

# PAINTING WITH LIGHT

For more than 70 years, the **American Cinematographer Manual** has been the key technical resource for cinematographers around the world. Chemical Wedding is proud to be partners with the American Society of Cinematographers in bringing you Toland ASC Digital Assistant for the iPhone or iPod Touch.

Cinematography is a strange and wonderful craft that combines cutting-edge technology, skill and the management of both time and personnel. Its practitioners “paint” with light whilst juggling some pretty challenging logistics. We think it fitting to dedicate this application to Gregg Toland, ASC, whose work on such classic films as *Citizen Kane* revolutionized the craft of cinematography.

While not every aspect of the **ASC Manual** is included in Toland, it is designed to give solutions to most of cinematography’s technical challenges. This application is not meant to replace the **ASC Manual**, but rather serve as a companion to it. We strongly encourage you to refer to the manual for a rich and complete understanding of cinematography techniques.

The formulae that are the backbone of this application can be found within the **ASC Manual**. The camera and lens data have largely been taken from manufacturers’ specifications and field-tested where possible. While every effort has been made to perfect this application, Chemical Wedding and the ASC offer Toland on an “as is” basis; we cannot guarantee that Toland will be infallible. That said, Toland has been rigorously tested by some extremely exacting individuals and we are confident of its accuracy.

Since many issues related to cinematography are highly subjective, especially with regard to Depth of Field and HMI “flicker” speeds, the results Toland provides are based upon idealized scenarios. The only way to ensure accuracy is to perform your own tests under your specific conditions. If you do observe any anomalies, please contact Chemical Wedding and we will take immediate action.

## A word from ASC President Michael Goi:

“ It is entirely appropriate to name this application in honor of Gregg Toland, ASC, one of cinema’s most groundbreaking artists. With this venture and more to follow, the ASC is expanding its outreach and influence to future cinematographers and the working professional by creating tools that reflect how we work today. These tools reflect the Society’s ongoing mission to educate, inform and influence cinematographers everywhere. ”

# THE BASICS

**T**oland adopts a “holistic” approach to the process of cinematography, and is therefore unlike any other app you may have used. This doesn’t mean that Toland employs the use of crystals or leaches. Put simply, Toland takes into consideration all of the variables of cinematography and works with you throughout the shooting process.

Rather than having to enter specific data to answer specific questions, Toland is designed to track your choices as you make them. As you change the camera speed, you will instantly get feedback on how this affects running time and exposure; when you change lenses, you will see Depth of Field and Field of View updates in real time. Toland then allows you to log all this information to build comprehensive camera reports.

To do this we have broken down the art of cinematography into four main technical concerns. These are:

- CAMERA** which deals with all the functions of a camera system, their effect on exposure and other consequences;
- LENS** dealing primarily with **Depth of Field, Field of View** and **diopeters**;
- LIGHTING** (currently under construction) will address photometrics and color temperature;
- LOGGING** enables the user to create a comprehensive log of the camera’s functions, which can be recorded on a shot-by-shot basis and distributed later.

You can access these functions via the buttons atop each main page, and logging via the “log” button on bottom right. The button on bottom left tells you which of your cameras you are currently using, and also allows you to add and toggle between cameras.

## Color-Coding

To keep things simple, Toland uses a system of color-coded buttons. You can tell immediately which values can be changed and what kind of information you are seeing. If the value is:

- ORANGE** values are variable and are available to be changed by you.
- GREEN** values are results - the consequences of values you've changed.
- RED** values are warnings (for example, if you attempt to exceed the speed range of the camera)
- BLUE** values are transitional values and cannot be changed directly.
- PURPLE** values in the process of being modified.

## Button Functions

Buttons with a shiny 3D look that scream "I can be clicked" will either move to another page or bring up a picker.

If these buttons have little arrows beside them, you can also use the swipe method to change their value incrementally. Simply place your finger on the button and flick left or right to make the value go up or down. It's worth practicing this a little. At any time you can do a regular click and a "picker" screen will pop up and let you change the value more precisely.

Result buttons are blue and green and look more like the screen of an old computer. You can click on the shiny ones, but buttons that look flat don't allow you to change anything.



Green result buttons cannot be clicked.



Blue result buttons cannot be clicked



Shiny buttons that can be clicked.  
Buttons with arrows to the left and right can also be swiped.

# GETTING STARTED

**B**efore your shoot, you should spend some quality time familiarizing yourself with Toland and its functions. The very first thing you should do when you launch Toland is to set up a camera. If this is your first time using Toland, pick a motion-picture camera you know well, or the camera you are about to use.

Located on the bottom left of the **Camera Page** is a button with a camera icon and a letter. Tapping here will bring up the **Choose Camera Page**. From here you can save and swap between saved cameras. Tap the + button on the bottom right of the page. This takes you through the process of adding your camera. Follow this example:

System Format	select	35mm
Camera Type	select	ARRI LT
Camera Format	select	Super 35mm Film (3-perf)
Aspect Ratio	select	1.78 (16:9)
Film Manufacturer	select	Kodak
Film Stock	select	Vision2 200T + #85
Lens Type	select	Zeiss Master Primes

Select the lenses you have in your arsenal, then tap **Save Lenses** at the bottom of the page. This then brings you back to the **Choose Camera Page**. You can store up to seven cameras in this list.

There are three more buttons on the bottom of this page. Tap the button first to activate it, then select the camera to modify from your list above.

- DUPLICATE** duplicates a camera package in the list;
- EDIT TITLE** allows you to give that package a name (e.g. Second-Unit B Camera)
- RE-ORDER** allows you to re-order the list so you can specify which is A, B or C camera. If you delete the "A" camera, all the others will shunt up the order, so watch out for that.

# BASE SETTINGS

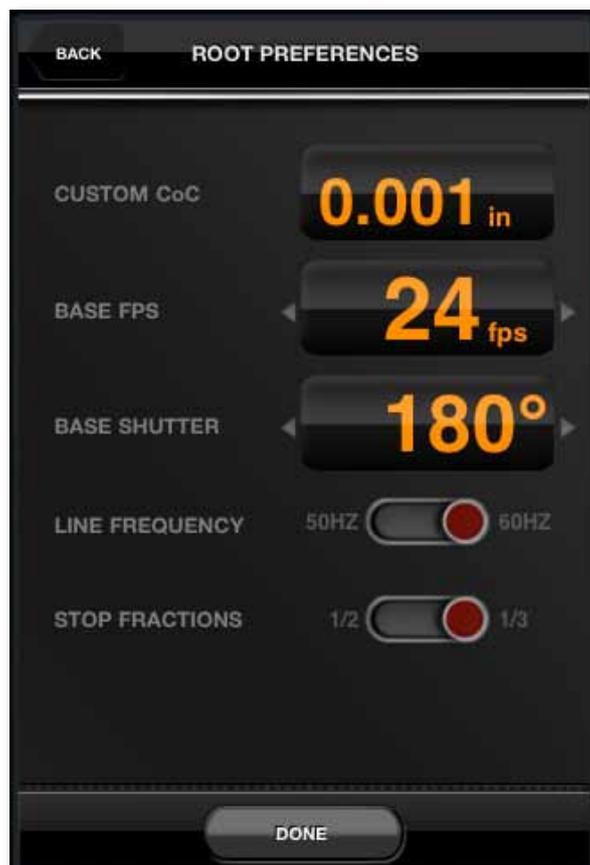
**A**fter selecting the camera you have just set up from the list, you now need to check the Base Settings. These are typically the sync-sound settings for your project, along with the basic functions you consider “normal” on your shoot. On the bottom of the main pages is the **Base Settings** bar. Click here to bring either **Change Base Settings** or **Reset to Base Settings**. Choose **Change Base Settings**:

- CIRCLE OF CONFUSION** for use in depth-of-field calculations
- BASE FPS** or sync-sound speed
- BASE SHUTTER** or the shutter you consider “normal”
- LINE FREQUENCY** of the power supply
- STOP FRACTIONS** which is limited to half and third stops

Press Done at the bottom to return to the main page.

At any time you can use the **Reset Base Settings** to return to the basic “normal” settings of the camera.

By now you’re probably thinking, “What the...?” But don’t worry: this is as complicated as it gets. Once you’ve chosen your camera and the correct **Base Settings** in Toland, things become much easier. In fact, the core idea of this application is that you enter this key information once, upfront; after that you just enter adjust for what changes, shot-to-shot.



# CAMERA SECTION

All motion-picture cameras have pretty much the same variable functions - camera speed (**FPS**) and **Shutter Angle** are the most universal. Within any specific camera system, other factors come into play, including camera filters (either in front of or behind the lens), film stock or sensor ISO, and the lens used for each shot. All of these factors have some bearing on the issue of exposure, one of the principal technical concerns of both cinematography and this application.

To demonstrate, select the camera's frame rate by tapping on the FPS button. This takes you to the **Shutter and FPS** sub-page.

## Shutter and Speed (FPS)



This is a sub-page of the **Camera Page**. It allows you to change the camera speed (**FPS**) and the Shutter Angle (for cameras with variable shutters) and to see what effect these have on screen time, exposure and whether flicker will be an issue.

You can either swipe **FPS** to select standard shooting speeds or tap to enter a picker for a more exotic speed. If you exceed the camera's speed range, Toland warns you by turning the speed value Red.

Underneath the **FPS** button are two percentages that vary with the camera speed. The first is the percentage difference between the selected camera speed and the base camera speed (set in the **Base Settings**). The second is the percentage difference between the recorded material and real time, mainly used in postproduction. These two figures are inversely proportional to each other. Lets say you are creating an homage to Benny Hill and want to shoot a sequence at 12**FPS**. This information would be displayed as **Camera (50%), Screen (200%)**.

Shown at the top of this page is a footage calculator that displays real time and screen time for the given camera speed. Enter a value into any of these three spaces to see the results for the camera speed that you select. For example, enter 1 minute (01:00:00) into the Screen Time picker. If you followed the sequence on the previous pages, this should translate to 2 minutes of real time and 68 feet of film. If you're shooting digitally, footage is expressed in frames rather than feet of film.

**Shutter Angle** is entered the same way. In this case we've changed the angle to 144°.

Underneath both **FPS** and **Shutter Angle** is **Exposure Duration**, expressed as a fraction of a second. Beside both **FPS** and **Shutter Angle** are the exposure-compensation figures for those changes, shown cumulatively below.

At the bottom of the page is the **Flicker Free Speeds and Angles** indicator.

## FLICKER FREE INDICATOR

Here we must establish one point very clearly:

***THERE IS NO SURE WAY TO GUARANTEE FLICKER-FREE IMAGES WITHOUT SHOOTING TESTS BEFOREHAND.***

Even with digital systems, flicker can sneak past the most diligent cinematographer in the heat of battle. There are too many variables, with too wide a degree of error, to say with mathematical certainty that flicker will not be visible somewhere in the frame. Equipment failures, variations in line frequency and spinning objects all have the potential to create flicker in a shot.

Instead of going for the contrasty black-and-white solution, we've opted for a hazy color warning system. We give you three conditions:

- GREEN** means we are 95% sure flicker will not be an issue
- ORANGE** indicates that the potential for flicker is very real, so you should be vigilant (and consider testing to minimizing your risk)
- RED** means that flicker of some kind is just inevitable (and you'd better start selling it to the director as part of your "creative" intent).

In making this application we spent hours and hours talking with people who know more about the issues of flicker and pulsing in cinematography than Charles Foster Kane knew about power. As much as we would like to offer a more concrete solution to this problem, we simply can't. One thing we can say for sure is that the more you increase camera speed and the more you narrow Shutter Angle, the more likely it is that you will see flicker and pulsing in the image. The most honest thing we can do is to help you to minimize the risk of having flicker.

# LENS SECTION

This section opens in one of two modes: **DoF** or **Depth of Field** mode, and **FoV** or **Field of View** mode. Let's start off by taking a look at **depth of field**. On the left is the analog lens scale. Double tap on the scale expand or contract it at any time. Where possible, we have used the same focus mark scaling as the specific lens you have chosen. You can select the lens you are using on the bottom right of the page. To move quickly between the lenses in your current list, swipe the lens button left or right. Tap the lens button to pull up a picker to see which lenses you have in your list and to make a selection.



At the bottom of the page is the **Change Lenses** button. This will take you back to the **Lens Picker Wizard**, where you can select another lens series and refine your list of lenses. If you are mixing and matching lenses, use the **Generic Lens List** but be aware that you will lose the benefit of all the information about specific lenses, including scaling, minimum focus and aperture range.

There are two ways to set the **Principal Focus** distance: you can either move the analog scale on the left up and down, or tap the **Principal Focus** button and enter the value using the picker.

At the bottom of the page, in the **Base Settings** pane, is the **Circle of Confusion** value, automatically set to 0.001 when you selected a 35mm film camera (as recommended by the ASC.) If you want to tweak this, tap the button **Base Settings** and select **Change Base Settings**. If you are planning to shoot an entire picture using nets behind the lens, in smoke-filled rooms with lots of backlight, then you could find a great

excuse to adjust your **Circle of Confusion** value to reflect the increased **Depth of Field**. There are no right choices in cinematography - just choices with outcomes that are either appropriate or not.

Above and below the **Principal Focus** button are the **Far Focus** and **Near Focus** results. To the left of **Principal Focus** is a small button marked **HF**, which stands for **Hyperfocal** distance. This is the distance at which the lens should be focused so that all objects between infinity and half that given distance will be in focus. When using wide-angle lenses, this is useful to gain the "deepest" amount of focus in the frame. (See *Citizen Kane* for classic examples of "Deep Focus" and to see a child's sled being set on fire).

Time to add some focus marks. Tap the + button to add a few focus marks at different points of **Principal Focus**. Now move the focus scale up and down. This way

it will be possible to see what marks fall within the highlighted zone at different focus points.

Focus markers can be tweaked by dragging them up and down the scale. First touch and hold the mark, which will make the **Principal Focus** button change to a **Marker Distance** button, then drag the marker to adjust the position.



Sometimes it is just easier to delete a marker and add a new one. To delete a mark, first tap the ominous **skull** button. This now glows **Red**. Tap any of the marks to delete them. When you are done, tap the button again and all the remaining marks are saved. To delete all marks, press and hold the skull button and all marks will vanish. Easy.

To cycle through the marks one by one, tap the arrows above and below the **+** and **-** buttons. Using marks will help you determine focus splits and keep a record of the principal planes of focus.

At the top right of the page is the **Shooting Stop** button. Swipe or set the stop via the picker. This way it is possible to see how opening up or stopping down the aperture will effect **Depth of Field**.



Let's say you are shooting a wide shot and you need to increase your **Depth of Field** to keep both the horizon and a mid-ground in sharp focus. First look at what setting the lens at the **Hyperfocal** distance gets you. If you still don't have enough depth of focus, increase the stop by swiping the **Shooting Stop** button. Changing this value turns it **Red**. Now return to the Camera Page. You can see that the Shooting Stop is still Red along with an **Out of Balance** warning and the change in stop value, also in **Red**. Tap the "**Out of Balance**" warning stop value button. Here you have three choices:



This resets to the original Shooting Stop set before adjusting the stop in the lens page.

This sets the Shooting Stop to the new value by shifting the Base Stop.

This adds the change in stop value to Other Variables, so you can deal with it later.

## Field of View

Just above the **Base Settings** button is the **FoV** button. This is largely self-explanatory. Change focal length and subject distance and you will see the resultant change in horizontal and vertical fields of view, complete with a visual guide to shot size.



There are two modes here: either **Unlock FoV**, where both the focal length and subject distance can be changed, or **Lock FoV**, where the subject distance will only change as a factor of focal length. If you swipe the focal lengths you'll see that that the field of view will stay fixed but the distance from the subject shifts. This shows what distance you will need to be at to get the same shot with a different lens.

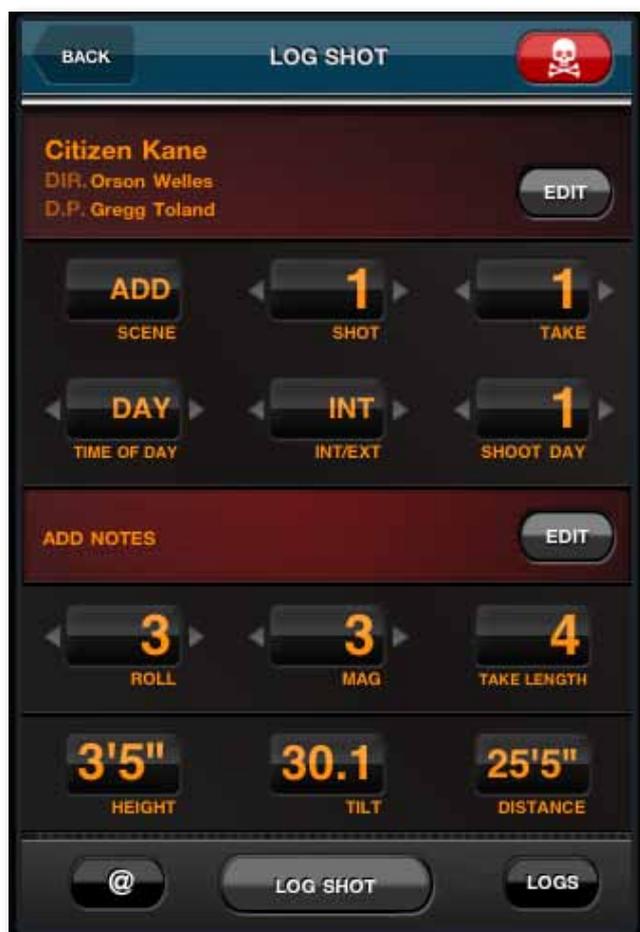
Above and below the **Lock/Unlock FoV** button are one green and one red triangle, showing field width and height, respectively. If you tap on either of these, Toland gives you an enlarged representation of the **angle of view** of that lens. This is great when you're planning shots on a set drawing or showing the director the kind of scene coverage you will get from a certain lens.



# LOGGING

In the bottom right corner of every page key is the **Log** button - which, not surprisingly, looks like a log. Tap here to begin setting up your camera logs.

This page allows you to add information to the log that isn't currently covered elsewhere in Toland. In other words, don't worry if you can't see your **Shutter Angle** and camera speed; they will be saved from the data you have already entered for that shot.



In the top section enter your **Job Title** and the names of the **Director** and **DP**.

Next, enter the **Scene** number, **Shot**, **Take**, script **Time of Day** (Day, Night, Dawn or Dusk), whether the shot is **Interior** or **Exterior**, and the **Shoot Day**.

After that, there is a section for notes or a description of the scene. Tap Edit to enter any information you deem important. Filters will be automatically included here if you've added them.

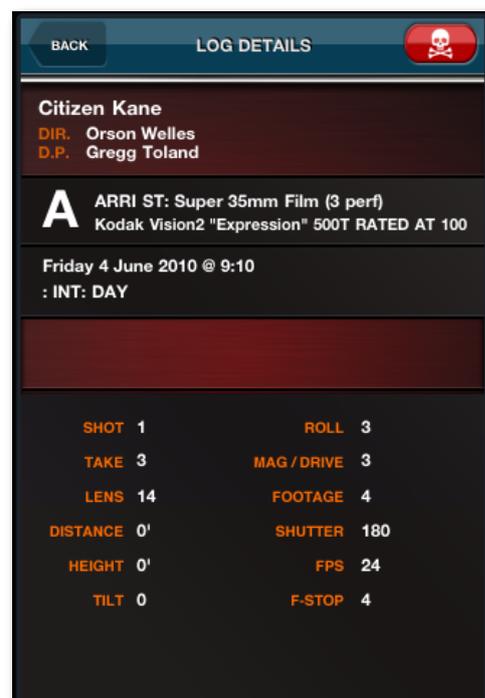
Underneath that is Roll, Mag and Take Length.

And finally, we have a provision for **Height**, **Tilt** and **Subject Distance**. When you tap **Tilt**, Toland lets you use the internal inclinometer to help you establish the angle by simply placing the arrows against a flat surface on the camera. You can also add this manually if you prefer.

Once the key information is entered, it's easy to amend the data from take to take.

When you are happy with the data you have entered, press **Log Shot** at the bottom of the screen. You can view all the logs by pressing the **Logs** button on the lower right. From here it is possible to mark good takes and look over each individual shot. Tap a log entry to enter the **Log Detail** view. If you want to delete an entry you can do so by tapping the - button on the top right of the **Log Detail** view.

One final tool is the @ button on the bottom left. This constructs an email out of your logs and makes it ready for you to send it to anyone who needs it. Lovely.



# LIGHTING SECTION

This section is still under development.

When finished it will address Photometrics & Color Balance. Look out for an update very soon.

# ACKNOWLEDGEMENTS

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**Nic Sadler**

