

the RED One

basic operation guide

by Brian Paris

RED DIGITAL CINEMA COMPANY produces the RED One camera. Jim Jannard, who made his fortune as the founder/owner of Oakley, the sunglasses company, founded RED. His goal was to make a digital cinema camera with the quality of 35mm film and the convenience of pure digital. The RED One is the company's first attempt to achieve that goal.

The RED One camera uses a CMOS sensor the size of Super 35mm film to produce 4K RAW digital files. The sensor is four times as large as those used in HD video cameras, so it produces similar depth of field to what you find when shooting film along with a far greater resolution than HD.

The workflow of the RED One is also similar to shooting film in that it allows for easily changeable lenses. The camera can be set up with either an industry standard PL (Positive Lock) mount to use traditional

cinema style lenses, or with a Nikon mount to use still camera lenses. The use of cinema lenses also allows for the use of accessories, such as a follow focus and matte-box, which you typically find used with film cameras.

The RED One records to a compressed RAW digital file. Recording in RAW allows for adjustments be made to the image in post-production. This is similar to the workflow that is used with the high-end DSLR still photography cameras. The compression codec is called RED Code. It is this codec that allows for the RED One camera to record the large amount of information onto CF (Compact Flash) cards, hard disk drives, or solid state drives.

Once the shoot is finished, the information can be transferred to any computer. This saves the time and money that it takes to develop and transfer film to a usable format.

Assembling the RED One Camera

THE RED ONE CAMERA is different from video cameras in that it needs to be assembled before you can use it. There are many different configurations, but the basic parts needed for every shoot are: the body, power, recording media, a lens, and a monitor.

The body is the base for configuring the camera setup. In addition to being the brain of the camera, the body is where everything else is attached. All of the other items mount to the body using the special mounts and rails system. The most basic piece is the ARRI Dovetail plate that mounts to the bottom of the camera. It is screwed on with two flat head screws. This system allows for the camera to be quickly attached and released from any camera support system that uses an ARRI base plate. These include a tripod, a handheld rig, a dolly, jib, or Steadicam.

The base plate also allows for the attachment of the lower rails. These rails can be used for mounting the follow focus, matte-box and other items that need to be attached below the camera. On the top, two top mounts attach to the ends of the camera. This allows for additional top rods to be used and also additional mounting positions for accessories. The top handle mounts to the front top mount to provide an easy hand grip for moving the camera.

The RED One can be powered either with a battery or plugged into an AC outlet. To use AC, you plug one end of the converter into the wall and the other end attaches to the back of the camera. Being attached to a wall outlet limits the maneuverability of the camera. If a more mobile solution is needed then one of the battery mounts should be used. The battery mounts are on the RED Cradle assembly which is attached to the top mount on the back of the camera, and then plugged into the power port. The battery mount in this case is for an Anton Bauer gold mount battery. The Dionic 90 or 160 batteries can be used to power the camera. The Dionic 160's last longer, but they are bigger and heavier.



The RED One can record its digital files to CF cards, the RED Drive, or the RED RAM. CF cards are inserted into the left side of the camera where they mount like a hard drive in a computer. The RED Drive or RED RAM can be mounted in the RED Cradle. As is the case with external hard drives on a computer, the disk must be correctly formatted in order to be read, and you have to unmount the drive before you remove it. There is a menu item for unmounting the media, but the easiest way is to do this while holding down the UNDO button, push the EXIT button.

To monitor the picture and settings of the RED One camera, one or more of the following have to be connected to the camera: a RED EVF (electronic view finder), a RED LCD, or an external HD monitor.



The **RED EVF** allows for a critical view of exposure and focus. The EVF mounts to the camera using the supplied arm and the cable connects to the right side of the camera. The EVF consists of a focus ring for adjusting the eyepiece to your eyes (just adjust it until the menu items are in clear focus), a rotary switch that can control different settings, programmable USER KEYS-3 (default is COLOR TOOLS) and 4 (default is METER), and a Fixed Focus Check Button.

The **RED LCD** is another way of seeing the picture and the settings of the camera. It is an easy all in one view that allows for quick adjustments to framing, settings, exposure and focus. The two triangular buttons are for increasing and decreasing brightness of the monitor, a programmable USER KEY 5 on the left side, and a Frame Guide button on the right.



An external monitor can be connected either by HD-SDI or HDMI. The connections are located on the right side of the camera. The HD-SDI cable connects to the PREVIEW port using the supplied BNC adaptor. This allows a signal that has been down converted to 720p to be viewed at a distance by additional crew members or an audience. By connecting a Dual Link HD-SDI connection to both of the HD-SDI outputs, footage can be played back at 1080p. This option is not available for a live shot, instead the HD-SDI ports will supply a copy of the PREVIEW ports.

The RED One can use either PL mount or Nikon F mount still lenses. PL mount lenses attach by opening the body cap, placing the lens so that the notch on the lens mount is aligned with pin on the body, and then rotating the mount on the body clockwise to lock the lens down. Nikon lenses mount placing the lens into the mount and then rotating the lens counter clockwise until it snaps into place.

Differences between Cinema and Still Lenses

- 1 Still lenses have some problems with breathing (optical shifting). This isn't much of a problem in still photography, but shooting cinema style, there is a need to track focus during a take. This requires higher quality and more expensive lenses.
- 2 Cinema lenses often have a longer turning radius on their focus rings. This allows the focus puller to make fine tune adjustment while tracking movement in a shot.
- 3 Still cameras are increasingly relying on automatic controls, so there is less need for manual focus and aperture. This makes it difficult to control the exposure when using these lenses on a cinema style camera, where manual controls are required.
- 4 The aperture on a still camera steps between stops instead of a continuous change. While this makes it very easy to achieve an exact repeatable exposure, it does not allow for seamless changes of exposure during a take on a cinema camera.

Setting up the RED One

NOW THAT THE CAMERA has been assembled, it will have to be set up to record. The power button is on the back of the camera. After pressing that the camera takes a minute to initialize and start up. Once the camera is powered up, the settings can be seen on the small status display on the back of the camera or on the monitor outputs. The status display shows all of the basic settings of the camera: Timecode/Status, ASA (ISO) White Balance, Shutter, Media, Power, Project Frame Rate, Format, and Timecode Lock.

When using the menu, the LCD allows for more information to be seen at once, so it is easier to use. To use the back status display, you will have to do a little more memorization of where all the options are.

There are buttons on the back of the camera to provide access to the settings. The center joystick is used to navigate and select the settings that are needed.

To set up a project, press the SYSTEM button on the back of the camera and then use the joystick to the PROJECT menu item, then down to select that item. Then move to the CONFIGURE menu item and press down to select. That will take you to the three main settings for your project.

1 RESOLUTION:

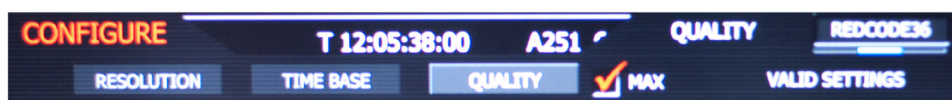
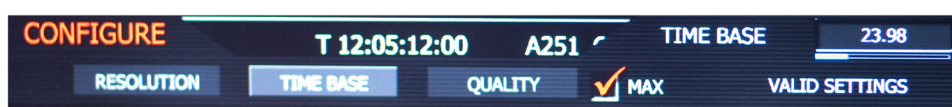
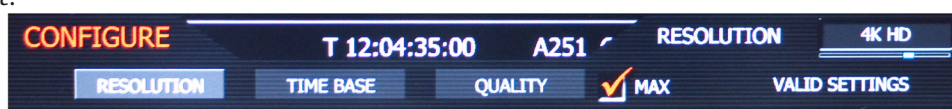
Select the RESOLUTION button and then you can scroll through your options by twisting the joystick. The RED One is capable of recording 2K, 3K, or 4K resolution at aspect ratios of 2:1, ANA (stands for Anamorphic), 16:9 or HD. There is also a special setting for 4.5K, which will allow for 2.33:1 widescreen recording. The best selection for a project that will end up for an HD or DVD final product is 4K HD. This setting is exactly four times as big as a 1920x1080 picture so down converting the files is quicker than using the other formats.

2 TIME BASE:

Select the TIME BASE item and you can choose among 23.98, 24, 25, 29.97. The most versatile choice here is 23.98. This is a better choice than 24 because it is an easier conversion to all of the other formats and it plays back better on external monitors.

3 QUALITY:

Next up is the QUALITY setting. The choices are 28, 36, 42. While 42 is the best compression setting, it limits some of the options for frame rates and recording media, so the best selection is the default 36.

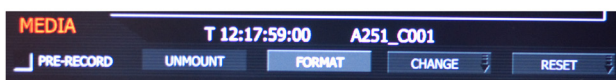
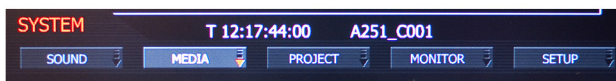


THE RED ONE CAMERA can use either Compact Flash cards or RED external drives to record the digital files.

Compact flash cards fit into the slot on the left side of the camera. Be sure to insert the card with the label facing out. Compact flash cards come in either 8 or 16GB capacities. With the current settings of 4K HD, RC 36, at 23.98 fps, the camera will need about 2GB of storage per minute of footage. This means that an 8 GB card will hold 4 minutes and a 16 GB card will hold 8 minutes of footage. This is similar to shooting with film. You will have to be mindful of the amount of time left on the card so that you don't run out of time during a take.

The RED Disk Drive options mount onto the back of the camera in the RED Cradle and plug into the DRIVE port on the back of the camera. The RED RAM is a 128GB Solid State Drive that can record a little over an hours worth of footage. This can be very handy when recording long events. The disadvantages of using the RED RAM are the additional weight that will be attached to the camera, and the possibility of losing a lot of footage if something goes wrong with the drive during the shoot or transfer.

In order to use any of the cards or drives with the RED camera, you will have to format the disk. This can be done by selecting the SYSTEM menu button, choosing MEDIA and then selecting the FORMAT option. A message will tell you that the formatting is happening and then there will be a confirmation message when the process is done.



Camera Control Center

The Camera Control Center is where all of the controls for the menu items are located.

Camera Playback Controls are located on the top portion of the camera control center. From left to right the buttons are:

- ◀◀ Cue to Beginning of Clip/Previous Clip
- ◀◀ Reverse Play (-1X to -8X speed)
- ▶ Play/Pause
- ▶▶ Fast Forward Play (2X to 8X speed)
- ▶▶ End of Clip/Next Clip

The **Status Display LCD** is the main portion of the camera control center. This bright LCD is readable in daylight. In normal operation the display will show the status and basic settings of the camera. When using the menu, the display will show the menu options.

Three **USER MENU Buttons** are located to the left of the Status Display.

By default they are **A: SENSITIVITY, B: SHUTTER, and C: COLOR TEMPERATURE**. To set these buttons to other menu options, navigate to the menu item and then hold down one of the USER MENU buttons (A/B/C) until the confirmation message displays on the external monitor.

To the right of the LCD are the **RECORD and READY indicator LEDs**. These indicate whether the camera is ready and if it is recording.

Underneath the LCD is the **Joystick**. The joystick can be moved left, right, up, down, rotated, and pushed like a button.

- Left/Right to navigate to different menu items
- Up to go to previous level of menu
- Down will navigate deeper menu options or select item
- Rotating will change the value of the menu item
- Pushing will select the item

Pressing the **EXIT** button will exit the menus.

Holding down the **UNDO** button and then pressing the EXIT button will unmount any of recording media.

The **SENSOR, VIDEO, and SYSTEM** buttons will access the three menu groups available on the RED One.

The **RECORD button** is the red button on the right side of the camera control center. There is an additional RECORD button on the left side of the camera near the front of the camera.

Beneath the Camera Control Center is the **POWER button** and connections for POWER and DRIVE.

If you try to format a card that already has footage on it, a warning message will tell you that the digital magazine is not empty. It is very important to make sure that you have that footage transferred and backed up before proceeding. Once you have formatted the card and recorded new material, you will not be able to recover the old footage.

When the media is full and ready to be changed, be sure to unmount the card or drive before removing. If you do not unmount the media, there is a chance that the files will be corrupted and unusable.

BECAUSE THE SENSOR OF the RED One is similar in size to a 35mm film camera, the depth of field is also similar. This is one of the reasons that the camera is able to produce images that have a film look. This shallow depth of field makes getting accurate focus essential.

The best way to make sure your focus is accurate is to use a tape measure, but the RED One also offers a couple of other ways to check your focus. The first is to use the 1:1 FOCUS CHECK mode on the EVF. This allows you to see the center of the 4K sensor image in full resolution. You can get to this option by pressing the EVF button closest to the eye piece. There is also an option to use focus overlays on the LCD monitor.

Additional Info:

RED Camera Company - www.red.com

RED User Forums - www.reduser.net

iPhone Apps: iSee4K, Pocket DIT, Hitchcock

A more detailed operations manual, downloads for the Final Cut Pro and QuickTime plugins can be found at www.red.com/support

EXPOSURE ON THE RED One is set with a combination of lens aperture and shutter speed/shutter angle. The normal shutter speed when shooting at 24 fps is 1/48 of a second. The sensor of the RED One has a native ASA rating of 320. If you use these two settings on a light meter you can set your aperture to match the light meter reading that you take from the subject.

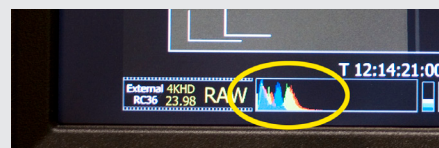
There are built in assist for exposure. The most obvious is the Histogram and Stop Light display on the LCD monitor. The Histogram reads luminance or RGB values from dark black on the left to the brightest highlights on the right. If you go over the maximum exposure on any of the red, green or blue channels, the stop light signals indicate the over exposure. It is very important to not lose any of the highlight detail in the image.

The RED One camera records in a RAW format so there is a lot of room to maneuver the image in post production, but best results come from a correctly exposed file. If the image is too dark then it will be grainy when adjusted, and if the image is too bright the image will look contrasty and video like when adjusted in post. The sweet spot for getting the best end picture makes exposures so that the thickest part of the histogram is just a little to the left of the center. This may look a little dark on the monitor, but there is a lot of room on the dark end of the exposure to bring back in post production.

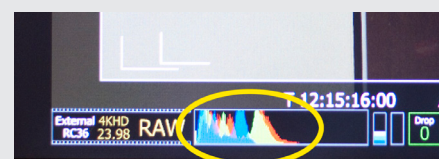
Exposure Histograms



Over Exposed Shot: Even though the stop light warnings are not indicating any clipped highlights, this image would be hard to bring down in post.



Under Exposed: This exposure would have to be raised a lot in order to compensate. This would result in a grainy image.



Correct Exposure: This is a perfect exposure. There is a lot of area to work with in the important mid levels. This little left than center exposure will produce the best image.