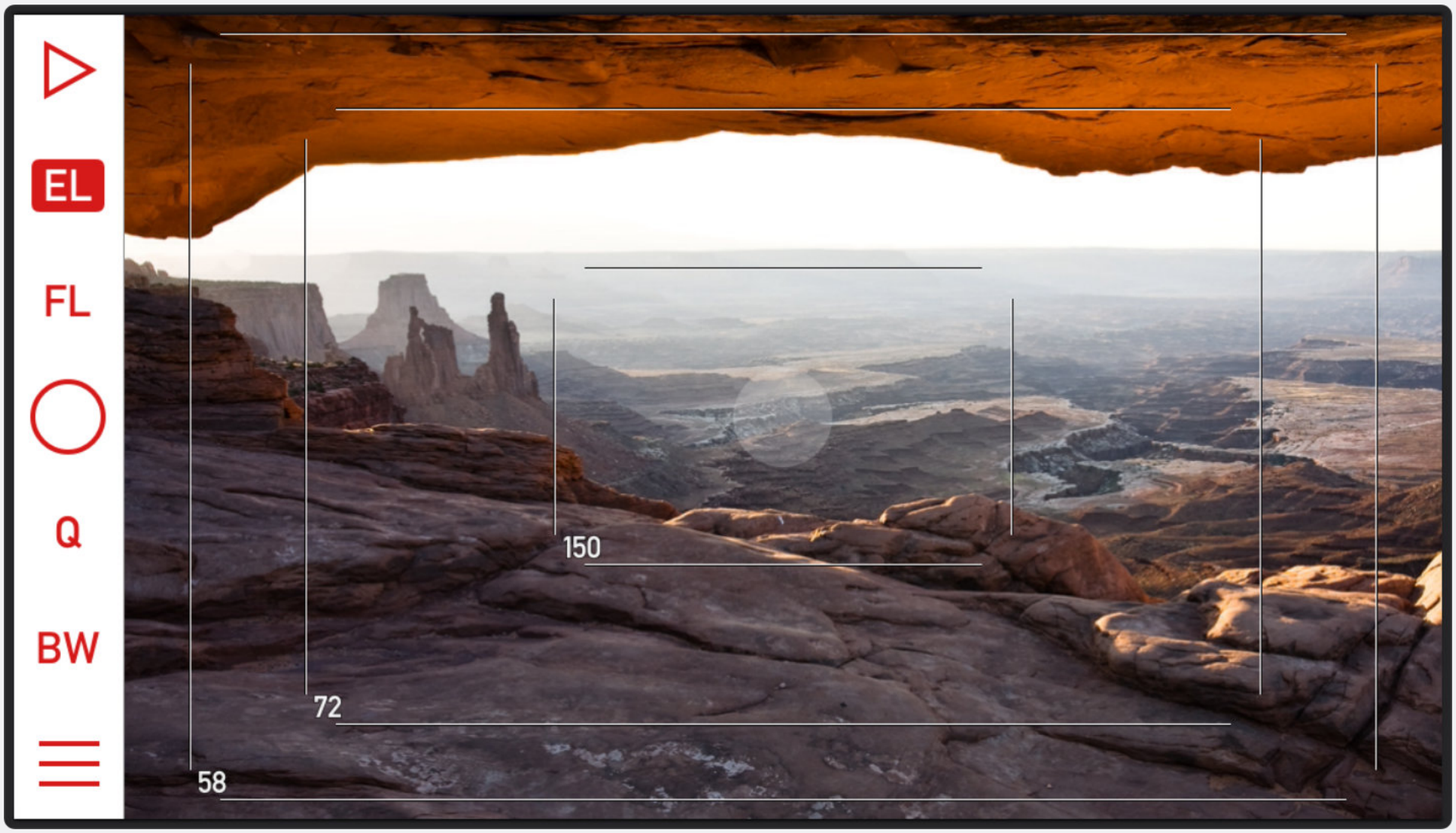
The Artist's

Viewfinder Handbook

2nd Edition



DIRE STUDIO

Laszlo Pusztai

Covers Version 6.8 of the Mark II Artist's Viewfinder and ALPA eFinder II.

Revision X

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Preface

When we started the development of Viewfinder back in 2009 my first and foremost goal was to create an app that users can understand at first startup. This proved to be tough to reach. We spent countless hours debating whether one method to invoke a feature is better than the other. Watched people working with the app to find the hard-to-grasp ideas. During the last two and a half years we also got user feedback – both positive and negative – and now I think that we have a good understanding of where we met my initial goal and where we missed it.

But even with the most easy to access and user friendly features, Viewfinder had grown up and became a complex tool. And as with every professional tool, there are some pretty neat features hiding in the gray areas.

My goal with this book is to explore those gray areas, telling the behind-the-scene stories, explaining why a given feature is implemented that way. But of course, we'll cover all the basics, too.

As the application evolves this book will grow larger and will contain more information. Your feedback is – as always – most welcome! Let me know if I forgot something, if you would like more or better explanation of a feature or idea, or anything that needs improvement in your opinion.

Every project of this size is a team journey. I would like to say a big thank you for each people involved in developing this software. First and foremost to my love, my partner and my boss, Agnes Lorincz for her exceptional support and tolerance during the tough weeks. She's the woman behind the top quality of the software. To André Oldani of ALPA of Switzerland, who helped us in lots of ways. His enthusiasm lifted the product into new heights. And to the several people who shaped the product with their ideas and feedback.

Thank you!

I hope you will enjoy Viewfinder – and this book – as much as I enjoyed creating the app.

Laszlo Pusztai
February 2012.

Preface to the Second Edition

Two years is a very long time in the technology world: everything becomes faster and improves in other ways. Apple's iPhone – especially with iOS 7 – is no exception. I was very excited when iOS 7 became available because its design and look resonates with my style. But the look and feel aren't the only things this operating system update brought: there are tons of under the hood changes. So much in fact, that we had to re-write substantial parts of the application.

This presented an unique opportunity: with a few months of additional work we could rebuild the entire app from scratch and elevate it to a whole new level. With the exception of the camera database, everything is new in the Mark II Artist's Viewfinder. Although we borrowed the mechanics of some tried-and-true elements from the original application (such as how equipment selection is made), most things work in completely different ways.

The Mark II consolidates four years of field experience and user feedback. It takes advantage of modern iPhone hardware and software. And according to early beta tester and early adopter opinions, it is a serious tool brought to a whole new level.

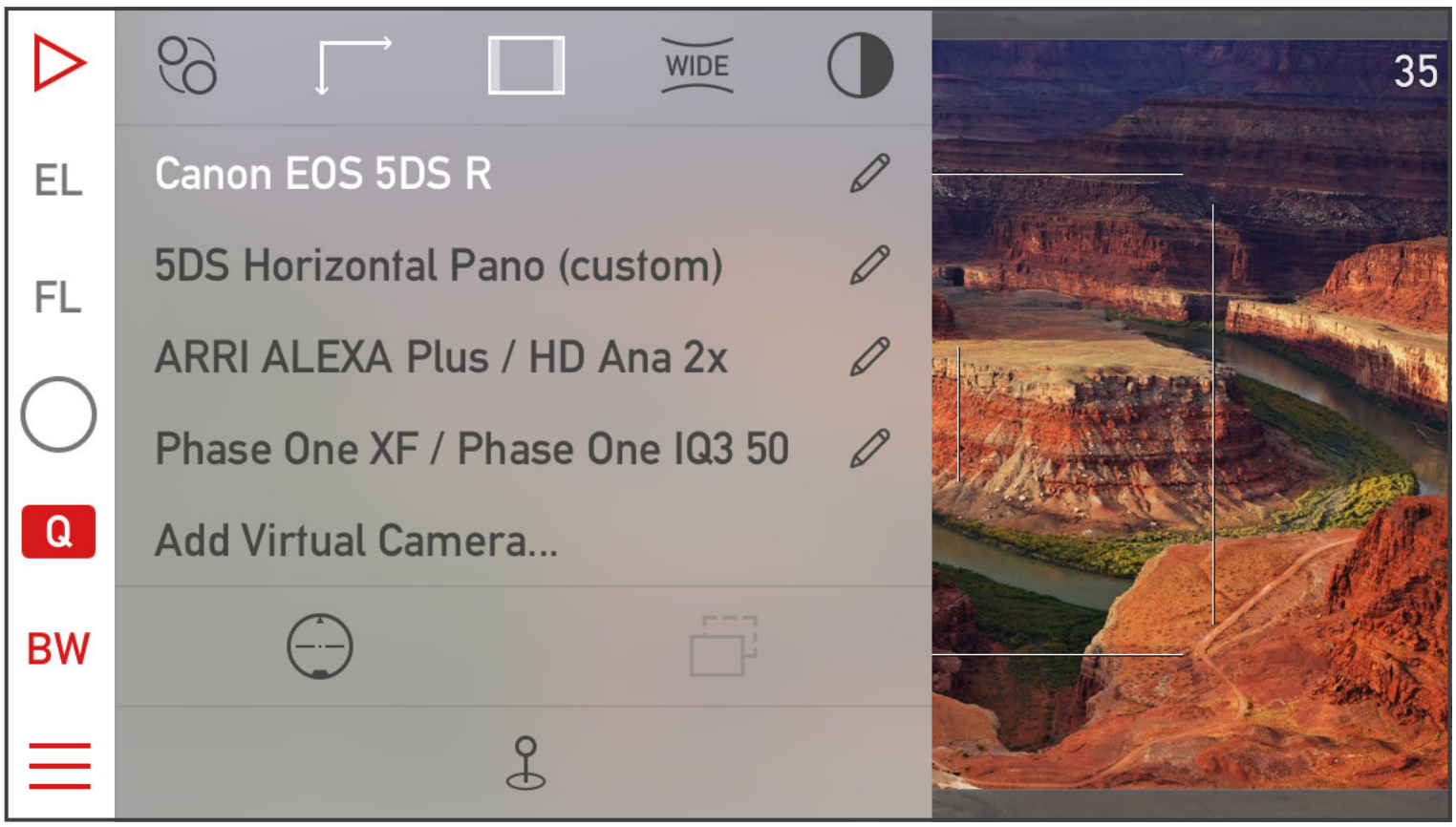
Because of serious conceptual and user interface changes, earlier Viewfinder Basic/Pro/Cine users should also read this book.

I would like to say thank you to the entire team for their high quality work: Anges Lorincz, Bianka Oravecz, André Oldani and Wang Yan.

Steve Combs and Eric Staudenmaier contributed a lot during the public beta. Although not all your ideas made their way into the app yet, thank you guys!

Laszlo Pusztai
February 2014.

Chapter I – Getting Started



What is the Mark II Artist's Viewfinder?

The *Mark II Artist's Viewfinder* – or just *Viewfinder* for short – is a simulator. It can show on your iPhone (or iPod touch or iPad) how a scene would look like using different camera / lens combinations. Motion picture folks call this kind of device a "director's viewfinder" and you can see original "hardware" versions hanging around the neck of your favorite director (unless he or she uses this app, of course).

Several masters teach that it's beneficial to walk the scene with some kind of visualization device before committing your composition to film or sensor. Thus, photographers and painters used cutout cardboards for ages. They even shoot Polaroids just to make sure that a composition is correct. I've used cardboards and compact cameras for my photography and know several people in the motion picture industry who were using DSLRs for these visualization needs.

But there are two important aspects where cardboards and optical director's viewfinders are lacking: the ability to record what you saw for later evaluation and the ability to share that with other people on the team.

Imagine the following two people.

Ansel is a landscape photographer. He works with heavy camera equipment. He likes to plan his work: carefully select the places where to and the times of day when to take his images. During the dead hours of the day he likes to explore the location looking for new compositions. He previously used cardboard finders, then a GPS plus a digital compact camera to record what he saw and where he saw it. Lately he switched to the Viewfinder app that not only fuses together the features the GPS and the compact camera gave him, but he can also simulate – to the highest level of precision possible – the shots his large camera will take.

Steven is an independent motion picture director. He works with a small crew and does lots of stuff himself. Scout locations, manages equipment rental and of course takes his wonderful images. He used to use traditional director's viewfinders but abandoned them because it was a pain to communicate his ideas to other parts of the crew. Trying to hold a viewfinder still while another crew member looks through it is not fun. Cropped sensor DSLRs where a revelation to him, because with their almost Super35 sensor he could estimate what lenses will he need. He switched to Viewfinder because he shoots more and more with anamorphic lenses and needed a device that can simulate those – without losing the flexibility that DSLRs gave him. He also developed a new habit: instead of jotting down the equipment required for a shoot he just emails the images recorded with Viewfinder – showing the exact equipment he'll need for the real shoot.

As you can see from the above examples, the Viewfinder app goes far beyond the abilities of the devices used to do similar things in the past.

There are lots of creative ways to use the app. Take ALPA for example. They manufacture the finest technical cameras money can buy. But they are also incredibly simple: the body is just attaches the lens to the recording medium. No mirror box, just an external viewfinder - that used to be optical. With a mount called iPhone Holder one can replace that external viewfinder with the app. The holder is so good that I'm even using it on my Canon 5DS R to compose stitched shots!

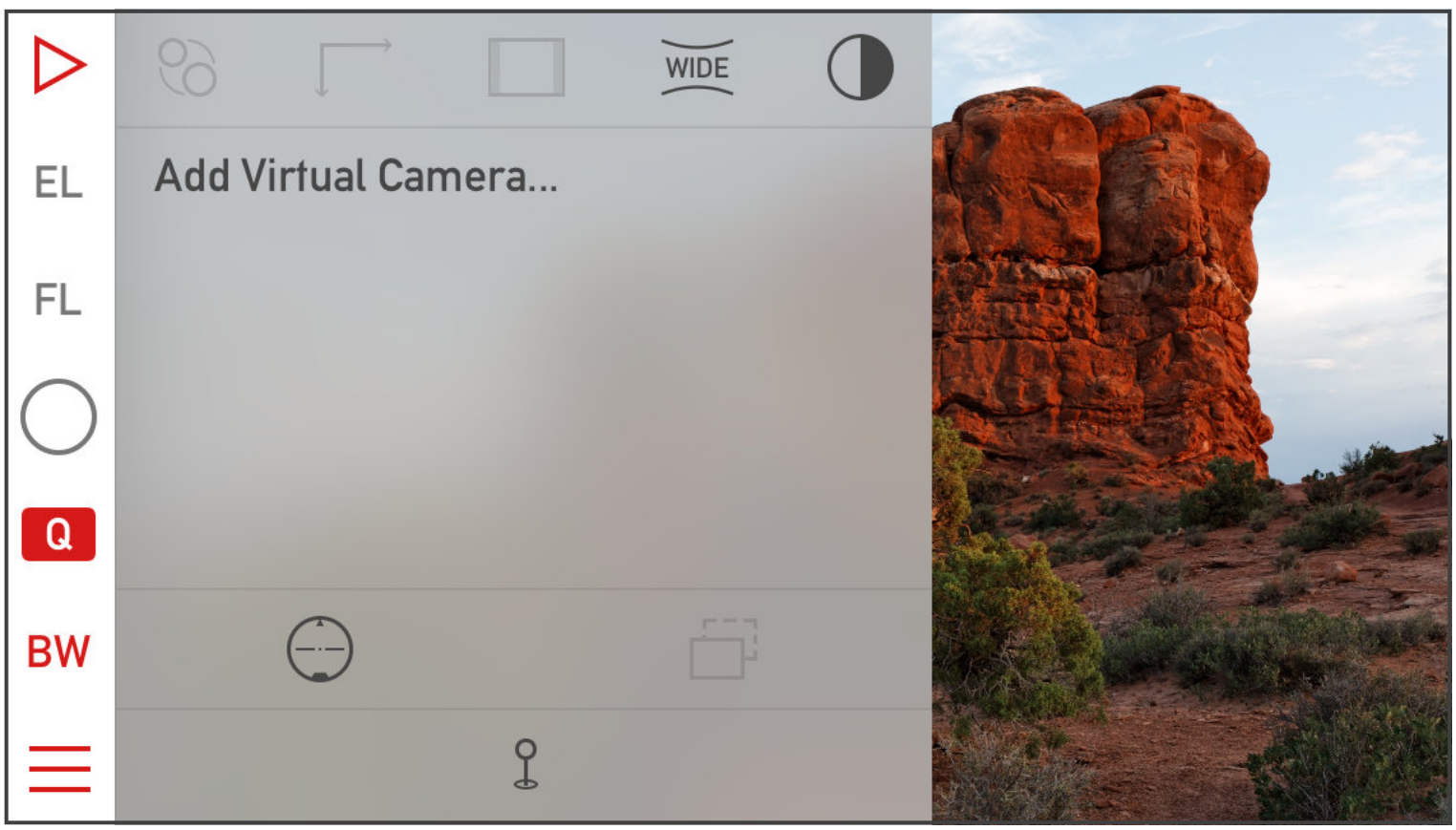
Speaking of ALPA – we make and sell a special version of the app for them, called *ALPA eFinder II*. It only supports ALPA cameras and their wide converter by default, but can be extended (with an in-app purchase) to be totally identical to the Mark II.

Viewfinder requires an iOS device with a built-in camera and iOS 12. The current list of supported devices is available at: https://www.artistsviewfinder.com/tech-specs.

It is a universal app: it supports both iPhones and iPads in their native resolutions. This way you can take advantage of the larger iPad screens.

Starting the App for the First Time

You'll see the screen shown below when you start Viewfinder for the first time.



On the left is the *Toolbar*, and the large gray area is the *Quick Control Screen*. The latter is the home of several shortcut keys as well as the starting point for creating and selecting *virtual cameras*.

> *The default toolbar theme is the dark and neutral one. Most images in this book show the other, formerly default theme, which is red on white.*

The virtual camera is a central concept in the app. It contains all the information needed to simulate a camera setup: the camera body, an optional back for medium- and large format cameras, the focal lengths and a few other options.

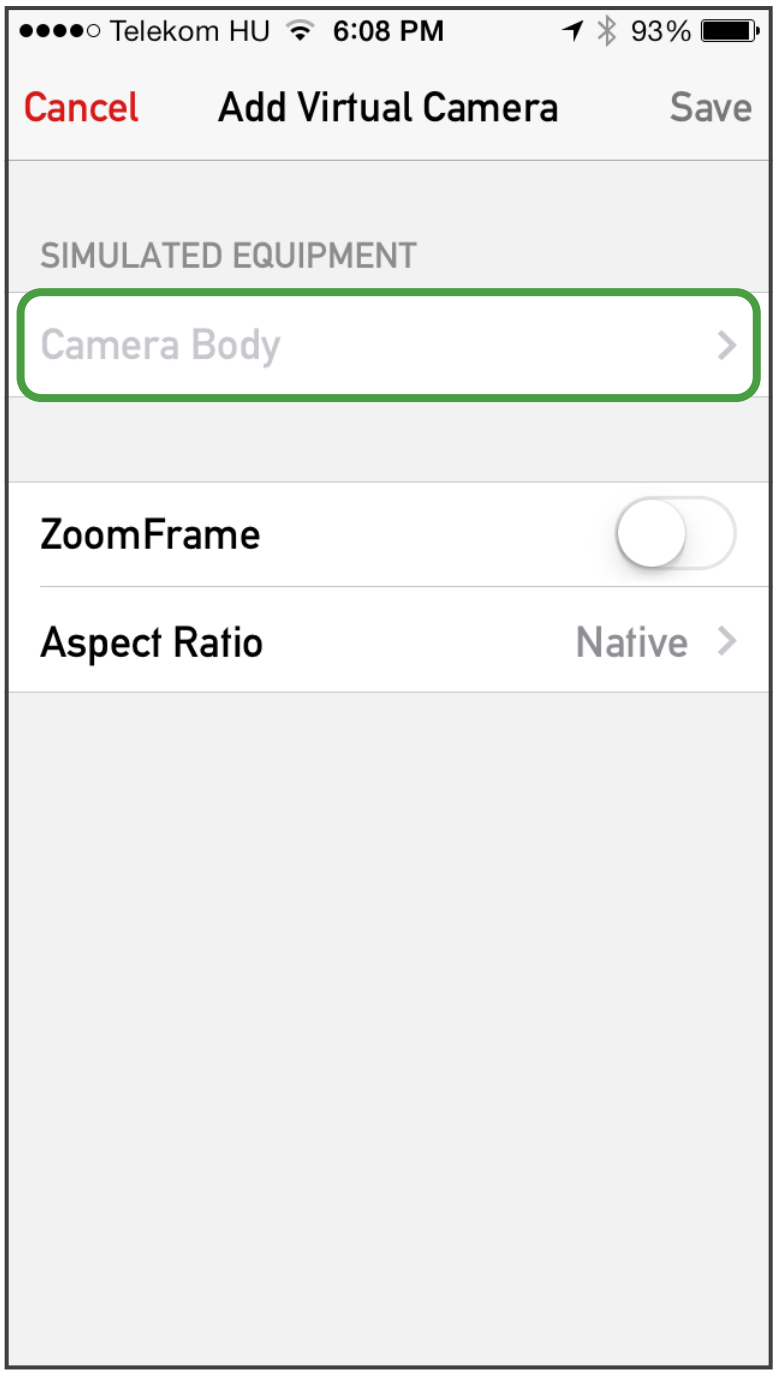
Many of the app's functions are unavailable until you have at least one virtual camera, so we'll begin with creating one. In the next section I'll walk you through a simple virtual camera setup procedure for a contemporary DSLR, but this book contains a few other examples – *Cases Studies*. I recommend you to first go through the first simple case study to understand the basics, then the one(s) relevant to your work. Some of them contain hidden treasures: tips and tricks you can benefit from not just in that given case, so I think it's worth to read them all.

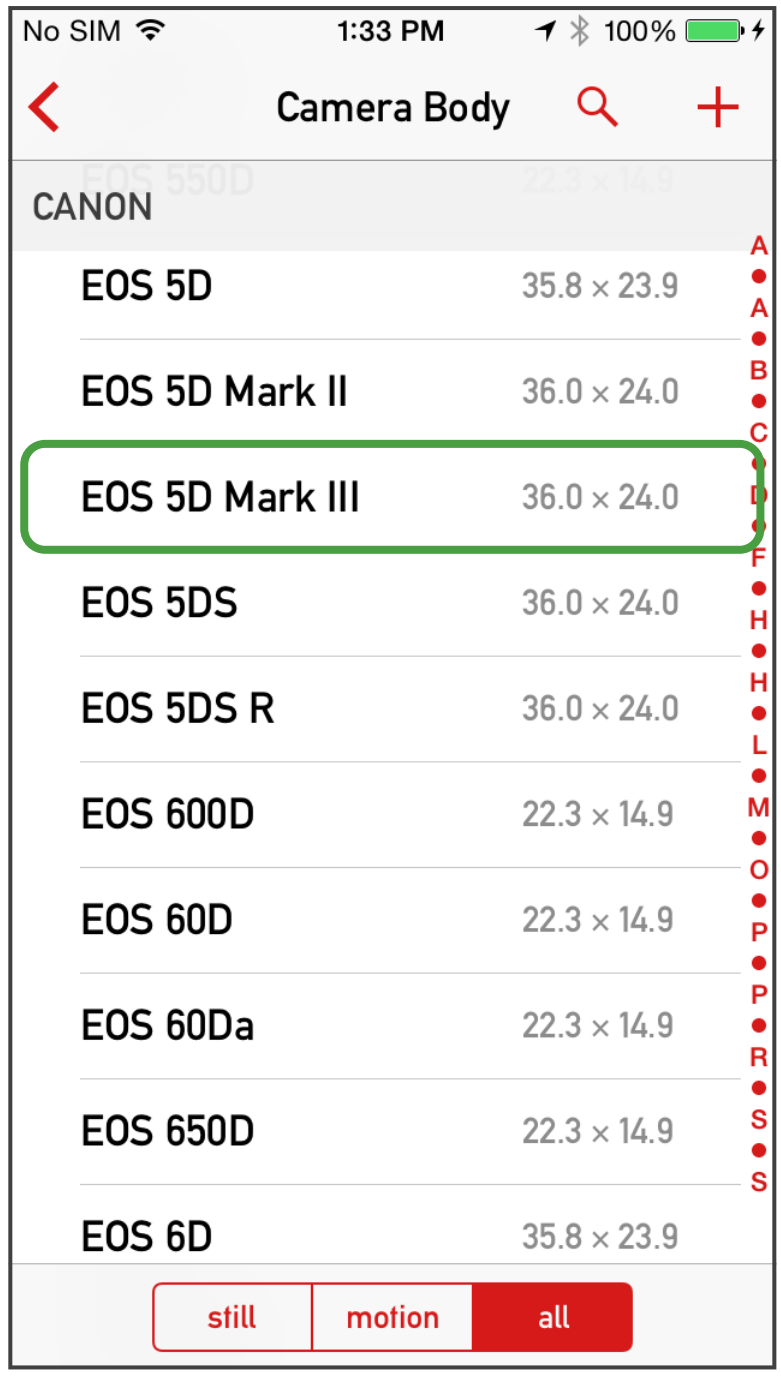
I encourage you to try on your device what I'm talking about as we proceed – it's just way easier to remember things that you did than those that you just read.

Case Study: 35mm DSLR System

Suppose we have a Canon EOS 5D Mark III camera with the following lenses: 24m, 35mm, 50mm and 300mm fixed focal length lenses and a 70-200mm zoom. To create a new virtual camera, just tap **Add Virtual Camera…** on the Quick Control Screen. Existing virtual cameras can be modified by tapping the pencil (edit) symbol on the right side of their corresponding line.

When the *Add Virtual Camera* screen appears, our first task is to choose the camera body we have. Some options (such as lens selection) are hidden until a camera body is selected. Tapping **Camera Body** will open the selection screen you see on the right.



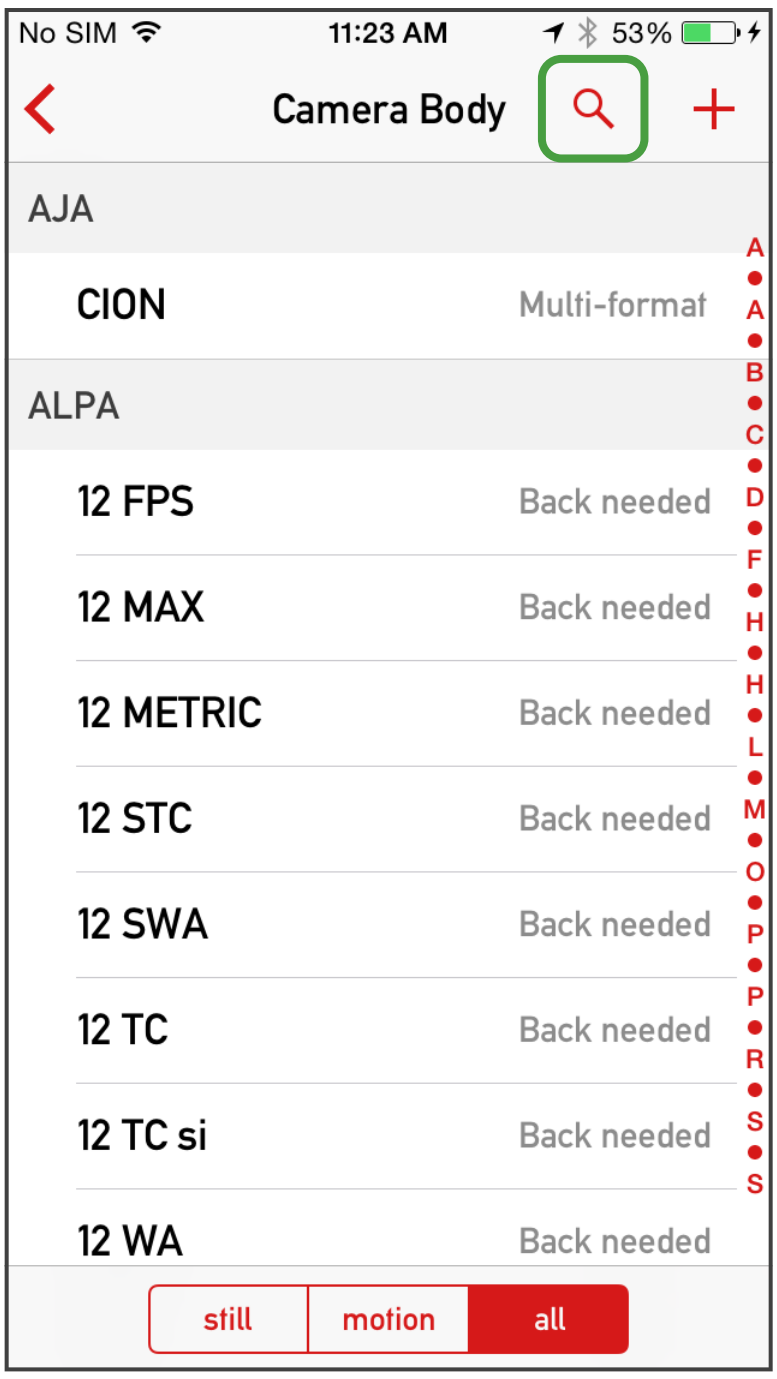


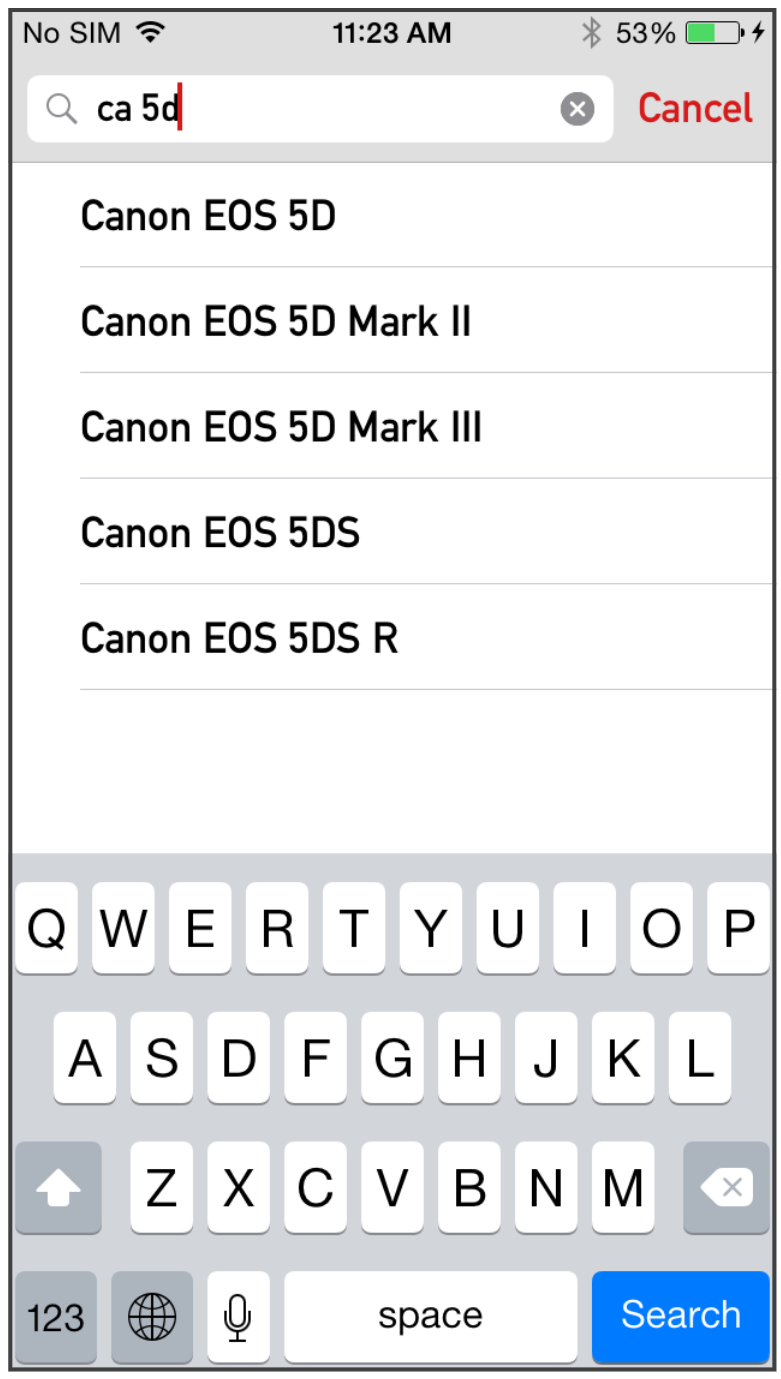
Camera bodies are grouped by manufacturer, and the alphabetical index on the right side of the screen could be used to quickly jump to a given manufacturer (whose name starts with the letter shown).

You can also filter the entire list by still and video (motion picture) recording capabilities. The option **still** lists all those camera bodies that have still picture taking ability and **motion** filters the list for just those that can record at least HD video.

We have well over 700 different cameras to choose from for your virtual camera setup. So finding your camera could be a daunting task. That's why we have full text searching capability.

To begin searching, tap the magnifying glass icon at the top of the **Camera Body** screen. Then just type the first few characters of your camera's manufacturer and/or model name or number, and Viewfinder will present a list of matching names. Simple as that.



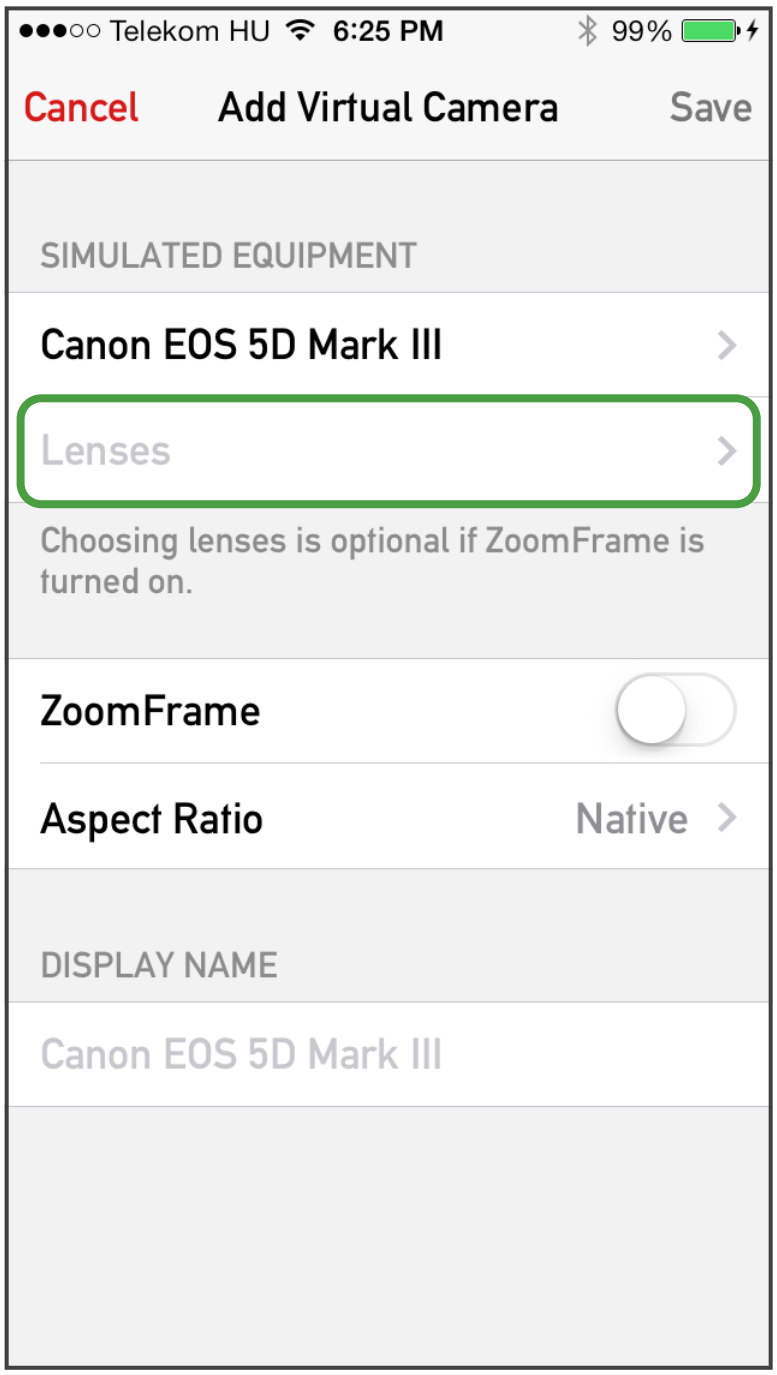


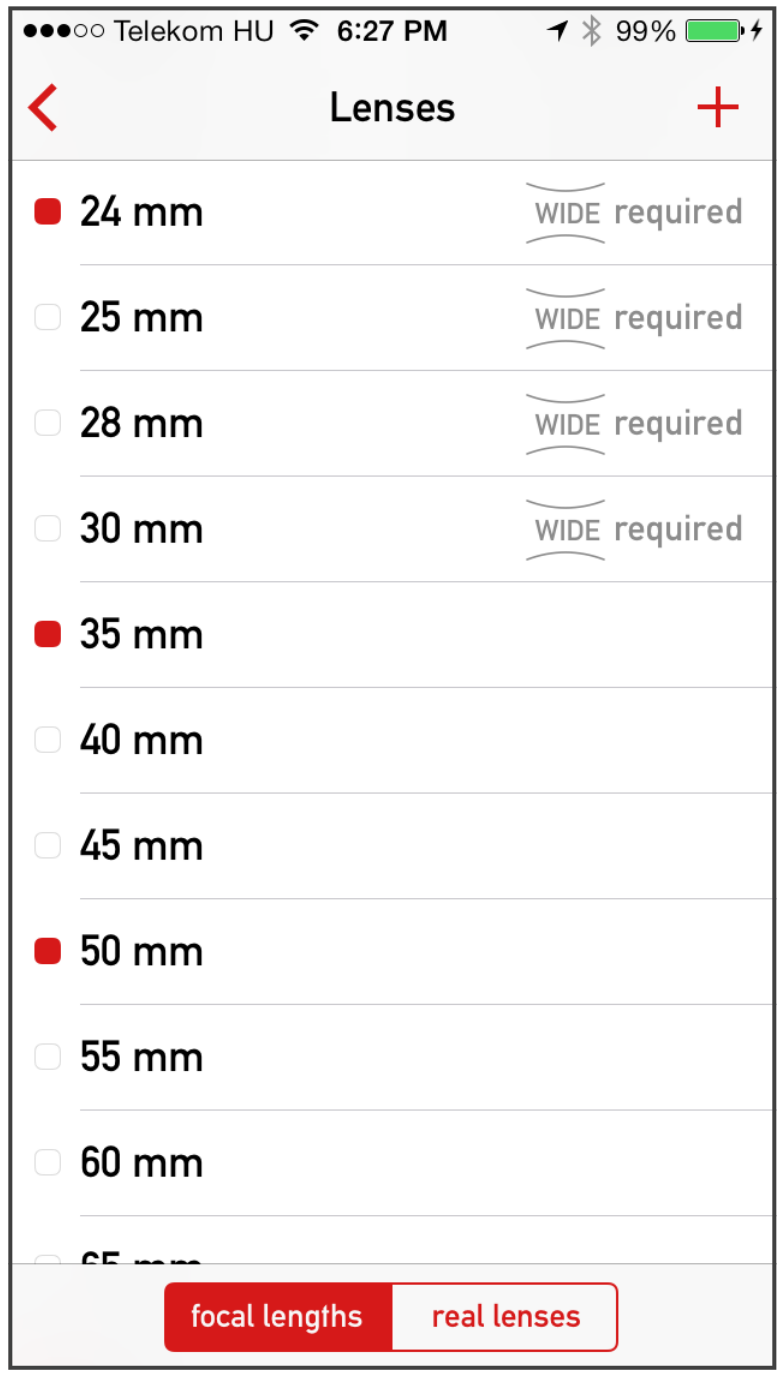
The app looks for words in camera names beginning with what you type. So for example typing "d71" will find the Nikon D7100, while typing "71" will not.

You can also type multiple words like "ca 5d" or use a single one such as "5d". If you specify more the result list will be shorter.

In ALPA eFinder II camera search is only available if you had purchased the Camera Pack.

Tapping our camera's entry will select it and immediately bring back the *Add Virtual Camera* screen. As you can see a few things appeared here after we have selected the camera. First of all we can now choose what kind of lenses we have. Go and select them now – we'll examine other parts of the screen after choosing the lenses.

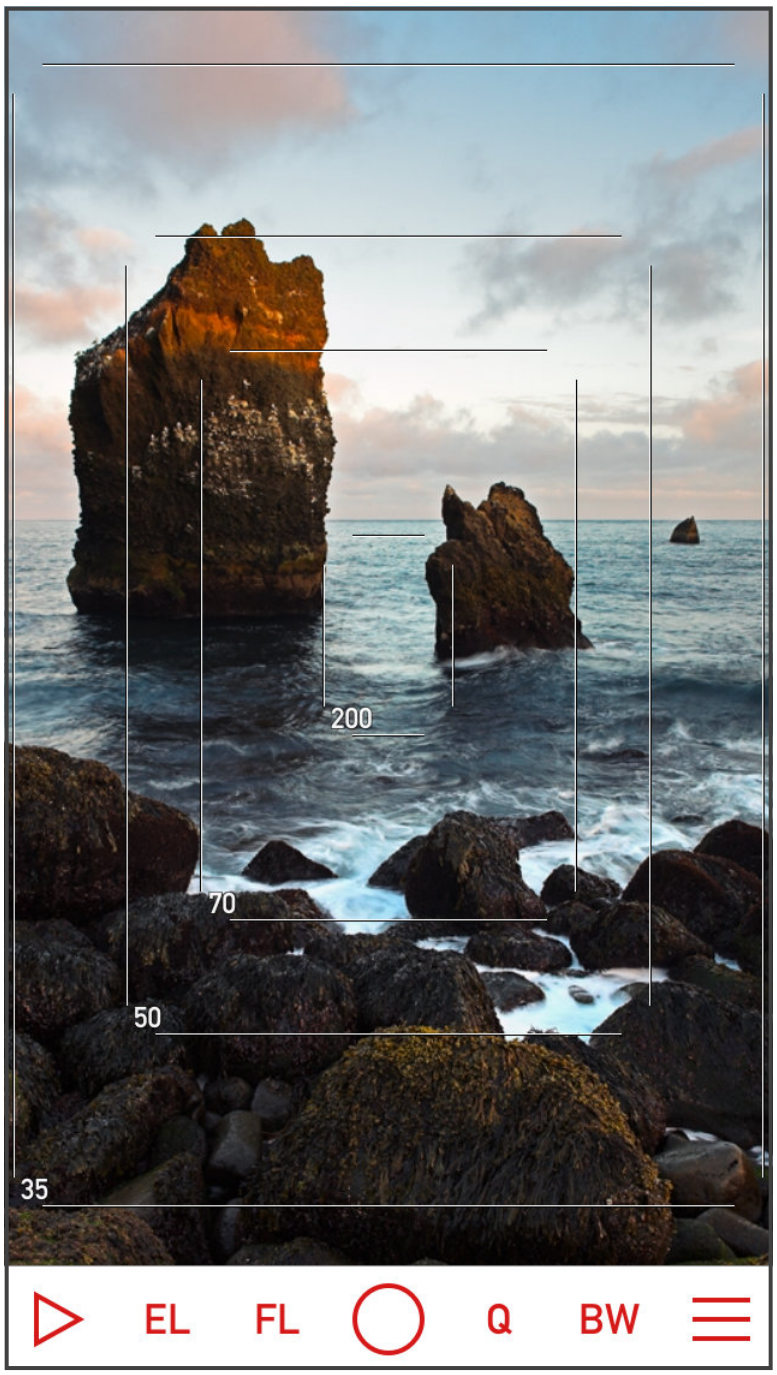




Here we select the focal lengths corresponding to our three fix focal length lenses and the both ends of the zoom. In case of zooms this is usually what I do and then fine tune the framing using *ZoomFrame*. Note that you can select multiple focal lengths here. Screens that allow just a single item to be selected will immediately close after tapping on that item. The lens list is a multi-select one, so you have to explicitly tap the back button to go back to the previous screen.

The most important thing on the *Lenses* screen is the badge below 35mm saying "WIDE required" – indicating that you will need a wide converter to simulate that focal length. To see what that means let's check how the virtual camera looks like now. Return to the *Add Virtual Camera* screen and tap the **Save** button in the upper right corner. This will bring you back to the main screen, and if you are running on an iPhone 5s you'll see something similar to the image below.

A system message might appear overlaid asking your permission to allow using your location in the app – if you don't allow it all GPS related functionality will be disabled in Viewfinder until you re-enable location services in Settings.



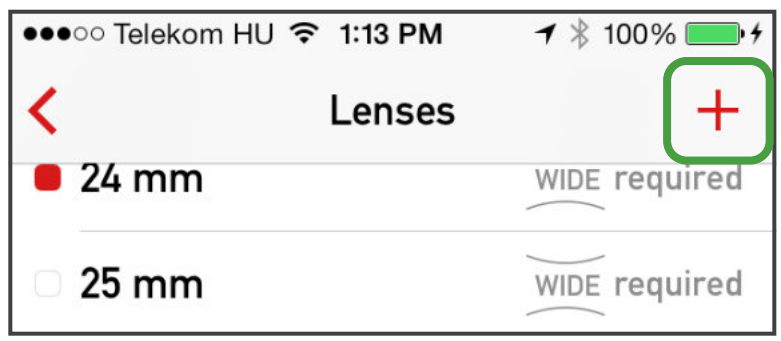
Of course you will not see the same scenery, but what your iPhone's or iPod's camera points to, with overlaid frame lines. I must also tell you that the majority of the illustration images in this book are simulated – simply because I didn't want to show you images of my keyboard.

Find the outermost frame line. This corresponds to the angle of view of a 35mm lens on a full frame 35mm DSLR. Had you selected the 30mm lens, its frame line would lay outside of the image the iPhone can record. Also note that there are aspect ratio differences between the iPhone camera's image, the displayed viewport and the simulated camera's sensor – more on this in the section about zooming. Actually an iPhone 5s can simulate a 31mm lens on a full frame 35mm DSLR. Newer models can do a bit better: it's 30mm on an iPhone 7 Plus.

30-31mm isn't that wide when speaking about landscape photographs. The app have a way of solving this and allowing to simulate wider lenses utilizing external wide angle converter hardware – that will make your iPhone see wider. The badge on the lens list shows you when a wide angle converter is needed to successfully simulate that focal length on your device.

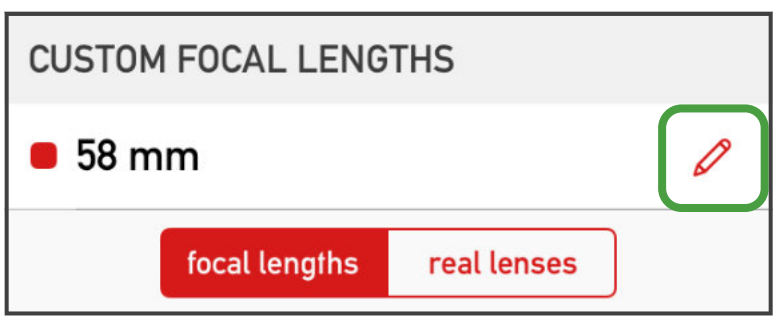
Now let's go back to the *Lenses* screen. Open the *Quick Control Screen* by tapping the **Q** button on the toolbar; tap the pencil (edit) symbol on the right side of the Canon EOS 5D Mark III entry; then tap the list of lenses to return to the *Lenses* screen.

Suppose we have a 58mm lens, which is not on the focal length list by default. What can we do? Define a custom focal length for it! This is one of the several customization features of Viewfinder. I'll discuss the rest in Chapter II.



You can add up to 20 custom focal lengths per camera by tapping the + button in the upper right corner of the screen. This will open a new section, titled Custom Focal Lengths, when you do it for the first time.

You can edit the new custom focal length in-place – entering the focal length in either millimeters or inches. Switching between them will automatically convert any already entered value. Note that even if you enter the focal length in inches it will be displayed in millimeters in other parts of the application! The longest focal length you can create is 2000mm.



Just press *return* on the keyboard when you finished entering the custom focal length. Your new focal length is now ready to use and is selected by default.

You can select and deselect the custom focal length as you would do with predefined ones. To modify an existing custom focal length just tap the pencil (edit) symbol and enter the new value. To delete a custom focal length enter a 0 value or delete the digits completely and press *return*.

The last thing to note on the *Lenses* screen is on the toolbar. Until this point we have specified lenses by focal length. In case of some cameras another option is available, called *Real Lenses*. I'll elaborate on the issue of tolerances in focal length specification towards the end of this chapter and will show how real lenses work in the medium format digital case study.

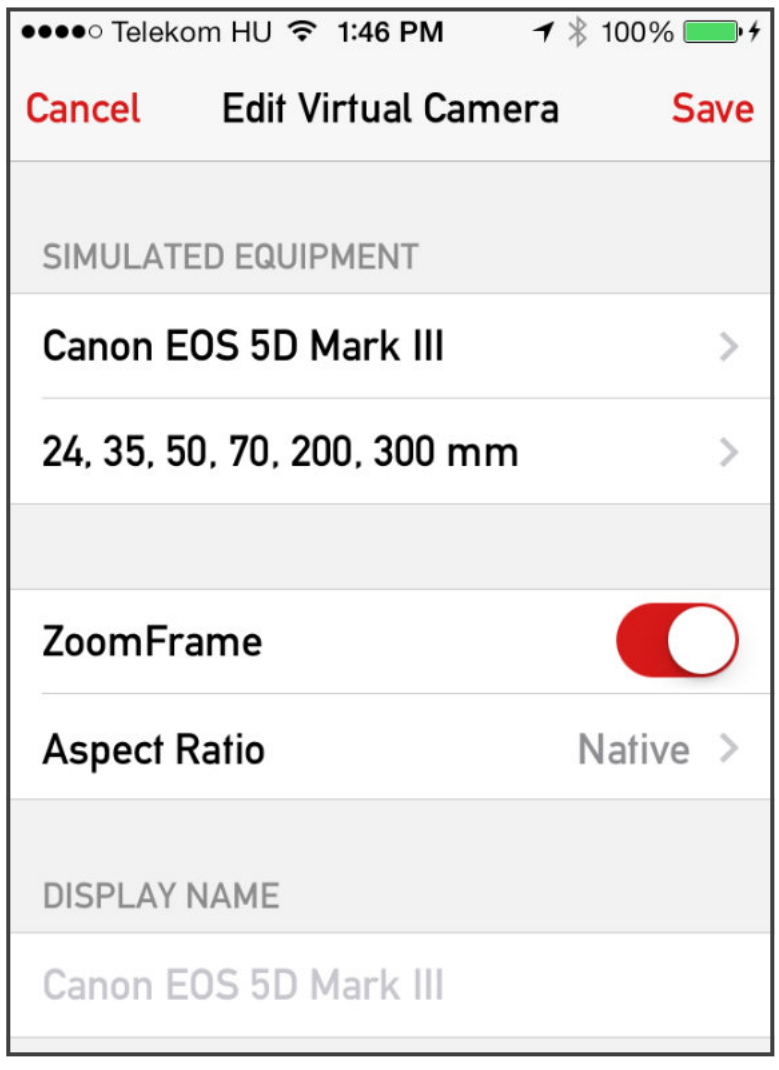
Let's go back to the *Edit Virtual Camera* screen and discuss the remaining options! The first one is a switch that can enable something called *ZoomFrame*. As you saw on the previous page Viewfinder shows frame lines for each focal length it simulates. This is good for fixed focal length lenses, but what about zooms? Of course you could set every well known focal length "stop" on the lens, for example 70, 100, 135 and 200 millimeters on a 70-200 zoom, but this is both inconvenient and results in a cluttered main screen. This is why we created the *ZoomFrame* instrument.

It consists of two parts. First is a shaded area which marks the edges of the simulated camera's sensor. On the image above you can see the gray areas outside the simulated sensor's 3:2 aspect ratio. The other part is number in the upper right corner – which shows the focal length for the actual angle of view. You can grab the image with two fingers and zoom it in and out – as you would do with pictures in the Photos app. The number in the upper right corner will change representing the current equivalent focal length.

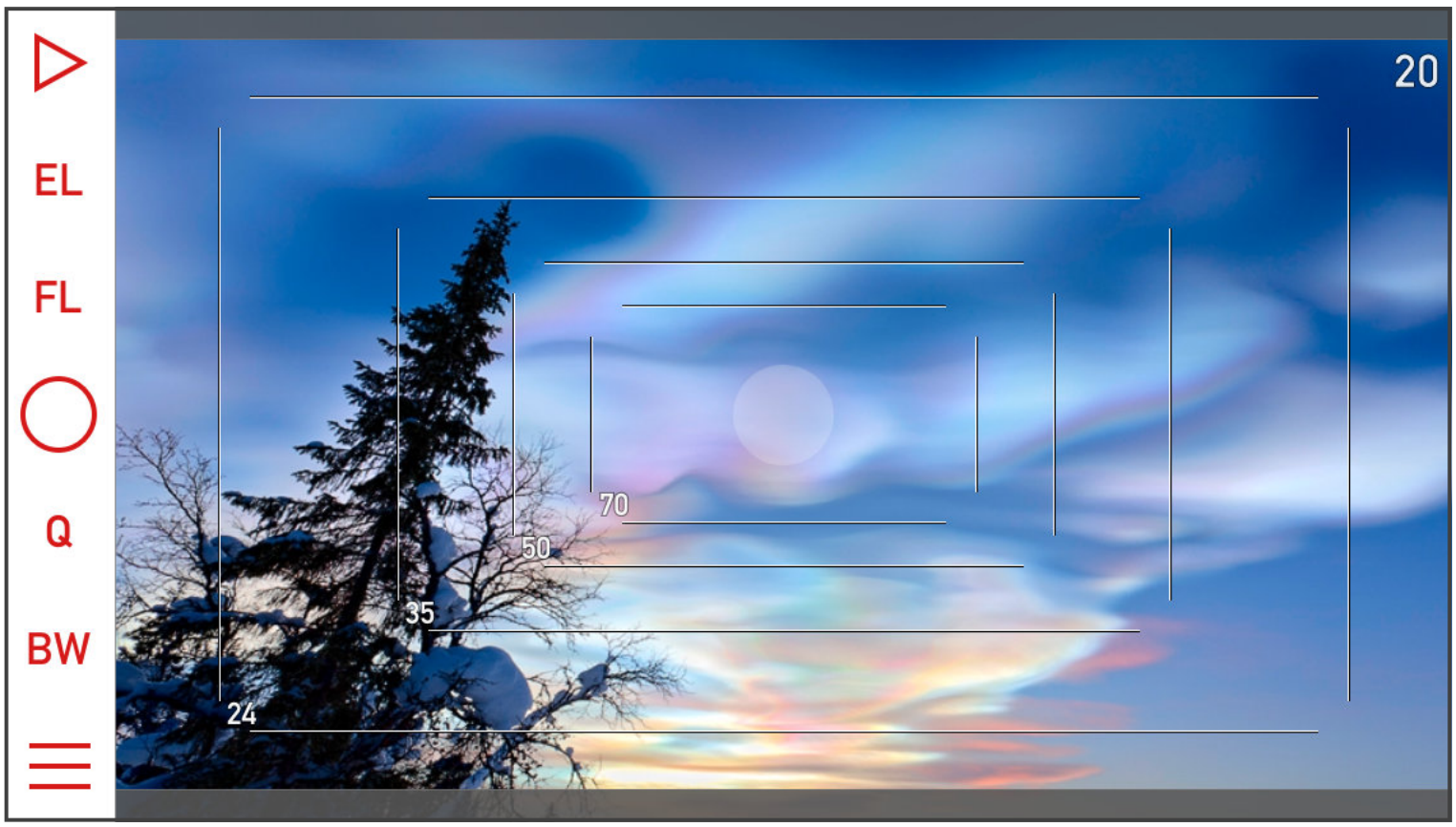
Note that *ZoomFrame* can be used in conjunction with frame lines as well as a standalone tool (the former is shows in the image above).

This is what I do when simulating both fixed focal length and zoom lenses: set all the lens focal lengths corresponding to the fixed focal lenses plus the ends of the zooms. In case of our example that would be 35, 50, 70, 200 and 300 mm. And then turn on *ZoomFrame*. This way I can see whether the 70-200 zoom will be needed for the given composition, and read the actual focal length from the *ZoomFrame* instrument's number.

With the next option you can change the simulated camera's aspect ratio.



Setting an aspect ratio is equivalent to cropping the image to that aspect. For example the illustration below shows the 16:9 aspect ratio used for HD movie recording. If you compare the frame lines to the previous image you'll see the difference.



Note that *ZoomFrame* and its displayed value also changed because the image now occupies a larger part of the screen.

Setting the *Native* aspect will set the aspect ratio back to the given camera system's default (3:2 in this case). Aspect ratios are stored per virtual camera – which means you can have different aspect ratios active for each of your virtual cameras.

With the last option on the *Edit Virtual Camera* screen you can set the name displayed on the *Quick Control Screen*. This is self-explanatory, but I would like to highlight just one thing: entering an empty display name will reset it to the factory default setting.

Delete Virtual Camera will remove the edited virtual camera from the *Quick Control Screen*'s list. Newly added virtual cameras can't be deleted – you should simply press the **Cancel** button to discard them.

There's an occasion when you will lose parts of your already established virtual camera settings: changing the camera body will reset the lens selection as well as it will reset the display name. We do this to avoid mismatches between the new camera body and the old lens selection (which could belong to an entirely different format or lens mount).

OK, we have now everything set up, so hit **Save**, which will show the main screen – assuming that you have done everything correctly. In case you forgot something (such as

adding lenses) the **Save** button will remain grayed out. We'll explore the main screen right in the next section.

The Main Screen

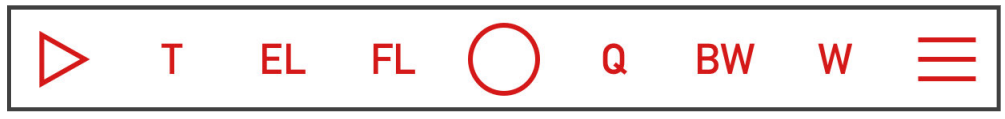
First a note on device orientation. If you created the configuration following the previous case study and happened to rotate the device you might have noticed that the app's user interface rotates to that new orientation. There are two exceptions from this. The first one is the *Quick Control Screen*: it locks the user interface's orientation while it is displayed. I'll discuss the other exception in Chapter V.

The central viewing area on the main screen is called the *view*. Sometimes referred to as the *current view*. Remember this name, as it will be important in later discussions.

The various numbered controls are the following:

1. **Play button.** Opens the catalog, which will be discussed in Chapter III.
2. **Exposure Lock button.** Locks/unlocks the view's exposure.
3. **Focus Lock button.** Locks/unlocks focus.
4. **Shutter Release button.** Saves the current view into the catalog.
5. **Quick Control Screen button.** Opens/closes the *Quick Control Screen*.

6. **Fn Key.** Executes the user-assigned function (which is *Toggle Black & White Mode* by default). Devices with 5.5" and larger screens have two additional Fn Keys. On the iPhone X these additional keys are located in the "horns" next to the sensor notch, on Plus sized phones and iPads they are in the toolbar. Below is the Fn Key assignment I use on my iPhone 7 Plus.



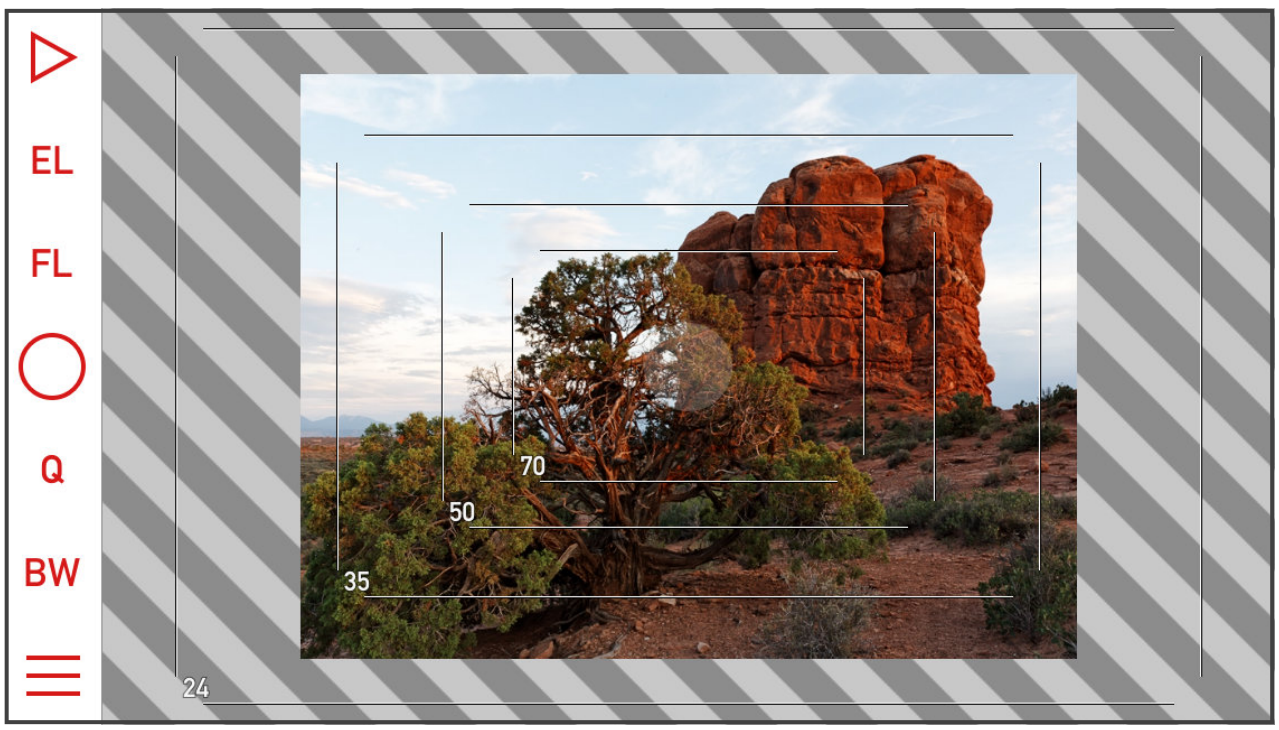
7. **Menu button.** Opens the app's menu. Discussed in Chapter II.

8. **AF/AE Point indicator.** The translucent white circle indicates the point where auto-focus and auto-exposure operates.

Note that the 300mm line is not visible. You have to zoom in to make longer focal lengths visible – so let's discuss zooming first!

Zooming

Zooming in and out on the main screen works exactly the same way you zoom in the Photos app. Pinch to zoom in up to 10x to see how longer focal lengths will look or zoom out to 0.6x to see what focal lengths are just outside of the iPhone camera's capabilities. There is a "detent" at the 1x zoom level.



If you zoom out from the 1x zoom level, Viewfinder will mark the area surrounding the device's camera image with a gray striped background. In many cases it can be useful to see what focal lengths lie barely outside of the view.

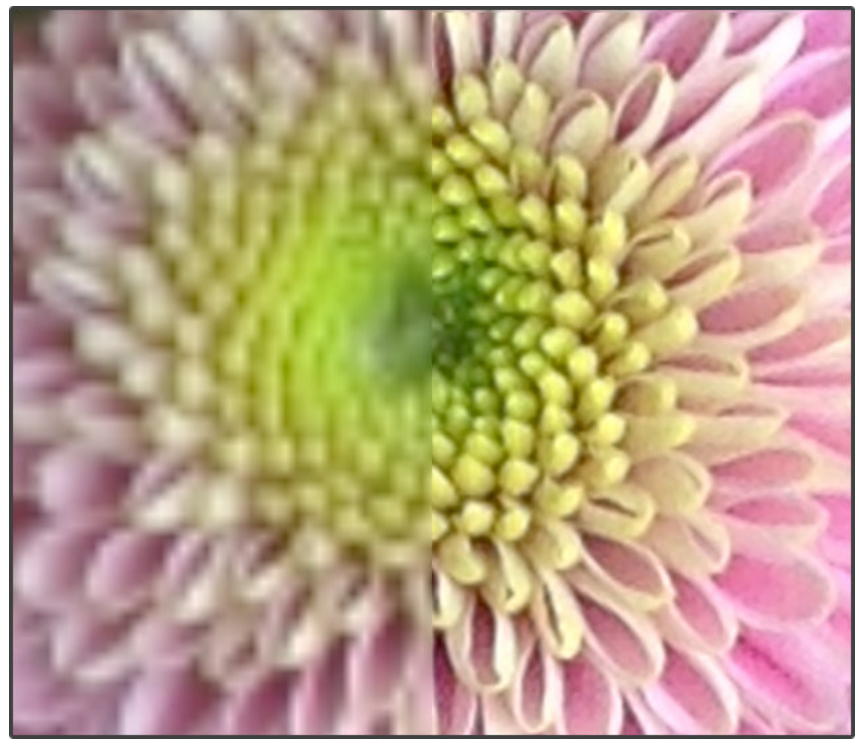
The above illustration also shows how the different aspect ratios of the iPhone's camera and screen are handled in the app. The iPhone's camera records in the 4:3 aspect ratio, so the live view part of the main screen is always in 4:3. Zoom level is at 1x when the live view occupies the entire width of the view area – with its top and bottom laying

outside. As you zoom out, these parts will become visible, but striped bars will be displayed on the left and right sides.

This is a change from the original Viewfinder where at 1x zoom level the entire live view was visible – along with the striped bars.

Note that on iPads the view area is almost 4:3, but it's still a tiny bit wider, so the above discussion holds true.

Zooming in simply magnified the device's limited resolution live view stream in the old Viewfinder. The Mark II utilizes iOS' ability capture the live view stream from a smaller area of the phone's sensor.



So instead of interpolating we now have real pixel data. The difference is huge.

The left side of the image on the right shows how a 10x zoom looked in the original app. The right side shows how it looks in the Mark II.

When you take a picture (save a view in
Viewfinder parlance), it is captured at the device's maximum usable resolution.

> ***Note:*** *High quality zooming is not available when RAW capture is enabled (either for storing DNGs in views or for export). This is an iOS limitation. Zooming will revert to the old method in this case.*

Frame Mask and Highlighting

Double tapping inside any of the frame lines will activate the frame mask, a cut out cardboard finder simulation by dimming the frame's surroundings.

Double tap in any other frame to set that as the current "hole".

Triple tap inside any frame to highlight that frame — other frames will turn into dotted lines. Highlighting is a great tool to document your preferred lens choice for a given scene, while leaving other options visible (if you save that view, of course).

The mask and the highlight are mutually exclusive, that is, highlighting a frame will turn the mask off, and vice versa. A long swipe across the screen in any direction will turn off both the mask and highlighting.

You can also switch the double and triple tap actions in the menu.

One of my favorite features is the ability to hide inactive frames. To grasp how it works the concept of the active frame needs to be understood. An active frame is the one you set as the masked or highlighted frame. So hiding inactive frames will hide every frame except the currently masked or highlighted one. This is good for reducing screen clutter in case you already indicated your interest in a specific focal length by masking or highlighting it. When you clear the mask or highlight, all hidden frames are displayed again.

Inactive frame hiding can be made the default behavior in the menu. Or you can hide and show inactive frames as needed by tapping the main screen with two fingers held close together.

Once *Zoom to Active Frame* is turned on in the menu, double or triple tapping a frame will not just set the mask or highlight, but will also zoom to the active frame so that it fits the screen (that is, the whole active frame becomes visible, at the largest possible size where the whole frame is on the screen). Clearing the mask or highlight will change the zoom level back to where it was before activating the frame (the original zoom level). There are a few things to keep in mind, though.

If the active frame is too small (it would need a higher zoom level than the maximum possible) or too large (smaller zoom level than possible), then it may not fit the whole screen. This may happen with long telephoto or ultra wide lenses.

Viewfinder forgets the original zoom level (and will not revert to it when the mask or highlight is cleared) if you:

- manually change the zoom level after the app zoomed into the active frame;
- switch between the wide and tele cameras on the phone; or
- toggle *Wide Mode*.

When you activate another frame while still in a previously activated one, the display will change to reflect your new activation. The original zoom level will not change in this case, so clearing the active frame will bring you back to the zoom level used before the first frame activation.

Auto-Focus and Auto-Exposure

iPhones support AF and AE in the Camera app by tapping a screen; but AF and AE are glued together there. In Viewfinder you can separately control focus and exposure, just like with regular cameras. This makes it much easier to cope with difficult lighting conditions, for example when you zoom in to a darker portion of the scene.

There are four controls contributing to this functionality: the *AF/AE Point* indicator, exposure compensation and the locks.

When unlocked, both AF and AE are executed for the point indicated by the translucent white indicator circle. You can tap the screen anywhere to relocate this point. This is a change from the old Viewfinder, where you had to double-tap to execute focusing.

The position of the *AF/AE Point* is reset to the center of the screen each time you leave and re-enter the app, or when you switch between cameras on dual camera devices.

The *AF/AE Point* does not move out of the view area – it will stop at the edges when you zoom in.

Auto-focusing is continuous by default, meaning that the app tries to re-acquire focus every time defocus is detected. This can be changed to single-shot focusing in the menu (described in detail in the next chapter). In single-shot focusing mode AF is executed when you tap the screen, or when you press the FL button (whose label changes to AF in this case). Regardless of the mode, focus is confirmed by a red flash of the *AF/AE Point* indicator, and by an optional beep that you can turn on in the menu.

Exposure – when not locked – is always taking measurements continuously. It can be also tied together with white balance with a menu setting controlling whether WB is also locked if you lock exposure (this isn't the case by default). Our protective metering algorithm tries to avoid over- and underexposure at the *AF/AE Point*.

Auto-exposure calculation can be influenced by the *Auto ISO* parameters set in the menu.

Exposure and focus can be locked with the *EL* and *FL* toolbar buttons, respectively. The *AF/AE Point* can be moved while locks are active, but the changed position will take effect only after the lock has been turned off.

Lock buttons are toggle switches: tap once to lock and tap again to unlock.

An active lock is indicated by red highlight – the illustration above showing an active exposure lock.

You can also set exposure compensation in 1/3 stop increments. Simply tap and hold the main screen, and a number (initially 0) will appear next to the *AF/AE Point*. Slide your finger slowly up to increase compensation and slide slowly down to decrease it.

Once you release the screen, the current value will be dimmed.

While you can reset compensation with swiping until the value reaches 0, there's a faster method: tap and hold the main screen with a single finger for a second. You'll hear a beep, and compensation will be reset to zero.

Compensation works regardless of whether the exposure lock is active or not.

Black & White Mode

This special viewing mode works by showing luminance information from the scene (just like when you convert to *Lab* in Photoshop and turn off the a and b channels leaving just L).

A button on the *Quick Control Screen* (see later) can be used to switch it on or off.

The default function assigned to the *Fn Key* is also the Black & White Mode toggle.

Taking a Picture (Saving a View Package)

You can initiate picture taking with either the *Shutter Release* toolbar button or the *Volume* + button – which I find much easier. Or you can even use the *Volume* + button on the headphone cable to act as a cable release.

Regardless of the method you used to start picture taking, Viewfinder can save several images to into the app's catalog, and also simultaneously export to Photos:

1. **Preview.** This is a "screen shot" with frame lines, *ZoomFrame* and cardboard finder simulation. This image is distortion-corrected in wide mode and the black and white filter is applied to it.

2. **High resolution JPG.** This is a clean, high resolution image with no decorations at all. When you zoom in, this image will represent the zoomed-in region (if RAW capture is not enabled, the whole image if enabled). This image is also distortion-corrected in wide mode and the black and white filter is applied to it.

3. **High resolution RAW.** On devices capable of RAW recording, you can save a DNG format file. This is a clean image with no frame lines. Distortion correction and the black and white filter are applied to the preview JPG and to the thumbnail embedded into the DNG file, but not to the RAW data.

By default the app only stores Previews to save space.

Metadata, such as GPS coordinates, will accompany these images. These images, along with an additional metadata file describing the simulated equipment gets saved into a

view package – and the *catalog* stores these *view packages*. Chapter III will discuss view packages and the complete catalog functionality.

A red dot in the corner of the screen indicates that saving a view package is in progress.

You can continue taking pictures while the app saves the previous view package – until the buffer fills up. The buffer can hold up to 5 view packages (just one if RAW capture is enabled).

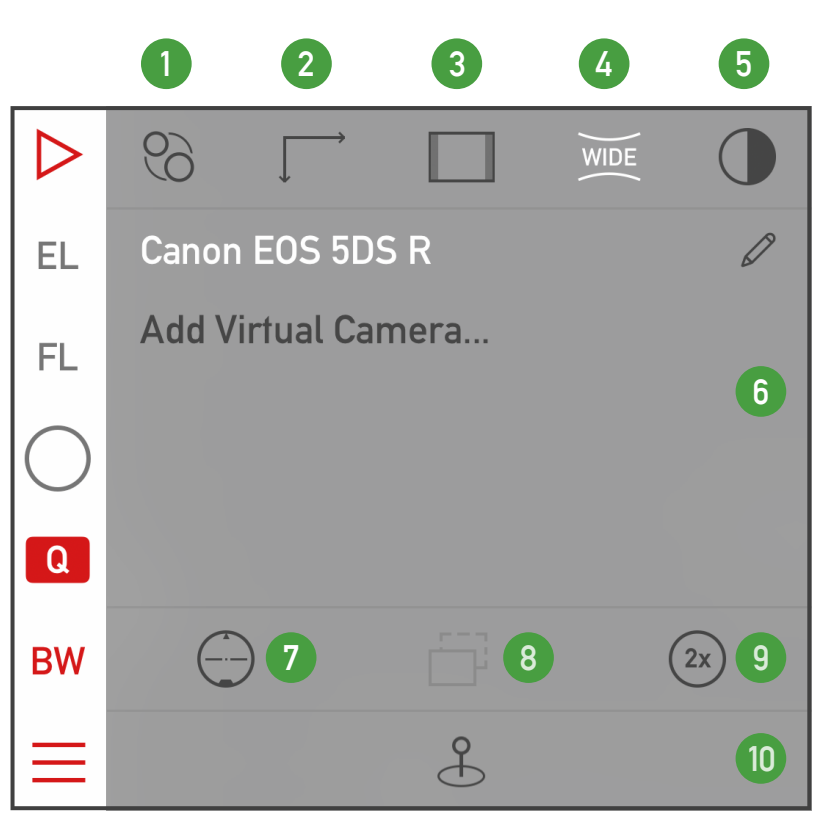
If you would like to review each picture you take, then set *Review Time* in the menu. It will show the last view package for the time you specify. Note that picture taking – as well as everything else – is disabled while the review is displayed. But a tap on the view area will dismiss the preview immediately.

The Quick Control Screen

The Quick Control Screen is a new feature in the Mark II. It gathers often-used functions into a quickly accessible place.

Its various controls can be in one of three states: inactive (mid-gray), active (white) or disabled (translucent gray, such as control 8).

They are the following:



1. **Quick Lens Change.** Opens the Lenses screen for the currently selected virtual camera.

2. **Change Aspect Ratio.** Opens the *Aspect Ratio* screen for the currently selected virtual camera. It becomes white when a non-native aspect ratio is in effect for the active virtual camera.

3. **Toggle ZoomFrame.** Toggles *ZoomFrame* on and off for the currently selected virtual camera.

4. **Toggle Wide Mode.** Toggles *Wide Mode* on and off globally. This control is only available if your device have a built-in ultra wide camera or supports at least one wide converter. In the latter case you need to set up a wide converter in the menu before you can turn on wide mode. Wide converters and wide mode are discussed in Chapter II.

5. **Toggle Black & White Mode.** Toggles *Black & White Mode* on and off globally.

6. **Virtual Camera Selector.** Lets you select different virtual cameras, add new ones and edit existing ones. You can create up to 20 virtual cameras, but only the first five is visible here by default. Just scroll down the virtual camera selector to see additional ones (as well as the Add line).

7. **3D Level.** Opens the *3D Level* of ALPA eFinder Tools, described in Chapter V.

8. **Parallax/Shift Tool.** Opens ALPA's *Parallax/Shift Tool*, described in Chapter V. It becomes white when parallax correction and/or shift simulation is set for the active virtual camera.

9. **Toggle Telephoto Camera.** Toggles the telephoto cameras on devices having one (with either 2x or 2.5x zoom, the button reflects this). It is not available on single-camera devices. The telephoto camera does not support wide converters.

10. **GPS Accuracy Indicator.** Shows the accuracy of the GPS signal. Its various states are described in Chapter IV.

Device rotation is not followed while the *Quick Control Screen* is displayed. It is automatically dismissed when you tap any of the controls, or can be closed manually by tapping the **Q** toolbar button again, or by tapping the screen outside it.

Smart Function Keys

Fn Keys (one on small screens and three on larger ones) as well as the *EL* and *FL* buttons are *Smart Function Keys*. These buttons reflect the assigned function's abbreviation in their title and also indicate the function's state.

A button is displayed in inverse when the assigned function or mode is turned on (such as *Black & White Mode* or *ZoomFrame*), or in case of the *Change Aspect Ratio* function when you use a non-native aspect ratio.

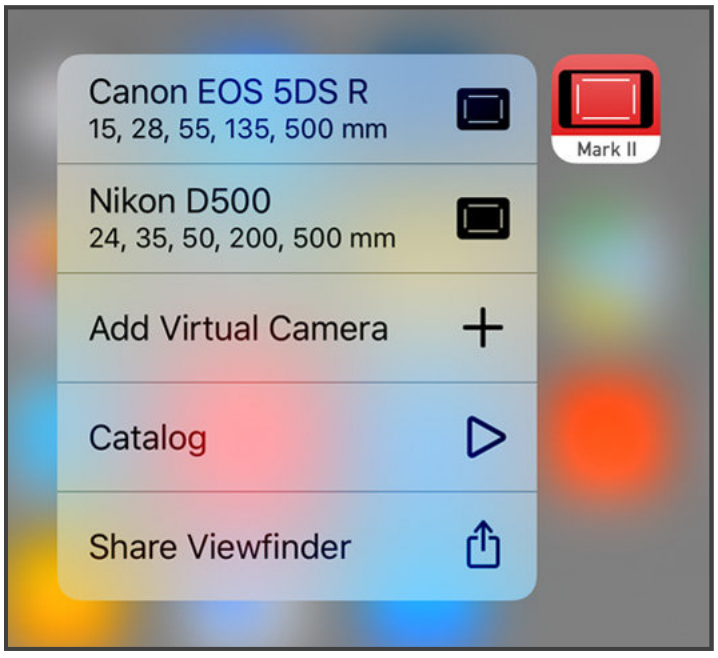
You can long tap a *Smart Function Key* to bring up its assignment screen immediately. Optionally they can be set up via the menu.

The title abbreviations are:

3D	3D Level
A	Change Aspect Ratio
AF	Initiate Auto-Focus
BW	Toggle Black & White Mode
EL	Exposure Lock
FL	Focus Lock
LC	Quick Lens Change
PS	Parallax/Shift Tool
T	Toggle Telephoto Camera
W	Toggle Wide Mode
ZF	Toggle ZoomFrame

3D Touch Quick Actions

Beginning with the iPhone 6s and 6s Plus, you can use 3D Touch Quick Actions on the phone's home screen to quickly access app functionality. Since I think this is a great way to save time, Viewfinder supports Quick Actions, as depicted on the following screen shot.



The Quick Actions menu includes the three last recently used virtual cameras (and the option to create a new one if there are less than three recently used cameras), and a shortcut to quickly access the catalog.

Focal lengths configured for displayed virtual cameras are also shown so you can decide quickly which virtual camera to use.

These Quick Actions bring you directly to the app's main screen or the catalog – regardless of where you previously were last time you left the app. This has a very important implication: if there were any unsaved changes (such as if you were editing a virtual camera), they will be lost when using a Quick Action.

The Quick Actions menu is only available if you used the app at least once.

Thoughts on Simulation Accuracy

Our aim is to make the app's simulation as accurate as possible. There are a couple of factors playing against us. Some can be compensated, some can't. Let's see them!

Before reading any further think about the following simple question: what is the focal length of a Leica Summicron 50mm f/2 lens?

No, it's not 50mm. Close, but not 50.

To shed some light on the above statement, let me introduce the *ISO 517:2008* standard [Photography – Apertures and related properties pertaining to photographic lenses – Designations and measurements]. This standard allows 5% variation between the lens' effective and advertised focal lengths. That is, 5% up and 5% down. So an 50mm lens could be anything between 47.5 and 52.5 mm. While this difference is negligible at longer focal lengths, it could be important at shorter ones (wide angles).

Let's take the aforementioned Leica lens as an example. (Don't misunderstand me, I'm citing Leica as a positive example here. They are amongst the few – mostly German – lens manufacturers who still publish data sheets showing the real focal length of its lenses.)

The outer 50mm line is the true 50mm, the inner line is the Summicron's real focal length – it's a bit longer than 50.

Viewfinder copes with this issue with its *Real Lenses* feature. If a manufacturer gives us data about the real focal lengths, we incorporate them into the app all those lenses appear under the *Real Lenses* heading on the lens selector screen.

To deepen the problem we have to talk about a phenomenon called focus breathing. This means that focusing a lens could change it's angle of view and thus it's effective focal length. Just Google on "lens breathing" or "focus breathing" and you'll find a few striking examples (for example a 70-200 zoom that is just mere 134mm at the long end when focused at the minimum focusing distance). Stellar priced motion picture lenses are well corrected for this effect, because it looks rather ugly on screen when the image

size changes if focus is moved from one actor to another. (But it still happens. Look for it and you'll find some good examples.) Still photographic lenses are usually not corrected at all for breathing. The problem gets even bigger at macro distances.

So what the label on the lens stands for? It is the effective focal length at infinity with +/-5% tolerance.

The tolerance issue can be corrected with real lens data. Not so easy with breathing. The iPhone's camera breathes. Simulated lenses breathe. Fortunately iOS device cameras does not breathe that much, so we could find a point where the error from that is around 1%. However with regard to the lenses simulated we are completely out of luck.

The third thing is distortion in the simulated lenses. Viewfinder does not take distortion into account at the moment.

To add support for new iPhones and iPads to the app we do a series of measurements in our lab to determine the angle of view of the device's camera. This takes time, and can only be done after we have the actual device in our hands. That is, there used to be a gap between when you can buy a new iPhone and when the app supports it. iOS also provides this angle of view data, but it is less precise than our measurements.

We utilize the iOS provided data until we can do the measurements. On newer phones the iOS provided data is much more accurate than it was in the past, making this feasible. This way you could immediately use the app on new devices.

Should the iOS provided data be a little off, a new menu item allows you to adjust frame sizes in a +/-5% range in 0.5% steps. This adjustment is also available when the app is utilizing lab measurements, to give you a bit more flexibility.

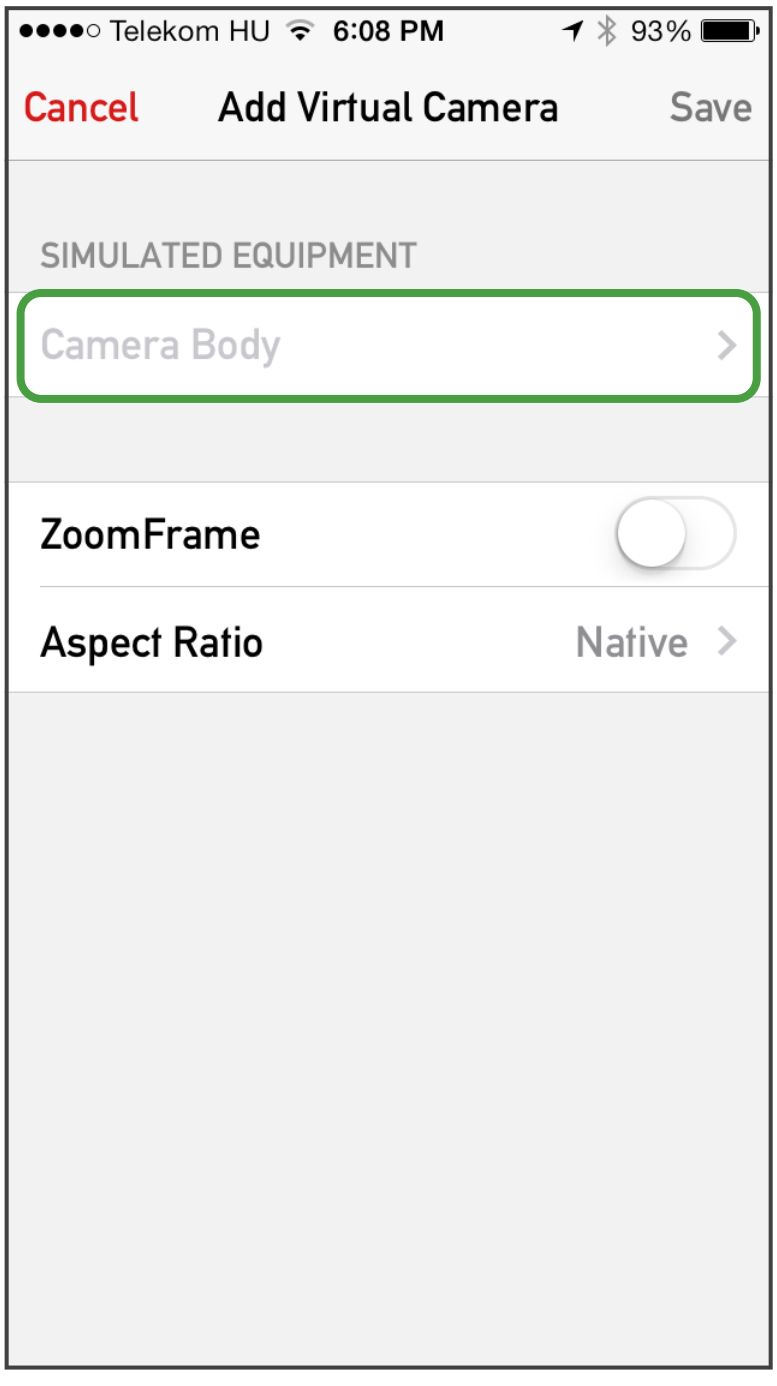
Even with these limitations, the application can beat optical director's and technical camera viewfinders in terms of precision easily. Don't forget that the best precision is at infinity focus, with a Real Lens. *Real Lenses* will be discussed in more detail in the next section.

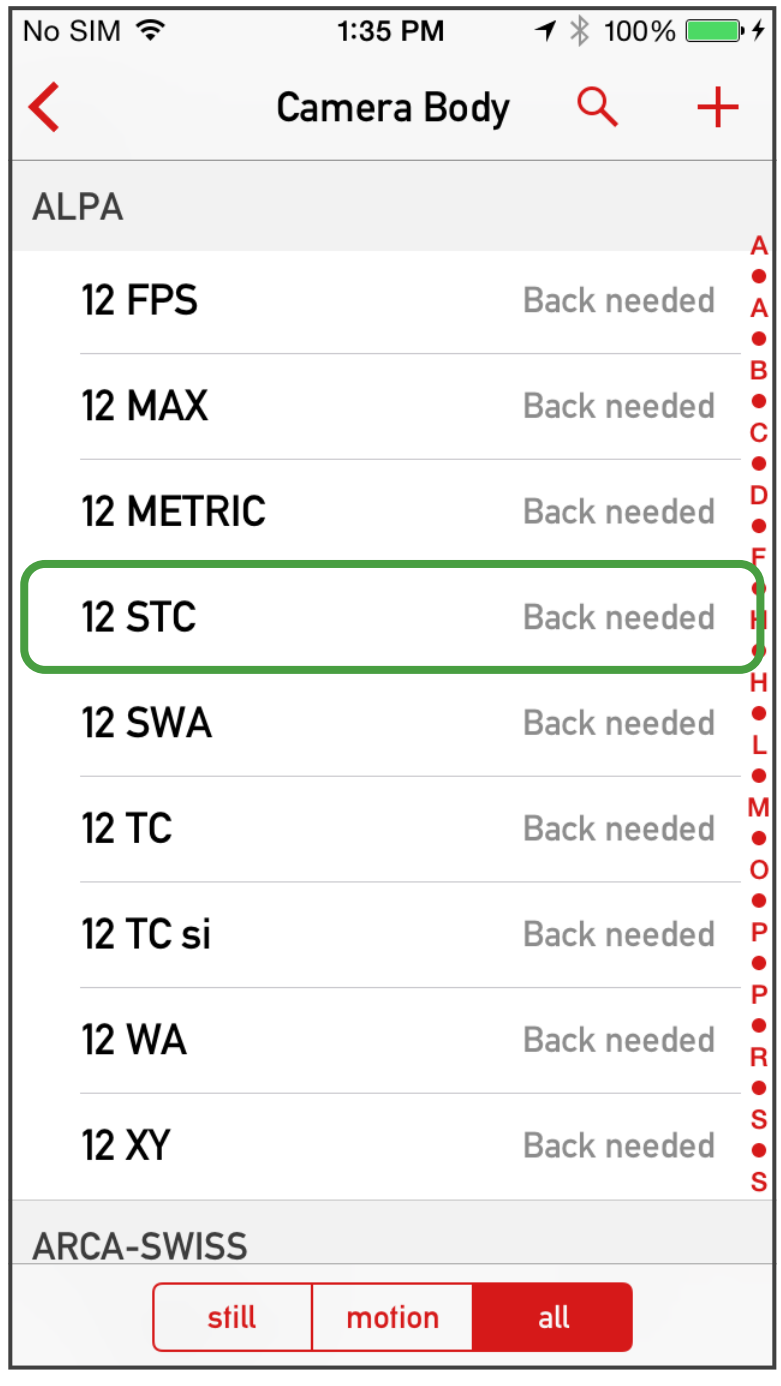
Case Study: Medium Format Digital System

In this case study we'll create a virtual camera for medium format equipment, which includes an ALPA 12 STC camera body, a Phase One P45+ back, and the following fixed focal length lenses: 38, 72, 120 and 210mm Schneiders, and a 50mm Rodenstock HR Digaron.

Several steps will be similar to what you saw in the 35mm DSLR case study.

The usual stuff: on the *Add Virtual Camera* screen tap **Camera Body** which will lead you to the camera body selection screen. Find and tap the **ALPA 12 STC**.

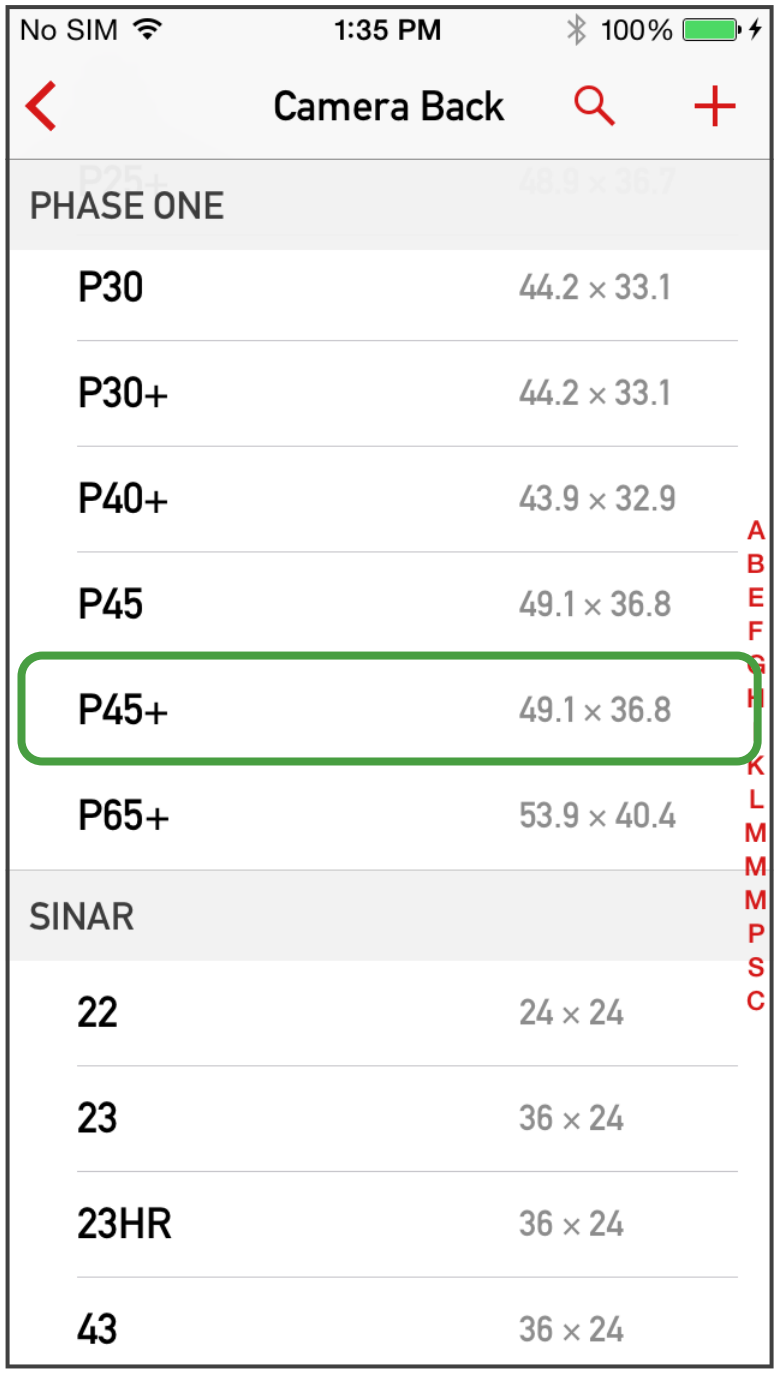


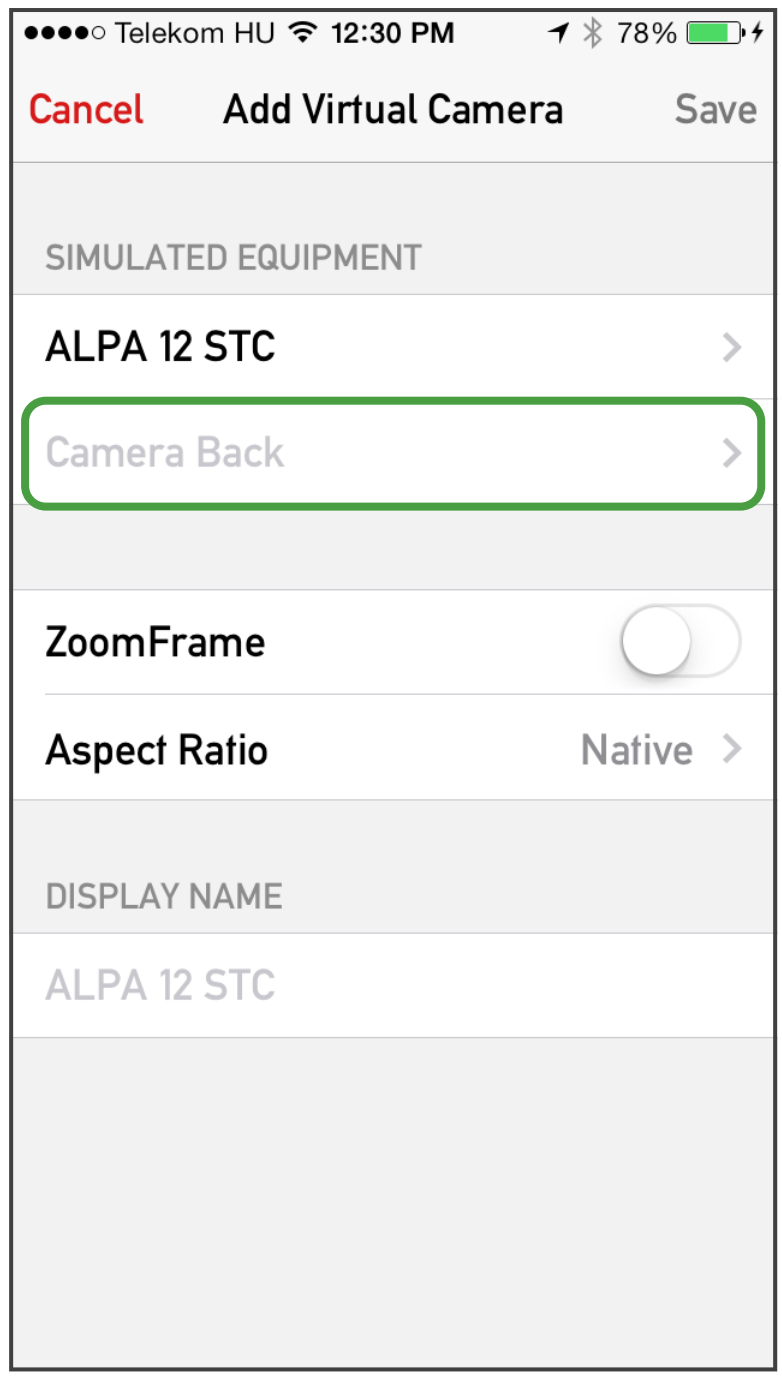


Most medium and large format cameras utilize a separate back to record the image – the ALPA 12 STC is no exception. You'll see the *Back needed* label in place of the image size when this is the case.

Tap the 12 STC's name, which will bring you back to the *Add Virtual Camera* screen. Because this camera needs a back to work, the second step is to choose our Phase One.

Backs looks and works similar to the body selection screen. Backs are grouped by manufacturer. There's an index on the right to quickly find what you are looking for. So scroll down to **Phase One P45+**. Tap on its line to select it.

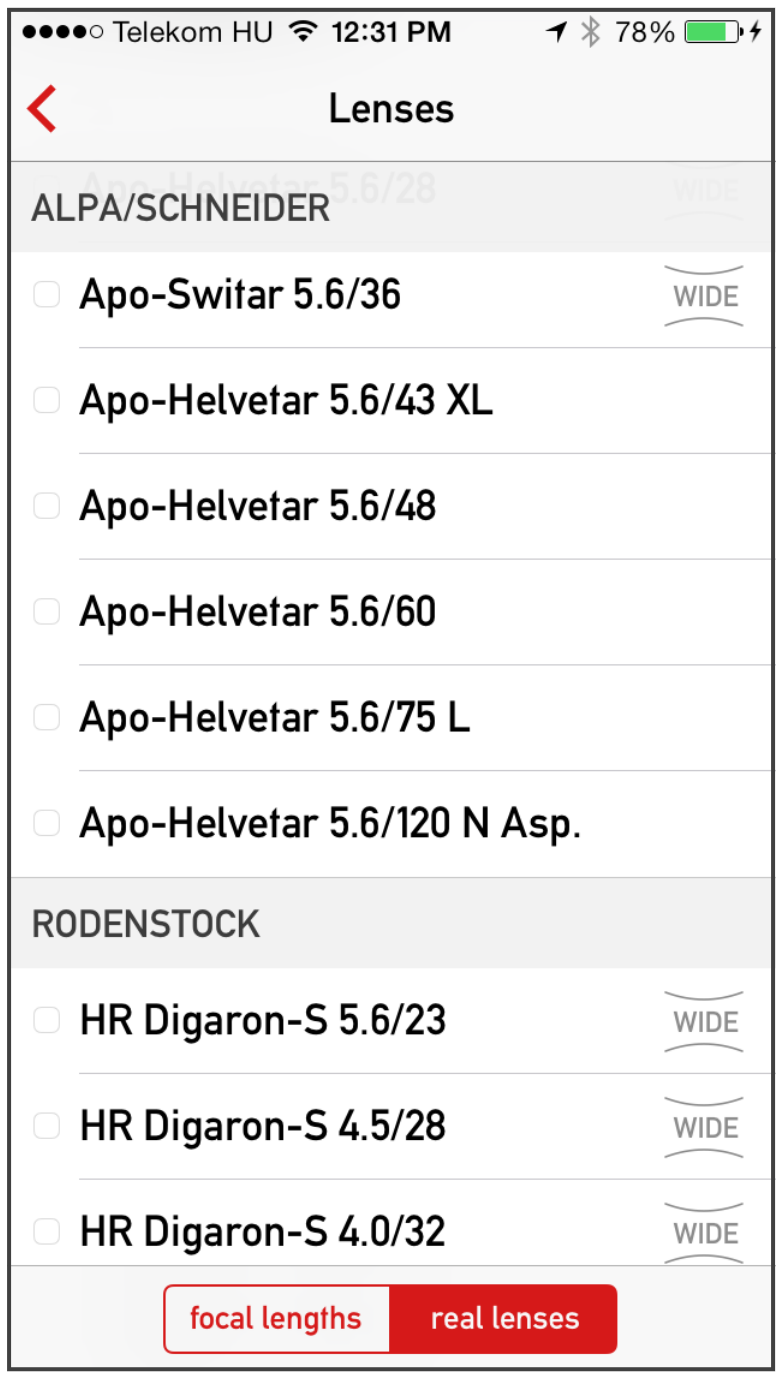




On the *Add Virtual Camera* screen you can see the selected body and back. Now that the image size is specified by selecting a back you can tap **Lenses** to select your lenses.

Now let's talk about *Real Lenses*. I've mentioned in the 35mm DSLR case study that this feature requires lens data from the manufacturer (ALPA is one of the manufacturers supplying lens data). So in this case we can work with *Real Lenses* only and leave the idealized – or marketing – focal lengths untouched.

When on the *Lenses* screen, tap **real lenses** on the toolbar. It will display the screen shown on the right.



You can see ALPA branded as well as Rodenstock and Schneider lenses here. Find and select the exact lenses you are using.

Tapping the **Back** button will return you to the *Add Virtual Camera* screen – just like in the 35mm DSLR case.

Take a look on the focal lengths displayed. The important thing here is that you can't tell the difference between lenses specified by focal lengths and via real lenses.

We had prototypes of the application where real lenses were marked with special characters. But what happens if you have a lens that is listed among *real lenses*? You'll select that one and not the corresponding focal length from the *focal lengths* list. They are kind of mutually exclusive. So we decided to remove those special characters as they just caused visual clutter.

We do not activate *ZoomFrame* or change the display name in this case. Tapping on the **Save** button will save and immediately activate this virtual camera.

Case Study: Digital Cinema Camera

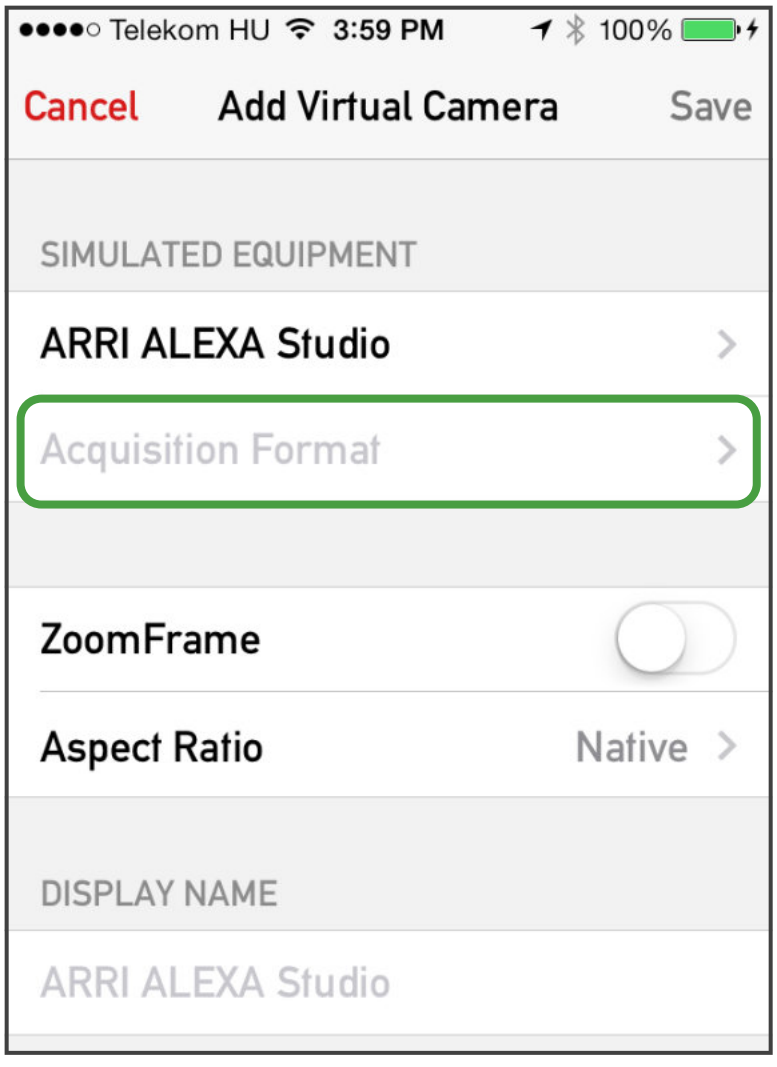
Up to this point I have only discussed still camera setups, but motion picture is an equally important and large subject. In the following two sections I'll talk about simulating anamorphic optics and a feature developed to deal with the ability to record different sized portions of the chip – which we call *acquisition formats*.

Let's see the equipment at hand. A production Steven is working in right now is geared towards the big screen, and will use the standard 2.39:1 format. Yes, 2.39:1, not 2.35:1 or 2.40:1. The actual 2x anamorphic aspect ratio is a controversial subject, but Viewfinder follows the current standard (SMPTE 195-1993), which defines the 2x anamorphic (or scope or cinemascope) aspect ratio to be 2.39:1. If you wish to use a

different aspect like the older 2.55:1 you can define a custom camera for it. I'll cover custom cameras in the next chapter.

Our equipment will be an ARRI Alexa Studio camera with 50, 100 and 180mm lenses. The Alexa studio (as well as the older D20 and D21) is unique among the current crop of digital cinema cameras because they have a 4:3 sensor. So they can record 2x anamorphic the way it was done with film (using the same aperture size).

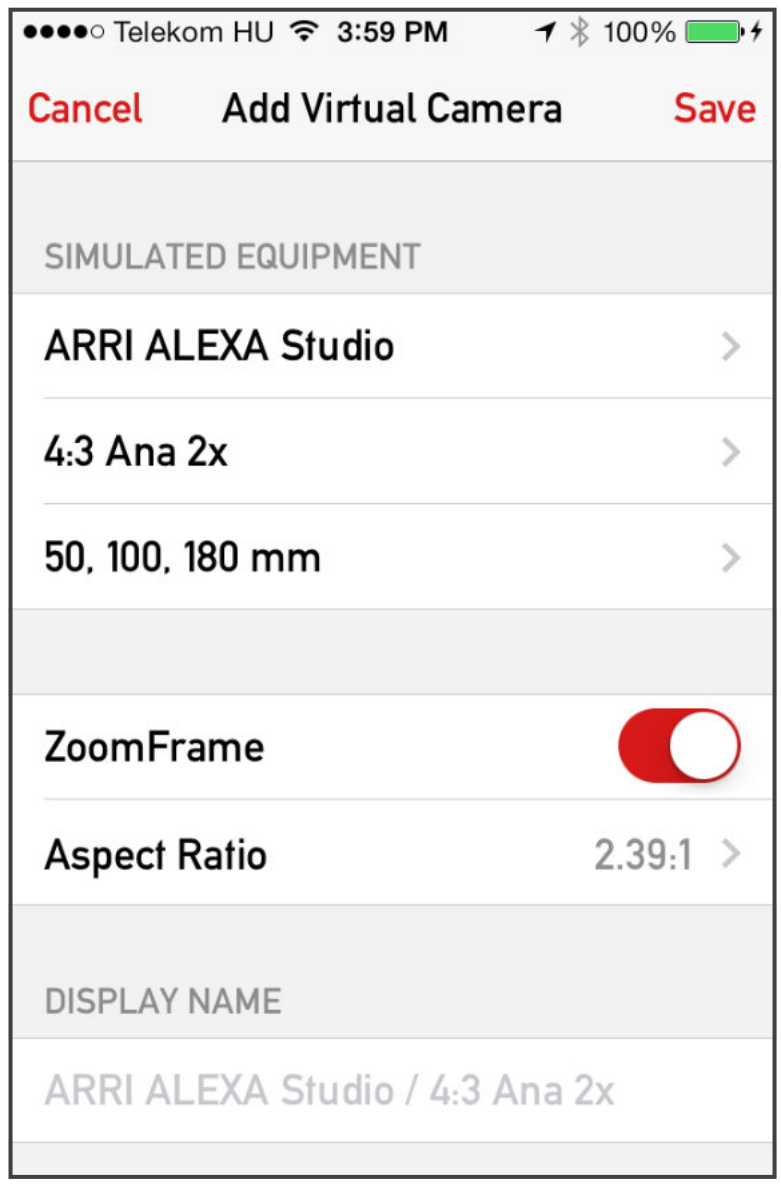
Go to *Camera Bodies* and find the **Alexa Studio**. The first thing you'll encounter in setting up a motion picture or video camera is that *Multi-format* is displayed instead of the image size. This shows that the camera supports multiple acquisition formats and is the case with every ARRI PL mount camera that can be used with 1.3x or 2x anamorphic lenses.



Select the **Alexa Studio**, which will bring you back to the *Add Virtual Camera* screen. Note that you have to choose an acquisition format before specifying the lens set. This is because different acquisition formats can use different lens sets (for example spherical or 2x anamorphic), and the app needs to know which lens set should it present for you. Note that changing the acquisition format resets the previous lens selection if the new and the old acquisition format's anamorphic squeeze factors differ.

Anamorphic (scope, cinemascope) formats are denoted with the *Ana [squeeze factor]* postfix. In case of the Alexa Studio, which supports both a 4:3 and 1.78:1 (HD) aspect ratio recording with both 1.3x and 2x anamorphic lenses you have six choices in total. Generally you'll see at least three (spherical plus the two anamorphic) for PL mount cameras. But there are ones with lots of them (such as all of the RED models).

Choose the **4:3 Ana 2x** format for now, select the focal lengths on the *Lenses* screen the same way you did previously and turn on *ZoomFrame*. In case the camera has multiple mount variants, you need to select the lens mount first. The resulting virtual camera is on the right.

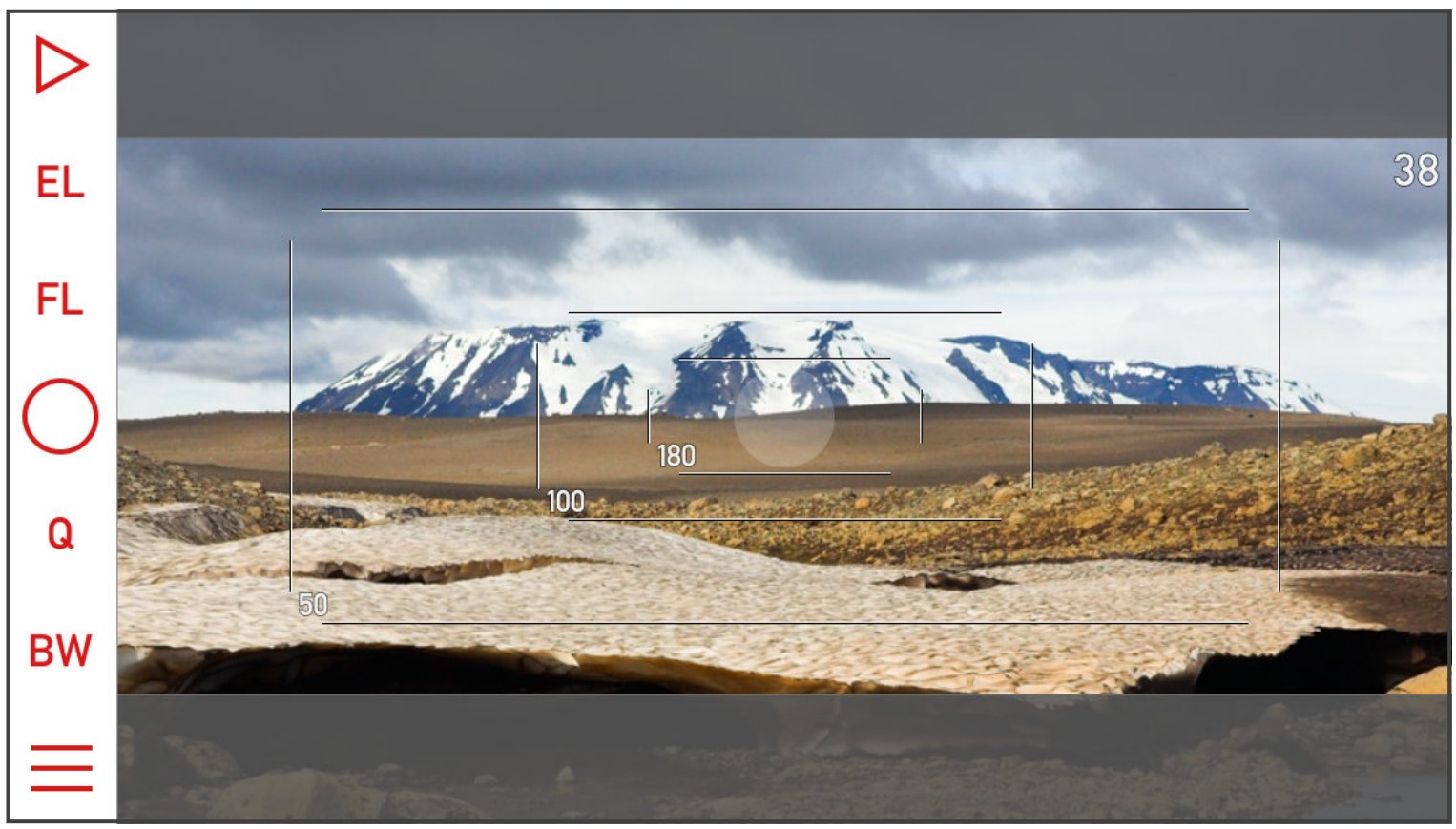


There's a thing to note here. *Aspect Ratio* in 2.39:1 instead of Native. It is set to 2.39:1 for anamorphic acquisition formats automatically.

You can always set it back to Native if you wish to use the aspect ratio calculated from the image dimensions – but for most of the time Native and 2.39:1 will be exactly the same (or the difference will be small), and you are just safe using the 2.39:1 aspect.

The deep technical discussion in the next section will shed some light on why are we doing this. I'll talk about creating and using even wider aspect ratio images in the next chapter when I discuss custom cameras.

Here's how the main screen looks like after you save this virtual camera.



Acquisition Formats Explained

Let me talk more about acquisition formats. Here's the definition: **an acquisition format specifies which area of the chip (or film) is used for capturing and the anamorphic squeeze (if any) applied to it.**

Why do we need acquisition formats? For the majority of tasks a simple crop is enough. For example if you record HD video or your HDSLR or mirrorless camera just set the 16:9 crop and that's all.

What happens if your camera (the Panasonic GH2 for example) never uses the entire sensor? The GH2's sensor measures 18.7 x 13 mm – a little bit larger than usual 4/3" sensors. It can record:

- 4:3 aspect ratio images (the default) from a 17.3 x 13 mm area
- 1:1 aspect ratio images from a 13 x 13 mm area
- 3:2 aspect ratio images from a 17.8 x 11.9 mm area
- 16:9 video from a 18.7 x 10.5 mm area.

There's no single rectangle containing all the others from which you can crop them out. So you have to choose between them.

But there's another, even more important factor behind the introduction of acquisition formats...

And that is *anamorphic lenses*. To almost every single PL mount camera you can attach lenses with 2x or 1.3x anamorphic squeeze factors besides the usual spherical optics. The goal behind using anamorphic optics is always the same: to produce that well known "anamorphic look" wide screen image. As I mentioned earlier the standard aspect ratio for that wide image is 2.39:1. You can go even wider by defining your own custom camera – but the non-custom part of Viewfinder treats that 2.39:1 image as the main goal for all anamorphic shooting.

Let's see how one could handle anamorphics:

> *When using 2x anamorphic lenses just double the horizontal angle of view of the sensor resulting in whatever aspect ratio comes from the sensor's native aspect and let the user crop the image back to 2.39:1 if he or she wants it.*

This one would be a nice, easy and consistent method of handling anamorphic optics in the film world or with 4:3 sensors. But nowadays the majority of movie cameras use 16:9 sensors. If someone wants to simulate a 2x anamorphic lens attached to a 16:9

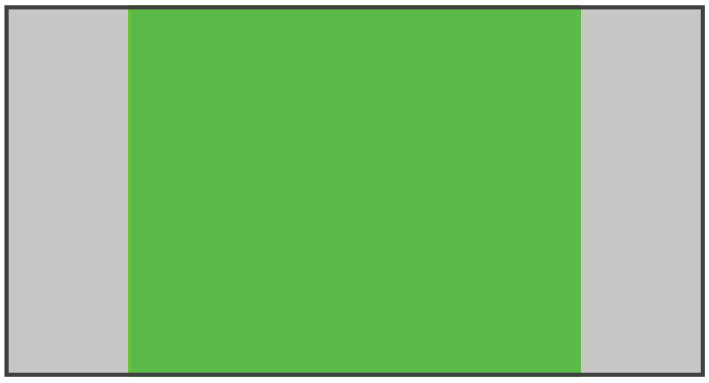
sensor based camera using the above method, then Viewfinder would display its frame lines for a 3.56:1 ultra wide format image. Causing a major surprise for most people. Wide converter requirements on the lens list would also reflect that 3.56:1 aspect ratio – which is rarely what we want. All in all, we need a better approach. Such as this:

> *Modify the sensor size for the 2x anamorphic format (actually crop the original size back to 1.195:1). Store this adjusted size in the database and use the adjusted sizes when the user picks that 2x anamorphic acquisition format.*

To put it another way: *Adjusted* image sizes will produce the exact same image in Native and 2.39:1 aspects. *Unadjusted* image sizes will generally produce a wider image in Native aspect than in 2.39:1.

Some cameras, such as the RED EPIC with its 5K ANA acquisition format setting do the same in-camera. Others record the entire 3.56:1 scene and necessitate to crop it in post processing. Nevertheless one wants to see the final product in 2.39:1 for all almost all anamorphic efforts (except when 4:3 sensors are used with 1.3x anamorphics to produce 16:9 HD format or if somebody really needs those ultra wide format images).

Let's see an example.



The gray rectangle shows the entire RED EPIC sensor. The green crop shows what gets used when you set the 5K ANA acquisition format on the camera. Remember, this will be twice as wide when un-squeezed. Similarly you can set the 5K Ana 2x acquisition format when simulating this setup. Sensor dimensions for that format are the green rectangle's but the database also notes that it should be un-squeezed, so the app will draw the correct un-squeezed frame lines (and will show wide angle adapter warnings on the lens list the way one would expect).

All 2x anamorphic acquisition formats in the app use **adjusted sizes** and work this way. As well as 1.5x anamorphic acquisition formats.

What happens if you attach a Hawk 1.3x anamorphic to the EPIC? The unadjusted final image would be in the 2.45:1 aspect ratio – because the EPIC uses a wider-than-1.78:1 sensor. This is relatively close to the desired 2.39:1, so we do not adjust image size in this case, leaving the ability to use this wider unadjusted format without creating a custom camera for it. But by default we set the 2.39:1 aspect for the virtual camera to obey the standard.

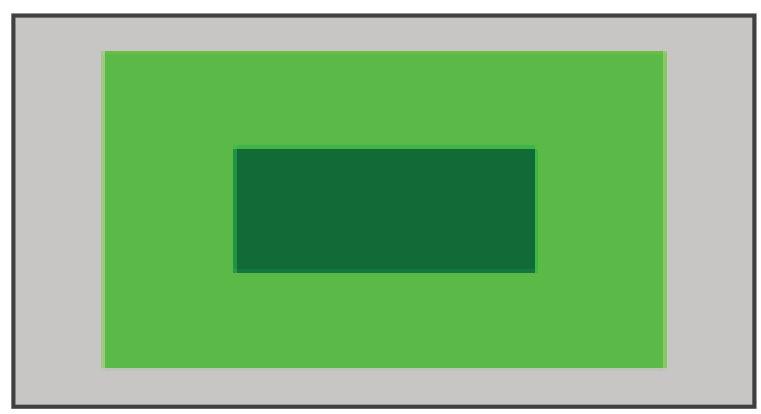
To sum it up: **1.3x anamorphic acquisition formats** in Viewfinder are using **unadjusted sizes.**

Leave anamorphic shooting for a moment and examine another situation that the RED EPIC presents.

The camera has seven acquisition formats, because:

- It supports faster frame rate recording from smaller portions of the chip
- Viewfinder lists all the acquisition formats that you can set on an EPIC even if they are just crops and could be simulated by setting an aspect ratio.

To be exact, the **5K 2:1** format is completely equivalent to the **5K FF** with setting the aspect to 2:1, the **5K 2.4:1** format is almost equivalent to the **5K FF** format with a 2.39:1 aspect (there's a slight difference because of the interpretation of the 2x scope format). So in the following example I'll just show "pure" acquisition formats – smaller-than-full-chip formats to be exact.



They gray rectangle shows the EPIC's whole sensor, which has a 1.89:1 aspect ratio (this is the **5K FF** acquisition format). The **4K HD** acquisition format (green) has roughly the standard 1.78:1 aspect ratio - and uses a smaller portion of the chip, so if you use the same lens on both the full frame and this format then the 4K HD mode will result in longer effective focal length (the well known "crop factor" effect in still photography). The **2K 2.4:1** mode is even smaller, and has a 2.4:1 aspect ratio. The same lens looks even longer using this format.

RED cameras usually sport dozens of these smaller formats. Actually there are not many other cameras that use smaller "cropped" formats.

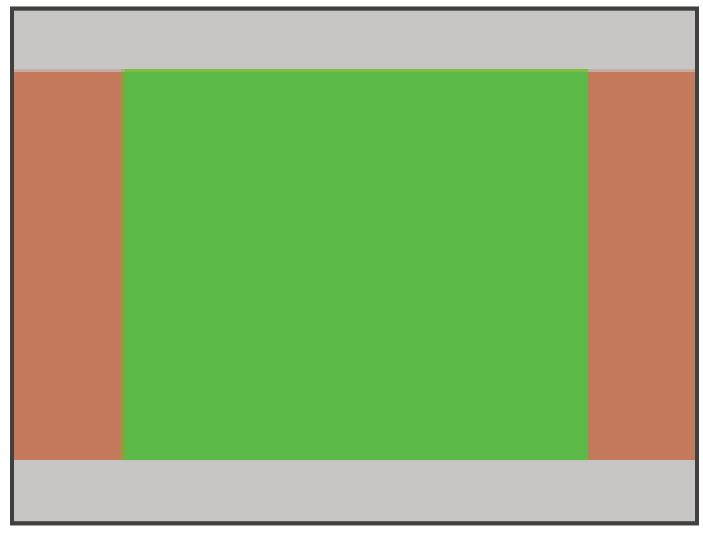
Now examine an ARRI: the Alexa Studio we used in Digital Cinema Camera case study. The camera has two operating modes: a 4:3 aspect mode (called Data mode in their older generations) and HD mode which limits recording to the central 1.78:1 band of the sensor and is equivalent to what other Alexas can record.

The first illustration shows the **4:3 Ana 2x** format we used in the case study. This format (the green rectangle) have a 1.195:1 on-chip aspect ratio, which is 2x squeezed and results in a 2.39:1 final (un-squeezed) aspect ratio image. Of course Viewfinder will show its frame lines for the **un-squeezed** format (as you saw in Case 3), but the numbers in the acquisition format's image size column are the dimensions of the green rectangle (which is an **adjusted size** by the way).

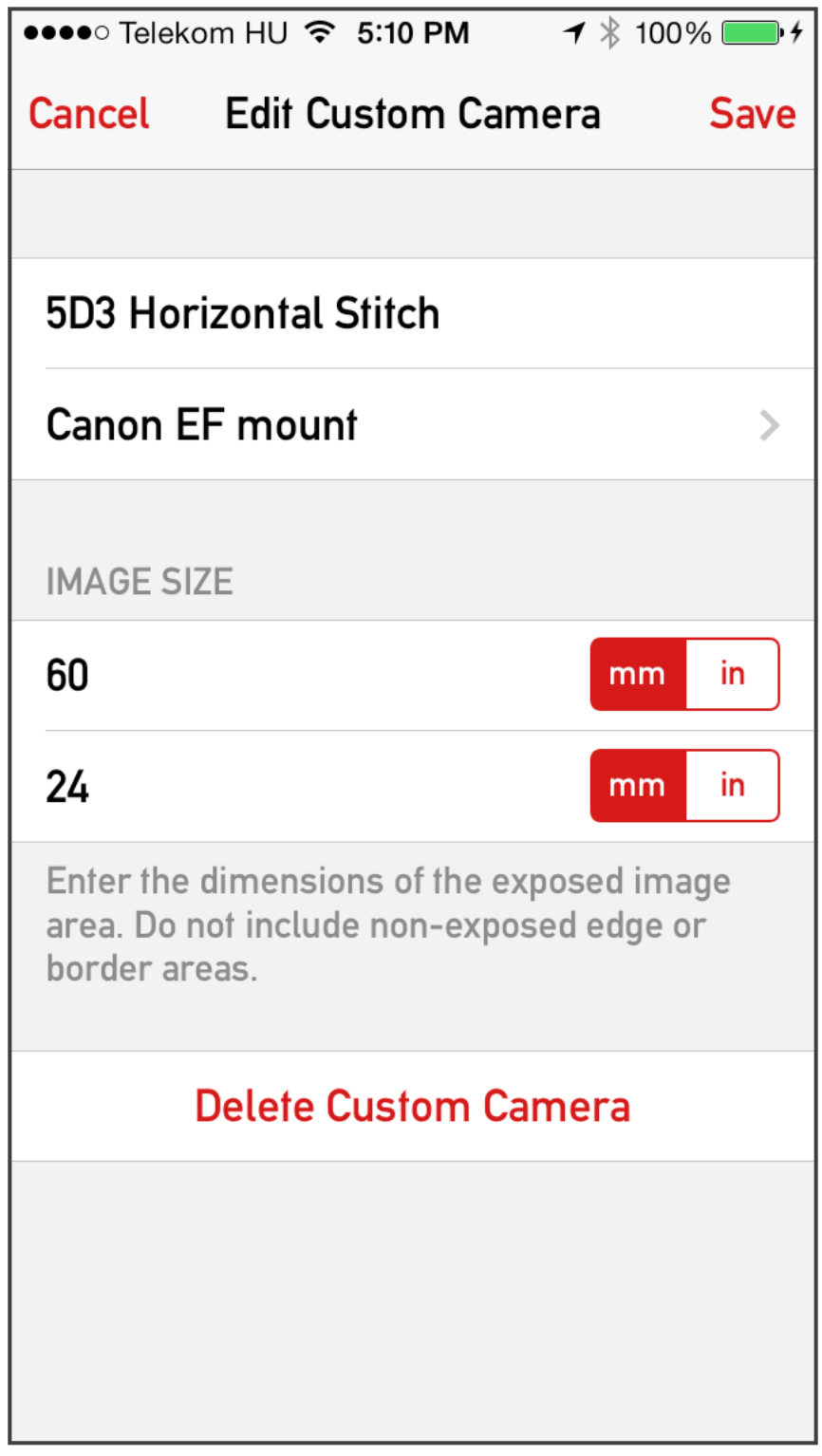
The illustration on the left shows two acquisition formats. Both are in the HD mode. The first is **HD Ana 1.3x** (green) with the effect of the automatically set 2.39:1 aspect shown. The dark green rectangle (watch for the two thin dark green lines above and below the green rectangle - those are the top and the bottom of the dark green rectangle) shows the unadjusted size. In this case the Native aspect is slightly taller than 2.39:1.

The second format is the simple, spherical **HD**, being the default area used for 1.78:1 image size (again, the dark green rectangle). Viewfinder will display this format in its original 1.78:1 aspect ratio, because this is not an anamorphic format.

With the **HD Ana 2x** acquisition format things get similar to what I described with the EPIC. In HD mode only the central 1.78:1 aspect portion of the sensor is used (brown+green), and the 2x anamorphic image comes from just the green part. The illustration shows a pitfall of using 2x anamorphic lenses on cameras with HD-aspect sensors: a significant portion of the image is thrown away. As with all anamorphic modes, Viewfinder simulates this format **un-squeezed**.



Chapter II - Advanced Configuration



In the previous chapter we went trough three case studies that involved cameras and backs that were already in the app's database. In this chapter I'll show you what happens if the equipment you want to simulate is not in the database.

I will also discuss all menu options, but first and foremost I would like to talk about the biggest new feature in the Mark II – its wide converter support.

Wide Converters

In landscape and architectural photography there are numerous occasions when one wants much wider angle of view than a 28-30mm lens (in 35mm terms) can provide. But it is a problem for the iPhone (less problematic for newer models and more so for iPods and iPads). In the last years several hardware accessories came to the market that could solve this problem. Growing from the success of these accessories, Apple added an ultra wide camera beginning with the iPhone 11 series (it is discussed separately in the next section).

Unfortunately, external lenses tend to have a bunch of aberrations. Distortion, chromatic aberration, centering errors, you name it, the converter has it.

Most of these aberrations can be safely ignored as nobody takes real images with a viewfinder. One of them however, distortion to be exact, is a huge problem. It enlarges the center portion of the image and compresses the edges, making the effort of precise frame line positioning futile.

Given the immense power of today's iPhone GPUs, we set out to get rid of wide converter distortion forever. And I'm pleased to tell you that we succeeded: the Mark II have real-time distortion correction. Following is an example of its power.

ALPA's ACAM Super Wide Converter exhibits about 11% barrel distortion (on the left). Which is completely eliminated in the Mark II (on the right).

Yes, resolution suffers, but it is pretty much enough for viewfinder use.

With the corrected view we can simulate super-wide lenses, which is a blessing for landscape and architecture photography. But I also regularly use a wide converter to compose my pano stitches – more on which later.

The iPhone 11/12 & iPad Pro Ultra Wide Camera

The ultra wide camera found in new iPhone/iPad models elevate Viewfinder user experience to a whole new level. No more bulky cases and external lenses to carry. Nothing to configure in the app.

Although it's not a first class camera (no RAW capture, no focusing, no image stabilization but strong distortion), it sports better quality than almost all external converter lenses. And our distortion correction technology eliminates distortion completely.

It works like a built-in 0.5x-class converter lens, and the app treats it like a wide converter lens. That is, you have to activate *wide mode* to use the camera (skip to the bottom of page 39 to see how to activate wide mode).

Using external accessory lenses with these iPhones/iPads is not supported.

Thoughts on Wide Converter Options

While most brand name converters are all suitable for viewfinder use, it's better to set the expectations right: you shouldn't expect stellar optical performance from such lenses.

Below are my experiences with the currently supported ALPA, Schneider and olloclip converters.

The actual list is always available at: https://www.artistsviewfinder.com/tech-specs/

They are all priced in the same range ($65-$100) with mounting-to-the-phone hardware included. Schneiders usually occupying the higher end of this range.

Let's take a look on their conversion factor and distortion characteristics first. The bad news: advertised conversion factors can't be used to compare them. All super wide converters we measured exhibit huge (10% or more) barrel distortion. What gets in the marketing material is the magnification ratio with no distortion correction applied. That is, they count in the extreme edges, which will result in smaller factors.

But when distortion is removed, those extreme edges go away (as you saw on the bookshelf images). The result: Schneider's super wide lens that's advertised as having a

0.45x conversion factor is a 0.5x lens is reality. ALPA's lens, which is advertised as 0.5x is a bit wider in reality than Schneider's 0.45x.

The conversion factor also changes from device to device – and all the adapters we measured go wider when they are used on a device having a wider native field of view. For example, the ALPA is a 0.48x on an iPhone 5S, but 0.47x on an iPhone X.

So in the end we have two classes: 0.5x and 0.65x. The Schneider super wide, the ALPA super wide and some olloclips belong to the first, others belonging to the second. Is it important to note that the wide Schneider exhibits only a small amount of barrel distortion – and this lens would be usable even without correction. The olloclip is not, it has the same huge distortion as super-wides.

The sharpest is the Schneider super wide, so it's an unfortunate development that Schneider had stopped making converter lenses.

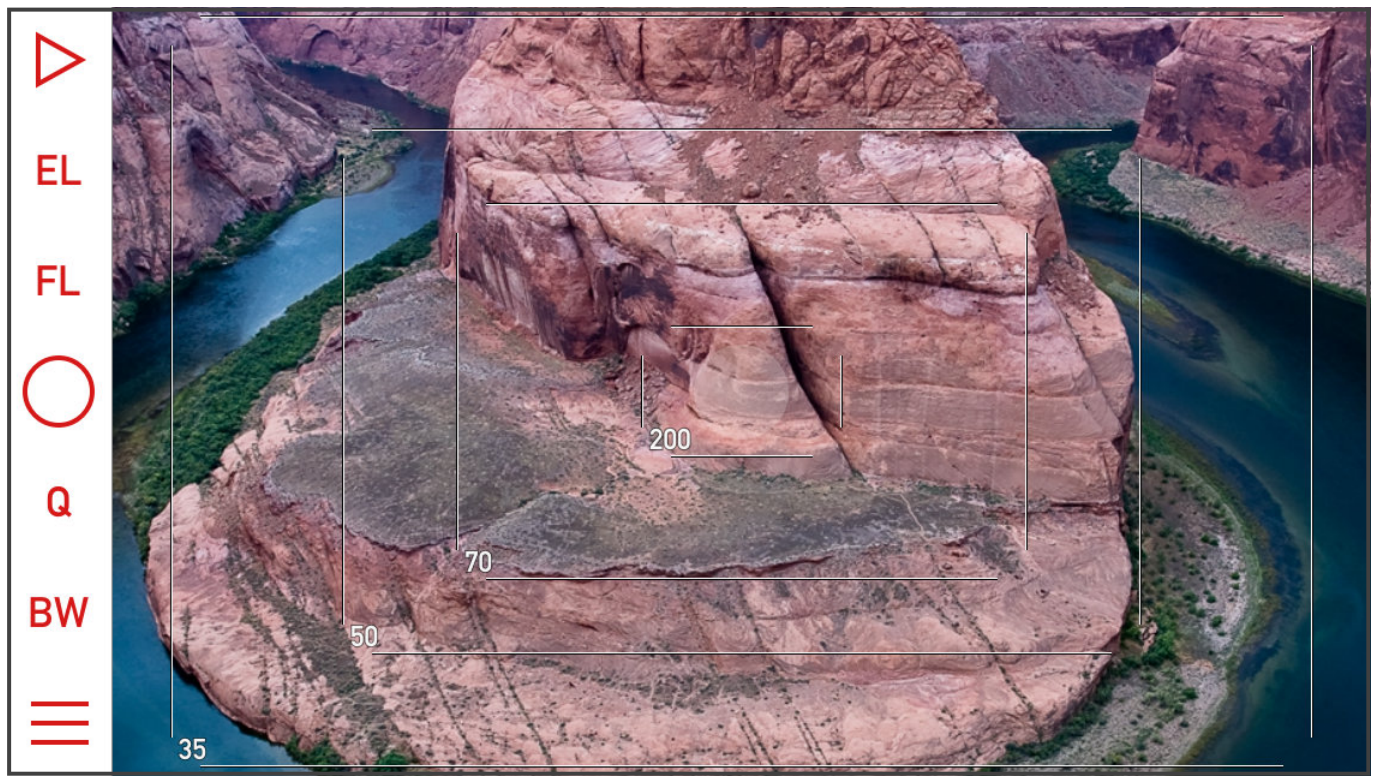
Schneiders are almost free of chromatic aberration. All others exhibit a huge amount of it in the corners. Centering tends to be bad on all converters. The Schneider super wide also exhibits hard to correct mustache-like distortion. On the iPhone 5 for example this – together with bad centering – causes residual pincushion distortion on one side of the image after the barrel has been removed.

Mounting options also vary from converter to converter. Olloclips tend to slip off easily – except when you use it on an iPod, where a rubber inserts keeps the lens in place. Converters with cases are all solid, although I found some cases too tight and hard to remove.

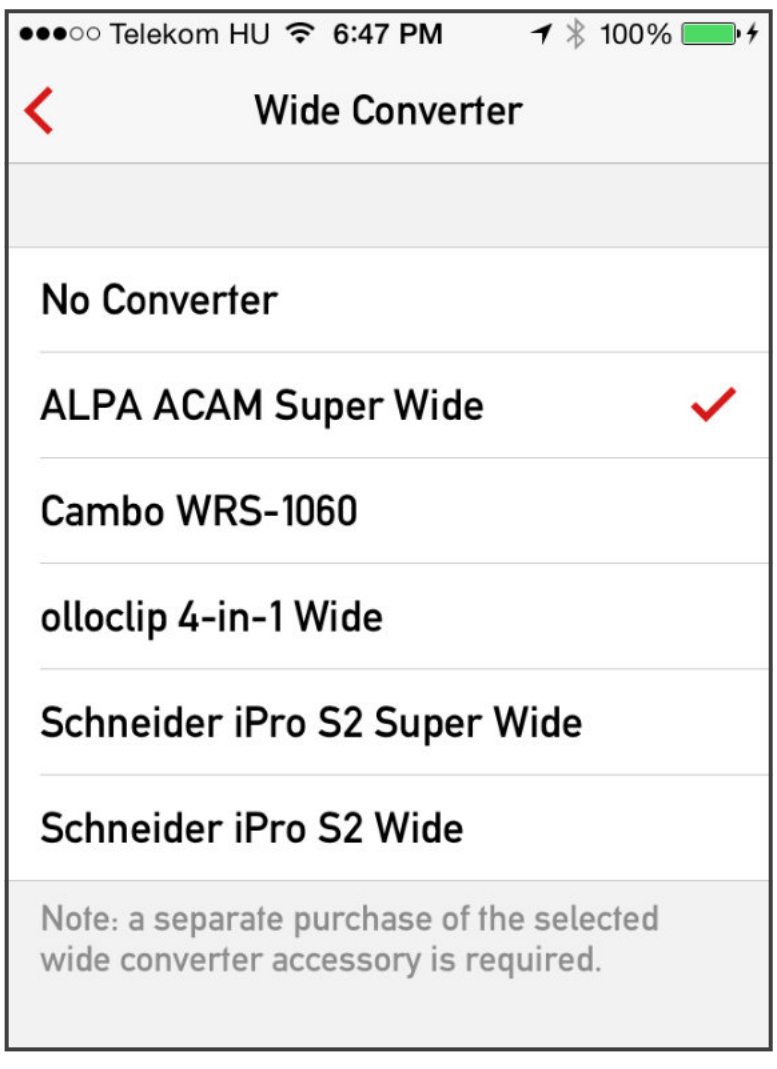
Mounting on the top of the camera (in the hot shoe for example) is another story. If you want to use the converter lens to compose stitched panoramas, you'll need a holder that keeps the phone's lens centered with the camera's. This is to avoid parallax as much as possible. This is where things start to cost more. ALPA makes a holder that ships with the super wide converter lens and two cases. Other manufacturers, such as Cambo, also make holders. But be prepared to spend $800-$900 on these.

With all that said, I have two personal favorites. The ALPA rig (holder and such) is what I used for years. But since it is not supported on Plus sized phones, I switched to the olloclip Active Ultra Wide lens. Both offer wide view, easy to mount, sturdy enough to withstand professional use. All in all, highly recommended.

Setting Up and Using a Wide Converter



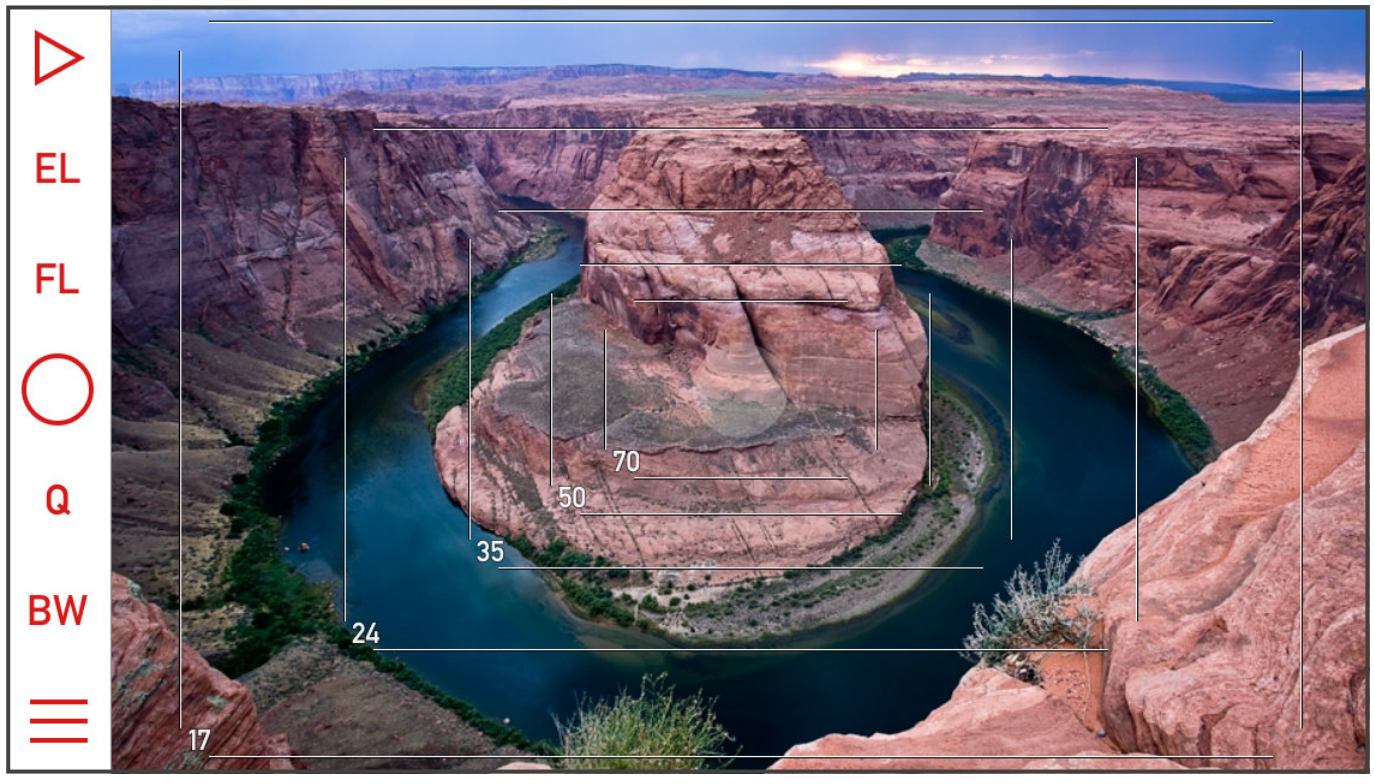
Take the scene on the right for example. It is Horseshoe Bend near Page, Arizona. To encompass the entire scene in a single shot one would need an ultra wide angle lens. The iPhone 5s (which has the widest lens from any iOS device at the time of writing) can only show the center of the composition we're after.



To cope with this, we have to attach a wide converter lens to the iPhone! In this example I'll use one with a 0.5x conversion factor.

Configuring a wide converter is a two-step process in the Mark II. First we have to tell the app which converter we are using. This can be done using the *Wide Converter* menu item (I'll cover the menu fully later in this chapter).

The second step is activating *wide mode* – in which Viewfinder turns on distortion correction, adjusts frame lines and the *ZoomFrame* value accordingly. We can do this either using the *WIDE* button on the *Quick Control Screen* or with a *Smart Function Key* (but you have to assign the *Toggle Wide Mode* function to the chosen key first).



The resulting view is on the left.

With a 0.5x converter you can simulate full frame 35mm lenses down to 15mm on an iPhone 5s!

Wide mode is global, not tied to the any virtual camera. So it will remain the same even if you switch between virtual cameras.

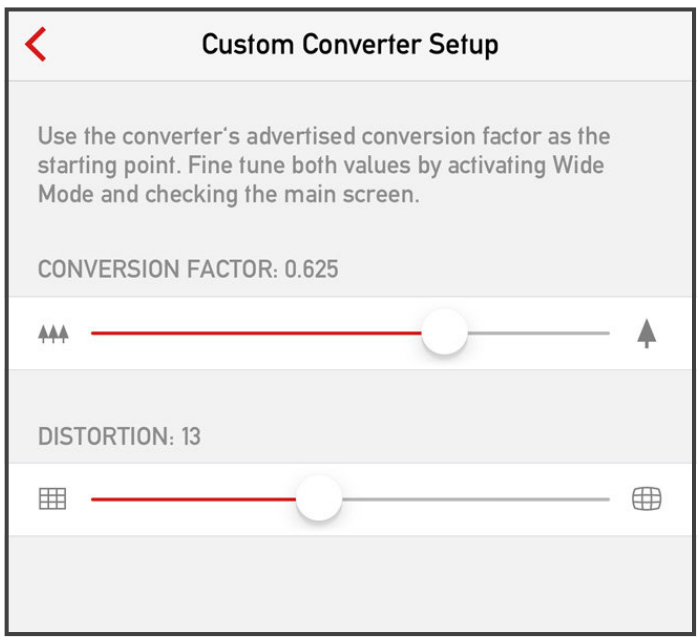
Due to the dynamic nature of conversion factor calculation discussed earlier, we do not list actual wide conversion factor requirements on the *Lenses* screen. But it's pretty easy to check whether a given converter will be usable with the lenses you want to simulate. The app doesn't require the actual converter to be attached to turn wide mode on. So select the converter you would like to buy, and check whether your lens' frame lines are visible in wide mode. It's better to place your iPhone flat on the desk cover its lens. This will eliminate any distraction caused by the heavily pincushioned pre-corrected image.

The Custom Wide Converter

In the early days of Viewfinder distortion correction was provided through the profiles we made for all the wide converter and device combinations the app supports. The profile approach was good a few years ago with a limited set of converters on the market, but these days you can find at least a dozen different converter lenses at online retailers. So we decided to address this situation by allowing users to create a *custom wide converter*. And of course we do support distortion correction with this. Being a simple correction, it does not always produce the almost perfect results the profile-based approach is capable of, but very capable nevertheless.

We'll continue to support the profile-based approach for existing combinations, but will add new profiles only if we have the combination in the lab, made an arrangement with the manufacturer to do so, or if we receive enough requests from you to add a given converter.

To set up the custom converter first select *Custom* for the *Wide Converter* option in the menu. This will reveal the *Custom Converter Setup* menu item.



Tapping it will bring up the converter setup screen that you can see on the left.

You can set the converter lens' actual conversion factor with the first slider. Since this is almost always different from what the manufacturer says, you'll definitely need to fine tune it for your actual phone (since the conversion factor also depends on the phone's lens as well as the distortion correction amount – be prepared for a little trial and error). We support converters with factors between 0.45 and 0.75.

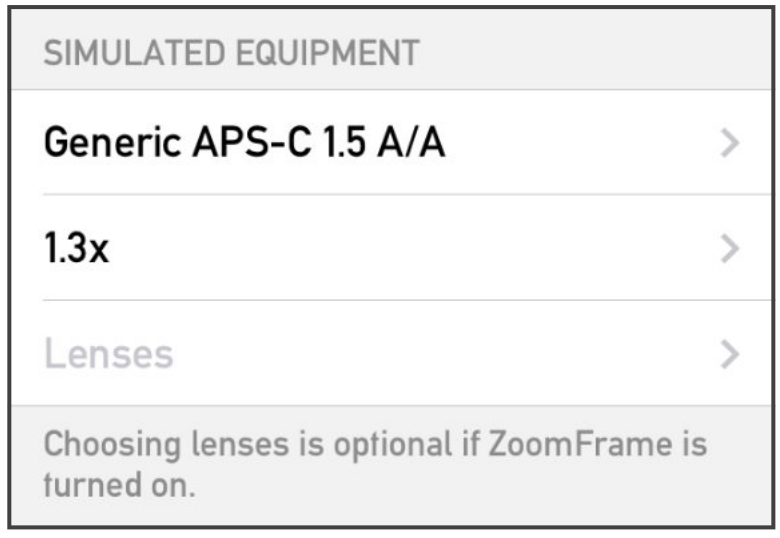
The second slider is used to specify how much distortion the converter lens has. It is an arbitrary scale from 0 to 30, zero meaning that you will not want to correct the distortion (suitable for well-corrected lenses such as some Zeiss optics).

I recommend to set distortion correction first (if needed at all). Use 15 as the starting point for 0.65x-class lenses and 20 for 0.5x-class lenses. Check how the main screen looks, and watch for over-correction artifacts in the corners. In case you still have barrel distortion, go back to the menu, and increase correction. If the corners are over-corrected, back off a little. A tiled wall, a window or a tall building are good test targets.

Once you're happy with the correction, mount the phone steadily, remove the lens, turn off *wide mode*, and set the main screen so that you have some objects or markings at the edges of frame lines. Now re-mount the lens, turn on *wide mode* and check whether the objects/markings are still at the frame lines. Go into the menu and adjust the conversion factor if not. Repeat until you are satisfied with the result.

Using Generic Equipment

The simplest solution if you can't find your favorite camera and/or back by manufacturer and model is to use generic equipment. In case of both cameras and backs you'll find generic stuff under the **Generic** manufacturer. Just find what best matches your camera and use that. Chances are that you'll be able to set up almost all the equipment ever manufactured this way.



There is one special case for using generic equipment, and that is for using anamorphic conversion lenses in front of your DSLR or 4/3" camera and lens. These can be set up only via generic equipment. For example if you are using a Nikon camera with APS-C sensor (with a 1.5x crop factor) and attached an 1.3x anamorphic you'll have to choose **Generic APS-C 1.5 A/A** as the camera. **APS-C 1.5** refers to the sensor size, and **A/A** means that an anamorphic adapter is attached. You can select the squeeze factor of the anamorphic adapter through by choosing the appropriate acquisition format. Generic A/A cameras are available for 4/3", APS-C 1.5 (eg. Nikon, Pentax), APS-C 1.6 (Canon) and 35mm (full frame) cameras.

Creating Custom Cameras

Adding new cameras that you use and are not in the app's database is a trivial use for the custom cameras feature. I'll show you two other examples where this could be a handy feature.

As a landscape photographer I love panoramas. I usually stitch two horizontal frames captured with a tilt/shift lens. I find 5:2 aspect ratio images made with my 24mm lens – such as the one below – particularly immersive.

The only difficulty in making those images was composition: it isn't easy to visualize a shot when you only see half of it.

It was like Christmas when I received a package from ALPA, containing their brand new ACAM Super Wide Converter. A few weeks later, when distortion correction started to work, a dream came true. I had a viewfinder that allowed me to compose these ultra-wide stitched images.

My pano setup was a Canon 5D Mark III with their TS-E 24mm f/3.5L II lens. Atop the camera is ALPA's iPhone Holder with their ACAM SWC converter.

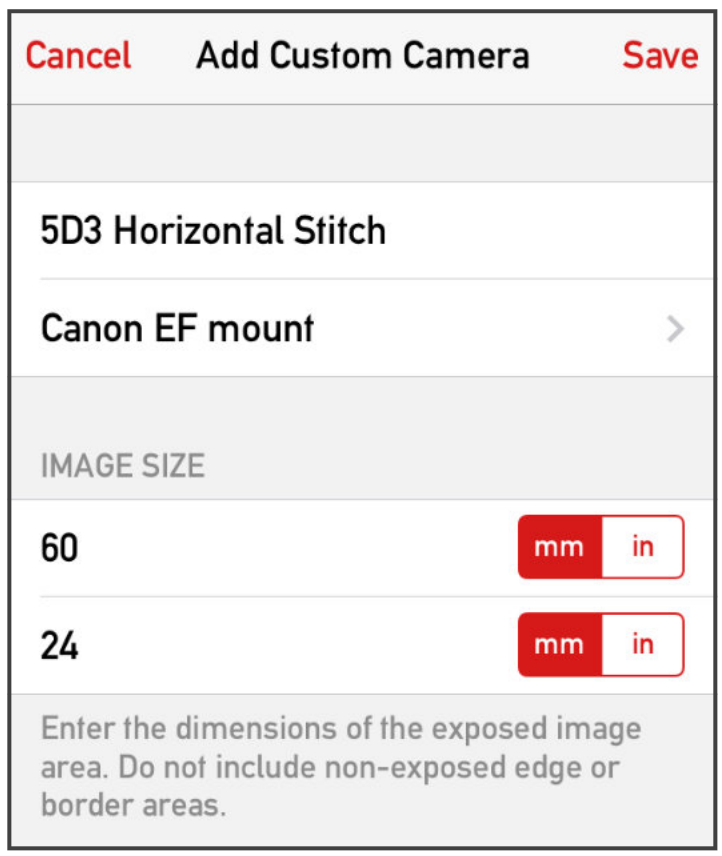
The picture on the left shows my old iPhone 4, but nowadays I'm using an iPhone SE, which paired with this particular converter can cover almost the entire width of such scenes.

The 5D Mark III has a 36 x 24 mm sensor, their T/S lenses are available in 24, 45 and 90 mm focal lengths and allow 12 mm shift. So you can create a 36 + 2 * 12 = 60 mm by 24 mm panoramic image with them.

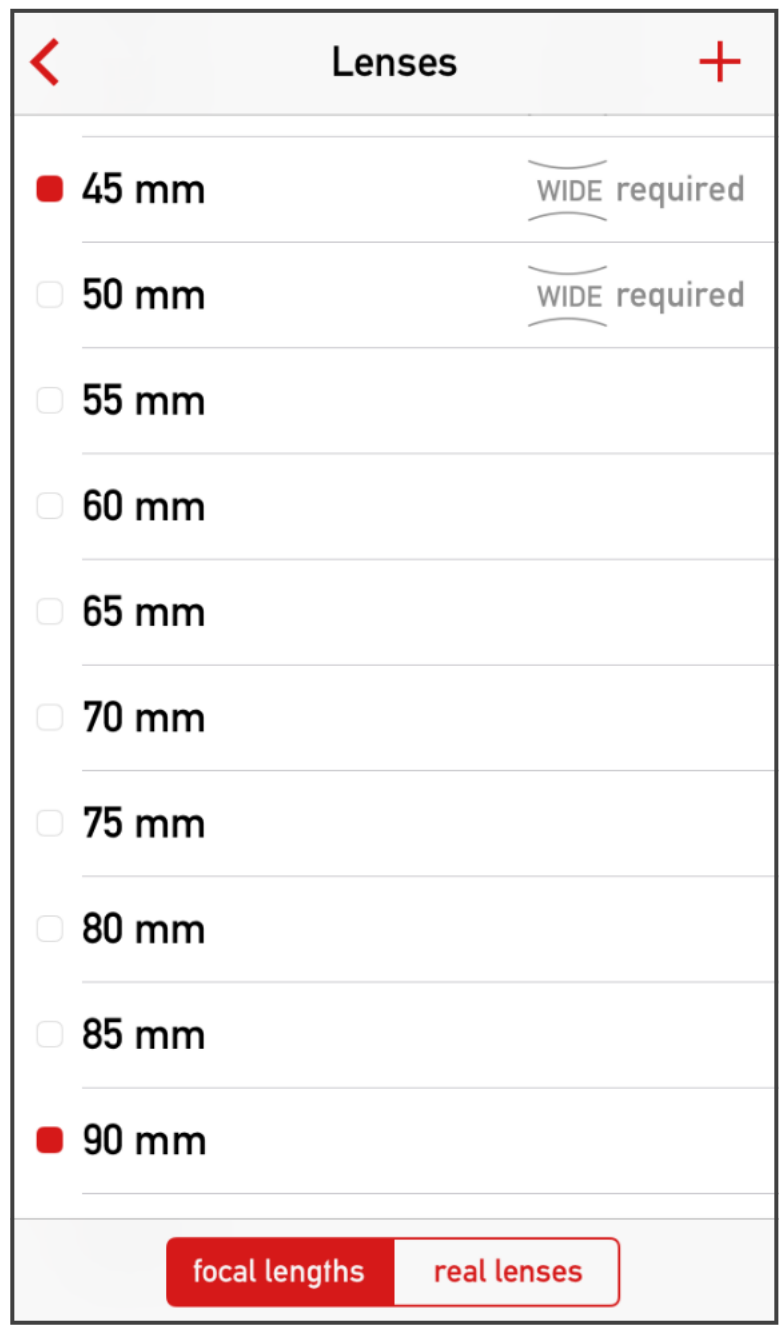
We'll set up Viewfinder for the 24/45/90 trio. Custom cameras can be added from the *Camera Body* screen by tapping the + sign in the top right corner. Custom cameras are global, meaning that even if you set up one through a specific virtual camera, it will be available on the *Camera Body* screen for other virtual cameras.

Defining a custom camera is pretty straightforward (the results are shown on the right).

You can (should) give it a meaningful name, choose what lens mount your camera has and specify the image dimensions. We specify here the dimensions calculated earlier. Similar to the



custom lens focal lengths, image dimensions can be entered in either millimeters or inches, but the app will display them as millimeters later on.

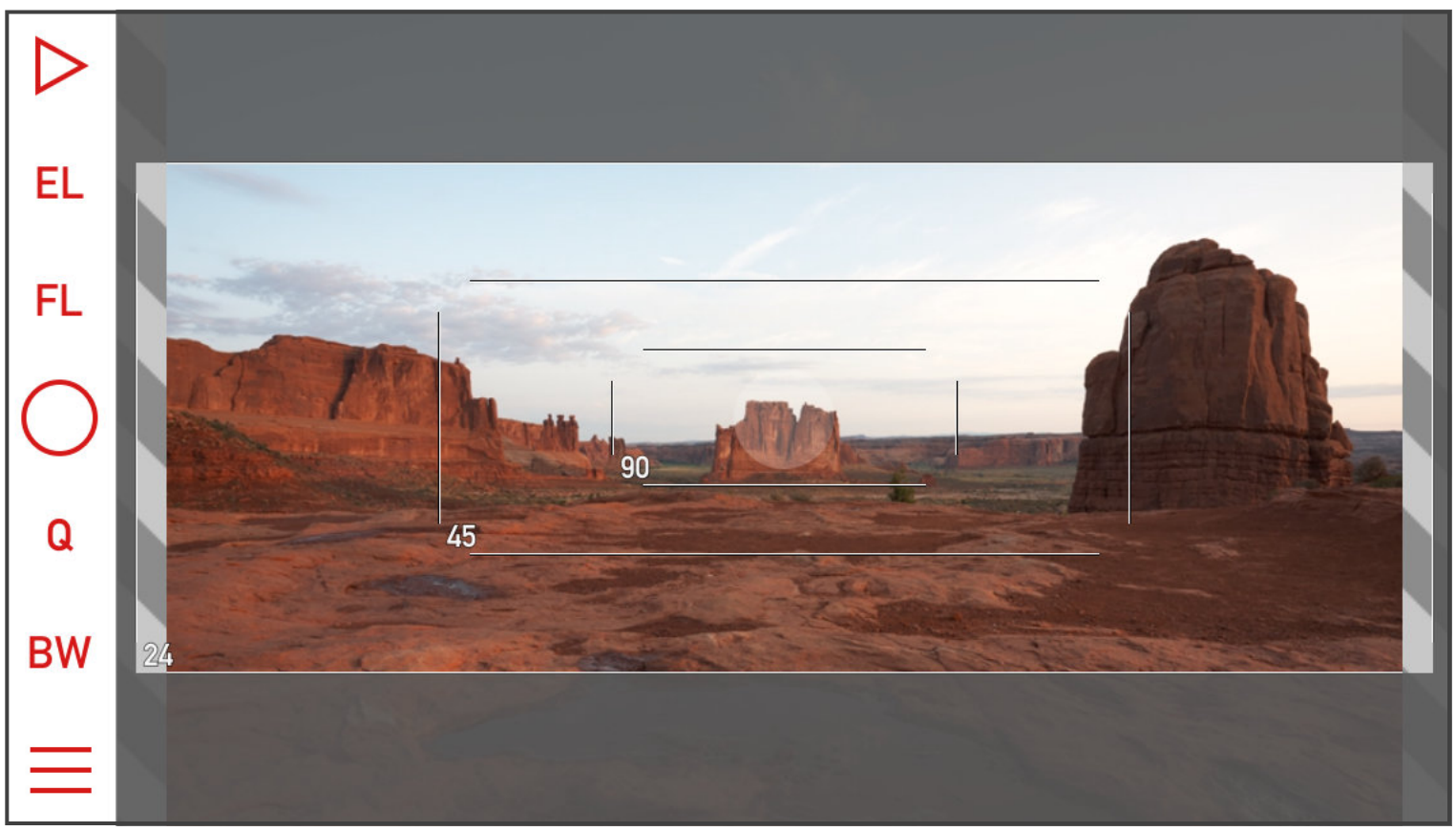


Tap the **Save** button. Your newly defined custom camera is already selected on the camera list, so just tap the back button again.

You can modify custom cameras by tapping their red image size number on the *Camera Body* screen. They can be deleted from the *Edit Custom Camera* screen.

Now select the lenses. You'll notice on the lens list that only the 90mm lens can be used without a wide converter. I do not recommend *ZoomFrame* for this setup (you work with just three fixed focal length lenses and that's all – no zooming.

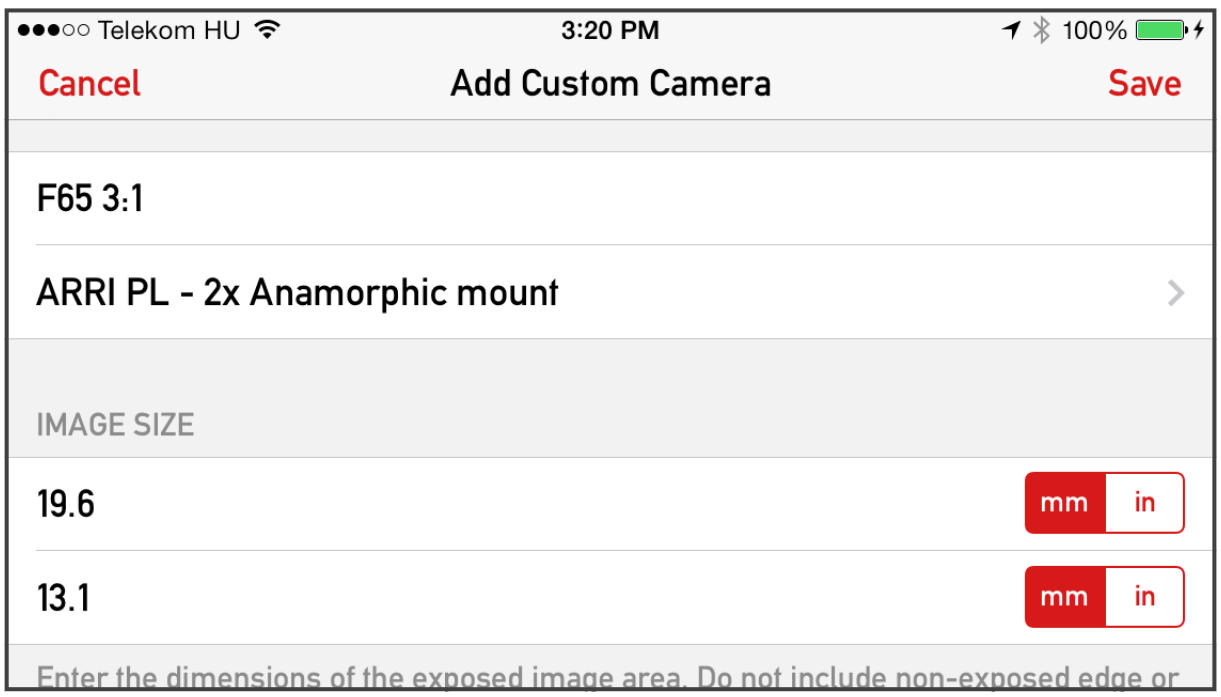
It's important to note that even the iPhone SE and ALPA ACAM SWC combination lacks the horizontal angle needed to display such a wide view that the stitched 24mm has. But as you can see on the image below, it's not far off. Not to mention that the extreme edges of the tilt/shift lens image circles are soft and I usually crop them off.



OK, let's move on to the next example.

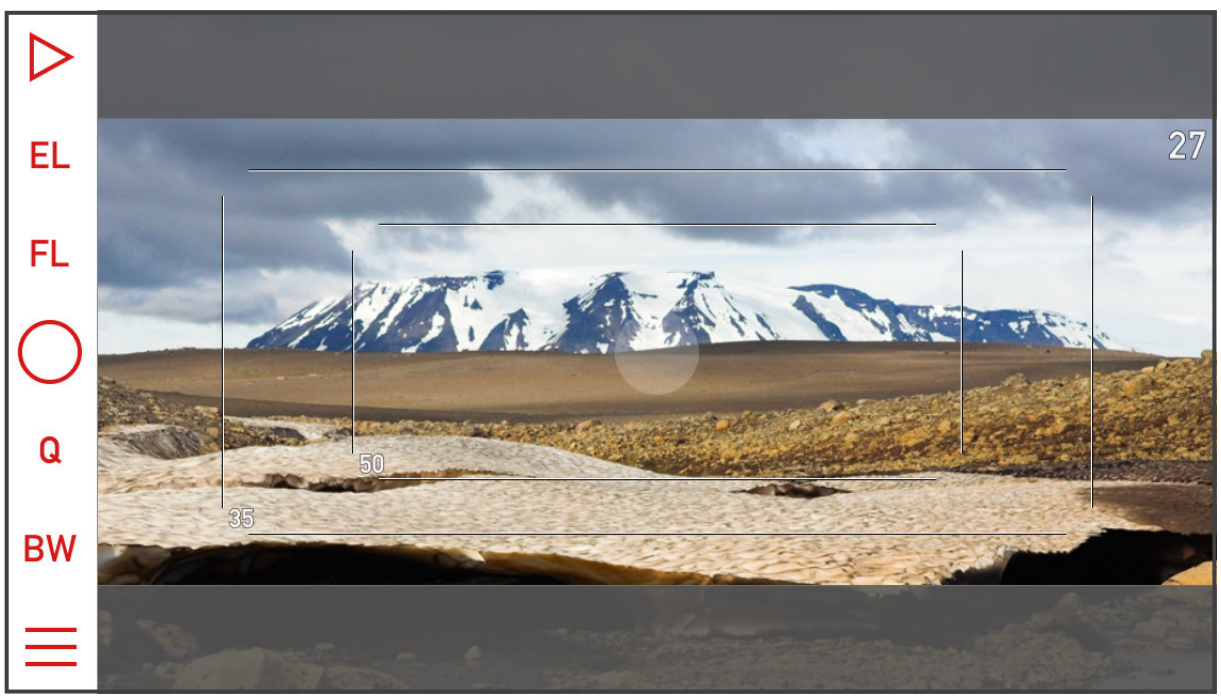
Do you remember that all 2x anamorphic lenses are using adjusted format? So what if you are working on a production that needs the ultra wide 3:1 format image? Here's how you set up a custom camera to support that.

To make images that wide you need a 16:9 sensor PL mount camera. I'll use the Sony F65 for this example. It's even wider than 16:9 by default, but that's not interesting now. The sensor's size is 24.7 x 13.1 mm. We need to use 2x anamorphic optics to reach the desired 3:1 format.



First, calculate the required size. The height is 13.1mm. The width is 13.1 * 3 / 2 = 19.65 mm (13.1 * 3 would be the image width with spherical lenses, but 2x anamorphics squeeze that into half). The 19.65 x 13.1 mm image size fits nicely on the F65 sensor. The 2x anamorphic squeeze factor is specified through the lens mount. We should choose ARRI PL - 2x Anamorphic in this case.

Go back to the virtual camera screen, select some lenses and turn on *ZoomFrame*. The results are shown below.



Note that the aspect ratio is forced to 2.39:1 automatically for anamorphic custom cameras. This is a change from old Viewfinder versions where custom camera aspects were not forced to 2.39:1.

Creating Custom Backs

Shortly after releasing the very first Viewfinder version I got a mail from the UK Large Format Photography group stating that the app's generic large format film dimensions are off by 10-15%. I was really surprised because the dimensions we used were following the ISO standards for large format film sizes. Also, medium format film dimensions were spot on. Having no access to large format equipment I had asked my friends at the BETON studio whether they still have large format archives and told them that I would like to measure effective image sizes from a bunch of LF negatives and transparencies. They still had LF materials, and I sat over a big pile for a day measuring different films.

The result? Large format film holder standards are just guidelines... I counted more than 10 different variants on the 4x5" effective image size. As it turned out almost every film holder produced different image sizes. That gave birth to the custom backs feature.

> ***Important:*** *For large format film users we highly recommend to use custom backs, because film holder manufacturers are not really following the standards for the image area. So we recommend to measure the effective image size on your negatives or slides, and set up a custom back for each size.*

Custom backs looks and works like custom cameras. They can be added with the top-right + sign and later found at the end of the back list.

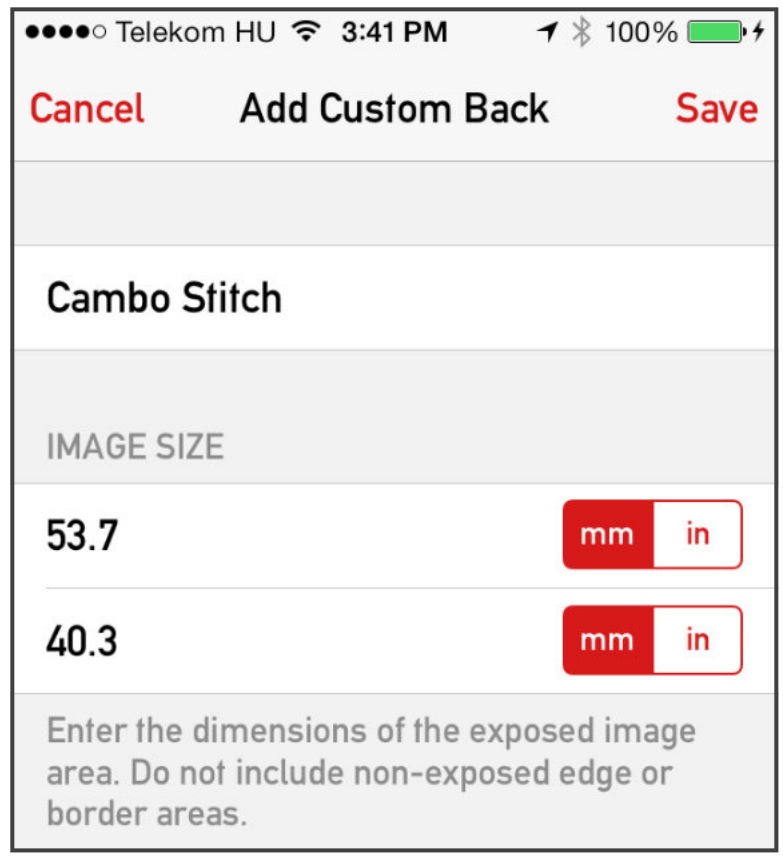
You can create up to 20 custom backs which are global: if you define one for a given virtual camera, you will see then when you configure other virtual cameras.

In this example we'll use a Cambo Wide RS-1050 camera. The back on this camera can be shifted – which calls for shooting stitched panoramas with it. The maximum shift is +/- 20mm horizontally. The back for which we will create a custom, stitched variant will be the Leaf Aptus-II 12, which has a 53.7 x 40.3 mm sensor. Add the 2 * 20 mm shift to that and we have a 93.7 x 40.3 mm frame.

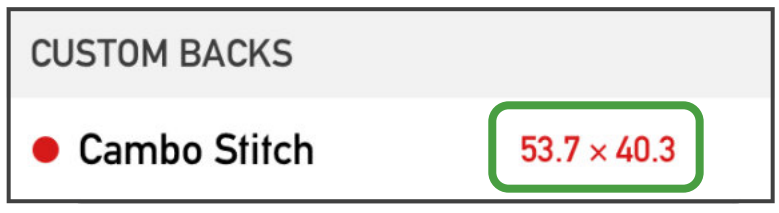
As done before, you can choose a back after choosing the camera body. Go ahead, choose the Cambo Wide RS-1050. Go to the *Backs* screen and tap the + sign in the top right corner.

If you are using film: **make sure that you use the exposed image area, not the external film dimensions!** The illustration on the right shows the difference between the two. You'll need an already exposed piece of film to measure these sizes.

Enter the dimensions we calculated above and tap the **Save** button.



The newly created custom back now appears on the backs list. You can modify a custom back anytime by tapping its red image size label.



Add lenses and save the virtual camera as usual.

Just one last important note regarding a Cambo camera, namely the X2-Pro. This camera allows you to mount regular Canon, Nikon, Fuji or Mamiya DSLRs behind a large format lens. In this case these regular cameras act like a back. In most cases the users will produce a stitched image with such a setup. The *Backs* screen does not list these regular DSLRs cameras, so you always have to create a custom back for the X2-Pro using the desired final image dimensions.

View Cameras with a DSLR or MILC as a Back

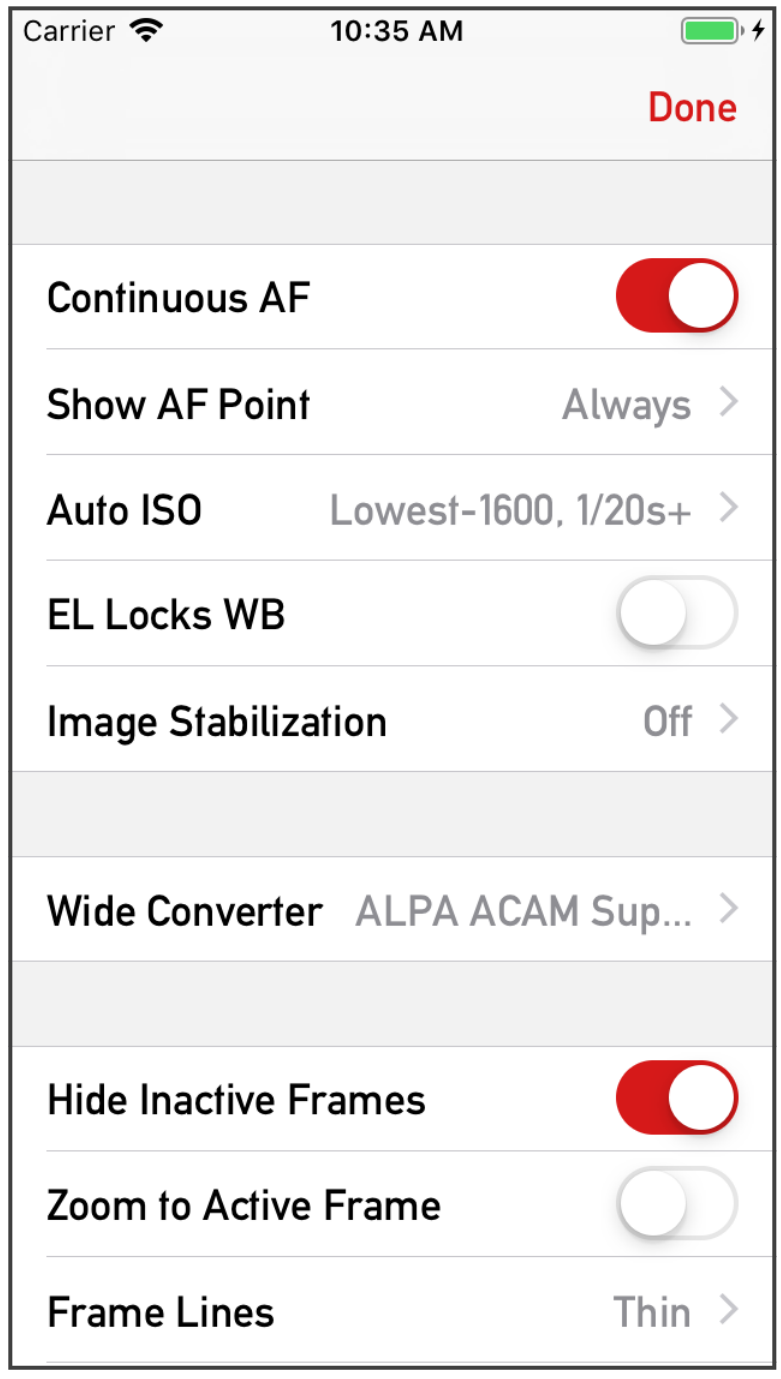
The Cambo Actus and the Arca-Swiss F-Universalis DSLR are two examples of view cameras that accept a DSLR or mirrorless camera in place of a film or digital back. You should set up Viewfinder for the DSLR or mirrorless camera in these cases.

For example if you have a Cambo Actus with a Sony A7R and 72mm and 100mm lenses, then you should choose the Sony A7R as the camera, and set the appropriate focal lengths. The Actus itself will not appear in the configuration.

If you are doing stitching with such a configuration, then you need to set up a custom camera as described previously.

The Menu

The menu is a new feature of the Mark II. It consolidates all app settings and some extra functions.



There are three kind of items in the menu: simple switches; items that allows selection from multiple values; and actions.

Let's go through all of the items and their possible values.

Continuous AF controls whether auto-focusing is executed continuously or just once when you tap the main screen.

Show AF Point controls how the translucent white indicator circle is displayed. In case you find it distracting, you can turn it off when AF is not in progress with choosing *During AF Only*.

Auto ISO controls auto-exposure calculation, and is discussed in the next section.

If **EL Locks WB** is on, then white balance is also locked with the EL button.

Image Stabilization has two or three choices, depending on whether your phone has optical image stabilization built-in or not. *Auto* lets iOS to do its automatic image stabilization magic, but it presents a few issues (such as the live image freezing for a moment during captures and reduced buffer depth), so it is *Off* by default.

Optical Only is available when your device has at least one optically stabilized lens. As the name implies, it only uses optical stabilization, and avoids Apple's digital stabilization. As a result, it can handle all shutter speeds and works even when RAW capture is enabled. I strongly recommend using it.

Wide Converter lets you select the converter you have. Please note that not all wide converters are supported on all devices. Also note that you have to activate *wide mode* to actually change frame lines. This item is not available on devices that does not support at least one converter.

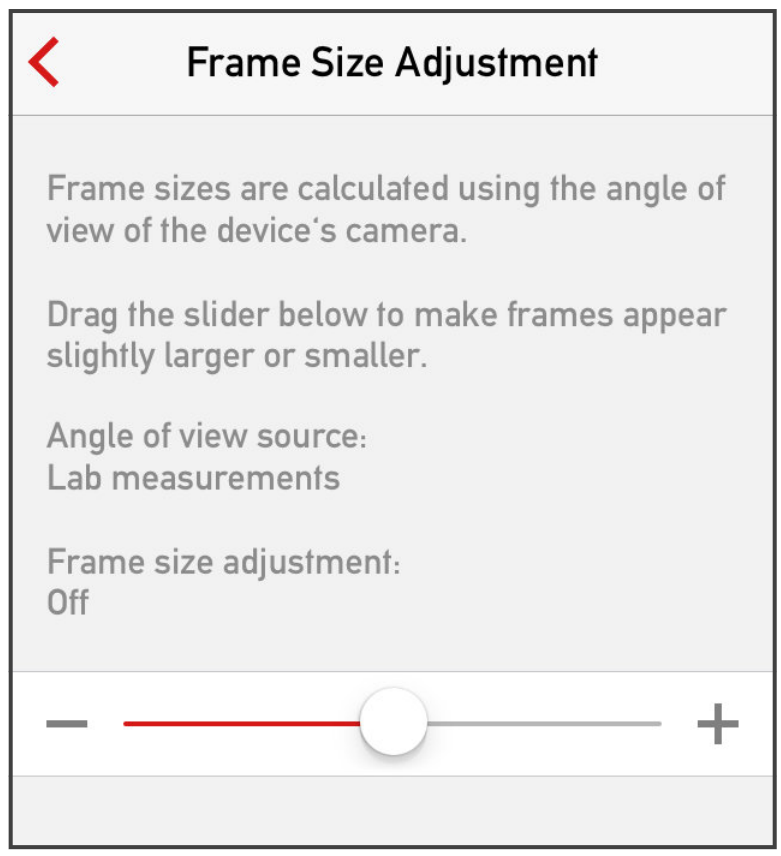
Custom Converter Setup is only displayed if you selected *Custom* in the previous item. The procedure of setting up the custom converter has been discussed earlier in this chapter.

By turning **Hide Inactive Frames** on, you change the default behavior of the app to remove non-masked and non-highlighted frames to reduce screen clutter. Of course when no masked or highlighted frame, all frames will be visible.

Zoom to Active Frame instructs Viewfinder to fit the active frame on the screen. It is described in detail in Chapter I.

Frame Lines allows you to choose between thin (default), medium, and thick frame lines to make the screen easily visible under any condition.

With **Frame Size Adjustment** you can slightly enlarge or shrink displayed frame lines. The range is +/-5%, in half percent steps. The adjustment is designed to overcome possible problems with *iOS provided* angle of view data, but you can even use it to adjust the *lab-measured* angle of view if your situation requires you to do so. But in general, it is not recommended to adjust the lab-measured angle of view.



On dual camera devices you can adjust the frame size separately for each camera.

The adjustment is stored per device type, so if you upgrade to a new iPhone, the adjustment value will be reset.

Review Time controls how long the app should display a review image after a picture has been taken. Possible values are *Off* and 1, 2, 4 and 8 seconds.

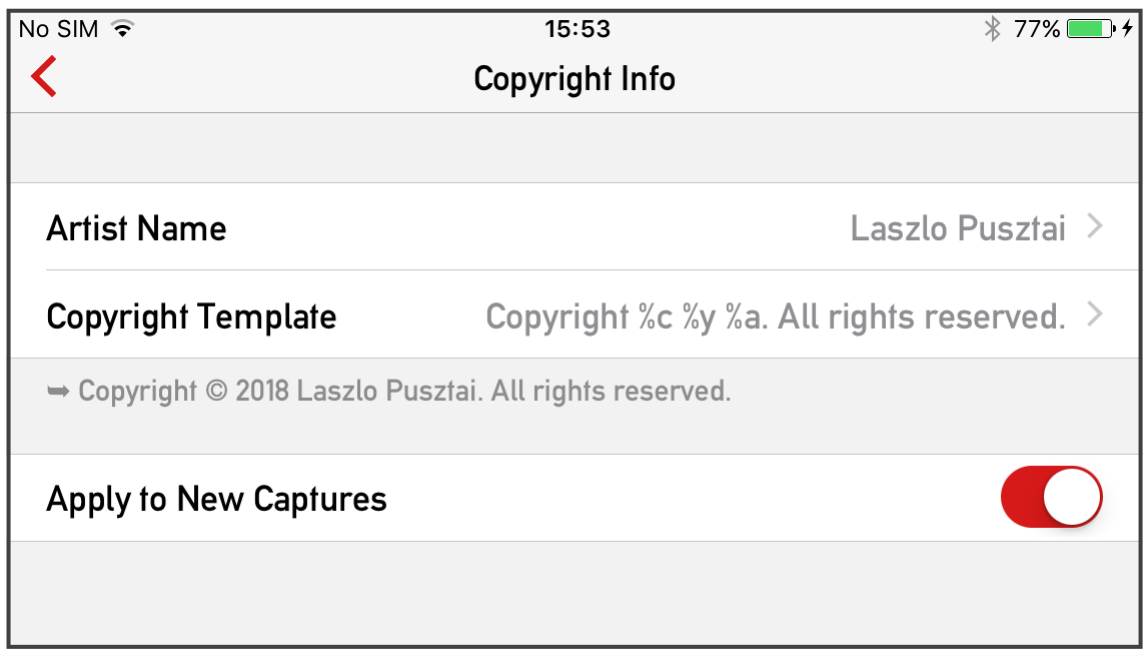
Store High Resolution Images allows you to enable storing full resolution images in *JPG*, and if the device is capable of recording those, *RAW* as well as *RAW+JPG* formats. RAW images are stored as DNG files. It is *Off* by default. Distortion correction and black & white filter are applied to high resolution JPGs, to the preview and thumbnail JPGs embedded into a DNG file, but not to the RAW data itself. Please be aware that DNG files take up a huge amount of space.

Auto Export lets you to automatically export any combination of the preview and high resolution images to Photos while a view package is created.

What is pretty neat is that you can separate the storage of previews from high resolution images (like shooting to different cards in a real camera). While previews are always stored in the app's catalog (you can't turn it off), you can auto export high resolution images to Photos with no need to duplicate them in the catalog. This is exactly how I use the app now, and it replaced the built-in Camera app in my daily usage.

With **Export to Album** you can choose the Photos album the app exports to. The default is *Viewfinder* (*eFinder* for eFinder II). To create a new album, just press the + sign in the top right corner.

Copyright Info allows you to embed artist and copyright metadata into each image file created by the app (previews as well as high resolution ones).



We have a separate artist field to accommodate the needs of photo agencies where the copyright holder and the image producing artist are different.

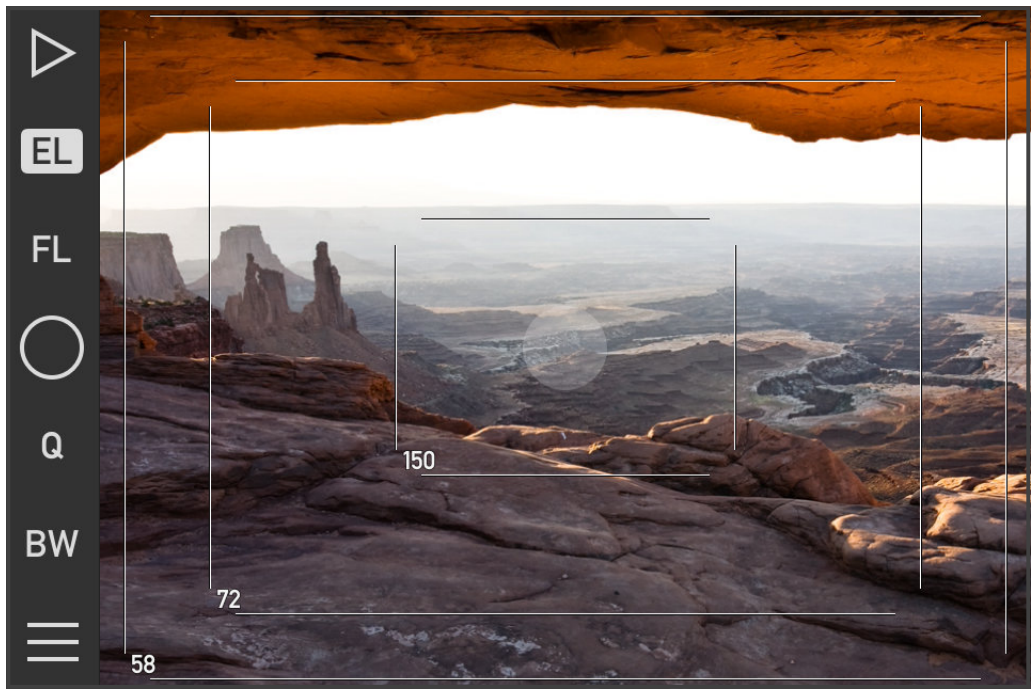
As you probably noticed on my example above, the actual copyright notice that goes into the image is created via a template. This saves you the need to type your name twice (once for the artist and again for the copyright notice), plus automatically updates the copyright year, so you won't run into problems next January.

Viewfinder has a default template that is active unless you create your own. This default is the same you see on the screen shot above. So you only have to type in your name to get proper copyright information in every image the app records.

Below the template field you'll see the template expanded. So you can immediately check that everything is set up correctly.

Since the app follows Metadata Working Group recommendations, the copyright symbol is inserted as a Unicode character. So please check that your systems support the same. For example Photoshop and Lightroom does. If not, you can always revert to using the (C) construct instead.

You also have the option to suppress inserting metadata into images should you need to do that. Simply turn off **Apply to New Captures**, and flip it back when you're done. Your carefully crafted copyright metadata will be instantly available.



Toolbar Theme lets you choose colors for the main screen's toolbar in the form of predefined themes. The now optional *Red on White* is what you see throughout this book. The default is *Dark & Neutral*, which makes the main screen completely neutral. This is what you see on the left.

Double Tap selects the action for double tapping the main screen. By default it is *Activate Frame Mask*, which means that triple tapping will highlight a frame. If you switch it to *Highlight Frame*, then triple tapping will be used to activate the frame mask.

Smart Function Keys contains all your key assignments in a single place. This includes the *Fn Key* (or three *Fn Keys* or large screen devices), and overrides for *EL* and *FL* buttons.

Fn Key in the sub-menu lets you choose the function for the main screen's *Fn Key*. Possible values are *Quick Lens Change*, *Change Aspect Ratio*, *Toggle ZoomFrame*, *Toggle Wide Mode*, *Toggle Black & White Mode*, *Toggle Telephoto Camera*, *3D Level* and *Parallax/Shift Tool*. *Toggle Wide Mode* is available only if the there's at least one supported wide converter for the given device. *Toggle Telephoto Camera* is present only on devices having a telephoto camera. There are two additional Fn Keys available on devices with 5.5" or larger screens.

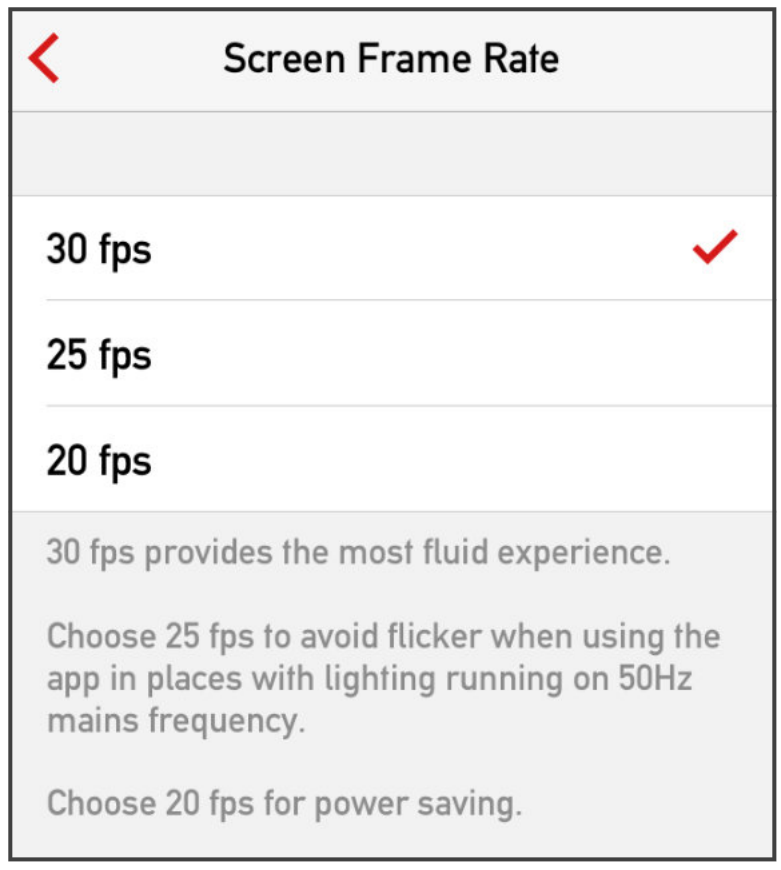
Override EL and **Override FL**, also in the sub-menu, allows you to change what the lock buttons do – at the expense of losing their original function. These buttons function as locks while the override is set to *Off*. You can choose from the same function set available for the *Fn Key* if you want override them.

Sounds & Haptics (or simply **Sounds** on devices without haptic feedback capability) consolidates all options related to app generated sounds and haptic feedback. When turned on, **AF Finished Beep** emits a beep when focusing completes. **Other Sounds** control whether other interface sounds, such as exposure correction reset, are emitted at all. My personal preference is to turn all sounds off, and rely on haptic feedback (controlled by the aptly named switch) only.

Track Logging controls whether GPS track logging is enabled (when set to *Foreground Only*). Track logging will be discussed in depth in Chapter IV. It is *Off* by default, so you have to turn it on manually.

Manage Track Logs allows you to delete and send GPS track logs. This function will be discussed in depth in Chapter IV.

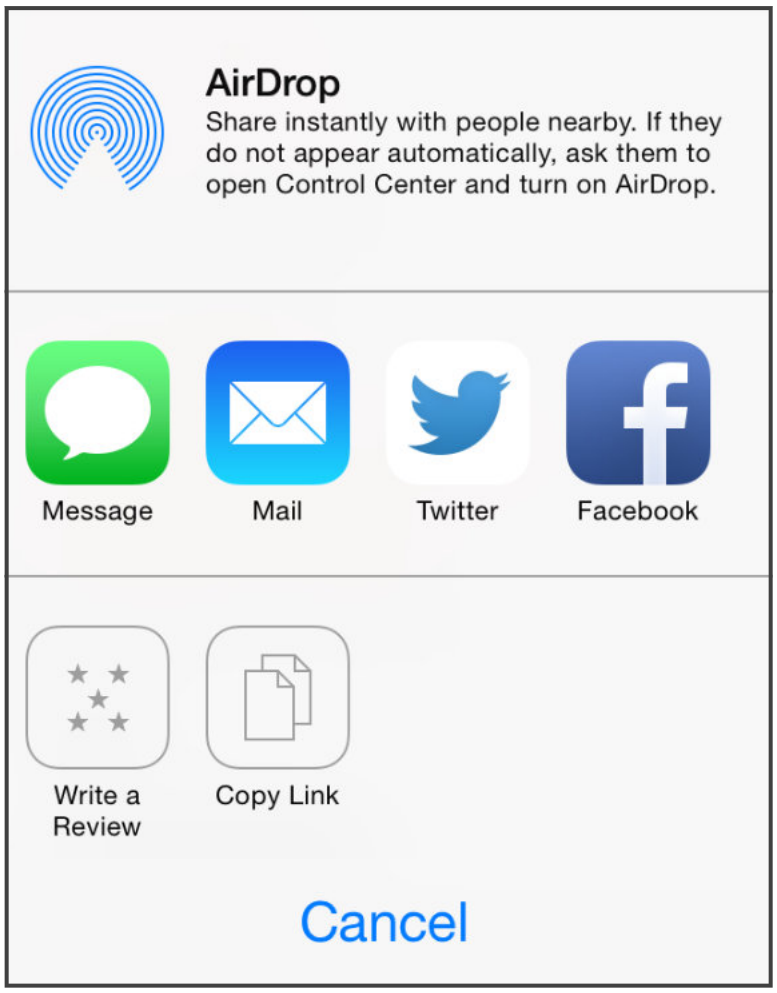
The first item under the **Advanced** sub-menu allows you to control the **Screen Frame Rate**.



This replaces the former *Power Saver* display processing mode, 20Hz being recommended for power saving.

25Hz is here to avoid interference artifacts with indoor lighting running on 50Hz mains frequency.

The other item in the **Advanced** sub-menu, **Rebuild Catalog** is used to rebuild the Catalog after restoring views. The Catalog is the subject of the next chapter.



About and **Acknowledgments** display credits and legal information.

While all red colored actions are rather self-explanatory, I would like to talk about three of them.

You can easily share your love towards the app with **I Like This App!**

It doesn't cost you a dime, but spreading the word helps us to bring exciting new features to the app faster.

Thank you for letting your friends – and even complete strangers – know about the Mark II!

But please do not use reviews as a feedback or bug reporting channel!

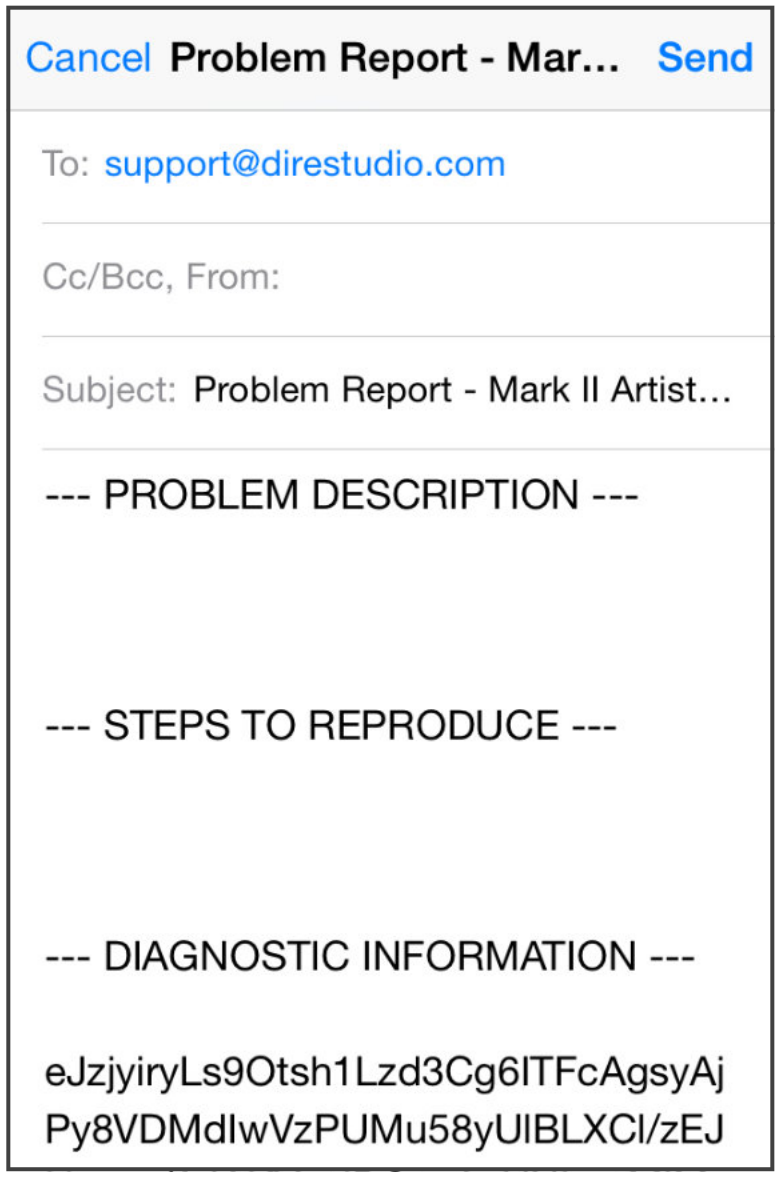
Use the **Report a Problem** menu item instead. It's the fastest way to get in touch with us – and you are not required to have an actual problem to use this feature.

We can fix only what we can reproduce in the lab – so with the exception of trivial cases it's important to tell us not just what the problem is, but also how can we make it happen.

Screen shots are also of great value. You can send them separately from this mail.

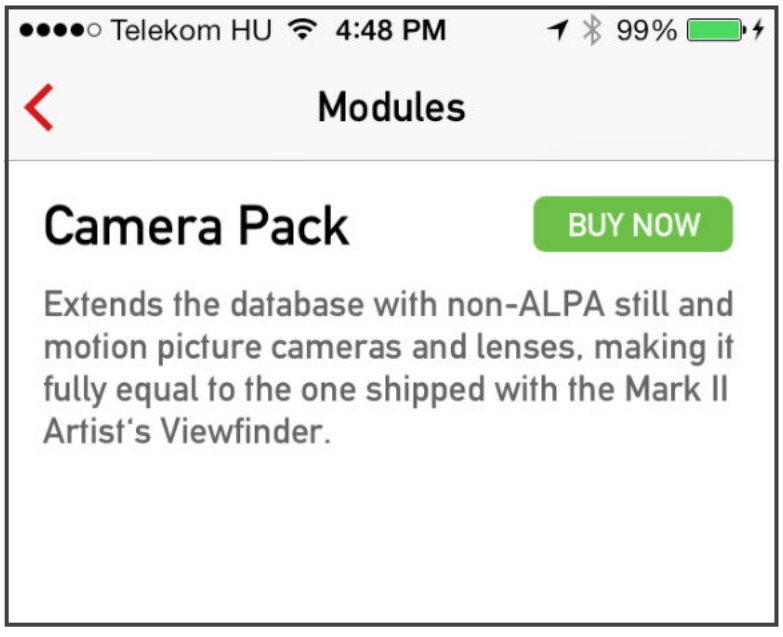
The *diagnostic information* section contains information about the app's environment: which device are you using; iOS and Viewfinder version numbers; as well as the result of some basic diagnostics.

The app automatically attaches console logs from the last 10 runs. These logs contain potential error information.



Please refer to our Privacy Policy (https://www.direstudio.com/legal/privacy-policy/) for personal information content of these reports.

The **Privacy and Device Settings** menu item brings up the Settings app directly with Viewfinder specific privacy settings. You can control location services (GPS) usage, camera and photos access there, in a single place.



ALPA eFinder II contains another item, **Module Store**. You can make eFinder completely equivalent to the Mark II Artist's Viewfinder by purchasing the Camera Pack.

There are no other modules at this time.

The *Module Store* needs to access Apple's servers through the Internet to list available modules and to execute the actual purchase. So make sure that you have network access before purchasing modules.

Purchasing goes exactly the same way as in the App Store.

If you happen to restore or reinstall your device, or just want to have a newly purchased module available on all other iOS devices you use, tap the **Restore Previous Purchases** button. The module store will check what modules belong to your Apple ID and activate them. Even if any module can be downloaded for the second time for free, restoring all the purchases is more convenient.

Because module purchases unlock parts of the underlying database, virtual camera editing is disabled while the selected module's purchase completes. You will be locked out from configuration even if you exit and restart the app. The best thing you can do is initiate the purchase only if you have a reliable network connection and wait while the purchase completes without leaving the *Module Store*.

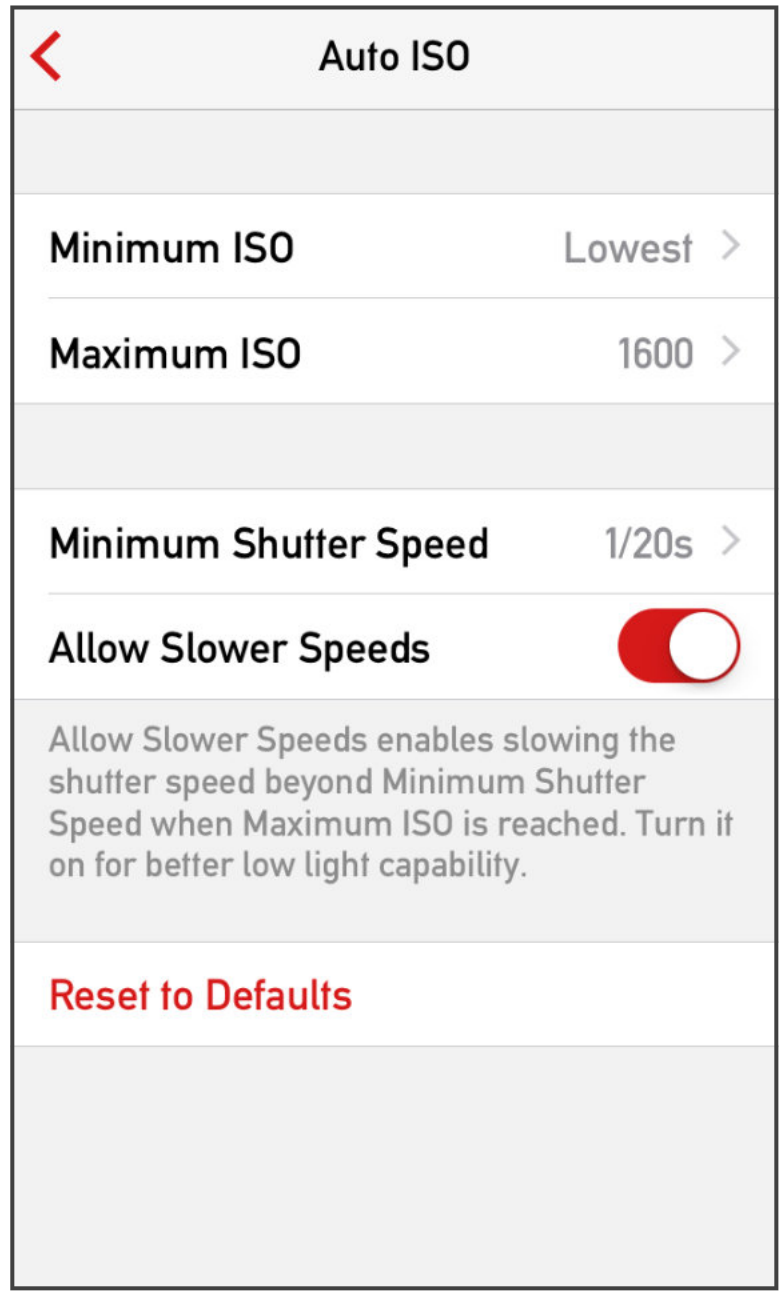
Auto ISO

Viewfinder inherits the auto-exposure calculation algorithm from our Technical Camera app (https://www.direstudio.com/technical-camera/), meaning that you have complete automatic ISO control. With capabilities usually found on higher-end cameras. Auto ISO is always active during auto-exposure calculation, even when you set exposure compensation.

You specify the allowed range with **Minimum ISO** and **Maximum ISO**. The range for minimum is 25-400 plus *Lowest*, and for maximum it is 50-1600 plus *Highest*. Both in whole stop increments. But wait, what *Lowest* and *Highest* means?

Let's take my iPhone 7 Plus for example. The native ISO range for the wide angle camera is 22-1760, for the telephoto 20-1210. These values do not fall onto whole stop boundaries. Lowest and Highest are a way to use the ends of the native ISO range. So if you set minimum to Lowest on the 7 Plus, then the auto ISO algorithm will use ISO 22 as minimum for the wide camera and ISO 20 for the telephoto. This gives a slight quality advantage over using the whole stop ISO 25 value.

The auto ISO algorithm has two additional settings in Viewfinder's fully automatic exposure mode. With **Minimum Shutter Speed** you can specify the preferred slowest



shutter speed. The app will begin increasing ISO from the minimum when light is low and this shutter speed is reached. If there's enough light to work at minimum ISO, then we'll begin to increase the shutter speed. That is, the algorithm maintains the lowest ISO possible (to avoid higher ISO noise). The range for the shutter speed minimum is 1/20 – 1/4000 seconds, in full stop increments. Given the very short focal length of the iPhone /iPad lenses, 1/20s is hand-holdable without an issue.

But why isn't that minimum even lower? The answer is screen refresh rate. With an 1/5s exposure you can't keep a 20-30fps refresh rate, it will drop to 1/5s. And not just that, but exposure calculation and response to lighting changes also becomes slower. That's why we chose the 1/20s default – as a good practical balance.

There's a trick, however. By turning on **Allow Slower Speeds** the app will lengthen exposures beyond 1/20s in case the maximum ISO is reached. This could be very handy in low light situations, landscape photographers routinely find themselves in.

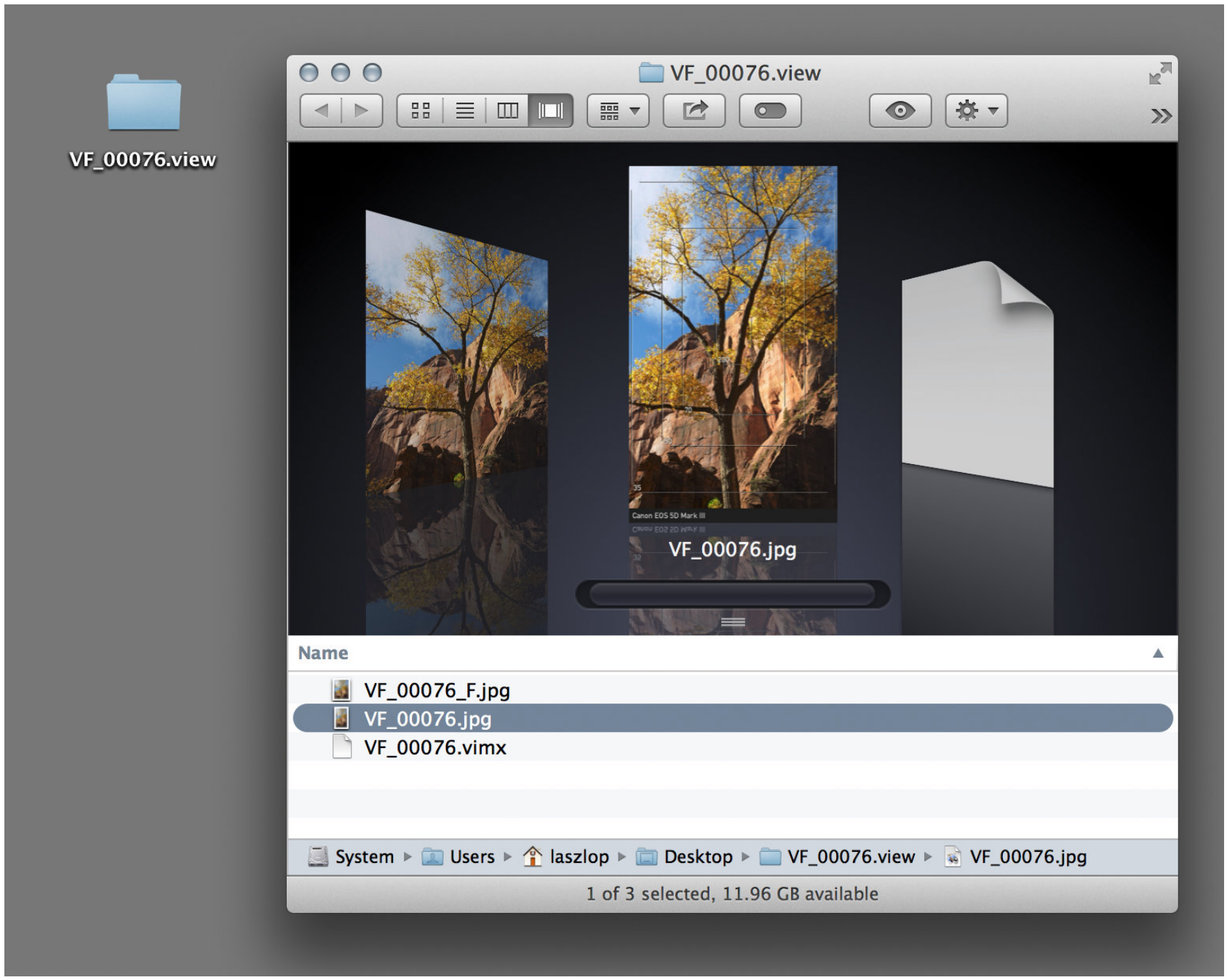
Don't be afraid to experiment with these settings, since you can always reset them to factory defaults with **Reset to Defaults**.

Chapter III - The Catalog

The View Concept Revisited

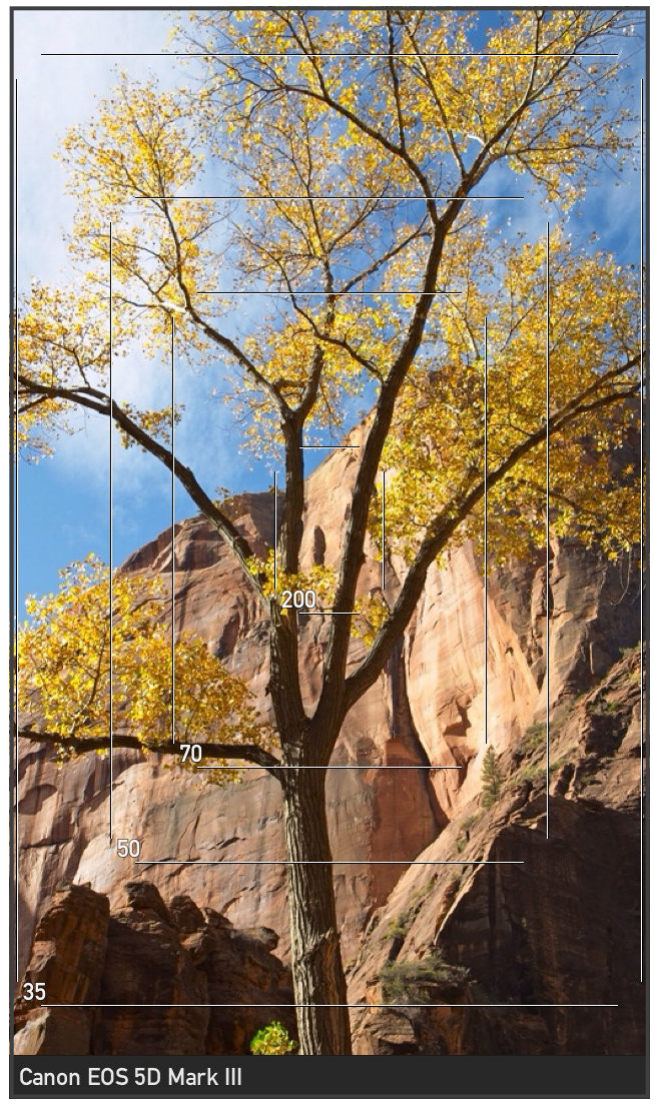
I mentioned in Chapter I that the center of the main screen is called a *view*, which you can save for later use as a *view package*. You might be wondering why we don't call these things "pictures", "images" or "photos". The reason is simple: a *view* (it is how we call it) is actually more than a photo. It contains a preview image, optional high resolution JPG and/or RAW, along with a special XML metadata file (with .vimx extension). And it is ready to encompass even more information in the future.

Each view is a standard macOS document package – a folder if you wish – with the *.view* extension. The following screen shot shows how a view package looks in Finder.



The preview JPG's name is the same as the view package's, VF_00076.jpg in the above example. High resolution images have an F appended to the file name, this is the VF_00076_F.jpg file above.

The *preview* is a "screen shot" of the main screen's view area, with the same dimensions and aspect ratio. It contains the frame lines, cardboard finder frame, and *ZoomFrame* overlaid on the image. In addition to these, the virtual camera's name is added below the image. Distortion correction and the black & white filter are applied to this image.



The *full resolution image* is clean, with no frame lines and such. It is always in the iPhone camera's 4:3 aspect ratio. If you zoom in on the main screen, this image will be cropped accordingly (unless you have RAW capture enabled).

The *metadata* file contains information about the simulated equipment (camera, back and all the lenses), plus location information (GPS coordinates). Viewfinder's built-in catalog uses this metadata to create emails or display the location of the view on a map. Other applications in the future can take advantage of this data. (The .vimx schema is publicly available. So if you are a developer who wish to handle view packages, please contact us.)

Contents of a .vimx file is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<view version="1.0"
 name="VF_00076.view"
 creator="Mark II Artist's Viewfinder 3.1 (593) - http://www.artistsviewfinder.com"
 created="2014-02-13T09:27:35Z"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns="http://www.direstudio.com/Schema/View/1/0"
 xsi:schemaLocation="http://www.direstudio.com/Schema/View/1/0
http://www.direstudio.com/Schema/View/1/0/View.xsd">
    <equipment>
        <body width="36" height="24">Canon EOS 5D Mark III</body>
        <lens focal="17"/>
        <lens focal="24"/>
        <lens focal="35"/>
        <lens focal="50"/>
        <lens focal="70"/>
        <lens focal="200"/>
        <lens focal="300"/>
    </equipment>
    <location lat="37.284967541" lon="-112.947656171"/>
</view>
```

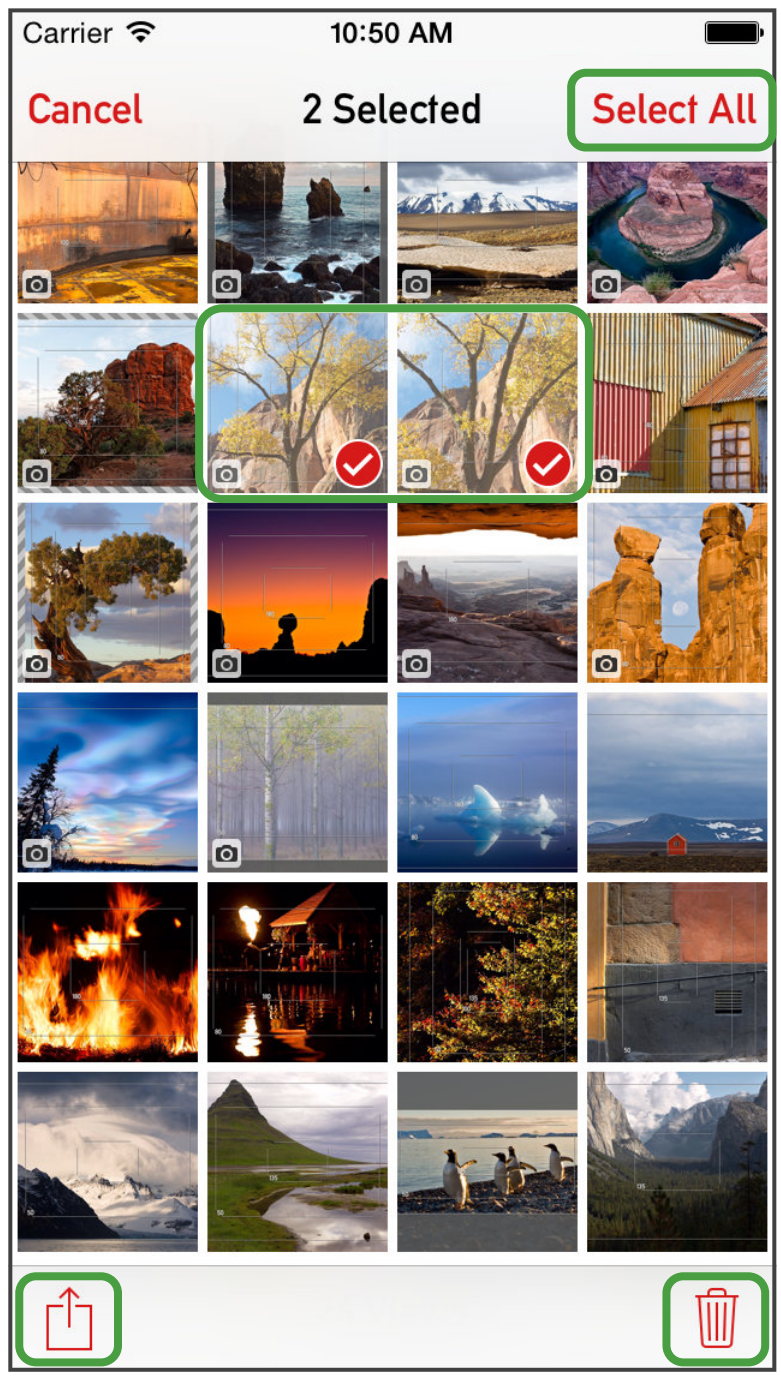
Of course both JPEGs contain GPS coordinates in their EXIF information. I'll show you in Chapter IV how can these coordinates be used to put your views on a map.

Managing Views - Enter The Catalog

Viewfinder has a private location for storing your views – called the *Catalog*. This allows the app to add metadata to the recorded images. This also lets you separate work done with Viewfinder from your family snapshots. The catalog works basically the same way as the Photos app.

The catalog consists of two parts: the *browser* (what you saw on this chapter's title page) and the *inspector*.

When you open the catalog for the first time it will open the *browser*. But later on it will remember the screen where you closed it with the **Done** button – and bring back the same screen when you re-open it.



The Browser

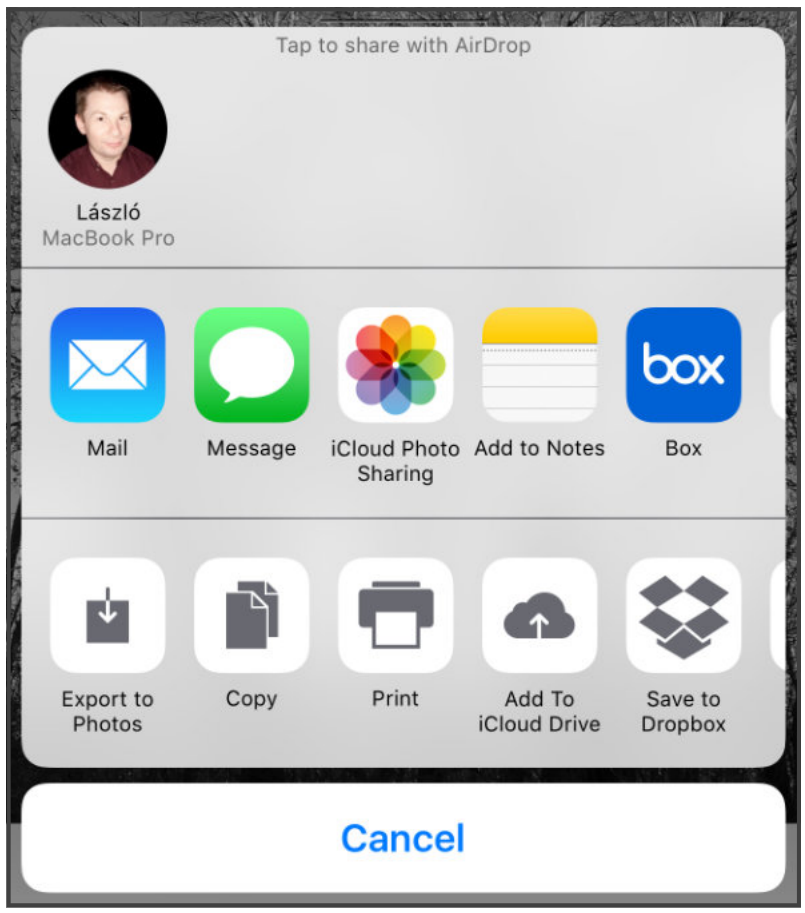
The browser displays all views contained in the catalog. New ones are added to the bottom, and the browser automatically scrolls to the bottom when the catalog opens on this screen.

Little camera badges indicate when a view have a full resolution image, and an **R** badge if you have a RAW.

Tapping **Select** will put the browser into selection mode. Tap a thumbnail to select it, and tap a selected one to deselect it. Tap **Cancel** to get out of selection mode.

Select All – as the name would imply – selects every single view currently in the catalog.

You can either delete or export the selected views. Deleting is self-explanatory – just use the trashcan icon and confirm the deletion.



You can email up to 20 views at a time on 64-bit devices, and up 10 on 32-bit devices.

Remember Steven from Chapter I? This is the feature he uses to send his equipment needs to his favorite rental house.

Export to Photos will export the selected views to iOS' built-in *Photos* (the place you see in the Photos app).

Make your choice and Viewfinder starts exporting the views in the background – which means you might need to wait a bit while the exported images become available in the Photos app.

The background export continues even if you press the Home button on your device and start working in another app.

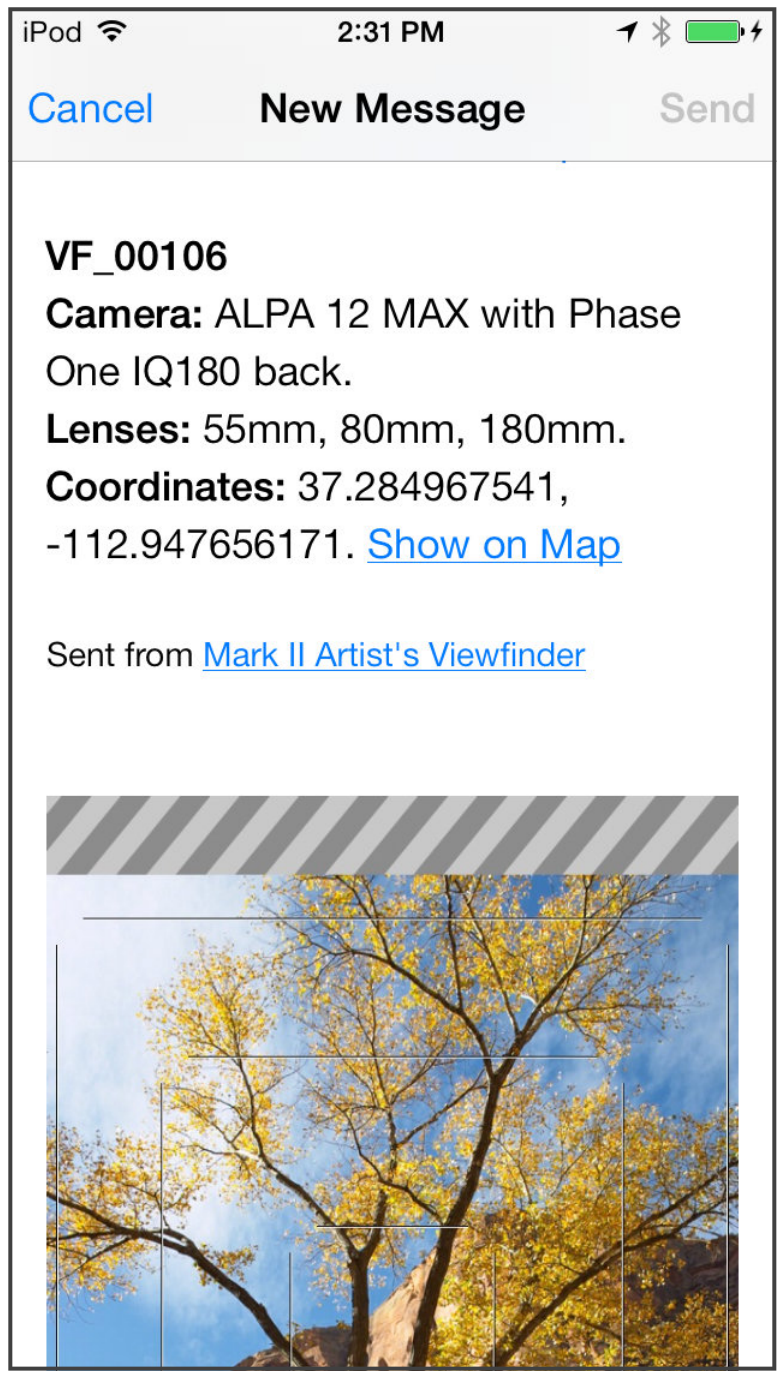
Selection is automatically cleared and selection mode is canceled when the export completes successfully.

There's no limit on the number of views that can be exported to Photos.

Tapping the export icon (arrow pointing out of a box) brings up the a standard iOS sharing and actions sheet shown on the left.

You can choose from several activities: emailing the selected views, exporting them to *Photos*, printing, plus others added by iOS automatically, including apps that can handle the shared images (such as Box or Dropbox shown on the screen shot).

Mail will create a new message containing your virtual camera configuration, the preview and the view's GPS coordinates. There's also a *Show on Map* link that will open the given location in Google Maps.



AirDrop is my favorite of all the sharing methods. It's the easiest and fastest way to get views off my phone onto my Mac. There's a few things you should know about AirDrop, however.

Images transferred to a Mac will end up in the *Downloads* folder. If you happen to transfer the same image multiple times a sequence number will be added to the end of the file name – so don't worry about overwriting things.

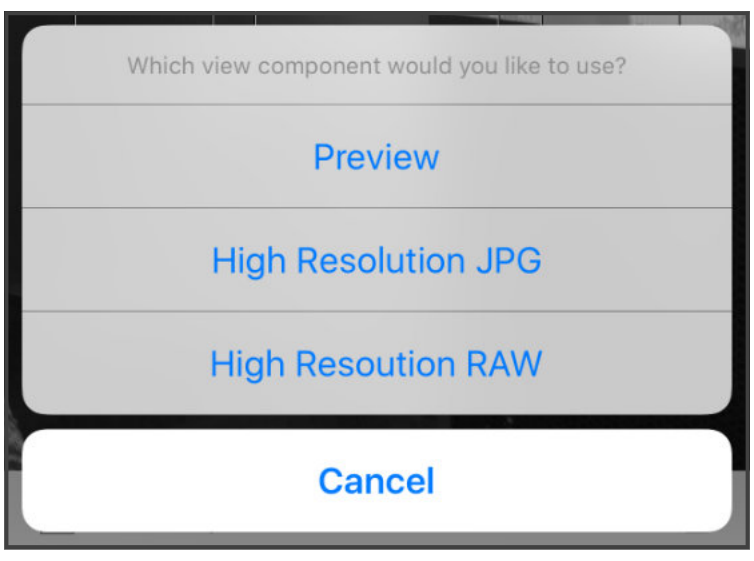
While AirDrop is a great technology in general, there's one grossly ill-designed aspect: you must not close the sharing sheet until the transfer has completed (despite the inviting Done button), otherwise you may end up with zero byte images.

There's no limit on the number of views you can transfer using AirDrop.

Printing could be a fun and productive tool to share views with your teammates or workshop participants. Just grab a small 4x6" AirPrint-capable printer and a permanent marker to draw on the images to illustrate concepts.

If you need to insert a view into a document you are writing, the Copy action is a really convenient tool.

Both printing and Copy has the same 20/10 image limitation as sending and email.



All sharing and export methods use the preview images stored in the views by default. But you have the option to export the high resolution images or RAWs (in case you turned on recording those). Long tap the export icon, and you can choose the view component actually present in the selected views.

In addition to the methods mentioned, iOS may add additional actions and apps to the sheet (like sharing in a Message, iCloud Photo Sharing, etc). The listed actions and apps are all capable of working with image data, and you can choose the view component to use with all of them in the same way described above. The 20/10 limit is also applied to all those, except that some apps impose lower limits on the number of images they are willing to accept.

The Inspector

Tapping any of the thumbnails in the browser will open that view on a screen called the *inspector*.

Controls on the inspector screen will fade away after if you tap the screen – they are brought back with another tap.

You can swipe horizontally, or use the arrow buttons on the toolbar to move between views.

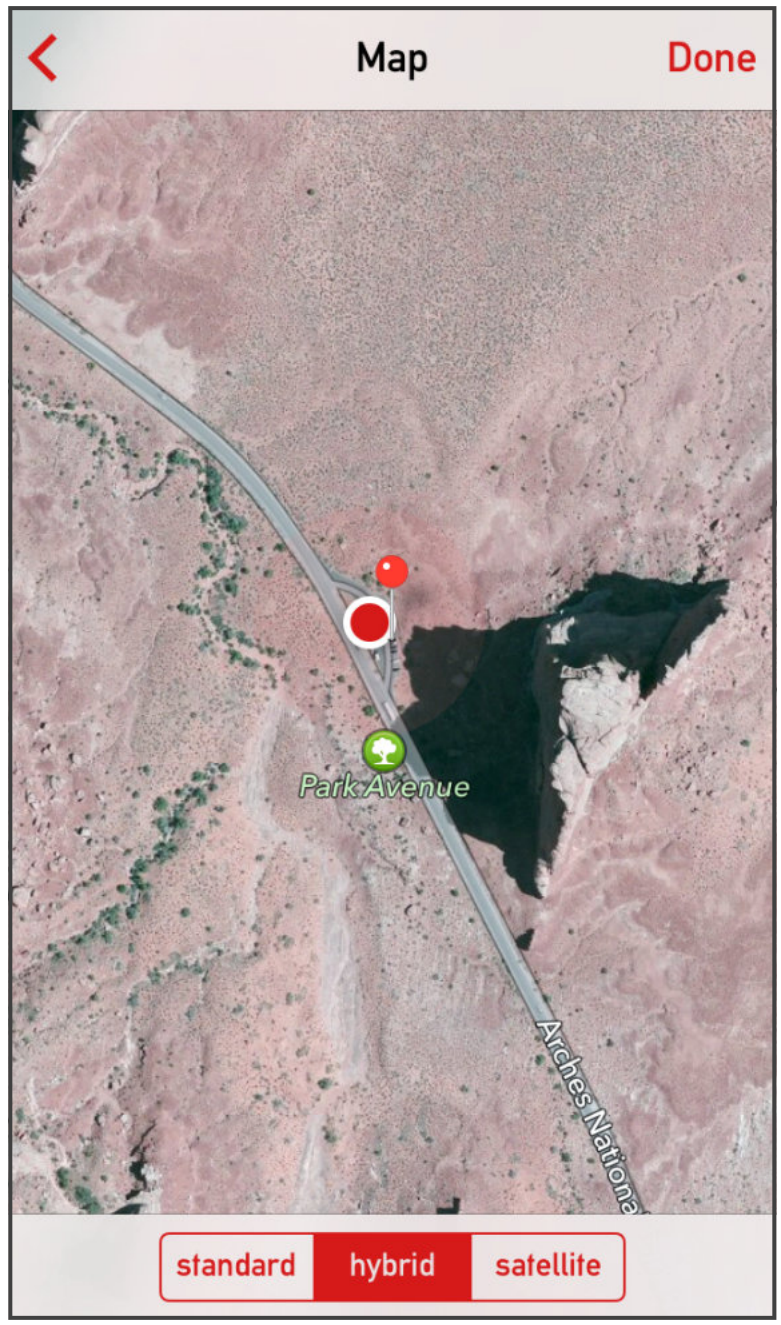
The trashcan will delete the currently displayed view and move to the previous one. Deleting the last view will return you to the *browser*.

Exporting works the exact same way I described it in the previous section.

The pin icon will display the view's location on the map. If there's no GPS information in the view (because for some reason there was no GPS signal or because location services was disabled on your device), the button will be grayed out.

The red pin on the map is where the view was recorded, and the red dot is your current location – making it easy to navigate back.

Have you ever been is a situation when you saw something interesting and forgot the



exact location? This feature could help you out in these kind of situations. It saved my day a couple of times.

Important: *Just like with the Maps app, you need Internet access for this feature to work.*

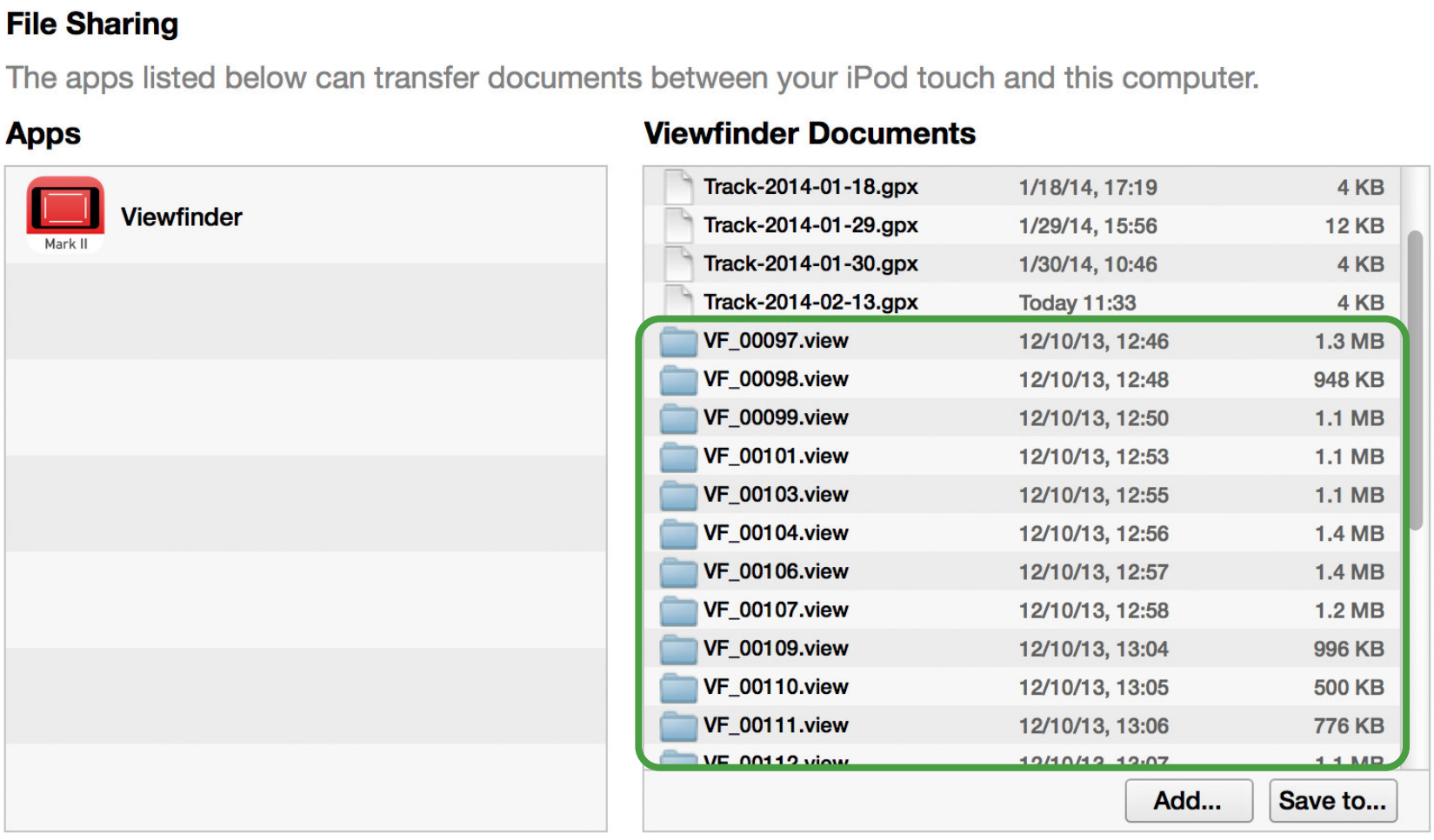
The default map type is the standard, low bandwidth, street map. But you can switch it to satellite and hybrid if you prefer those.

When sufficient bandwidth is available, I recommend using the hybrid view because showing only the roads only is not really helpful when you are out in the field – sometimes far from any roads.

Backing Up and Restoring Views

View packages can be downloaded from and uploaded into the app via *iTunes File Sharing*. By downloading views you can create a backup, and you can restore all your views (or just a few) by uploading them into the app.

You need to connect your device to a Mac or PC running iTunes for this operation.



To download a view either drag it from the iTunes window and drop into your folder of choice, or select the view and click the **Save to…** button. Of course you can select and download multiple views at once.

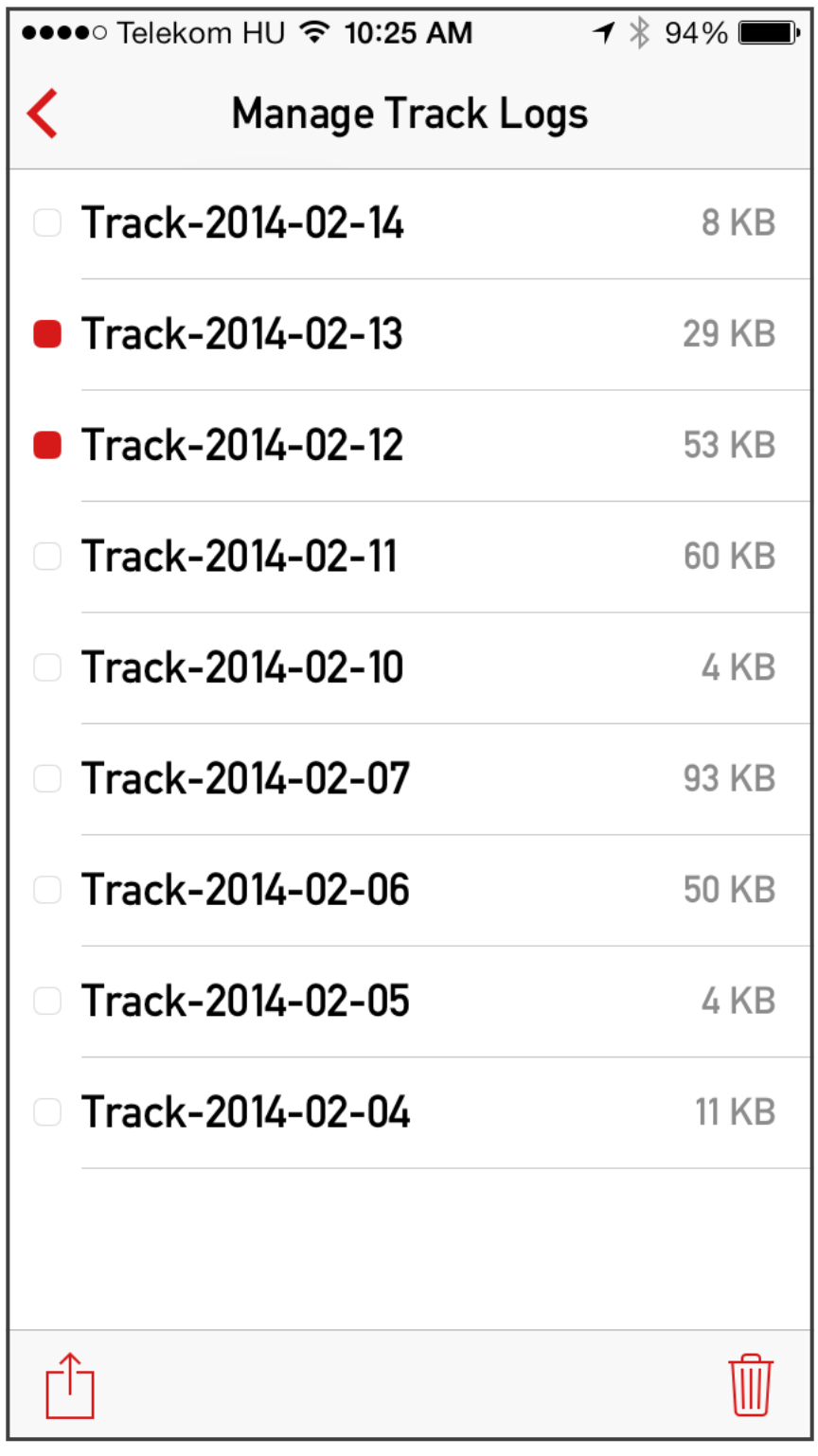
> ***Important:*** *It is not possible to delete views in iTunes! You can only download them. Use the Catalog on the device for this purpose.*

To upload a view either drag it from your folder and drop it onto the iTunes window, or press the **Add…** button. Of course you can upload multiple views at once.

> ***Important:*** *Uploading (restoring) views will leave the Catalog in inconsistent state. You must rebuild the Catalog every time you restore views by using the* ***Rebuild Catalog*** *item in the app's menu.*

> ***Important:*** *If a view with the same name already exists, iTunes may not be able to overwrite it. Delete the view from the Catalog first in this case.*

Chapter IV - GPS



Viewfinder is equipped with a couple of handy GPS features: you can check the signal at any time with the accuracy feedback on the *Quick Control Screen*, and GPX format track logging records location information that can be later merged into your digital images. GPS data is also saved in the image's EXIF information. So GPS-aware applications, such as Adobe Photoshop Lightroom shown below, can place your views on a map.

This is ideal for evaluating a location scout's results. Because each view contains two JPEGs (the preview and the full resolution), every location will appear twice if you just import the views into Lightroom.

GPS consumes a lot of energy and can drain your battery quickly. To conserve battery capacity the app manages GPS intelligently, only running it for 2.5 seconds every 15 seconds. We also turn it off when the app is in the background – but not when the device is locked while Viewfinder is the foreground app. This is what I recommend to use for track logging: just lock the device while the app is active.

Accuracy Feedback

There are two kinds of location information that iPhone/iPod devices can collect: WiFi-based location in case of iPods and real GPS signal processing on iPhones (and cellular-equipped iPads). The former provides 100m accuracy at best, while the latter is capable of 10m or better precision.

There is an accuracy indicator on the bottom of the *Quick Control Screen* that helps you decide how good is the current GPS signal.

Location services is disabled globally on the device or for Viewfinder.

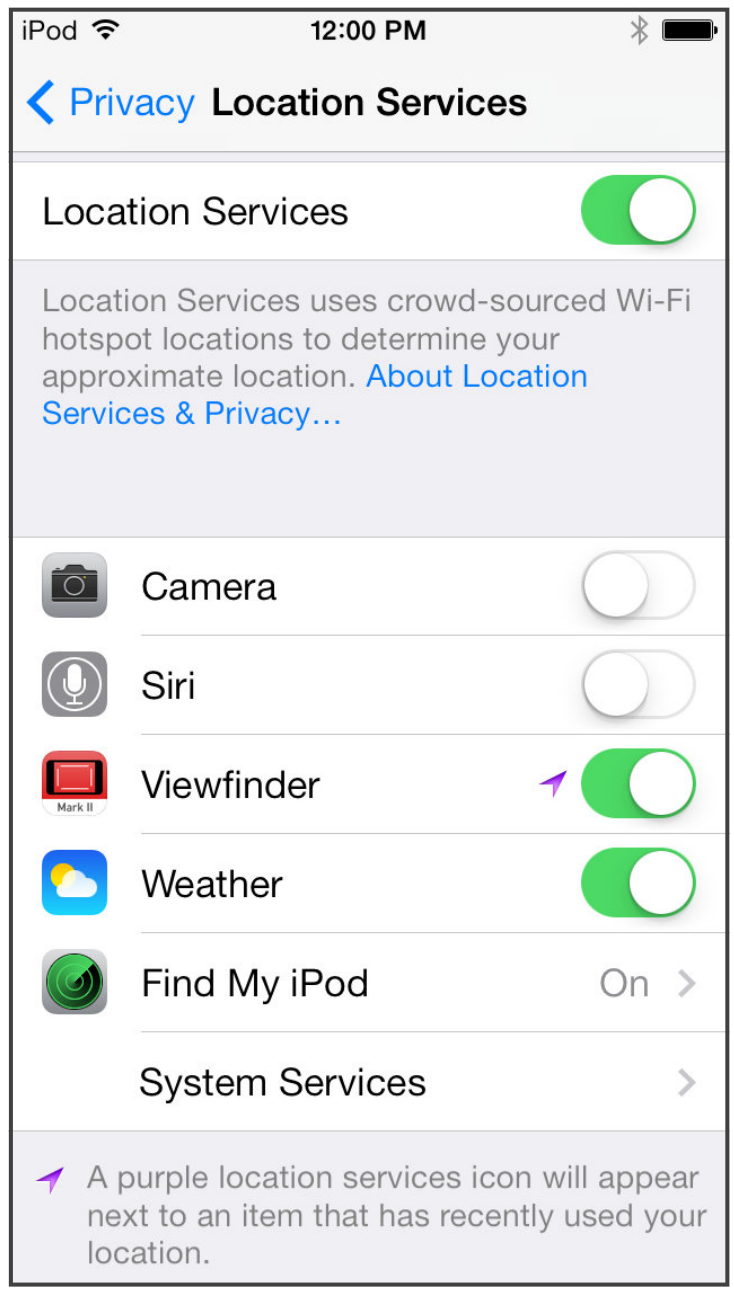
Acquiring position.

Accuracy is 100m (328 feet) or better.

Accuracy is 50m (164 feet) or better.

Accuracy is 10m (33 feet) or better.

Note that if you don't have at least 100m accuracy then there will be no GPS coordinates recorded into saved views – simply because the device was not yet able to determine its location. So I recommend to periodically check for this indicator to avoid the "missing coordinates" problem. When you save a view we turn GPS on immediately to try to get a coordinate. If that also fails then you'll end up with a view with no GPS coordinates.



Viewfinder asks for your permission to use your location when you start it for the first time.

All its GPS functionality will be disabled if you don't allow this. You can change it later on, however. Just open the Settings app and go to **Privacy > Location Services**.

Both the global *Location Services* setting and the one for Viewfinder should be turned on to let the app to use the GPS. Turn either off, and Viewfinder will not append GPS coordinates to views and will deactivate track logging.

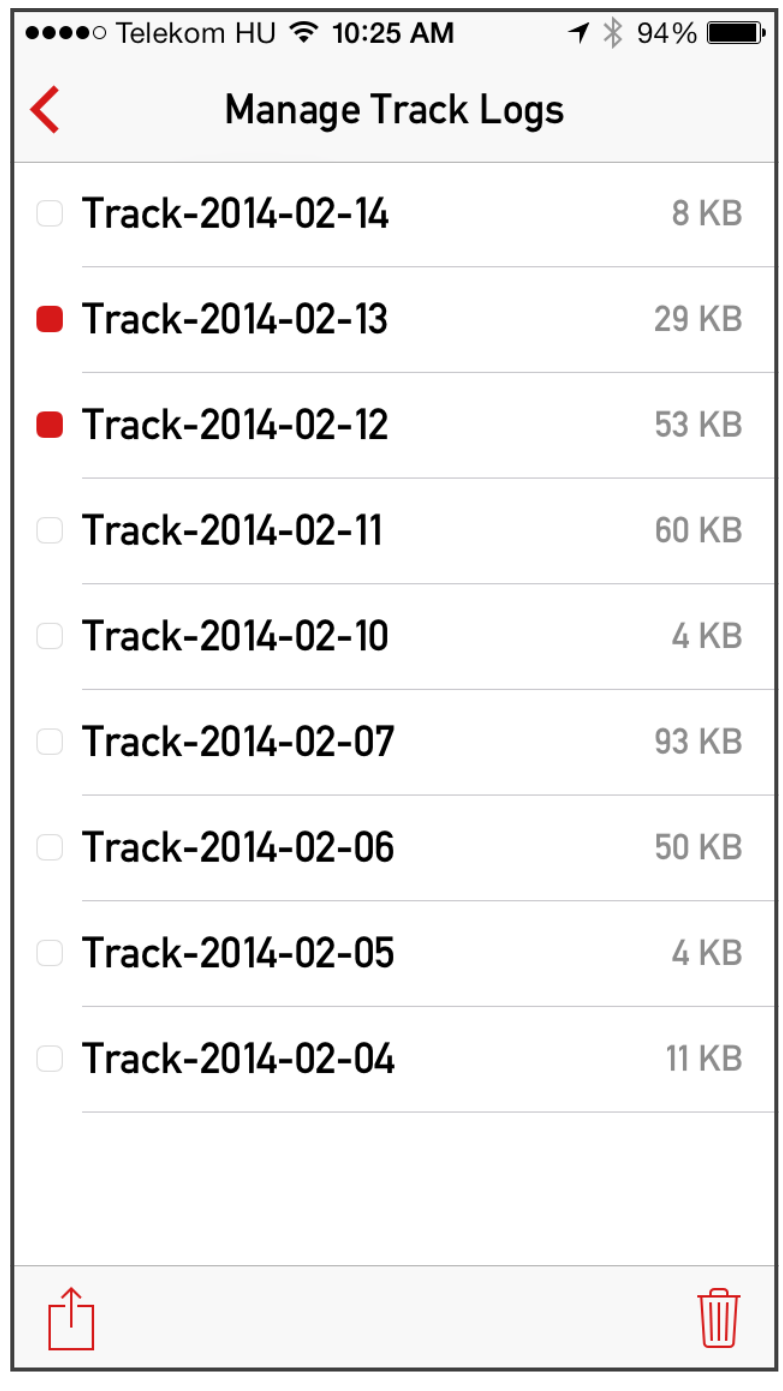
Track Logs

Track logs are saved in standard GPX format. A new GPX file is created per day. Points are logged every 15 seconds if your device was able to acquire a coordinate and if accuracy is 100m or better.

Logging is active only if the app is in the foreground – but you can lock the screen to save power. In other words, it will be turned off when you switch to another app.

Why no background logging? The reason is that Apple does not provide a way to run our optimized track logging code while the app is in the background. We either run logging all the time, burning through the battery rather quickly, or have 1.5km accuracy. Not to mention that Apple doesn't let the first method through the App Store review – I know it from experience...

To get the logs out of the app you can use two methods: its Manage Track Logs screen or iTunes File Sharing.



Manage Track Logs is similar to the catalog browser – you can select logs and either delete or mail them.

You can even delete the current day's log, but it will be re-created when the next logging turn comes – in 15 seconds.

Logs are also accessible through iTunes File Sharing. Just drag or save any of the GPX files from iTunes – it is the same as I described for downloading views. There's a little difference, though. You can delete any of the GPX tracks via iTunes.

If you happen to kill the app from the task switcher you can interrupt its work right in the middle of appending to the track log. This is highly unlikely to happen, but there's still a small probability.

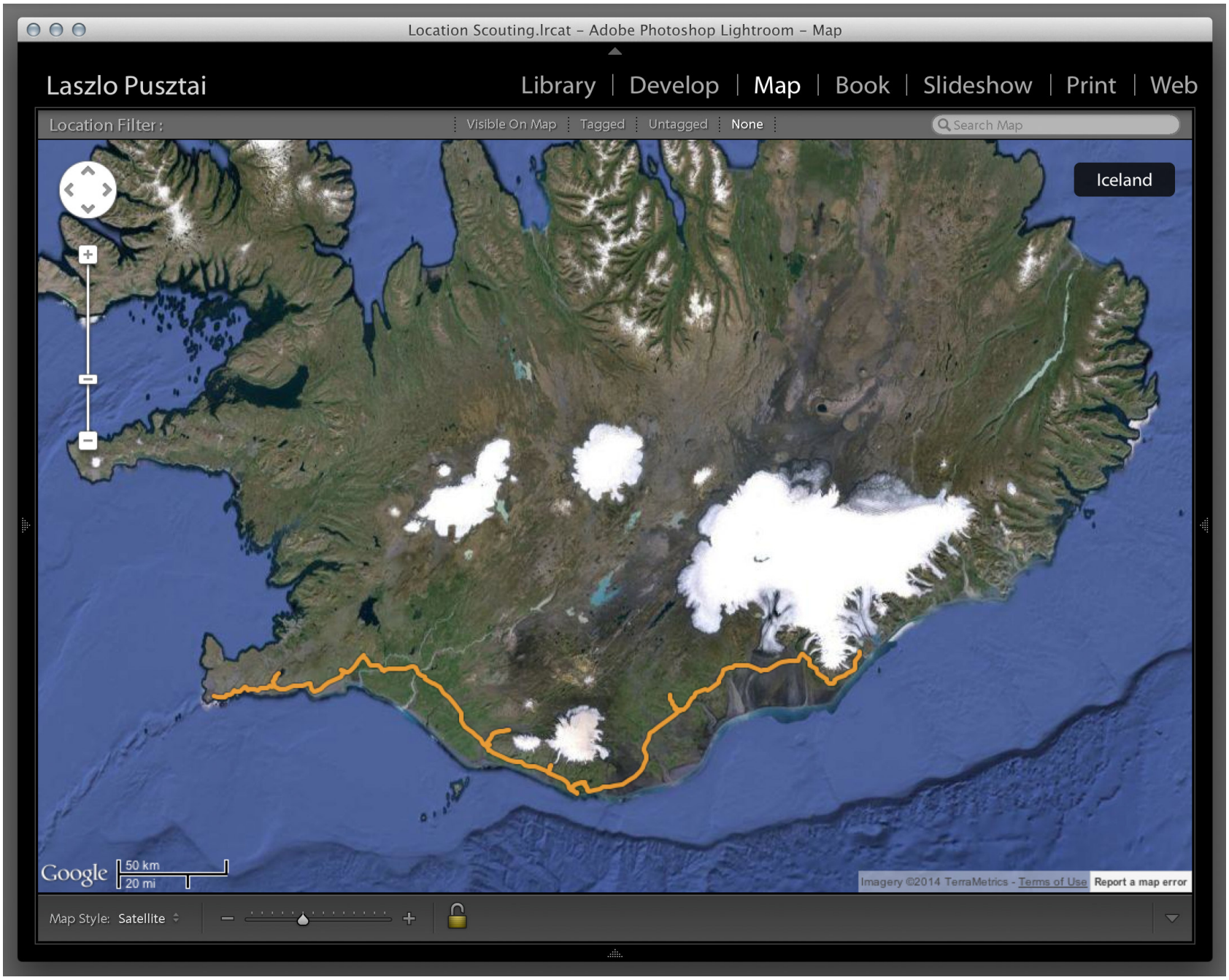
Viewfinder will automatically repair such logs the next time it appends the current location, but if you download the log through iTunes after killing the app, you might end up with a corrupt track. But it's easy to repair.

There are two methods:

- If you are on the same day, disconnect your device, restart Viewfinder, press the Home button to put the app into the background, then reconnect the device. You'll be able to download the file correctly.

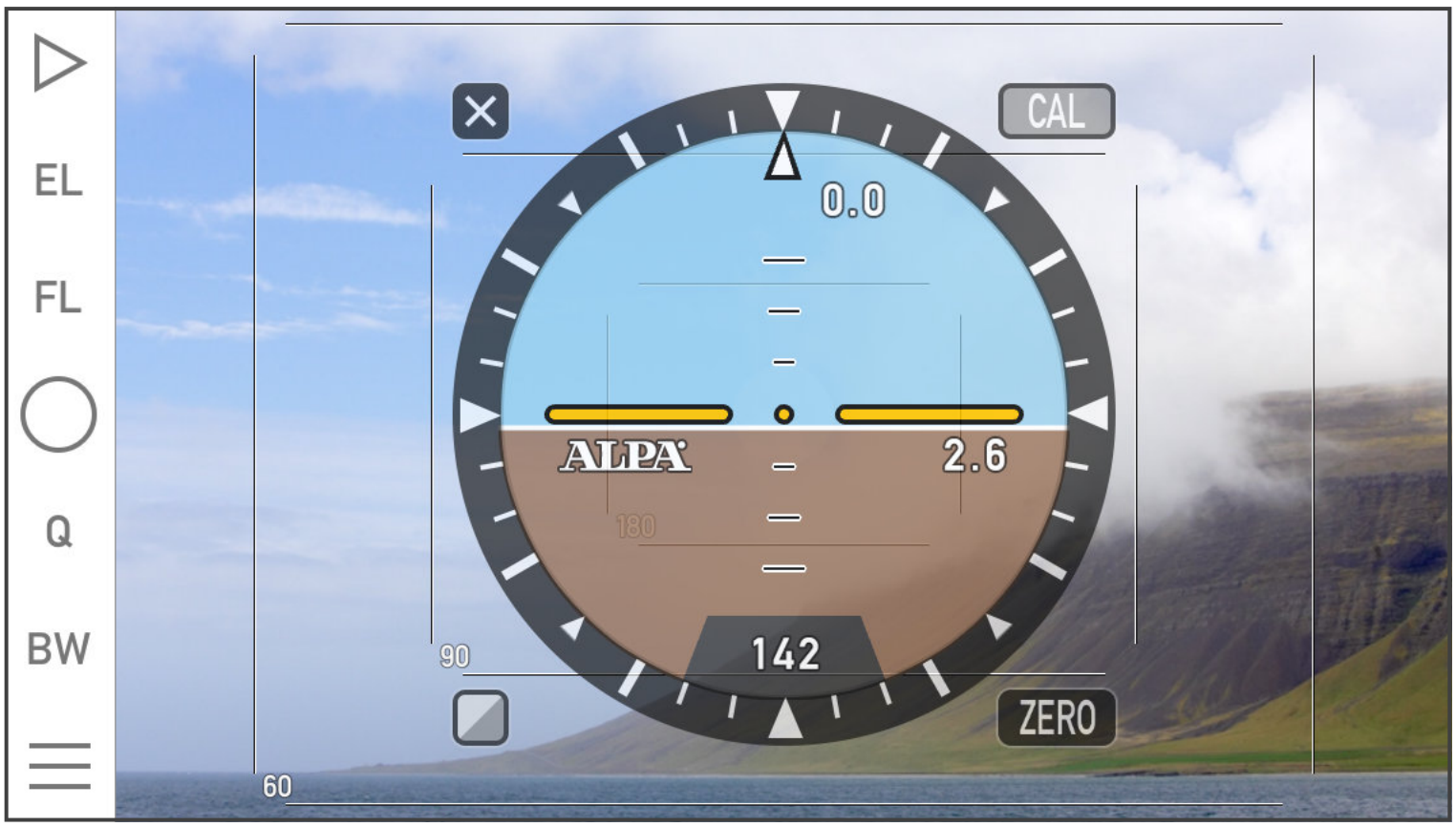
- You can add the missing XML tags to the end of the corrupt file. So open it in a text editor and append the following to the end of the file: </trkseg></trk></gpx>

The downloaded track logs can be opened in any GPX aware application, such as Adobe Photoshop Lightroom. You can even use these tracks to geotag photos taken with your real cameras.



This was long day's track from midnight to midnight driving in Southern Iceland with a few stops along the road.

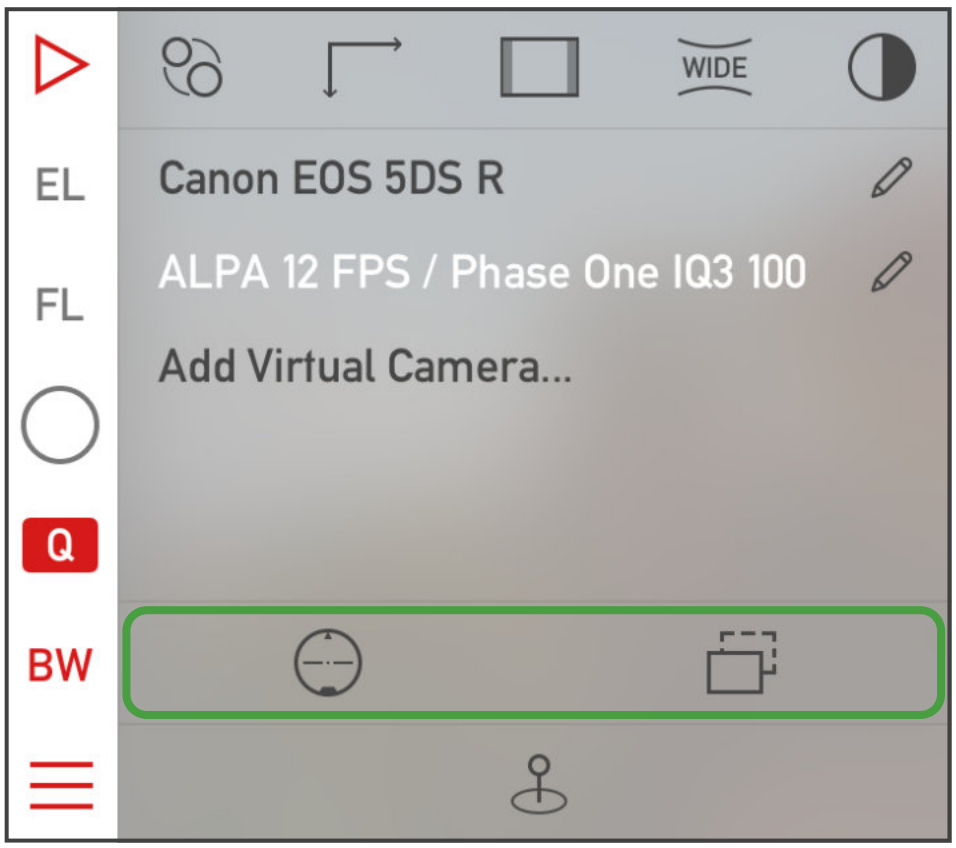
Chapter V - eFinder Tools



eFinder Tools was originally developed with ALPA of Switzerland to augment their iPhone Holder. It's now a built-in feature of both the Mark II and ALPA eFinder II.

It provides of two tools:

- A 3D level that can be used with any other.
- Parallax correction and shift simulation for ALPA cameras only. This tool requires the ALPA iPhone Holder (either the Mark I or the Mark II) hardware.



As you can see on the screen shot on the left, these tools can be invoked with two icons on the *Quick Control Screen*. Tapping the left one brings up the 3D level, while tapping the right one leads to the parallax correction/shift simulation tool. The parallax/shift tool is enabled only if the currently active virtual camera is an ALPA model.

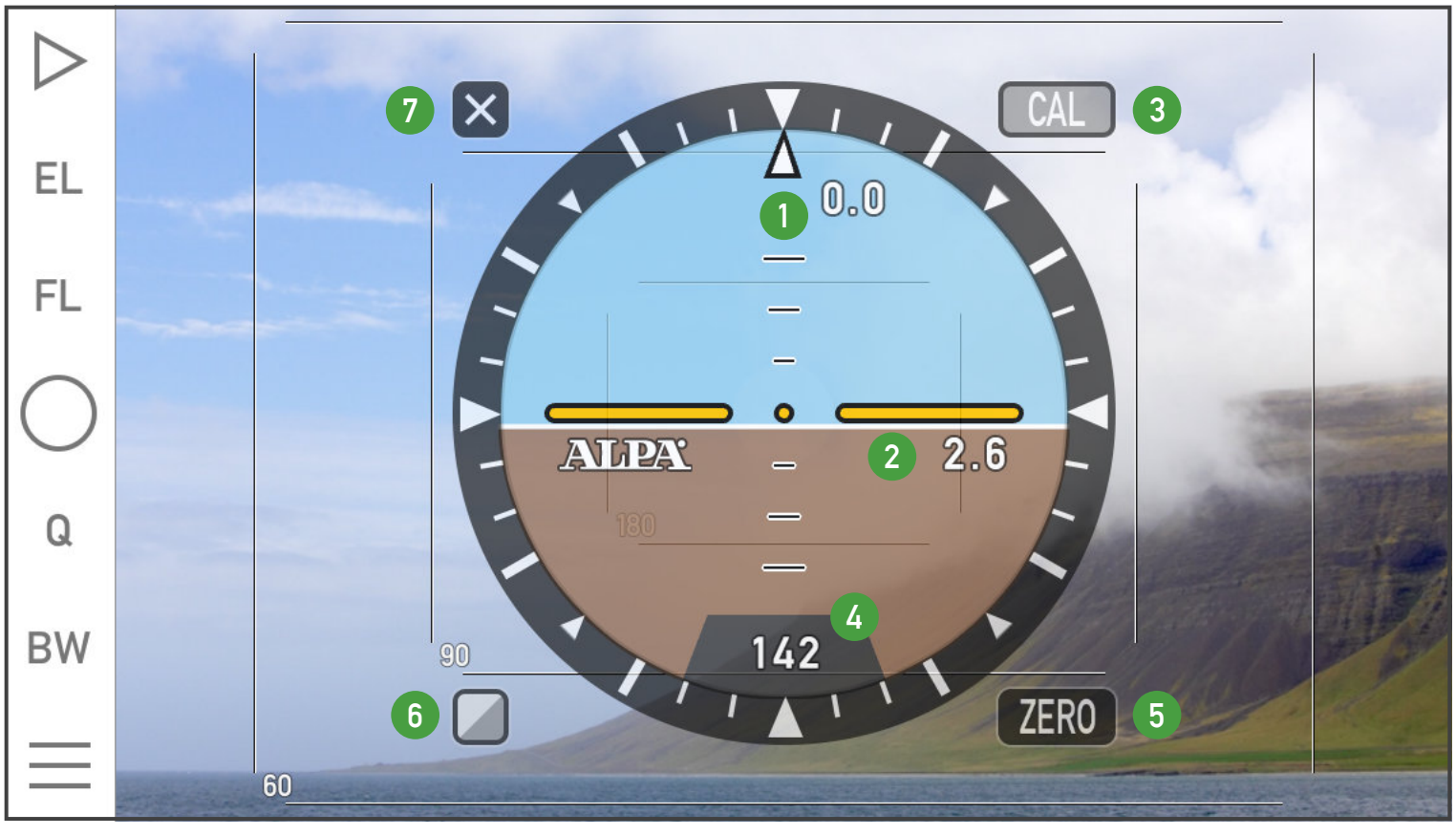
Note that both parallax correction and shift simulation is a per camera setting (i.e. you can set different values for each of the virtual cameras).

Both tools are designed to be used with the iPhone/iPod residing in the ALPA iPhone Holder on top of your tripod-mounted camera. The 3D level however can be used in "freehand" mode, without mounting your device.

> ***Important:*** *any change in the current virtual camera setup (e.g. changing focal lengths, the back or switching on/off ZoomFrame) will reset the parallax/shift values for that camera.*

> ***Note:*** *the parallax correction/shift simulation tool is not available on iPads, as there's no holder for iPads exist at the moment.*

3D Level



The 3D level tool gives you roll and pitch indicators which can be used to precisely level your camera, as well as an electronic compass (on compass-equipped devices only). The tool looks and works like the artificial horizon used in airplanes. The 3D level is designed to be used with a tripod mounted camera and and ALPA iPhone Holder, but all functions are usable when the device is hand-held. The above screen shot shows the different readouts and controls of the level.

1. **Roll indicator.** Shows the left/right tilt angle of your camera. The yellow indicator triangle turns white when the amount of tilt is less than 0.3 degrees.

2. **Pitch indicator.** Shows the front/back tilt angle of your camera. The yellow indicator bars turn white when the amount of tilt is less than 0.3 degrees.

3. **Roll/pitch calibration set/reset button.** You can calibrate roll/pitch measurement for your device. Calibration values are persistent between restarts of the app. See the *Calibration* section below for detailed information.

4. **Heading indicator.** Shows heading information from the app's gyro compass. This indicator works differently on devices equipped with a magnetic compass (such as the iPhone 5s) and on devices without one. On devices with no magnetic compass, the initial value is reset to 0 whenever you activate the tool. Heading is tracked with the gyro compass.

   On devices with a magnetic compass, the heading is initialized from the magnetic compass, and then subsequently tracked with the gyro compass. This gives

much better tracking accuracy. Heading is used from the magnetic compass to initialize the gyro after the reading from the magnetic compass is stable enough (magnetometer readings needs a few seconds to stabilize).

This indicator shows *magnetic heading*. Also note that the precision of this indicator (especially regarding the magnetic heading, which should be treated as just as a rough, approximate value) falls way below the precision of roll/pitch indicators. This is due to the limits of the actual iPhone hardware.

5. **Heading zero button.** Resets the heading back to 0. Although zeroing works like calibration, the main difference is that heading zero position is not persistent across invocation of the 3D level.

6. **Monochrome/color switch.** Switches between an all gray and a blue/brown color scheme. The screen shot shows the color one.

7. **Close button.** Closes the 3D level.

While the roll/pitch indicator is fairly accurate (when calibrated), heading indicator shows only approximate values. We made that as usable as possible, but don't bet your life on it - the iPhone compass is simply not a 1-degree accurate military spec'd device.

Important: *it is not possible to use the toolbar and the main screen, for example to save the current view (not even with the Volume + button), while this tool is active.*

Bubble Level Mode

When you tilt the device towards the Earth or upwards to the sky, the 3D level switches into bubble level mode. The yellow bubble turns white when the device is perfectly level (that is, the level of tilt is below +/- 0.3 degrees), and you can calibrate this mode similarly to the artificial horizon roll/pitch calibration (which is described in the next section).

Calibration

Calibration is designed to counteract the manufacturing alignment imprecision of iPhone/iPod sensors. Calibration is simply setting a new reference (or zero) point. The application distinguishes between five different orientations, all of which should be calibrated separately. Four of the five orientations are *portrait*, *upside down*, *landscape right* and *landscape left* – in all cases the device's camera pointing towards the direction your camera is looking. The fifth one is when the device is held *flat* (in this orientation the 3D level switches to bubble level mode).

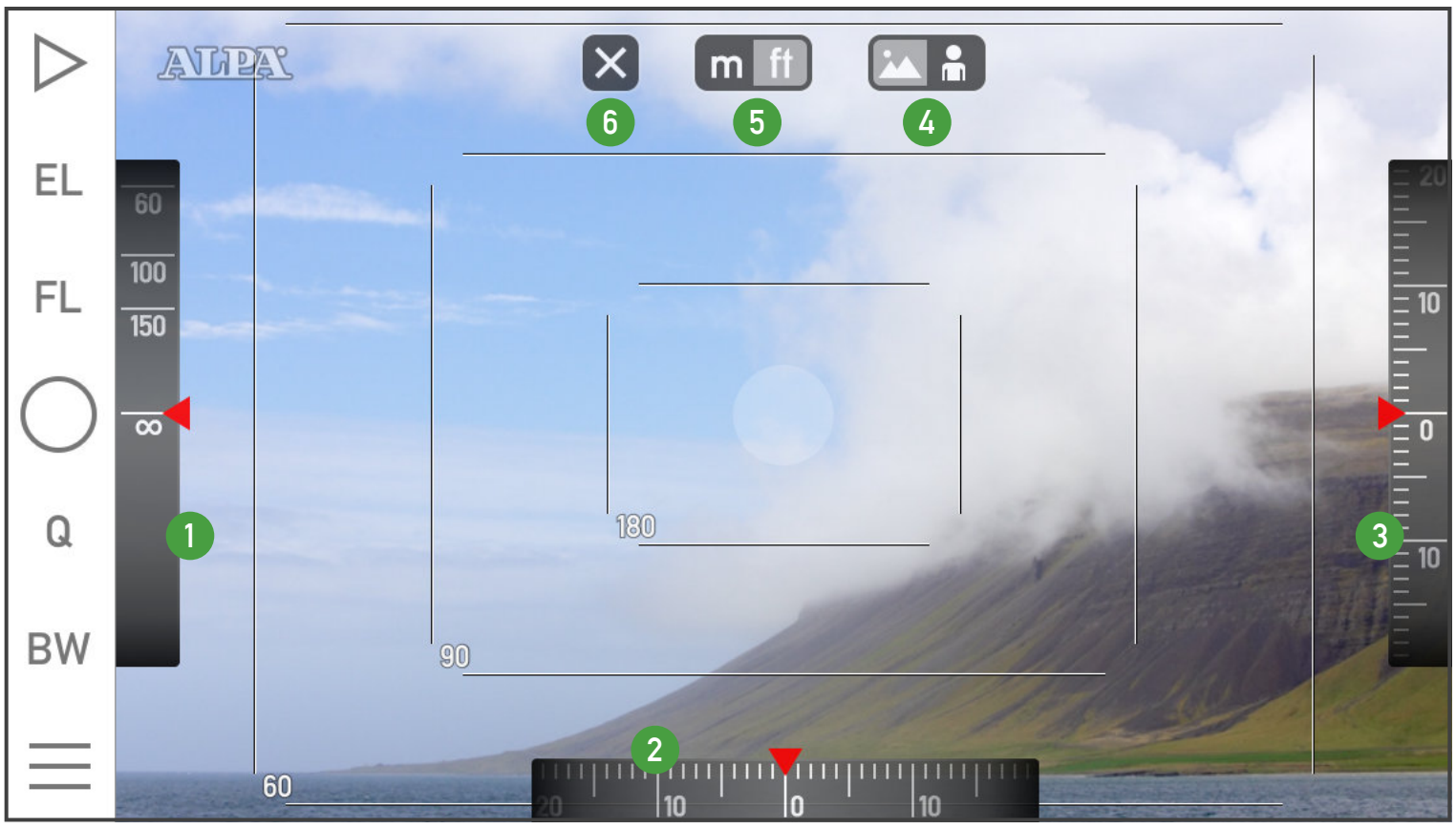
The procedure is the same in each orientation (except for flat).

- Mount the iPhone Holder on top of your camera.
- Align the iPhone Holder using the bubble level on the base.
- Mount your device in the iPhone Holder in the desired orientation.
- Press the **CAL** button for at least one second.

To calibrate the flat orientation, simply put the device on a leveled surface and press **CAL** for one second.

You can reset the calibration back to factory defaults for any orientation by putting your device into that orientation and pressing the **CAL** button for 3 seconds.

Parallax Correction and Shift Simulation



This tool works with ALPA cameras only, and requires that your device be mounted in an ALPA iPhone Holder. Although you can mount the iPhone Holder on the sides of your ALPA, just the top mounting position is supported by this tool.

The tools is quite simple: you can dial in the subject distance for parallax correction and/or set the shift amounts you want to simulate. Various controls numbered on the screen shot are discussed below.

1. **Parallax correction dial.** You can set the subject distance using this dial. Frame lines will move downward to compensate for parallax. Numbers on this scale are either meters or feet, depending on the state of the scale unit switch (5).

2. **Horizontal shift dial.** You can set the amount of horizontal shift to simulate. Scale is millimeters. This dial is visible only if the currently active camera setup has horizontal shift capability.

3. **Vertical shift dial.** You can set the amount of vertical shift to simulate. Scale is millimeters. This dial is visible only if the currently active camera setup has vertical shift capability.

4. **Sensor/film orientation switch.** To ensure that frame lines move to the intended direction (regardless of whether your camera is mounted straight on your tripod, or tilted sideways) you should tell the app the direction in which you have attached your back to the camera body. This is also the orientation of

your device in the iPhone Holder. Note that you should put your device in one of the two parallax-minimizing positions into the iPhone Holder.

5. **Parallax correction scale units switch.** Switches the scale of the parallax correction dial (1) between meters and feet.

6. **Close button.** Closes the tool.

On every dial you can double-tap the red triangle, which will immediately reset that dial's position back to zero (in case of shift setting dials) or infinity (in case of the parallax correction dial). Tapping the sides of the shift dials will turn that dial in the tapped direction to the next mm position on the scale.

Important: *the parallax/shift tool and ZoomFrame are mutually exclusive tools.*

So if *ZoomFrame* is enabled for any give camera setup with no lens focal lengths explicitly set, then the parallax/shift tool will be unavailable on the main screen. In the other direction, if any parallax correction or shift is set in the parallax/shift tool, then *ZoomFrame* will be switched off automatically.

Important: *it is not possible to use the toolbar and the main screen, for example to save the current view (not even with the Volume + button), while this tool is active.*