
PROCEDURE: Setting up Canon Software for Tethered Photography

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The Hill Museum & Manuscript Library (HMML) has been using digital single-lens-reflex (dSLR) cameras for manuscript and document photography since 2003. A key feature of HMML's digital photography workflow is the use of special computer software that allows the photographer to take pictures and have them transmitted directly to a personal computer (PC). This involves connecting the camera to the computer using a data transmission cable (usually a USB cable) and controlling the camera using *tethering* software to take pictures and review the captured images.



Digital Camera on Copy Stand. Canon EOS 6D Mark II shown. USB data cable is on the right. Flash synchronization cable is plugged into special hot shoe adapter.

This document outlines the setup for tethered photography using Canon dSLR cameras and Canon's own proprietary software, which, unlike commercial software products, is free of charge. Users may wish to use their own software product such as:

- Capture One by Phase One
- Adobe Lightroom
- Smartshooter
- Nikon Capture NX2 (for Nikon digital camera models)
- DigiCamControl

Users choosing to employ any other tethering software applications will have to learn how to use them to achieve the results specified by HMML project directors.

As of this writing, the current dSLR model used for HMML projects is the Canon EOS 6D Mark II camera equipped with the Canon EF 50mm f 2.5 Compact Macro lens. This unit is capable of producing digital images of extremely high quality and has proven to be a robust and cost-effective imaging system.

This document deals largely with the setup of the capture and review software and assumes that the dSLR camera has already been set up to HMML specifications.

Obtain the Software

The Canon software can be downloaded from HMML's resource download page at:

<http://www.vhmm1.us/Resource/Downloads/>

Two separate software applications are needed. *Canon Digital Photo Professional* (DPP) is a RAW file converter, image browser, and has basic image manipulation capabilities. This is the program used to inspect the images as they are taken.

The other application is *Canon EOS Utility* (EU). This is the application that controls the digital camera and works in conjunction with DPP. Both applications are needed to perform tethered photography operations with Canon dSLRs.

The HMML download page has versions of both of these applications for 32-bit and 64-bit versions of the Microsoft Windows operating system. In working with 64-bit Windows systems (the current standard), the two installers needed are:

dppw4.12.20-installer-Win7-64bit.zip

EU-Installset-W3.12.10.7-Win7-64bit.zip

These are compressed ZIP files. The user must unZIP the files by double-clicking on them and then dragging the contents of the ZIP file to another folder for use. The installation files contained in the two ZIP files are:

dppw4.12.20-installer.exe

euw3.12.10-installer.exe

The “.exe” files are double-clicked to begin the installation process. The person setting things up must have “administrator” access to the PC to install the software items. If the user is logged in as an administrator, they will simply have to confirm that they wish to install the software by clicking “yes” when prompted by the PC. If they are logged in as a “user” or “standard” account, it will be necessary to type in an administrator password to install the software items.

After installation, two new desktop icons will appear on the Windows desktop, one for each of the two installed applications. *At this point, do not double-click any of these just yet!*



Digital Photo Professional (DPP) desktop icon.



EOS Utility (EU) desktop icon.

Starting the Software and Configuring Settings

The first time the software is used, various settings must be made so that everything is easy to use and produces results that meet HMML requirements. Before starting on this, make sure that the camera is configured properly (HMML generally provides cameras that are already set up), mounted in place on the copy stand column, and connected to a USB port on the PC computer with a cable long enough to allow unhindered motion of the camera on the copy stand.

There are a number of ways that the two Canon software applications can be configured and used together, which can be confusing. To keep things as simple as possible, follow these guidelines.

Set up EOS Utility (EU)

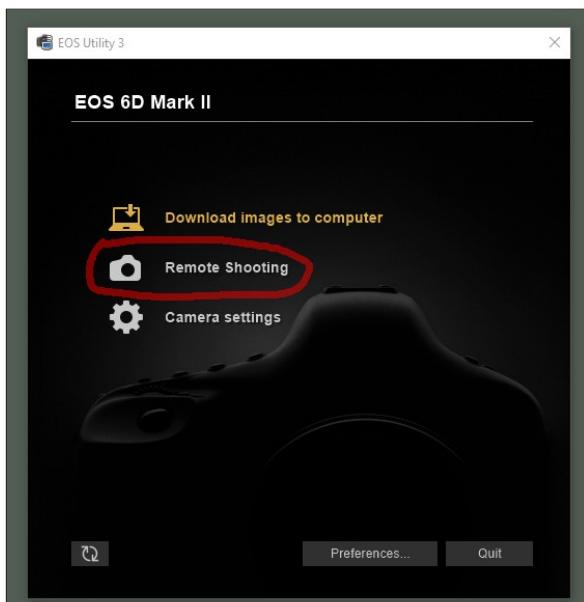
Turn on the digital camera. Neither of the software applications can remotely turn the camera on or off. When mounted on the copy stand, the on/off switch for the Canon 6D Mark II will be at the upper right of the camera facing the operator. It is clearly marked “ON” and “OFF.” Simply flip the little lever over to “ON” to turn the camera on.



On/Off Switch on Canon EOS 6D Mark II dSLR. The user flicks the switch to the “ON” position—the computer should detect the camera if the USB data cable has been connected.

What happens next depends a bit on how the PC is set up and whether this is the first time the camera was switched on using the computer configuration at hand. The operating system often recognizes the camera as an external device. Sometimes a message pops up assigning the camera a hard drive letter, or it may ask the user what to do with the new device that it has detected. Click on the “x” or whatever is needed to get rid of these unnecessary Windows messages.

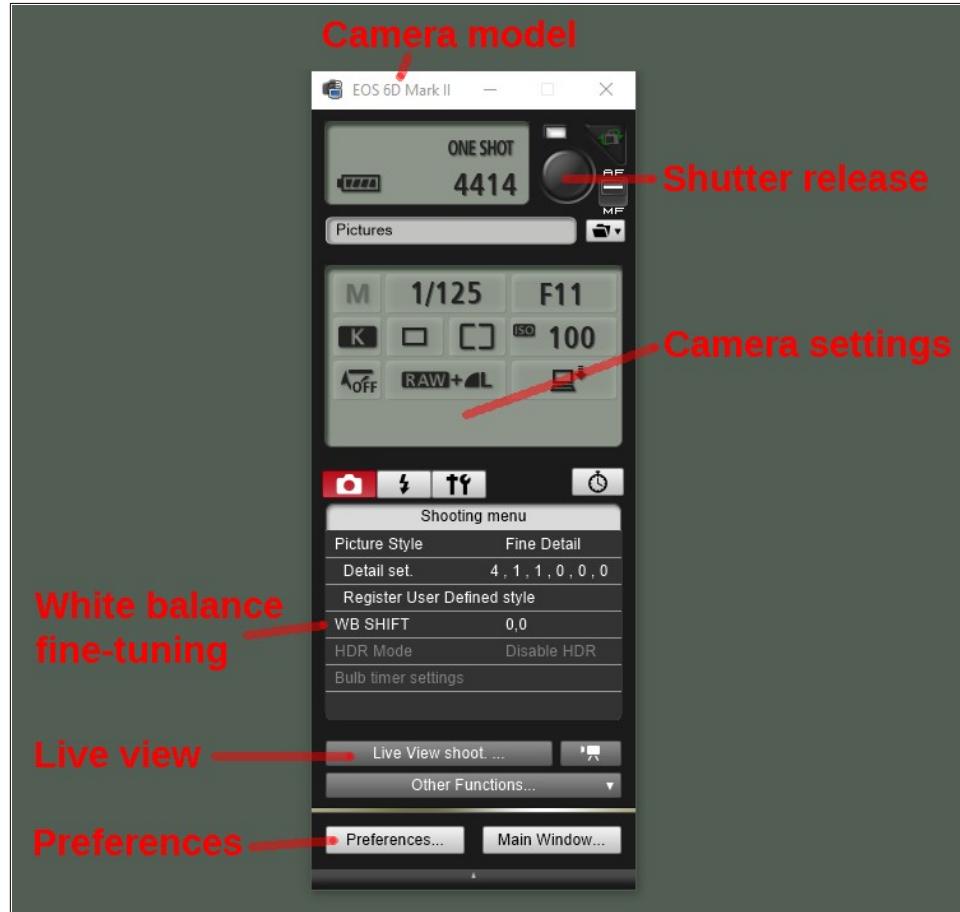
If the computer user has already launched and configured EOS Utility previously, a window will appear in the middle of the PC screen indicating that EOS Utility has launched and needs to know what you intend to do with the connected camera. Click the “Remote Shooting” selection to finish launching the application.



Starting EOS Utility. After connecting the USB cable between the camera and the PC and turning the camera on, this window should appear on the PC desktop. Click the second choice, “Remote Shooting,” to finish launching the utility.

If you are setting things up for the first time, this window will likely not appear. This isn't a problem, it just means that you have to set up the EOS Utility application. If this is the case, launch the EOS Utility application from the desktop icon instead.

When the application is finished launching, the EOS Utility (EU) control panel will appear.

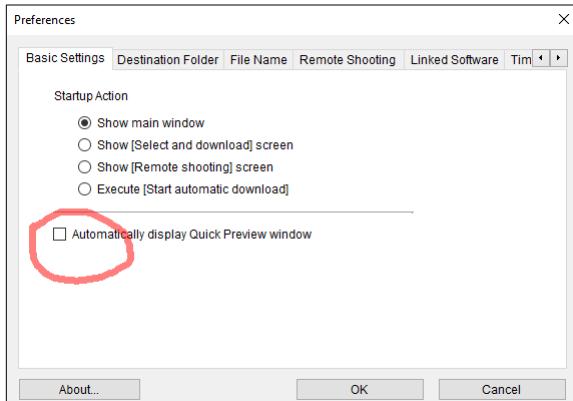


EU Control Panel. Here is where the user can configure various settings related to image capture, file naming, camera settings, and the like. The round “button” at the upper right actuates the camera (a picture is taken). If this panel is the “active” window, pressing the computer’s space bar also actuates the camera. The item marked “Live View shoot” activates the camera’s live view mode. Other items of use to the photographer are labeled.

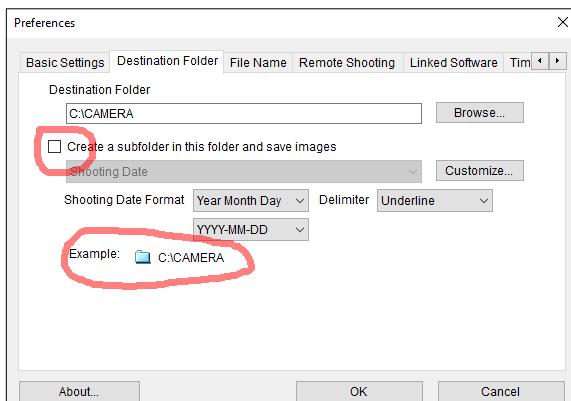
The EU control panel allows the user to control the digital camera from the computer. It is important to keep in mind that *camera settings* made in the EU control panel are saved *in the camera*, not on the computer. If a different camera is connected to the computer, the settings for that particular camera will be shown when EU is launched. Also, there are some settings that have to be made on the camera and not on the EU control panel, such as the setting for manual or automatic focusing, which is done by actuating a switch on the camera lens. Any changes made on the camera will be reflected in the EU control panel.

Before taking any pictures, there are a number of user preferences that should be set using the EU control panel. These relate to file-naming, the location of captured images, and how the application works with Digital Photo Professional (DPP). Unlike the camera settings, these settings are saved on the computer. To begin, click the button labeled “Preferences...”

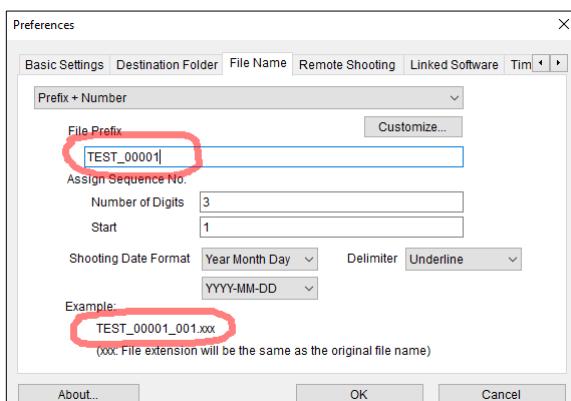
A multi-tabbed window will appear. Go through the tabs one by one and set them according to the screenshots that follow.



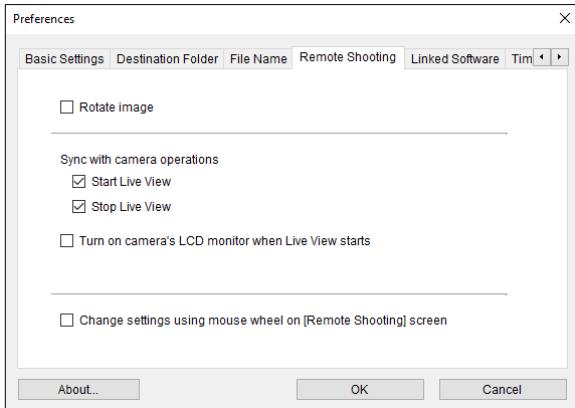
Basic Settings. The last item is checked by default. I uncheck it, as we will configure DPP to show each new shot as it is created, making the “quick preview window” unnecessary.



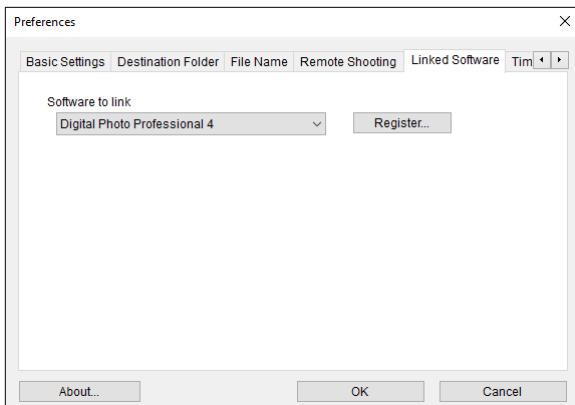
Destination Folder. There are many options that the user can configure here. I uncheck the option to “Create a subfolder in this folder and save images.” This keeps the image capture folder structure simple. NOTE: You have to create your destination folder before you can browse to it and select it using this control panel tab.



Setting File Naming. Enter the file prefix, choose the “Number of Digits” for the file sequencing, and choose a starting number. The software shows you an example of the filename structure *before* you start—this way you are assured of getting the file-naming set up correctly.



Remote Shooting. These are the settings that work best for HMML's work. I leave the "Rotate image" checkbox unchecked.



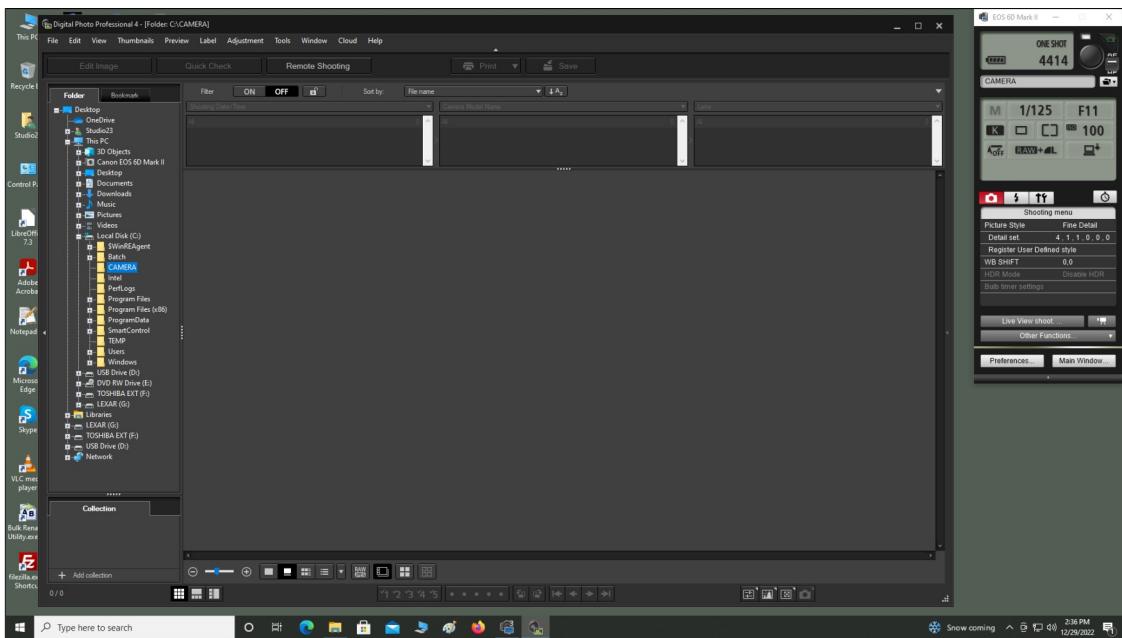
Linked Software. Application is set up to link to Digital Photo Professional.

These first five tabs are all that need to be attended to for HMML's photography workflow. At this time, EOS Utility is set up and ready to use.

Set up Canon Digital Photo Professional (DPP)

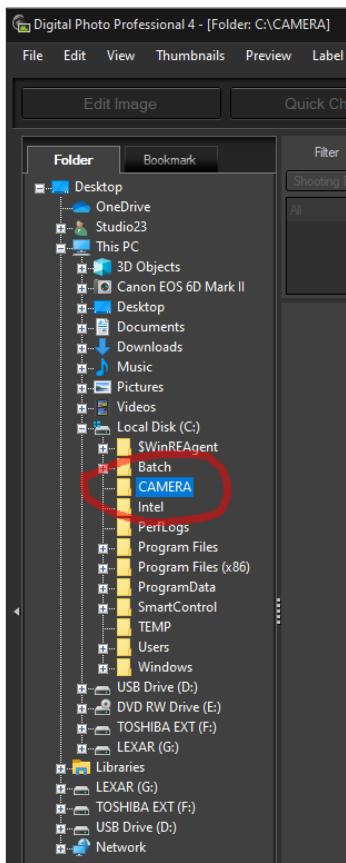
Canon's image-handling software has evolved through the years. When HMML started using digital SLR cameras to photograph manuscripts, the application was quite basic and was used simply to look at captured images.

Today, Digital Photo Professional has become a full-featured image viewing and manipulation application that has many of the features found in expensive applications such as *Capture One* from Phase One or *Lightroom* from Adobe Systems. It's nice to have these capabilities, but it can also make things confusing for the user in that the application can be set up in numerous ways and has lots of features that HMML's technicians won't use. There are many different tools and information "palettes" that can either be viewed or hidden—having all of them open can fill up the computer screen. Here's how to set up DPP in the most efficient way for HMML's work.



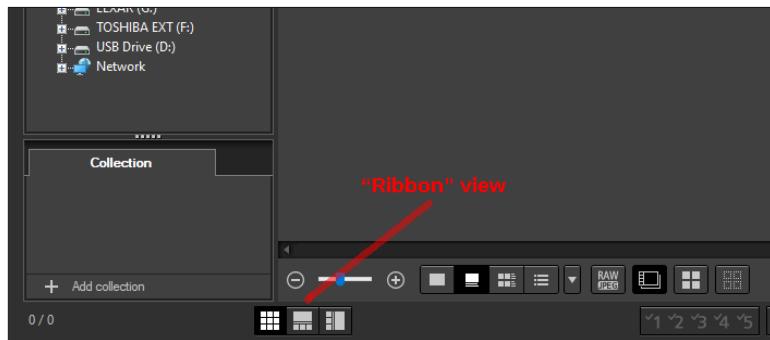
Initial Digital Photo Professional Layout. From here, the user can customize the application to make things more efficient.

The left side of the DPP window contains a “navigation tree,” which is a representation of the file system on the computer. Navigate to and select the folder that was specified earlier to be the destination for captured photographs.



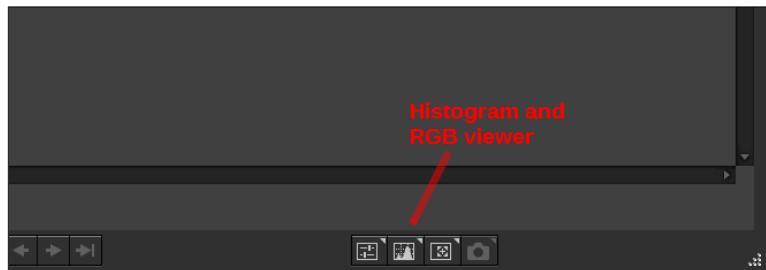
Navigation Tree in DPP. Select the destination folder for images captured by EOS Utility.

By default, DPP is set to show the contents of the active folder as a series of thumbnail images. For HMML's use, it's better to set the display to show a "ribbon" of thumbnail images at the bottom with a larger preview image of the chosen image above. This is done by clicking an icon in the lower left of the DPP window as shown.



Choosing DPP Layout. The center icon shown above will present images as a "ribbon" of thumbnail images with a larger preview image above.

Next, choose to view the "Histogram" information palette by clicking on its icon at the lower right of the DPP window. The histogram information palette is needed because it contains a "readout" of the Red, Green, and Blue (RGB) values of the portion of the image underneath the mouse cursor. This is needed to check RGB values for determining exposure and color balance.



Activating the Histogram Information Palette. Click this icon to make the histogram palette visible. This palette contains the cursor readout for Red, Green, and Blue (RGB) needed for checking exposure and color balance in captured images.

At this point, the interface for DPP is set up for optimal use. At this point the shutter release button on EU can be clicked to take a picture.

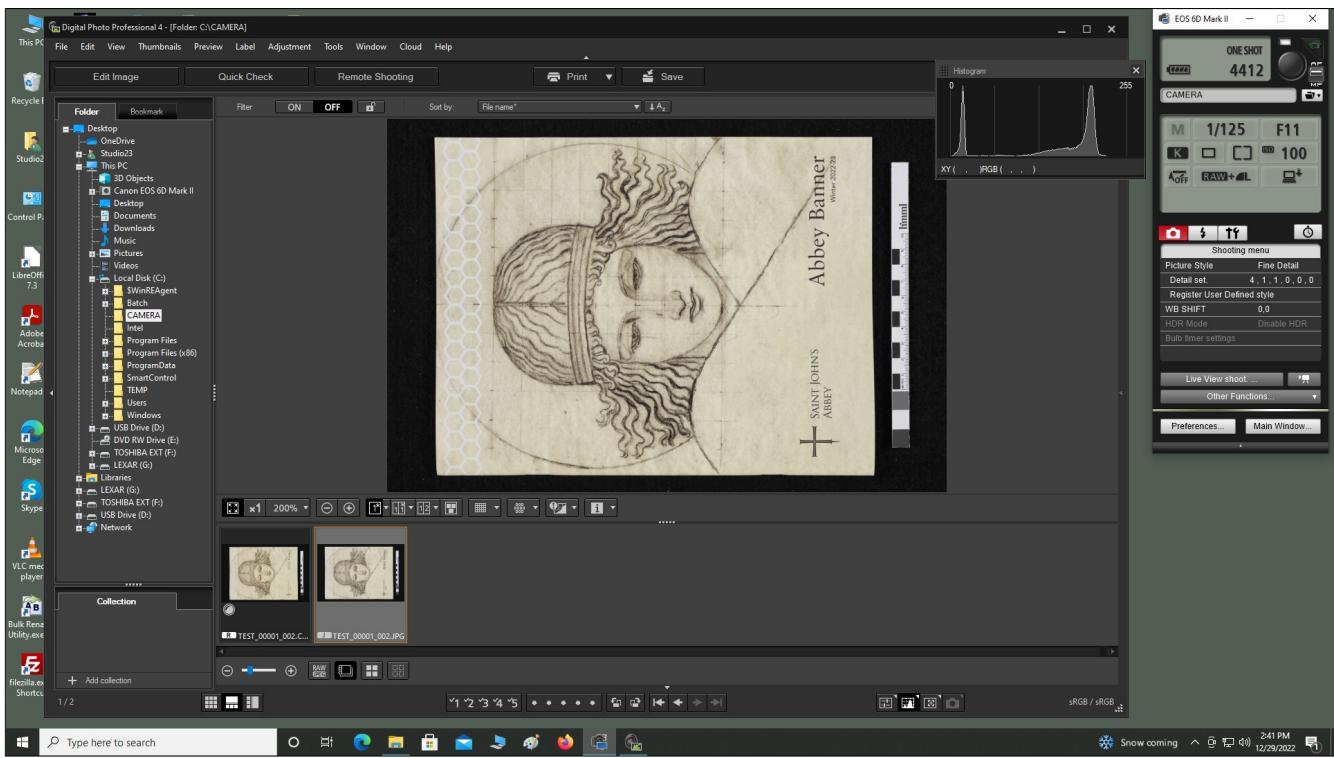


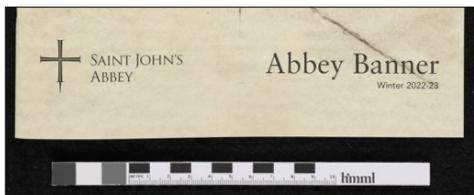
Image Capture. The RAW and JPEG versions of the captured image are seen in the thumbnail “ribbon” at the bottom of the DPP window with a larger preview image above. This image can be zoomed to full size and inspected for composition, focus, exposure, and color balance.

The image will appear in the preview window of DPP with the two thumbnails (the RAW and JPEG versions of the image) below. The software automatically selects the latest image taken as the one displayed in the preview window, but the user can select any of the thumbnails to view as desired. Image files are sequenced according to the settings made in EU’s preferences tab.

Obtaining Proper Exposure and Color Balance

One of the big advantages of using capture control software for photography is that the user can precisely check the exposure and color balance of the captured images and adjust them to a degree of perfection not possible when using the digital camera untethered.

HMMI has created a “gray/metric scale” accessory for studio use. It is a custom-made metric ruler containing three grayscale reference control patches. These patches are made from the white, gray, and black patches from the popular “QP Card” digital color target, which is a photo industry standard. In HMMI’s work, the white patch is used to set overall image exposure and the gray patch is used to set optimal color balance.



Gray/Metric Scale. This small item is placed near the subject and positioned so that it receives the same lighting as the subject matter. The metric scale is useful in determining the size of the photographed object. The white and gray patches are used to set the exposure and color balance.

Understanding the RGB Color System

The aim in obtaining optimal exposure is to capture the full tonal range of the subject matter without losing information in the extreme light or dark areas. Underexposure, where not enough light has reached the image sensor, results in the dark areas being difficult or impossible to see. Overexposure, where too much light reaches the image sensor, results in the light areas of the subject matter being “blown out” to pure white, leaving no visual detail. When properly adjusted, optimal exposure results in the complete tonal range of the subject matter being successfully captured and displayed by the digital image.

The aim in obtaining optimal color balance (called *white balance* in the Canon camera user manual) is to adjust the camera settings so that neutral (gray) values in the subject matter are rendered as neutral numeric values in the captured image. When this is achieved, all other colors should likewise be rendered correctly, falling where they will within the colorspace employed. The result will be an image that is an accurate representation of the subject’s colors.

In HMML’s work, these RGB value numbers range from 0 to 255. Pure black has RGB values of:

Red	0
Green	0
Blue	0

Pure white has these RGB values:

Red	255
Green	255
Blue	255

Any neutral (gray) value on this scale will have *equal* RGB numbers. A theoretical “middle gray” value would have the values:

Red	128
Green	128
Blue	128

Using this numbering system, over 16.7 million unique RGB colors can be described, enough to create the illusion of continuous color and tonality in the digital image. Understanding and using this number system helps HMML technicians achieve optimal exposure and color balance.

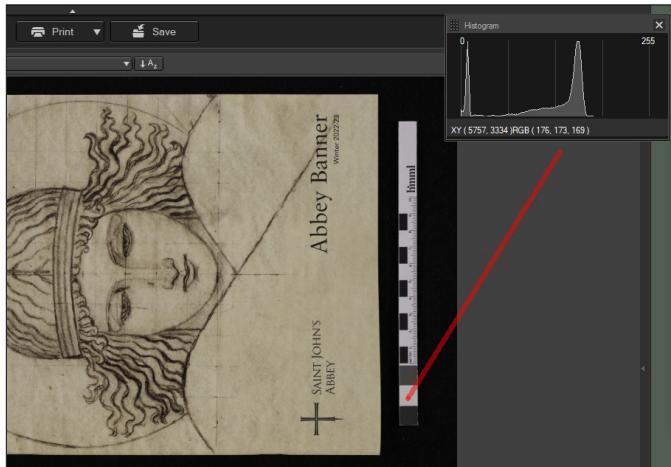
In setting exposure, we pay special attention to the “white point,” which in our systems is represented by the white color control patch on the gray/metric scale. In the DPP software, the user can put the mouse cursor over this patch and read the Red, Green, and Blue (RGB) values. By interpreting these RGB readings, we can determine if the exposure is correct.

Exposure can be changed in a number of ways. Using the flash lighting system that HMML uses for manuscript digitization, exposure can be changed by:

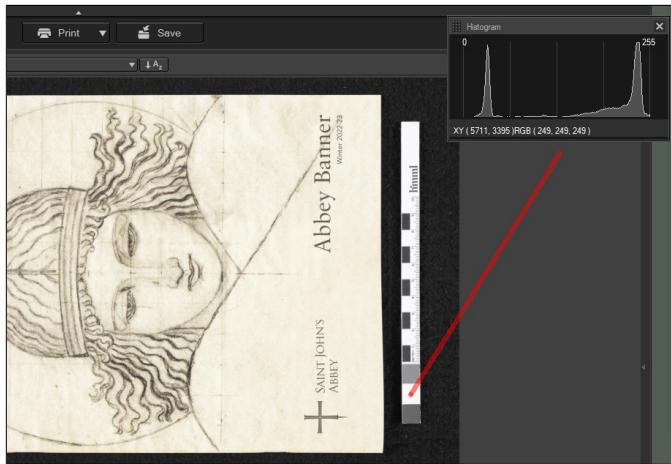
- Changing the aperture (*f-stop*) of the camera lens
- Changing the ISO sensitivity setting of the camera
- Changing the power settings on the two flash lighting units
- Physically moving the lighting units closer or farther away from the subject

In HMML's digitization setups, we try to use an aperture of *f*11-16 for most of our photography work. For ISO sensitivity, we try to use the lowest setting possible, generally ISO 100. The shutter speed, set at 1/125 of a second for flash use, does not affect the exposure because it is the burst of flash light that determines the amount of illumination on the subject. Thus, in most cases, it is the adjustment of the flash intensity that is most often used to achieve proper exposure. The flash units employed by HMML have continuously-variable power settings, so fine-tuning the exposure is easy. Make sure, however, that the power settings on the two lighting units are at the *same setting* to ensure even lighting across the subject.

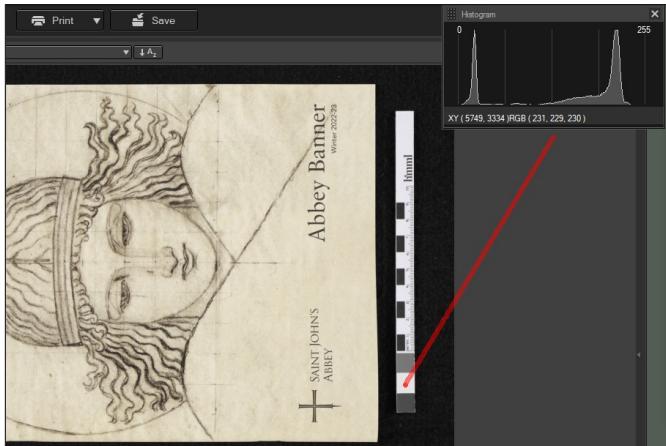
In setting exposure, HMML aims for a white patch reading of around 230. Readings above 240 threaten to blow out the highlight values in the subject, and readings that are in the 200 range or below are too low, resulting in an overall dark effect in the captured image.



Underexposure. The white patch RGB reading is R176 G173 B169.

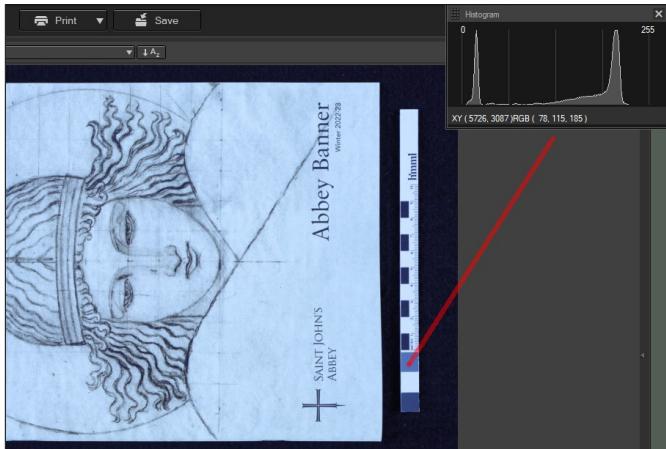


Overexposure. The white patch RGB reading is R249 G249 B249.



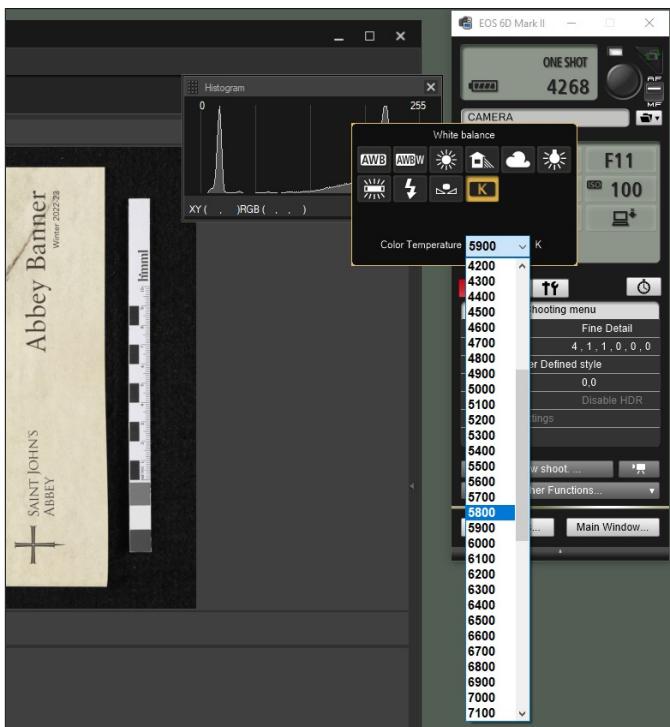
Proper Exposure. The white patch RGB reading is R231 G229 B230.

Along with the exposure, attention must also be paid to the color balance of the image. This is checked by putting the mouse cursor over the *gray* patch on the gray/metric scale. Proper color balance is achieved when the RGB values for the gray patch are equal or nearly so.



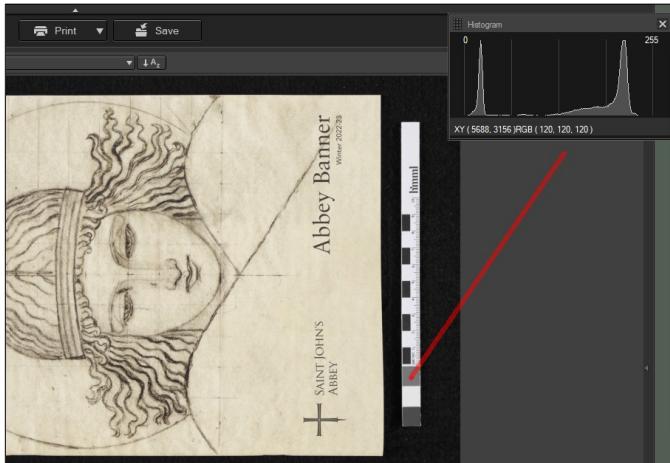
Grossly Inaccurate Color Balance. Here, the camera was deliberately set to the “tungsten” setting (meant to be used with old-fashioned incandescent bulbs) to create an obvious mismatch between the illumination (flash) and the chosen setting. Gray patch reading is R78 G115 B185. The captured image is obviously off-color when compared to the original subject matter.

Adjusting the color balance is done by changing the white balance setting of the camera. This can be done using the EU control panel. For HMML work, cameras are set to use the “color temperature” (K —degrees Kelvin) white balance setting. When using flash lighting, a good starting point is to set the Kelvin temperature setting to 5800 and make a test exposure. Check the RGB values. If the numbers have a total “spread” of 6 units or so, the color balance is acceptable for HMML’s use.



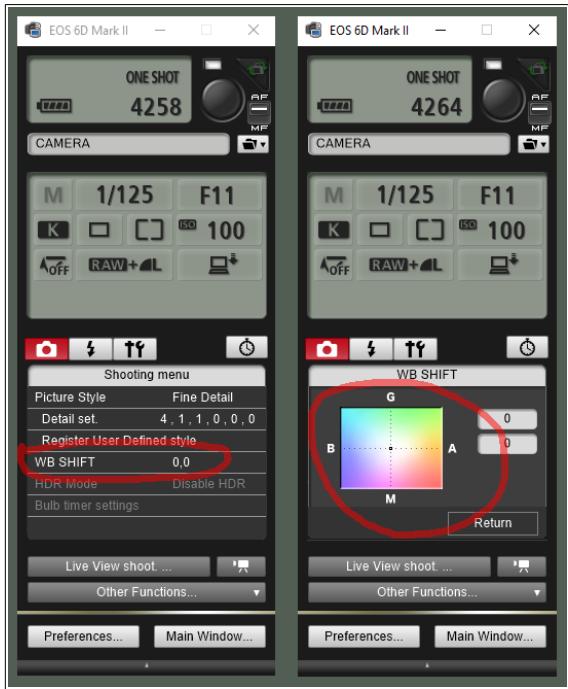
Choosing Color Temperature. The “K” white balance setting contains a drop-down that allows the user to pick the color temperature. For HMML studios equipped with flash units and reflective umbrellas for lighting, 5800 degrees Kelvin is a good starting point for testing.

If the gray patch is reading low in blue compared to the red and green values, lower the color temperature setting and try again. If the gray patch is high in blue compared to red and green, raise the color temperature value and try again. Make small adjustments of 100 degrees at a time.



Perfect Gray Balance. Adjusting the color temperature in small increments and checking the results has yielded a perfect gray patch reading of R120 G120 B120.

Through these adjustments, it’s possible to get the values of the gray patch to have very close RGB readings. Further adjustments, if needed, can be done using the “WB SHIFT” control in EOS Utility. This control allows very small adjustments to be made to the color balance, allowing the user to fine-tune the color balance if color temperature adjustments alone can’t quite do it.



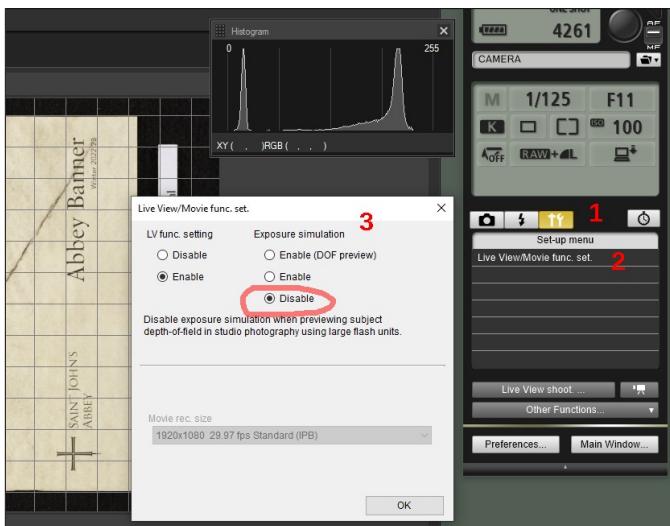
WB SHIFT Fine-Tuning Control. Clicking this brings up a panel depicting a two-dimensional “green-magenta” and “blue-amber” color range. If you need to nudge the gray patch value just a bit, you can click in this color field to move the color to where it needs to be. Click on the “Return” button to exit the tool.

Exposure and color balance adjustments are often done several times, one after the other. First, a basic gray balance is set. Then the white patch is checked for proper exposure values. Exposure is adjusted to a proper white patch reading and the gray patch is again checked to see if things have changed. It may take a couple of iterations to get everything right. However, once these two things are properly set, there should be *no need to make further adjustments* as the work proceeds unless fundamental changes have been made to the studio setup. At the start of each photography session, simply check the RGB values of the white and gray patches on the gray/metric scale to confirm that nothing has changed and you should be ready to proceed with the work.

Using Live View

One of the most popular features of today’s digital cameras is “live view,” where the camera can be activated as a video system, sending an image from the camera to the computer in real time. This is extremely handy for framing and composition, as the user doesn’t have to actually look through the camera’s viewfinder to accomplish this. When photographing a large manuscript, the camera is often raised on the copy stand to the point where the photographer would have to climb a ladder to compose the picture using the viewfinder.

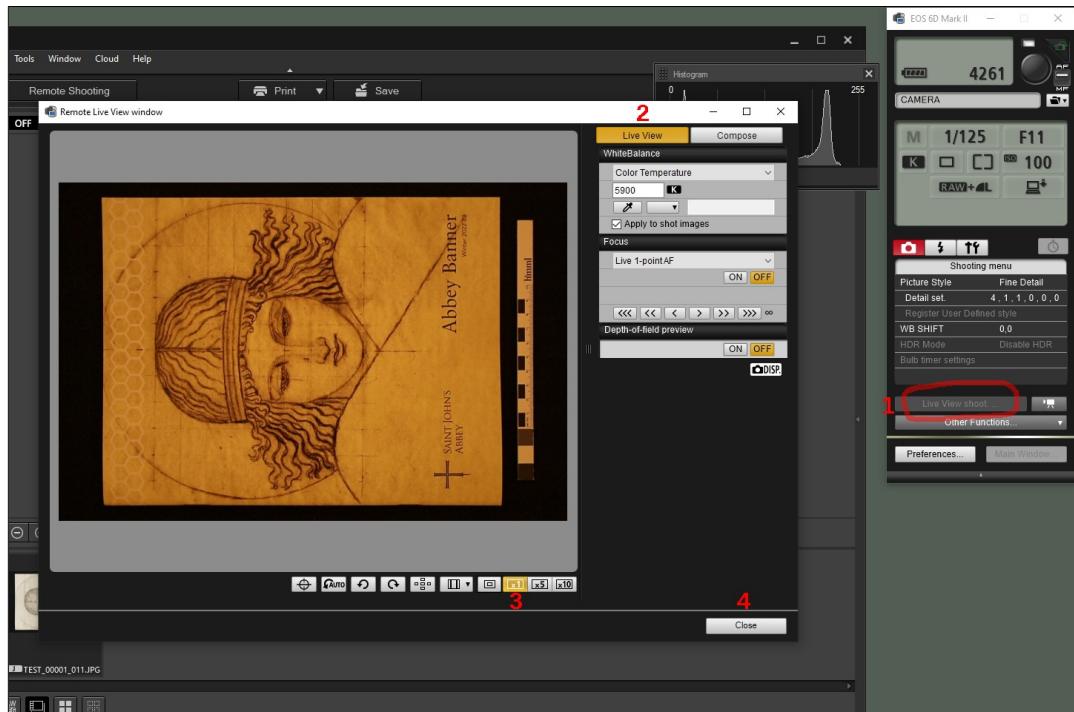
Before using live view, check the settings in the EU control panel. Click on the icon that looks like a wrench (labeled as “1” in the screenshot below), then on the item labeled “Live View/Movie func. set.” A window will appear where settings can be selected.



Setting Up Live View. 1. Click the “wrench” icon. 2. Select “Live View/Movie func. set.” A settings window will appear. 3. Check the settings as show. It is vital that “Exposure simulation” is disabled.

Click on the radio buttons to enable live view and **disable** exposure simulation. If you enable exposure simulation, the live view (when activated) will likely show a totally black rectangle! This is because the camera is set to 1/125th of a second at f11 (or thereabouts), and with the ambient lighting available, this would result in extreme *underexposure*. The camera and software have no way of “knowing” that external flash lighting will supply the illumination needed for the actual photograph.

When the proper settings have been made, click the “camera” icon (same area of EU control panel that the “wrench” icon resides) and then the item labeled “Live View shoot ...” The live view window appears.

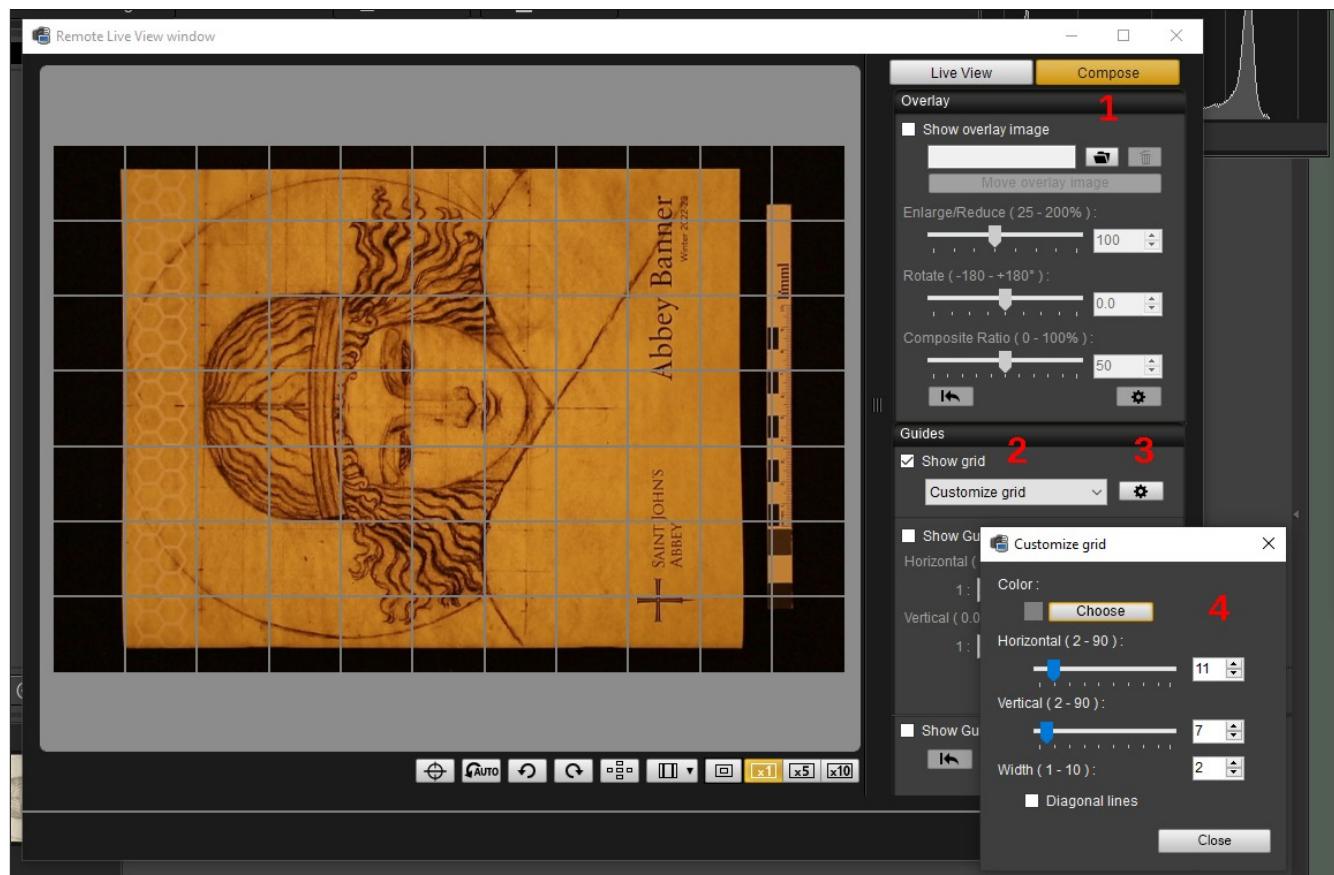


Initial Live View Display. 1. Activate live view by clicking the item labeled “Live View shoot” 2. New live view window appears. 3. Various controls are used to magnify the image, display focus points, etc. 4. Click the “Close” button to exit live view.

The user will notice that the live view image of the subject matter is often quite different in color than the actual image captured. This is because the system has to be set to disable exposure simulation and the software and camera are simply applying whatever digital amplification to the signal is needed to make it visible using whatever ambient light is available. Usually, this is the light provided by the “modeling lamps” in the flash lighting units, which often have a very yellowish color. The actual photograph taken will have the proper color balance and exposure established earlier.

With live view enabled, the operator can watch the computer screen while moving the subject matter into place or raising or lowering the camera on the copy stand to optimize the composition. If manual focusing is employed, enlarging the live view image allows the user to focus the camera very precisely.

When photographing manuscript materials, it is often helpful to have a grid superimposed on the live view image to allow for the precise positioning of the subject matter. This can be set up in the live view window by clicking on the “Compose” button at the upper right.



Setting Up Grid Overlay in Live View. 1. Click the “Compose” button. 2. Click the box next to “Show grid.” 3. Click the “gear” icon button. 4. Use sliders to customize the number of vertical and horizontal lines desired for the grid overlay, then click the “Close” button.

Precautions Regarding Live View

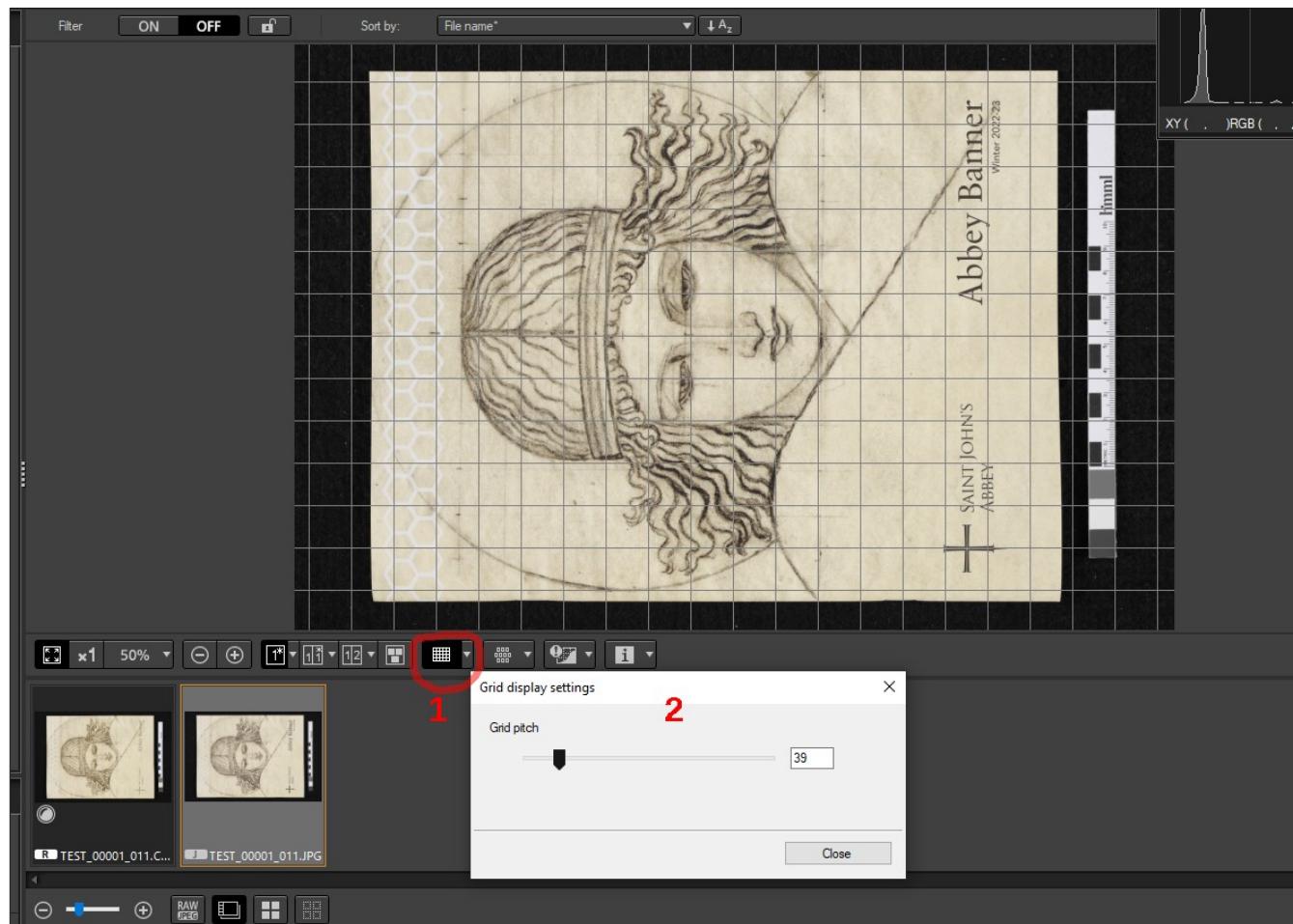
HMML recommends using live view only as an aid in framing and arranging the subject matter. Some technicians try to do *all the work* in live view, leaving it on as they take photographs over long periods of time. HMML has had mixed results with this work method—the software has shown a tendency to become unstable over time as shots are made while remaining in live view.

There are other considerations when trying to work entirely while in live view. The sensor chip in the camera is activated continuously during live view and will heat up. If it gets too hot, there are built-in safety circuits in the camera that will shut it off if the sensor temperature gets to a certain level. If this happens, work has to stop and the camera allowed to cool off.

Another point to consider if one wishes to photograph while in live view is that the auto-focusing methods can differ between how the camera is set up for regular photography and how live view auto-focusing is set up. Consult the camera use manual to understand and properly set up live view auto-focusing if that is the intent.

Generally, HMML recommends composing and arranging the imagery using live view and then exiting live view to proceed with the photography.

If the user desires a grid overlay to be present on the main preview window of DPP, there's a setting for this. Click on the button icon that looks like a grid that is located right below the preview image.



Grid Settings for Main DPP Display. 1. Click the button that looks like a grid, then click the “down arrow” next to it. 2. In the window that appears, use the slide to customize the grid interval.

Using the Canon RP Mirrorless Digital Camera for HMML Projects

In 2023, it was becoming clear that the major digital camera manufacturers were moving away from the single-lens-reflex camera design to the smaller, lighter “mirrorless” design. Rather than attempt to purchase dSLR cameras from “new old stock” or in the used camera market, the decision was made to adopt a new camera/lens system for HMML’s manuscript photography.

After examining the camera models available and comparing capabilities, specifications, and cost, HMML decided that the Canon EOS RP mirrorless camera was an ideal tool for manuscript digitization.



Canon EOS RP Mirrorless Camera. Shown mounted on copystand with PC flash adapter, USB cable, and AC adapter. Note that the main mode dial on the camera is set to “M,” for complete manual control of the camera.

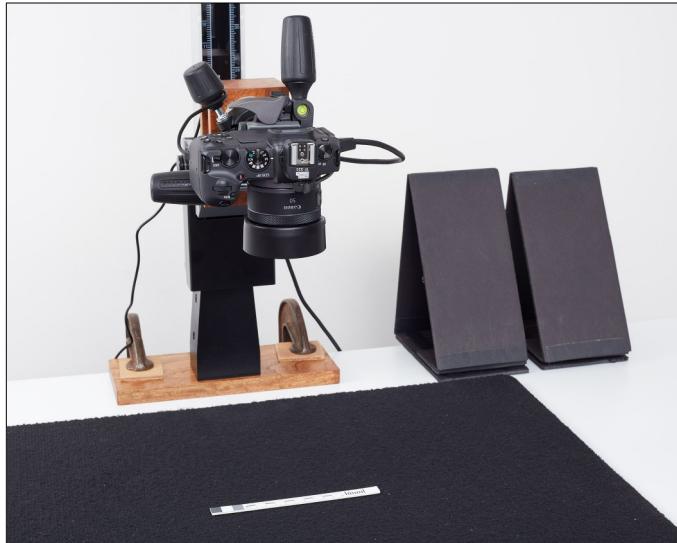
The EOS RP is a “full frame” digital camera, with an image sensor that is the same size as the 35mm film frame used in older analog cameras. It’s a 26-megapixel camera, producing an image with pixel dimension of 6240 x 4160. These are the same image specifications as those produced by the Canon EOS 6DMKII. Compared to the EOS 6DMKII, the RP is much smaller and lighter.

The lens used with the RP camera is the Canon EOS RF 50mm f/1.8 STM lens. It’s important to note that the mirrorless cameras from Canon use a different lens mount than their dSLR cameras. Thus, the standard 50mm Canon EF macro lens that HMML has used for years will not directly attach to the RP, although Canon makes an adapter that allows EF lenses to be attached to their mirrorless (RF) cameras.

The Canon RP is a camera designed for today’s still/video picture workflow. It has many advanced features allowing highly-effective automatic photography as well as extremely high-quality video. Many of these advanced features find no use in HMML’s work, however. Those wishing to understand

the camera's many functions are encouraged to read the user manual. Here, features related to successful manuscript photography will be outlined.

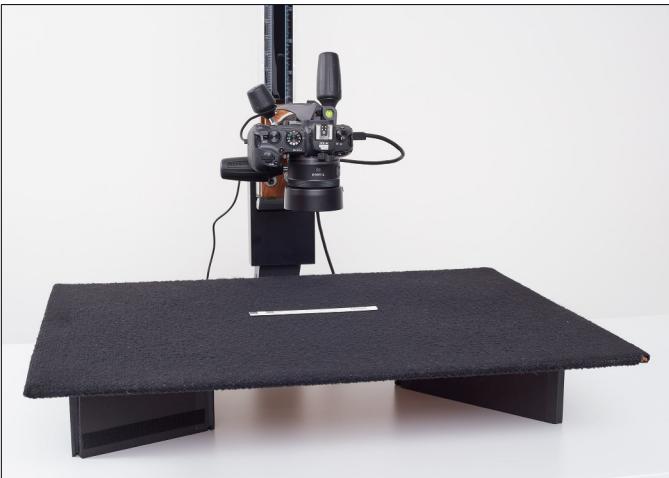
The good news for HMML technicians is that the way the camera works with the Canon Digital Photo Professional (DPP) and EOS Utility (EU) software is nearly identical to the procedures outlined earlier in this document. Here, we will show some of the differences in the workflow that are unique to the Canon RP camera.



Copystand Setup with the Canon RP. Here, the camera is lowered on the copystand as far as it will go.

The Canon RP mounts onto the same copystand system HMML has used with earlier camera systems. Being lighter and smaller, it's actually easier to raise and lower the camera on the copystand column. When the copystand carriage is lowered to its lowest point (the copystand carriage stops when it hits the metal base fitting), the camera with its standard 50mm lens covers an area measuring 12 x 18 cm.

If it is necessary to get even closer to the subject matter, the easiest thing is to raise the book cradle platform. The book cradle triangle pieces can be used to accomplish this. Without any special attachments, the RF 50mm STM lens can focus down to an area measuring 15cm on the long dimension of the sensor, eliminating the need for macro attachments in most cases.



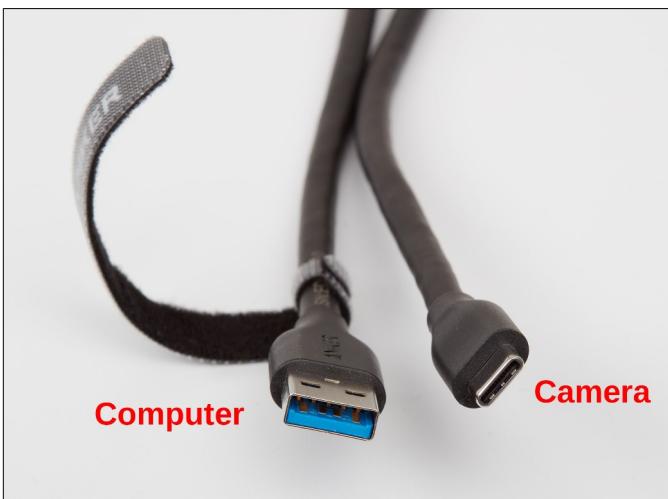
Raising the Baseboard for Close-Up Photography. The book cradle triangles can be used to elevate the baseboard, getting the subject matter closer to the camera. The standard lens can focus on a six-inch item filling the viewfinder (long dimension).

The Canon RF 50mm STM lens is constructed with its front glass element close to the front of the lens barrel. Therefore, unlike the 50mm macro lens HMML has been using, a lens hood is necessary to prevent unwanted light from striking the front lens element and possibly causing flare and image degradation. Canon sells this items as part number ES-65-B for about \$35. However, cheaper “no-name” alternatives are plentiful.



Leveling the Camera. The rim of the lens hood is a good place to check the alignment of the camera to the baseboard. Camera must be leveled in two directions at ninety degrees to each other. In this picture we can also see the small rubber flap in the right side of the camera near the bottom—this is for the cord powering the AC adapter unit, which replaces the camera’s battery.

One difference between the new Canon RP and earlier Canon cameras used by HMML is that the USB data port on the RP is the newer “Type C” USB port. Many PC computers have this type of USB port, but some do not. Ensure that the data cable purchased for use with this camera has the proper plugs to work with the camera and computer.



USB Cable Plugs. This three-meter cable has a USB-C plug on one end for the Canon RP camera and a standard USB 3.0 “Type A” plug on the other, allowing it to connect to typical PC computers. Some PC computers have a USB-C port already, so purchase the cable or adapters needed to make the connection. Check the ports on your computer before buying cables!



Cords and Connectors. Here we see the USB data cable plugged into the camera’s data port (after lifting and swinging rubber cover out of the way) and the flash unit’s sync cable plugged into the accessory hot shoe flash adapter. The hot shoe adapter is needed because the Canon RP, like many digital cameras, has no PC flash contact port of its own.

The textured front ring on the Canon RF 50mm lens is a bit different in function compared to lenses that HMML has been working with in the past. One would assume that it’s the lens focusing ring, and that’s partially true, but there’s more to it.



Multi-Function Control Ring

Front Control Ring on Canon RF 50mm Lens. This ring can be set as the focusing control, or it can be assigned to control *other functions*, such as the lens aperture. Setting the indicated switch to “FOCUS” sets it as the focusing ring.

The ring can be set to act as the focusing ring, or a switch on the lens can be set to “CONTROL,” whereby it controls other things dependent on other settings made by the user. For example, in aperture-priority automatic mode, the ring controls the aperture (F-stop) of the lens when set to CONTROL.

What this also means is that the ring is not *physically connected to anything*—it’s a totally electronic sensor-encoded control ring, so the “feel” of the ring is a bit different than one might be used to. Manually focusing the camera using the ring is sort of a “fly by wire” thing, with your turning of the ring controlling the lens’ internal motors to focus the optics.

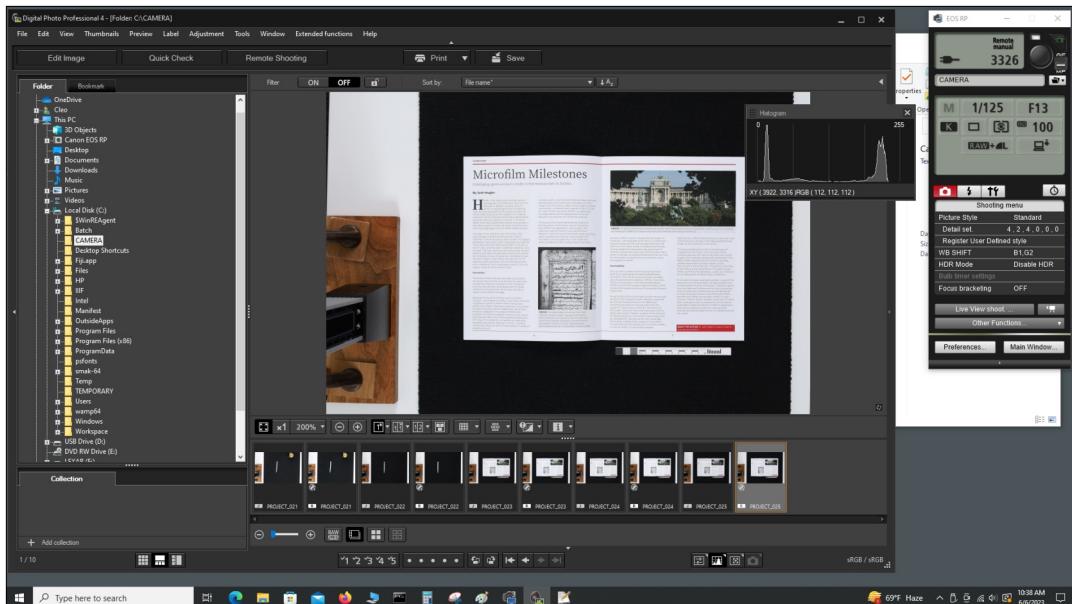
Use of the 50mm lens, combined with the height of the copystand, allows the camera system to photograph manuscript items of considerable size. At full height, the area covered by the camera and lens is about 73 x 48 cm in size. Even with the usual margin around the subject matter, this allows for a very large manuscript object to be photographed.



Camera Swung Sideways. The tripod head mounted to the copystand allows the camera orientation to be changed to photograph books lying flat with the “gutter” in line with the two lights.

HMML often advises those photographing books as two-page spreads to orient the book in such a way that the “gutter” between the two pages is in line with the two copy lights. This reduces the shadow in the gutter area that occurs if the book is oriented in the normal side-to-side orientation, with the gutter at 90 degrees to the lighting direction. The tripod head attached to the copystand allows the camera to be easily swung into the proper position for this. After doing this, re-check the camera to ensure it is still level (in both directions) to the baseboard and adjust if necessary.

With the camera swung into the 90-degree position, the system can image an area measuring about 48 x 61 cm. This is far larger than most books that will be encountered. The following screenshot from Digital Photo Professional (DPP) illustrates the capacity of the new camera/copystand system.



Screenshot Depicting Copystand Range. Here, the camera has been rotated to photograph a double-page spread with the page gutter in line with the copy lights. Camera has been raised to the top of the copystand column. The open magazine measures 11 x 17 inches (28 x 43 cm), and there is still quite a bit of space available. Note bottom of copystand column at left of image.

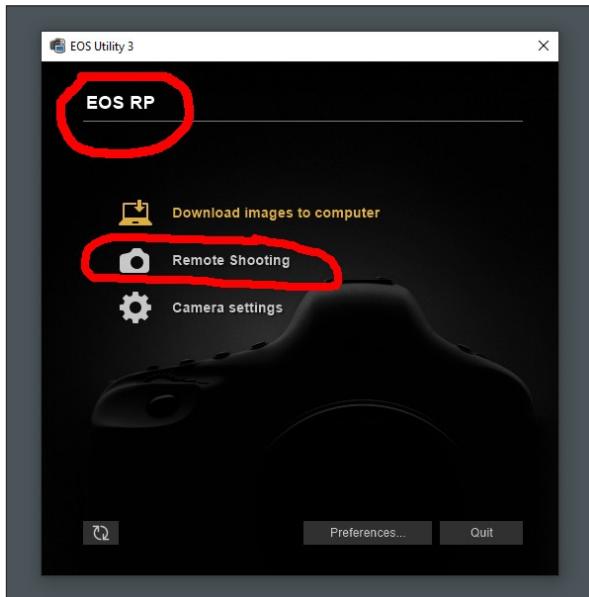
The copystand model now used by HMML employs 5mm hex-head cap screws to attach the column to the baseplate and the carriage to the custom tripod-mounting block. If the screws become loose for any reason, they need to be tightened. Also, if extreme close-up photography is being done and there is no way to elevate the cradle baseboard, it is possible to remove the custom tripod-mounting block and re-attach it to the carriage in an upside-down configuration (the middle screw cannot be used in this position, but the outer two screws will suffice). This allows the camera to be lowered almost on top of the subject matter. The small hex wrench needed to work on these cap screws is included with the copystand, mounted in a hole at the top of the column.



Top of Copystand Column. Here, the user can find the 5mm hex wrench needed to work with the hex-head cap screws that hold things together.

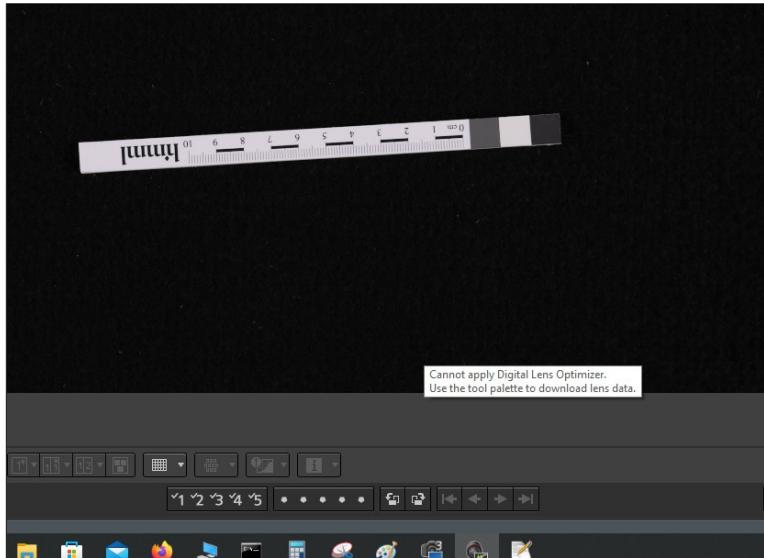
Using The Canon RP with Digital Photo Professional (DPP) and Canon EOS Utility (EU)

As stated earlier, there is very little difference in how the new Canon RP camera works in conjunction with Canon's DPP and EU remote capture software applications. If a user already has these applications running their computer, it's simply a matter of plugging the Canon RP in, turning it on, and working with the system as usual.



Startup of EOS Utility. This screen appears after you turn on the plugged-in camera. Note that the software "knows" what camera model is being used. Choose the "Remote Shooting" selection to get started.

One thing you may encounter when using the new Canon RP with an *older* version of DPP is a small annoying message that follows your mouse cursor around. It looks like this:



Annoying Message. If you're using an older version of DPP, this little message popup will follow your mouse cursor around. It doesn't prevent anything from working properly, but it's annoying. Upgrade DPP to version 18 and download the lens correction file for the EOS RF 50mm STM lens to get rid of this.

This means that the software doesn't have digital lens correction data for the Canon RF 50mm STM lens being used. The easiest way to fix this is to upgrade DPP to a newer version. The current version as of 2023-06-09 is called:

dppw4.18.0-installer.zip

This software can be found on the HMML download page at:

<http://www.vhmmml.us/Resource/Downloads/>

Direct link:

<http://www.vhmmml.us/Resource/Downloads/dppw4.18.0-installer.zip>

Once installed, the user can take a picture, go to the “Edit Image” panel of the software, and install the digital lens correction data for the Canon RF 50mm STM lens (an internet connection is needed). No more annoying message!

Setting proper exposure and gray balance is done using the same techniques as are employed when using previous Canon camera models. HMML generally uses the lowest ISO setting of the camera (ISO 100) and operates the camera in “manual mode,” (M) which is set using the round dial on the top of the camera itself. The white balance setting is set to “degrees Kelvin” (K), and the temperature setting adjusted to get the red, green, and blue readings from the gray patch of the HMML grayscale as close together as possible. In the tests made for this document, the setting was 5700 degrees Kelvin. This was

quite close, but a further adjustment using the white balance shift control in EU perfected the gray balance.



Two Views of the EU Camera Control Panel. The left view shows the main display with proper settings for the test project that produced this document. Right view shows the final color balance tweaks used to perfect the gray balance.

Focusing the Camera



EU Control Panel Focusing Controls. Hovering the mouse over the shutter button will focus the camera. Focus mode switch toggles between manual and automatic focusing.

The Canon RP, with the 50mm STM lens, can be focused in a number of ways depending on the subject matter photographed.

HMML recommends using autofocus for manuscript photography if it is possible. With autofocus, the technician does not have to fuss with the critical focusing of each image made. This saves time and prevents mistakes that can happen if the operator forgets to manually focus an image.

The Canon RP camera has settings for a variety of auto-focusing modes. For HMML's work, the following settings are recommended:

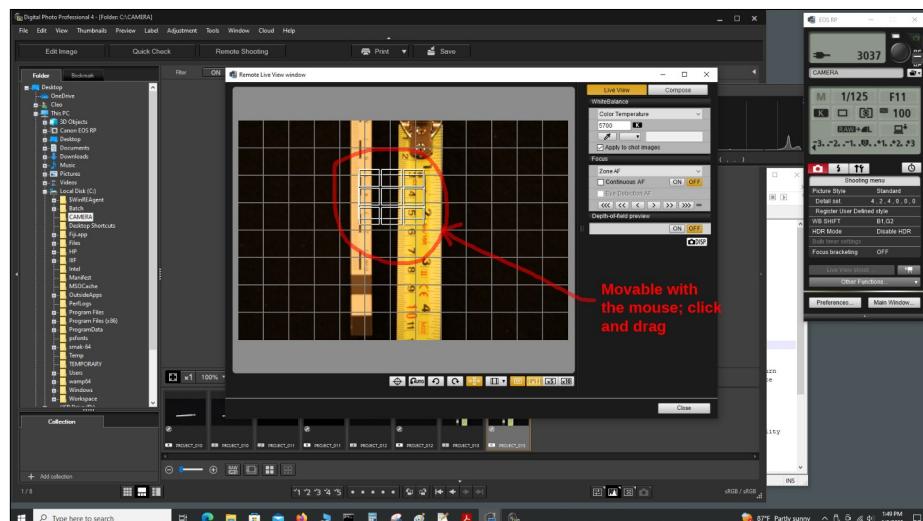
AF Operation AF method

ONE SHOT AF Zone AF

“ONE SHOT AF” sets the camera to perform autofocus on one image at a time, which how manuscript objects are photographed, as opposed to focusing on a moving objects, which happens when photographing sports, wildlife, or other things in motion.

“Zone AF” is one of the settings that determine how many of the camera’s auto-focusing points (AF points) are used to determine where to focus the image. With manuscripts, there is usually enough areas of high contrast (such as writing on a page) across the image to allow the autofocus to “find” something to focus on in most areas. With the older dSLR cameras, the setting was made to enable all the autofocus points available, ensuring that an area of sufficient contrast would fall under at least *one* of these points.

With Zone AF using the Canon RP, a fairly large area of overlapping AF points is enabled for autofocus use. This area of AF points is visible in the viewfinder of the camera and also can be seen while using Live View to compose and focus a picture using DPP. Using Live View on the computer screen, the user can click on the autofocus zone and drag it to wherever works best to achieve focus on the subject matter.



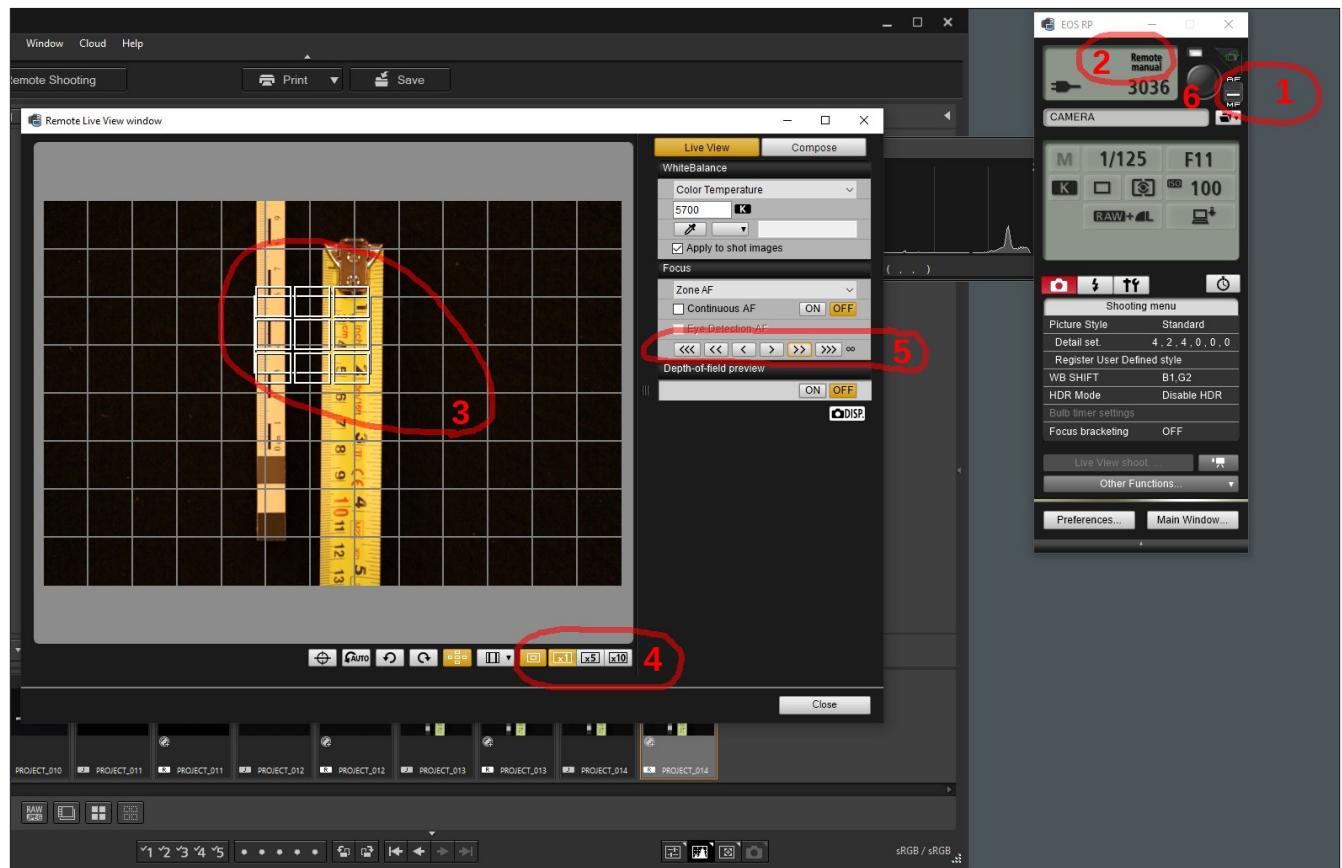
“Zone AF” in Use With Live View. White boxes indicate the cluster of AP points used to set focus. The user can click and drag this zone of AF points to wherever it is needed. Hovering the mouse over the shutter button in the EU control panel will refocus the camera.

Hovering the computer mouse over the shutter button on the EU control panel has the same effect as pressing the shutter button on the camera halfway. When set to autofocus, the camera will focus using the method specified by the user and will “beep” when focus is achieved. This reassures the operator that the camera has successfully focused.

There are times when autofocus won’t work properly. If the subject matter is very dark or has no areas of contrast for the autofocus sensors to detect, the lens may focus in and out (“hunting”) trying to achieve focus. Generally, the cameras are set up so that a picture cannot be taken if focus is not achieved. This is where manual focusing is needed.

In the past, manually focusing the camera meant reaching up to the camera lens and turning the focusing ring, while either looking through the camera’s viewfinder or at the live view display on the computer screen.

This can still be done using the Canon RP. Hovering the mouse cursor over the shutter button on the EU control panel enables the focusing ring on the 50mm STM lens (Make sure the lens is set to “FOCUS” as indicated earlier). The user will hear the electric motors in the lens operate as the ring is turned. Often, when manually focusing in the past, the user would have to awkwardly reach to focus the lens ring while also trying to closely examine the Live View display. With the new system, this is no longer the case.



Remote Manual Focusing Using DPP and EU. 1. Switch to “MF” for manual focusing. 2. “Remote manual” will appear in the control panel. 3. Drag the Zone AF array to the area where you want to set critical focus. 4. Use magnification buttons to enlarge live view if necessary. 5. Arrow buttons electrically focus the lens at chosen speed. 6. Picture is taken by clicking shutter button.

Earlier in the document, the focusing ring on the 50mm STM lens was described as a “fly by wire” system, where the mechanical motion of the ring was translated into the electrical motor action that actually focuses the lens. What this means is that the focusing of the lens can also be done remotely using the DPP software in Live View mode. The user puts the system in manual focus mode by clicking a switch on the EU control panel (a helpful “Remote manual” message appears). Then, a series of buttons with arrow markings can be used to focus the lens in either direction. The markings correspond to the speed of the focusing action as such

- > **Standard focusing speed**
- >> **Faster focusing speed**
- >>> **Fastest focusing speed**

In Live View, there are also magnification buttons that can enlarge the image, allowing hyper-critical focus to be achieved. These capabilities make this system the most convenient ever for manual focusing while using Live View.

Camera Menu Settings for the Canon RP

The Canon RP has an extensive system of menu items, allowing the user to configure the camera in many different ways. For HMML’s work, here are the pertinent menu settings as they appear on the camera’s LED screen during setup.





NOTE: WB Shift/Bkt. Setting and degrees Kelvin will be customized to each studio's lighting situation.





