



RED EPIC® OPERATION GUIDE



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COMPLIANCE

INDUSTRIAL CANADA EMISSION COMPLIANCE STATEMENTS

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

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

FEDERAL COMMUNICATIONS COMMISSION (FCC) STATEMENT



This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

NOTE: This device complies with Part 15 of the FCC Rules.

Operations subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable interference.

CAUTION: If the device is changed or modified without permission from RED, the user may void his or her authority to operate the equipment.

AUSTRALIA AND NEW ZEALAND STATEMENT

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to EN 55022:2006

JAPAN STATEMENTS



This is a Class B product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は家庭環境で使用することを目的としていますが、ラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをしてください。

EUROPEAN UNION COMPLIANCE STATEMENTS



RED declares that the equipment described in this document is in conformance with the requirements of the European Council EMC Directive 2004/108/EC, Low Voltage Directive 2006/95/EC, RoHS Directive 2002/95/EC and WEEE Directive 2002/96/EC.

This declaration is based upon compliance of the product to the following standards:

- EN 55022, Information Technology Equipment - Radio Disturbance Characteristics
- EN 55024, Information Technology Equipment - Immunity Characteristics
- EN 61000-3-2, Limits for harmonic current emissions
- EN 61000-3-3, Limits for harmonic current emissions
- EN 60950-1, Information Technology Equipment – Safety



The Waste Electrical and Electronic Equipment (WEEE) mark applies only to countries within the European Union (EU) and Norway. This symbol on the product and accompanying documents means that used electrical and electronic products should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product to designated collection points where it will be accepted free of charge. Alternatively, in some countries you may be able to return your products to your local retailer upon purchase of an equivalent new product.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling. Please contact your local authority for further details of your nearest designated collection point. Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

For business users in the European Union, if you wish to discard electrical and electronic equipment, please contact your dealer or supplier for further information.

Responsible party:

Red Digital Cinema.

20291 Valencia Circle

Lake Forest, CA 92630

USA

BEFORE YOU START

Congratulations on your purchase of a RED EPIC® camera. Please read the attached safety instructions, and only then unpack the camera body and any accessories. If there is any physical damage or missing components for either your camera body or any accessories, please file a support ticket at www.RED.com/support.



Figure 1: RED EPIC Camera

IMPORTANT SAFETY INSTRUCTIONS

READ BEFORE USING YOUR CAMERA

- A. Heed all cautions and warnings in these instructions.
- B. Read these instructions before operating the camera and accessories.
- C. Follow these instructions while operating the camera and accessories.
- D. Keep these instructions with the camera and accessories at all times.
- E. DO NOT attempt to modify, dismantle or open your camera, lens or other accessory as doing so may expose you to electric shock and serious injury. There are no user-serviceable parts inside. Alteration or repairs made to the camera, lens or other accessory, except by a RED authorized service facility, will void the Limited Warranty. Users are not permitted to make design changes or otherwise modify the operation of the camera, lenses or other accessories, without the express written approval of RED DIGITAL CINEMA.
- F. Only use attachments/accessories specified by RED.
- G. Install camera and accessories in accordance with the manufacturer's instructions.
- H. Avoid imaging of laser beams as they may cause damage to the sensor.
- I. DO NOT use the camera or accessories near water. Avoid exposing your camera to moisture. The unit is not waterproof, so contact with water could cause permanent damage to the unit as well as electric

shock and serious injury to the user. DO NOT use the camera in the rain or under other conditions with high moisture without appropriate protection, and immediately remove power source if camera or accessories are exposed to moisture.

WARNING: To reduce the risk of fire or electric shock, do not expose the camera or accessories to rain or moisture.

- J. DO NOT expose your camera to excessive vibration or impact (shock). Be careful not to drop your camera. Internal mechanisms may be damaged by severe shock. Mechanical alignment of optical elements may be affected by excessive vibration.
- K. **ELECTROMAGNETIC INTERFERENCE:** The use of devices using radio or other communication waves may result in the malfunction or interference with the unit and/or with audio and video signals.
- L. Clean only using a dry cloth. When cleaning your camera, remember that it is not waterproof and moisture can damage electronic circuitry. DO NOT rinse or immerse any element of the camera, lens or other accessory, keep them dry at all times. DO NOT use soaps, detergents, ammonia, alkaline cleaners, and abrasive cleaning compounds or solvents. These substances may damage lens coatings and electronic circuitry.
- M. Maintain sufficient ventilation - DO NOT block any ventilation openings or obstruct cooling fan airflow.

CAUTION: Proper camera ventilation requires a minimum .5" (1,25cm) clearance between the camera ventilation openings and external surfaces. Verify airflow is not impeded by objects that block or cover the ventilation openings. Failure to permit adequate airflow may result in overheating of the camera, degraded operation and in extreme situations, damage to the camera.

- N. DO NOT operate or store near any heat sources such as radiators, heat registers, stoves, or any other apparatus that produce heat. Store in a protected, level and ventilated place. Avoid exposure to temperature extremes, damp, severe vibration, strong magnetic fields, direct sunlight or local heat sources during storage. Remove any batteries from the camera before storage. Recommended storage and usage temperatures for your camera, lenses and other accessories are:

- a. Operating range: 0°C to +40°C (32°F to 104°F)
 - o Storage range: -20°C to +50°C (-4°F to 122°F)

If there are any performance issues with your camera or accessories when operating within this temperature range, please file a support ticket on www.RED.com/support.

- O. Do not bypass the third prong of the grounding-type plug on the power cord of the AC Power Adapter. A grounding-type plug has two blades and a third "grounding" prong. The third prong is provided for your safety. A grounding-type plug shall be connected to an outlet with a protective earthen connection. If the grounding-type plug does not fit into your outlet, do not attempt to modify the plug or outlet, consult a qualified electrician.
- P. Protect all power cords from being pinched, walked on or driven over by a vehicle. Replace any power cords suspected of sustaining damage due to crushing or other forms physical damage.

CAUTION: The power cord plug for the AC Power Adapter is used as the power disconnect. To disconnect all power from the AC Power Adapter, unplug the power cord plug from the wall outlet. During use, the power cord plug should remain easily accessible at all times.

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Q. Lithium Ion batteries may be subject to special handling requirements pursuant to federal and local laws. Please refer to specific shipping instructions included with your battery regarding proper transport of your battery. Do not handle your battery if it is damaged or leaking. Disposal of batteries must be in accordance with local environmental regulations. For example, California law requires that all rechargeable batteries must be recycled by an authorized recycle center. Storing batteries fully charged or in high temperature conditions may permanently reduce the life of the battery. Available battery capacity may also be temporarily lessened after storage in low temperature conditions.

WARNING: Do not expose the battery to excessive heat.

WARNING: Danger of explosion if an incorrect battery is charged with the RED Charger or is used to power the camera and accessories. Replace only with the same or equivalent type battery.

CAUTION: Refer all service and repair to qualified RED service personnel. To reduce the risk of electric shock, and damage to the camera or accessories, DO NOT attempt to perform any servicing other than any procedures that are recommended in the operating instructions.

THEORY OF OPERATION

The RED EPIC digital cinema camera provides high performance digital imaging over a wide range of frame rates and optical formats including Super 35mm, 35mm and Super 16mm. The camera is supplied as standard with a PL mount, and may be configured with mounts and 19 mm rods to accommodate most cinematography lenses, matte boxes and follow focus systems. Adaptors for 15mm offset studio and 15mm lightweight rods are also available.

In addition to compatibility with existing PL mount cinematography lenses, a select range of S35mm (APS-H) PL mount prime and zoom lenses are available from RED.

Other lens mounts, including Canon FD, and Nikon F are available, permitting the use of Canon and Nikkor photographic lenses. Lens mounts can report lens iris, focus and zoom data when mated to an appropriate lens. In addition, the iris and focus settings for select Canon and Nikkor lenses may be driven from the camera when operating in Auto Exposure (AE) and Auto Focus (AF) modes.

Lens mounts may be exchanged in the field, however it is highly recommended that this be performed in a dust-free environment, as the optical path will be exposed to the elements during this process.

A B4 mount to PL mount adaptor is also available to permit use of 2/3" HD lenses on the RED EPIC camera. The optical coverage it provides is approximately equivalent to 16mm hence the maximum recording resolution with a B4 lens is 2K RAW (2048 x 1152 pixel) progressive scan.

MYSTERIUM X® SENSOR

The MYSTERIUM X sensor has been specifically designed for use with RED EPIC cameras, and provides variable frame rate imaging over 1 to 240 fps at up to 2K resolution, 1 to 160 fps at up to 3K resolution, and 1 to 120 fps at up to 4K or 5K resolution.

Native color balance for the MYSTERIUM X sensor is 5,000 degrees Kelvin, but it may be electronically compensated for any color temperature in the range 1,700 to 10,000 degrees Kelvin. White balance preset values include Tungsten (3200K) and Daylight (5600K) light sources; the camera may also calculate a color neutralizing White Balance value on demand by imaging on a standard white or 18% grey card.

The MYSTERIUM X sensor includes high precision analog to digital conversion, capable of delivering up to 13.5 stops of dynamic range with daylight light sources over a camera sensitivity range of 320-800 ISO.

IMAGE PROCESSING

The digital image received from the sensor is formatted as a pixel defect corrected (but in all other aspects unprocessed) 12-bit, 14-bit or 16-bit per pixel RAW data frame. When operating in STILLS mode, each image received from the sensor is treated as a unique FRAME; however when operating in MOVIE mode, successive images received from the sensor are collected together into a CLIP. In all other regards, a frame of information gathered in STILLS mode or MOVIE mode is identical.

Each RAW frame or sequence of RAW frames in a clip is compressed using proprietary wavelet based REDCODE® RAW compression, then stored to digital media such as a REDMAG™ 1.8" SSD.

The RAW data recorded is independent of any RGB domain signal processing choices such as ISO, White Balance or other RGB color space adjustments made by the camera operator. These parameters are saved with the RAW data as reference METADATA, they are not burned into the recorded RAW data.

This recording technique permits RGB color processing choices to be deferred to post production and/or to be adjusted in the field to visualize alternative color treatments, without impacting the recorded image.

The camera's monitoring path converts RAW sensor data to a white balanced 12-bit depth 2048 x 1080 pixels RGB 4:4:4 video signal. This signal may be modified using ISO, White Balance or other RGB color space adjustments as desired by the operator, and is then scaled and gamma corrected to provide VIEWFINDER, HD-SDI and HDMI monitor outputs at 10-bit depth in 4:2:2 Y,Cb,Cr, or at 8-bit depth in 4:4:4 RGB.

Frame guides and other camera data may be added as desired by the user to one or more of the outputs.

NOTE: If a specific set of RGB image processing values are desired to be repeatable on-set, a .RMD "look" file may be created either by the camera or by supplied REDCINE-X® application software.

HDRX™

HDRx is an option for extending dynamic range from +1 to +6 stops over the baseline Dynamic Range offered by the camera. HDRx mode simultaneously shoots two images of identical resolution and frame rate - a primary track (A-track) that is normally exposed, and a secondary track (X-track) that has an exposure value that reflects the additional stops of highlight protection desired.

EXAMPLE: If you select an HDR value of +2 and your primary exposure is 1/48th sec, the X-track exposure will be 2 stops faster, 1/192 sec.

The ISO and Aperture remain the same for both exposures.

During acquisition and recording, the two tracks are "motion-conjoined", meaning there is no gap in time between the two separate exposures. This is important to note because if they were two standard alternating exposures, there would be a time gap between the two tracks that would show up as an undesirable motion artifact. Both tracks (A & X) are stored in a single R3D® file. Since there are two exposures, when in HDRx mode, the camera is recording double the amount of frames. For example, if you are shooting 24fps, the camera is recording two 24fps tracks which is the data rate equivalent of 48fps. However, after combining the two tracks in post production you see only one 24fps motion stream.

HDRx provides multiple options for exploitation in post production.

- Blend the two tracks in post tools like REDCINE-X, Storm or any other application that supports the SDK to create Magic Motion™. This blending of the two tracks comes with a slider so you can decide just how much of each track you want to use. A preview window shows you the combined result of your selection, or you can view each track individually.
- Combine the two tracks using MNMB (More Normal Motion Blur). MNMB is designed to emulate the motion of a traditional camera with full motion blur. This is a tool created by The Foundry that uses a new motion estimation algorithm designed specifically for HDRx. The shorter exposure (sharper image) is blended to match the motion blur of the normal exposure. Again, a preview window shows the combined result of your selection, or you can view each track individually.
- Use the X-track data for motion tracking, then combine the X-track with the A-track as in #1 or #2 above... or just motion stabilize the A-track using the motion analysis data extracted from the X-track.
- Exporting to EXR file format will give you a multi-view EXR with both exposures (like a stereo EXR).

NOTE: If you ignore the X-track completely, you will have a standard exposure with 13.5 stops of native dynamic range just as if you had not enabled HDRx. For this reason, we encourage the A-track exposure to be "normal" as it provides the most options. If you are tempted to shoot "over-under", you are then fully committed to using HDRx and your post production options are reduced.

NOTE: When recording in HDRx mode the camera records twice as many frames, so the maximum frame rate, minimum REDCODE ratio, and maximum record time on your media will be cut in half.

MAGIC MOTION™

Shooting at 24fps and with an 180 degree (1/48th) shutter on a film or digital camera may create an optical illusion we are familiar with, however it is not really the way the eye sees motion. To understand this, ask someone to stand in front of you and swing their arm over their head from one side to the other. What you would observe in the recording is a constant motion blur until the arm stopped. What your eye sees though is both motion blur AND a sharper reference to the arm and hand all along the motion path. "Magic Motion" provides such a combination of motion blur (A-track) and a sharper reference (X-track), with the bonus of extreme dynamic range not available with any other motion capture camera system.

AUDIO RECORDING

The RED EPIC can record up to two discreet channels of microphone level uncompressed 24-bit, 48 KHz audio (four channels of microphone level or line level audio inputs when equipped with a PRO I/O Module), that are synchronized with video and timecode, to REDMAG 1.8" SSD media.

Input signals are routed via a high quality pre-amplifier and soft clip limiter in order to achieve the desired audio reference / recording level and to maximize dynamic range.

To assist with audio reference level setup, the camera provides a color-coded 4dB per division Peak Level meter in the Graphical User Interface with 0dBu (-20dBFS) and +4dBu (-16dBFS) Witness Marks. Meter range is -36dBu to +20dBu (-56dBFS to 0dBFS) with audio input type and audio input clipping indication.

Audio monitor output options include a 2-channel headphone output on the camera Brain and 2-channel line level analog outputs from the optional PRO I/O Module, plus 2-channel and 4-channel 24-bit 48KHz uncompressed digital audio embedded in the HD-SDI and HDMI outputs.

MICROPHONE LEVEL ANALOG INPUTS

The recording level of Microphone inputs are affected by the sensitivity of the microphone and the Gain setting of the camera's pre-amplifier. Available pre-amplifier range is +8dB to +62dB, with a default value of +32dB. The camera operator should choose a Gain value that aligns the input signal to the 0dBu reference line drawn through the camera's peak meter (or +4dBu line if referencing to that level).

This setting provides up to 30dB of input signal headroom above reference 0dBu level before clipping (26dB for +4dBu reference level) and maximizes the signal to noise ratio of the 24-bit digital recording.

LINE LEVEL ANALOG INPUTS

The recording level of Line inputs are affected only by the signal provided by the field production sound mixer or other external line level source. The sound mixer operator should choose a mixer output level that aligns a reference tone signal to the 0dBu (0.775 volts RMS / -20dBFS) reference mark drawn through the camera's Peak Meter, or if using +4dB as reference level, a mixer output level that aligns a reference tone signal to the +4dBu (1.23 Volts RMS / -16dBFS) reference mark.

The 0dBu setting provides up to 24dB of input signal headroom above reference level before clipping (20dB for +4dBu reference level) and the maximum signal to noise ratio for the 24-bit digital recording.

VIDEO MONITORING OUTPUTS

In its default configuration, the RED EPIC camera can simultaneously support one VIEWFINDER output (suitable for use by a BOMB EVF®, or RED LCD) plus one HD-SDI based PROGRAM output and one HDMI based PREVIEW output. Each output can support a set of overlay graphics including camera GUI, timecode, clip name and framing guides; the specific overlay graphics for each type of output is user configurable.

The default VIEWFINDER output is the EVF / LCD connector located on the front face of the Side SSD Module. If neither of these is connected, VIEWFINDER output will be automatically transferred to the HDMI output, or it may be selected by the operator to appear on the HD-SDI output of the camera Brain.

BOMB EVF

A 1280 x 784 pixel resolution progressive scan color image equivalent to viewing a 17" reference monitor from a distance of about 3ft (1m), with Surround View™ look around area, frame guides and safe action / title, zebra and false color exposure overlays, operational status and setup menus.

RED LCD

A 800 x 480 resolution RGB 4:4:4 progressive scan touchscreen video display with Surround View™ look around area, frame guides and safe action / title, zebra and false color exposure overlays, operational status and setup menus.

HD-SDI

A 1920 x 1080p PROGRAM (clean feed) output suitable for monitoring or recording to an external VTR or DDR device. May be configured for 10-bit Gamma or 10-bit LOG encoded video data.

HDMI

A 1920 x 1080p PREVIEW output suitable for monitoring via a PC monitor or most HDTV displays.



Figure 2: Example of Video Monitor Output – WITHOUT LCD or EVF Connected

RED LCD / BOMB EVF®

The optional RED LCD and BOMB EVF are specialized video monitors that provide the user with a variety of tools to assist framing, focus and exposure, including:

- Surround View™, which is an additional look around area, visible outside of the recorded image.
- Frame Guides, showing common film presentation and television aspects such as 2.40:1 and 16:9.
- Focus, aided by high display resolution, 1:1 Focus Check function and False Color overlay.
- Exposure, aided by dual Zebras, False Color overlay, RAW “Traffic Lights” and RGB histogram.
- System information including current frame rate, ISO rating, shutter speed, color temperature, record resolution, record quality, clip name, timecode value and the remaining battery and media capacity.

For applications where use of an attached RED EVF or RED LCD is not desired – for example when working on a crane – the VIEWFINDER output can be transferred to the HD-SDI or HDMI outputs, supporting remote camera monitoring up to 200 ft away.

RED EPIC® OPERATION GUIDE

REDMOTE®

REDmote is a proprietary camera control unit for RED EPIC cameras that attaches to the rear of the camera Brain or the back face of the rearmost expansion module. The REDmote may also be detached from the camera and operate over a proprietary REDlink™ 2.4Ghz wireless connection.

Whether operating attached or via wireless, REDmote supports all basic controls necessary to operate the camera, including Record Start / Stop, Shutter Speed, White Balance, ISO and programmable User Keys. An integrated color LCD displays camera parameters, media and battery capacity and REDmote menus.



Figure 3: REDmote LCD display

REDmote includes a rechargeable Li-Ion battery, which automatically re-charges when attached to the camera or rearmost module. It may also be re-charged by connecting to a USB-2 based power source such as a laptop P.C or cell phone charger. Under typical operating conditions, REDmote should operate for up to 8 hours without requiring a re-charge and support a wireless communication range of ~ 50 ft.

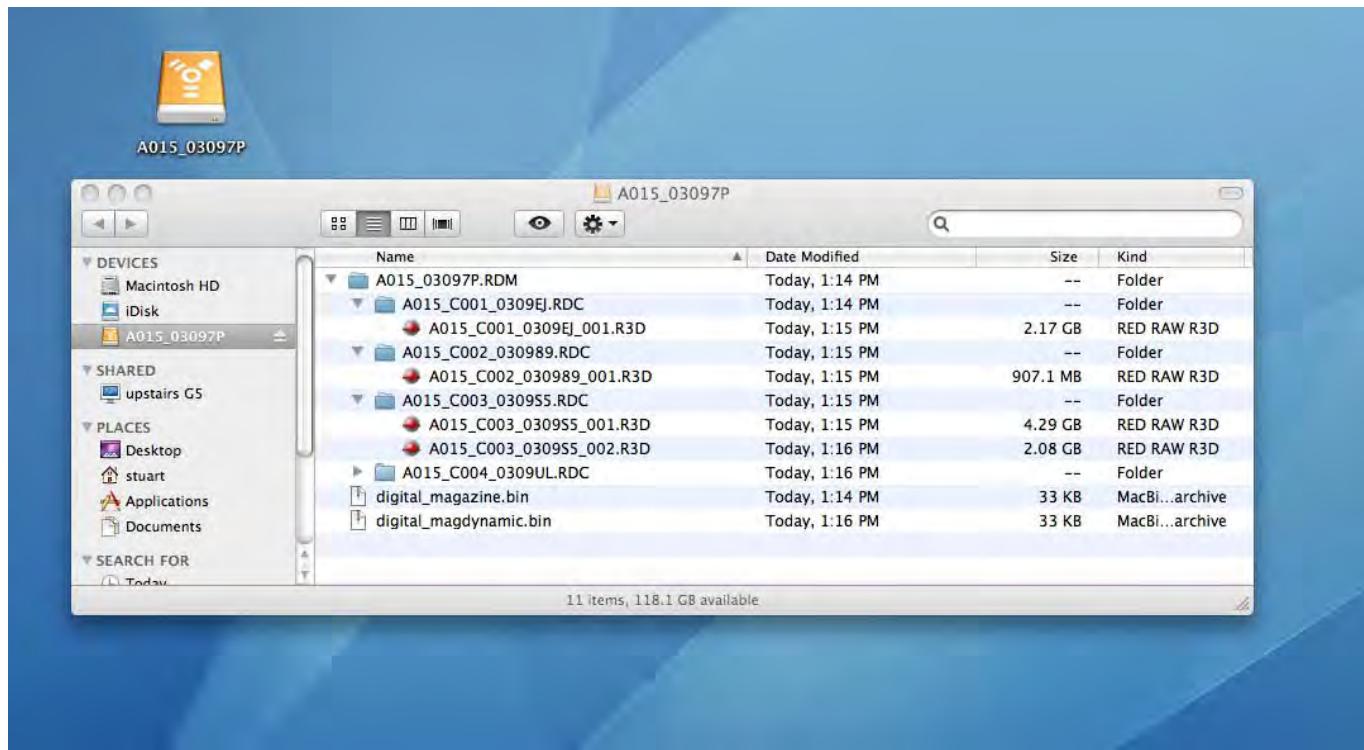
DIGITAL MAGAZINE (MEDIA)

REDCODE RAW compressed MOVIE clips and STILLS images, plus time code, multi-channel audio and metadata may be recorded to **REDMAG 1.8" SSD** solid-state digital media of 64GB, 128GB or 256GB capacity.

Each MOVIE clip is recorded with a unique name and with all the appropriate elements of the clip including one or more REDCODE RAW.R3D files and associated metadata, placed in a clip folder with the file extension .RDC. Refer to CLIP NAMING CONVENTIONS.

All Clips are placed in a master folder (i.e. root directory) for the Magazine with the file extension .RDM. This folder contains all clips recorded on that digital magazine; therefore copying these clips from the digital magazine to backup media may be performed by a single drag and drop operation.

For additional information about digital magazines, refer to APPENDIX B: MANAGING DIGITAL MEDIA.



METADATA

RED EPIC cameras record extensive Metadata, which is data that describes the precise characteristics of the picture and sound signals in each frame of the recording. This includes camera specific setup information, project and clip management information, Clip Name, Time Code, Date and GMT, lens and shutter speed / angle parameters, audio settings and any video image processing information.

CLIP NAMING CONVENTIONS

When you press RECORD, the camera automatically creates a unique name for the CLIP being recorded to the REDMAG 1.8" SSD media. The format of the clip name is Camera Letter + Reel Number + Month + Day + ** - where ** is a random two digit alphanumeric number used to prevent accidental duplication of file names.

e.g. A001_C002_0502A6.RDC

Where: A = camera A, 001 = reel 001, C002 = clip 002, and 0502 = May 02, and the digits A 6 are the random characters generated by the camera as described above. Other examples are shown below:

A001_C001_0502X3.RDC

A001_C001_0502G6.RDC

A001_C001_0502AB.RDC

MULTI CAMERA SHOOTS

The naming scheme means that three cameras, slated as A, B, C, will generate easily recognizable clips:

A001_C001_0502**.RDC

B001_C001_0502**.RDC

C001_C001_0502**.RDC

3D FOOTAGE

When two cameras are connected together as Master and Slave to film in 3D, the slave camera takes the master camera's ID. In this configuration, the Master will modify its file naming structure, changing the "C" in the second character group in the filename to an "L". Conversely, the Slave camera will modify its file naming structure, changing the "C" to an "R". This structure indicates the master camera is positioned as the left (L) camera and the slave camera is positioned as the right (R) camera in the 3D configuration.

Assuming the master camera is slated as camera "S", Clips recorded using the Master and Slave camera configuration to shoot 3D footage would look like:

S001_L001_1206**.RDC and S001_R001_1206**.RDC

NOTE: L (left) and R (right) file name designations may be adjusted if desired in the MEDIA menu.

SMPTE TIMECODE

Edge Code is a SMPTE timecode track that always starts at 1.00.00.00 on the first frame recorded to the digital media. It is a sequential code that is continuous from frame to frame and also continuous from clip to clip. Edge Code is equivalent to RUN RECORD commonly found on broadcast cameras.

Time Code is a SMPTE timecode track that synchronizes to the camera's clock, or if operated in Jam Sync mode, to an externally supplied SMPTE master timecode signal. It is a sequential code that is continuous from frame to frame, but is discontinuous from clip to clip.

The timecode counter always updates at the same frame rate as the recording, irrespective of whether the camera is operating in normal, Vari-Speed, Time-Lapse or Animation recording mode. This ensures that a valid SMPTE timecode is created without count jumps that would affect clip playback during editing. If operating in Jam Sync mode referenced to an external timecode source, the clip's master time reference point is the first frame of the recorded clip.

RED EPIC® OPERATION GUIDE

NOTE: When in Loop Record mode, Edge Code will also become discontinuous from clip to clip, because frames copied into the cache memory are discarded. This may lead to editing difficulties with post production applications that assume continuous timecode.

POWER CONSUMPTION

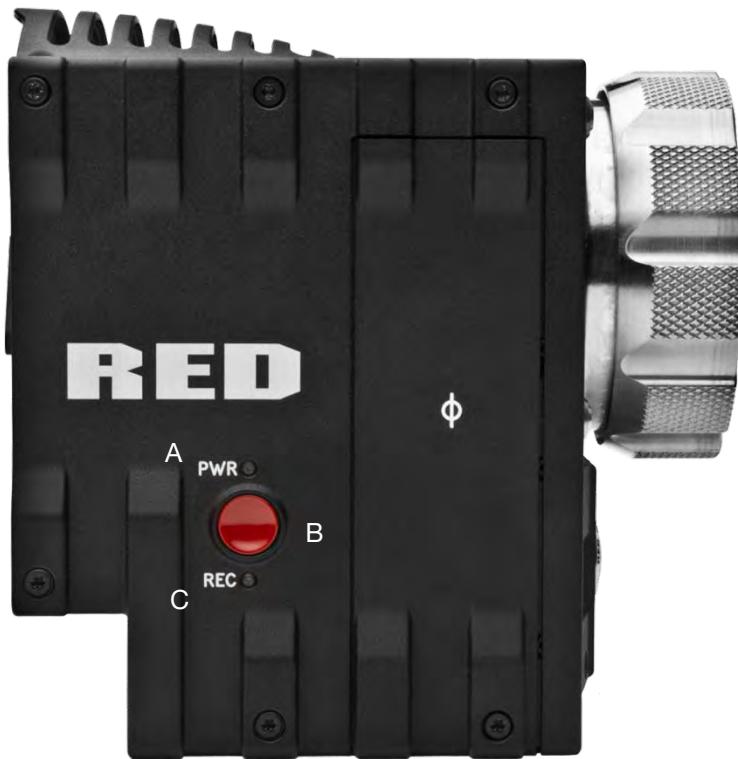
The camera draws approximately 60 watts when recording in 5K resolution, 24fps MOVIE mode. The camera is cooled by convection from the camera body assisted by a fan contained in a sealed air duct.

Under typical operating conditions, a REDVOLT™ XL 90Wh battery will run the camera and accessories for about 90 minutes. A REDVOLT 30Wh battery will run the camera and accessories for about 30 minutes.

CAMERA OPERATIONAL CONTROLS

This section describes the available operational controls on the EPIC camera Brain, Side SSD Module, Side Handle and REDremote accessories.

BRAIN



A	Power Status LED
B	Power / Record Button
C	Record Status LED

Figure 4: Power / Record Button / Status LEDs

- **Power Status LED:** Indicates Status of Power: Power Available / Not Available / Power O.K
- **Power / Record Button:** Powers camera Up / Down and initiates Record Stop / Start
- **Record Status LED???:** Indicates status of Media: Media Available / Not Available / Media Recording

SIDE SSD MODULE



A	SSD Slot
B	User Key 1
C	User Key 2
D	Focus / Record Button
E	Media Indicator

Figure 5: Side CF / SSD Controls

- SSD Slot:** Slot for REDMAG 1.8" SSD Media.
- User Key 1:** Initiates user defined camera function. Default: 1:1 Magnify
- User Key 2:** Initiates user defined camera function. Default: False Color: Exposure.
- User Key 1 + User Key 2 :** Press both keys to Eject (unmount) REDMAG 1.8" SSD Media
- Focus / Record Button:** Touch for Auto Focus, fully depress to Start or Stop Record.
- Media Indicator:** When media is inserted and ready to record, the LED illuminates Green. When no media is present, the LED is off.

RED EPIC® OPERATION GUIDE

SIDE HANDLE

TOP



A	Battery Release	D	LCD Menu Keys
B	Focus / Record Button	E	LCD Display
C	Adjustment Ring	F	LCD Backlight Button

Figure 6: RED Side Handle Controls - Top

- **Battery Door Release Button:** Releases Side Handle battery door to permit battery exchange.
- **Focus / Record Button:** Touch for Auto Focus, fully depress to Start or Stop Record.
- **Adjustment Ring:** Selects and adjusts camera parameter values.
- **LCD Menus Keys:** Specific functions are defined by LCD screen.
- **LCD Display:** Displays key camera parameter values.
- **LCD Backlight Button:** Enables LCD backlight.

RED EPIC® OPERATION GUIDE

FRONT



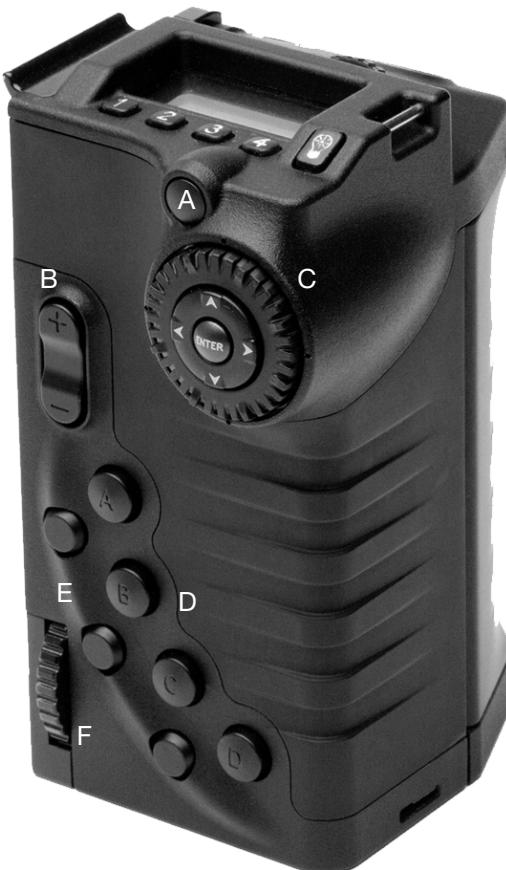
Figure 7: Side Handle Controls - Front

- **Stills / Movie Slider:** Selects between STILLS and MOVIE modes of operation.

NOTE: This switch is not active at this time. Default camera operation is MOVIE

RED EPIC® OPERATION GUIDE

REAR



A	MENU Button	D	User Keys A-D
B	Rocker Switch	E	System Keys 1- 3
C	Navigation Group	F	Thumbwheel Lock

Figure 8: RED Side Handle Controls - Rear

- **Menu Button:** Press to access / camera setup menus.
- **Rocker Switch:** Increases or decreases selected value based on parameter selected in USER KEYs.

RED EPIC® OPERATION GUIDE

- **Navigation Group:** Allows navigation through camera menus, selection of camera parameter for adjustment, and adjustment of selected camera parameter.

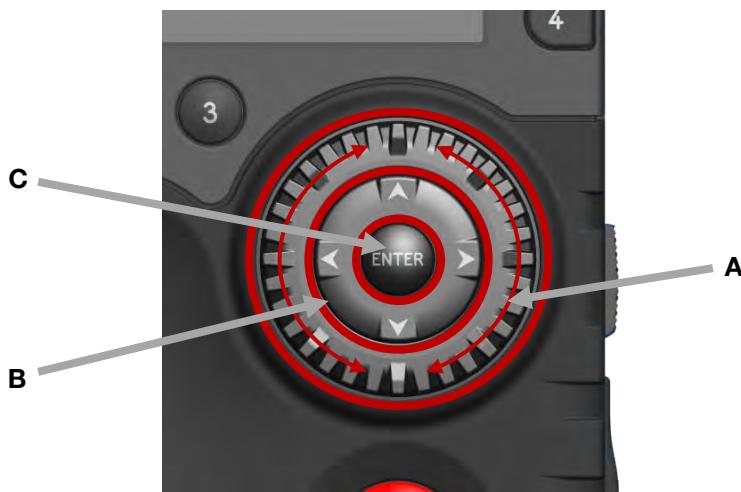


Figure 9: Side Handle Navigation Group

A	Scroll Wheel	B	Direction Keys	C	Enter Button
----------	--------------	----------	----------------	----------	--------------

- **Scroll Wheel:** Selects and adjusts camera parameter value.
- **Direction Keys:** Navigates camera menus and may select parameter for adjustment.
- **Enter Button:** Confirms selected parameter value adjustment.

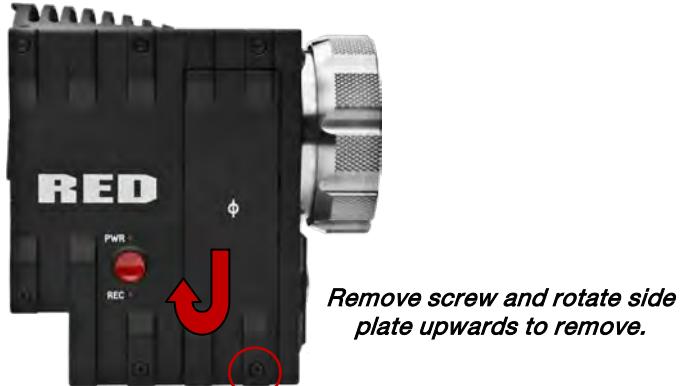
- **User Keys:** User Function Keys A-D (F). The specific function of these keys may be programmed by the user. Default settings for User Function Keys A-D are as follow:
 - User Key A – Enables (Auto) Focus Indicator
 - User Key B – Enables White Balance calculation
 - User Key C – Enables 1:1 Focus Check
 - User Key D – Enables false color Exposure Check.
- **System Keys:** Function are defined by System Firmware
 - Upper: Enables false color Exposure Check.
 - Center: Not currently defined.
 - Lower: Ejects (unmounts) the currently selected Media.

RED EPIC® OPERATION GUIDE

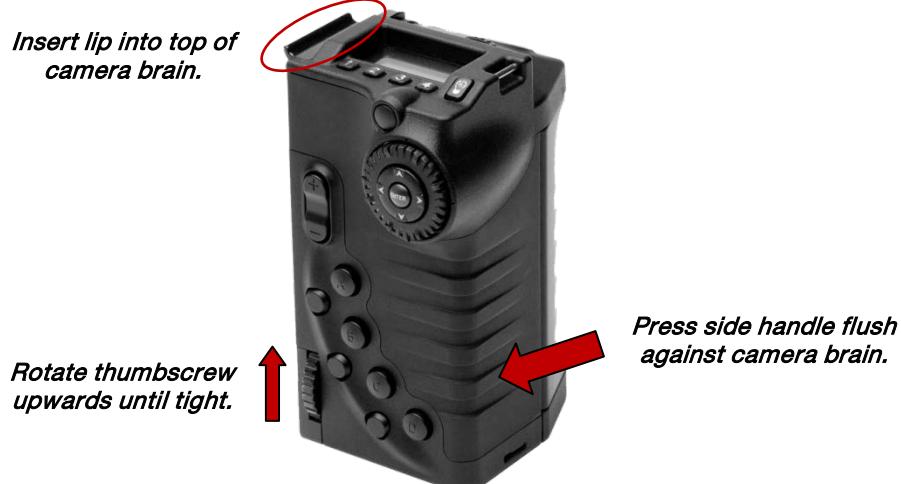
INSTALLATION / REMOVAL

To install the side handle:

1. Remove the brain side plate (if installed) by removing the single screw located at the bottom.
2. Rotate upwards to disengage lip at top of side plate from camera brain.



3. Insert the lip at the top of the side handle into the area where the lip from the side plate was installed.

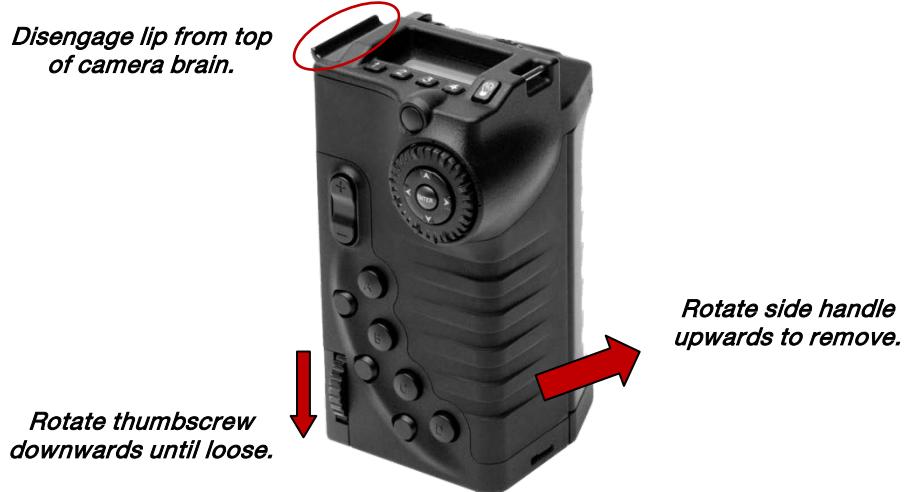


4. Rotate side handle down flush along side of camera brain.
5. Rotate thumbscrew upwards until tight. Ensure side handle is secure to camera brain.

RED EPIC® OPERATION GUIDE

To remove the side handle:

1. Rotate the thumbscrew downwards until detached from camera body.



2. Rotate upwards to disengage lip at top of side handle from camera brain.
3. Remove side handle from camera.

RED EPIC® OPERATION GUIDE

REDMOTE

This section describes the physical controls on the REDmote.



Figure 10: REDmote Controls

A	Still/Motion Slider	F	User Keys A-D	K	Soft Menu Keys 4-8
B	Release Button (L)	G	MENU Button	L	Ambient Light Sensor
C	Record LED	H	Soft Menu Keys 1-3	M	Power/Lock Slider
D	Power LED	I	Navigation Group	N	Release Button (L)
E	Rocker Switch	J	Focus / Record Button	O	USB Connector

- Stills / Motion Slider:** Allows selection of STILLS or MOVIE operational modes.
- Rocker Switch:** Provides continuous adjustment of parameter specified in USER KEYS menu.
- User Keys:** Press to initiate camera functions as defined in USER KEY menu.

Default settings for User Function Keys A-D are as follow:

- User Key A – Enables (Auto) Focus Indicator
- User Key B – Enables White Balance calculation
- User Key C – Enables 1:1 Focus Check
- User Key D – Enables false color Exposure Check.

- Menu Button:** Press to access / camera setup menus.

RED EPIC® OPERATION GUIDE

- **Soft Menus Keys 1-3:** Function defined by LCD screen.
 - Soft Menu 1 - Adjust ISO.
 - Soft Menu 2 - Adjust Shutter Speed.
 - Soft Menu 3 - Adjust White Balance.
- **Navigation Group:** Allows navigation through camera menus, selection of camera parameter and adjustment of selected camera parameter.

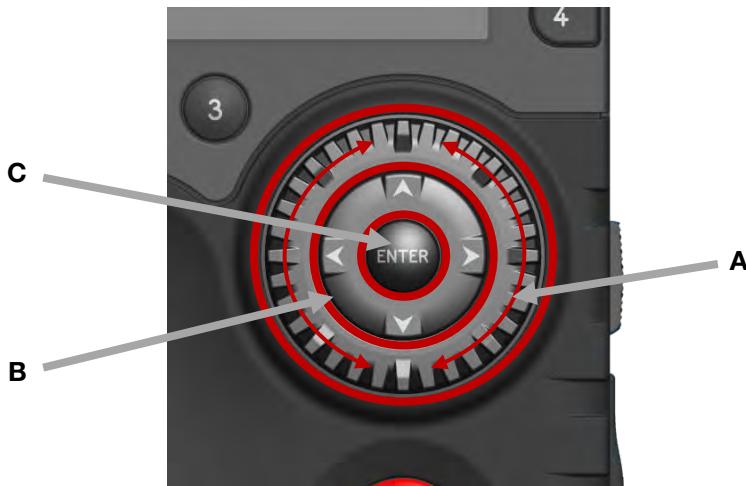


Figure 11: Side Handle Navigation Group

A	Scroll Wheel	B	Direction Keys	C	Enter Button
---	--------------	---	----------------	---	--------------

- **Scroll Wheel:** Selects and adjusts selected camera parameter value.
- **Direction Keys:** Navigates camera menus and may select parameter for adjustment.
- **Enter Button:** Confirms selected parameter value adjustment.
- **Focus / Record Button:** Touch for Auto Focus, fully depress to Start or Stop Record.
- **Soft Menus Keys 4-8:** Functions defined by LCD screen. Not active at this time
- **Power / Lock Slider:** Slide and hold down to power up / down REDmote. Slide up to lock keys.

RED EPIC® OPERATION GUIDE

BOMB EVF



Figure 12: BOMB EVF

A	Focus Ring	B	EVF User Key 1 / 2	C	EVF Tally Light
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- **Focus Ring:** Adjusts optimal subject focus for your eye. Available diopter range is +2.0 to -5.0.
- **EVF User Key 1:** Initiates user defined camera function. Default: 1:1 Magnify
- **EVF User Key 2:** Initiates user defined camera function. Default: False Color : Exposure

RED EPIC® OPERATION GUIDE

RED LCD

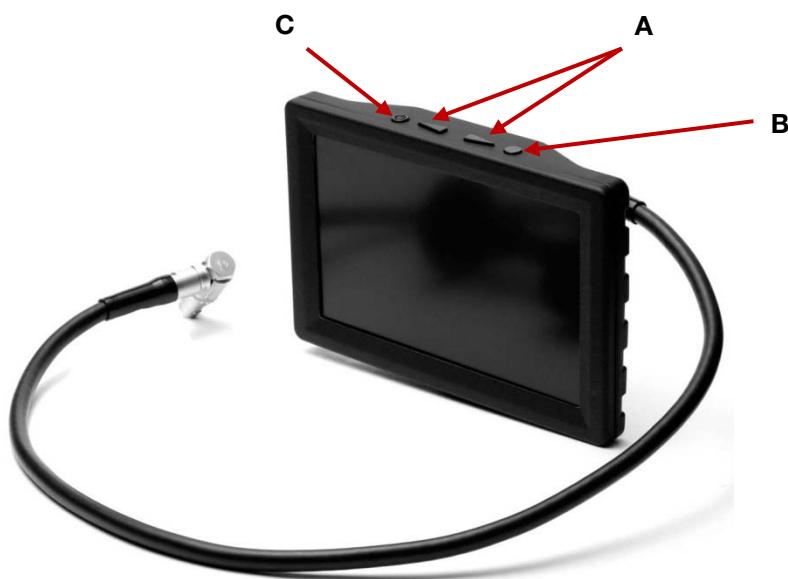


Figure 13: RED LCD

A	Backlight Adjust	B	Power Key	C	LCD User Key
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- **Backlight Adjust:** Adjusts LCD backlight intensity.
- **Power Key:** Not Used
- **LCD User Key:** Press to execute user defined function. Default: False Color > Exposure.

RED EPIC® OPERATION GUIDE

TOUCHSCREEN LCD



Figure 14: RED Touchscreen LCD

A	Backlight Adjust	B	Power On/Off	C	LCD User Key
----------	------------------	----------	--------------	----------	--------------

- **Backlight Adjust:** Adjusts LCD backlight intensity. Upper button +, Lower button -
- **Power Key:** Press to power LCD On / Off.
- **LCD User Key:** Press to execute user defined function. Default: False Color > Exposure.

NOTE: The touchscreen LCD also allows navigation of camera menus and selection and adjustment of camera parameters by directly touching icons on the screen. Gestures supported include:

- **Tap:** Tap on an icon to bring up a quick adjustment display.
- **Hold:** Touch and hold on an icon to bring up an advanced interface display.
- **Slide:** Touch and slide on an icon to increment a value.
- **Pinch:** Touch with two fingers, then open or close to magnify or normalize the video image.

BASIC OPERATION

This section describes basic operation, starting from power up, Viewfinder layout and Menu navigation.

POWER SOURCES

SIDE HANDLE

The optional Side Handle accepts one 30Wh REDVOLT battery, which can power the camera and typical accessories for approximately 30 minutes when recording in 24 fps RAW 5K MOVIE mode.



Figure 15: Side Handle Battery Compartment

EXTERNAL DC POWER

EPIC accepts input voltages between 11.5V - 17V D.C and can draw a maximum current of 12 Amps.

- An appropriate 150W supply with DC output rated at 15V 10A is available from RED Digital Cinema.
- RED BRICK® 140Wh batteries may be used with the camera via adaptor cable p/n 140-0135.
- 4-pin XLR DC power sources may be used with the camera via adaptor cable p/n 140-0160.

RED EPIC® OPERATION GUIDE

POWER UP

Locate the camera's Power / Record button on the right face of the Brain.

NOTE: This button also serves as a Record Start / Stop button once the camera is powered up.



A	Power Status LED
B	Power / Record Button
C	Media Status LED

Figure 16: Power / Record Button / Status LEDs

When an appropriate power source is connected to the Brain, the Power Status LED will illuminate Red. If it is illuminated, depress and then release the Power / Record button. The Power Status LED will initially go out and within 5 seconds illuminate Orange to confirm the camera is powering up, then it will illuminate Green, confirming the camera is powered up and ready to use.

If a formatted REDMAG 1.8" SSD is attached to the Brain, once powered up the Media Status LED will illuminate Green. If this LED is not illuminated, verify a formatted REDMAG 1.8" SSD is inserted into the Side SSD Module and / or format the SSD if it has not previously been formatted on the camera.

NOTE: Once powered up, if the Power Status LED illuminates Red, it indicates low remaining battery capacity and a battery exchange or switch over to external DC power is recommended.

POWER DOWN

Depress and continue to hold the Power / Record button in its fully depressed position for 5 seconds.

After Power Down, the Power Status LED will illuminate Red, if an appropriate power source is available.

NOTE: The camera may also be powered down using REDmote or Side Handle Menu controls, or via Touch Screen LCD icons. Refer to **SECONDARY MENUS > POWER**.

RED EPIC® OPERATION GUIDE

GRAPHICAL USER INTERFACE AND NAVIGATION

RED LCD/TOUCHSCREEN LCD, BOMB EVF, EXTERNAL MONITORS

The following is a general description of the structure of the camera's Graphical User Interface (GUI) which overlays the video monitor signal on the Viewfinder output(s) of the camera.

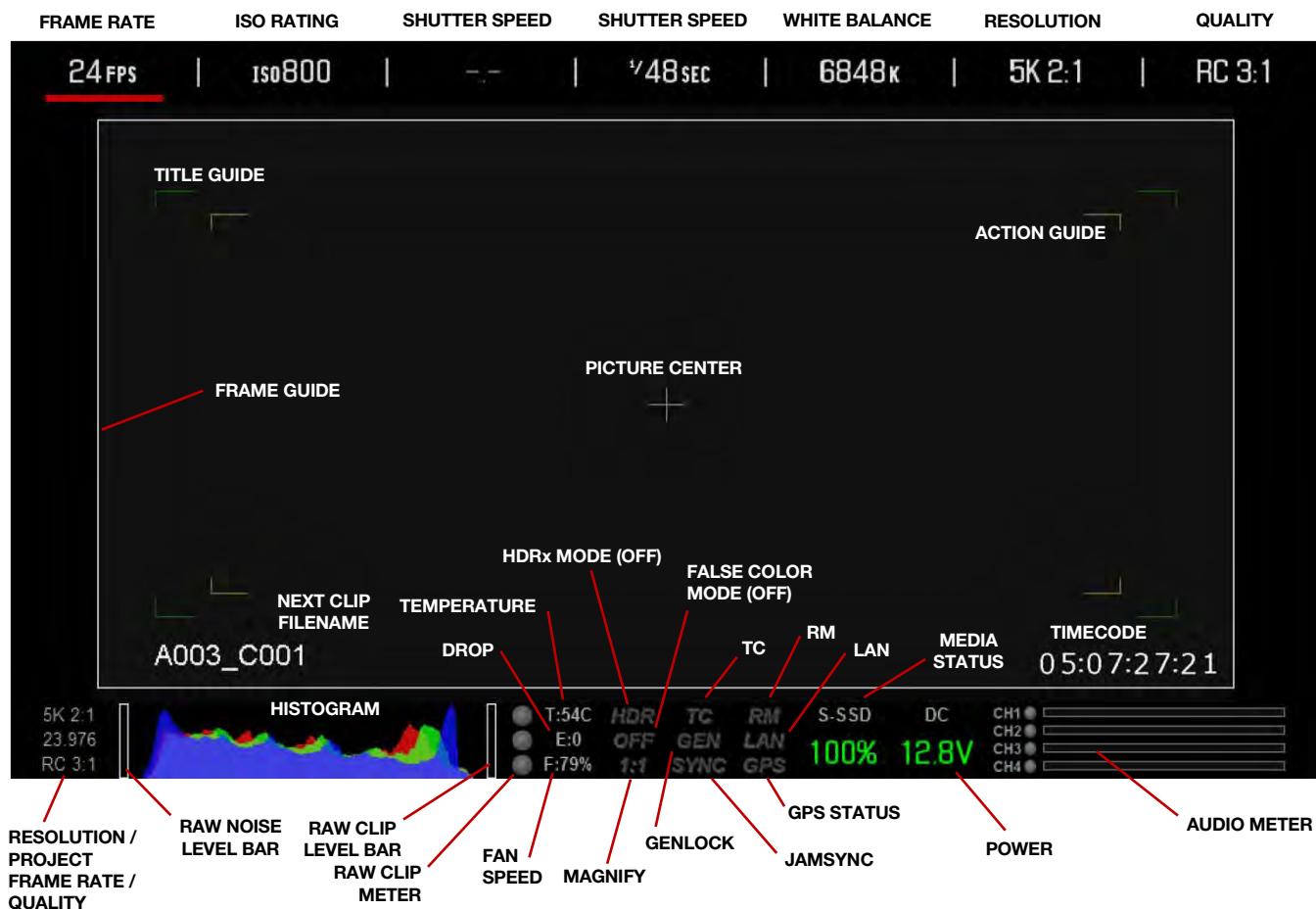


Figure 17: GUI Display Elements

The display elements include:

- **Frame Rate:** Current frame capture rate
- **ISO Rating:** Camera sensitivity
- **Shutter Speed:** Exposure Time (or Degrees)
- **White Balance:** Color Temp
- **Resolution Record Resolution**
- **Quality:** REDCODE setting
- **Cursors:** Reference cursors – Safe Action / Safe Title, Picture Center, Grid Overlay
- **Frame Guide:** Record or Projection area
- **Clip Filename:** Filename of the clip that will be shot

- **Project Frame Rate:** Current project TIME BASE
- **Noise Level Bar:** Relative number of RAW pixels in noise
- **Histogram:** RGB Histogram.
- **Clip Level Bar:** Relative number of RAW pixels near clip
- **Clip Meter:** RGB sensor RAW clipping status
- **Temperature:** Camera core temperature
- **Drop:** Indicates if any frames were dropped during recording of the clip
- **Fan Speed:** Displays fan speed in %
- **HDRx:** Displays HDRx mode status
- **False Color Mode:** Displays false color overlay mode
- **Magnify:** Tallies 1:1 if magnify is selected
- **TC:** Indicates presence of valid SMPTE timecode signal
- **Genlock:** Indicates presence of valid Genlock signal
- **Jam Sync:** Timecode Jam Sync status
- **RM:** Indicates communication to REDmote controller
- **LAN:** Indicates communication via Ethernet connection
- **GPS:** Indicates presence of a GPS signal
- **Media Status:** Media location and remaining media capacity in %
- **Power:** Indicates D.C supply voltage or % of remaining battery capacity Including current supply voltage
- **Audio Meter:** Audio input selection and levels
- **Timecode:** Current **timecode** value
- **Menu ICON**  : In the upper right corner on the touchscreen LCD - Opens the Secondary Menus

The GUI is broken down into the following three main sections: the Upper Status Row, the Live Action Area, and the Lower Status Row. On VIEWFINDER output(s), all three sections are visible, on PREVIEW outputs only the Live Action Area and associated graphic overlays are visible. On PROGRAM outputs, none of the graphic overlays are visible, i.e. a PROGRAM output is defined to be a CLEAN FEED output.

UPPER STATUS ROW



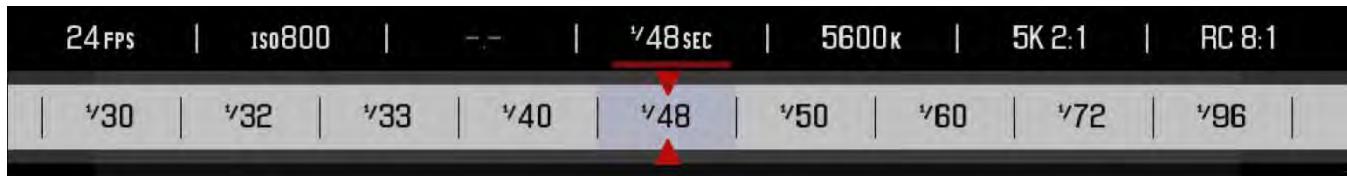
Provides immediate feedback on the most critical image composition parameter settings, including:

- Current frame capture rate
- ISO Rating
- Shutter Speed (or Shutter Angle)
- White Balance
- Record Resolution
- Record Quality

Whichever parameter is underlined with a red bar may be immediately adjusted by pressing ENTER in the Navigation Group of the Side Handle or REDmote, then using the Scroll Wheel to change the value of that parameter. To confirm the parameter change press ENTER a second time.

RED EPIC® OPERATION GUIDE

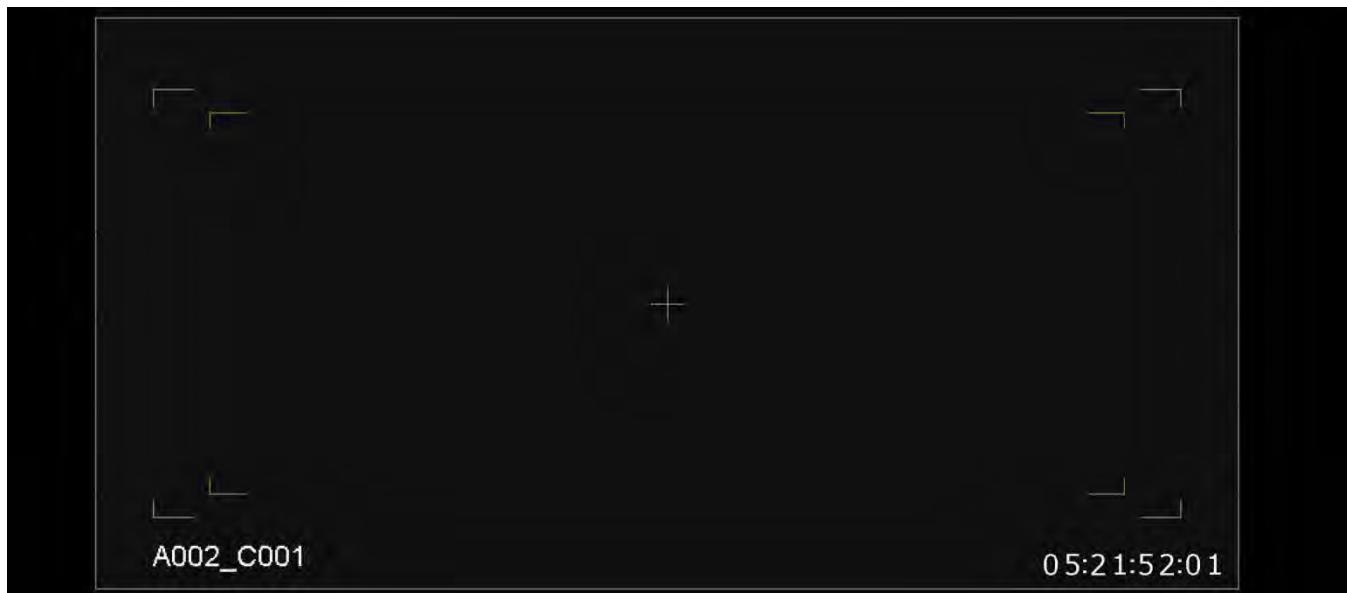
If the red bar is not on the parameter you wish to change, first use the Scroll Wheel to position the red bar under that parameter, then press ENTER, adjust with the Scroll Wheel and press ENTER a second time to confirm the value change.



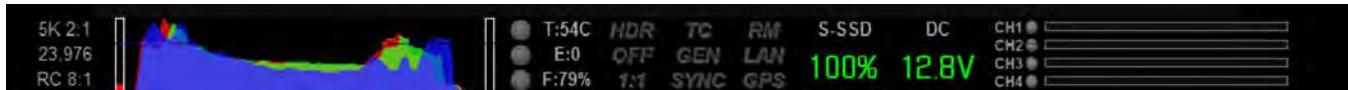
In the above GUI example, the Scroll Wheel has been used to move the red cursor to the Shutter Speed parameter; and the ENTER key has been pressed. This reveals the Parameter Adjust Window. Adjust the value using the Scroll Wheel and then press ENTER to confirm the value change, then close the sub-menu.

LIVE ACTION AREA

Contains the recorded image area plus Surround View™ look around area, plus overlays for Frame Guide, Safe Action / Safe Title and the current Clip Name and Timecode values. Each overlay may be color coded in one of 5 colors to maximize the contrast between the guide(s) and scene being captured.



LOWER STATUS ROW



The Lower Status Row provides feedback on key systems level camera values, including:

- Clip Settings
- Exposure (Histogram)
- Temperature, Power and Sync
- Media Status
- Power Status
- Audio Levels

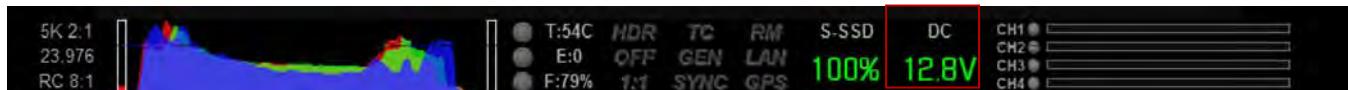
POWER STATUS

If using a REDVOLT battery to power the camera, power status displays the location of the power source (example: SH: Side Handle) and reports the % of remaining battery capacity and the display text is color coded as follows:

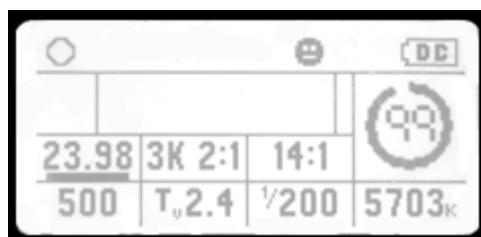
- Green = 99% - 11%
- Yellow = 10% - 6 %
- Red = 5% - 0%



NOTE: If using a REDBRICK battery to power the camera, power status displays DC and voltage as if the camera is hooked up to DC power.



SIDE HANDLE



The display elements include:

- **Power:** Camera power status (DC Shown)
- **Frame Rate:** Image capture rate
- **Resolution** Recording Resolution
- **Quality:** REDCODE setting
- **ISO Rating:** Camera sensitivity
- **Shutter Speed:** Exposure Time (or Degrees)
- **White Balance:** Color Temp

RED EPIC® OPERATION GUIDE

REDMOTE



The display elements include:

- **Wireless Status:** Displays signal strength when connected wirelessly
- **Connected Camera:** PIN of camera connected via REDlink wireless link
- **Battery Indicator:** Displays battery life or charge status (shown) of REDmote
- **Resolution** Recording Resolution
- **Quality:** REDCODE setting
- **Clip Filename:** Filename of next clip
- **Frame Rate:** Image capture rate
- **F-Stop:** Not active at this time
- **ISO Rating:** Camera sensitivity
- **Shutter Speed:** Exposure Time (or Degrees)
- **White Balance:** Color Temp
- **AE / AF:** Auto Focus / Auto Exposure - Not active at this time
- **Timecode:** Current timecode value
- **Battery:** Camera battery life status
- **Media:** Remaining media capacity
- **Clip Meter:** RGB sensor RAW clipping status

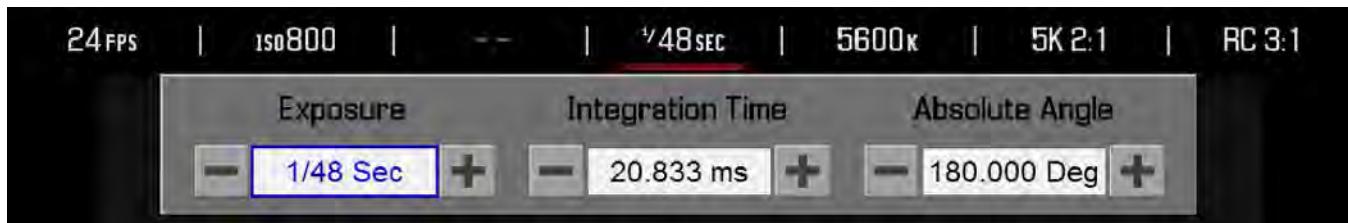
NAVIGATING MENUS

The primary method to navigate Menus is via the Scroll Wheel. Rotate clockwise to move right, counter clockwise to move left. However, the Left and Right direction Navigation Keys may also be used for this purpose.

The Up and Down direction Navigation Keys provide additional navigation functions when pressed:

UP Selects Advanced Settings menu when Cursor is positioned on the Upper Status Row
 Moves Cursor to the Upper Status Row if the Cursor is positioned on Lower Status Row.

DOWN Selects Advanced Settings menu when Cursor is positioned on the Lower Status Row



As an example, position the Cursor under the Shutter Speed (24FPS) icon and press the UP Direction Key to access advanced adjustment values for Shutter Speed.

USING TOUCHSCREEN LCD

If operating a Touchscreen LCD, camera menu navigation may be made through finger gestures.



- To adjust a parameter value, simply touch it, and then swipe the finger left / right to adjust its value.
- To access an advanced parameter settings display, press and hold down on the parameter icon.
- Touch anywhere outside the overlay windows to enter the value changes and to hide the sub-menus.
- To enter the Secondary Menus, touch the MENU icon.

SHORTCUTS

Along the lower status row, menu items can be accessed by simply touching that section of the screen.



- Touching Clip Settings at the lower Left corner of the LCD will display the System Status screen. Refer to SECONDARY MENUS > SETTINGS > MAINTENANCE > SYSTEM STATUS for complete information.
- Touching the RGB Histogram will bring up the False Color overlay menu. Refer to SECONDARY MENUS > SETTINGS > DISPLAY > FALSE COLOR for complete information.
- Touching System Status in the lower Center of the screen will bring up the Settings menu. Refer to SECONDARY MENUS > SETTINGS for complete information.
- Touching Media Status indicator will bring up the Media menu. Refer to SECONDARY MENUS > MEDIA for complete information.
- Touching Power Status indicator will bring up the Power menu. Refer to SECONDARY MENUS > POWER for complete information.
- Touching the Audio Meter will display the Audio Input menu. Refer to SECONDARY MENUS > SETTINGS > AUDIO/VIDEO for complete information.

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POWER DOWN

THROUGH POWER MENU

1. Select the MENU icon  in the right corner of the Upper Status Bar to reveal the Secondary Menus.
2. Select POWER.
3. Select SHUTDOWN.
4. The camera will immediately power down.



USING POWER STATUS DISPLAY

1. Select the POWER status located between the audio channels and media remaining indicator, to reveal the same menu illustrated above.



2. Select SHUTDOWN.
3. The camera will immediately power down.

LOCK / UNLOCK TOUCHSCREEN OPERATION

LOCK

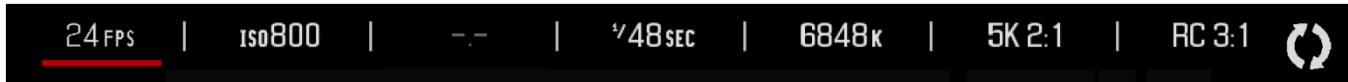
To lock out the touchscreen operation, touch and hold the MENU icon  until the LOCK icon  displays; indicating the touchscreen has been locked out. When locked, the main menu will be displayed.



RED EPIC® OPERATION GUIDE

UNLOCK

To unlock out the touchscreen and allow normal operation, touch and hold the LOCK icon  until the MENU icon  displays; indicating the touchscreen has been unlocked.



FIRST TIME USE - SETTING UP YOUR RED EPIC

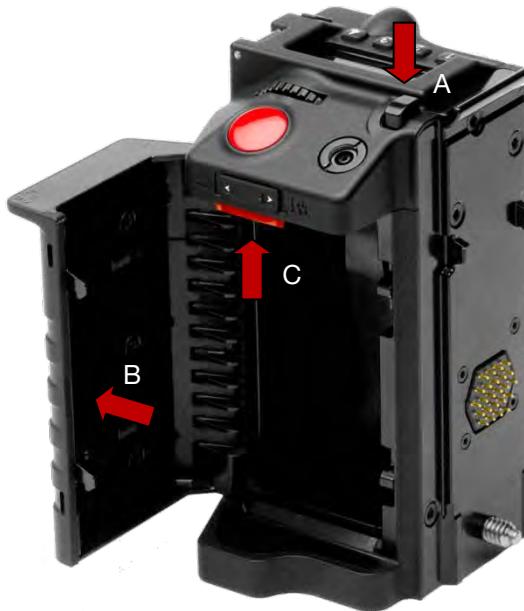
1. ATTACH POWER SOURCE

BATTERY

Connect a RED battery to the camera in one of the following ways:

SIDE HANDLE

Attach a Side Handle and insert a REDVOLT battery.



INSTALL

1. Press the battery door release button (A).
2. Open battery door (B).
3. Press upwards on retainer (C).
4. Insert a REDVOLT battery until it is fully seated and retainer (C) clicks into place.
5. Close battery door.

REMOVE

1. Press the battery door release button (A).
2. Open battery door (B).

3. Press upwards on retainer (C) to release battery.
4. Remove battery from side handle.

REAR BATTERY MODULE

Attach a Rear Battery Module and insert one or more REDVOLT or REDVOLT XL batteries.

RED BRICK

Attach to the camera using a V-Plate and adaptor cable p/n 140- 0135 to the DC IN connector.

DC POWER

Connect a DC power source to the camera in one of the following ways:

- Plug the RED AC Power Adapter into AC power, and the LEMO connector to the DC IN connector.
- Plug the RED CHARGER into AC power, and the LEMO connector to the DC IN connector via adaptor cable p/n 140-1060.
- Plug a 12V XLR based power source into the DC IN connector via adaptor cable p/n 140-1060.

NOTE: The maximum sustainable power load of the EPIC AC Power Adapter is 150W (15V@10A). The output of the adapter is over current protected, and will shut down if an excess load condition occurs. If the output trips for any reason, remove any external loads from the camera, such as lights, motors etc, turn off the Adapter and repeat the above procedure.

2. POWER UP

Locate the camera's Power ON / OFF button on the right face of the Brain. If the Power Status LED is illuminated Red, depress and then release the Power / Record button. If not illuminated, check your battery charge status or external power source cable connection. Once powered up the Power Status LED will illuminate Green, confirming the camera is ready to use.

3. PREPARING TO RECORD

Before each days recording, the camera should be prepared as follows:

- Physically set-up camera as desired.
- Verify camera is using the latest firmware version at www.RED.com/support and if appropriate, upgrade the camera firmware. Refer to APPENDIX A: UPGRADING CAMERA FIRMWARE.
- Insert a blank (or previously used but erasable) REDMAG 1.8" SSD and format it.
- Perform a BLACK CALIBRATION of the Sensor.
- Check your PROJECT SETTINGS (Time Base, Record Resolution, Record Quality, etc.).
- Frame, focus and record.

CONNECTING AND FORMATTING MEDIA

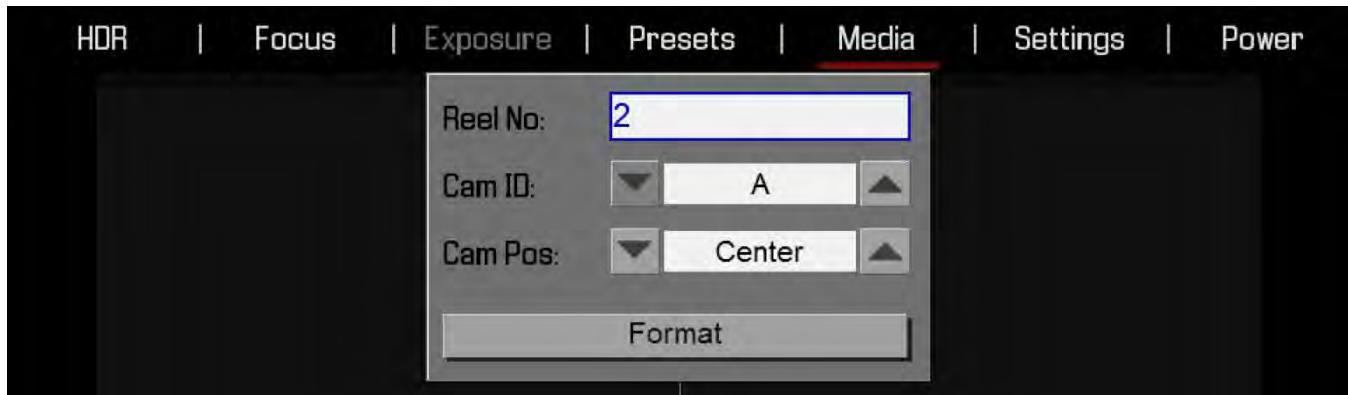
Identify a REDMAG 1.8" 64GB, 128GB or 256GB SSD that has not previously been recorded to, or is not a camera master and may therefore be erased and re-used. Align the RED logo of the SSD to the outside, and then push the SSD firmly, but without excessive force, into the slot in the Side SSD Module.

NOTE: When fully inserted, the SSD media protrudes slightly from the SSD slot as indicated above.

The Media Menu is used to format and number attached media and to Eject (unmount) the media prior to removal from the camera. Menu options include Select Media, Format Media and Eject Media.



When FORMAT is selected, a SLATE dialog box will appear allowing you to add Camera Identity and 3D Position properties when formatting.



PERFORMING A BLACK SHADING CALIBRATION

Refer to SECONDARY MENUS > SETTINGS > MAINTENANCE > CALIBRATION for complete details for performing a Black Shading Calibration.

ADJUSTING PROJECT SETTINGS

TIME BASE

To adjust the project TIME BASE, press the MENU button on the Side Handle or REDmote. Then use the Scroll Wheel or Direction Keys to navigate to SETTINGS > PROJECT > PROJECT RATE and press ENTER. Adjust to the desired value using the Scroll Wheel and press ENTER once more to confirm.

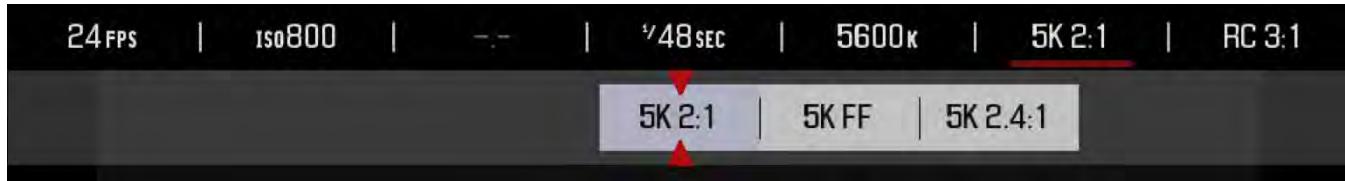
If using a Touch Screen, select  > SETTINGS > PROJECT > PROJECT RATE. Adjust by sliding your finger left / right or tapping on the desired value, and then press anywhere else on the touch screen to confirm.

The following TIME BASES are currently available:

- 23.98 fps
- 25.00 fps
- 47.96 fps
- 50.00 fps
- 24.00 fps
- 29.97 fps
- 48.00 fps
- 59.94 fps

NOTE: A project can only support one Time Base as this defines the frame count to be used for time code and as the clip playback and editing frame rate. It is also the primary frame rate for acquisition, but variable speed (over-crank and under-crank) recordings can be made above and below this base frame rate using the VARISPEED menu.

RECORD RESOLUTION



To adjust Record Resolution, navigate the Cursor to the RESOLUTION icon in the Upper Status Row and press the Navigation Group ENTER key. Adjust to the desired value using the Scroll Wheel and press ENTER a second time to confirm.

If using a Touch Screen, press the RESOLUTION ICON, adjust RESOLUTION by sliding your finger left / right, or tap on the desired resolution, and then press anywhere else on the touch screen to confirm.

The following Recording Resolutions are currently available:

- 5K 2:1
- 5K 2.4:1
- 5K FF

RECORD QUALITY (REDCODE)



To adjust Record Quality, navigate the Cursor to the QUALITY (RC) icon using the Navigation Group Scroll Wheel, then press the ENTER key. Adjust to the desired value using the Scroll Wheel and then press ENTER to confirm. Available REDCODE compression options are RC 3:1 through RC 18:1.

If using a Touch Screen, press the QUALITY icon, adjust the REDCODE value by sliding your finger left / right or tap on the desired value, and then press anywhere else on the touch screen to confirm.

Default value for REDCODE is 8:1.

CAMERA ID (SLATE)

If operating on a multi-camera production, enter a different Camera ID for each camera; otherwise skip this step; the camera is ready to shoot.

The Camera ID is set when the media is formatted. Refer to ADVANCED MENU > MEDIA for details.

4. RECORDING

Ensure a formatted REDMAG 1.8" SSD is inserted in the camera's Side SSD Module, then fully depress any one of the RECORD buttons located on the Brain, Side SSD Module, Side Handle or REDmote.

Fully depress again to stop recording. The camera will automatically create a unique and sequential file name for each clip recorded on the SSD based on the Camera's I.D set in the MEDIA menu.

REDCODE RAW data recordings store the Color Temperature and Exposure (ISO) and any RGB color processing values you use in the monitor path as metadata. This metadata is used in REDCINE-X or other post production software as initial white balance, exposure and color correction points however, you are free to change these values at any time when you process the RAW footage.

Time Code and Edge Code values used by the camera are Non Drop Frame (NDF); Drop Frame (DF) is not supported. Audio is captured uncompressed at 24-bit resolution, 48KHz sample rate per channel.

Digital media such as REDMAG 1.8" SSDs are very robust, but should be treated with equal care as exposed film or a videotape master. We recommend storing digital media that contains your footage in a secure location and backing up the data to a digital archival media, such as data tape or hard disk drive.

RECORD INDICATOR

When recording, the RED EPIC camera provides a variety of record indications (tallies):

- Timecode, normally displayed in white colored text, will be displayed in red colored text.
- A small Red dot will appear in the top right corner of the VIEWFINDER output(s).



- The REC LED on the right side of the camera Brain will illuminate Red.

- REDmote upper LED will illuminate Red, the Timecode will turn Red, and a Red dot will appear to the left of the Timecode display.



- If using a BOMB-EVF, the LED on the front will illuminate Red if Tally is enabled
- SMPTE-RP188 timecode VITC-2 HANC metadata record flag will be enabled on HD-SDI outputs.
- If enabled in the USER KEYS menu, the GPO trigger output in the CNTL connector will pulse.

5. PLAYBACK

Playback of recorded clips is not currently enabled in camera firmware and must be performed off the camera. Off-load the Clips from your REDMAG 1.8" SSD to a personal computer using a RED STATION REDMAG 1.8" module.

MENU CONTROLS

Displayed in the Upper Display Group of the VIEWFINDER output(s), are FRAMERATE (FPS), EXPOSURE (ISO), ... (F/Stop), WHITE BALANCE, RESOLUTION, and QUALITY (REDcode). These parameters are adjustable directly through this screen. When using the touchscreen, directly to the right of these parameters is the MENU icon  which when pressed will take you to the secondary camera set up menus.



ADJUSTMENTS

BASIC SETTING ADJUSTMENTS

SIDE HANDLE / REDMOTE

- Navigate to the desired setting using the NAVIGATION GROUP direction keys and press ENTER.
- Use the Scroll Wheel to increase or decrease the parameter value.
- When the desired value has been selected, press ENTER to set.

TOUCHSCREEN

- Touch the desired parameter for adjustment.
- Slide your finger across the screen to scroll through the available parameter values.
- When desired the parameter value has been selected, touch anywhere in the screen area to set.
- To close an alpha numeric keypad when entering information directly, tap anywhere on the screen outside the keypad.

ADVANCED SETTING MENUS

At this time, only FRAMERATE, SHUTTER SPEED and WHITE BALANCE on the MAIN MENU have advanced settings.

SIDE HANDLE / REDMOTE

1. Navigate to the desired setting using the NAVIGATION GROUP direction keys and then press the UP directional key.
2. Use the direction keys to navigate to the desired parameter adjustment field and press ENTER.
3. Use the Scroll Wheel to adjust the selected parameter value.

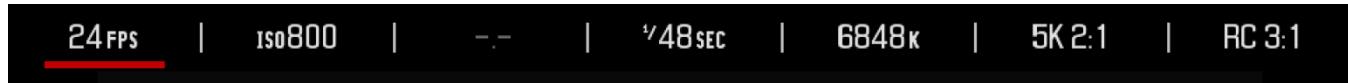
4. When desired selection is made, press the MENU button to set.

TOUCHSCREEN

1. Press and hold the desired parameter to gain access to advanced setting adjustments.
2. Press the field - a keypad type menu may appear to allow adjustments.
3. Press the desired parameter settings to adjust.
4. When desired selection is made, press anywhere in the screen area to set and exit the advanced settings submenu.

MAIN MENU

Available options under the MAIN MENU are FRAMERATE (FPS), EXPOSURE (ISO), WHITE BALANCE, RESOLUTION, and QUALITY (REDcode).



FPS (VARISPEED)

Used to select an image capture frame rate that differs from the Project's TIME BASE frame rate.

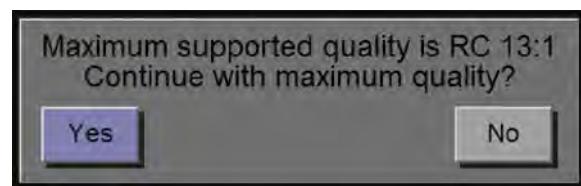
Range is 1 – 120 fps

Default is 24 fps (or the selected Project TIME BASE frame rate if not 23.98 or 24.00 fps).

When a frame rate other than the current TIME BASE has been selected, the FPS text will turn Yellow and VARISPEED will be shown where the Audio Meter is normally displayed at the lower right of the display.



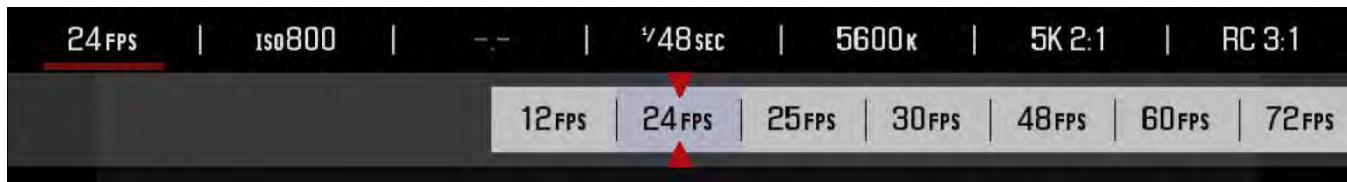
If you press record with a frame rate set too high for the selected record quality, you will be prompted to allow the camera to change the REDCODE setting to the maximum quality that enables that frame rate.



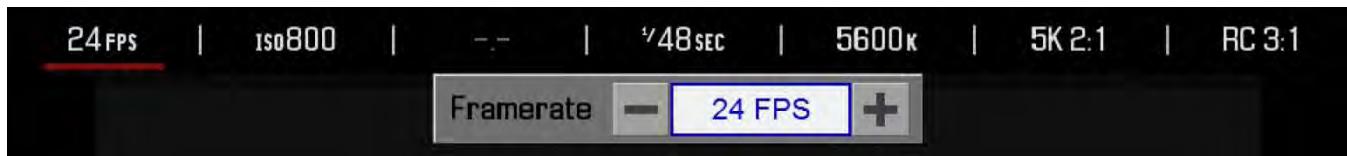
BASIC SETTINGS

Provides quick selection of the most common Varispeed frame rates.

RED EPIC® OPERATION GUIDE



ADVANCED SETTINGS



When selected a numerical keypad will appear allowing the desired Varispeed Framerate to be entered in 1 fps increments. Maximum frame rate is a function of RECORD RESOLUTION and REDCODE settings.



On Touchscreen systems, a Keypad is available for direct numeric entry of the Varispeed FPS value. Touch the value bounded by the + and – labels to bring up, press outside the keypad to confirm the value.

ISO (SENSITIVITY)

Adjusts the camera's ISO rating. The sensitivity value is adjustable in 1/3rd stop increments. When the ISO rating is adjusted, the camera logs the change as metadata and the monitor path reacts accordingly. Higher ISO values lead to brighter images in the monitor path, and vice versa.



Range is ISO 80 – 12800

Default is ISO 800

/F (F-STOP)

Not implemented at this time.

1/SEC (EXPOSURE)

BASIC SETTINGS

Adjusts the exposure of each frame captured by the MYSTERIUM X sensor. Shutter speed presets are provided for all common speeds (and shutter angles) for 24 / 25 fps and 50 / 60 fps project frame rates.



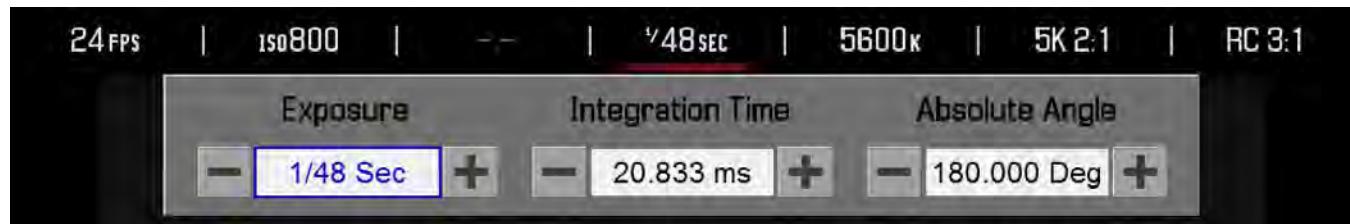
Decreasing Shutter Speed allows more light to fall on the sensor, increasing exposure and motion blur on any objects moving within the frame. Increasing Shutter Speed increases allows less light to fall on the sensor, decreasing exposure and motion blur on objects moving within the frame.

Range is 1 sec – 1/8000th sec - Slowest available speed is 1/frame rate, so for 24 fps it is 1/24th sec.

Default is 1/48th Sec.

ADVANCED SETTINGS

When selected, the advanced settings menu allows fine control over the Exposure value, and permits entry in any of the three following common units – EXPOSURE (Shutter Speed), INTEGRATION TIME or ABSOLUTE ANGLE (Shutter Angle).

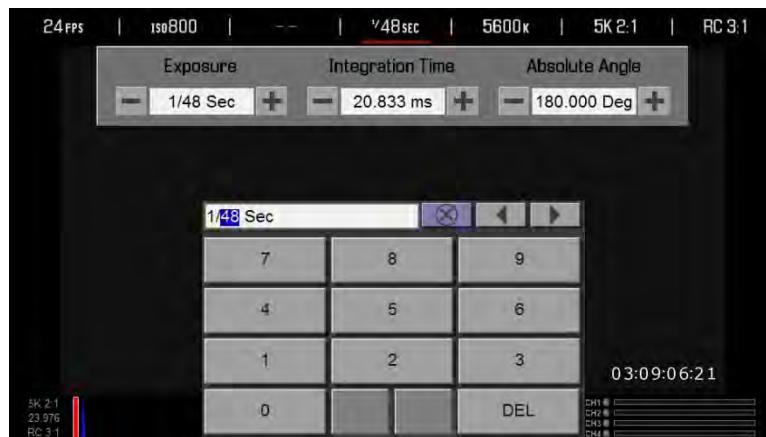


EXPOSURE (SPEED)

Provides the ability to enter the Exposure value as a Shutter Speed (1/xx sec).

Range is 1 Sec – 1/8000th Sec - Slowest available speed is 1/frame rate, so for 24 fps it is 1/24th Sec.

Default is 1/48th Sec.



TIME

Provides the ability to enter the Exposure value as a Shutter Integration Time (xx milliseconds).

Range is 0.125 to 1,000 mS (milliseconds)

Default is 20.833 MS



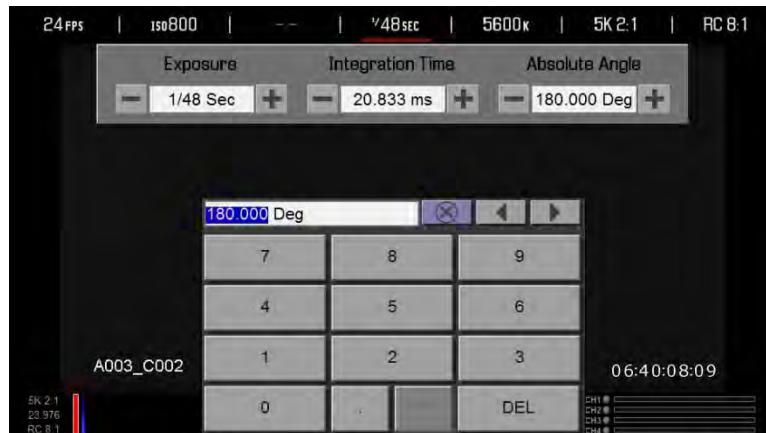
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ANGLE

Provides the ability to enter the Exposure value as a Shutter Angle (xx Degrees).

Range is 4.0 to 360.0 Degrees

Default is 180.0 Degrees



As you adjust any of these three parameters, the camera will automatically calculate the equivalent value in the other units, but as a quick reference here are some common Speeds and Angles.

To Convert Shutter Speed to Angle Equivalent:

Equivalent Degrees = (Shutter Speed x Frame Rate x 360)

E.g. = $(1/48 \times 24 \times 360) = (8640/48) = 180$

SHUTTER	DEGREES	SHUTTER	DEGREES
1/32	270	1/120	72
1/48	180	1/192	45
1/50	172.8	1/348	22.5
1/60	144	1/696	11
1/96	90	1/1000	8.6

Equivalent Shutter = $1 / (\text{Frame Rate} \times 360 / \text{Angle})$

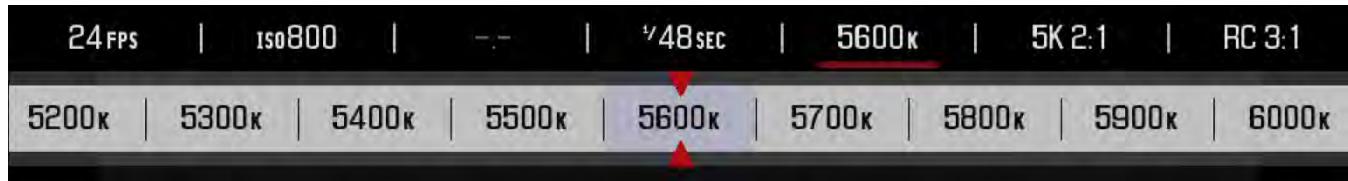
E.g. = $1 / (24 \times 360/180) = 1 / (8640/180) = 1/48$

DEGREES	SHUTTER	DEGREES	SHUTTER
270	1/32	72	1/120
180	1/48	45	1/192
172.8	1/50	22.5	1/348
144	1/60	11	1/696
90	1/96	8.6	1/1000

WHITE BALANCE

BASIC SETTINGS

Allows you to manually set Color Temperature in the range from 1,700 to 100,000 degrees Kelvin.

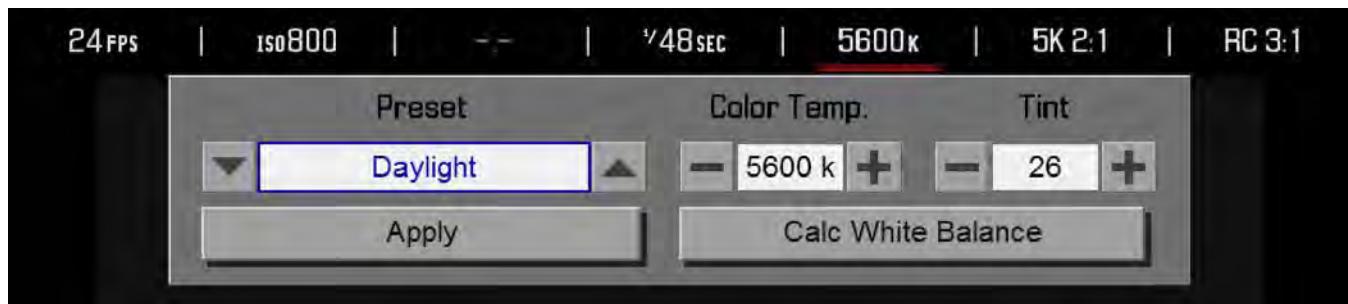


Range is 1,700 K to 10,000 K.

Default is 5600K.

ADVANCED SETTINGS

When selected, allows additional adjustment of the White Balance. Available options are PRESET, COLOR TEMP, TINT, and CALCULATE WHITE BALANCE. Press APPLY for settings to take effect.



PRESET

Available preset options are:

SHADE

Preset to 9,000K

DAYLIGHT

Preset to 5,600K

FLOURESCENT

Preset to 4,500K

INCANDECENT

Preset to 2,800K

CLOUDY

Preset to 7,500K

FLASH

Preset to 5,500K

TUNGSTEN

Preset to 3,200K

RED EPIC® OPERATION GUIDE

COLOR TEMP

Allows you to manually set Color Temperature in the range from 1,700 to 100,000 degrees Kelvin. Default is 5600K.



TINT

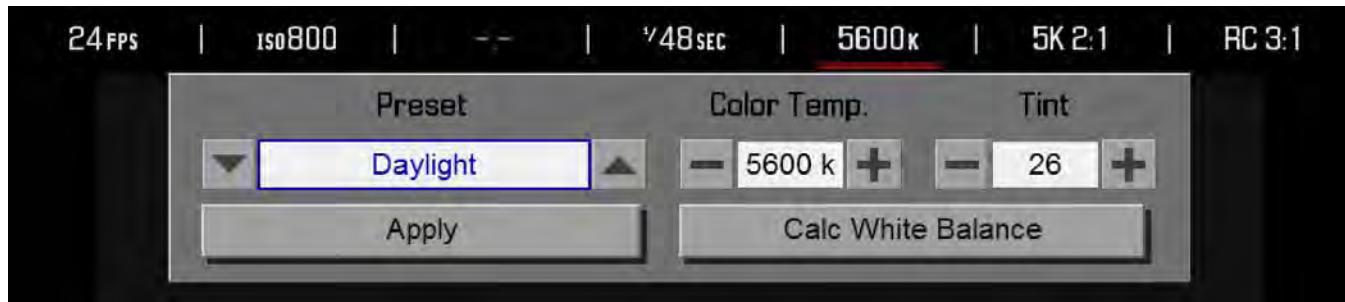
Color Temperature calculations assume a pure light source that may not be true in the specific scene the camera is imaging. To compensate for any residual colorcast, the TINT parameter can adjust the RGB color balance with a compensating Magenta - Green color component. Default is 0. When selected, a secondary keypad will appear allowing you to enter the desired Tint value directly.

NOTE: Selecting Calc White Balance calculates a new Tint value. This is maintained if the Color Temp is adjusted via the Color Temp parameter. If you select ANY presets, Tint will be reset to zero, which is the default value.



CALC WHITE BALANCE

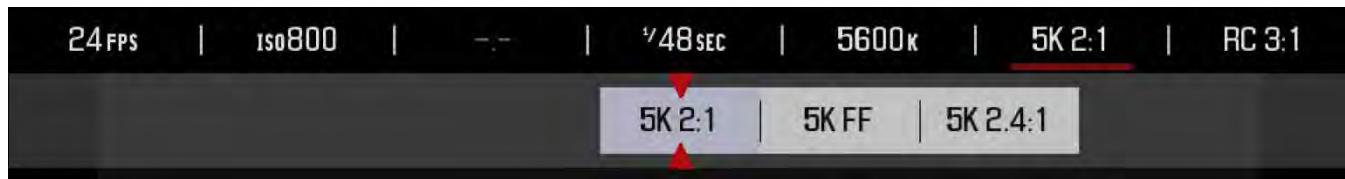
The Calc White Balance function analyzes the central 25% of the image visible in the monitor to calculate a Color Temperature that will render a white object as white.



To use Calc White Balance function, place a White or Gray object under the ambient light, select the Calc White Balance function and then press the Calc White Balance function box. Calc White Balance is also assigned to a User Key on the REDremote and Side Handle as a factory default setting.

RESOLUTION

Allows adjustment of resolution.



Default is 5K 2:1

The following Resolution options are available:

- 5K 2:1
- 5K FF
- 5K 2.4:1

REDCODE®

Allows adjustment of REDCODE settings.



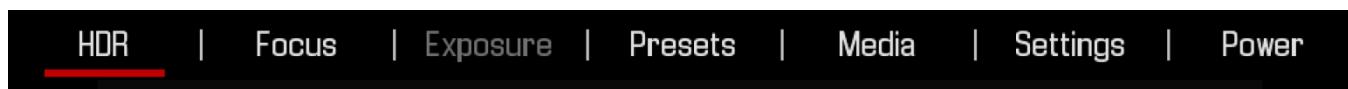
Range is 2:1 to 18:1

Default is 8:1

SECONDARY MENUS

Press the Menu button on the REDmote / Side Handle or touch the MENU icon  on the LCD to access the Secondary Menus.

Available options in this menu screen are HDR, FOCUS, PRESETS, MEDIA, SETTING, and POWER. EXPOSURE is not implemented at this time.



HDR MENU

Available options are HDR OFF, HDRx and STOPS.



HDR ON / OFF

By default, HDR is OFF (HDR button is illuminated Blue). In the Lower Status Group of the Viewfinder screen, the HDR text is Gray, indicating HDR is inactive.



To turn HDR on, navigate to the HDRx button using the Nav Group and press ENTER, or from the touchscreen directly touch the HDRx button. Press the HDRx button, which will turn Blue. In the Lower Status Group of the Viewfinder screen, the HDR text will turn White, indicating HDRx is active.



STOPS

To adjust the STOPS parameter, select the Stops box and use the UP / DOWN arrows to adjust.



Range is 1 to 6.

Default is 3.

FOCUS MENU

The Focus Menu is used to enable and select Auto Focus parameters including MODE and ZONES.

MODE

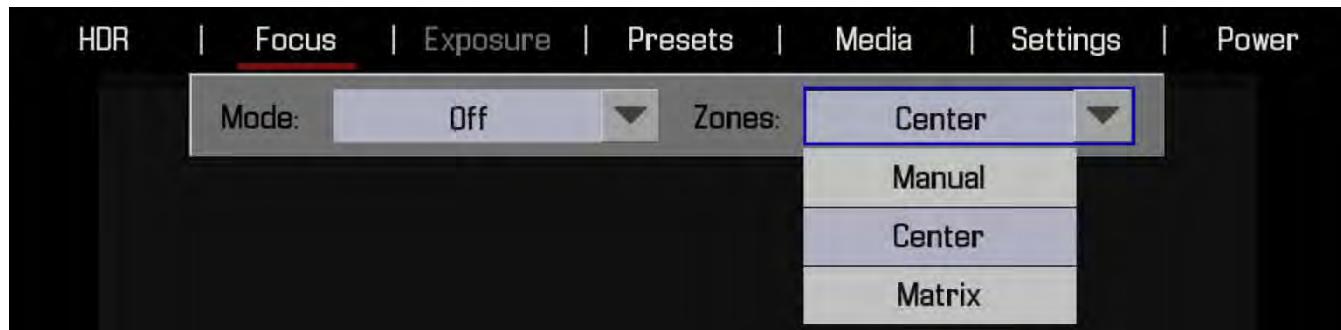
To adjust the MODE parameter, select the Menu box and use the UP / DOWN arrows to adjust. Available options are OFF and FOCUS CONFIRM. Default is OFF. If selected, FOCUS CONFIRM places a single box or a grid of boxes on the screen (depending on the ZONES selection) that indicate where the image is in focus.



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ZONES

Available options are MANUAL, CENTER and MATRIX. Default is CENTER. This control allows selection of the number and location of the circles / boxes used to indicate objects in/out of focus.



MANUAL

Provides a small, square target for precise focus (similar to Center focus, only smaller). When objects located in the square are in focus, the square will be Yellow or Green. When objects located in the circle are out of focus, the circle will be Red.

The manual focus square can be moved around the screen. Tap on the manual focus square and drag to the location you wish to relocate the manual focus square to.

The manual focus square can be resized. Tap two times on the square to increase size. You can increase the size 3 times. After that, when you double-tap the manual focus square, it will decrease in size.



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CENTER

Provides a large, round target for focus. When objects located in the circle are in focus, the circle will be Yellow or Green. When objects located in the circle are out of focus, the circle will be Red.



MATRIX

Provides a many targets for focus. When many objects on the screen are in focus, many boxes will be Yellow or Green. When few objects on the screen are in focus, few boxes will be Yellow or Green. Red boxes indicate objects that are out of focus.



EXPOSURE MENU

Not implemented at this time.

PRESETS MENU

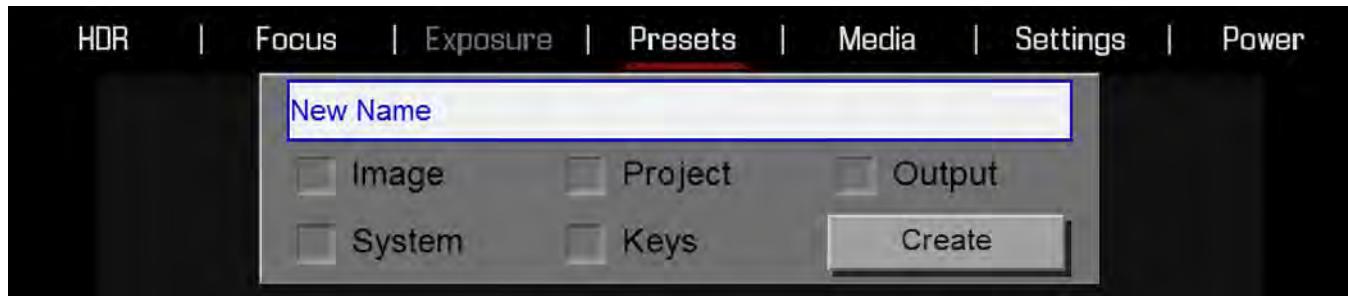
The Presets menu is used to create, save and import presets. Available options are APPLY, CREATE, IMPORT/EXPORT and DELETE.



CREATE PRESET

NOTE: A properly formatted REDMAG 1.8" SSD must be installed on the camera as this is where presets are stored.

When selected allows you to create your own preset and decide which information will be stored with that preset.

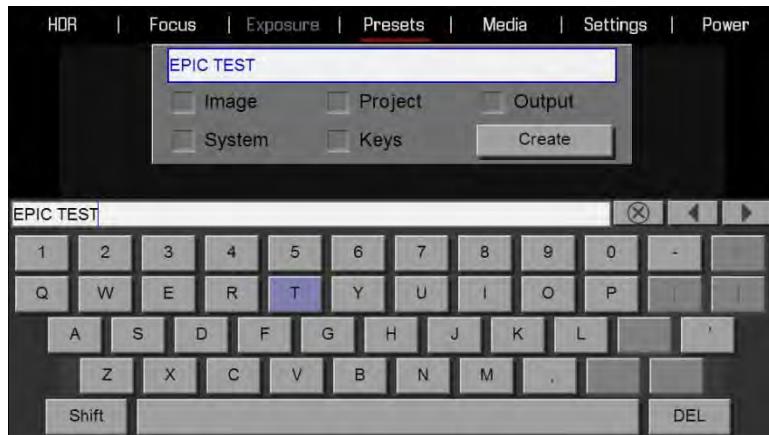


After Preset name is entered and Preset information is highlighted, select CREATE to create your preset and will be taken back to the Preset Main Menu – your new preset shown.

NOTE: If more presets are available, they will be accessible by using the arrow keys on either end of the Preset name field.

PRESET NAME

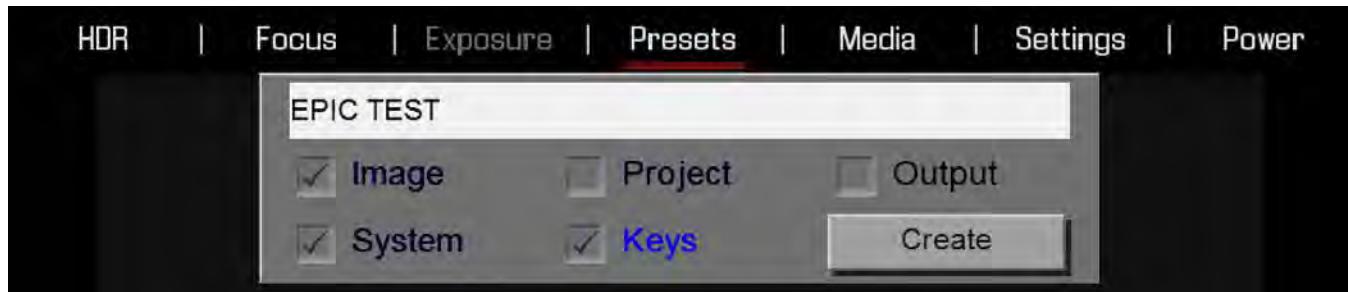
Press the Enter button on the New Name field, a keyboard will appear allowing you to enter the desired preset name.



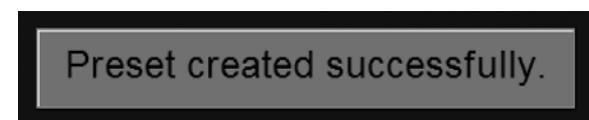
Use the arrow keys and Enter button, enter the desired name. When finished, press the Menu button to close the keyboard.

PRESET INFORMATION

Use the arrow keys and Enter button to select the information you want to be stored for your preset. Available options are IMAGE, SYSTEM, PROJECT, KEYS, and/or OUTPUT.



When creating a new preset successfully completed, "Preset Created Successfully" will appear and the preset will be listed.



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You can then select APPLY to apply the preset to the camera.



When successfully completed, "Preset Applied Successfully" will appear.



EXPORT / IMPORT PRESET

When selected you will be able to export presets from the camera to external memory (1.8" SSD), import presets from the external memory (1.8" SSD) to the camera, or apply available RMD presets.

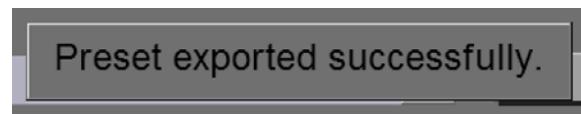
CAMERA PRESETS

When EXPORT PRESET is selected, this will export the CAMERA PRESETS from the camera to the external memory (1.8" SSD). Once a preset is exported, it will appear as a selection in the DISK PRESETS field.

NOTE: If external memory is not connected, the Export Preset function cannot be performed.



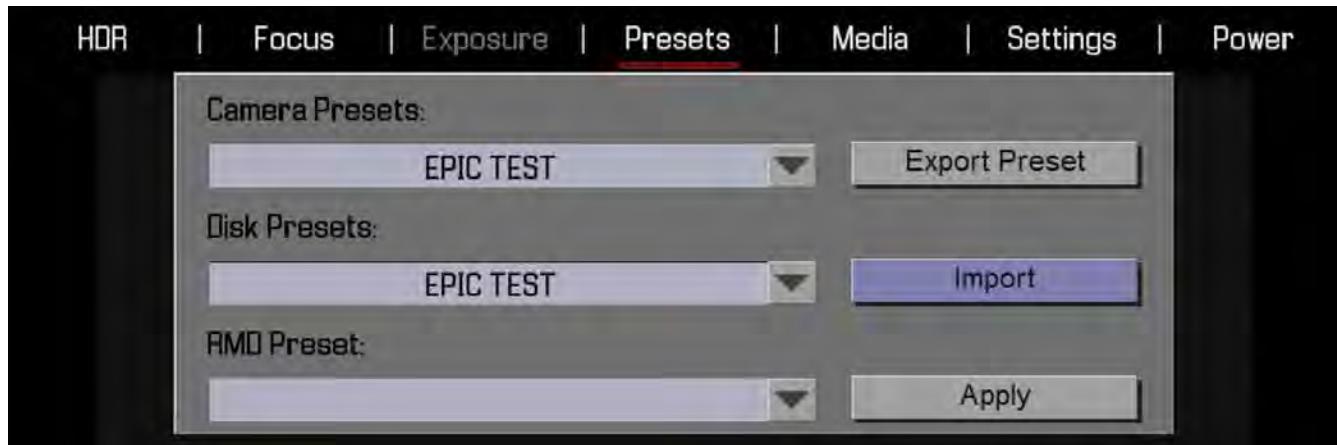
When successfully completed, "Preset Exported Successfully" will appear.



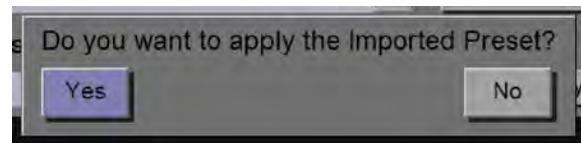
DISK PRESETS

When IMPORT is selected, the selected preset will import from external media (1.8" SSD) to the camera. Once imported the preset will be listed under CAMERA PRESETS.

NOTE: If no media is present on the external memory (1.8" SSD), this selection will remain Grayed out (until a preset is exported of course).



You will then be asked if you want to apply the imported preset.



If **No** is selected, the preset will be imported and listed in the available Camera Presets.

If **Yes** is selected, "Preset Applied Successfully" will appear when successfully completed. The preset will be listed in the available Camera Presets.

Preset applied successfully.

If the preset could not be applied, "Preset Could Not Be Applied" will appear to inform you.

Preset could not be applied.

APPLY

When APPLY is selected, the preset settings are transferred to active system memory.

RED EPIC® OPERATION GUIDE

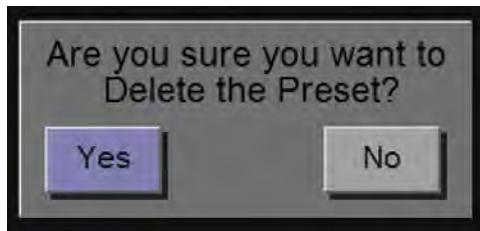
DELETE PRESET

When selected will delete the selected preset from the camera. It will not delete the selected preset from the external media (1.8" SSD).



IMPORTANT: You will not be warned of the deletion nor asked to confirm this deletion. Be sure to save your preset to the external media (1.8" SSD) for later use before deleting the preset from the camera. Once you have deleted the preset, you will either need to create a new one or import and existing one from external media.

You will be asked to confirm if you want to delete the preset.



When successfully completed, "Preset Deleted Successfully" will appear.



MEDIA MENU

The Media Menu is used to format media (SSD) prior to use on the camera as well as to Eject (unmount) the media prior to removal from the camera. Available options when selected are SELECT MEDIA, SET MEDIA, FORMAT MEDIA and EJECT MEDIA.

IMPORTANT: Media **MUST** be ejected from the camera before removal to prevent corruption and/or loss of data on media.

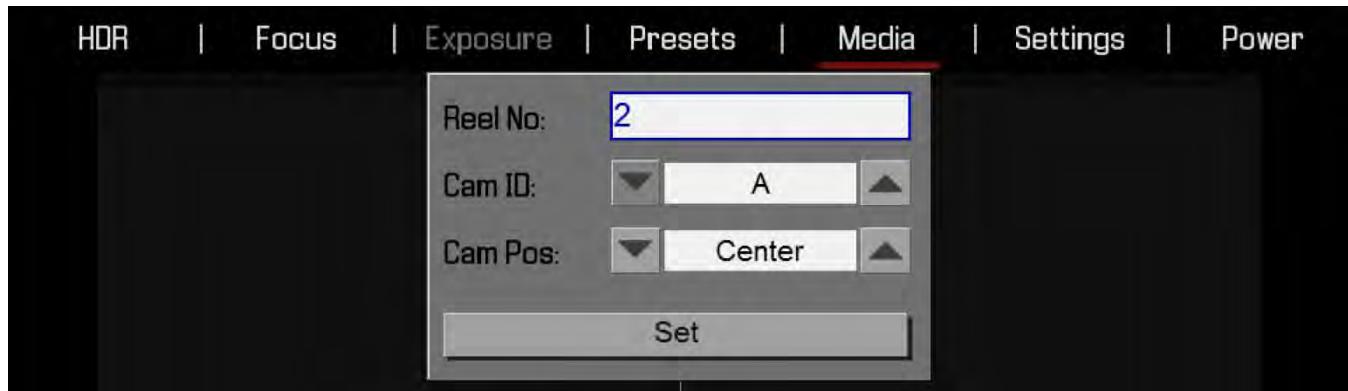


SELECT MEDIA

Allows you to select the Media location to be used by the camera. Default is the Side SSD Module.

SET MEDIA

When selected, a new dialog box will appear allowing you to add properties to the media highlighted in the Current Media box when formatting. Available options are REEL NO, CAM ID, CAM POS, and SET to set the values entered.



REEL NO.

When selected, a keypad will appear allowing you to enter a value between 1 and 999.



CAMERA ID (SLATE)

Identifies the camera with a letter A through Z. Default is A.

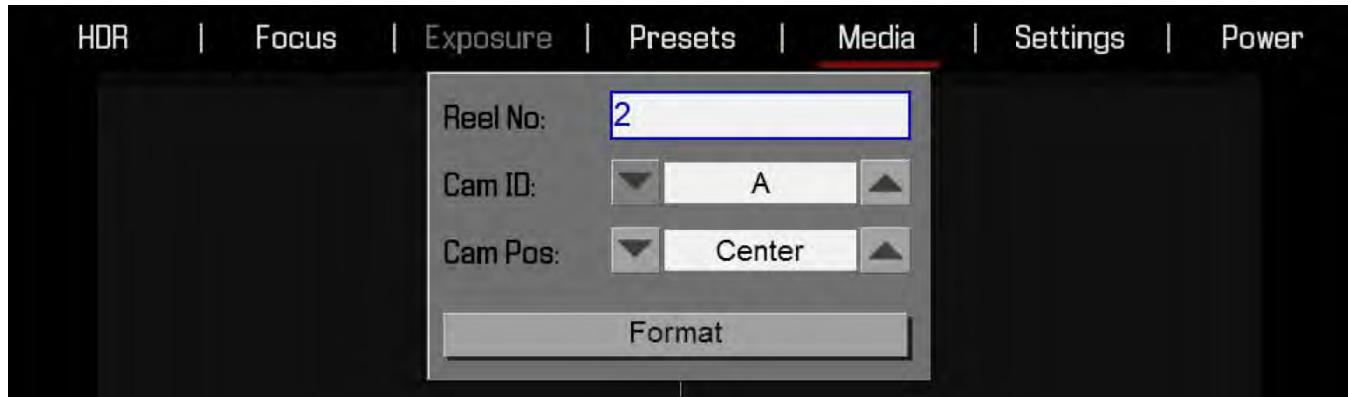
CAMERA POS (POSITION)

Identifies the camera position as Right, Left or Center. Default is Center.

RED EPIC® OPERATION GUIDE

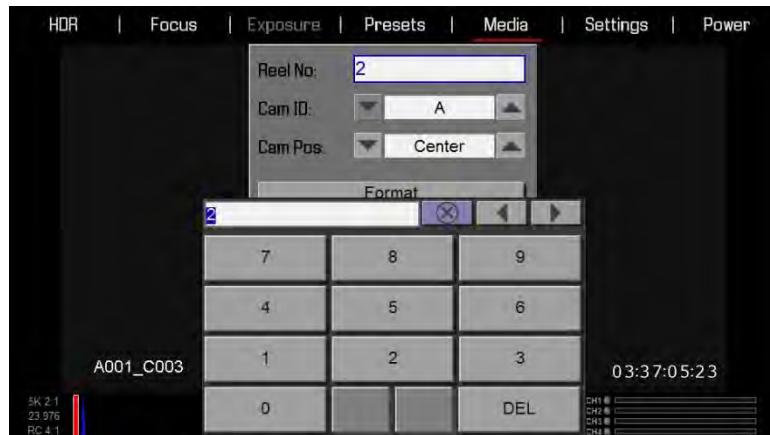
FORMAT MEDIA

When selected, a new dialog box will appear allowing you to add properties to the media highlighted in the Current Media box when formatting. Available options are REEL NO, CAM ID, CAM POS, and FORMAT to format the media with the values entered.



REEL NO.

When selected a keypad will appear allowing you to enter a value between 1 and 999.



CAMERA ID (SLATE)

Identifies the camera with a letter A through Z. Default is A.

CAMERA POS (POSITION)

Identifies the camera position as Right, Left or Center. Default is Center.

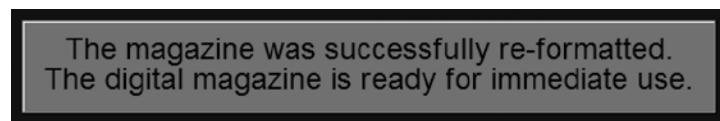
FORMAT

When selected, formats the media and adds the selected properties.

- During formatting, the camera will display “Formatting” with a Green status bar.



- When formatting is complete, camera will display “The magazine was successfully re-formatted. The digital magazine is ready for immediate use.”

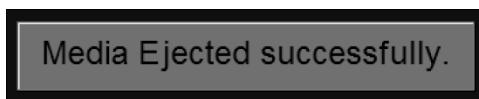


EJECT MEDIA

When selected will Eject (unmount) the media highlighted in the Select Media box.

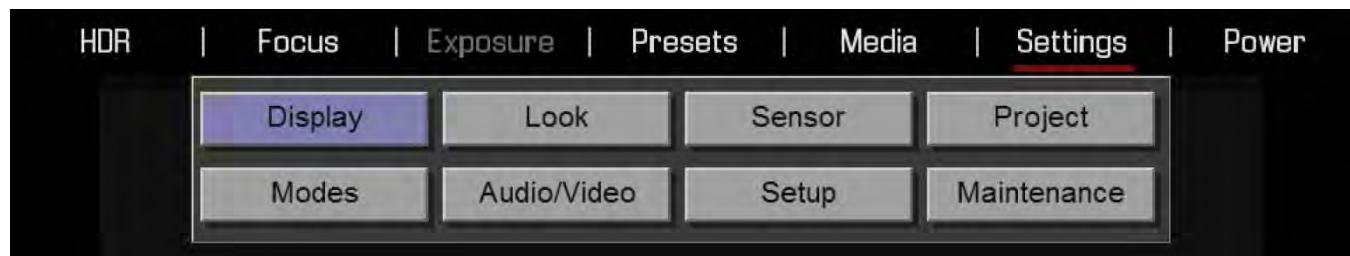


When ejected, camera will display “Media Ejected Successfully”.



SETTINGS MENU

This section describes the various secondary controls available to configure the camera. Menu options are DISPLAY, LOOK, SENSOR, PROJECT, MODES, AUDIO/VIDEO, SETUP and MAINTENANCE.



RED EPIC® OPERATION GUIDE

DISPLAY

The Display menu permits the operator to adjust the GUI elements displayed on the Viewfinder output(s). Available options are FALSE COLOR, ZERA, OVERLAY, MODES, FRAME GUIDE, AREA GUIDES, and MONITOR.



FALSE COLOR

When selected, forces the Viewfinder output(s) to display one of three false color modes - EXPOSURE, VIDEO, FOCUS - plus RAW and MAGNIFY view modes. Default is OFF.



EXPOSURE

EXPOSURE displays a 2-color overlay that allows you to check minimum and maximum exposure levels of the RAW sensor data, and hence prevent underexposed or overexposed images. When selected, the icon "E/" will be displayed in the Lower Status Group.



The EXPOSURE meter's color bands provide the following information:

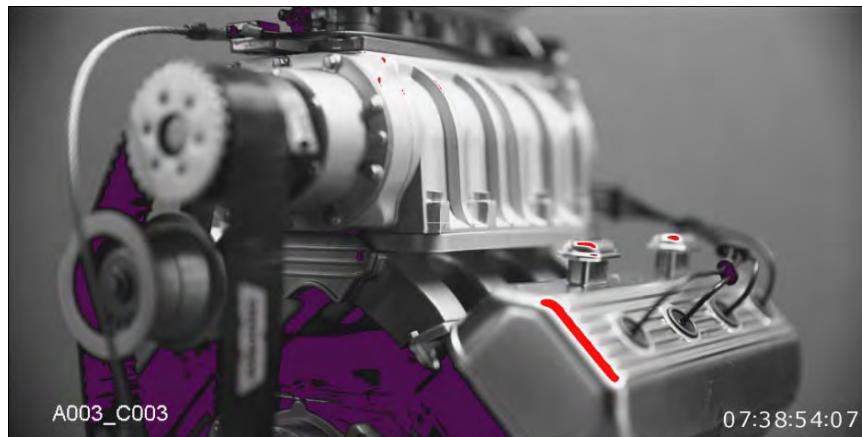
PURPLE	Minimum Exposure
RED	Maximum Exposure

Between minimum and maximum exposure values, the image is displayed as a monochrome image.



RED EPIC® OPERATION GUIDE

In the image, Purple areas represent sensor exposure levels that are likely to be noisy if gained up in post production. Red areas represent sensor exposure levels that are at clipping.



NOTE: As EXPOSURE meters sensor RAW information, it is not affected by any RGB domain adjustments - such as ISO rating, FLUT, White Balance, Video Gain or other LOOK information.

NOTE: Because the RAW data represents a wider color space than RGB, provided that the Red (clip) color is not present in EXPOSURE view, even if Red (clip) color is present in VIDEO view, the apparently clipped RGB highlights can be recovered in post production by adjustment of ISO, FLUT or changing the KNEE and WHITE values of the CURVE box.

VIDEO

VIDEO displays a multi-color color overlay that allows you to check the video level of the RGB monitor path (calibrated to the SMPTE test signal) and any outputs driven from that path - such as HD-SDI and HDMI. When selected, the icon "V √" will be displayed in the Lower Status Group.



Purple represents Super-Black, Dark Blue represents Black, Teal represents 3-stops under 18% Gray, Green represents 18% Gray, Pink represents Skin Tone, Straw represents White, and Yellow, Orange and RED represent various degrees of signal clipping in RGB space.

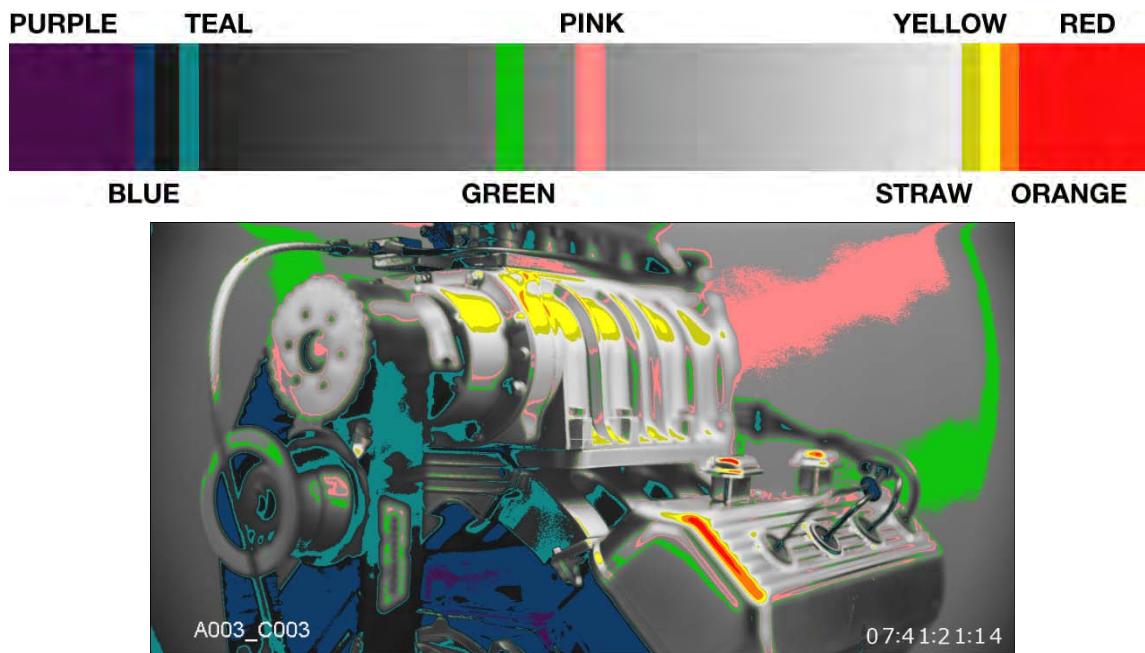
By adjusting ISO, FLUT and Shadow while looking at VIDEO check, the operator can ensure that Black, White and 18% Gray values conform to the desired levels on the HD-SDI and /or HDMI outputs.

RED EPIC® OPERATION GUIDE

The VIDEO bands provide the following information:

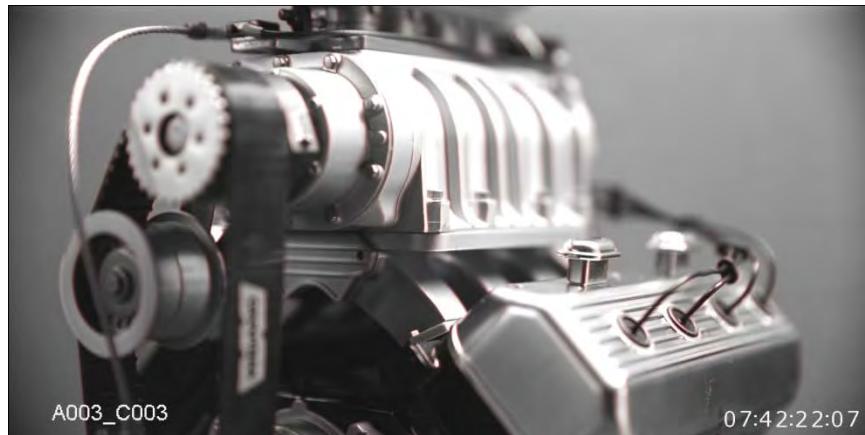
PURPLE	Super Black (IRE 1-0)
BLUE	Black (IRE 1-3)
TEAL	Dark Gray (IRE 9-12)
GREEN	Typical Level for 18% Gray Card (IRE 44-47)
PINK	Typical level for Caucasian Skin (IRE 54-57)
STRAW	White (IRE 96-98)
YELLOW	Super White (IRE 101-104)
ORANGE	Super White (IRE 105-107)
RED	Super White (IRE 108-109)

At all other values, the monochrome image displayed represents the luminance value of the ISO adjusted image.



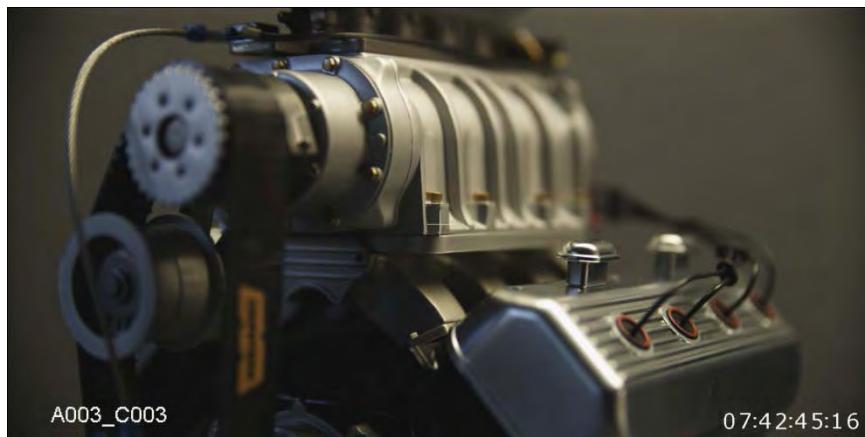
FOCUS

FOCUS displays a Red color overlay that outlines the edges of objects that are in sharp focus. By adjusting your lens zoom and focus you can see which objects are coming into and falling out of focus. When selected, the icon “F ✓” will be displayed in the Lower Status Group



RAW

RAW displays the image without any ISO correction. When selected, the icon “R✓” will be displayed in the Lower Status Group.



RED EPIC® OPERATION GUIDE

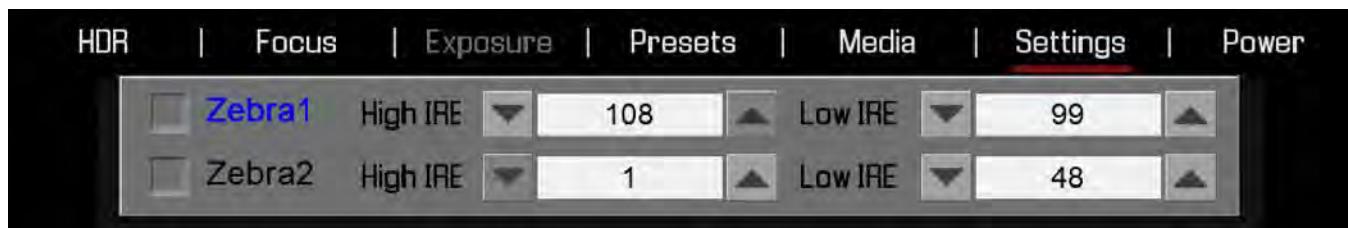
MAGNIFY

Magnify displays the central region of the sensor in 1:1 pixel resolution. When enabled, the 1:1 text in the Lower Status Group will change to Green. If in Magnify mode, when the Record button is pressed, the system will automatically exit this mode. When using a touchscreen you can also perform this function by pinching your fingers together and apart.



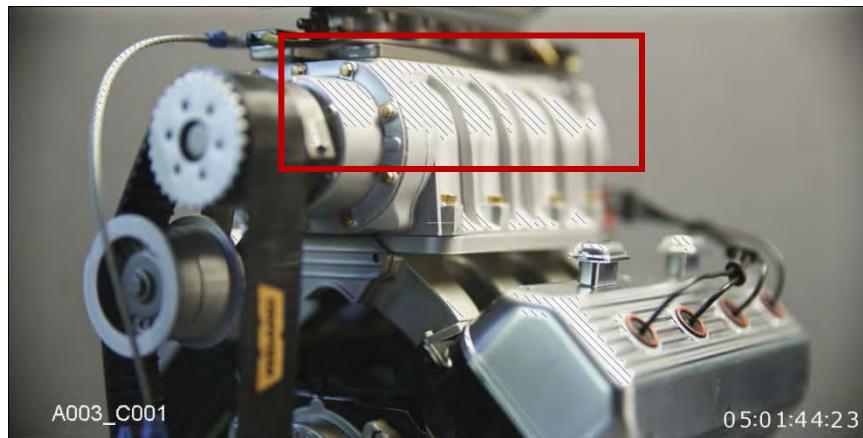
ZEBRA

Zebras enable and adjust the upper and lower values for two independent Zebra indicators. One zebra may be used for highlight exposure, and the other for mid tone or shadows. **By default, Zebra 1 and 2 are disabled.**



ZEBRA 1

To enable, select ZEBRA 1 check box. Areas of the image exposed within these ranges will be indicated by crosshatched overlays at - 45 degrees relative to vertical. Zebra 1 is shown in the image below.



High IRE

Change the desired setting between 93 and 109 (default is 108).

Low IRE

Change the desired setting between 75 and 107 (default is 99).

ZEBRA 2

To enable, select ZEBRA 2 check box. Areas of the image exposed within these ranges will be indicated by crosshatched overlays at + 45 degrees relative to vertical. Zebra 2 is shown in the image below.



High IRE

Change the desired setting between 1 and 99 (default is 1).

Low IRE

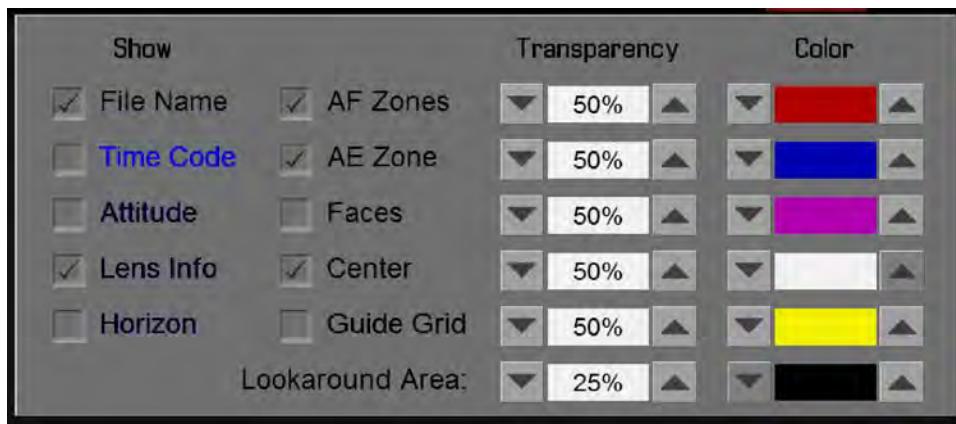
Change the desired setting between 0 and 84 (default is 48).

OVERLAY

Allows you to enable and color code graphic overlays visible the on the Viewfinder and Preview outputs.

SHOW

Check the box adjacent to each overlay type to enable. Overlays available are File Name, Time Code, Attitude, Lens Info, Horizon, AF Zones, AE Zone, Faces, Center and GRID. LOOK AROUND is always enabled.



Transparency

The transparency setting for AF ZONES, AE ZONE, FACES, CENTER, GRID and LOOK AROUND may be adjusted. Options are 0%, 25%, 50%, 75% and 100%.

Color

The color setting for AF ZONES, AE ZONE, FACES, CENTER, GRID and LOOK AROUND may be adjusted. Options are White, Blue, Yellow, Green, Red, or Black. Select the color that provides maximum contrast with the scene you are shooting.

RED EPIC® OPERATION GUIDE

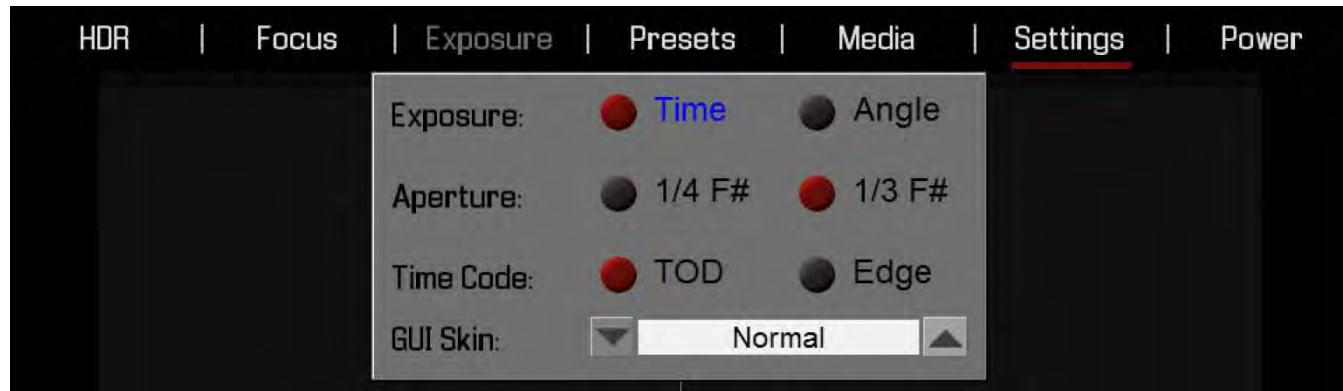
Grid

The Grid display is shown below. The grid may be used as a “rule of thirds” indicator.



MODES

Available GUI display mode adjustments are Exposure, Aperture, Time Code and GUI Skin.



EXPOSURE

Selects GUI display of Shutter Exposure as Time (1/xx sec) or Angle (Degrees).

APERTURE

Selects GUI display of f/stop as 1/4 f Stop or 1/3 f Stop.

TIME CODE

Selects GUI display of Timecode as Time of Day (TOD) and Edge.

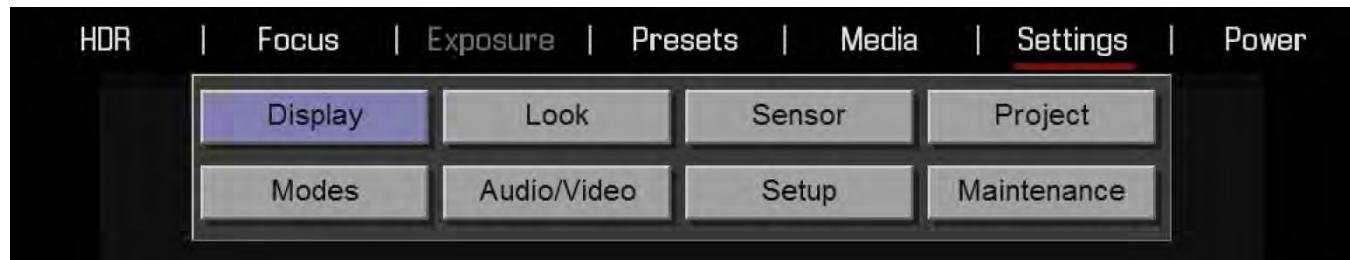
RED EPIC® OPERATION GUIDE

GUI SKIN

Selects GUI skin as NORMAL, OUTDOOR or NIGHT.

Normal

Normal displays the menu items in Black text over a Gray background for indoor shooting conditions.



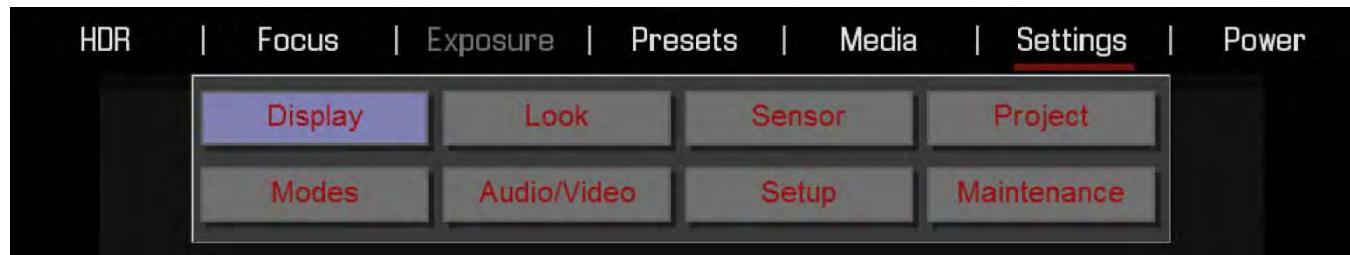
Outdoor

Outdoor displays the menu items in Black text over a Gray background for outdoor shooting conditions.



Night

Night displays the menu items in Red text over a Gray background for nighttime shooting conditions.



FRAME GUIDE

This sub-menu provides a selection of frame guides and safe action and safe title guides. User definable safe action and safe title guides may be saved as a USER PREFERENCE, thereby permitting the camera guides to be fully customized for any application. Available options are Size, Color and Transparency.



SIZE

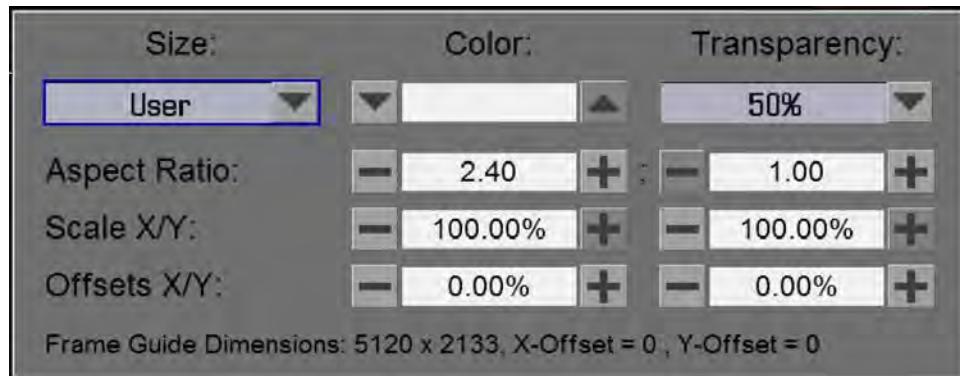
Available options are Off, Full, 2.39:1, 1.85:1, 16:9, 4:3, 1.9:1, or User. Full is illustrated below.



RED EPIC® OPERATION GUIDE

User

Frame guides can be set to your own preferences through the User Settings. Available options are Aspect Ratio, Scale X/Y and Offsets X/Y.



COLOR

Sets the frame guideline color to White, Blue, Yellow, Green, Red, or Black. Select the color that provides maximum color contrast with the scene you are shooting.



TRANSPARANCY

Sets the frame guide transparency. Available options are 0%, 25%, 50%, 75% and 100%.



AREA GUIDES

Area Guides displays Title Guides and Action Guides.

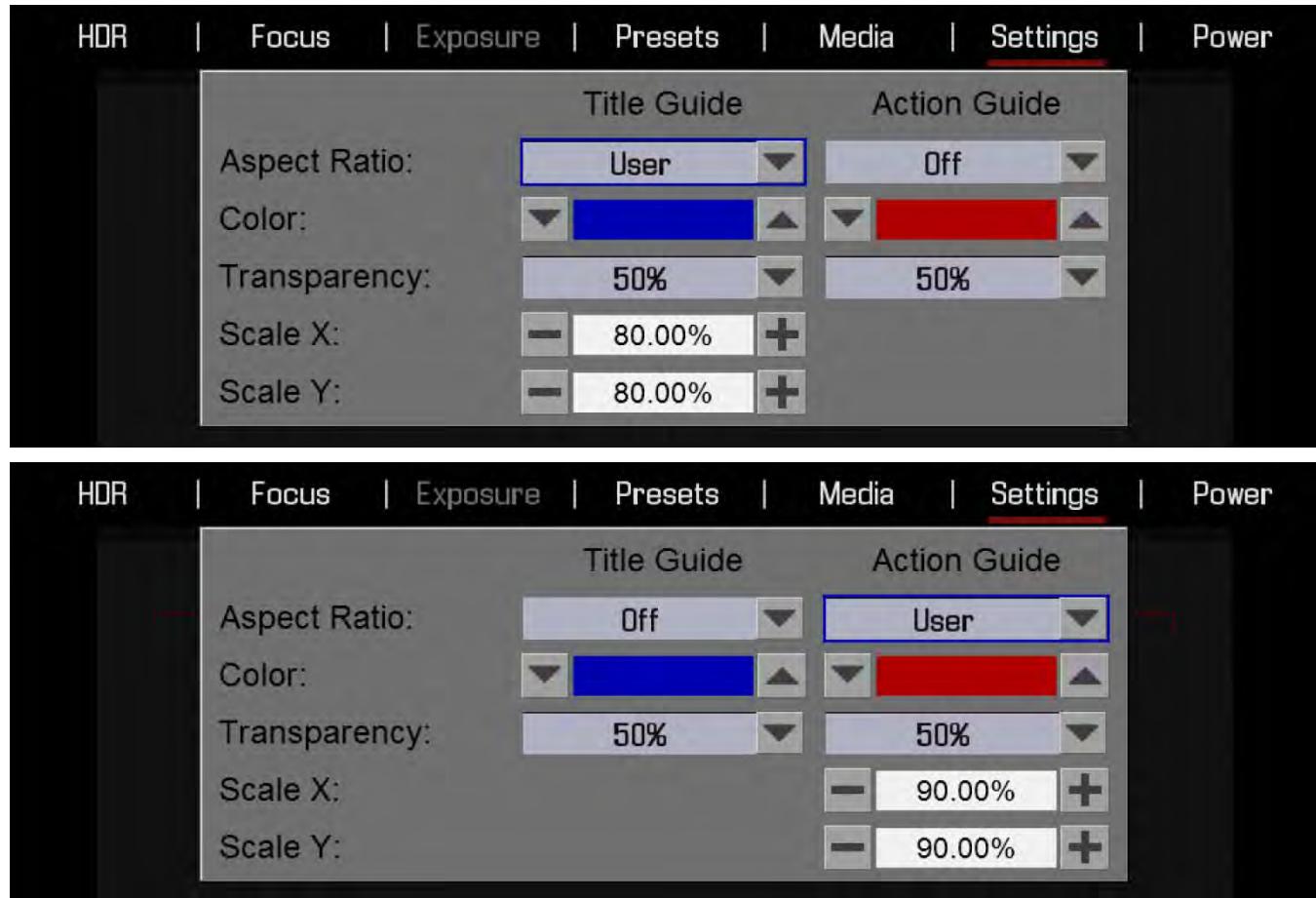


ASPECT RATIO

For both Title Guide and Action Guide, available options are OFF, 16:9, 14:9, 4:3, 2.4:1, 1.85:1, and User. Default is OFF.

User

Title Guide and Action Guide can be set to your own preferences through User Settings. Available options are Aspect Ratio and Scale.



COLOR

Sets Title Guide and Action Guide line color to White, Blue, Yellow, Green, Red, or Black. Select the color that provides maximum color contrast with the scene you are shooting.



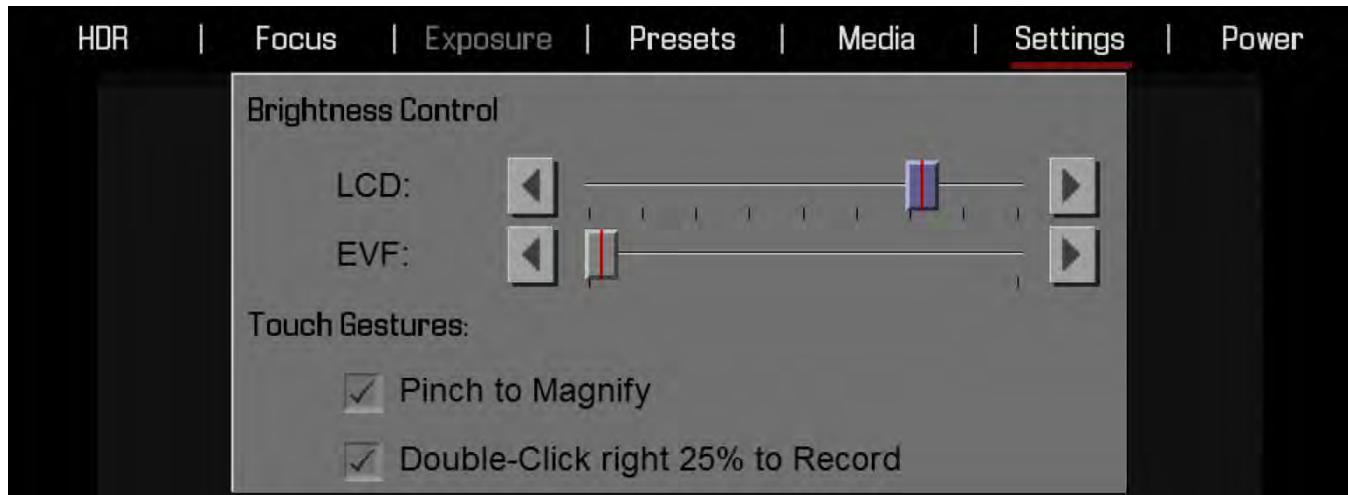
TRANSPARENCY

Sets Title Guide and Action Guide transparency. Options are 0%, 25%, 50%, 75% and 100%.



MONITOR

Allows you to modify brightness of the LCD and EVF parameters through Brightness Control. Also allows options for the LCD touchscreen to be changed through Touch Gestures.



BRIGHTNESS CONTROL

Slide to the right for a brighter display; slide to the left for a dimmer display.

TOUCH GESTURES

These options apply ONLY to the Touchscreen LCD.

Pinch to Magnify

When selected, allows you to use two fingers in a pinching motion on the screen to enable Focus Zoom. To zoom out to normal view, slide fingers apart.

Double-Click Right 25% to Record

When selected, the right 25% of the screen can be double-tapped to start and double-tapped again to stop recording.

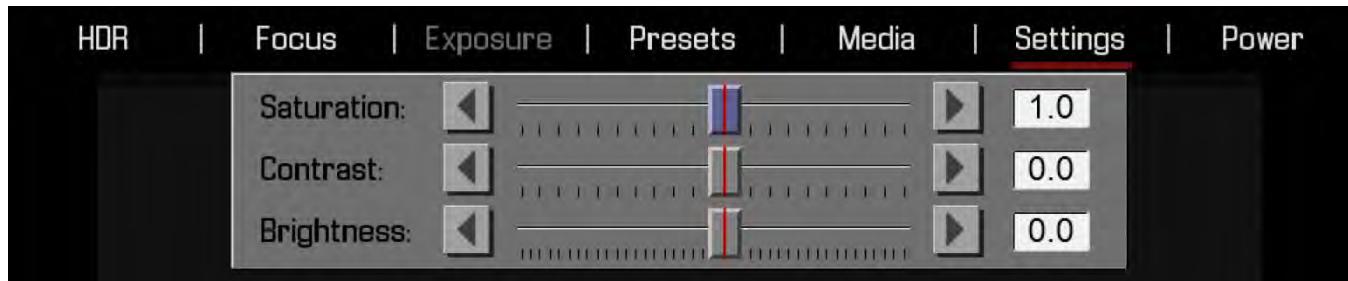
LOOK

The LOOK menu permits adjustment of COLOR, GAIN, FLUT™, and CURVE metadata values. These parameters will affect the look of the monitor path, but do not affect the actual REDCODE RAW data being recorded.



COLOR

The Color sub-menu permits adjustment of SATURATION, CONTRAST, and BRIGHTNESS.



SATURATION

Adjusts color saturation. Range is 0.0 (monochrome) to + 2.0 (super color). Default is 1.0.

CONTRAST

Adjusts the overall contrast of the image. Range is -1.0 (flat) to +1.0 (max contrast). Default is 0.0.

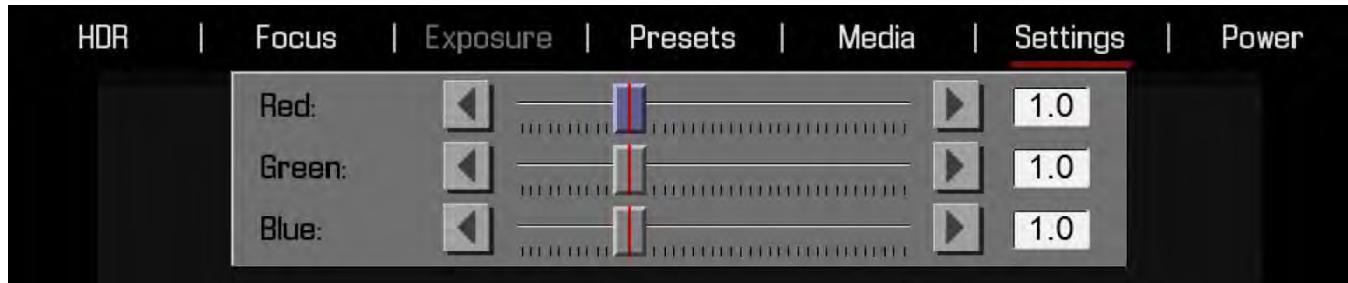
BRIGHTNESS

Adjusts brightness without crushing highlights. Available range is – 10 to +10. Default is 0.0.

RED EPIC® OPERATION GUIDE

GAIN

The GAIN sub-menu permits adjustment of RED GAIN, BLUE GAIN and GREEN GAIN.



RED

Adjusts the gain of the RED channel only. Range is 0.0 (no Red) to 4.0. Default is 1.0.

BLUE

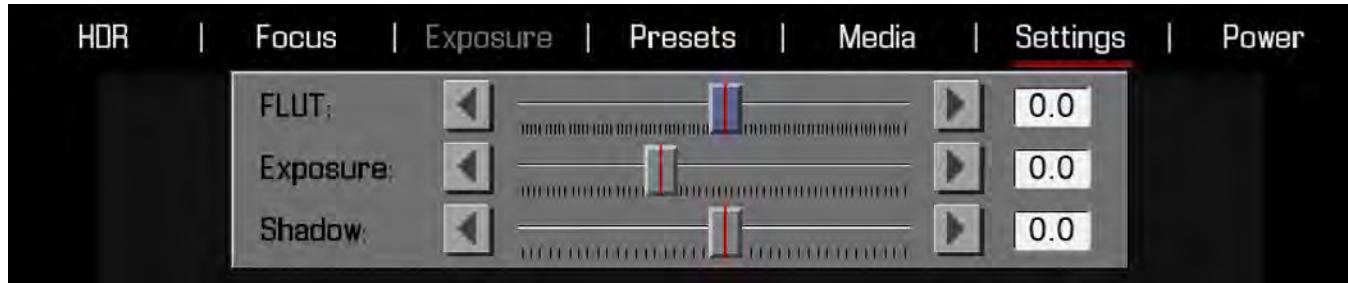
Adjusts the gain of the BLUE channel only. Range is 0.0 (no Blue) to 4.0. Default is 1.0.

GREEN

Adjusts the gain of the GREEN channel only. Range is 0.0 (no Green) to 4.0. Default is 1.0.

FLUT®

The FLUT sub-menu permits adjustment of FLUT, EXPOSURE COMPENSATION and SHADOW.



FLUT

FLUT (Floating Point Lookup Table) adjusts mid-range tone values. Range -4.0 to +4.0. Default is 0.0.

EXPOSURE

Adjusts exposure compensation. Available exposure range is - 7.0 to +7.0. Default is 0.0.

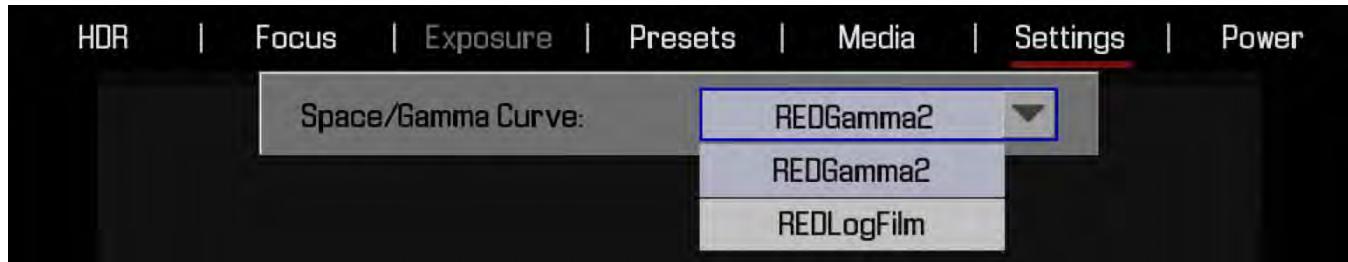
SHADOW

Shadow adjusts the toe value of the FLUT or in other words, the tone near Black. Range is -1.0 to +1.0. Default is 0.0. Increasing the Shadow value raises the video level of near Blacks. Lowering the Shadow value crushes the video level of near Blacks.

CURVE

The CURVE sub-menu permits adjustment of the monitor output Color Space and Gamma curve.

Available options are REDGamma2 and REDLogFilm.



SENSOR

Defines operational modes for the SENSOR. Available options are SHUTTER and SYNC.



SHUTTER

Enables one of two shutter timing (duration) modes: Absolute or Relative. Default selection is Absolute.



ABSOLUTE

Shutter Speed is defined exclusively by the Shutter Speed setting.

RED EPIC® OPERATION GUIDE

RELATIVE

Shutter Speed is defined by the requested Shutter Speed divided by the ratio of the current capture fps to the Project TIME BASE fps.

NOTE: When operating in Relative mode, the shutter speed is reported in yellow text.

NOTE: If the operator requests a shutter speed that is outside the capability of the camera in that mode, the actual shutter speed used will be reported in red text.

SYNC

Allows the shutter timing (scan start) to be synced to an external signal.



MODE

Available options are OFF, GENLOCK, SHUTTER, INTERNAL, PROXY, and SLAVE. Default is Off.

OFF – Shutter start time is defined by internal camera timing.

GENLOCK – Shutter start time is slaved to an external RS170A tri-level sync signal .a.k.a “Genlock”.

SHUTTER – Shutter start time is slaved to an external Shutter Sync signal.

INTERNAL – Not implemented at this time.

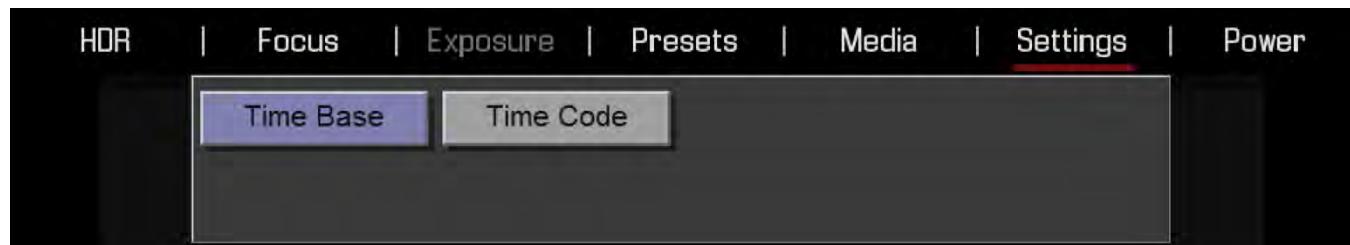
PROXY – Not implemented at this time.

SLAVE – Not implemented at this time.

Select Apply to enable the selected mode.

PROJECT

The project menu sets the operating parameters the camera will use for a given project. Options available are TIME BASE and TIME CODE.



TIME BASE

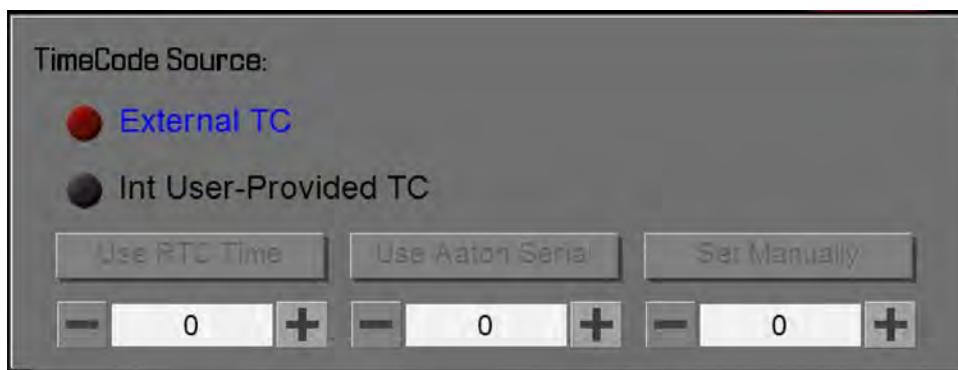
Sets the TIME BASE (fps) to be used for the project - the primary acquisition frame rate, time code count and playback & editing frame rate. Setting is displayed in the lower left corner of VIEWFINDER output(s).

Default is 23.98.



TIME CODE

Selects the TIMECODE source to be used. Options are EXTERNAL TC and INTERNAL USER- PROVIDED TC, USE RTC TIME, USE AATON SERIAL, and SET MANUALLY.



EXTERNAL TC

When selected, the camera reads the external SMPTE timecode signal and synchronizes its internal timecode counter to that value at the beginning of each recording.

INT USER- PROVIDED TC

Use RTC Time

When selected the camera uses the camera's Real Time Clock as the timecode counter source.

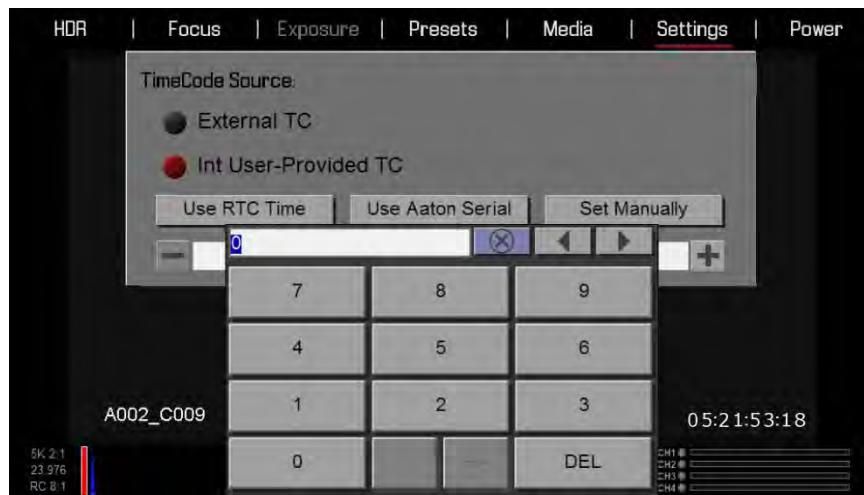
Use Aaton Serial

Not operational at this time.

RED EPIC® OPERATION GUIDE

Set Manually

When selected allows the user to define a custom value as the timecode counter seed.

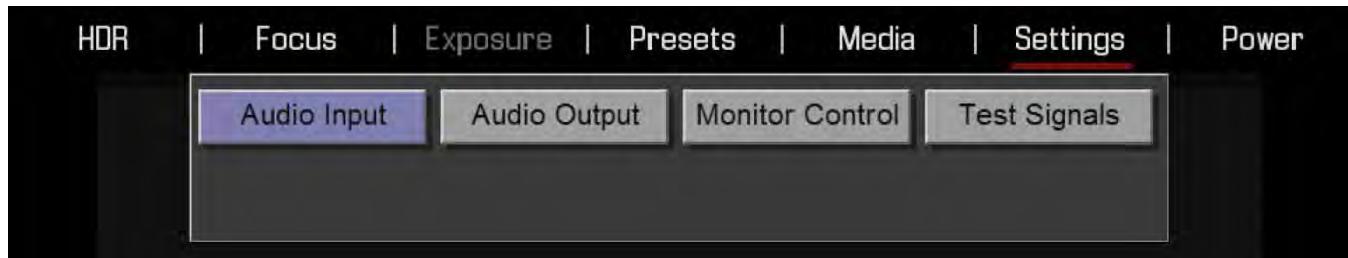


MODES

This menu is currently not operational.

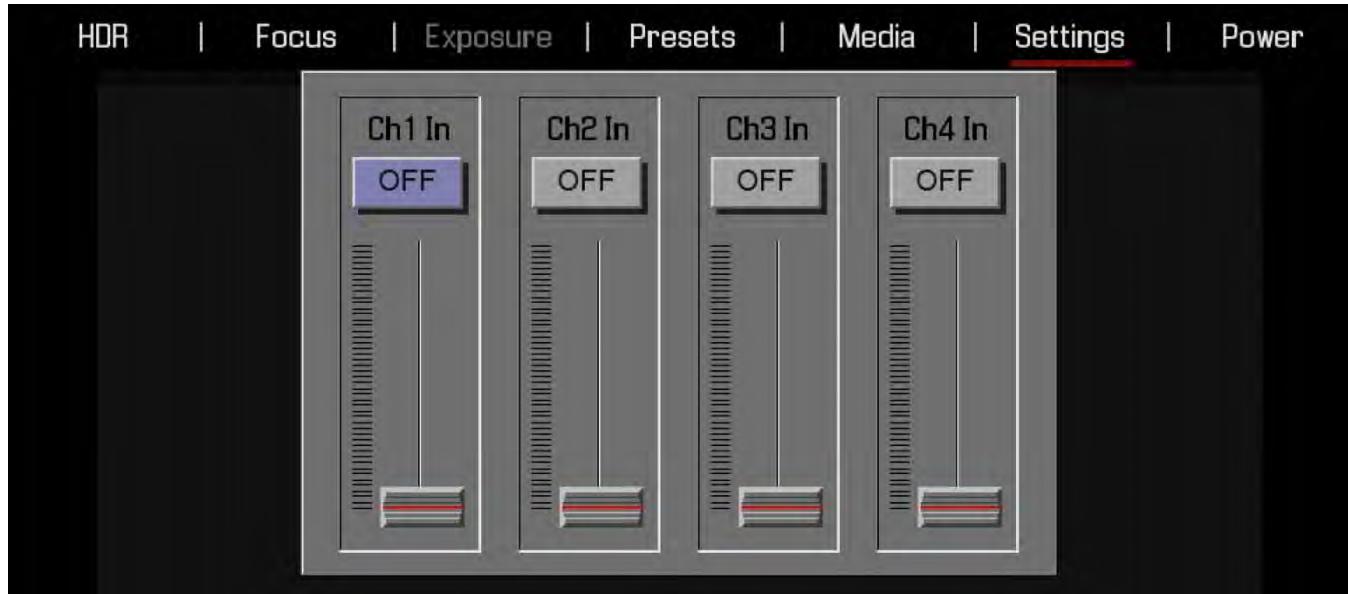
AUDIO/VIDEO

Menu adjusts AUDIO INPUT, AUDIO OUTPUT, MONITOR CONTROL, and TEST SIGNALS.



AUDIO INPUT

Allows you to enable / disable and adjust levels for audio inputs (Channel 1-4). Available options for each input are OFF, BAL and UNB. Default is OFF.



AUDIO OUTPUT

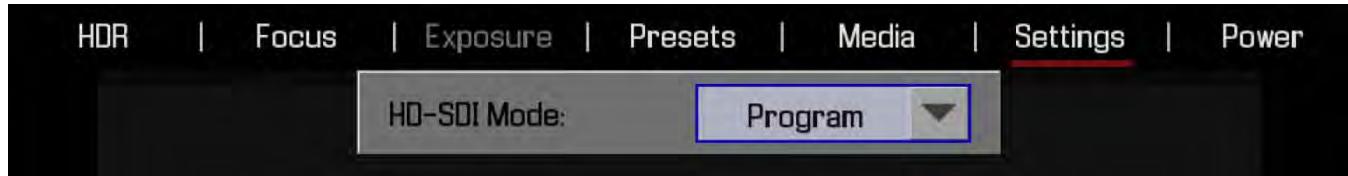
Allows adjustment of audio output levels fed to the Headphone jack. Available options for each channel are VOL and MUTE. Default is VOL.



RED EPIC® OPERATION GUIDE

MONITOR CONTROL

This sub-menu allows the HD-SDI output to be switched between PROGRAM and PREVIEW output modes.



PROGRAM

When Program is selected, the HD-SDI output provides a clean feed video with no graphic overlays.

PREVIEW

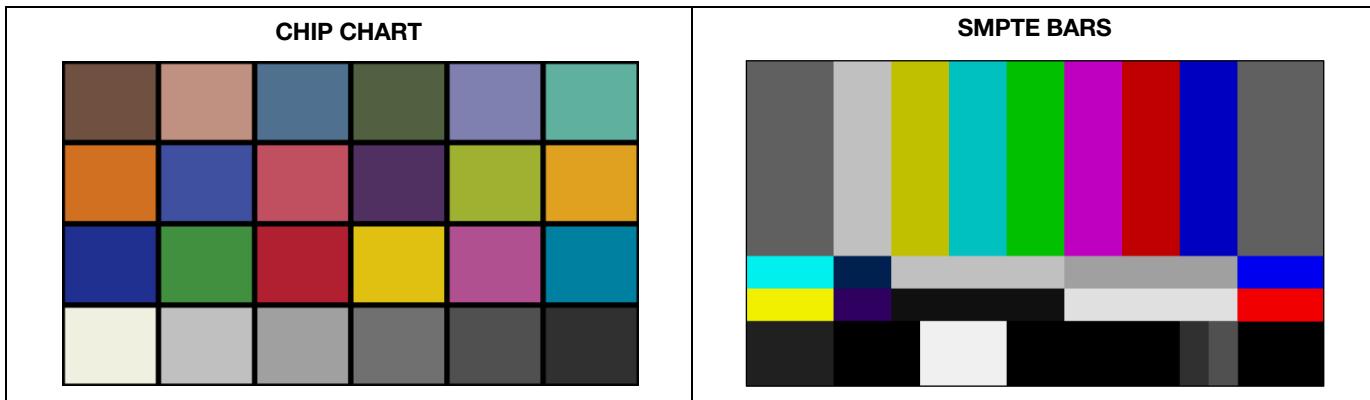
When Preview is selected, the HD-SDI output includes SurroundView Look Around Area plus Frame Guides, Safe Action / Safe Title, Clip Name and frame accurate Timecode overlays.

TEST SIGNALS

Permits the video monitor outputs to be replaced with a video test pattern. Available test patterns are CHIP CHART and SMPTE BARS.



To enable/disable a test signal, select the desired test signal box.



NOTE: RED EPIC test signals are not recordable, they are provided to help align external video monitors connected via the HD-SDI or HDMI outputs.

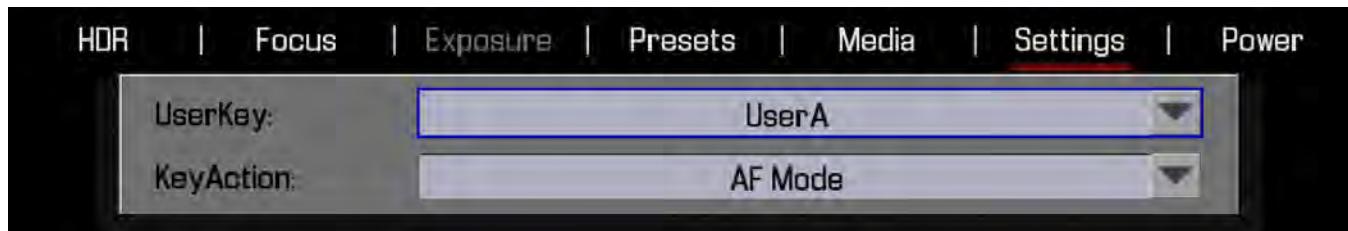
SETUP

This menu permits a variety of system setup tasks to be accomplished. Options available are KEYS / SHORTCUTS, DATE / TIME, NETWORK, SERIAL, REMOTE, GPIO, and SYSTEM.



KEYS / SHORTCUTS

Keys / Shortcuts display the USER KEY and KEY ACTION sub-menus. These options allow selected menus or functions to be mapped to specific User Keys on the camera body and accessories. User keys are also referred at as Soft Keys / Buttons.



USER KEY

Use this menu to select and program the camera USER KEYS A - D.

USER A: Default is **AF MODE**.

USER B: Default is **WB CALC**.

USER C: Default is **TOGGLE MAGNIFY**.

USER D: Default is **EXPOSURE CHECK**.

NOTE: To reset keys to default settings, go to RESTORE. A reboot of the camera is necessary to restore defaults.

NOTE: Multiple keys can be programmed to the same action.

RED EPIC® OPERATION GUIDE

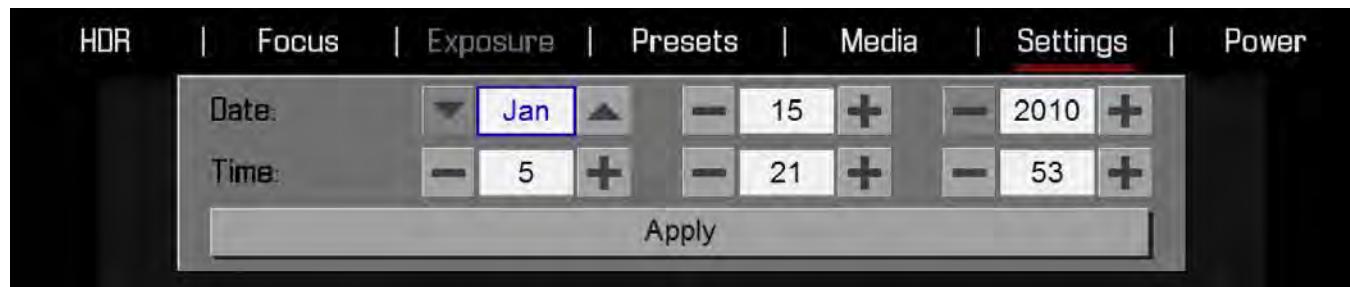
KEY ACTION

When the desired User Key is selected, this setting allows the desired action for that User Key to be defined by the user. Available actions are as follow:

- Activate ISO
- Activate WB
- Activate Shutter
- Activate Aperture
- Toggle Record
- Toggle Magnify
- WB Calc
- Menu Select
- Eject Media
- AF Refocus
- Menu Left
- Menu Right
- Menu Toggle
- TC Jamsync
- Shutter Sync
- False Color
- Next Value
- Previous Value
- Shutdown
- Sensor/TC Sync
- AF Mode
- Exposure Check
- Zoom Stop
- Zoom In Speed 1
- Zoom In Speed 2
- Zoom In Speed 3
- Zoom In Speed 4
- Zoom Out Speed 1
- Zoom Out Speed 2
- Zoom Out Speed 3
- Zoom Out Speed 4
- Brain LCD Br. Up
- Brain LCD Br. Down
- Toggle ND Filter
- Open FPS
- Open ISO
- Open Aperture
- Open Shutter Speed
- Open White Balance
- Open AF AE
- Record Start
- Record Stop
- Toggle SH Backlight
- Menu Up
- Menu Down
- Rotary Next Value
- Rotary Previous Value
- Set Focus Mode For Still
- Set Focus Mode for Movie
- RAW Check

DATE / TIME

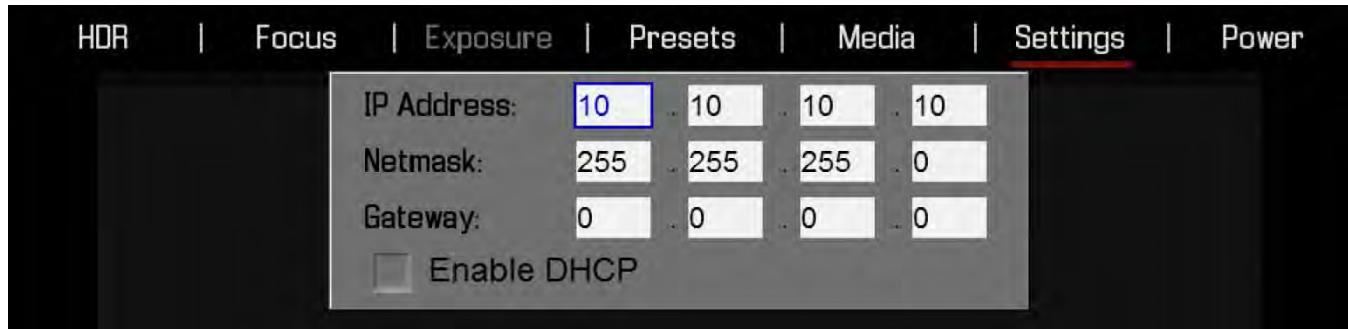
This menu allows the user to reset the battery backed up clock of the RED EPIC camera. These values will be used to timestamp each recording as they are made to the RED MAG 1.8" SSD media.



NOTE: Enter time in 24-hour clock format. i.e. 2:35 pm should be entered as 14:35:00.

NETWORK

Network Menu allows you to set an IP ADDRESS, NETMASK, GATEWAY and ENABLE DHCP.



IP ADDRESS

Permits the user to adjust the camera's static IP address.

NETMASK

Permits the user to adjust the Subnet Mask address.

GATEWAY

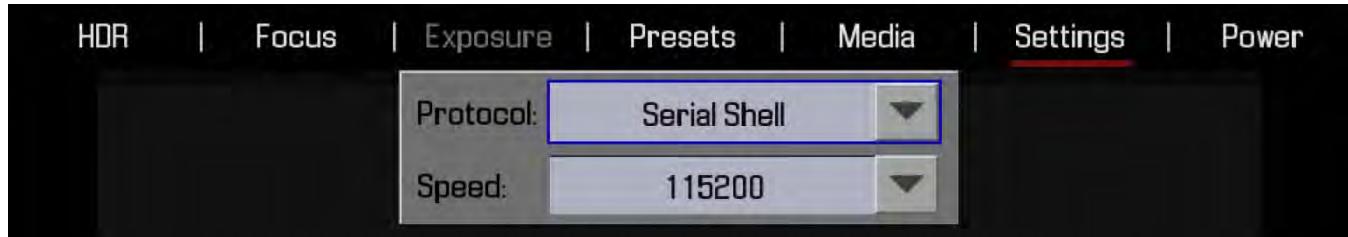
Permits the user to adjust the Gateway address.

ENABLE DHCP

When checked, the camera will be auto-assigned a dynamic IP address.

SERIAL

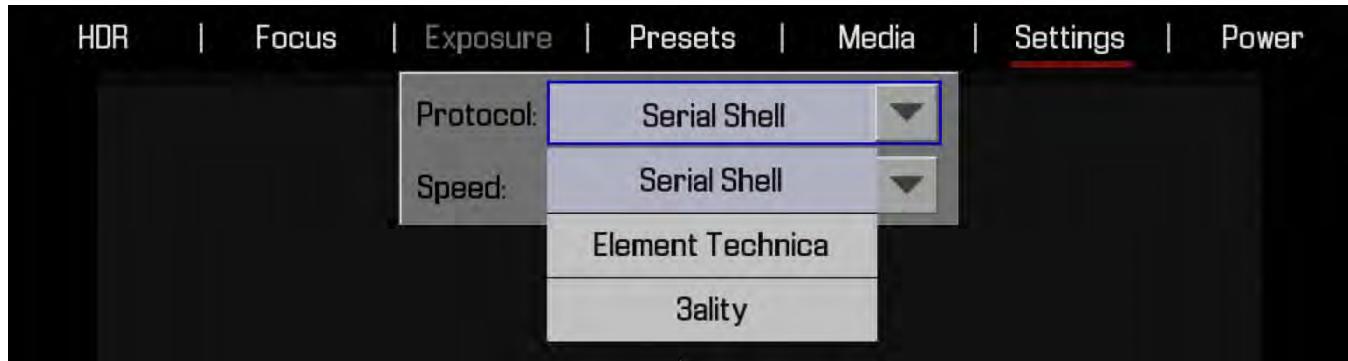
This menu allows the user to select the RS232 Serial Port PROTOCOL and SPEED.



RED EPIC® OPERATION GUIDE

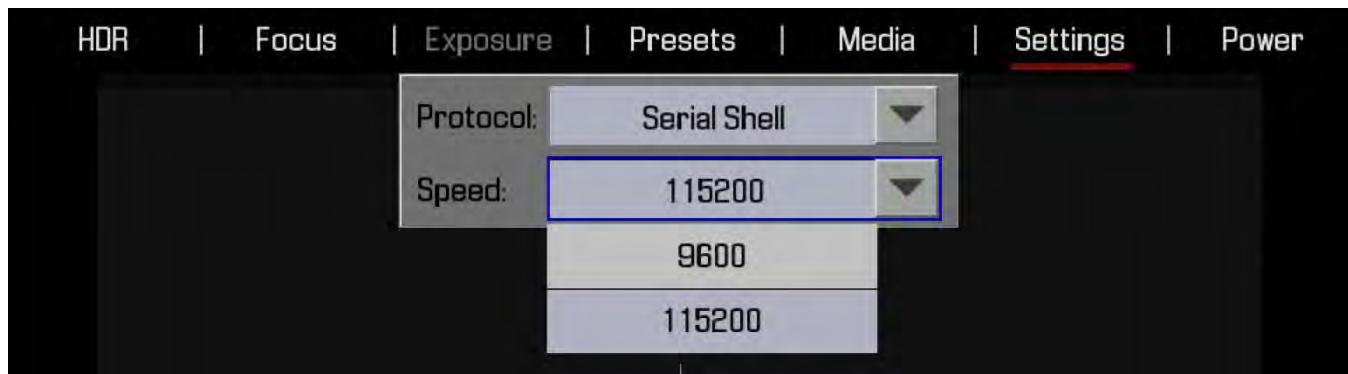
PROTOCOL

Available options are SERIAL SHELL, ELEMENT TECHNICA and 3ALITY. Default is SERIAL SHELL.



SPEED

Available options are 9600 baud and 115200 baud. Default is 9600 baud.



REMOTE

This function is not enabled at this time.

GPIO

GPIO selects the GPIO preferences sub-menu.



CAMERA INPUT

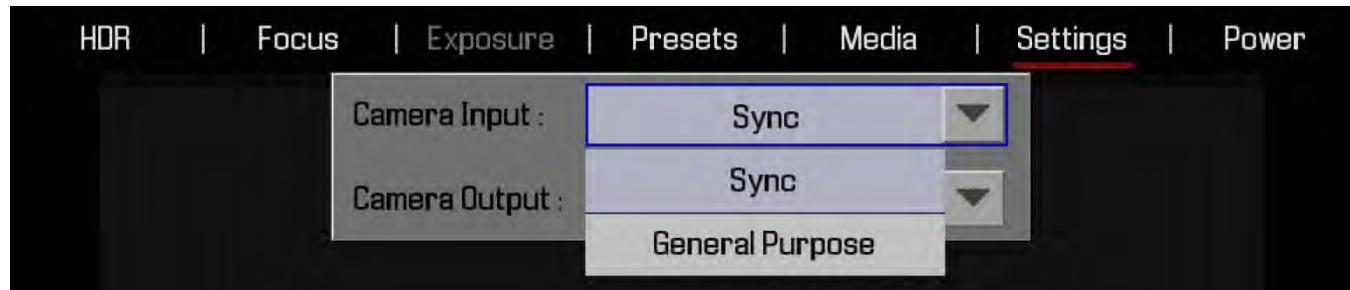
Permits the function of the SYNC IN / GPI pin in the SYNC connector to be defined as:

Sync

Accepts an Input Sync signal to control Shutter Start timing

General Purpose

Accepts an Input Trigger signal to act as a General Purpose Input.



CAMERA OUTPUT

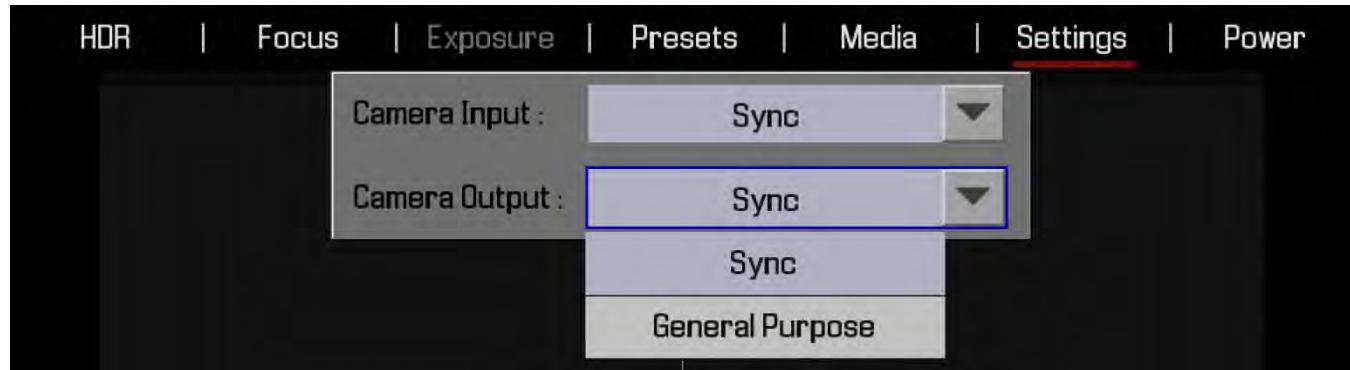
Permits the function of the SYNC OUT / GPO pin in the CNTL connector to be defined as:

Sync

Provides an Output Sync signal to act as a Shutter Start tally.

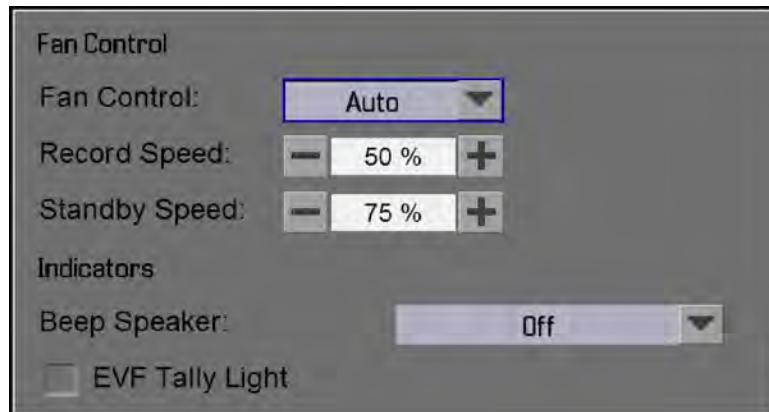
General Purpose

Provides an Output Tally to act as a General Purpose Output tally signal.



SYSTEM

Available options are FAN CONTROL, FAN RECORD and FAN STANDBY SPEED, BEEP SPEAKER and EVF TALLY LIGHT.



FAN CONTROL

Specifies cooling fan operation. Available options are AUTO and MANUAL. The default setting is AUTO.

Auto

This setting selects VARIABLE speed fan operation based on the camera core temperature.

Manual

This setting allows you to set a fixed fan speed to be used during Record and Standby modes.

Record Speed

Sets a fixed fan speed to be used during Record. Range 35 – 100%. Default is 50%.



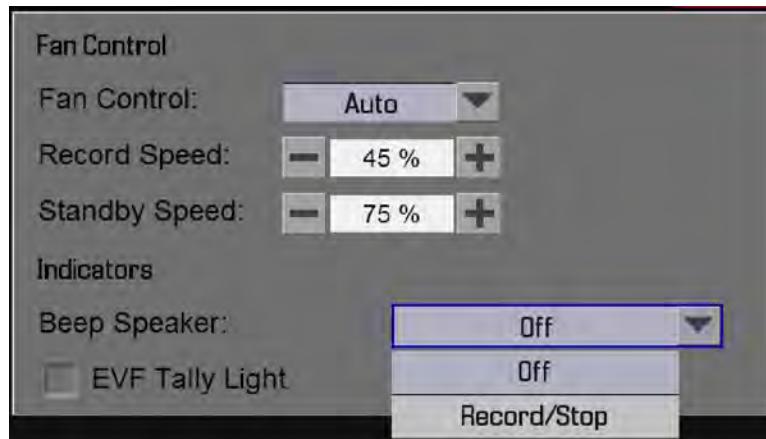
Standby Speed

Sets a fixed fan speed to be used during Standby. Range 45 – 100%. Default is 75%.

INDICATORS

Beep Speaker

Available options are OFF and RECORD/STOP. When RECORD/STOP is selected, an audible beep will be heard when record is started and another when record is stopped.



EVF Tally Light

When checked, enables the Record Tally Red LED on the front face of the EVF.

MAINTENANCE

The maintenance menu allows the user to check system status and information, save the camera diagnostic LOG to attached media, perform a software update, calibrate the sensor, perform a camera self test, and reset system settings to factory defaults.



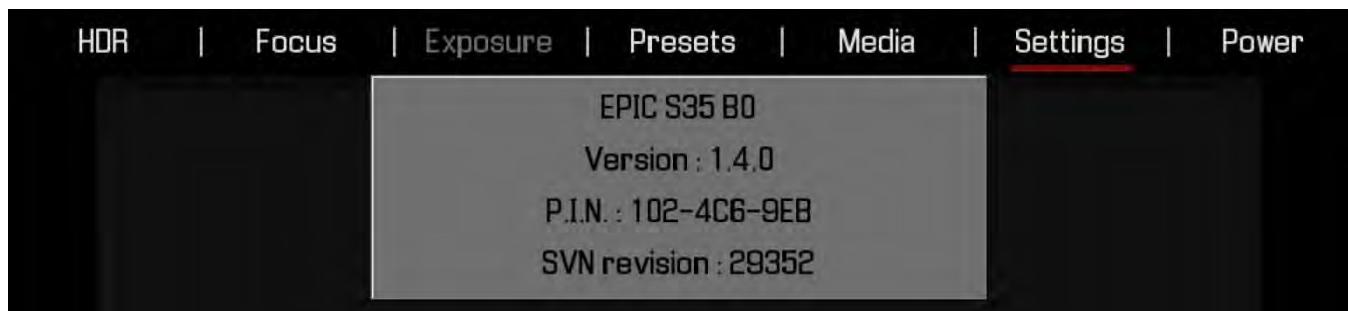
SYSTEM STATUS

When selected the Viewfinder output(s) will display the System Status screen. This screen provides a summary of all operational settings currently applied to the camera.

System configuration			
Format	5K 2:1	ISO	800
Timebase	23.98	Kelvin	6930
REDCode	8:1	Tint	27
Varispeed	23.98	Flut	0.0
TC Track	---	Genlock	None
TC JAM	OFF	Master/Slave	---
Rig Metadata	---	Cam Name	A
Sensor Sync	None	Cam Pos	Center
Color Space	RedGamma2		

SYSTEM INFO

When selected the Viewfinder output(s) will display the camera Model, current firmware Version, installed and camera P.I.N.



SAVE LOG

Select to write camera's .LOG file to the REDMAG 1.8" SSD. The .LOG file is a diagnostic tool that can assist RED with camera troubleshooting. After capture, upload the .LOG file to the RED customer service team contactable at www.RED.com/support.

After successfully writing the log file to media, viewfinder output(s) will display LOG SAVE COMPLETED.

LOG Save Completed.

If media is not attached to the camera when attempting to perform a write log request, external monitors will display NO MEDIA ATTACHED.

SW UPDATE

Update SW initiates a camera software (firmware) update. If a software update is on the attached media, you will be given the option to upgrade the camera.



For complete, detailed procedure, go to APPENDIX A: UPDATING CAMERA FIRMWARE.

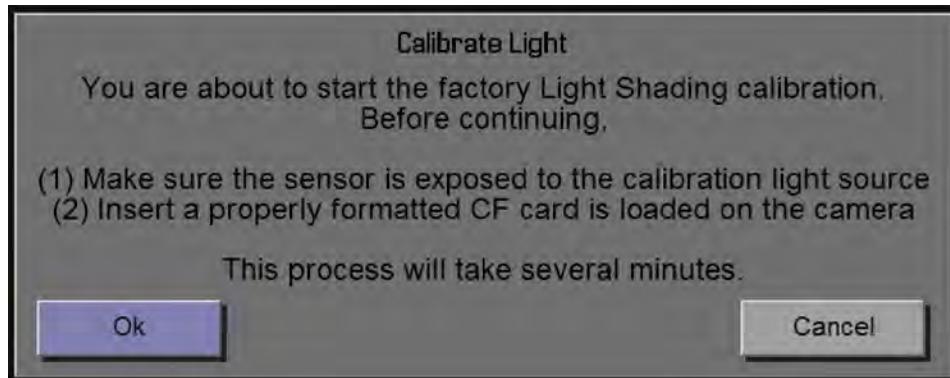
CALIBRATION

Allows you to calibrate the MYSTERIUM X sensor three different ways; LIGHT, LIGHT F24 and/or DARK.



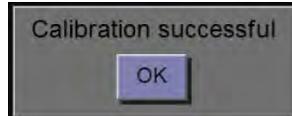
LIGHT

When selected, a screen will appear asking if you wish to proceed with Light Shading calibration.



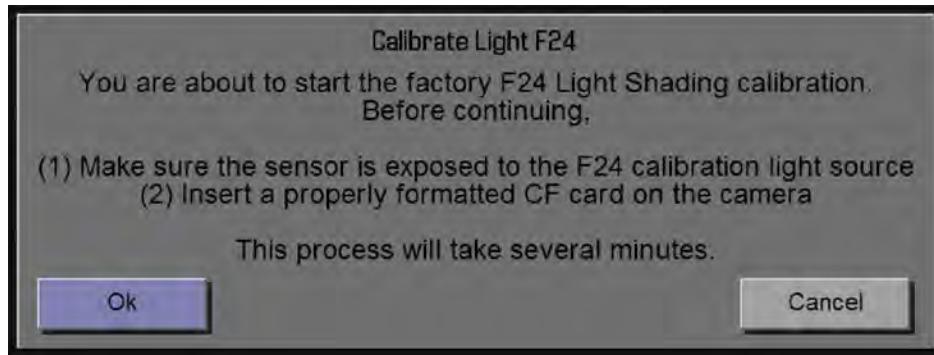
Light Shading calibration procedure:

1. Ensure the sensor is exposed to the calibration light source.
2. Ensure a properly formatted SSD is attached to the camera and properly formatted.
3. Select OK to perform the Light Shading calibration. A status screen will appear showing progress in percent.
4. When the Light Shading calibration is complete, CALIBRATION SUCCESSFUL is displayed. Select OK.



LIGHT F24

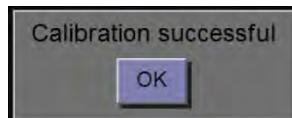
When selected, a screen will appear asking if you wish to proceed with F24 Light Shading calibration.



F24 Light Shading calibration procedure:

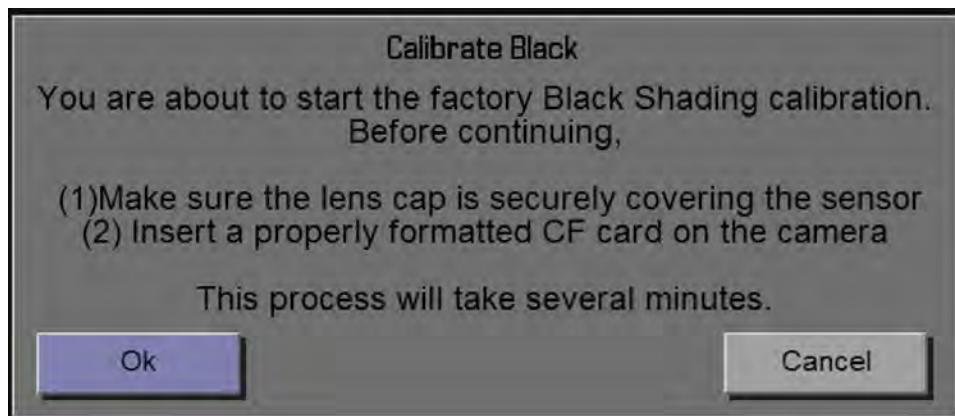
1. Ensure the sensor is exposed to the F24 calibration light source.
2. Ensure a properly formatted SSD is attached to the camera and properly formatted.

3. Select OK to perform the F24 Light Shading calibration. A status screen will appear showing progress in percent.
4. When the F24 Light Shading calibration is complete, CALIBRATION SUCCESSFUL is displayed. Select OK.



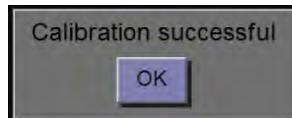
BLACK

When selected, a screen will appear asking if you wish to proceed with Black Shading calibration.



Black Shading calibration procedure:

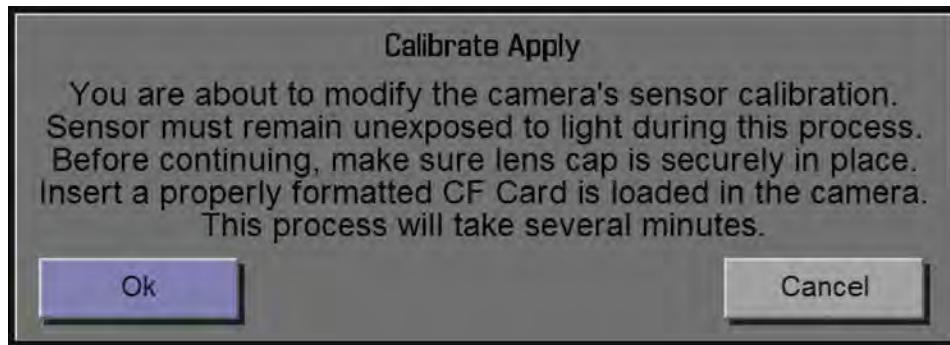
1. Ensure the lens cap is securely covering the sensor, preventing entry of any light source.
2. Ensure a properly formatted SSD is attached to the camera and properly formatted.
3. Select OK to perform the Black Shading calibration. A status screen will appear showing progress in percent.
4. When the Black Shading calibration is complete, CALIBRATION SUCCESSFUL is displayed. Select OK.



RED EPIC® OPERATION GUIDE

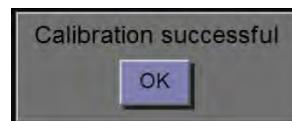
APPLY CAL

This will apply any of the performed calibrations. When selected, the Calibrate Apply screen will appear asking you to confirm if you want to modify the camera's sensor calibration.



Before performing the Calibrate Apply procedure, ensure the following is performed:

1. Ensure the lens cap is securely covering the sensor, preventing entry of any light source.
2. Ensure a properly formatted SSD is attached to the camera and properly formatted.
3. Select OK to perform the Calibrate Apply procedure. A status screen will appear showing progress in percent.
4. When the Calibrate Apply procedure is complete, CALIBRATION COMPLETE will be displayed. Select OK.

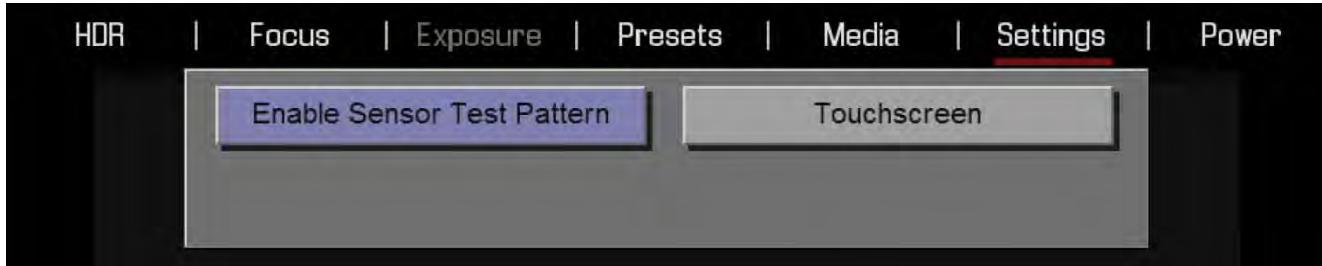


NOTE: If the Calibrate Apply procedure fails, APPLY CALIBRATION FAILED. TRY AGAIN will be displayed. Perform the APPLY CALIBRATION procedure again.

Apply calibration failed. Try again.

SELF TEST

When selected allows you to perform a self-test for the sensor and LCD Touchscreen.



RED EPIC® OPERATION GUIDE

ENABLE / DISABLE SENSOR TEST PATTERN

When selected enables / disables the sensor test pattern (White Screen). To turn on, select ENABLE SENSOR TEST PATTERN.

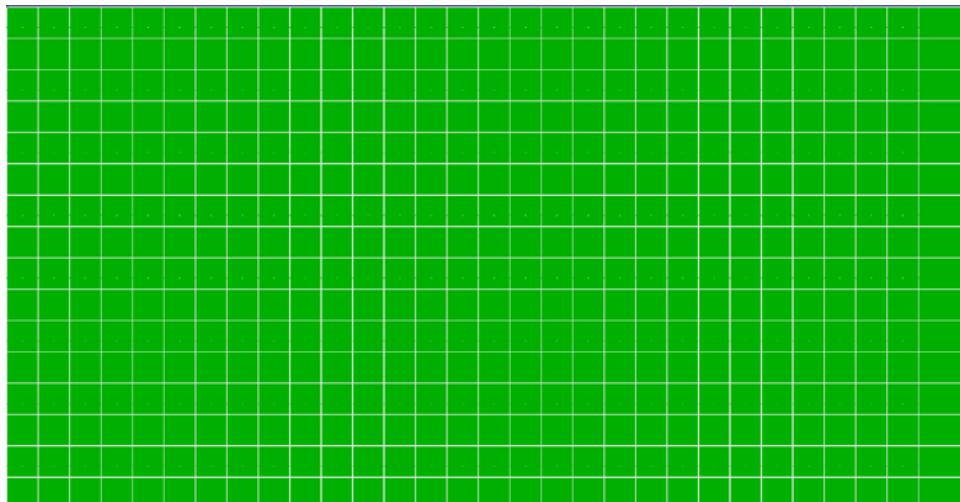


To turn off, select DISABLE SENSOR TEST PATTERN.

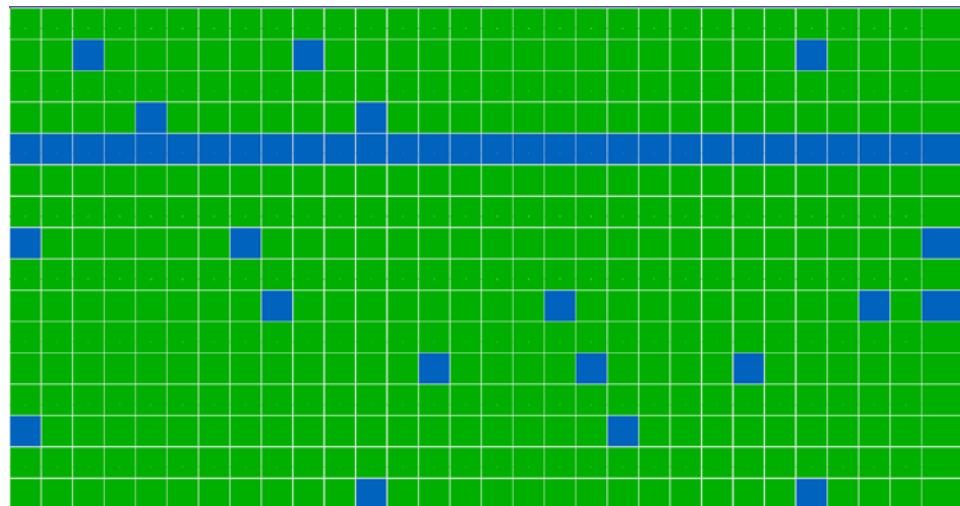


TOUCHSCREEN

When selected allows you to perform a touchscreen self-test.



When the touchscreen self-test is on, you can verify all areas of the touch screen respond to touch. Simply touch each box using your finger. The touchscreen responds to the touch and the Green box turns Blue.



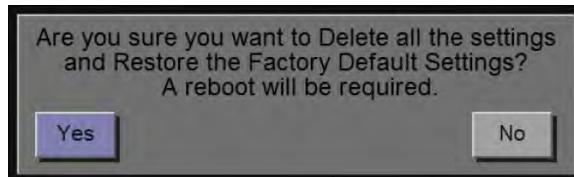
To exit the Touchscreen Self-Test:

- Place your finger on the touchscreen until the menu appears.
- Press the Menu button on the Side Handle or REDmote.

RESTORE SYSTEM

Restore System permits ALL camera configuration and setup data to be reset to factory default values.

When selected, you will be asked to confirm if you want to delete all settings and restore the factory default settings. After settings are restored, “DEFAULT SETTINGS RESTORED, INITIALIZING RESTART...” Camera will automatically power down and will require you to manually power it up.



POWER MENU

Power OFF controls are interlocked to prevent accidental powering down of the camera. For details on the different ways to properly power down your RED EPIC, refer to BASIC OPERATION > POWER DOWN.

1. Press the MENU icon  in the right corner of the Upper Status Bar to reveal the Secondary Menus.
2. Press POWER from this menu bar.
3. Press SHUTDOWN. The camera will immediately power down.



APPENDIX A: UPGRADING CAMERA FIRMWARE

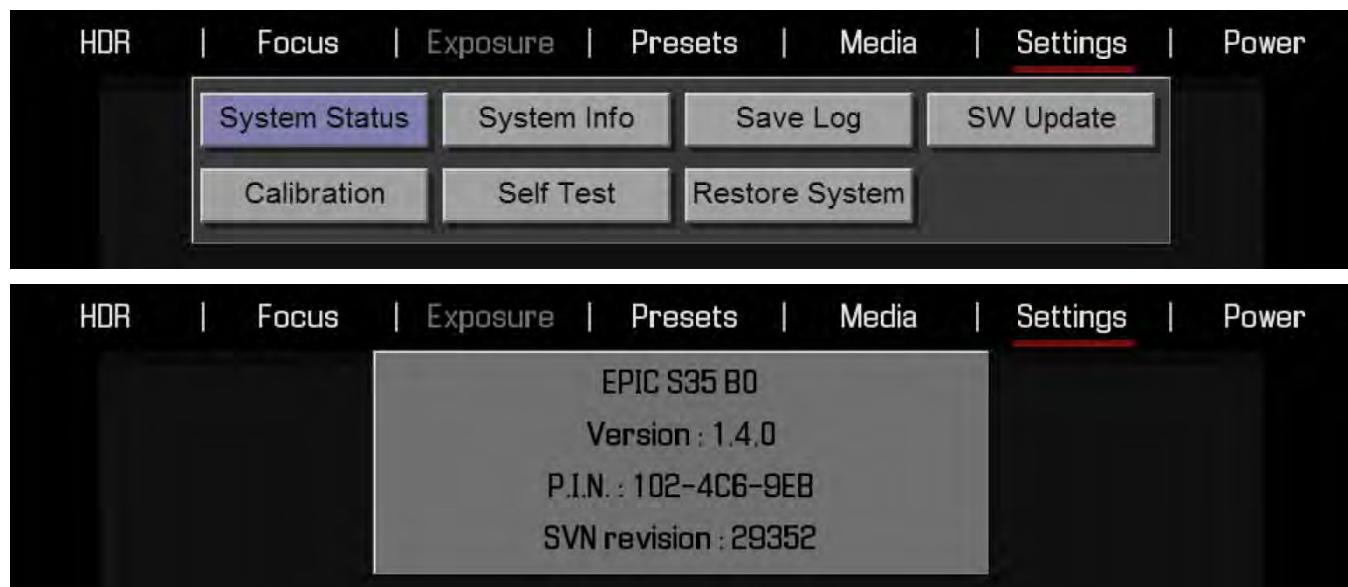
RED EPIC camera functionality may be upgraded by installing the latest firmware.

Camera firmware is identified by a Version number, which will be displayed by the camera on the LCD display when SYSTEM INFO is selected. A higher number reflects a later release.

Make a habit of frequently visiting www.RED.com/support to check for later versions of camera firmware, Operations Guide updates, and postproduction software.

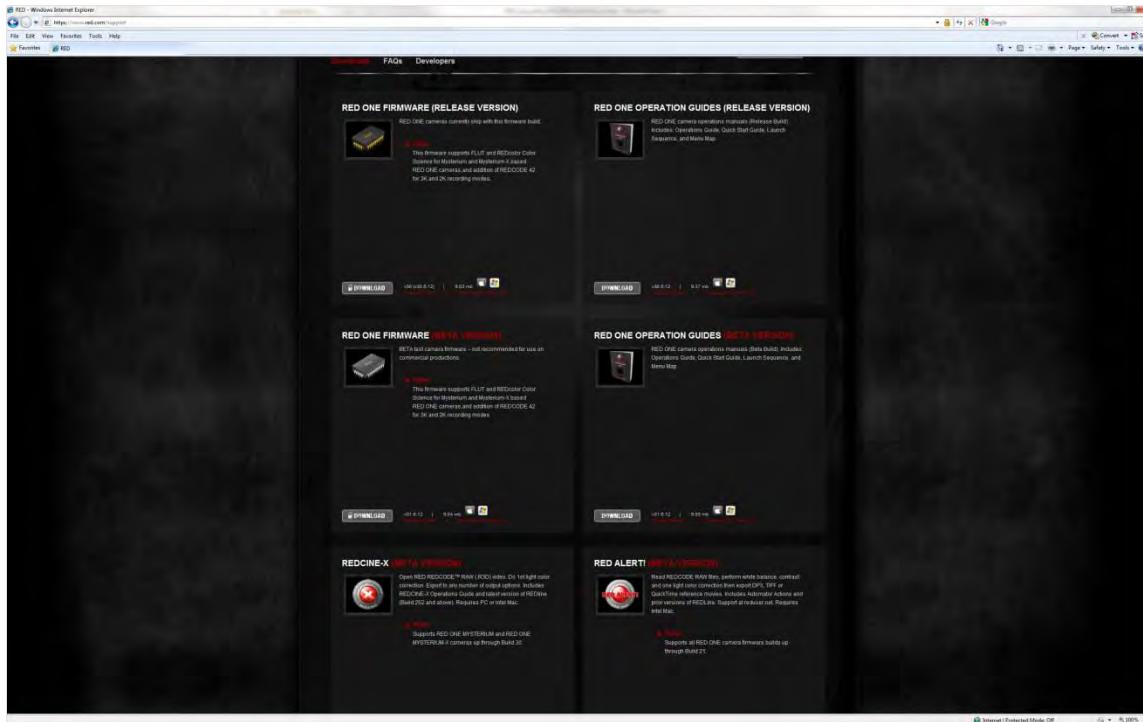
VERIFY CURRENT CAMERA FIRMWARE

With the camera ON, select ADVANCED MENU > SETTINGS > MAINTENANCE > SYSTEM INFO. The camera's P.I.N number and current firmware version will be displayed on the Viewfinder output(s).



UPGRADE PROCEDURE

1. To download the latest firmware (Build), go to www.RED.com/support.



2. Click on the desired build link and download to your desktop or directory of your choosing.

NOTE: Before the download starts you will be prompted to enter your account and password or the camera's P.I.N.



3. After downloading the build, you will see the new compressed (zipped) folder on your desktop.
4. Open the new compressed folder and note 2 folders, one for Windows (it will be the same name as the compressed folder) and one for Macintosh OS X (_MACOSX).
5. Open the folder for your operating system (for Macintosh OS X you will have to open a second folder with the same as the compressed folder) and verify there is a .txt read me file (containing installation instructions), and an "UPGRADE" folder.

NOTE: If multiple cameras are to be upgraded, it is necessary to perform STEPS 6 through 17 of this procedure for each camera.

6. Connect REDMAG 1.8" SSD to the computer using a RED STATION. Ensure the media has been formatted by the camera. For detailed instructions on formatting, go to APPENDIX B: MANAGING DIGITAL MEDIA.
7. Open the REDMAG 1.8" SSD on the computer desktop and then copy ONLY the "UPGRADE" folder to the media.
8. Unmount the SSD media from the desktop and remove it from the RED STATION.

IMPORTANT: The camera must be connected to DC power when upgrading the camera firmware. If a REDVOLT battery is installed in the side handle, remove the battery before upgrading.

9. There are two (2) different ways to upgrade camera firmware. One while the camera is already on, the second requires turning the camera off.
 - A. To upgrade the camera firmware with the camera ON, go to STEP 10.
 - B. To upgrade the camera by turning off, go to STEP 12.
10. With the camera on, insert the REDMAG 1.8" SSD into the Side SSD module on the camera.
11. Go to SECONDARY MENUS > SETTINGS > MAINTENANCE and select UPDATE SW. Go to STEP 14.
12. With the camera OFF, insert the REDMAG 1.8" SSD into the Side SSD module on the camera.
13. Turn the camera ON.
14. If there is valid upgrade firmware (build) version on the REDMAG 1.8" SSD, all monitor outputs will display that there is an upgrade available (displaying current version and upgrade version), allowing you to upgrade now or later.



NOTE: If you choose to upgrade later, the camera will continue to operate on the current firmware version.

NOTE: If the camera does not automatically display the upgrade, go to STEP 11 to manually install upgrade.

15. Select now to perform the upgrade procedure. All monitor outputs will display “FIRMWARE UPGRADE, PERFORMING SYSTEM UPGRADE, THIS MAY TAKE SEVERAL MINUTES, DO NOT POWER DOWN DURING THE PROCESS”. The progress of the upgrade is displayed in percentage below.



16. After the upgrade completes, all monitor outputs will display “FIRMWARE UPGRADE, SOFTWARE UPGRADE SUCCESSFUL, PLEASE RE-START THE CAMERA”.



17. Power the camera down and back up.

18. Perform a Dark Shading Calibration. Refer to SECONDARY MENUS > SETTINGS > MAINTENANCE > CALIBRATION for complete information.

APPENDIX B: MANAGING DIGITAL MEDIA

MEDIA

REDMAG 1.8" SSD is available with capacities of 64GB, 128GB or 256GB. Record duration is dependent on resolution, quality and frame rate, but a 64GB SSD will typically provide 24 minutes of 24fps 5K RAW recording.

IMPORTANT: After connecting **REDMAG 1.8" SSD** to the camera and **BEFORE** recording, you should format the media using the camera (even if formatting was previously performed on a computer). Go to **ADVANCED MENU > MEDIA > FORMAT** to properly format media before recording.

FORMATTING MEDIA

Media must be formatted prior to using it for recording. Formatting is performed on camera, although media may be erased on a Macintosh OS X personal computer, allowing the camera to just add the necessary project profile and clip log data.

NOTE: Media formatted on-camera will use a name and root volume in the format:

Camera Letter + Reel Number + Month + Day + ** where ** is a two digit alphanumeric random number generated by the camera for each file e.g. A001_0512A6.RDM

Clips recorded to the media follow similar naming conventions

A001_C001_0512A6_001.RDC and A001_C001_0512A6_H.mov etc.

IMPORTANT: Media must always be un-mounted prior to removal or disconnection from the camera. This ensures power is removed from the digital media and any open data files are closed. Failure to do so may result in lost data or corrupted files. Refer to REMOVE MEDIA FROM CAMERA (UNMOUNT).

This procedure outlines the formatting of REDMAG SSD media using the RED EPIC camera. Formatting the SSD media will take about 10 seconds.

1. Insert SSD into camera.
 - Insert the REDMAG 1.8" SSD with the RED logo facing outward (away from camera body). SSD firmly into its slot, but without using excessive force to prevent damage.
2. When SSD media is inserted into the camera, the camera will recognize the media is unformatted and display "MEDIA UNFORMATTED" on the LCF, EVF and/or external monitors.
3. To format the media select SECONDARY MENUS > MEDIA > FORMAT MEDIA.



- Viewfinder output(s) will display "FORMATTING".



NOTE: If when selecting FORMAT, the display indicates FORMAT FAILED, refer to MEDIA ERRORS.

4. Once formatting is completed, the Viewfinder output(s) will display "THE MAGAZINE WAS SUCCESSFULLY FORMATTED THE DIGITAL MAGAZINE IS READY FOR IMMEDIATE USE".

The magazine was successfully re-formatted.
The digital magazine is ready for immediate use.

MEDIA CAPACITY REMAINING STATUS

The Viewfinder output(s) will display the remaining media capacity in the MEDIA indicator (100% is shown).



At 10%, remaining capacity the media status will turn yellow, at 5% it will turn red. At 2%, remaining the camera will cease recording. This reserves a small amount of capacity for ancillary data to be written to the media.

EJECT MEDIA FROM CAMERA (UNMOUNT)

IMPORTANT: Media must always be Ejected (un-mounted) prior to removal or disconnection from the camera. This ensures power is removed from the digital media and any open data files are closed. Failure to do so may result in lost data or corrupted files.

Removing an SSD without first un-mounting it will not physically damage the media, however it does increase the risk of file corruption, so it's good operational practice to un-mount the media if possible before removing or disconnecting.

IMPORTANT: Unmounting the digital media takes a few seconds, protects the integrity of your recorded data and helps clips mount instantly to your workstation once in postproduction, so it's a recommended habit to develop. If you do not un-mount the media the camera will offer a warning – your files may not be damaged, but you will have been warned!

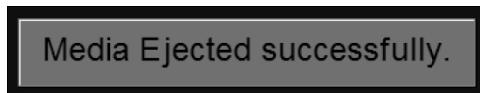
NOTE: The camera will respond to physical removal of the media without un-mounting and display "MEDIA REMOVED PRIOR TO UNMOUNT – DATA INTEGRITY RISK".

USING REDMOTE / TOUCHSCREEN LCD

1. Go to SECONDARY MENUS > MEDIA.



2. Select EJECT MEDIA.
3. When media is ejected, Viewfinder output(s) will display "MEDIA EJECTED SUCCESSFULLY".



4. Media can now be removed from the camera.

USING SIDE HANDLE

1. By default, the lower of the three (3) SYSTEM KEYS is set to Eject Media when pressed.



2. When media is ejected, Viewfinder output(s) will display “MEDIA EJECTED SUCCESSFULLY”.
3. Media can now be removed from the camera.

NOTE: Media can also be ejected in the same manner as described for the REDmote and Touchscreen LCD.

Media Ejected successfully.

USING SIDE CF / SSD

1. Press both User Keys 1 and 2 at the same time to eject REDMAG 1.8" SSD Media.
2. When media is ejected, Viewfinder output(s) will display “MEDIA EJECTED SUCCESSFULLY”.

Media Ejected successfully.

3. Media can now be removed from the camera.

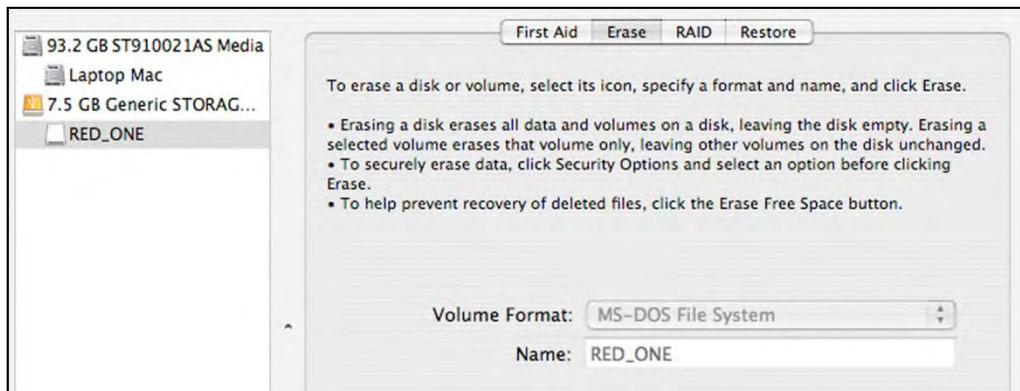
COPYING MEDIA

For use when media is connected directly to your computer. When copying media, it is recommended that you drag the complete .RDM folder on the digital magazine to the archive storage media. This copies all the media and metadata files. You will not need to copy the log, magazine profile, or presets files, but if you do so, it will do no harm.

ERASING MEDIA

MACINTOSH OS X

1. Connect the REDMAG 1.8" SSD via RED STATION REDMAG 1.8".
2. Open the Disk Utility.



3. Carefully choose the drive from the list on the left.
4. Select the Erase tab.
5. Choose MS-DOS (FAT) as the Volume Format. You can add a Name if desired, however the camera will overwrite this.

IMPORTANT: Before performing the next step, double-check that this is the correct SSD that you wish to erase DATA FROM.

6. Select Erase. When the pop up window appears click on the Erase button.
7. When the media is erased, drag its icon to the trashcan and physically disconnect it.
8. The media will need to be formatting by the camera before use. Refer to FORMATTING.

WINDOWS

1. Connect the REDMAG 1.8" SSD via RED STATION REDMAG 1.8".
2. Open Windows Explorer (go to my computer icon, right click and select EXPLORE).
3. Double-click on the dive you wish to erase files from.
4. Select all the files on the drive you wish to erase.

IMPORTANT: Before performing the next step, double-check that this is the correct SSD that you wish to erase DATA FROM.

5. Press the "DELETE" key on the keyboard, select FILE > DELETE or right-click on selected file and choose DELETE. When the pop up window appears click YES.
6. The media will need to be formatting by the camera before use. Refer to FORMATTING MEDIA.

APPENDIX C: CHARGING BATTERIES

BATTERY LED ARRAY

Consists of three (3) LED's and a button. When button is pressed, LEDs will illuminate in relation to battery life available (in 33.3% steps). If single LED blinks or no LEDs illuminate when pressed, battery requires charging. When charging, LEDs will illuminate indicating current battery charge status.

CHARGING

Using the supplied RED TRAVELCHARGER™, recharge time for a single REDVOLT battery is approximately 90 minutes. The battery can also be partially charged, to approximately 80% capacity, in 60 minutes.

1. Plug the supplied AC power cord into the charger's AC input and then into the AC power source.
2. Verify that the charger's LED status bar is solid Red (indicating ready to receive battery for charging).
3. Insert a REDVOLT battery into the charger.
4. Leave the battery to charge for the appropriate time as shown in the table (assuming battery is discharged completely). Charger status LED flashes Orange while charging.

Charging REDVOLT using RED TRAVELCHARGER

CHARGE AMOUNT% (MINUTES)
80 (60)
100 (90)

5. The battery is completely charged when the charger status LED turns green.
6. Remove the battery from the charger and repeat operation as necessary for additional batteries.

APPENDIX D: INPUT / OUTPUT CONNECTORS

BRAIN FRONT



A	MIC-1 3.5mm Audio Jack	B	MIC-2 3.5mm Audio Jack
----------	------------------------	----------	------------------------

Figure 18: Brain Connectors - Front

MIC-1, MIC-2 (MICROPHONE AUDIO)

Two 3.5mm phone jacks on the front of the brain support two independent channels of balanced or unbalanced analog microphone level audio inputs.

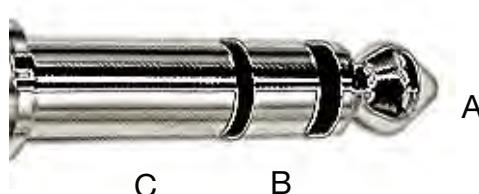


Figure 19: Microphone Input Connector

PIN	SIGNAL	DESCRIPTION	DIRECTION
A (TIP)	IN +	Mic Input (+48V Phantom Power)	In
B (RING)	IN -	Mic Input (+48V Phantom Power)	In
C (SLEEVE)	GND	Camera ground	--

Microphone Level analog audio input signals are routed via a high quality A/D and pre-amplifier, whose Gain may be controlled using the Input Level control to achieve the desired audio reference / recording level. Each microphone input supports +48V @ 10mA Phantom Power as a user selectable option.

To assist with reference level setup, the camera provides a color-coded Peak Level Meter in the Graphical User Interface, with a solid vertical witness mark that indicates 0dBu / 0.775 v RMS /-20dbFS.

Peak Level Meter range is -34dBu to +20dBu (-54dBFS to 0dBFS) and provides input clip indication.

BRAIN REAR



A	HD-SDI
B	Headphone
C	SYNC (Video Sync)
D	CTRL (RS232 Control)
E	GIG-E (Ethernet)
F	DC IN (Power Input)
G	HDMI

Figure 20: Brain Connectors - Rear

HD-SDI

A standard size BNC connector provides a high definition video Preview or Program output.

PIN	SIGNAL	DESCRIPTION	DIRECTION
Center	HD-SDI	SMPTE-292M HD-SDI	Out
Shield/Screen	GROUND	Camera ground	--

HD-SDI Output

The HD-SDI output provides a 1920 x 1080p 10-bit 4:2:2 progressive scan video feed at 23.98, 24.00, 25.00 or 29.97 Hz when in 1.5GHz HD-SDI mode, and 50.00 or 59.94 Hz when in 3GHz HD-SDI mode.

The HD-SDI output may be specified as a PROGRAM output (clean feed video) or as a PREVIEW output (with SurroundView™ look around, Clip Name, Timecode and Safe Action / Safe Title frame guides).

In addition to video data, the HD-SDI output also provides two (2) channels of embedded audio, Time of Day timecode, record tally flag and Clip Name information as SMPTE RP-188 VITC2 HANC metadata.

NOTE: Default setting is PROGRAM.

NOTE: HD-SDI video output is Progressive Scan; it does not support 1080i or 1080PsF modes.

HEADPHONE

A 3.5mm stereo jack provides two channels of adjustable level analog audio for monitor headphones.

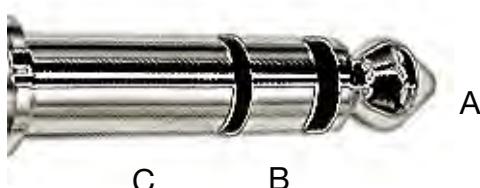


Figure 21: Headphone Output Connector

PIN	SIGNAL	DESCRIPTION	DIRECTION
A (TIP)	LEFT	Left channel audio	Out
B (RING)	RIGHT	Right channel audio	Out
C (SLEEVE)	GND	Camera ground	--

The camera's four audio channels may be monitored in pairs: either 1L - 2R or 3L - 4 R or as a quad mix of 1+3L - 2+4R based on the MIX parameter. Default is 1L-2R.

Output volume may be adjusted as follows.

Volume: (master volume) Adjusts headphone volume equally for left and right outputs.

Range is -18dB to 0dB in 1dB steps. Default is -9dB.

NOTE: for maximum output signal quality, only use high impedance headphones.

SYNC (VIDEO SYNC)

A 4-pin LEMO connector supports shutter synchronization input, GPI, timecode and genlock signals.

The shutter Sync Input signal acts as an immediate response hardware trigger to commence a scan. This is useful for motion control and other applications where the camera is driven by a master timing device. When using SYNC as the camera shutter timing reference, fine shutter start time timing (SHUTTER PHASE) is disabled, make any timing adjustments at the external SYNC generator itself.

Alternatively, this input pin may be used as a GPI (General Purpose Input) trigger, whose function is programmed in the USER KEYS menu. Default is Record Start / Stop.

A SMPTE timecode input signal provides a frame accurate time stamp for each frame of recorded video.

A Video Genlock input signal may be used as a vertical interval reference signal for applications that require precise synchronization between cameras, such as 3D and live broadcasts. When using GENLOCK as the camera shutter timing reference, fine shutter start time timing (SHUTTER PHASE) may be adjusted.

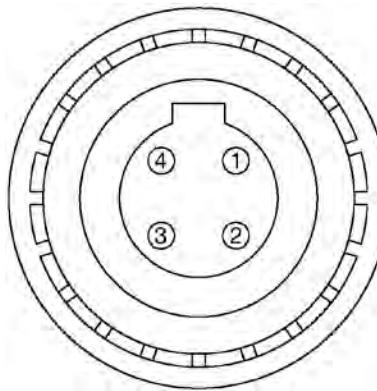


Figure 22: View into camera SYNC (Video Sync) Interface connector

Mating Connector: FGG.00.304.CLAD27Z

PIN	SIGNAL	DESCRIPTION
1	GROUND	Common Ground
2	SS/GPI	Shutter Sync / GPI Trigger Input
3	TIMECODE	SMPTE unbalanced timecode Input
4	GENLOCK	RS170A Tri-Level Sync Input

NOTE: The Shutter Sync / GPI Trigger uses a Schmitt trigger operating at 3.3V. Both edges of the input signal can be used as a trigger event.

For example, when GPI trigger is used as a Record Start / Stop.

- **Start Record:** Ground - 3.3V Transition
- **During Record:** Hold at 3.3V

- Stop Record: 3.3V - Ground Transition
- During Stop: Hold at Ground

NOTE: A pre-fabricated SYNC interface cable is available from RED Digital Cinema.

- Part # 140-0078 - Video Sync - Camera to 3 BNC - 3 ft. (1m)
- White BNC: Shutter Sync / GPI
- Yellow BNC: SMPTE Timecode
- Green BNC: RS170A Genlock

CTRL (RS232 CONTROL)

A 4-pin LEMO connector supports RS232 remote control for stereoscopic camera image capture, and third party metadata ingest applications. Supported command protocol is available on request.

The shutter Sync Output signal acts as an immediate response hardware tally of a scan. This is useful for 3D or motion control applications where a slave camera or lighting device needs to be synchronized to a master camera.

Alternatively, this output pin may be used as a GPO (General Purpose Output) tally, whose function is programmed in the USER KEYS menu. Default is Record Tally.

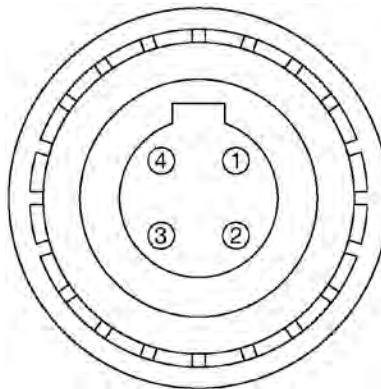


Figure 23: View into camera CTRL (RS232 Control) Interface connector

Mating Connector: LEMO FGG.00.304.CLAD27Z

PIN	SIGNAL	DESCRIPTION
1	GROUND	Common Ground
2	232 RX	RS232 RX
3	SS/GPO	Shutter Sync / GPO Output
4	232 TX	RS232 TX

NOTE: When active, the GPO tally presents 3.3V @ 0.04 Amps maximum between pins 1 and 3.

NOTE: A pre-fabricated CTRL interface cable is available from RED Digital Cinema.

- Part # 140-0076 - RS232 - Camera to DB-9 - 3 ft. (1m)
- DB-9 Pin 1 Shutter Sync / GPO
- DB-9 Pin 2 RS232 Tx
- DB-9 Pin 3 RS232 Rx
- DB-9 Pin 5 Ground

GIG-E (ETHERNET)

A 9-pin LEMO connector supports a Gigabit Ethernet port for remote camera setup, master / slave camera-to-camera control and external metadata ingest. Supported command protocol is available on request.

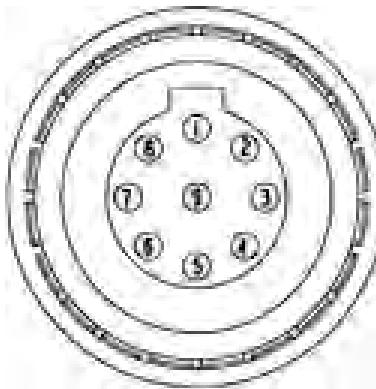


Figure 24: View into Ethernet Interface connector

Mating connector: FGG.0B.309.CLAD32Z

PIN	SIGNAL	DESCRIPTION	DIRECTION
1	B1_DC +	Data Pair C+	--
2	B1_DC -	Data Pair C-	--
3	B1_DD+	Data Pair D+	--
4	B1_DD -	Data Pair D-	--
5	B1_DA-	Data Pair A-	--
6	B1_DA+	Data Pair A+	--
7	B1_DB+	Data Pair B+	--
8	B1_DB-	Data Pair B-	--
9	-	Do Not Connect	--

NOTE: Two pre-fabricated Ethernet interface cables are available from RED Digital Cinema.

- Part # 140-0152 - Ethernet - Camera to Camera - 3 ft. (1m)
- Part # 140-0125 - Ethernet- Camera to RJ45 - 3 ft. (1m)

DC IN (POWER INPUT)

The 6-pin LEMO connector accepts a DC voltage between +11.5V and +17V DC. Power conditioning circuits provide protection against reverse-polarity connection, ESD, under voltage, and over current.

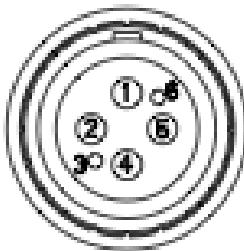


Figure 25: View into camera DC IN Power Input connector

Mating Connector: LEMO FGJ.1B.306.CWLD72Z

PIN	SIGNAL	DESCRIPTION
1	+VBATT	Power input, +11.5 to +17VDC
2		
3	SCL-BATT	Serial Battery Bus Clock
4	GROUND	Power Return (Camera Ground)
5		
6	SCA-BATT	Serial Battery Bus Data

WARNING: It is very important that both pairs of +VBATT and GROUND pins are wired up. DO NOT fabricate power cables with just one each of +VBATT and GROUND pins wired, as this may cause damage to the camera's power supply; this is not covered by Warranty.

NOTE: Two pre-fabricated DC Power input cables are available from RED Digital Cinema.

- Part # 140-0135 - DC Power - REDBRICK to Camera - 18 in (0.5m)
- Part # 140-0160 - DC Power - XLR to Camera - 10 ft. (3m)

HDMI OUT

The HDMI output supports an HDTV compatible 10-bit 4:2:2 progressive scan video signal (with embedded audio) at 1080p resolution.

The HDMI output may be specified as a PROGRAM output (clean feed video) or as a PREVIEW output (with SurroundView™ look around, Clip Name, Timecode and Safe Action / Safe Title frame guides).

In addition to video data, the HD-SDI output also provides 4 channels of embedded audio.

NOTE: Default setting is PREVIEW.

NOTE: HDMI video output is Progressive Scan; it does not support 1080i or 1080PsF modes.

SIDE SSD MODULE



Figure 26: Side SSD Module

An optional Side SSD Module may be mounted on the left side of the camera Brain. On the rear face of this module is a slot for inserting REDMAG 1.8" SSD media. Do not attempt to insert any other media type, or any foreign objects into this slot, or damage to the Side SSD Module and / or the camera Brain may occur.

The VIEWFINDER output Module to the front face of the Side SSD provides digital video, communications and power interconnection between the camera and a RED EVF or RED LCD digital display. Due to the requirement for absolute data integrity this requires a custom cable manufactured by RED, the pin-out of this interface is not published.

NOTE: Pre-fabricated VIEWFINDER cables are available from RED Digital Cinema.

- Part # 140-0120 - VIEWFINDER – Right Angle to Right Angle - 6in (0.15m)
- Part # 140-0177 - VIEWFINDER – Right Angle to Straight- 18 in (0.5m)

REDMOTE

This section describes the physical connectors on the REDmote.

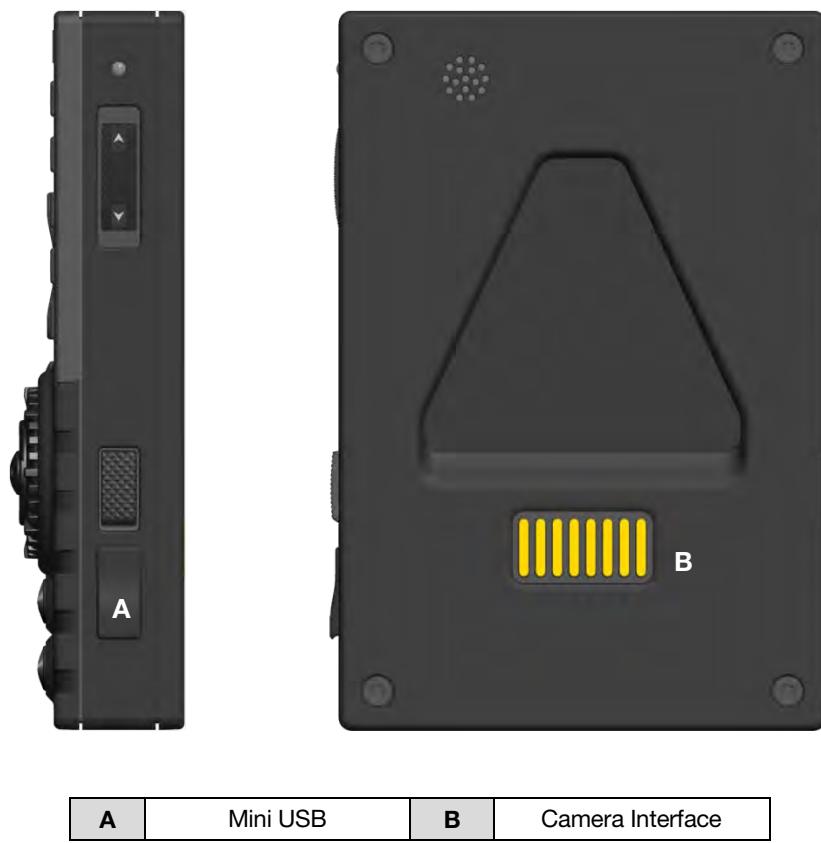


Figure 27: REDmote Connections

The Mini USB connector (A) may be used to charge the REDmote from a 3rd party USB power source.

The REDmote interface connector (B) allows communication between the REDmote and EPIC Brain or any expansion module when installed. Make sure these contacts are kept clean and free of any grease that may interfere with electrical contact.

APPENDIX E: REDMOTE OPERATION

CONTROLS

This section describes the physical controls on the REDmote.



Figure 28: REDmote Controls

A	Still/Motion Switch	F	User Function Keys A-D	K	Soft Menu Keys 4-8
B	Release Button - L	G	MENU Button	L	Ambient Light Sensor
C	Record Status LED	H	Soft Menu Keys 1-3	M	Power/Lock Switch
D	Power Status LED	I	Navigation Group	N	Release Button - R
E	Zoom Rocker Switch	J	Focus / Record Button	O	USB Power Port

STILL / MOTION TOGGLE SWITCH

On the upper left edge of the REDmote is the STILLS/MOVIE toggle switch (A) used to switch between STILLS operation (DOWN) and MOVIE operation (UP). The toggle switch is set to the MOVIE position, the camera settings and defaults become movie specific. When the toggle switch is set to the STILLS position, the camera settings and defaults become still photography specific.

LEDS

The upper bi-color LED (C) indicates the camera's record status and illuminates Red when recording. The lower bi-color LED (D) indicates the camera's power status and illuminates Green when REDmote is powered UP and working.

ZOOM ROCKER SWITCH

The pressure sensitive ZOOM rocker switch (E) may be assigned by the operator to one of a number of operational controls. Refer to SECONDARY MENUS > SETTINGS > SETUP > KEYS / SHORTCUTS.

USER FUNCTION KEYS

Below the Menu buttons are four (4) User Function Keys A-D (F). The specific function of these keys may be programmed by the user. Refer to SECONDARY MENUS > SETTINGS > SETUP > KEYS/SHORTCUTS.

Default settings for User Function Keys A-D are as follow:

- User Key A – Enables (Auto) Focus Indicator
- User Key B – Enables White Balance calculation
- User Key C – Enables 1:1 Focus Check
- User Key D – Enables false color Exposure Check.

MENU BUTTON

Below and to the left of the User Keys is the MENU button (G) - press once enter the menus at the top level, press twice in quick succession to re-enter menus at the last location from which you exited them.

SOFT MENU BUTTONS 1-3

Below the LCD are three (3) Soft Menu buttons 1-3 (H) whose functions are defined on the LCD screen.

- Soft Menu 1 – Navigates to ISO menu
- Soft Menu 2 - Navigates to Shutter Speed menu
- Soft Menu 3 - Navigates to White Balance menu

After pressing any of these buttons, use the Navigation Group to adjust the parameter value.

NAVIGATION GROUP

The Navigation Group (I) allows navigation through allowing navigation of camera menus and adjustment of selected parameters.

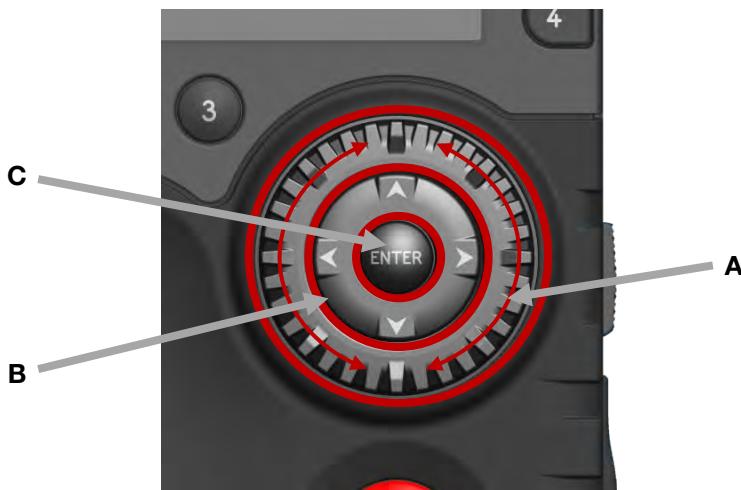


Figure 29: Side Handle Navigation Group

A	Scroll Wheel	B	Directional Pad	C	Enter Button
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The Navigation Group has three (3) separate operational capabilities.

SCROLL WHEEL

The Scroll Wheel (A) allows the operator to select and adjust the values of selected camera parameters.

DIRECTIONAL PAD

The Directional Pad (B) allows Left / Right / Up / Down navigation thru camera menus to select a desired parameter for adjustment.

ENTER BUTTON

The Enter button (C) located at the center, allows confirmation of a parameter adjustment.

FOCUS AND RECORD BUTTON

Below the Navigation Group is the focus and record button (J). This is a dual throw action switch. A half press initiates Auto Focus; a full press initiates still capture, or starts /stops a movie recording.

When recording, the upper LED will illuminate Red and a Red dot will appear to the immediate left of the Timecode on the REDremote LCD display.

SOFT MENU BUTTONS 4-5

To the right of the LCD are five (5) Soft Menu buttons 1-3 (H) whose functions not currently defined.

- Soft Menu Key 4 - Undefined
- Soft Menu Key 5 – Undefined.

- Soft Menu Key 6 – Undefined.
- Soft Menu Key 7 – Undefined.
- Soft Menu Key 8 – Undefined.

AMBIENT LIGHT SENSOR

On the upper right side of the REDmote is an ambient light sensor (L) which is used to automatically adjust the brightness of the LCD display.

POWER / LOCK SWITCH

Below the ambient light sensor is the Power / Lock switch (T).

Sliding and holding in the switch in the POWER direction for longer than 2 seconds will Power UP or Power DOWN the REDmote.

Moving the switch to the LOCK position will lockout all REDmote buttons to prevent unintentional operation. When in the LOCK position, a padlock icon will be displayed in the REDmote LCD display.

USB POWER PORT

On the lower right side is a USB port that may be used to charge the REDmote internal battery. Refer to CHARGING / BATTERY LIFE > CHARGING USING USB CONNECTOR for complete information.

CHARGING / BATTERY LIFE

CHARGING USING CAMERA

While connected to the camera, the REDmote will automatically recharge its internal battery. Charge status is indicated by the Green Battery Icon at the top-right of the REDmote LCD display screen. A fully discharged REDmote battery will be re-charged in approximately 8 hours if connected to a powered camera. A much faster charge time may be achieved with a USB based power source such as laptop P.C.

CHARGING USING USB CONNECTOR

The REDmote can be charged by connecting a Mini-USB-to-USB cable between REDmote and a computer or a cell phone charger.

NOTE: The REDmote can be charged using the Mini-USB connector while connected and controlling a camera wirelessly.

1. Connect the USB connector to any computer (computer must be ON to charge REDmote).
2. Connect the Mini-USB end to the REDmote USB Port located on the lower right side (under rubber protective cover).

3. If the REDmote is powered down, nothing will display and the battery will charge. If the REDmote is powered UP, it will list the available cameras it has been connected to and recognizes.
4. The REDmote will be fully charged in approximately 4 hours.

CHARGE STATUS INDICATOR

Charge status is shown by a “Battery” indicator at the upper right corner of the screen. When battery charge is good, indicator is Green. When battery charge is marginal, indicator will be Yellow. When battery charge is low, the indicator turns Red. Ensure the battery is fully charged to Green before operating camera in a wireless configuration.



BATTERY LIFE INDICATOR

Battery life is shown by a Green indicator at the upper left corner of the screen (same indicator as charge, but without the lightning bolt). When battery life is good, indicator is Green, when battery life is marginal, indicator will be Yellow. When battery life becomes low and requires recharging, the indicator turns Red.

WIRELESS OPERATION BATTERY LIFE

When using the REDmote in a wireless configuration, the battery will last approximately 8 hours before charging is necessary.

NOTE: The REDmote can be charged using the Mini-USB connector while connected and controlling a camera wirelessly.

CONNECTING / REMOVING

This section describes how to physically connect / remove the REDmote to / from an EPIC or SCARLET Brain or to / from the back on an expansion module. On the lower left and right sides of the REDmote are V-lock release buttons (B, N) that must be depressed to release the REDmote from the camera or module.

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PHYSICAL

CONNECTING (DOCKING)

1. Place the female V-Mount of the REDmote over the male V-Mount of the camera/module.



2. Press down until a click is heard which indicated the REDmote is securely attached.

NOTE: If the camera is ON, the REDmote will automatically power UP when connected.

REMOVING (UNDOCKING)

1. Depress the two (2) release buttons located on the sides of the REDmote.
2. Slide the REDmote upward to release from the V-Mount of the camera/module.
3. Remove the REDmote.



WIRELESS COMMUNICATION

When REDmote is physically connected to a camera, it automatically logs the I.D of that camera into its internal memory. Up to four camera I.D's can be simultaneously held in memory, which will be the last four cameras to which it has been physically attached.

To communicate to a desired camera wirelessly, perform the following tasks:

1. Ensure the REDmote is attached to the camera, both are powered up and REDmote can control that camera.
2. Disconnect the REDmote from the camera while the camera and REDmote are still both powered up.
3. REDmote's LCD panel will display:

“NOTIFICATION - RMOTE IS UNDOCKED FROM CAMERA”

4. Press USER MENU button No. 1 (stated on the LCD screen) to re-connect REDmote to the camera.
5. The REDmote LCD screen will then return to a similar Status Screen as seen when physically attached to the camera you can operate the camera using the REDmote via the REDlink™ 2.4GHz wireless link. The wireless indicator showing signal strength will be displayed in the upper left corner of the REDmote display.



6. Once the REDmote has communicated with a camera, it does not need to be connected to that camera again to enable communication in the future. The only requirements to connect wirelessly are that the camera and REDmote are both powered on, within signal range, and press the USER MENU No.1 button to connect.

NOTE: When communicating with a camera mounted on a boom or in a remote location, ensure an external monitor is set up to show the camera menus if you plan to adjust those using the REDmote.

POWER UP / DOWN

Located on the upper right side of the REDmote is the Power / Lock Switch (refer to CONTROLS).

POWER UP

CONNECTED TO CAMERA

If the REDmote is physically attached to a camera, when the camera is powered UP the REDmote will automatically power UP along with the camera.

NOT CONNECTED TO CAMERA

To manually power UP the REDmote, depress and hold the Power / Lock Switch in the Down direction for 2 seconds then release.

POWER DOWN

CONNECTED TO CAMERA

If the REDmote is physically attached to a camera and the camera is powered DOWN, the REDmote will automatically power DOWN.

NOTE: If the power cable is disconnected from the camera or the AC plug, the REDmote will remain powered up and should be manually powered down using the Power / Lock Switch.

NOT CONNECTED TO CAMERA

To manually power DOWN the REDmote:

Press and hold the Power / Lock Switch in the Down direction for 2 seconds then release.

RECORDING

IMPORTANT: Before recording from a REDmote ensure the camera is properly powered, set up and media is connected. Refer to BASIC OPERATION.

To record, press the Red REC (record) button on the REDmote.

- If media is connected and properly formatted, the upper LED will illuminate Red and a Red dot will appear to the immediate left of the Timecode display on the REDmote LCD display.
- If media is NOT connected, the REDmote LCD display will display “ERROR ON CAMERA A – DIGITAL MEDIA NONE ATTACHED”. The camera LCD and external displays will indicate “DIGITAL MEDIA NONE ATTACHED” (shown).

To stop recording, press one of the record buttons a second time.

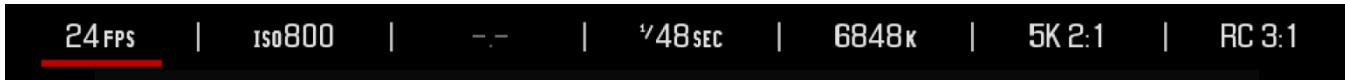
ACCESSING CAMERA CONTROLS / SETTINGS

The Navigation Group is used to navigate through the camera's menus. Refer to CAMERA OPERATIONAL CONTROLS > REDMOTE > NAVIGATION GROUP. The camera settings and status are displayed on the REDmote Color LED display. Refer to BASIC OPERATION > GRAPHICAL USER INTERFACE AND NAVIGATION > REDMOTE.

The operations will be the same whether connected physically to the camera, or wirelessly.

CHANGING CAMERA SETTINGS

To adjust a parameter value displayed on the camera's Upper Status Group, first note the red colored bar (located under 24fps in this example), indicating the currently active parameter for instant adjustment.



Use the NAVIGATION GROUP directional pad to move the cursor to a different parameter if desired, then press the ENTER key to select that parameter and use the Scroll Wheel to adjust that parameter's value. To confirm the change in parameter value and to exit the adjustment menu, press the ENTER button.

To access the camera's menus, press the MENU button at the lower left. The MENU displays on the EVF, LCD or external monitors if the LCD and/or EVF are not connected disconnected.



Use the NAV GROUP to make changes to the cameras settings. Use the scroll wheel and directional pad to move the cursor to navigate and make changes to the desired settings. When a desired setting change is made, press the ENTER button or the directional pad UP arrow to exit from that setting.

EXITING MENUS TO MAIN SCREEN

To EXIT from the Secondary Menus and return to the main screen:

- Press the MENU icon  in the upper right corner of the touchscreen until the main screen is displayed.
- Press the MENU button until the main screen is displayed.

APPENDIX F: 3D SETUP / OPERATION

This section under construction.

APPENDIX G: EXPOSURE – USING FALSE COLOR AND ISO

NOTE: The following section uses a RED ONE camera display to illustrate exposure tools; however, the same principles apply to EPIC camera systems.

RED EPIC provides several advanced exposure indication tools. In the following examples, we will show how these tools respond to a reference scene that is under-exposed, over-exposed and then correctly exposed. Each scene will have its unique characteristics so the “correct exposure” is a matter of judgment, balancing the desire to avoid clipping any highlights and also avoiding underexpose of elements in deep shadow – which may therefore be prone to noise when developed in post production.

The following reference scene includes highlight and shadow elements and was shot at ISO 800.

UNDEREXPOSURE (~ 2 STOPS)



ISO 800 - Monitor Output

In the image above it is obvious the camera is under exposed. The initial clues are the monitor is very dark, and the histogram is justified to the left. Also note that red bar at the left edge of the histogram and the vertical color stack to the right of the histogram is only at grey. These indicators are saying a significant amount of the sensor's RAW data is “in the noise” and that the peak level of the sensor's RAW data is at a very low level – in fact less than halfway.

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ISO 800 - False Color: Exposure

Select False Color – Exposure: note the \checkmark E icon in the GUI when active. This mode allows us to visualize where in the image underexposure is taking place. These areas are indicated in purple. It is clear those areas are under the matchbox and coin, and between the bottle and cigar holder.

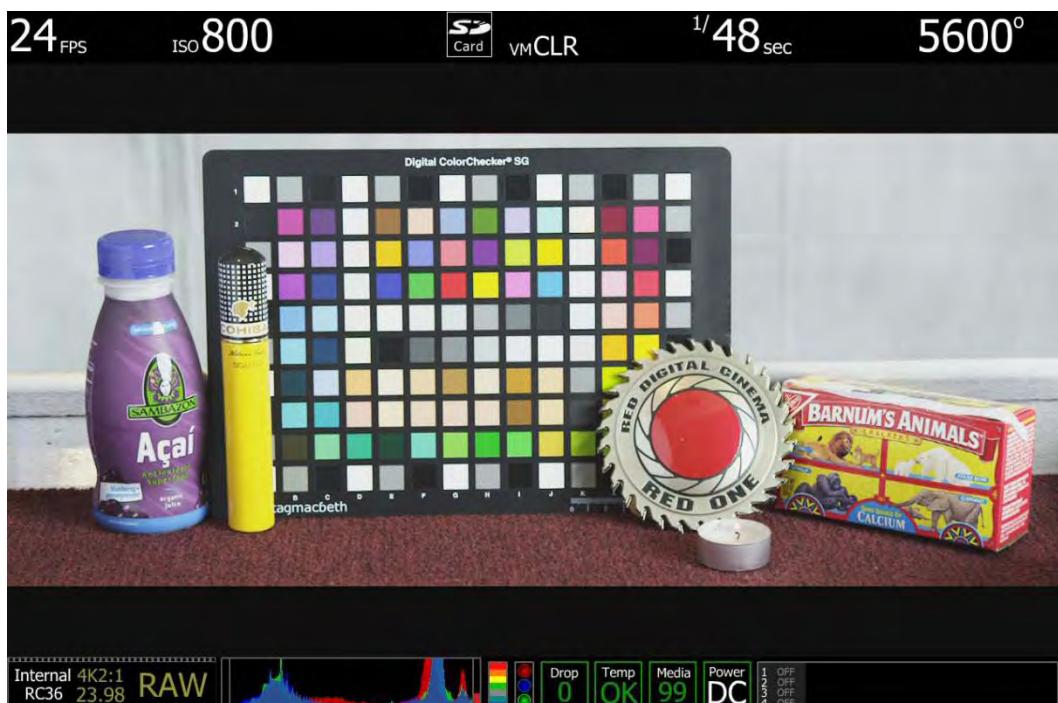


ISO 800 - False Color: Video

Select False Color – Video: note the √ V icon in the GUI when active. This mode allows us to check the RGB video levels of the scene. As the peak white chips on the test chart are showing up in green and the underexpose areas are showing up in dark blue, this says the monitor path video levels are only ranging between 44 IRE and 1 IRE.

Because the scene is under exposed, when the recorded .R3D file is color corrected in post-production, the scene's highlight information will certainly not be clipped, however the shadow information will probably display with significant noise once pushed to an acceptable brightness.

OVEREXPOSURE (~ 2 STOPS)



ISO 800 - Monitor Output

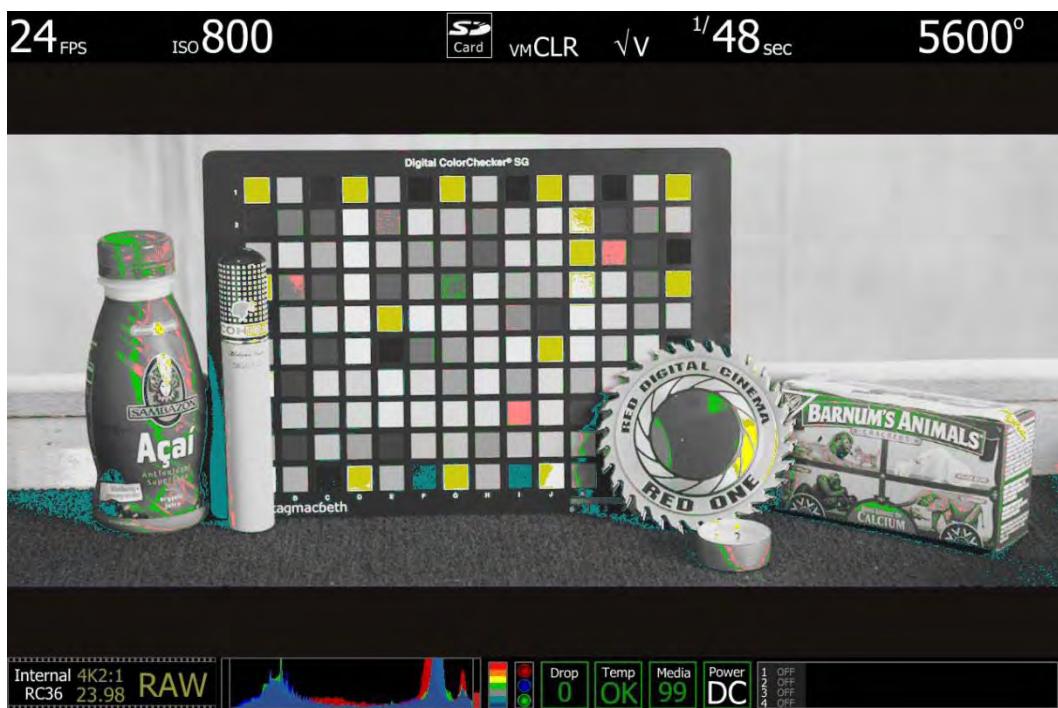
In the image above it is obvious the camera is over exposed. The monitor is very bright and the histogram is justified to the right. Note the red bar at the right edge of the histogram and the vertical color stack to the right of the histogram is showing red plus the three traffic lights to the right of that are all illuminated. These indicators are suggesting that a significant portion of the sensor's RAW data is "at clip", and this clipping is occurring on Red, Green and Blue channels.

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ISO 800 - False Color: Exposure

Select False Color – Exposure: note the \sqrt{E} icon in the GUI when active. This mode allows us to visualize where in the image over exposure is taking place. These areas are indicated in red. It is clear those areas are on the highlight on coin, and at the top right edge of the color chip test chart.



ISO 800 - False Color: Video

Select False Color – Video: note the \sqrt{V} icon in the GUI when active. This mode allows us to check the RGB video levels of the scene. As all the white chips on the test chart are Yellow, this suggests that a significant portion of the monitor path video is at the maximum legal 100 IRE value.

Because the scene is over exposed, when the recorded .R3D file is color corrected in post-production, the scene's highlight information will almost certainly be clipped, however the shadow information will probably display cleanly once pulled back down to an acceptable brightness.

APPROPRIATE EXPOSURE



ISO 800 - Monitor Output

In this image, the camera is appropriately exposed for this scene. The monitor is neither very dark nor very bright and the histogram is spread evenly given that there are bright highlights on the coin we wish not to blow out. Note that there is no red bar on either the left or the right edges of the histogram and the vertical color stack to the right of the histogram is at yellow. These indicators suggest that there is no significant amount of the sensor's RAW data "in the noise" or "at clip", and that the peak level of the sensor's RAW data is about 2/3 stop below clipping.



ISO 800 - False Color: Exposure

Select False Color – Exposure: note the \sqrt{E} icon in the GUI when active. This mode allows us to visualize where there is under exposure (purple) or over exposure (red) in the image. In this case, there is a very small area of purple under the cracker box, and just a suggestion of red on the highlight on the coin, which suggested that the sensor is appropriately exposed for this scene.

RED EPIC® OPERATION GUIDE



ISO 800 - False Color: Video

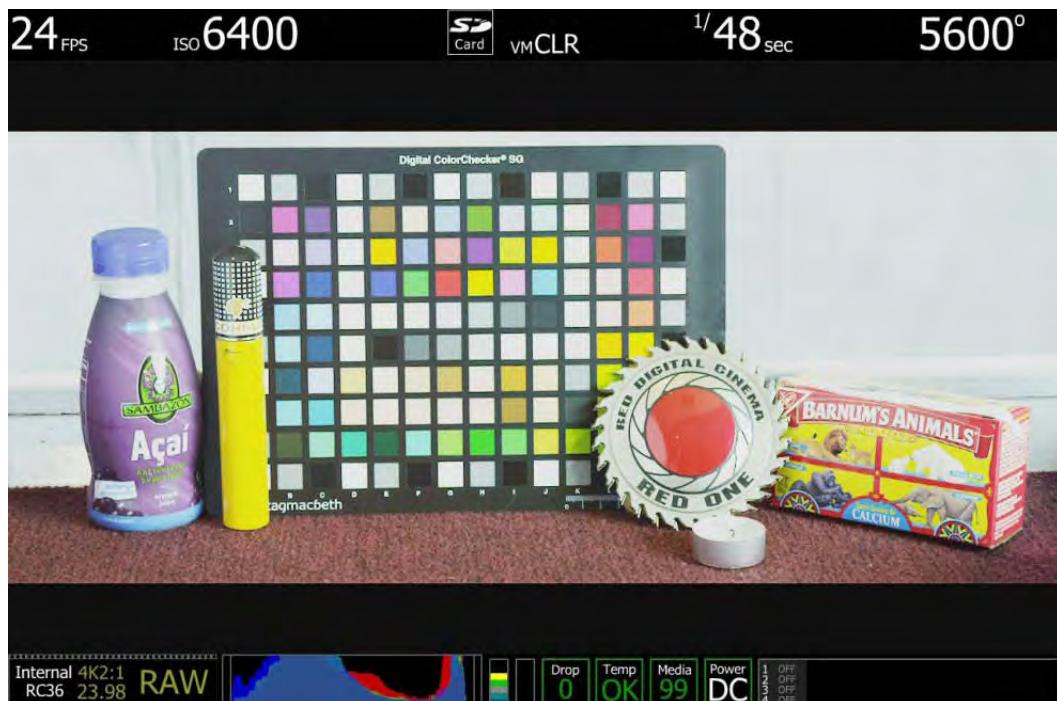
Select False Color – Video: note the \sqrt{V} icon in the GUI when active. This mode allows us to check the RGB video levels of the scene. The two green squares in the upper right corner of the color chart and green in the background indicate that the scene's mid grey and skin tone elements, plus peak white and blacks are all at appropriate levels.

Because the scene was well exposed, when the recorded clip is color corrected in post-production, sufficient headroom exists for the scene's highlight information to be displayed without clipping, and the shadow information can be displayed without significant noise, even if the brightness of the shadow information is pulled up.

ADJUSTING THE ISO RATING

In the following two examples, the image exposed at ISO 800 rating have had the ISO rating adjusted first to ISO 6400 and then to ISO 100.

NOTE: Although the image and Histogram both adjust to changes in the ISO rating, the sensor RAW meters do not change – they always indicate what is happening at the sensor level and hence where the image is truly in noise or at clipping.



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ISO 100 - No Exposure Adjustment

In these extreme examples, it is clear that the RGB domain images are respectively very bright and very dark. The histogram data reflects that, however you can also see that the sensor RAW meters are unchanged. The exposure at the sensor at this point in time is the same. If you choose to close the iris to reduce the brightness of the first image you will be reducing exposure at the sensor – this biases exposure in favor of protecting the scene highlight. Alternatively, if you choose to open the iris to increase the brightness of the image of the second image you will be increasing exposure at the sensor – this biases exposure in favor of minimizing noise in the scene shadows.

The technique is similar in principle to re-rating a film stock. With practice, the ISO rating can be used as a tool to assist ideal exposure based on the dynamic range identified within the scene.

APPENDIX H: POST PRODUCTION

RED workflow is quite easy to understand, especially if you have experience with photographic RAW image processing, or shoot 16mm or 35mm film followed by a Telecine transfer to a non-linear video editor and on-line conform.

RAW data has a wide dynamic range and color space, so you can freely change the white balance of the footage, adjust exposure and alter highlight and shadow tonality in post-production.

The RED EPIC camera records RAW sensor data using wavelet based REDCODE RAW compression to REDMAG 1.8" REDMAG 1.8" SSD. The compressed RAW data is then transferred from the digital media to a Macintosh OSX or Windows XP workstation running REDCINE-X post production software. These applications do not directly edit or conform the RAW data themselves, but prepare the RAW data for editing and conforming by RGB domain post-production software applications.

In film processing terms, REDCINE-X act as an integrated film laboratory, telecine, and one light color corrector. They convert recorded REDCODE RAW data to RGB video, and provide basic one light image processing and color correction. Using REDCINE-X footage can also be cropped, resized, or repositioned. These functions lessen the amount of time required for color correction or re-framing of shots after the final cut has been completed.

REDCINE-X can also encode 4K or 2K RAW footage into a variety of uncompressed RGB and compressed 4:2:2 video formats. Provided the appropriate QuickTime codec's are available on the host computer workstation, compressed video choices include ProRes, DNxHD, DV100 and M-JPEG QuickTime movies at 1080p or 720p resolution. For film out, multi-media or special effects applications, REDCINE-X may export a sequence of 2K or 4K image files in TIFF, Open EXR, DPX, JPEG, or Photoshop PSD file formats.

Creating 4:2:2 at 1080p or 720p resolution QuickTime movies provides compatibility with the majority of non-linear editing systems.

Depending on the QuickTime movie resolution, material may be taken directly to a broadcast delivery videotape format, or after the editorial decisions have been made, video can be conformed at full image resolution by replacing the lower resolution edit proxy (e.g. 720p at 8 bit quality) with a high resolution 4K, 2K or 1080p image file.

SOFTWARE TOOLS

RED Digital Cinema provides a variety of software tools to aid postproduction. For proper color rendition using a Macintosh OSX computer, your monitor should be set to Adobe 1998, or to SMPTE-C display profile. If you use the HD Cinema display profile, adjust the gamma to 2.2.

REDCINE-X®

REDCINE-X is available for Intel based Mac OSX and Windows XP platforms. In addition to performing white balance and one light color correction, REDCINE-X provides image pan/scan, crop and scaling operations. The application can export either a single clip, or a sequence of clips, as 4K or 2K resolution 10-bit DPX or 16-bit TIFF files. REDCINE-X can also render clips into standalone QuickTime movies using specific HD video codecs. As RED EPIC shoots progressive scan images, all QuickTime movies created by REDCINE-X are also progressive scan.

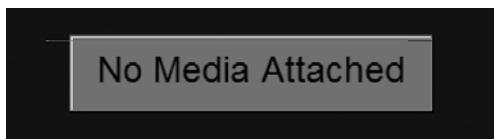


REDCINE-X is available for download at <http://www.RED.com/support>. Included with the download is the REDCINE-X Operation Guide to assist with understanding the tools available in REDCINE-X.

APPENDIX I: TROUBLESHOOTING

NO MEDIA ATTACHED

Displayed if media is not present or not formatted when pressing the record button. Connect media to camera if necessary. If media is already connected, format media and attempt to record again. Refer to APPENDIX B: MANAGING DIGITAL MEDIA for detailed information.



CAMERA FIRMWARE UPGRADE HANGS AT UPGRADING PERIPHERALS

If the camera firmware upgrade hangs up when Upgrading Peripherals, ensure camera is connected to DC power and that a REDVOLT battery is NOT installed in the Side Handle. If a battery is installed, remove the battery and perform the upgrade procedure again.

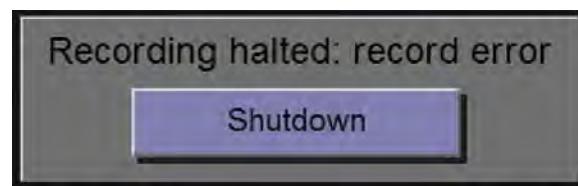
APPLY CALIBRATION FAILED

If the Calibrate Apply procedure fails, APPLY CALIBRATION FAILED. TRY AGAIN will be displayed. Perform the APPLY CALIBRATION procedure again.

A gray rectangular box with a thin black border. Inside, the text "Apply calibration failed. Try again." is centered in a black, sans-serif font.

RECORDING HALTED: RECORD ERROR - SHUTDOWN

Displayed if media removed while recording. DO NOT remove media while camera is recording. Power down the camera, verify the media is inserted properly (inspect connectors for damage), power up and resume recording.



PRESET COULD NOT BE APPLIED

If the preset could not be applied, "Preset Could Not Be Applied" will appear to inform you. Power down camera, power back up and attempt to apply the preset that failed.

Preset could not be applied.

POWER SPIKE DETECTED – SHUTDOWN



If this message appears, power down the camera, power back up and continue camera operation. If error reoccurs, please file a support ticket at www.RED.com/support.

APPENDIX J: MAINTENANCE

WARNING: DO NOT attempt to modify, dismantle or open your camera, lens or other accessory as doing so may expose you to electric shock and serious injury. There are no user-serviceable parts inside. Alteration or repairs made to the camera, lens or other accessory, except by a RED authorized service facility, will void the Limited Warranty.

CLEANING

WARNING: DO NOT rinse or immerse any element of the camera, lens or other accessory, keep them dry at all times.

WARNING: DO NOT use soaps, detergents, ammonia, acetone, alkaline cleaners, abrasive cleaning compounds, or solvents. These substances may damage lens coatings and electronic circuitry.

CAMERA AND ACCESSORY EXTERIOR SURFACES

Clean ONLY using a dry cloth. When cleaning your camera and accessories, remember that it is not waterproof and moisture can damage electronic circuitry.

BRAIN

SENSOR

Use Delkin Devices Digital Duster Kit (Part No. DDSS-DUSTER2) or equivalent to clean sensor surface.

OPTICAL LOW-PASS FILTER (OLPF)

If equipped with an OLPF, use Delkin Devices Digital Duster Kit (Part No. DDSS-DUSTER2) or equivalent to clean OLPF surface.

LCD SCREEN

Use Pancro Professional Lens Cleaner (Part No. PANCROCLN) and Photographic Solutions Pac Pads (Part No. 05011) or equivalent to clean the screen on Touchscreen and Non-Touchscreen LCDs.

EVF

Use Pancro Professional Lens Cleaner (Part No. PANCROCLN) and Photographic Solutions Pac Pads (Part No. 05011) or equivalent to clean the viewfinder lens. Ensure you spray the solution onto the pad and not directly onto the lens surface.

REDMOTE SCREEN

Use Pancro Professional Lens Cleaner (Part No. PANCROCLN) and Photographic Solutions Pac Pads (Part No. 05011) or equivalent to clean the screen on Touchscreen and Non-Touchscreen LCDs.

LENSES

Use Pancro Professional Lens Cleaner (Part No. PANCROCLN) and Photographic Solutions Pac Pads (Part No. 05011) or equivalent to clean the viewfinder lens. Ensure your spray the solution onto the pad and not directly onto the lens surface.

SIDE HANDLE LCD

Use Pancro Professional Lens Cleaner (Part No. PANCROCLN) and Photographic Solutions Pac Pads (Part No. 05011) or equivalent to clean the screen on the Side Handle LCD.

ELECTRICAL CONTACTS

This section under construction.

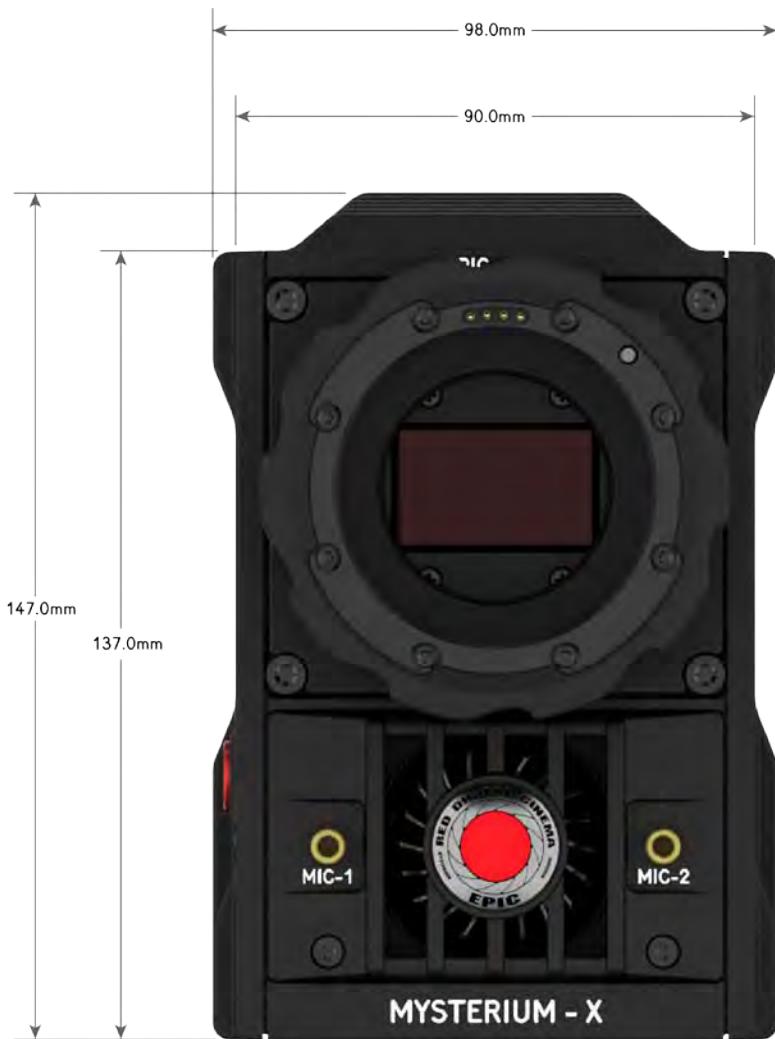
APPENDIX K: TECHNICAL DATA

TECHNICAL SPECIFICATIONS

SENSOR	14 MEGAPIXEL MYSTERIUM X
PIXEL ARRAY	5120 (h) x 2700 (v)
S/N RATIO	66db
DYNAMIC RANGE	13.5 stops, up to 18 stops with HDRx
MAX IMAGE AREA	5120 (h) x 2700 (v)
LENS COVERAGE	27.7mm (h) x 14.6mm (v) x 31.4 mm (d)
DEPTH OF FIELD	Equivalent to S35mm (Motion) / APS-H (Still) lenses Equivalent to 16mm (Motion) lens in 2K RAW
ACQUISITION FORMATS	5K RAW (Full Frame, 2:1, 2.4:1 and Anamorphic 2:1)
PROJECT FRAME RATES	23.98, 24, 25, 29.97, 48, 50, 59.94 fps, all resolutions
DELIVERY FORMATS *	4K : DPX, TIFF, OpenEXR (RED RAY™ via optional encoder) 2K : DPX, TIFF, OpenEXR (RED RAY via optional encoder) 1080p RGB or 4:2:2, 720p 4:2:2 : Quicktime, JPEG Avid AAF, MXF. 1080p 4.2.0, 720p 4:2:0 : H.264, .MP4
PROGRAM OUTPUT	HD-SDI Clean Feed 2K RGB, 1080p RGB or 4:2:2, 720p 4:2:2 SMPTE Timecode, HANC Metadata, 24-bit 48Khz Audio
MONITOR OUTPUT	HD-SDI and HDMI with Frame Guides and Look Around 2K RGB, 1080p RGB or 4:2:2, 720p RGB or 4:2:2 SMPTE Timecode, HANC Metadata, 24-bit 48Khz Audio
DIGITAL MEDIA	REDMAG 1.8" SSD Module: (64, 128, 256GB Media)
REDCODE™	12 and 16-bit RAW : RC25 - 250 Quality Levels 1-120 fps 5K, 4.5K, 4K 1-180 fps 3K 1-225 fps 2K
AUDIO	2 channel, uncompressed, 24 bit, 48KHz. Optional 4 channel, and AES / EBU digital audio.
MONITORING OPTIONS	RED LCD 5" Touchscreen Display BOMB EVF High Definition Viewfinder
REMOTE CONTROL	REDMote, Wireless, Ethernet, RS232, GPI Trigger
WEIGHT	5lbs. Brain only
CONSTRUCTION	Aluminum Alloy
TEMPERATURE RANGES	Operating Range: 0°C to +40°C (32°F to 104°F) Storage Range: -20°C to +50°C (-4°F to 122°F)
* - From REDCINE-X	

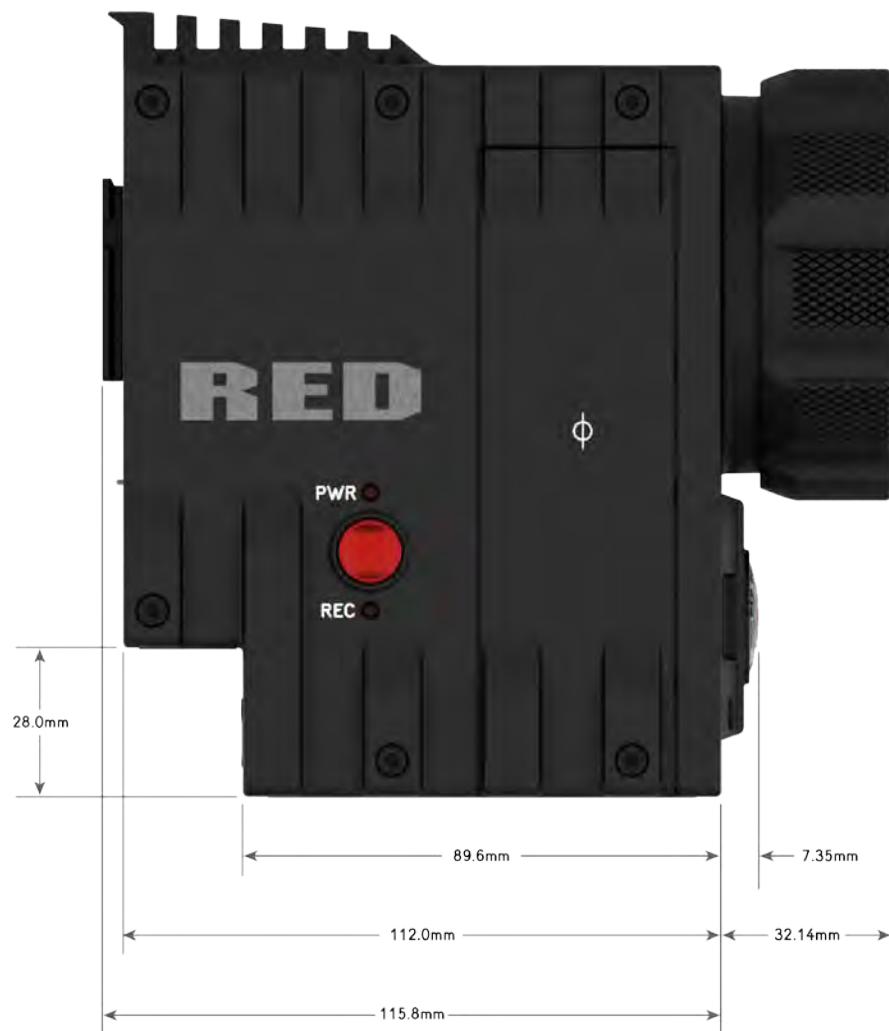
BRAIN DIMENSIONS

FRONT VIEW



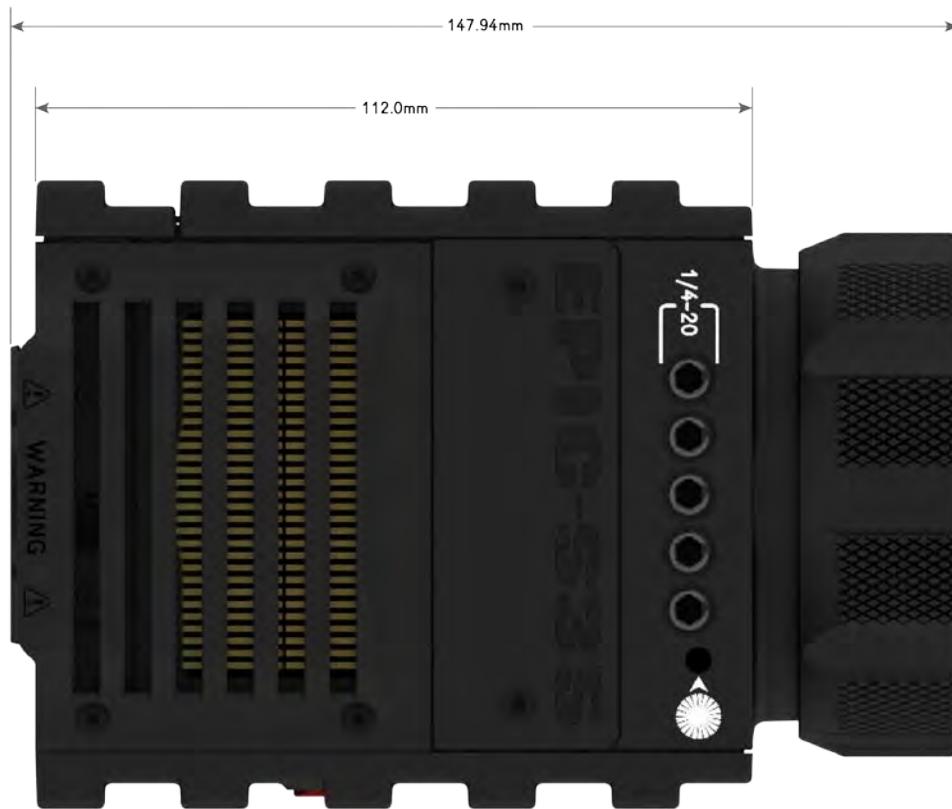
RED EPIC® OPERATION GUIDE

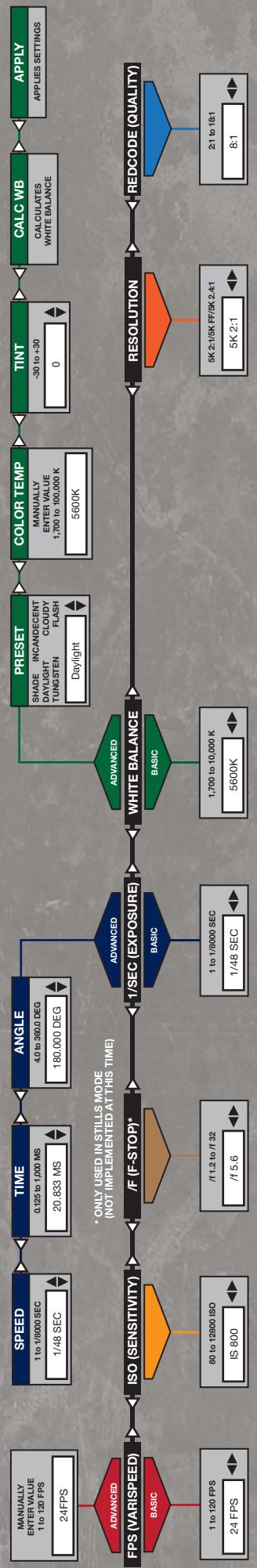
SIDE VIEW



RED EPIC® OPERATION GUIDE

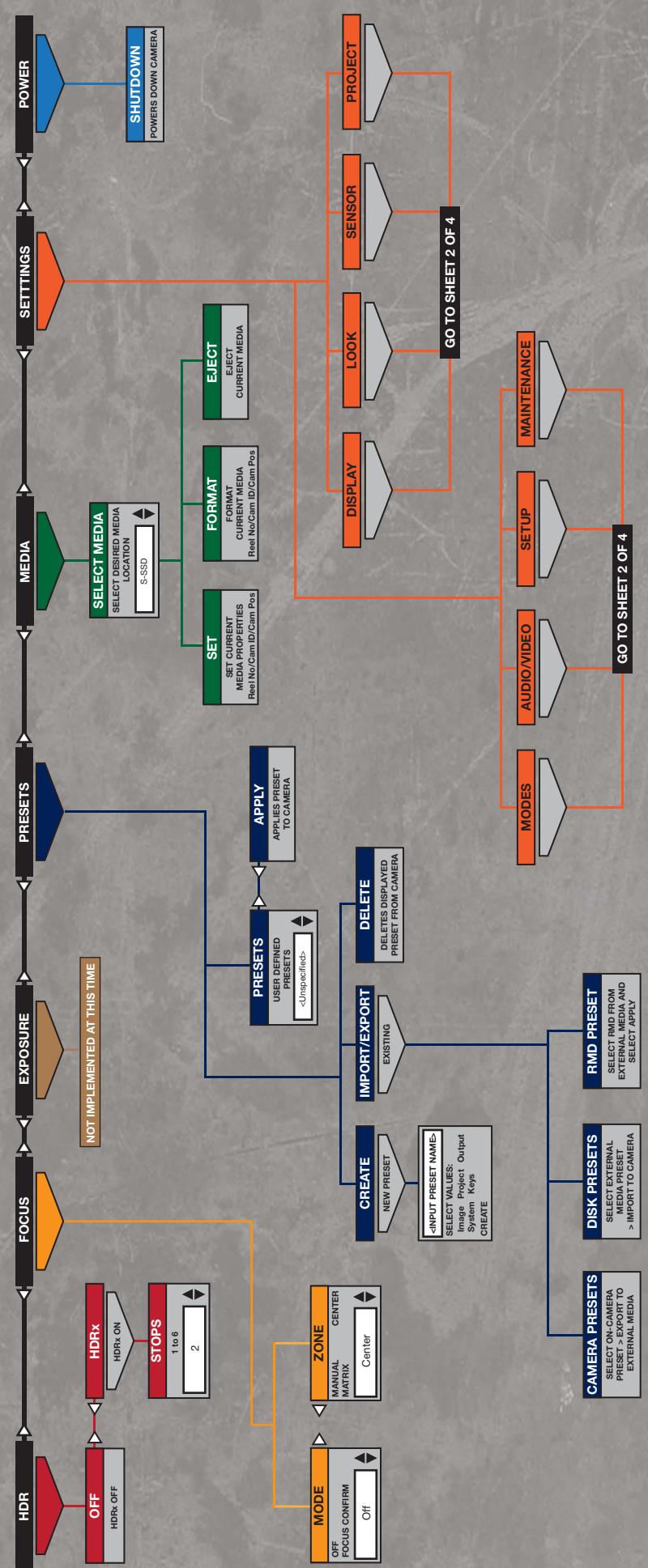
TOP VIEW





SECONDARY MENUS

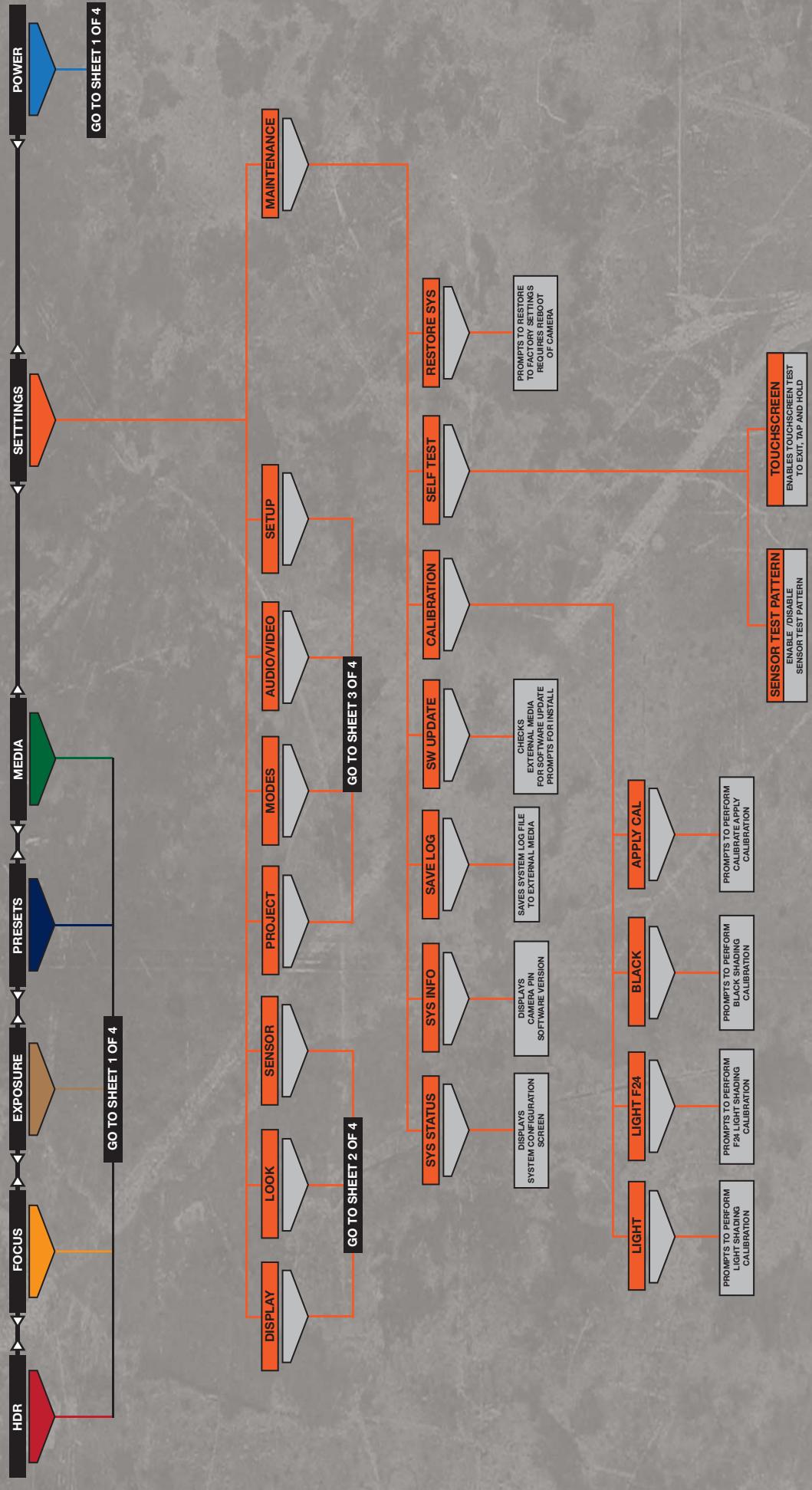
PRESS MENU ITEM OR CANCEL TO ACCESS



SECONDARY MENUS

PRESS MENU ICON () (LCD) OR MENU BUTTON TO ACCESS

DEFAULT VALUES ARE DISPLAYED IN BOXES



FLOWCHART CONCEPT XL FILMS LTD.

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MAP MENU

REV A
VERSION: 1.4.0 BETA
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