



Falcon Spectral III Camera

Technical Manual

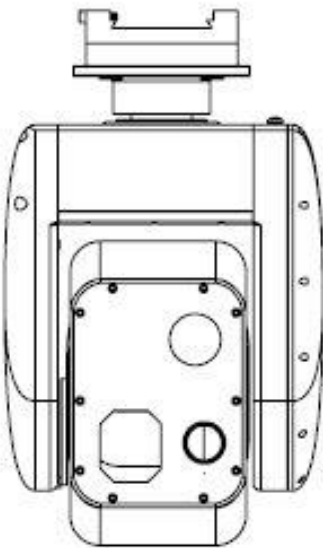


Table of Contents

List of Figures	4
List of Tables	5
Contact Information	6
Warranty Information.....	7
Limitations of Liability	7
Standard Repair and Terms Conditions.....	7
Repair Warranty	8
Standard Terms of Sale	9
Sales Warranty	9
Returns	9
Export Notification	10
System Overview.....	11
Mechanical Movement	12
Applications	13
Falcon Spectral III Kit Components	14
Operational Overview.....	15
System Set-Up.....	16
Controller Settings.....	18
Powering on the Unit.....	19
Default/Startup Settings.....	19
Controller Settings.....	20
Gimbal Control Functions	20
HOME Button	20
Thermal Camera Control.....	22
UV Camera Controls	24
HD Visual Control Functions.....	25
Powering Off the Unit.....	26
Monitor/DVR User Manual	27
Controls	28

UV Functions Guide49
Installation56
Troubleshooting57
Maintenance59
Falcon Spectral III Inspection & Cleaning60

List of Figures

Figure 1: Isometric View	12
Figure 2: Mechanical Movement	12
Figure 3: External Cable Plug Location	12
Figure 4: R-Series Video Cable	15
Figure 5: R-Series Power Cable	15
Figure 6: DVR Memory Drive	15
Figure 7: GPS.....	15
Figure 8: Interface Box Power Cable	15
Figure 9: Main Cable	16
Figure 10: USB Controller Port	16
Figure 11: Power Cable Connection	16
Figure 12: GPS Connector	16
Figure 13: R-Series Power Cable Connector	16
Figure 14: Video Cable Connectors	16
Figure 15: Memory Drive.....	17
Figure 16: Hand Controller	18
Figure 17: System Power Switch	19
Figure 18: HOME Button.....	20
Figure 19: Gyro Button	20
Figure 20: Proportional Speed Joystick.....	21
Figure 21: Proportional Speed Joystick.....	21
Figure 22: AGC Return Button.....	22
Figure 23: Manual Gain Adjustment Buttons.....	22
Figure 24: Zoom Out	22
Figure 25: Zoom In	22
Figure 26: IR Cross Hair On/Off	23
Figure 27: UV Menu Access	24
Figure 28: UV Gain Up	24
Figure 29: UV Gain Down	24
Figure 30: UV Zoom In.....	25
Figure 31: UV Zoom Out	25
Figure 32: HD Visual Zoom In.....	25
Figure 33: HD Visual Zoom Out	25

List of Tables

Table 1: Visual Camera Specifications	11
Table 2: Thermal Camera Specifications.....	11
Table 3: Ultra Violet Camera Specifications.....	11
Table 4: Falcon Spectral III Kit Components.....	14
Table 5: Startup Settings	19
Table 6: Monitor Channel Presets.....	27

Contact Information

Please contact HurleyIR for all questions, comments, and concerns regarding the following owner's manual or any HurleyIR equipment presented herein. HurleyIR technical support can be reached via:

E-mail: info@hurleyir.com

Phone: 410-875-0234

Fax: 410-875-0291

Warranty Information

HurleyIR offers a lifetime warranty on the environmental integrity of their cameras. If for any natural reason HurleyIR cameras should leak, rust or corrode regardless of the lands natural environmental conditions HurleyIR will cover the cost of the repair. Our commitment is to getting our troops reliable systems that will endure, however in the unlikely event your system needs repair our fixed repair cost program doesn't hold up your system waiting for time consuming repair estimates. HurleyIR offers the only flat rate repair program in the industry.

Limitations of Liability

SELLER's liability and BUYER'S sole and exclusive remedy for damages for any claim with respect to a sale, or any supplemental sale of Product(s), or its use or non-use, or its delivery or non-delivery, and regardless of legal theory, will not be greater than ten percent of the actual purchase price of the Products(s) with respect to which such a claim is made.

UNDER NO CIRCUMSTANCES WHATSOEVER WILL EITHER PARTY BE HELD LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OF CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, COST OF REMOVAL / REINSTALLATION, LOSS OF GOOD WILL OR REVENUES OR PROFITS, LOSS OF USE, INJURY, IR INFRINGEMENT OR ALLEGED INFRINGEMENT OF ANY PATENT OR COPYRIGHT.

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This Standard Repair Terms and Conditions ("SRTC"), referenced by SELLER, is in addition to SELLER's delivered Product original warranty for the Product previously delivered to BUYER, and includes the following:

Repair Warranty

Notwithstanding delivered Product original warranty, all repaired Product(s) will conform to SELLER's then current drawings and specifications and be free from defects in material and workmanship under normal use and service ninety (90) days from date of repair or the balance of the original warranty, if any. The warranty shall not apply to Products: 1. used for purposes for which they are not designated or intended, or 2. which have been repaired or altered without SELLER's prior written consent, or 3. which have been subjected to misuse, negligence, accident or improper maintenance or installation, or 4. upon SELLER's examination that do not disclose to SELLER's examination that do not disclose to SELLER's satisfaction non-conformance to the Warranty. The Pre-Installation Confirmation Form must be returned to SELLER for Warranty provisions stated herein and above to be effective. SELLER ADVISES, NO OTHER WARRANTIES, EXPRESSED OR IMPLIED ARE MADE WITH RESPECT TO THE PRODUCT(S) INCLUDING, BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. BUYER agrees that any documentation and or representation provided to its customer(s) shall include the preceding advisement by SELLER.

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This Standard Terms of Sale (“STS”), referenced by BUYER (defined as the party issuing the respective purchase order) upon its purchase order to HurleyIR, Inc. (SELLER), hereby attaches and makes the following terms and condition effective for said order.

Sales Warranty

Product(s) will conform to SELLER’s then current drawings and specifications, and will be free of defects in material and workmanship under normal use and service for twelve (12) months, beginning on the date the product is delivered to the BUYER. SELLER’s sole obligation, and BUYERS exclusive remedy, under the warranty is for SELLER at its option to repair, replace, or refund BUYER’S purchase price in the form of credit, for any part of the Product which fails to meet the Warranty.

For Warranty repairs/replacements from SELLER, BUYER shall return Product(s) to SELLER’s facility designated by SELLER with a written explanation of failure. The Warranty shall not apply to Products: 1. used for purposes for which they are not designated or intended, or 2. which have been repaired or altered without SELLER’s prior written consent, or 3. which have been subjected to misuse, negligence, accident or improper maintenance or installation, or 4. following Hurley IR, Inc’s. examination, do not disclose to SELLER’s satisfaction non-conformance to the Warranty. The Pre-Installation Confirmation Form must be returned to SELLER for Warranty provisions stated herein and above to be effective. SELLER ADVISES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR MADE WITH RESPECT TO THE PRODUCT(S) INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY, NON- INFRINGENT OR FITNESS FOR A PARTICULAR PURPOSE. BUYER agrees that any documentation and or representation provided to its customer(s) shall include the preceding advisement by SELLER.

Returns

Unless otherwise authorized in writing, SELLER will not accept Product non-warranty returns for credit. Obsolete, closeout, demo, used, blemished or specifically manufactured goods are not returnable.

Note: Sale Warranty will be void unless the Pre-Installation Test Confirmation Form is completed and is mailed back to HurleyIR Inc. to be filed with all records pertaining to your order.

Export Notification

Please be aware that the HurleyIR, Inc Thermal Imaging equipment is currently under the licensing jurisdiction of the U.S. Department of Commerce. This equipment may require an export license prior to exporting or taking this equipment out of the United States. The export control classification number (ECCN) that Hurley IR Inc. uses for this equipment is 6A003.b.4.

It is your responsibility to comply with the export control laws and regulations of the United States Government and to obtain export licenses if required.

If you need additional information regarding this product, please contact Hurley IR Inc. (410-875-0234)

The U.S. Department of Commerce export administration regulations can be found at <http://www.bis.doc.gov/>.

System Overview

Falcon Spectral III Overview

- Gyro Stabilized, multi sensor gimbal for many applications
- Automated Detection system
- Includes high definition visual, high resolution thermal (infrared) and high resolution imaging camera
- All sensors can be used for day and night search and rescue, pursue and track, monitor vast areas for motion, locate camouflaged people, forest detection and monitoring, moisture damage and more.
- 360° continuous rotation in both clockwise and counterclockwise directions
- Tested operationally to an airspeed of 165 MPH.

Camera Specifications

Table 1: Visual Camera Specifications

Visual Camera	
Effective Pixels	4.8 Megapixels (1920 x 1080)
Field of View	(X) HFOV 58.2° - 6.9° (Optical)
Optical Zoom	10x
Minimum Illumination	0.5lx
Focus	Autofocus
Digital Stabilization	ON

Table 2: Thermal Camera Specifications

Thermal Camera	
Effective Pixels	307,200 pixels (640 x 480)
Field of View	(X) HFOV 17.6°
Digital Zoom	4x
F Stop	F/# 1.2
Focus	Autofocus
NEDT	<50mK
*	Athermal and radiometric

Table 3: Ultra Violet Camera Specifications

Ultra Violet Camera	
Sensitivity	240-280nm
Field of View	HFOV 5.5° - 50° VFOV 3.1°-37°
Optical Zoom	10x
Digital Zoom	16x

Mechanical Movement

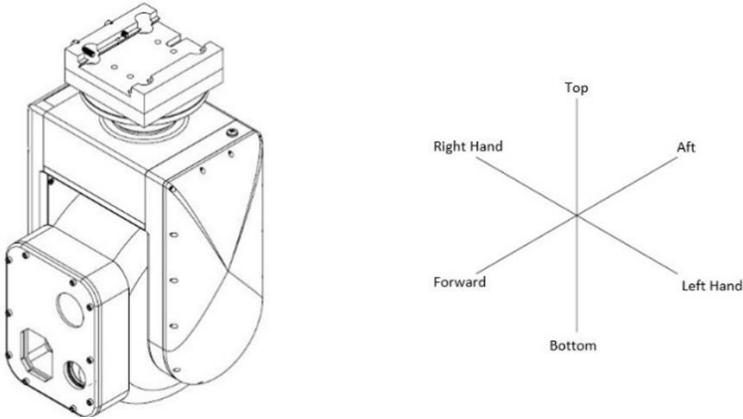


Figure 1: Isometric View

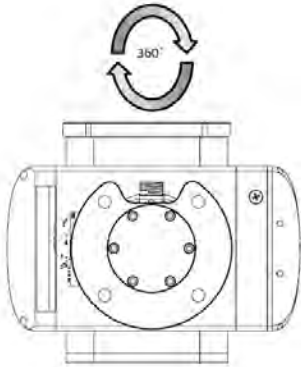


Figure 2: Mechanical Movement

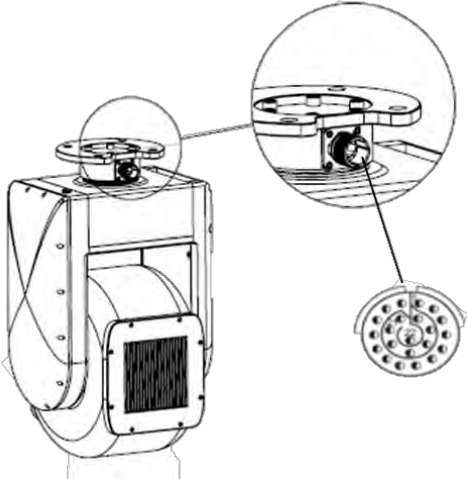


Figure 3: External Cable Plug Location

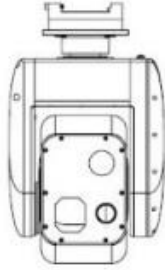
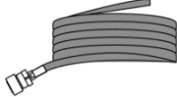



Applications

- Locate power line defects
- Locate hot cars in parking areas locate false chambers in large vehicles
- Muzzle fire detection
- Locate vegetation changes, grow houses, subsurface sink holes, surface and subsurface pipeline and steam leaks, night and animal tracking and counting, locate bug infestation, locate building energy loss.
- Track and chart thermal changes to waterways from power plan cooling systems and water runoff thermal effects

Falcon Spectral III Kit Components

The falcon Spectra III system includes all components listed in Table 4 below which come supplied in a ruggedized case.

Table 4: Falcon Spectral III Kit Components

Quantity	Description	
1	Falcon Spectral III gimbal with high definition visual, high resolution UV and thermal camera	
1	Falcon Spectral III external cable, 12' standard-length. Features female connector with long back shell on gimbal.	
1	Falcon Spectral III hand controller	
1	Falcon Spectral III The Monitor/DVR unit can display the visual, UV and thermal images in divided screen fashion. It has a wide range of land or sea-borne display applications including remote/indirect viewing of video images generated by day, night or thermal cameras.	
1	The Falcon Spectral III interface box contains the video outputs, power input, GPS input, controller input, fuse connection, and camera main cable connection. Note: During instillation ensure box is secured.	

Operational Overview

Preflight Inspection and Installation

1. Upon receipt of system the unit should be removed from the ruggedized storage cases.
2. Items present in storage case include: Falcon Spectral III (in stowed position), cable set, hand controller, interface module and monitor
3. The unit should be checked preflight for debris that may reside on the visual camera window.
4. The unit should be inspected for fuel and oil deposits
5. After aircraft engine startup, the Falcon Spectral III system should be powered on.
6. Locate the following cables and components: USB cable, RSeries Video Cable, R series Power cable, main cable, GPS and controller

Cables and Connectors	Description	Quantity
Figure: 4	R-Series Video Cable	1
Figure: 5	R-Series Power Cable	1
Figure: 6	DVR Memory drive	1
Figure: 7	GPS	1
Figure: 8	Interface Box Power Cable with flying leads.	1



Figure 4: R-Series Video Cable



Figure 5: R-Series Power Cable

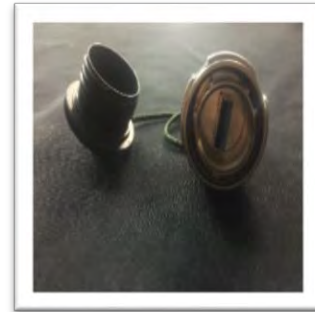


Figure 6: DVR Memory Drive



Figure 7: GPS



Figure 8: Interface Box Power Cable

System Set-Up

1. Connect Main Cable to interface module and Falcon Spectral III



Figure 9: Main Cable

2. Connect controller to USB controller port on interface module



Figure 10: USB Controller Port

3. Connect Interface Box Power Cable to interface box

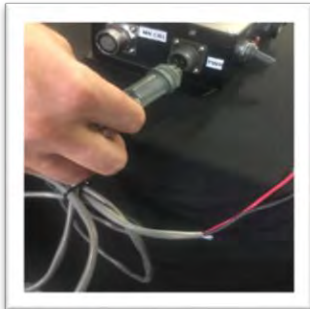


Figure 11: Power Cable Connection

4. Connect GPS to interface box

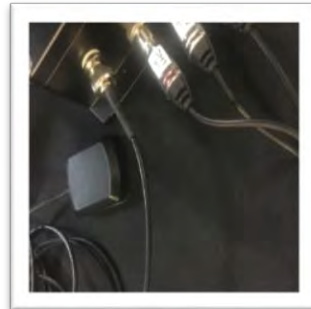


Figure 12: GPS Connector

5. Connect R-Series Power Cable to the power connector on the black opal monitor. Connect the flying leads to a 28 volt supply from the aircraft.

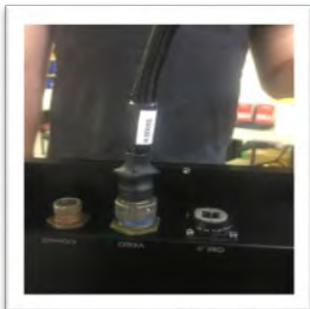


Figure 13: R-Series Power Cable Connector

6. Connect R-Series Video cable to video port on the black opal monitor. Connect the leads to the interface box. (Ch. 1 to video 1, Ch.2 to video 2, Ch.3 to video 3)



Figure 14: Video Cable Connectors

7. Connect the MemorEyes-to-go memory drive to the USB port on the black opal monitor.

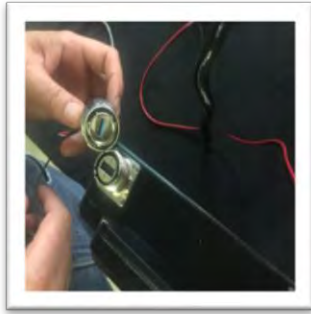


Figure 15: Memory Drive

Controller Settings



Figure 16: Hand Controller

Note: After hitting right on the D-Pad, buttons Y,X,B,A access all UV camera menus with D-pad navigation as well. After 4 seconds of no use, the menu will time out and revert to hot buttons shown above

Powering on the Unit

▲ Avoid powering OFF the unit during startup process

1. Supply appropriate power to the system.
2. The operator will be able to switch the Falcon Spectral III unit ON by toggling the power rocker switch upward on the interface module.
3. A power indicator will glow to show the system is energized.
4. Upon power up, the unit will move to the HOME position.
5. The unit will be ready for use after approximately 60 seconds. The UV camera can take up to two minutes to become fully operational. This is due to internal calibration by the UV sensor. Note: If the UV camera fails to boot cycle power on the interface box to reboot the entire system.

▲ Do NOT at any time power the unit off during flight. This WILL damage the gimbal head.



Figure 17: System Power Switch

Default/Startup Settings

Table 5: Startup Settings

Default/Startup/Home Position	0° azimuth, 0 elevation
Visual Camera	Full Wide FOV
Thermal Camera	White HOT Full Wide FOV AGC Mode
UV Camera	85% Gain sensitivity, 0.5 Zoom FOV
Video (Display)	Selectable on Monitor

Controller Settings

Gimbal Control Functions

HOME Button

- If the user at any time becomes disoriented press the 'HOME" button on the controller to reset the viewing direction of the gimbal to the nose of the aircraft. The "HOME" button may be pressed as indicated below. Press in the left joystick and unit will return to "HOME" position.



Figure 18: HOME Button

Stow Position

- When ferrying or flying at high rates of speed the unit should be in stow position.
- The unit position in stow is 180° azimuth and 0° elevation.

Enable and Disable Gyro-stabilization

- Press "DOWN" on the middle Logitech button as shown in figure 19.



Figure 19: Gyro Button

Proportional Speed Joystick

- The joystick as shown in Figures 20 & 21 features proportional speed control of pan and tilt movements.
- Slight movement of the joystick will cause the Falcon Spectral III to move at a slower rate than a full movement in the same direction, resulting in faster movement



Figure 20: Proportional Speed Joystick



Figure 21: Proportional Speed Joystick

Thermal Camera Control

Auto Gain Control and Manual Gain and Level – Thermal Sensor

- The Falcon Spectral III will start up in automatic gain control mode (AGC).
- This mode allows the thermal imager to change the scene sensitivity dynamically while in use.
- To manually adjust gain, the operator can increase or decrease the thermal sensitivity of the IR imager. This function is performed by pressing down either “Y” or “A” to adjust the gain up and down as shown in Figure 23.
- To return to AGC mode pressing the “START” button on the controller as shown in figure 23



Figure 23: Manual Gain Adjustment Buttons



Figure 22: AGC Return Button

Digital Zoom in and Out Control for IR Camera

- Zoom Out - Press DOWN on the D Pad as shown in Figure 24
- Zoom IN Press UP on the D-PAD as shown in Figure 25



Figure 24: Zoom Out



Figure 25: Zoom In

IR Cross Hair and Temp ON/OFF

- Press the “LEFT” arrow on the D-Pad to turn the IR Cross Hair Temperature ON or OFF as shown in Figure 26



Figure 26: IR Cross Hair On/Off

UV Camera Controls

Menu Access

- To access the UV camera menu press “DOWN” on the right side of the “D-Pad” as shown in figure 27.
- Once in Menu X, Y, A, B & up, down, left, right will let you navigate through the menus.



Figure 27: UV Menu Access

UV Gain UP/DOWN

- To adjust UV gain UP Press the “LT” button on the back of the controller as show in Figure 28.
- To adjust UV gain DOWN press the “RT” button on back of the controller as shown in Figure 29.



Figure 28: UV Gain Up



Figure 29: UV Gain Down

UV Zoom IN/OUT

- Zoom IN – Press the RB button on the back of the controller as shown in Figure 30.
- Zoom OUT- Press the LB button on the back of the controller as shown in Figure 31.
- Zoom Options: 0.5x, 1x & 2x



Figure 30: UV Zoom In



Figure 31: UV Zoom Out

HD Visual Control Functions

- Zoom IN – Press the “B” Button as shown in Figure 32
- Zoom OUT – Press the “X” Button as shown in Figure 33



Figure 32: HD Visual Zoom In



Figure 33: HD Visual Zoom Out

Powering Off the Unit

- To power the unit OFF move the toggle switch DOWN on the interface box.
- When the unit is powered OFF the gimbal head might move in a downward direction. This is normal operation of the system.

▲ **The system is free to rotate if not powered ON.**

▲ **IT IS NOT ADVISED TO POWER OFF UNIT DURING FLIGHT.**


▲ **IT IS advised to put the camera in STOW position during ferry flights.**

Monitor/DVR User Manual

The Monitor/DVR unit has four display options as show in Table 5: Full screen visual, IR, UV & 3 Channel display.

Table 6: Monitor Channel Presets

Channel	Display
1	Visual
2	Thermal (IR)
3	Ultraviolet (Corona)
4	3 Channel Display: IR, Visual and UV





NOTE: To change channels the button for the corresponding channel has to be pressed twice.

Overview

The Internal Recording Facility (IRF) is a standard definition video recorder module, based on the Laserdyne “MemorEyes 3G” video recorder. As such, in this document the integrated recorder may be referred to as the “MemorEyes”, “IRF”, or “DVR”. It is pre-configured for operation within the display, and as such should operate without any setting changes. Likewise, the mode of operation has been set to that of a standard recorder with the usual STOP, PLAY and RECORD functions. These can be factory customized to support other modes of operation (such as always recording, restricted access to video playback or download, audio recording, emergency erasure of video, etc.). Other factory-enabled options include Multi-Channel Recording (MCR) and Simultaneous Playback and Record (SPR).

DVR Menus





- There are two ways to access the DVR controls:
- direct access via dedicated buttons for basic function 
- by pressing the  dedicated Menu button until the DVR menus are displayed (depends on context)

Start-up

- The integrated recorder takes more time to initialize than the RMU. An attempt to access the DVR controls before the DVR is ready will be met with “DVR is not ready”. Once the DVR boots, the DVR controls become available.
- The dedicated buttons will be illuminated when they are available. Some reasons for buttons to be unavailable are DVR not booted; no files to play back ('PLAY' button); no room left to record ('REC' button).

Controls

The basic recorder controls are as follows

	Start playback of recorded video. The playback (by default) will start from the earliest recorded content when play is used for the first time after power-up. From then on, it will start from the beginning of the last file used during playback. The file length is set to 1 minute, but this can be changed using the web page interface. ^[1]
STOP	Stop playback, recording, or snapshot display. ^[2]
PAUSE	Pause playback. Once video playback is paused, then the >> control allows for frame advance. Frame reverse during pause is not supported. To go backwards, resume playback, rewind past the point of interest, then play/pause/frame advance. ^[3]
	Commence recording. The channel to be recorded should be selected in the DVR Menu prior to recording – but will default to CH1. ^[4]
	Mark an event while recording video. Events serve as chapter marks in the video, allowing for rapid access to these locations during playback using the <-EVENT-> controls. ^[5]
SNAPSHOT	Take a snapshot (freeze-frame image) while recording. These can be accessed using the SNAPSHOTS control after recording stops.
	Access the DVR Menu. This allows the user to configure the recording source, to debrief recorded files (for display on other platforms, such as a PC), and to exit from the DVR controls. The recording source can either be the 'Main' video (i.e. whatever is 'full screen'), or CH1 or CH2 if available. Debriefing is only needed if the recorded video or snapshots need to be transferred to a PC for viewing. This processes the files to be a suitable format for standard viewers.
>>	Fast-forward video playback, or step forward while playback is paused. While fast-forwarding, pressing this button again will increase fast forward speed, to a maximum of 32x. While rewinding, pressing this button will decrease rewind speed.
<<	Re-wind video playback. While rewinding, pressing this button again will increase rewind speed, to a maximum of 32x. While fast-forwarding, pressing this button will decrease fast-forward speed.
SNAPSHOTS	Display previously taken snapshots.
<-EVENT->	Moves between marked events during playback.
<-IMAGE->	Moves between captured images during snapshot playback.

1. With MCR option, playback will simultaneously play all channels recorded at the same time. The user can select how these are presented using the 'LAYOUT' option.
2. With SPR option, pressing STOP from the Record menu will stop recording only, and pressing STOP from the PLAY menu will stop playback only.
3. With MCR option, playback controls (pause, step, etc.) apply to all channels playing at the same time (see [1])
4. With MCR option, the recorded channels may only be set through the DVR's web interface, not from the display's button/menu interface.
5. Mark can optionally be triggered externally (see section 1.8).

Playback

- By default, playback from the DVR causes the live main screen video (for the selected layout) to be replaced by the playback video. Stopping playback reverts the main screen video back to the usual video source (as selected by that layout).
- If configured, the playback video signal will also be sent to the SD video output (CH1 out) for viewing.
- With MCR option, playback will simultaneously play all channels recorded at the same time. Pressing the 'LAYOUT' option changes how the multiple video feeds- including a mix of recorded and live feeds- are presented.
- When in playback is sped up (forward or reverse) the 'PAUSE' option may change to 'x1', to restore normal playback speed (applies to certain button layouts).

Recorded Files

- Recorded files can be downloaded using the web interface in the same manner as with the standard stand-alone MemorEyes digital video recorders. The IP address of the internal recorder is shown when the DEFAULTS menu is shown, but is typically 10.1.1.1.
- NOTE: Video files will not be available for download unless the DEBRIEF function has been applied to the required files.
- Alternatively, if the internal storage option is unavailable (USB recording only) the video files will be available on the USB storage device, after debriefing. Snapshot
- images are available even without debriefing

Selection of Recordings

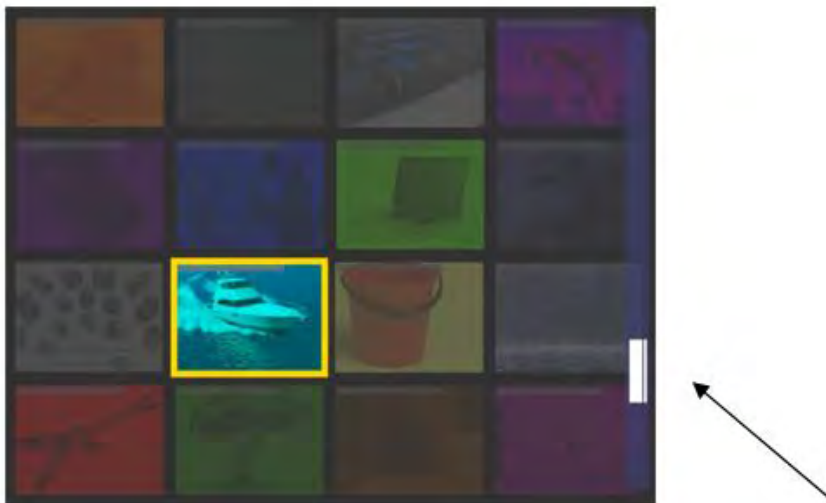
Several menu actions involve the selection of a video recording or range of recordings:

- Playback (video and snapshot): single file
- Debrief: range of files
- Erase: range of file
- The DVR interface displays the available recordings as an array of images (tiles) representing each snapshot. This is called *Mosaic Selection*. The name of the recording is visible at the top of each tile.

NOTE: Each image represents a *snapshot*, not a video recording. A snapshot is automatically created for every video recording, but it may have several snapshots. If the user creates them during recording (by selecting the 'SNAPSHOT' option).

Selecting a single recording

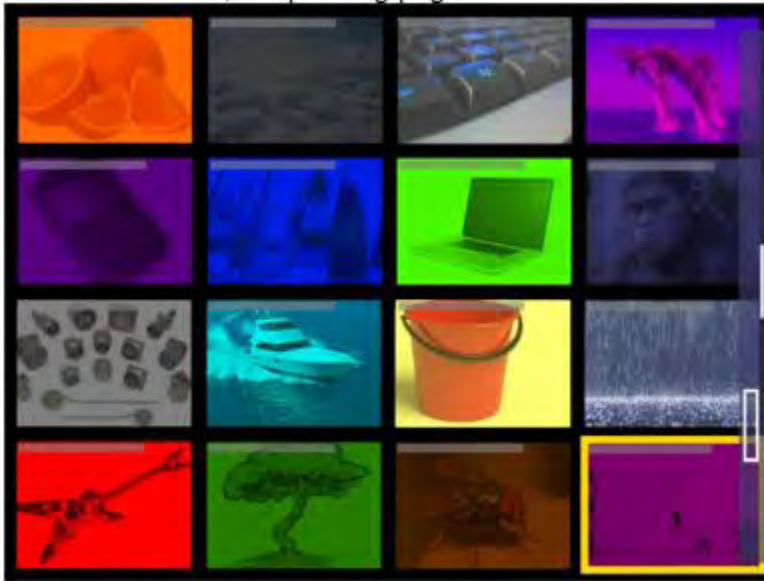
- When selecting a file to play or a snapshot to view, a single selection menu is presented. Use the navigation buttons to select a file on the current page. Selected files have an outline, as shown below. Some models have "JUMP FIRST/LAST" options for easier navigation. Press "PLAY" or "VIEW" when the desired file is selected.



Note: The context bar on the right indicates the page is currently being used

Navigating pages of recordings

- When selecting files in Mosaic Selection, use navigation buttons to go between pages. Quickly navigating across pages using UP & DOWN buttons will set a target page, indicated by a hollow rectangle in the context bar. When the buttons are not pressed for about 2 seconds, the pending page will be selected.



Page Navigation: The hollow rectangle in the context bar represents the target page.

Advanced Features

Several advanced options can be specified at time of order. Check with the factory to ensure the desired features are all available at the same time.

Multiple Channel Recording (MCR)

- This option allows more than one video channel to be recorded at the same time, useful for when several perspectives of the same scene are required.
- Since there is no readily available standard for synchronizing playback of multiple recordings, MCR recordings use a custom video file format that allows synchronized playback within the RMU.
- The Debrief function extracts the individual recordings and converts them to MP4 files for playback on a PC. The user is then responsible for playing back the video channels in sync with each other. A display may be configured to record a 'combination' video channel which has all available channels included. This is suitable for checking synchronization, although the quality of each channel is reduced because of the down-scaling required to merge all channels into one. Choosing which channels are recorded is set in the web interface for the DVR module (see section 2).

Simultaneous Playback & Recording (SPR)

This option allows playback of recorded video while still allowing live video to be recorded at the same time. SPR demands significant processing power from the DVR controller and as such playback may occasionally exhibit a momentary 'pause' in some models.

- Accessing the menus for playback and record can be achieved by pressing the dedicated 'REC' and 'PLAY' buttons. For example, if 'REC' is pressed from the playback screen while recording is in progress, the 'REC' menu will be displayed, permitting regular recording controls (STOP and MARK).

External Event Marking Source

- This option permits the use of an external momentary switch to mark events in recordings. Pressing this button has the same effect as selecting 'MARK' from the DVR Recording menu, or pressing the dedicated 'Mark Event' button. Neither option has any effect unless video is currently being recorded. See the display's Product Specification document for wiring details.

Safety

Electrical Safety

- The Black Opal R-series is designed to operate from low voltage dc power.
- Once installed, there are no safety procedures required to protect the operator from the display itself.

NOTE: the On/Off button switches the unit from standby to operating status, it does not cut the unit off entirely from the external power input.

System Protection

The system is internally protected against:

- reverse polarity;
- over-voltage;
- Over-current.

Packing, Handling, Storage and Transportation

Caution: on a receipt of your Black Opal R-series, immediately report any damage to packaging or contents to your supplier.

Packing, Unpacking and Inspection

To unpack on first receipt:

- carefully open the outer packaging, do not slit cartons deeper than sealing tape;
- remove the Black Opal R-series components and any Manuals and ancillary items from the carton;
- remove the display from its plastic bag/wrap;
- remove the protective sheet from the front of the display;
- retain packing materials if required for future use.
- Packing is in the reverse order.

Handling

- Touching or abrading any exposed optical surface is to be avoided. If a touch screen option is fitted, minimize unnecessary screen touches and avoid using abrasive or sharp implements to contact the screen.
- Environmental conditions specified in this manual should not be exceeded.

Storage

- The equipment may be stored in its original packaging provided that packing and handling conditions described in this manual are observed. The packaged unit should not be stored in damp conditions or damage to the packaging will result.
- The unpackaged unit should not be stored in areas where conditions may exceed the product's environmental specification.

Transportation

All items should be packed as described in this manual. Road, rail or air transport are suitable transport methods.

System Description

The Black Opal R-series models have been engineered for a wide range of land or sea-borne display applications including remote/indirect viewing of video images generated by day, night or thermal cameras.

General Description

- Each Black Opal R-series model consists of an LCD, a microprocessor unit (computer), and power and control electronics.
- Each model features MultiVision, allowing for multiple analogue and digital inputs, and providing simultaneous display of multiple inputs (model and connector dependent – see specifications).
- All items are housed within a rugged enclosure containing heating mechanisms. The LCD is protected by a tough, antireflection-coated window which also provides EMI/EMC shielding. All models are button operated.

Display

Images are displayed on a backlit LCD that may be viewed in full direct sunlight down to full darkness and feature backlight settings suitable for low light viewing, for viewing with Night Vision Devices (model dependent) and completely off for black-out conditions.

Auto Backlight Reduction

- To reduce power consumption, and as part of the Black Opal R-series thermal management scheme, the backlight will automatically reduce to a suitable level if no button has been pressed for more than 30 seconds (configurable) and the internal temperature is above a preset limit. Pressing any button (except Power and Day/Night buttons) will cause the system to return to the current backlight setting.

Upgrades

- The Black Opal R-series has been designed so that software upgrades can be downloaded easily via a PC.

Additional Features

- Black Opal displays have several features designed to increase the effectiveness of surveillance, sighting, and security systems, including
- Image Enhancement: video inputs are compensated for obscuration (e.g. rain, fog, snow, mist or smoke) within an adjustable central window where contrast and color are enhanced. For a chosen window size, the enhancement is applied to that portion of the displayed image;
- Digital Zoom: a fully X & Y interpolated “smart” zoom, not merely pixel multiplying, yields a clear zoomed image without the blocky “pixelated” appearance often seen with digital zooming; and
- Freeze Frame: freezes the current prime video channel while leaving live any video inset.
- Colorization: applies preloaded color palettes to monochrome imagery.
- Motion (“edge tearing”) compensation: minimizes the jagged edges that can occur with motion in video on LCDs.

Factory Options

- The Black Opal R-series can be ordered with factory-configured options, including:
- Other video inputs (i.e. DVI, SDI, VGA etc.);
- Touch screen;
- Internal Recording Facility (IRF);
- Integrated x86 and/or ARM PC.
- There may be restrictions with the number and combination of features available.

System Contents

- The Black Opal R-series system consists of: 1 x Black Opal R-series unit;
- 1 x User's Manual; and
- 1 x Product Specification document (includes Set-up information) plus any options that the purchaser has elected to acquire.
- NOTE: The purchaser must supply the appropriate power, video, and other necessary cable assemblies as required.

System Specification & Set-Up

- The specifications and set-up procedures for your model of Black Opal R-series are presented in a separate Product Specification document provided with your unit.
- Caution: ensure that all instructions in the separate Product Specification document applicable to your model are performed correctly, before attempting to operate the Black Opal R-series.

Operation

Controls

The 'M6' button arrangement display has 21 points of control, being 3 groups of buttons located on the bottom of the front face of the unit. These are momentary action, sealed, backlit buttons. A typical configuration is shown below (button numbers are for reference only; they do not appear on the display bezel).



Controls and indicators (typical) Numbers added for reference only; these are not on the display bezel.

In all cases, the 8 left-most buttons (1-8) have fixed functions (see table on following page).

- The functions of the remaining buttons vary depending upon the screen being displayed, the level of customization in the system software, and the hardware variant. Usually the available button function is displayed above the button on the LCD.

Left Button Group (fixed buttons)

- These buttons do not require on-screen text describing their function.



System On: Adjustment of LCD Backlight Brightness
Standby: Adjustment of Button Backlight Brightness



On/Off/Blackout



Day/Night Backlight mode selection



Zoom in on centre of screen. Icon will appear on screen while zoomed in.



Reset zoom level (fully zoomed out)



Freeze video (toggle). This button will blink when Freeze is ON.



PIP (Picture-In-Picture) Toggle

Centre Button Group (navigation buttons)

- The function of buttons in this group change depending on the mode.



When adjustments to various parameters need to be made, labels will appear on screen above the navigation buttons indicating the function of each button.

Right Button Group

The function of these buttons in this group change depending on the mode.



The function of these buttons is indicated by a label above it on the LCD. When no menus are visible, pressing one of these buttons will show the default menu.






Menu, Cycles through available menu options.





Indicators

- The illumination behind the buttons operates both as thermal status indicators in the case where the temperature is too hot or too cold for the unit to operate, and when specific functions require it (such as freeze or record).
- If the display's internal temperature is too low, Warm-up mode will be engaged, and the button backlighting will blink at a slow rate (around 0.5Hz). Once the internal temperature is within operating parameters the button backlight will operate as normal.
- If the display's internal temperature is too high, it will shut down and the button backlight will blink at a fast rate (around 2Hz).
- Once the internal temperature is within operating parameters the button backlight will operate as normal.

Button Labeling, Adjustments & Menu Presentation

- If no button has been activated for about 30 seconds (configurable), and no menus have been entered, the button labels will be withdrawn from the screen, however buttons in the left-hand side group will still be active for their dedicated functions. Pressing any button in the center or  button in the right-hand side group will restore the labels without initiating a new function.
- When adjustments are available, labels will appear above the center button group describing the adjustment.
- Backlight can be adjusted at any time by using the backlight up/down buttons.
- Zoom can be adjusted at any time by using the  (In) and  (Reset) buttons.
Some presets may prevent zooming on some video inputs.

When no buttons are visible:

- Pressing a button on the Centre group will start the adjustment of video parameters (Gain, Brightness, Saturation, etc.).
- Pressing  button in the Right group will display the User Presets menu;
- Pressing the  (menu button will cycle through other variable menus
- Whenever a presets menu is visible, the currently selected preset will be highlighter. Pressing the button below the preset number will load that preset.
- Pressing the  (menu) button will cycle other available menus.
- Holding the  (menu) button down for 2 seconds will display a System menu.

Operating Procedures

Caution: the system is in standby status whenever external power is applied. Do not leave the system in standby status for extended periods; in this case remove external power.

Start-Up

- Before proceeding check that all connections and mountings are secure and appropriate, then switch on external power to the display.
- Select a suitable button backlight intensity by pressing Brightness Adjust up/down (far left) PRIOR to pressing the On/Off button.
- Press the On/Off button to power up the system.

NOTE: The default backlight mode and level used on power-up can be controlled in a number of ways depending on the factory-configured power-up configuration as follows:

- If the Day/Night button is held down when the On/Off button is pressed, then NIGHT mode is enabled for this power-up, regardless of any factory configured boot mode.
- Otherwise, pressing the power button will select one of the factory- configured backlight modes as follows:
- Fixed Mode: In this mode, the default backlight mode and level will be specified and set to suit a particular program requirement.
- User Preset Mode: In this mode, the user can save the current backlight intensity and day/night mode. In subsequent power-ups the saved preset will be used.

The Boot-up Sequence

The boot-up sequence has several phases, all of which can be customized to suit customer requirements.




- The first phase is the initial backlight setting. There are several options for this (one of which is pre-configured to suit customer requirements), including a slow ramp up of backlight intensity (which is suspended by a button press), or a specific level and mode (i.e. day or night modes). Unless otherwise specified, the backlight will be set to DAY mode, and at a suitable brightness for visibility under most conditions.
- The next (optional) phase is the display of a Boot Logo and version information. This can be customized to suit program requirements if necessary.
- The last phase is the loading of the default screen layout. This can be either the last selected layout, or a fixed layout. This is pre-configured prior to delivery to suit specific customer requirements.

Primary Button Functions

- After boot-up:
- Press Brightness Up/Down (buttons 1/2) to adjust LCD backlight brightness.
- Press On/Off button (button 3) to toggle LCD Backlight Blackout mode.
- Hold the On/Off button for 2 seconds to put the display into 'Standby' mode.
- Press Day/Night button (button 4) to toggle between day and night backlight modes.
- Press Zoom in (button 5) or Zoom Reset (button 6) to adjust zoom for selected video channels.
- Press Freeze (button 7) to toggle freeze mode for selected video channels.
- Press 'PIP' (button 8) to toggle Picture-In-Picture channels on and off.
- Press Menu (button 10) to cycle through menus, or hold it down to show system menus.



The function of the remaining buttons depends on the current mode.

NOTE: if the video format changes from that specified in the preset, use the zoom feature to re-format the image on the screen.

NOTE: continuous adjustment between day and night backlight modes is a factory configured option. If adjusting backlight intensity by holding the  or  buttons, you must release the button before the backlight mode can change between day and night. Extra presses of the  button are required for night-day transitions to prevent accidental mode changes. Going from night to day mode can optionally transition through a 0% (blackout) level.


Adjust Digital Zoom

The unit has multiple digital zoom settings. When the unit is turned on the zoom defaults to the lowest available setting (zoomed out).


- Pressing  (Zoom) will zoom in by one step on the main video window.
- Pressing  (Reset) will restore the zoom setting to default (zoomed out).
- When the zoom level is not default (zoomed out) an icon will appear on-screen above the zoom buttons indicating the current zoom level.

Note that some presets may prevent zooming on some video inputs.

Freeze Video

- Pressing  (Freeze) will toggle the freeze state of video inputs.
- When video is in the frozen state, the Freeze button will flash slowly.
- Some video channels (e.g., PIP channels) can be configured to remain un-frozen even when the main channel is frozen, and vice versa.

Hide PIPs

- Pressing  (PIP toggle) toggles any PIP channels on and off. A pop-up will indicate the current state of PIP channels. Each video channel will also be identified by name and format.

Navigation Button Functions

- The center button group is used for adjusting parameters as required. Whenever these buttons are available to press, their function will be described by a label positioned above.
- When no menus are visible on the screen, pressing any button in the center group will invoke a 'Video Adjustment' menu.


Menu Button Functions

- The right-hand side button group has soft-defined buttons along the top row, a menu select button (button 10), and 3 special function buttons.

Soft-Defined Buttons

- The top row of 4 buttons behave according to the currently displayed menu. Whenever a button is available to press, their function will be described by a label positioned above.
- When no menu is visible, pressing one of these buttons will open the 'User Presets' menu.

Menu Button

- Pressing the  (menu) button cycles through the available menu choices. These may vary depending on the model and configuration.
- Holding the menu button for 2 seconds will invoke a 'System' menu. Pressing the menu button will then cycle through system menu options, which may also vary depending on the model and configuration.

Special Function Buttons

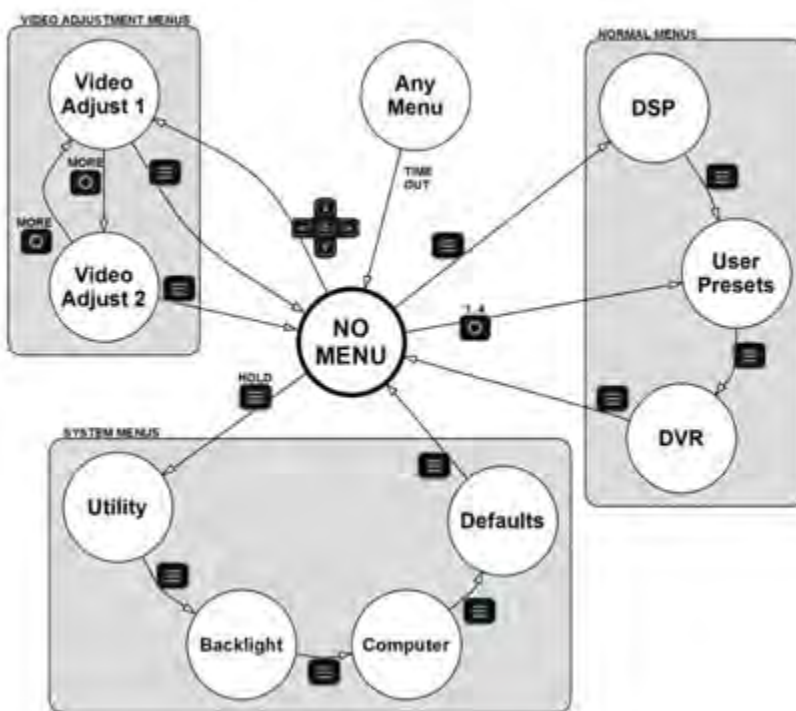
- Button numbers 12, 14, and 16 vary depending on the model and configuration. For units with Internal Recording Facility (IRF) they will have related dedicated functions as per UM-RMU-G-5643-x_1. Icons will describe each dedicated function where applicable.

- They may also be configured to perform custom actions, including transmission of serial port messages; contact factory for details.

Menus

- Buttons in the center group (Navigation buttons) and right-hand side group (Menu buttons) have different functions depending on the selected menu. Pressing the Menu button cycles through the available menus. Different menus will be available depending on the model, configuration, and operating mode.

The following diagram shows how menu navigation works.





NOTE: A menu will only appear if it is applicable to the model, configuration, and operating mode.

NOTE: If no menu button is pressed for a time, the menu will automatically hide ('No Menu').

- The MemorEyes/DVR menu is available only if the IRF (Internal Recording Facility) is installed as a factory option. This feature is described in an appendix to this User's Manual.
- Video Adjustment Menus
- Pressing a Navigation button when menus are hidden will open the Video Adjust menus.
- Press 'MORE' to switch between Video Adjust menus 1 & 2
- The channel name displayed for 'SELECT' indicates the video channel to be adjusted. Press the 'SELECT' button to cycle between available video channels.
- Press Up/Down and Left/Right buttons to adjust gain, contrast, saturation, and phase (if applicable).

- Press 'CANCEL' to discard any changes you have made
- Press 'SAVE' to store your changes in that preset. They will persist each time you select that preset.
- Presets can be restored from factory defaults via the Defaults menu.
- Press 'MENU' at any time to close the video adjustment menu. This discard any pending changes.
- If available, pressing 'SWAP' will shuffle input video channels along to its adjacent view port/window.

User Presets Menu

- Pressing a  menu button (buttons 9, 11, 13, 15) when menus are hidden will open the User Presets menu.
- There are up to 4 presets that control how video channels are displayed on screen. The currently selected preset will be highlighted.
- Press the corresponding button to select a preset. The name of the preset will be shown on-screen.
- After selecting a preset, the menu will time out after about 3 seconds. Selecting a preset will restart the timeout.
- DSP Menu
- Pressing the  (menu) button when menus are hidden will open the DSP menu. This provides access to enhancement and colorization features.
- 'ENH' toggles image enhancement (will default to that last selected).
- 'COL' cycles through available colorization modes. Available colorization modes are:
 - *Rainbow 1*
 - *Rainbow 2 Ironbow Greyscale True*
 - 'OFF' turns off all DSP functions.
 - 'ENH+/-' navigation buttons changes the size of the enhancer window.
 - 'THRESH' navigation buttons adjust the threshold level of applicable colorization modes (if not applicable, these labels will not be visible).

NOTE: enhancer window size has an effect on enhancement as only the portion of the image contained in the window is sampled. A smaller window can yield a more profound result if it contains a narrower spread of native contrasts than a larger one.


NOTE: If zoom is selected on an enhanced image, the enhancement parameters are held constant.

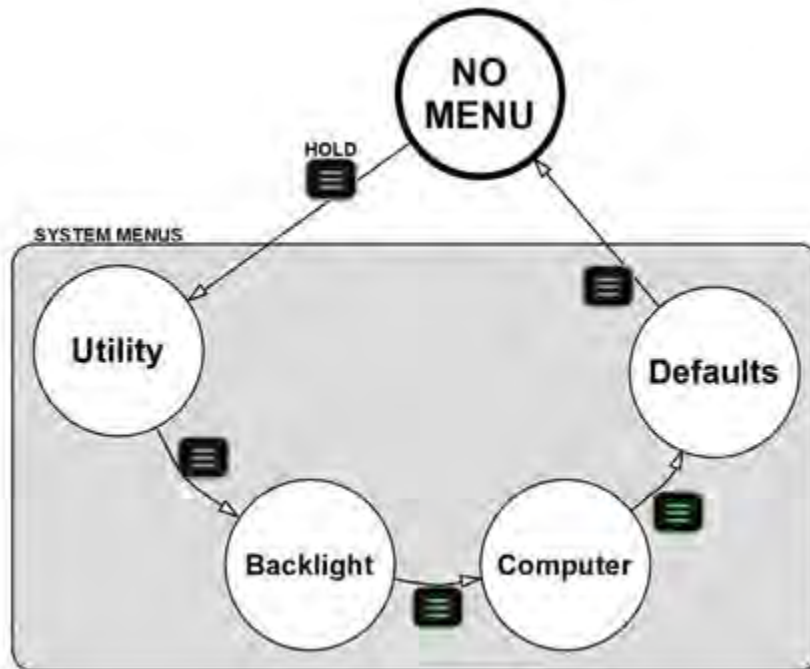
NOTE: the MONO GREY option is used to generate 256 grey scales for both color and monochrome video.

DVR Menu

- If the Internal Recording Facility (IRF) is installed the 'DVR' menu will be available. This feature is described in an appendix to this User's Manual, and separate documentation referenced in the appendix.

System Menus

- Holding the  (menu) button down for at least 2 seconds will open the System menus. These are menus that are normally accessed less often than the regular menus.
- Pressing the menu button again cycles through available system menus.



Utility Menu

- 'INFO' displays version and configuration information about the display.
- 'REBOOT' will shut down the display and automatically restart.
- 'STDBY' puts the display into 'Standby' mode. The display, backlight, and video I/O functions are turned off to minimize power consumption, but other circuitry is still operational.
- 'DEMO' (if enabled) starts demo mode.

Computer Menu

This is an optional menu that will only be displayed if a x86 computer module is present inside the display. The menu options below depend on the computer type and configuration.

- 'RESET' will reset the computer. Only perform this function if the computer is not responding.
- 'SLEEP' mimics pressing computer's sleep button. *

Note: The behavior of the SLEEP function will depend on the operating system configuration.

- 'POWER' mimics the computer's power button. *
- A short press will request a software-based power-off.
- Holding it down for 4 seconds will force a hardware shut-down.
- ACPI compatible modules only

Backlight Menu

Selecting the Backlight menu presents options for the configured backlight start-up mode (strategy). The NVIS backlight color can be changed here also (Green, Red). Some start-up strategies may have extra controls in this menu.

Defaults Menu

This menu permits restoring User presets and other display settings to factory defaults. The ability for the system to retain the settings can be factory enabled.

Reset

The system may be reset by holding down the On/Off button for at least 8s.

CAUTION: resetting the system should not be performed flippantly, as the system may not have updated its non-volatile settings since the last setting change.

Shut-down

- Press the On/Off button for approx. 2 seconds to set the unit to standby.
- Switch off external power to the unit.

If the On/Off button is not used to shut-down the unit, it will power up as soon as power is reapplied, unless the factory settings prevent auto turn-on. The selected lay-out will also be retained in this case.

General Maintenance

The following procedures are those that may be performed by the User. Other than the following procedures maintenance is to be performed only by authorized service personnel.

CAUTION: avoid scratching, abrading or contaminating the surface of the display window; do not scrub.

- **Clean display screens and control panels with a soft cloth and spirit.**
- **Clean housings with a soft cloth and spirit.**
- **Clean connectors and mounting points with a soft brush.**

DVR Menu

- The DVR menu can be accessed using the Menu button if the Internal Recording Facility (IRF) option is enabled from factory. The integrated DVR is uses the core functions from Laserdyne's MemorEyes digital video recorder product. Full details of the IRF option are covered in UM-RMU-G-5643-x_1.
- Basic DVR functions such as Play, Record, and Event Marking are available (as dedicated buttons). The DVR also supports Snapshots, which are still images representing events during recording, and file management (e.g. erasure). All recordings are written to internal storage (when installed) or external media. Video and image files stored on optional internal media can also be transferred to external storage media ('debriefing') – a feature that is not required on standard systems that only use external media.
- The DVR takes a few seconds to start after the display is turned on. If an attempt is made to start the DVR menu before this time, the message "DVR NOT READY" will be displayed.

Fault Finding Guide

#	Symptom	Probable Cause(s)	Remedy
1	System will not turn on	a/ no power from remote source	a/ check power supply & specifications, harness & connections
2	Power supplied but no display	a/ temperature too low ¹ b/ temperature too hot ¹ c/ unit in Blackout mode ¹	a/ allow unit to warm up b/ allow unit to cool down c/ press Power or Day/Night button
3	No image	a/ connected video or graphics source not operating/sending b/ connector dirty or faulty	a/ check operation & specifications of connected signal source b/ check/clean/adjust connector
4	Controls do not respond	a/ selected at inappropriate point in menu structure b/ faulty buttons	a/ check operating instructions b/ service required, return for diagnosis/repair
5	Image lacks contrast, brightness and colour quality	a/ settings inappropriate	a/ adjust settings
6	Dark screen	a/ backlight setting at minimum b/ backlight in Night mode c/ unit in Blackout mode ¹	a/ adjust Backlight setting b/ select Day mode c/ press Power or Day/Night button
7	Screen presets corrupt/imagery garbled ²	a/ Input video format is not correct for the loaded preset	a/ adjust input video

The integrated recorder takes more time to initialize than the RMU. An attempt to access the DVR controls before the DVR is ready will be met with “DVR is not ready”. Once the DVR boots, the DVR controls become available.

The dedicated buttons will be illuminated when they are available. Some reasons for buttons to be unavailable are DVR not booted; no files to play back ('PLAY' button); no room left to record ('REC' button).

UV Functions Guide

For all Functions to the Relevant KEY must first be pressed. When a KEY is pressed the user interface will appear at the active tab and allow selection of a function or changing of a value. To scroll through the tabs press the relevant function KEY again.

Key / Tab	Function	Options to Cycle Left / Right	Change Value Forward / Back	Default
1 / 1	Zoom & Gain	ZOOM x0.5 / x1 / x2 / xD	UV GAIN Max - Min	X1, 85%
1 / 2	Integration	Period 2, 4, 8, 32	Integration Gain Max - Min	NUC
1 / 3	NightView (CC6D2 only)	SB Filter Position / Darkframe Subtraction		Daylight / Off
2 / 1	Spectrum	UV + Vis / UV / VIS	UV Blob Opacity	UV + Vis / 0%
2 / 2	Labels	Active Label Location	Scroll label text	N/A
2 / 3	Screen	Auto / Manual Brightness	LCD Brightness	Auto
3 / 1	UV Focus	Auto / Manual	UV Focus	Man, infinity
3 / 2	UV Count	L / S / Full Screen	UV Threshold Level	30%
3 / 3	UV Palette	Cycle Pre-sets	Select Hue	White
4 / 1	Visible Focus	Auto/Man	VIS Focus	Auto
4 / 2	VIS Effects	OFF / BL / LL / BL+L	N/A	Off
5 / 1	Record Mode	Video, Still, Off	N/A	Still
5 / 2	Image Series Number	Increment / Value / Reset	S-Key to Increment	Last Value
5 / 3	Playback	Prev / Next		
6	Capture (Still)	Accept, Discard	N/A	N/A
6	Capture (Video)	N/A	N/A	N/A

Rules		
1	Menu time-out	Menu/Function indicators disappear after 4 seconds
2	Menu Exit	Functions confirm and exit through S button or another function button.

Zoom



- The Zoom values affects the field of view (FOV) of the camera. The FOV of the visible channel can be set to Wide (0.5x), 1x or NARROW (2x) by pressing the L/R keys. When the visible FOV is changed the UV will scale to fit.
- The default 1x Zoom value will be loaded if the S-key is long pressed.
- Selecting results in the digital zoom being activated, it will zoom to maximum visible times the selected value. To change the selected digital zoom value press the S-KEY. The values below can now be schooled using the L/R keys to select the required digital zoom



- Set the value using the S-Key. The interface will now return to the standard zoom selection. Zooming digitally will remove the UV overlay.

UV Gain



- The GAIN variable affects the amount of amplification applied to the UV signal entering the camera.
- The GAIN value can be increased by pressing the F key and decreased by pressing the B key. The default Gain value will be loaded if the S key is double tapped. An increase in gain might result in excessive noisy images. Setting the gain too low may result in some UV signals not passing about the threshold value.

Integration of Frames



- **This determines the averaging or integration of the UV channel. When a good period is selected the camera performs a non-uniformity correction to remove the system noise.**

Options			
2 frame averaging	4 frame integration	8 frame integration	32 frame integration

- The number of frames to be averaged can be set using the L/R keys.
- The frames are summed for the period indicated and then divided by the number of frames integrated resulting in an average.

- The integration gain can be set with the F/B key. Setting the integration gain changes the value with which the summed frames are divided by.
- The result is integration of the UV channel over the number of frames.
- To make small signals visible set the gain higher. Consider the sequence of the opposite page of the resulting images for the various Gain levels.



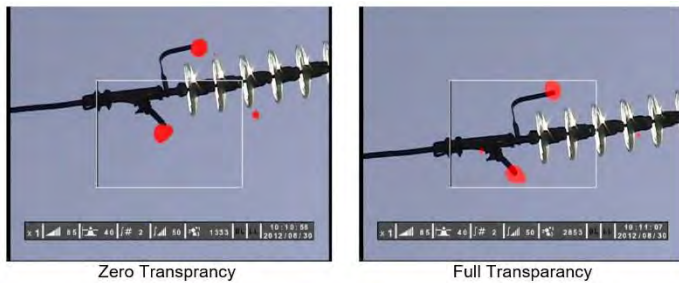
Channel



- This determines the image displayed on the LCD and how the images are fused. UV+VI

Options			
Visible with UV overlay	Visible only	UV only	UV inlaid into Visible
<i>Values</i>			
UV			
Opaque (F)		Transparent (B)	


- Use the L or R key to scroll through the options. Use the F key to increase opaqueness and the B key to decrease opaqueness.



Labels



- This determines the labels shown on the screen

Options			
Top Left	Top Right	Bottom Left	Bottom Right
Values			
			
Scroll entries			

- Use the L or R key to select the active annotation position, Press S-Key to activate or deactivate. Use the F or B keys to select the entry available at that position. The entries are entered into the CSV file (labels.csv) on the SD card. The CSV file can be edited from the PC or Tablet/Smartphone via USB connection.


UV Focus




- This determines the UV FOCUS mode and position. In Manual focus, the UV camera focus is independent of the visible camera focus. In Auto focus, the UV camera focus is synchronized to the visible camera and follows it as the visible camera focus changes – this will increase the drain on the battery, reducing the operating time.

UV Measure



Options			
Slaved to Visible		Manual	
Values			
			
		Increase to Infinity (F)	Decrease to 1m (B)

- This determines the ROI for counting of UV and the minimum signal level required for the UV to appear on the overlay.

Options		
Large	Small	Full Screen
Values		
		
Increase Threshold (F)		Decrease Threshold (B)

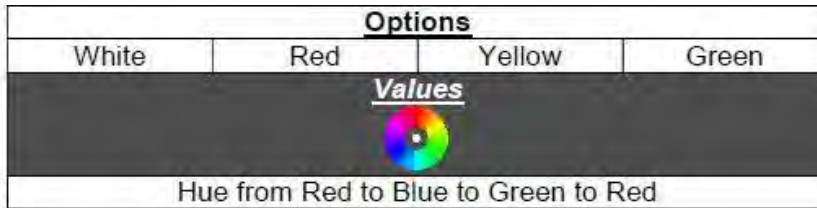
- The Threshold function sets the intensity above which blobs are shown on the screen and included in the count. Reducing the threshold to a too low value will result in the noise on the detector being shown on the screen and included in the count. Reducing the threshold to

a too low value will result in the noise on the detector being shown on the screen and included in the count.

UV Palette



- This determines the color of the UV on the overlaid image changing the value will change the hue of the corona overlay, allowing the operator to pick from over 100 colors.



- The value bar becomes a hue gradient, the color at the top of the bar is the color applied to the UV channel.

Calibration



Long press the #3- KEY to activate the calibration interface. A password will be required to make any changes. This can only be done by authorized technicians.

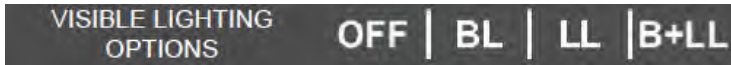
Visible Focus



- This determines the visible FOCUS mode and position. In manual focus, the visible channel is manually focused. In Auto Focus the camera uses an algorithm to determine the optimal focus level. The UV channel can be slaved to the visible channel and will then change focus when the visible changes focus.

Options			
Auto Focus		Manual Focus	
		<i>Values</i>	
		⤴	
		Increase to Infinity (F)	Decrease to 1m (B)

Visible Lighting Options



- This changes the effects of the visible channel. The visible channel can be switched to Low Light mode for use during night, dusk and dawn. Backlight compensation is available to increase detail of dark objects against a bright background, i.e. the shadow side of an insulator.

Options			
OFF BL LL BL/LL			
OFF = Normal camera view	BackLight	Low Light	Back Light & Low Light

OPT – Output Options

Right on D-Pad



- Long press the #5-KEY to activate the menu. Highlight the required icon and press the S-Key to toggle the switch.
- The GPS toggle sets whether the GPS co-ordinates are shown on the image or not. The GPS signal strength is displayed via the satellite icon below.

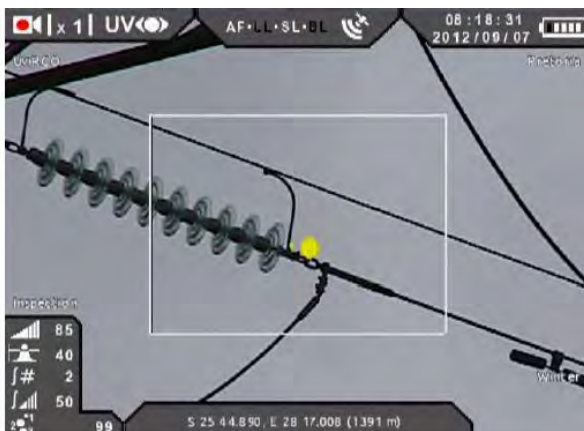


Figure 17. GPS coordinates shown at the bottom of the screen, GPS satellite ON icon and signal strength indicator is shown at the top.

The OSD switch determines if the information overall is shown on the video output



Figure 18. The OSD-off image recorded

The DISPLAY setting will record the screen as displayed on the camera. The REPORT setting will record the combined UV/VIS image with a text block containing the camera settings and pertinent information.

Installation

The dust cap can and should be removed from the system by using a **3/32"** hex head wrench to remove the corresponding #4-40 cap screw currently securing the dust cap from becoming free of the unit. Once removing the dust cap and its tether, the screw should be tightened back in the corresponding hole.

PAL/NTSC switches between PAL or NTSC video output format. The recording is done in the format selected. PAL is much better quality. NTSC video is not advised for UV.

Troubleshooting

No Picture on Monitor

Make certain your monitor is powered on and the correct input was selected. Verify that the main cable to the camera is securely connected. Check all system cable connections. If the problem continues to persist, please contact customer support.

Picture on Monitor, but IR Visual images lack detail

Tilt camera or engage default switch, it might still be in stow position. If the problem continues to persist, please contact customer support.

Visual and Thermal Image, but no system functions

Power down unit, check all cable connections, and then reinitialize unit. If the problem continues to persist, please contact customer support.

Visual Image, but no thermal image (gray scene) and system functions work on controller

Move camera to a 0° azimuth and 0° elevation position and stare at an object at about 20 ft. out from camera, but in front of lens move something with notable thermal change higher or lower than ambient temperature in front of IR lens while observing image. If there is some change within the image keep this target in the field of view while moving the zoom control to full travel one direction, then the other direction. If image appears during this process the camera was left in the full NFOV position and should be fine. If there is no recognizable change to the thermal image, proceed to the menu and complete a NUC function. If the problem continues to persist, please contact customer support.

No Thermal Image (blue or total black scene) and system functions work on controller

Attempt to NUC the infrared camera, if unsuccessful cycle power to the system. If the problem continues to persist, please contact customer support.

System Fully Functions, but has intermittent loss of video or control functions

This is likely a loose connection in system cabling. Jiggle each connection point to locate loose connection and reseal the problem connection. If problem continues, with the system off, check the problem connections pins and sockets for a bent point or damaged socket. If the problem continues to persist, please contact customer support.

System is fully operational, but has developed a noisy image

This is likely a loose power supply ground wire or a damaged ground in cabling. If the problem continues to persist, please contact customer support.

System is fully operational, but has developed a noisy image only when craft is in operation

If the craft was recently serviced wires that may have interfering frequencies are now too close to camera system cabling or there is a loose ground in the power supply. If the problem continues to persist, please contact customer support.

System is fully operational, but it is more difficult to manually keep on target and is not as steady

It is possible your gyro stabilization is off. Ensure it is on through the menu settings and if problems persists, contact customer support.

System is fully operational, but it has some vibration noticed in the image.

▲ Warning, this may be a sign that your mount is loose, make provisions to check it immediately. It is also possible your Digital stabilization is off. Ensure it is on through the menu settings and if it is and the problem persists, contact customer support.

Maintenance

Falcon Spectral III Cleaning

▲ Caution: Remove the camera from the aircraft before the aircraft is power washed. The camera should not be power washed.

Routine minor cleaning is recommended to maintain optimal performance, particularly in regards to the visual camera. The cleaning of the Falcon Spectral III unit should be a two (2) step process.

1. Clean all non-window and lens surfaces. These surfaces can be cleaned by using a clean wet cloth and a mild solution of dishwashing soap. Do not wash the optical windows at the same time as the other surfaces, the optical window and lens should be treated as a separate process in order to prevent them from being scratched and/or damaged.
2. Clean the visual window, UV lens and thermal lens. Various chemicals may come into contact with the window and lens that may affect performance or increase the corrosion rate of the optical coatings on the unit over time. Apply light pressure to the optics with a clean, damp, non-abrasive cloth. A mild dishwashing solution can again be used in conjunction to the damp cloth if insects or other hard to remove debris reside on the optics. Care should be taken in not applying too much pressure so scratch and/or damage.
3. It is highly recommended to clean off any Jet-A fuel that might have spilled on the camera. Jet-A could possibly discolor the finish.

Falcon Spectral III Inspection & Cleaning

Pre-Flight Inspection

It is advised that a pre-flight or daily inspection be performed. The following should be a part of the pre-flight inspection:

- Inspect the unit for cracks
- Inspect the infrared lens and visual window for cracks or scratches and free of debris
- Inspect to ensure the mounting assembly is secure
- Inspect external cable connections to ensure they are fully tightened
- Inspect hand controller for scratches and defects that may affect performance
- Check circuit breaker or fuse in helicopter
- Perform full operational check per manual
- Inspections of the unit should be performed minimally at each 100hr aircraft inspection.
- Check dovetail bolts every 100 hours and tighten if necessary

Hand Controller Inspection and Cleaning

Routine minor cleaning is recommended to maintain optimal performance for the hand controller and may be conducted in a similar fashion to the Falcon Spectral III. Apply light pressure to the controller with a clean, damp, non-abrasive cloth. A mild dishwashing solution can again be used in conjunction to the damp cloth if insects or other hard to remove debris reside on the optics. Care should be taken in not applying too much pressure so scratch and/or damage.

System Storage

The system should be cleaned as per the instructions provided in the previous sections. The unit should be dried and moved to the "STOW" position so that the pan and tilt locks engage before placing in the provided hardened transport/storage case. The unit can be stored in temperatures ranging from -55°C to 85°C. It is advised to perform routine 6 month system checks to ensure proper functionality per the manual.