Red Scarlet Workflow Guide

2014 v1.0

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Camera

Camera Specifications

MX Sensor

SENSOR	14 MEGAPIXEL MYSTERIUM-X™
PIXEL ARRAY	5120 (h) x 2700 (v)
DYNAMIC RANGE	13.5 stops, up to 18 stops with HDRx™ 6 fps with 5K FF and HDRx On 15 fps with 4K HD and HDRx™ On
MAX IMAGE AREA	5120 (h) x 2700 (v)
LENS COVERAGE	27.7mm (h) x 14.6mm (v) = 31.4 mm (d)
MAX DEPTH OF FIELD	Equivalent to S35mm (Motion) / APS-H (Still) lenses
ACQUISITION FORMATS	5K FF REDCODE RAW (Full Frame) 4K HD REDCODE RAW 3K HD REDCODE RAW 1080p REDCODE RAW 1K REDCODE RAW
PROJECT FRAME RATES	23.98, 24, 25, 29.97, 47.96, 48, 50, 59.97

I/O ports:

Front

- 2 x balanced 1/8" jacks
- EVF/LCD

Rear

- SDI
- HDMI
- Sync (Genlock/Timecode/Word Clock)
- Power

DSMC Side Handle

The side handle is a removable item which expands the user interface and gives extra battery options. It has a LCD display, navigation wheel, record start/stop, and user programmable buttons (8 total).

1 Redvolt battery can be mounted inside the handle. Redvolts last for about 25 minutes.

The handle screws into the Scarlet body and may be removed and replaced with a flat body panel.

SSD Module and Cards:

The side mount SSD module is technically removable, but we record only to SSD cards so it is

permanently installed on our Scarlet.

We use 64GB SSD cards. Each card will give you between 23-46 minutes of record time depending on compression quality.

EVF, LCD, and SDI

The **EVF** and **LCD** can display based upon the *RAW* (unprocessed) image, or display based upon the *Redcolor* (processed look) image. Factors such as *ISO, Exposure, FLUT, contrast, colour balance*, etc will change how the *Redcolor* image is displayed. Both the EVF and LCD will indicate which view is being displayed with **RAW** (RAW image) or **vmCLR** (REDCOLOR image) at the top center part of the OSD. vmRAW is your indicator as to what the unprocessed sensor is actually seeing (exposure @ 320, linear gamma, etc). This viewing mode is one of your best tools for verifying correct exposure (in combination with the histogram and clipping warnings)

LCD

The 5" Red LCD has four buttons across the top. The two middle buttons control the brightness of the LCD. The far left button toggles between vmRAW and vmCLR for quick comparison, the far right button toggles OSD information. When using the LCD for focusing, clearing this information will give you a larger, less cluttered image to work with.

To get proper brightness that matches the exposure of the camera, use the arrows on the top of the LCD to gain up to maximum brightness, then tick down 4 clicks. Obviously environmental conditions such as direct sunlight will change visibility.

5" Touch LCD

The 5" Touch LCD is the newest addition to our monitoring arsenal. It has a bolt down base with a double hinged neck to give it movement similar to other build on camera LCD screens. It displays a higher colour saturation and contrast range than the original 5" LCD, thus giving it the appearance of being sharper, though the actual pixel density is the same (800x480 in 5") . A stylus is provided to use with the screen, so you do not have to use your greasy fingers. As with the original 5", the touch LCD has four buttons – they are along the left hand side, instead of the the top.

SDI Output

Serial Digital Interface, or SDI is a high quality video standard for connecting display devices via coaxial cable. Usually found in high end filmmaking and industrial video devices SDI requires expensive encoders and decoders, but uses inexpensive cabling. Cables can range from a few inches long to a hundred feet or more. SDI almost exclusively uses locking BNC connectors. SDI devices often have a "pass through" so that they can be daisy chained for multiple screens to be run from one original video tap. The Scarlet outputs a full 1080 signal with options for clean, full or partial overlays of the video image. We have a very flexible Manhattan HD089B2 with 3G SDI, a 9" field monitor with multiple video connections and powering options. Monitors can also be rented from places like Sim Video, or AFCOOP.

Media

The Red Scarlet has a total of 2 different media types (VS 4 on the One): SSD (Solid State Drive) media which we currently use (for both the Scarlet and One), and the newer mini SSDs. Other media types are usable on the One, but outdated. SSDs from Red are packaged in industrial strength aluminum housings and are notched so they slide into the camera's SSD module only one way (Red label faces out). SSD's come in a range of sizes from 32GB to 512GB. Our cards are 64GB. Record time will vary based on factors such as frame rate, resolution, and compression level.

Media *must* be unmounted (or camera shut down) before removing the card. Failure to do so may result in a corrupted dataset on the card and a complete loss of footage. Media may be ejected through the

System menu: **System -> Media -> Unmount.**

It is recommended you set up a custom button to unmount media on the side handle, RedMote, both, or in a custom menu slot on the Redmote. The common shortcut for ejecting media is pressing buttons 1 and 4 simultaneously on the side handle. It should be noted that the default for 1+4 button press is to lock the buttons on the side handle, so be sure the mapping is as you expect it to be when setting up the camera.

Red Launch Sequence: http://www.red.com/news/launch-sequence-epic-and-scarlet

Power

There are currently three option for powering the Red Scarlet – Using the large, high capacity v mount batteries (RedBricks) , the RedVolt in the side handle, or the wall plug DC Power Supply. Obviously the wall plug is only useful in situations where the camera will be stationary. This power adapter must be requested separately, and is not part of the normal Scarlet kit. The RedVolt gives the most compact option, but can only be expected to last 20-30 minutes. Given that there are only six of these batteries total (shared between two cameras), they will not last for an all day shoot. RedVolts are important and useful for a couple of reasons: They can be used for a very lightweight setup. If short handheld shots or pickups are needed, or if the camera needs to be used in confined spaces. Having a RedVolt in the side handle while using the larger RedBricks also allows for battery hot swapping, and provides a backup power source incase of a failure in the RedBrick (runs out of power). The Scarlet will switch between power sources without breaking shooting, timecode tracking or any other function of the camera. The camera decides on which power supply to use based on priority, not which battery has the most charge left. In the case of simultaneous use of Red Bricks and RedVolts, the camera will run down the Red Brick completely before switching over to the RedVolt.

Red provides the following priority for power consumption (with #1 being first used):

1.   DC Power Supply
2.   Red Brick
3.   RedVolt in Side Handle

By default V Mount Batteries will display "DC" and a Voltage reading, as pictured below. The smaller Volts will display "SH" (Side Handle) and a percentage reading.

Keep in mind that you do not have to wait for a V mount battery to be completely flat before switching it out. In fact, running a battery completely empty is much harder on the cells inside and will likely reduce the lifespan (capacity) of the unit. You also do not want to be in a situation of a long take where your battery runs out. When your DC power source is displaying 14.2V (or less), it is a good point to start thinking about swapping out the V battery for a fresh unit. This does not mean to stop shooting, or break the flow of what's happening. *This is an early warning.* Look for an appropriate break and then swap V mount battery. The camera will automatically shut down when power supply dips to **11.5V**. If you are running off V mount and have a Volt in the side handle, the camera will automatically switch to the Volt without breaking any recording that might be happening at the time.   Assuming your Volt is fully charged, you still have 25 minutes before the camera will completely shut down.

Red Bricks take less than 2.5 hours to charge from completely flat to completely full on the Red V Charger.   Bricks should last a minimum of 1.5 hours with aggressive shoot conditions (constant rolling, no camera downtime). 4 bricks should be sufficient for a full day of shooting, if you have access to power and are charging bricks as they are used. If required, be sure to request a larger than standard power kit.

Camera Settings

Exposure

Red Scarlet has possible ISO values of 100 to 6400. The factory default ISO setting is 800. However, ISO is metadata, and has no bearing on the actual Redcode Raw information recorded by the camera.

The Red Scarlet MX sensor captures images based on a set sensitivity. Unlike traditional video cameras which have *Gain* to boost sensitivity of the imaging chip (by increasing voltage to the chip), the Red's sensor stays at a constant. Any changes to ISO are simply a change in interpretation of the captured data within the Redcode Raw file. For ideal results with regards to noise, exposing with the Red Scarlet MX should be based on ISO 800 for outdoor scenes, and ISO 400 for indoor scenes. Pay close attention to histograms, waveforms, and other tools provided by the camera when exposing. This is, of course, an *ideal*. If circumstances require it, any setting between 100-1000 should yield satisfactory results. Above 1000 will see the introduction of noticeable sensor noise. The higher the ISO value, the more pronounced the noise.

ALWAYS REMEMBER: Unlike with film stock or traditional gain controls in video changing ISO does *not* change the actual sensitivity of the camera's sensor.

Ignore the concept of ISO and expose to the right (avoiding clipping) then adjust the ISO to get an image of visually correct brightness. Then you've got the least grainy possible image on your RED.

~ Graeme Nattress, official Red problem solver

Red Exposure Guides (three parts):

http://www.red.com/learn/red-101/exposure-with-red-cameras

ASPECT RATIO/RESOLUTION

Any aspect ratio or resolution combination is acceptable, except for aspect ratios which are **anamorphic**. Anamorphic aspect ratio is squeezed and requires a special anamorphic lens to resolve properly. Please note that resolutions less than 4k will result in a crop factor to the focal length of the lens in use (it will appear to zoom in). This is because the camera does not scale the image down, it simply crops the sensor to match the resolution selected.

Suggested aspect ratio/resolution combinations (with *maximum* time base frame rate on 64GB SSD):

* 4k 1.9:1 | 30 fps (suggested 24fps)

* 4k HD 1.78:1 (16:9) | 30 fps (suggested 24fps)

Reasons for shooting 4K 1.9:1:

- Gives you slightly wider angle of view
- Less crop of footage if 2:1 is your final output

Reasons for shooting 4K 16:9:

- Standard look, no need for cropping or adding black bars for DVD or HDTV output.

At 4k resolution there is also the option of 4K 2:1, but because this is *cropping* the sensor, this aspect can be achieved in post. By shooting 4K and cropping in post, you maintain the ability to do slight reframing if you desire, instead of being stuck with the full image as you shot it (reframing 4k 2:1 in 2:1 aspect is of course possible, but would require you to zoom into the image).

Compression

There are many levels of RedCode compression available on the camera and they are expressed as ratios. The lower the ratio, the lower the compression. There are pros and cons to using high or low compression.

The following table illustrated estimated shoot times @ 4K on a 64GB SSD for common compressions. Shooting 4K HD will yield marginally longer shoot times since resolution is slightly lower.

	6:1	7:1	8:1	9:1	10:1
4K 1.9:1	23 min	27 min	31 min	35 min	38 min

8:1 should be considered the default data rate for 4k cinema style shooting, this will give you almost %25 extra record time over the maximum quality of 6:1 with little to no visual impact. Documentary or other uses can use 9:1 to 10:1 as default which little to no real impact on documentary aesthetics (where small amounts of noise and compression are more acceptable).   In both shooting styles compression can be pushed to gain more record time on the media. Red says compression up to 10:1 will have very small impacts on visual quality. Using compressions beyond 10:1 might be acceptable for your project – but be sure to shoot tests so you know what to expect. If you do not intend on finishing in 4K, but instead to output HD or 2k only feel free to use 10:1 as your start point, as most noise will be lost when shrinking the image.

Time Base Frame Rate

Use 24 fps, unless you have specific reasons to use a different rate. Slow motion effects are achieved through the varispeed menu option. Be sure to match the Sound Devices audio recorder to 24 FPS as well. 24 fps will mean no conversions needed for playback at Parklane. 24 fps is also directly compatible with BluRay discs. For DVD output you will need to pull down your finished project (audio and video) %0.1 to 23.976 fps (also known standardly as 24P). This can be done with Adobe Media Encoder.

Shooting in 24fps also means you do not have to worry about certain shutter speeds causing the exposure to flicker.   When using 23.98 fps, only shutter speeds of 1/60, 1/40, and 1/30 will give %100 flicker free results.

Camera Looks

Like the Canon 60D, users can customize the output of the Red One and Scarlet. These *look* settings are stored as *metadata* and applied to RAW image data to show an RGB image based on user preferences. Unlike the Canon 60D Red looks are **non destructive** and can be changed *in post (via metadata)* with *no* change to the original R3D files.

The only time looks are permanent is when the user outputs a RGB video file, such as a ProRes Quicktime (.MOV).

Looks can be constructed in RedCineX Pro and uploaded to the camera for preview of your custom looks under specific shooting situations.

Red's video tutorial for building looks and uploading to the camera:

http://www.red.com/learn/workflow/redcine-x-saving-looks-camera

ISO, EXPOSURE... What the *FLUT*?

`Exposure` can force clipping the same way opening the aperture can - it is a linear adjustment of brightness values. `FLUT` and `ISO` gently bend the tones in the image to avoid clipping using gamma curves. A `FLUT` of +1 is the same as doubling `ISO` (IE one stop more perceived brighness), but `FLUT` gives you finer control over the over-all image brightness and avoids clipping highlights. The `ISO`, `exposure`, and `FLUT` settings are all *metadata* and can be changed within the Redcode Raw file at any time, including in post after the footage is shot.

`Flut` is found under the `Video` menu. `ISO` is found under the `Sensor` menu. `Exposure` is not found in the camera menu structure, but rather in the expanded metadata toolbox of RedCineX Pro, or Adobe Premiere Pro.

Timelapse/Intervolometer

As of Firmware V4 the Scarlet has built in timelapse/intervolometer functions.

FRAME PROCESSING

You can select the following frame processing settings: NO FRAME PROCESSING, FRAME SUMMING, FRAME AVERAGING.

NO FRAME PROCESSING

Normal frame processing mode. The FRAMES TO PROCESS selection will not affect your recording.

FRAME SUMMING

The Frame Summing setting takes the number of specified frames, combines them into 1 frame, and adds together the exposure time for each of the original frames. Frame summing results in a final image that is brighter and possibly blurrier than any of the original frames. You can use frame summing to achieve the effect of long-exposure.

For example, if you select 16 as your FRAMES TO PROCESS value, and set your exposure to 1/48 sec, your resulting image will have a new exposure value of 1/3 sec (16 x 1/48).
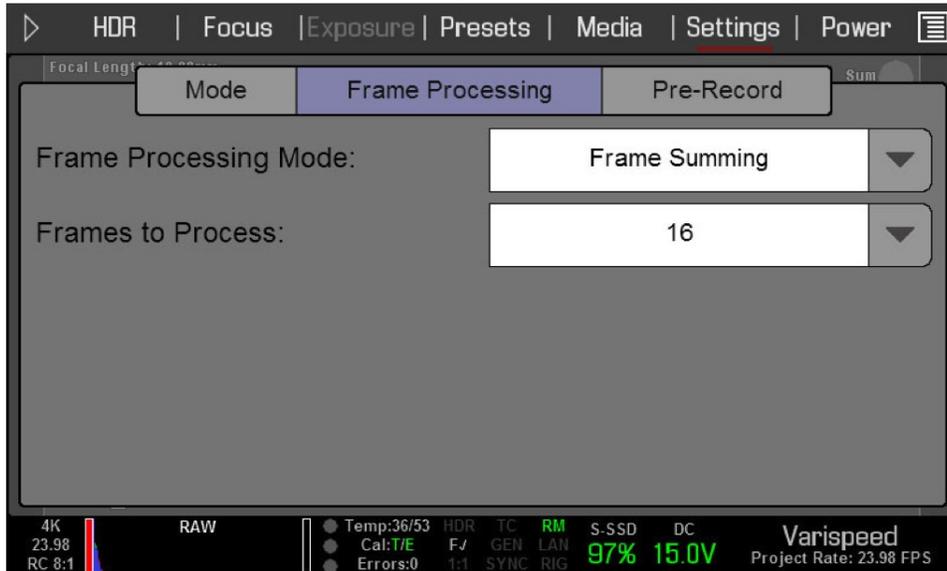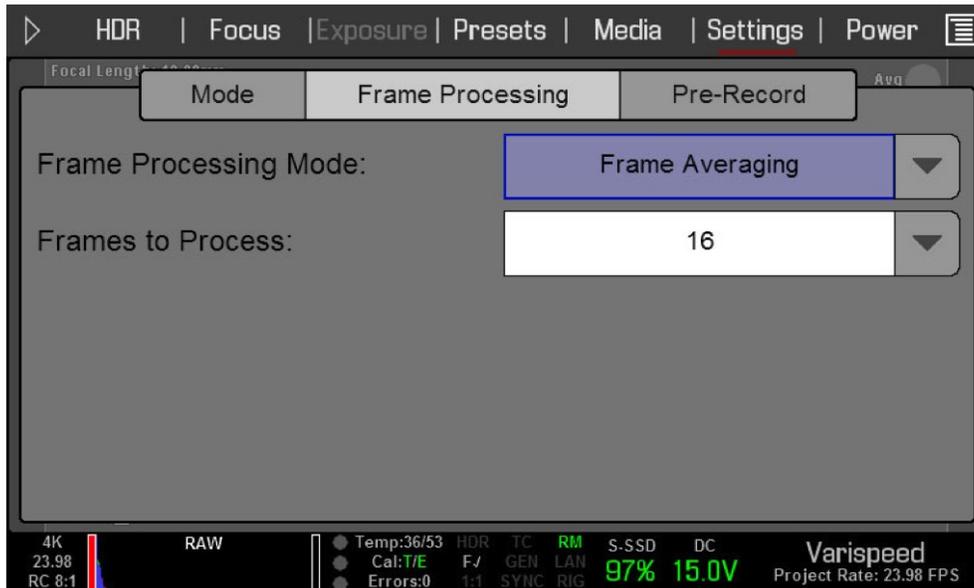
NOTE: When you're in preview mode, you will not see frame summing take effect. Once you start recording, you will be able to see the brightened image. You may have to experiment with your exposure and frame summing settings before you achieve the brightness and effect you want.

FRAME AVERAGING

The Frame Averaging setting takes the number of specified frames, combines them into 1 frame, and averages the exposure time for each of the original frames. You can use frame averaging to achieve the effect of long-exposure along with the benefits of reduced noise. However, frame averaging does affect motion blur characteristics.

For example, if you select 16 as your FRAMES TO PROCESS value, and set your exposure to 1/48 sec, your resulting image will still have the exposure value of 1/48 sec along with the effect of long-exposure.

NOTE: When you're in preview mode, you will not see frame averaging take effect. Once you start recording, you will be able to see the altered image. You may have to experiment with your exposure and frame averaging settings before you achieve the effect you want.

Timecode and Jam Sync

The Red Scarlet is capable of syncing timecode to an external source. Unfortunately timecode sync is lost when the camera is power cycled (turned off and back on). To reach the timecode options, enter the **Menu -> Settings -> Project Timecode**

Then select the `JAM SYNC` option.

> *`Jam Sync` instructs the camera to replace its internal Time of Day value with external timecode read from the 5pin LEMO connector. This value is updated at the first frame of each recording, provided a valid ex- ternal timecode source is present. If the external source is not present, the camera auto-increments the timecode until the external source is re-connected. Unchecked by default.*

Use the 3BNC-to-00 Sync Cable to connect the Scarlet to the Denecke SB-3

Provides timecode / genlock / trigger in functionality via camera SYNC port.

- White BNC: For Start/Stop Trigger
- Yellow BNC: For Timecode (has been replaced with a silver metal connector)
- Green BNC: For Genlock

Time Code Display

Time Code Display allows you to choose between Time of Day (TOD) and Edge display. In TOD mode, the time runs continually. With edge display, the time code starts and stops coincident with recording. You will always use TOD to maintain sync with external audio recording.

Time Code Source

Selects the TIME CODE source to be used. Available options are USER PROVIDED, EXTERNAL: BRAIN, and EXTERNAL: REAR MODULE.

Time Code Source	Mode	Comments
User Provided (Internal)	Real Time Clock (RTC)	When selected the camera uses the cameras Real Time Clock as the time code counter source (snapshot of the RTC.)
	Set Manually	When selected allows the user to define a custom value as the time code counter seed.
External: Brain	Varies by device	Uses the time code from an external device connected to an input on the camera brain. *Use this with Denecke SB-3*
External: Rear Module	Varies by device	Uses the time code from an external device connected to an input on a rear module such as the RED PRO I/O MODULE

Denecke SB-3

To maintain sync through power cycles we make use of the Denecke SB-3. This device runs on two "AA" batteries and is small enough to attach to the camera while shooting.

The Denecke requires two special cables to be used with the Scarlet – one to sync it with the 788t audio recorder, and the other to connect it to the Red camera.

By default the Denecke is set to match normal frame settings (24fps) but this can be adjusted using a small flat head screwdriver with the black indicator dial inside the battery compartment.

Denecke Troubleshooting

Q: Strobe stays quick after attaching Denecke to Sound Devices 788t.

A: *Be sure to set SB-3 to the same frame rate as the 788t.*

Field Monitor

The Manhattan field monitor is a high quality third party monitoring option. It may be connected to the Red camera via HDMI, or preferably 3G SDI. It runs on Sony NP style batteries. These are the same batteries which run the Sound Devices recorders, as well as the small LED light panels.

The Manhattan field monitor has a wide variety of user options, including 1:1 pixel mapping, build in focusing and exposure controls, and a hard plastic sunshade for outdoor use.

Field Monitor Troubleshooting

Q: Monitor is flickering and resetting.

A: *Probably a power supply issue. Use fresh SONY BRAND battery*

Q: There are no menus on monitor/I want to get rid of the menus.

A: *Be sure SDI output is set to "show menus" if you want to see them, or to "clean" if you do not want to see them.*

Post Production

RedCineX Pro

Currently on V.30.x, RCX Pro is a invaluable on set and post production tool. You can download it for free directly from Red, or nab it off our public folder on Zoetrope. RedCineX is the easiest interface for primary colour correction. XML timelines may be imported from Premiere, used clips graded, and Premiere updated to reflect changes. Advanced colour correction will require software such as Davinci Resolve.

General Overview:

http://www.red.com/learn/workflow/rcx-pro-general-overview

Overview of Look Panel:

http://www.red.com/learn/workflow/overview-of-the-look-panel

Audio sync (usually done in Premiere):

http://www.red.com/learn/workflow/audiosync

Premiere Pro CS6

Adobe Premiere is the main edit software which we currently use. It is compatible with all versions of Red footage (including footage with the new RedColor3 setting).

Quick video tutorial from Red:

http://www.red.com/learn/workflow/cs6-premiere-pro-red-overview

Sync Clips In Premiere

1. Sort bin by **timecode**, then select the video and audio which belong together (they will be next to each other and have similar timecode start and end points)

2. Right click, select **MERGE CLIPS**

3. Merge Clips dialogue box will open. Rename as required (Default is "<VIDEOCLIPNAME> - MERGED")

4. Use **timecode** under **Syncronize Point**

New synchronized clip will appear in Project panel. Use this clip as you would any other clip. Double click on merged clip and in the Source Monitor, set IN ("I") and OUT ("O") points to trim clip to usable area. Rename, sort into bins, and use in timeline as you would any regular clip.

Speedgrade

Workflow is extremely buggy and substandard compared to Davinci Resolve. Speedgrade is workable, but unsupported.

Resolve 11

Davinci Resolve is the preferred platform for advanced grading of R3D media. The lite version is completely free. CUDA acceleration means that Nvidia cards and CUDA drivers are required for accelerated processing.

Roundtripping Ppro - Resolve

1. Edit in PPro using R3Ds.

2. Export XML and render offline video.

3. Import into Resolve and verify your timeline against your offline.

4. Use "trim R3D" function and export trimmed R3Ds to a new folder.

5. Use "reconfirm from bins" in Resolve, using new trimmed R3Ds in the folder.

6. Grade.

7. Use "roundtrip for FCP" function in delivery tab, render.

8. Open new XML in PPro, done.

Sources:

Red User Scarlet Manual, https://www.red.com/downloads

Reduser.net forums, http://reduser.net