**Everything You Wanted to Know About Photographing the Total Solar Eclipse 2024 but Were afraid to Ask”**

**John Grusd Total Eclipse of the Sun PowerPoint Notes for the Eclipse on April 8, 2024:**

1. Before Eclipse Event, conduct tests with the actual set-up. Then create Custom Presets so there is no time wasted. Things happen quickly! (and slowly!)
2. Decide on your Optimal Equipment with the gear you already have. That includes long lenses and teleconverters. You want to get close but you also want a crisp image. Better crisp and in focus than close and fuzzy. Your particular set-up may result in different settings but the procedures are the same.
3. JG Optimal Set-Up for the 2017 Eclipse (Remember that this was from actual tests. No guessing!):
   1. Body – Canon 5DSR
   2. Lens – Canon 100-400 f/5.6 (@ 400mm)
   3. Teleconverter – Canon 1.4
   4. Solar ND Filter (16 3/5 stops, Filter Factor = 100,000!) for partial phases - (Remember, any visible sun = partial)
4. Additional Optimal Support Gear
   1. Hoodman Loupe
   2. Sturdy Tripod
   3. Remote Shutter Release
   4. Blue Painter’s Tape
   5. Batteries! Plenty of charged backups.
   6. Lens Cloth
   7. Wristwatch – I like this to keep track of time without using up a charge.
   8. Cel Phone or iPad with an Eclipse app. (a solar charger would be very handy)
   9. Sun Viewing Cards or Glasses
   10. Domke or similar to cover camera in hot sun.
   11. Test Notes from your tests!
5. Test Procedure for Partial Phases of the Eclipse.
   1. You do this at home at your leisure before your trip to the Eclipse!
   2. Test in different conditions (clear, hazy, cloudy haze, etc) and take notes.
   3. Test at relatively the same hours of the eclipse. Usually midday.
   4. Set up camera on tripod with Image Stabilization turned OFF. Solar ND Filter on lens and at maximum focal length (with TC, if that is optimal) That is 560mm for me.
   5. Tape Zoom Ring so it can’t change.
   6. Work in Manual Mode.
   7. Start with ISO 800, f/11 - This is the widest available aperture in the “Optimal” configuration described above, closed down 1 stop. (Widest aperture for the 100-400 at 400 is f/5.6. With the 1.4 TC it is reduced by 1 full stop to f/8. Closing down 1 additional stop brings me to f/11)
   8. Turn off Autofocus. Manually focus and tape focus ring so it is secure.
   9. Focus in Live View. (DO NOT LOOK AT THE SUN THROUGH THE VIEW FINDER! **EYE DAMAGE!**) Use the Hoodman loupe on the LCD screen.
   10. Make sure the shutter speed is fast enough. Use the Rule of 500 for full frame sensors. (350 for crop sensors) That means the slowest usable shutter speed is your focal length divided into 500. For me, that was 500/560 which comes to about .9 seconds. For the sun in the partial phases, you will be much faster than that.
   11. At f/11 (in my case) and starting at a 1 second exposure (for me), test exposure speeds in 1 stop increments as far as the set-up will allow.
   12. When you have found the best exposure, you can experiment with the exposure triangle to achieve optimum results.
   13. Review and record your best settings (including in different conditions noted above). These will be your settings for the Partial Phases of the eclipse! That means you will not need to figure this out at the eclipse! Bring your notes! There are no do-overs!
6. My Settings from the 2017 Total Eclipse (From tests! No guessing!)
   1. Exposure – 1/1000 Sec
   2. Aperture – f/11
   3. ISO – 400
   4. Note! For an Annular Eclipse where the moon is farther away and does not completely cover the sun, these settings for the partial phases are the only settings you will use. There is no “Totality” when you can take the solar filter off your lens. There will be an annular eclipse in the continental USA on October 14, 2023!
7. Totality – This is the brief time (in a handful of minutes) when the Moon is completely blocking the direct sun. You must act quickly and with practice. The camera settings are completely different from the partial phase and the set-up changes! You may have only enough time to do this procedure 1 or 2 times during totality.
   1. Lens still at maximum focal length (with the TC, as needed).
   2. The Solar ND Filter comes OFF!
   3. Use “Live View” to compose image but you will probably need to stop Live View to Bracket if you have a DSLR.
   4. Bracket in 2 stop increments using the maximum bracket range of the camera.
   5. ISO 400.
   6. Set at 1/125 second a 7 Bracket range will span from ½ sec to 1/8000 sec
   7. f/stop will be wide open (For me it was f/8)
8. Program Custom Settings – This will allow you to easily and quickly change your camera settings when the eclipse goes from Partial to Totality and back again to Partial.
   1. Create a Custom Setting for the Partial Phases (before and after Totality) This is from your tests in #5 above.
   2. Create another for the bracketing during Totality. (# 6 above)
   3. You can make exposure adjustments in Custom Settings if conditions change. (haze, clouds, clear)
9. Suggested Settings
   1. Shooting Mode – High Speed Continuous
   2. Bracket 7 frames during Totality (use the maximum amount available)
   3. Daylight White Balance
   4. Picture Style (Canon – Fine Detail)
   5. Focus Manually in live view with a Hoodman and then secure focus ring with tape.
   6. Take note of date and time in camera so you can reference it later (I’m always on PST)
   7. Image Stabilization is OFF
   8. Shoot in RAW
   9. Use Live View for entire shoot. (Have extra batteries handy!)
   10. Mirror Lock-up (DSLRs) is not necessary because being in Live View
   11. Setup a Grid Display on the LCD for easier composition. You will be constantly repositioning if you do not have a tracker!
   12. Use Custom Modes (To easily go from Partial to Totality and back to Partial again)
   13. All noise reduction off.
10. Eclipse Apps - These are terrific! They have the timings of the eclipse with audio warnings and alerts when things are about to happen as well as countdowns. They also have simulations that you can play so you can practice before the eclipse. The one I used was “Solar Eclipse Timer”
11. The Shoot
    1. Get up early and have a Shooting Itinerary ready to go. (Times, Settings and Gear)
    2. Have something handy to cover the camera, protecting it from the hot sun.
    3. Use Live View.
    4. Check the framing about once every minute. You will constantly be readjusting! (If you have a tracker, use it)
    5. Keep the filter clean with air or a lens cloth.
    6. Use a Remote Shutter Release.
    7. Tip: Rest your hand (quietly but firmly) on the barrel of the lens when you click the shutter. This cuts down on vibration from shutter shock which can blur the image at long focal lengths.
    8. Have a watch. (I like a wristwatch because it doesn’t drain the phone battery.)
    9. Use the Eclipse App to track the event and to tell you when things are happening. Your device (and that app) will be on for the entire duration of the event.
    10. Documenting the progression of the Partial Eclipse before and after Totality
        1. Decide ahead of time how many images you require for this. I had 16 (32 in all, 16 before and 16 after) including one image before 1st Contact and one image after 4th Contact. Research will tell you how much time there will be. Change it all into minutes and divide by the number of images you want.
        2. For the first minute or two you might want to shoot every 10 seconds just to get the best 1st contact image. (and the same leading up to the 4th contact)
    11. Be ready for Totality! It will happen fast! TAKE SOLAR ND FILTER OFF! CHANGE CUSTOM SETTINGS! (to bracket during totality you may need to turn Live View off)
    12. After Totality, PUT SOLAR ND FILTER BACK ON! CHANGE CUSTOM SETTINGS! (and begin Live View again if you needed to turn it off for bracketing in totality)
    13. The entire event takes about 2 ½ hours.
        1. First Contact – When the moon first starts eclipsing the sun.
        2. Second Contact – The beginning of Totality.
        3. Third Contact – The end of Totality.
        4. Fourth Contact – When the moon ends eclipsing the sun.
12. What You Can Photograph
    1. The progression of the Partial Phases – Single images can be combined into a single composition that shows the whole progression of the eclipse. (solar filter on)
    2. Totality in a single frame can reveal Solar Prominences as well as the naked eye view of totality. (solar filter off)
    3. Bailey’s Beads – Hot spots at the edge of the eclipse (within a couple of seconds of totality) created by high areas of the moon blacking the sun. (solar filter off)
    4. The Diamond Ring Effect – about 4 seconds from totality when the moon is rim lit except for the last flare of the sun. (solar filter off)
    5. Important Note! - The Diamond Ring and Bailey's Beads are taken without the Solar filter. The effect lasts for only a second or two just before and just after totality. It is NOT totality! If timed incorrectly it will wreck your camera. (and damage your eyesight if you view them unaided).
    6. Bracketed Totality enables you to assemble the best exposures of all of the elements in processing to create a stunning representation of totality.
    7. Composited elements with the totality and a landscape.
13. Safety
    1. NEVER aim the camera at the sun without the Solar ND Filter. (CAMERA DAMAGE!)
    2. NEVER look at the sun through the viewfinder. (EYE DAMAGE!) Use Live View.
    3. Only look at the sun using an approved viewing filter. (Not the Solar ND Filter!)
14. Comfort
    1. Hat
    2. Sunscreen
    3. Snacks and liquids (cooler)
    4. Chair and maybe a big blanket (can keep dust down)
    5. Jacket (it will be hot and then get very chilly and then hot again)
15. Logistics
    1. Plan Ahead
       1. There will be a lot of people going to witness this. Lodging will fill up.
       2. Specialized Equipment will sell out before the event. (Solar ND Filters, viewing glasses or cards.)
       3. Know where the path of totality is and have a plan to get there.
       4. The more likely an area is to be sunny, the better.
    2. When you get there:
       1. If you go to a rural area (and you likely will) it will be likely that even with advance planning, local services may be overwhelmed.
          1. Fuel – Carry a hundred miles worth of extra gas.
          2. Food – Have a couple days of easy to eat meals handy and plenty of water.
          3. Toilets – Bring TP, hand sanitizer, etc.
       2. Get set up early. It’s better to have to wait for the Eclipse than to get caught in traffic.
       3. After the Eclipse there will be traffic, especially on two lane roads. Most people will be going home right after the Eclipse. Bring your patience, don’t be in a hurry. Enjoy a late picnic lunch, a glass of wine and a nap.
       4. Include the night after the eclipse as part of your stay. The day following the Eclipse will be much calmer.
    3. During the Eclipse
       1. Don’t forget to enjoy it! Be present!
       2. Feel the temperature become colder (and warmer after totality)
       3. Notice how the world gets more dim, slowly at first.
       4. The last 30 seconds before Totality is remarkable as darkness comes on faster and faster.
       5. Totality – Listen for animals (Roosters, other Birds, Coyotes etc)
       6. Set up a second camera (w/tripod) if you want to get some landscapes during totality. It’s like photographing in blue hour.
       7. Have fun! Be amazed! Know that you are connected to this place and by extension this event, the solar system, our galaxy and the rest of the cosmos! It’s OK to be awestruck!
16. Extras
    1. Date April 8, 2024
    2. Path of Totality starts in Mazatlan, Mexico, and moves in a northeast direction. It enters the USA in southwest Texas and arcs up through the Canadian Maritimes.
    3. Although there are no guarantees as far as the weather is concerned, the southwestern “deserty” areas will have the highest probability of clear skies.
    4. Arrange your lodging NOW and prepare for too many people for the local infrastructure. (fuel and food)
    5. Where I plan to be: Kerrville, TX (nearby) or near Uvalde, TX
       1. Eclipse Starts – 12:14:43 pm CDT
       2. Eclipse Ends – 2:55:29 pm CDT
       3. Eclipse Duration – 2 hours 40 minutes 46 seconds
       4. Maximum Eclipse – 1:34:17 pm CDT
       5. Sun’s Altitude at Maximum – 67.5 degrees
       6. Duration of Totality – 4 minutes 25 seconds
       7. Some websites to get you started:
          1. [Where & When | 2024 Total Eclipse – NASA Solar System Exploration](https://solarsystem.nasa.gov/eclipses/2024/apr-8-total/where-when/)
          2. [20 of the best places to see the 2024 total solar eclipse | Astronomy.com](https://astronomy.com/news/2021/06/20-of-the-best-places-to-view-the-2024-great-north-american-eclipse)
          3. [Best Places to See the 2024 American Eclipse Based on Historical Weather Data | TheSkyLive.com](https://theskylive.com/articles/2023/02/best-places-to-see-the-2024-american-eclipse-based-on-historical-weather-data#:~:text=Based%20on%20historical%20weather%20and%20cloud%20coverage%20data%2C%20the%20best,Melchor%20M%C3%BAzquiz%2C%20Mexico)
    6. PhotoPills has a downloadable guide to photographing the eclipse.
       1. [photopills-total-solar-eclipse-2024-en.pdf](http://static.photopills.com/ebooks/photopills-total-solar-eclipse-2024-en.pdf)
17. The Takeaway:
    1. Do your research
    2. Plan Ahead
    3. Allow yourself time.
    4. Tests!
    5. Practice!
    6. Be Prepared.
    7. Enjoy the Show!