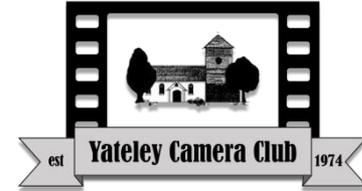


Yateley Camera Club



Tethering, Focusing and other Stuff

Hopefully, a Helpful Guide

By

Steve Banks

Tethering

WHAT IS TETHERING?

- Broadly, the connecting of a single device to another device.
- Encompasses connectivity, integration and mounting of the digital devices.
- Wired or Wireless.

WHAT IS TETHERED PHOTOGRAPHY?

- Images get saved directly onto your computer's hard drive in the folder of your choice.
- Software then displays the images on the larger computer or tablet screen as they are captured so you can see them clearly.
- Sometimes referred to as Direct or Instant Image Transfer – this is how you will often find it listed in camera and software manuals.

BENEFITS OF SHOOTING TETHERED

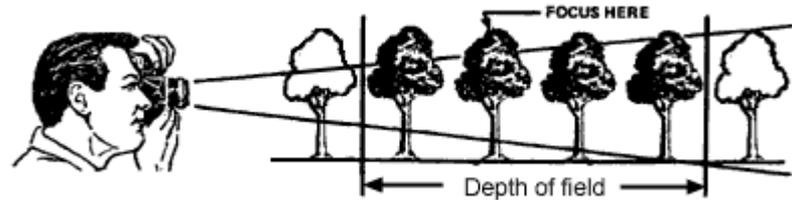
- View images on a large monitor as you shoot.
- Instantly see images at full resolution.
- Check critical focus, composition, styling.
- Adjust lighting and camera settings more quickly and easily.
- Control camera settings and remote trigger from connected device.
- Tag, rate, compare and share images while you shoot.
- Share images on multiple devices.
- Back up files to hard-drive while shooting.
- Move images from laptop to desktop in an instant.
- Reduce the chance of image loss

TETHERING SOFTWARE

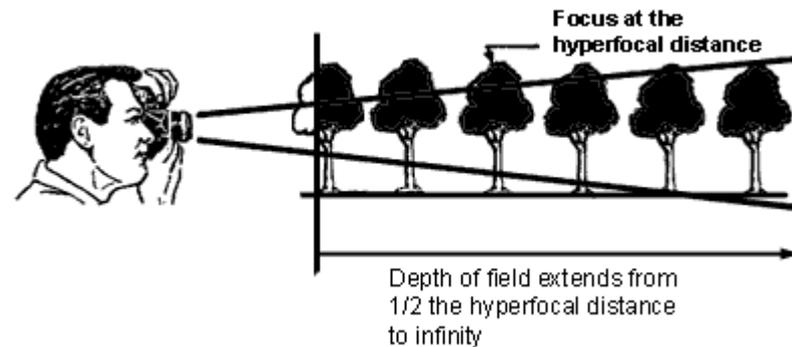
- Canon – EOS Utility – free!
- Olympus – Olympus Capture – free!
- Nikon – Camera Control Pro 2 - £160
- Lightroom – not sure of how much camera control. More about importing direct.
- digiCamControl – Donation Ware – open source. This software is used to give the following Depth of Field demonstration.
Another use is Focus Stacking – another time!
- Perry has added a guide to tethering on the YCC Website Members' Page

Depth of Field

Depth of Field Definition



Hyperfocal Distance Definition



There are many on-line resources available for Depth of Field calculation, but this and the following charts are taken from www.dofmaster.com

The first chart and diagrams are for a specific distance and f-stop: 1 metre, $f/8$, for a 50mm focal length lens.

Camera, film format, or circle of confusion

Nikon D7000, D5100, D5000, D3200, D3100, D3000

Focal length (mm) 50

Selected f-stop f/8

Subject distance 1 meters

Calculate

Subject distance 1 m

Depth of field

Near limit 0.94 m

Far limit 1.06 m

Total 0.12 m

In front of subject 0.06 m (47%)

Behind subject 0.06 m (53%)

Hyperfocal distance 15.7 m

Circle of confusion 0.02 mm

AdChoices

Camera Cannon

Canon DSLR

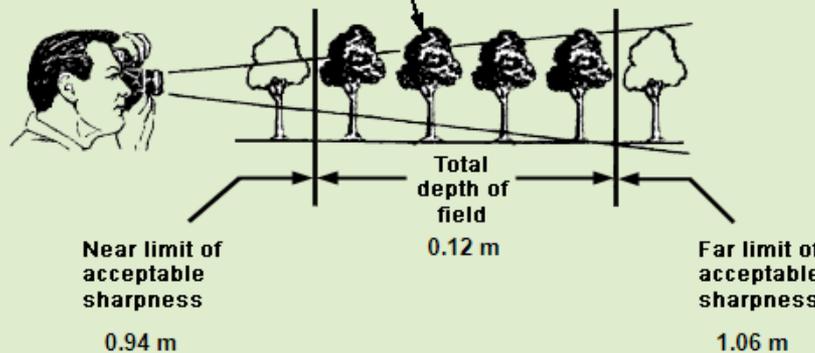
Canon Lens



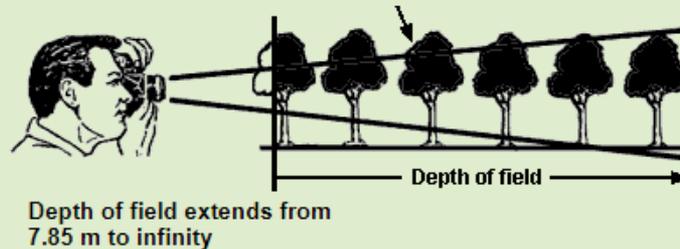
Use the actual focal length of the lens for depth of field calculations. The calculator will automatically adjust for any "focal length multiplier" or "field of view crop" for the selected camera.

Focal lengths of digital camera lenses are listed [here](#).

Focus at the subject distance, 1 m



Focus at the hyperfocal distance, 15.7 m



Nikon D7000, D5100, D5000, D3200, D3100, D3000

Focal Length: 50 mm

Distance (meters)	f/1.4		f/2		f/2.8		f/4		f/5.6		f/8		f/11		f/16		f/22		f/32	
	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far
0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.24	0.26	0.24	0.26	0.24	0.26
0.5	0.50	0.50	0.50	0.50	0.49	0.51	0.49	0.51	0.49	0.51	0.49	0.51	0.48	0.52	0.47	0.53	0.46	0.54	0.45	0.57
0.75	0.74	0.76	0.74	0.76	0.74	0.76	0.73	0.77	0.73	0.77	0.72	0.79	0.71	0.80	0.69	0.82	0.67	0.86	0.64	0.91
1	0.99	1.01	0.99	1.02	0.98	1.02	0.97	1.03	0.96	1.04	0.94	1.06	0.92	1.09	0.89	1.14	0.85	1.21	0.80	1.32
1.5	1.48	1.53	1.47	1.54	1.45	1.55	1.43	1.57	1.41	1.61	1.37	1.65	1.33	1.73	1.27	1.84	1.19	2.03	1.09	2.39
2	1.96	2.05	1.94	2.06	1.92	2.09	1.88	2.13	1.84	2.19	1.78	2.29	1.70	2.43	1.60	2.67	1.48	3.09	1.33	3.99
2.5	2.43	2.57	2.41	2.60	2.37	2.65	2.32	2.71	2.25	2.81	2.16	2.96	2.05	3.21	1.90	3.64	1.73	4.49	1.54	6.71
3	2.90	3.10	2.86	3.15	2.81	3.21	2.74	3.31	2.65	3.46	2.52	3.70	2.37	4.09	2.18	4.82	1.96	6.44	1.71	12.3
3.5	3.37	3.64	3.32	3.70	3.25	3.80	3.15	3.93	3.03	4.15	2.87	4.49	2.67	5.09	2.43	6.27	2.15	9.32	1.86	30.0
4	3.83	4.19	3.76	4.27	3.67	4.39	3.55	4.58	3.39	4.87	3.19	5.35	2.95	6.23	2.66	8.09	2.33	14.0	1.99	∞
4.5	4.28	4.74	4.20	4.84	4.09	5.00	3.94	5.25	3.75	5.63	3.50	6.29	3.21	7.53	2.87	10.5	2.49	23.1	2.10	∞
5	4.73	5.30	4.63	5.43	4.50	5.63	4.32	5.94	4.08	6.44	3.80	7.32	3.45	9.06	3.06	13.6	2.64	48.1	2.21	∞
5.5	5.18	5.86	5.06	6.03	4.90	6.27	4.68	6.66	4.41	7.30	4.08	8.45	3.68	10.9	3.24	18.2	2.77	409	2.30	∞
6	5.62	6.43	5.48	6.63	5.29	6.93	5.04	7.41	4.73	8.21	4.35	9.69	3.90	13.0	3.41	25.2	2.89	∞	2.38	∞
8	7.34	8.79	7.10	9.17	6.78	9.75	6.38	10.7	5.88	12.5	5.30	16.3	4.65	28.5	3.97	∞	3.28	∞	2.64	∞
10	8.99	11.3	8.63	11.9	8.16	12.9	7.58	14.7	6.90	18.2	6.11	27.5	5.26	101	4.40	∞	3.57	∞	2.82	∞
15	12.8	18.1	12.1	19.7	11.2	22.7	10.1	28.8	8.95	46.4	7.67	347	6.37	∞	5.15	∞	4.05	∞	3.11	∞
20	16.3	25.8	15.2	29.4	13.8	36.5	12.2	55	10.5	206	8.78	∞	7.13	∞	5.63	∞	4.34	∞	3.27	∞
30	22.4	45.4	20.3	58	17.9	93	15.3	721	12.7	∞	10.3	∞	8.08	∞	6.21	∞	4.67	∞	3.46	∞
50	31.9	115	27.8	249	23.5	∞	19.2	∞	15.3	∞	11.9	∞	9.06	∞	6.76	∞	4.98	∞	3.63	∞
∞	88	∞	63	∞	44.2	∞	31.3	∞	22.1	∞	15.7	∞	11.1	∞	7.86	∞	5.57	∞	3.96	∞
Hyperfocal Distance	88		63		44.2		31.3		22.1		15.7		11.1		7.86		5.57		3.96	

Circle of confusion: 0.02 mm

Nikon D7000, D5100, D5000, D3200, D3100, D3000

Focal Length: 200 mm

Distance (meters)	f/1.4		f/2		f/2.8		f/4		f/5.6		f/8		f/11		f/16		f/22		f/32	
	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far	Near	Far
0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
0.5	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.74	0.76
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.01	0.99	1.01	0.99	1.01
1.5	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.49	1.51	1.49	1.51	1.49	1.51	1.48	1.52	1.48	1.52	1.47	1.53
2	2.00	2.00	2.00	2.00	1.99	2.01	1.99	2.01	1.99	2.01	1.99	2.01	1.98	2.02	1.97	2.03	1.96	2.04	1.94	2.06
2.5	2.50	2.50	2.49	2.51	2.49	2.51	2.49	2.51	2.48	2.52	2.48	2.52	2.47	2.53	2.45	2.55	2.44	2.57	2.41	2.60
3	2.99	3.01	2.99	3.01	2.99	3.01	2.98	3.02	2.98	3.02	2.97	3.03	2.95	3.05	2.93	3.07	2.91	3.10	2.87	3.14
3.5	3.49	3.51	3.49	3.51	3.48	3.52	3.48	3.52	3.47	3.53	3.45	3.55	3.44	3.57	3.41	3.59	3.37	3.64	3.32	3.70
4	3.99	4.01	3.98	4.02	3.98	4.02	3.97	4.03	3.96	4.04	3.94	4.06	3.92	4.09	3.88	4.13	3.84	4.18	3.77	4.26
4.5	4.49	4.51	4.48	4.52	4.47	4.53	4.46	4.54	4.45	4.56	4.42	4.58	4.39	4.61	4.35	4.66	4.29	4.73	4.21	4.83
5	4.98	5.02	4.98	5.02	4.97	5.03	4.95	5.05	4.93	5.07	4.91	5.10	4.87	5.14	4.82	5.20	4.74	5.29	4.64	5.42
5.5	5.48	5.52	5.47	5.53	5.46	5.54	5.44	5.56	5.42	5.58	5.39	5.62	5.34	5.67	5.28	5.74	5.19	5.85	5.07	6.01
6	5.98	6.02	5.97	6.04	5.95	6.05	5.93	6.07	5.90	6.10	5.86	6.14	5.81	6.20	5.73	6.29	5.63	6.42	5.49	6.61
8	7.96	8.04	7.94	8.06	7.91	8.09	7.88	8.13	7.83	8.18	7.76	8.26	7.66	8.37	7.53	8.53	7.35	8.77	7.11	9.14
10	9.93	10.1	9.90	10.1	9.86	10.1	9.81	10.2	9.73	10.3	9.62	10.4	9.47	10.6	9.27	10.9	9.00	11.2	8.64	11.9
15	14.8	15.2	14.8	15.2	14.7	15.3	14.6	15.5	14.4	15.7	14.2	15.9	13.8	16.4	13.4	17.0	12.8	18.0	12.1	19.7
20	19.7	20.3	19.6	20.4	19.5	20.6	19.2	20.8	18.9	21.2	18.5	21.7	18.0	22.5	17.3	23.8	16.3	25.8	15.2	29.3
30	29.4	30.6	29.1	30.9	28.8	31.3	28.3	31.9	27.7	32.8	26.8	34.1	25.7	36.1	24.2	39.4	22.4	45.3	20.3	57
50	48.3	52	47.6	53	46.7	54	45.5	56	43.8	58	41.7	62	39.0	70	35.8	83	32.0	115	27.8	246
∞	1414	∞	1000	∞	707	∞	500	∞	354	∞	250	∞	177	∞	125	∞	89	∞	63	∞
Hyperfocal Distance	1414		1000		707		500		354		250		177		125		89		63	

Circle of confusion: 0.02 mm

The two charts on the preceding slides give a comparison of 2 lenses. 50mm and 200mm focal length.

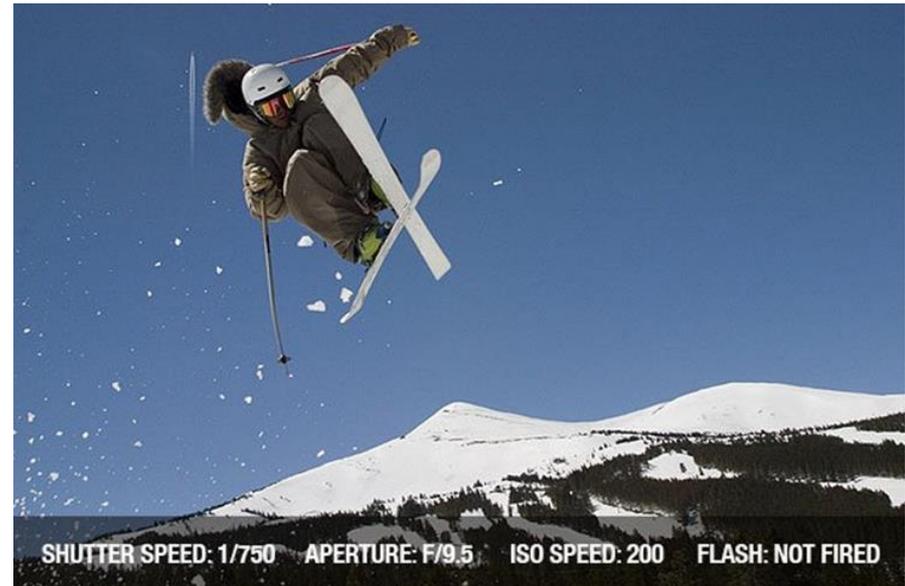
- As the aperture gets smaller, the total depth of field increases.
- As the subject gets further away, the total depth of field increases.
- This effect is far greater with the 50mm lens, compared to the 200mm lens.
- At large apertures and a relatively close subject, the depth of field can be very small e.g. 50mm lens, $f/2$ at 2 metres, D of F = 120mm.
- Of course, this may give a beautiful out-of-focus background, but care needs to be taken to ensure the subject is sharp!
- Experiment with different apertures. See what works for you and your camera!

Focusing and Autofocus Modes

Understanding Autofocus Modes

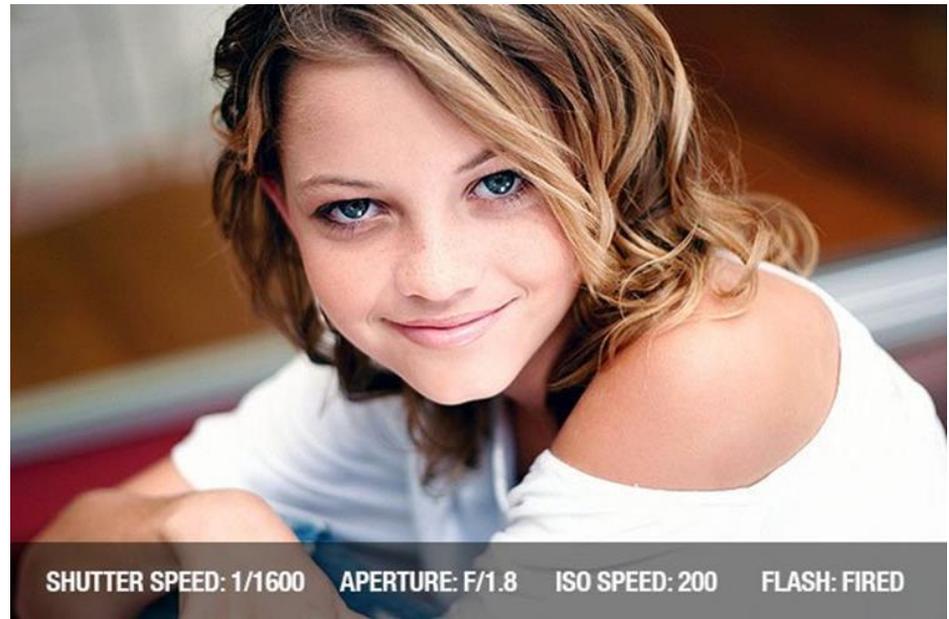
- Nothing ruins a photograph more than a blurry, unsharp image.
- One of the godsend of modern DSLR technology is the autofocus feature.
- But as useful as autofocus is, sometimes the camera gets it wrong and focuses on the wrong subject.
- Additionally, there are situations where autofocus does not work well.
- Four primary focus modes: Continuous, Single, Automatic and Manual

Continuous Focusing Mode



- AI Servo AF (Canon)/AF-C (Nikon)
- Press the shutter halfway and the camera detects the subject's movements and refocuses continuously.
- Uses a lot of battery power.
- May not accurately predict the direction of the subject if chaotic.

One Shot Focusing Mode



- One-Shot AF (Canon)/AF-S (Nikon)
- Press the shutter halfway and the camera focuses on the subject just once – there's no continuous adjustment.
- Saves battery power.
- Best for non-moving subjects.

Automatic Autofocus Mode



- AI Focus AF (Canon)/AF-A (Nikon)
- The camera decides which mode is appropriate and automatically switches between One-Shot AF and AI Servo AF (Canon) / AF-C and AF-S (Nikon)
- Maintains focus if you change subjects or the subject moves
- Good for quick shots where you don't have time to select the best mode.
- May miss, of course!

Manual Focusing Mode



- Select Manual Focus
- Accurately measure the subject/camera distance and set to the measurements on the lens barrel. (not easy if there are no marks on the barrel!)
- Focus by eye. Ensure Diopter adjustment is correct!
- Good for Macro with camera on Tripod. Use Live View and zoom in.

Autofocus Area Modes (Nikon)

AF-area mode controls how the camera selects the focus-point for autofocus.

- **Single-point AF:** Select the focus point; the camera will focus on the subject in the selected focus point only. Use with stationary subjects.
- **Dynamic-area AF:** Select the focus point. In **AF-A** and **AF-C** focus modes, the camera will focus based on information from surrounding focus points if the subject briefly leaves the selected point. The number of focus points varies with the mode selected:
 - 9-point dynamic-area AF:** Choose when there is time to compose the photograph or when photographing subjects that are moving predictably (e.g., runners or race cars on a track).
 - 21-point dynamic-area AF:** Choose when photographing subjects that are moving unpredictably (e.g., players at a football game).
 - 51-point dynamic-area AF:** Choose when photographing subjects that are moving quickly and can not be easily framed in the viewfinder (e.g., birds).

Autofocus Area Modes (Nikon)...Continued

- **3D-tracking:** Select the focus point. In **AF-A** and **AF-C** focus modes, the camera will track subjects that leave the selected focus point and select new focus points as required. Use to quickly compose pictures with subjects that are moving erratically from side to side (e.g., tennis players). If the subject leaves viewfinder, remove your finger from the shutter-release button and recompose the photograph with the subject in the selected focus point.
- **Group-area AF:** The camera focuses using a group of focus points selected by the user, reducing the risk of the camera focusing on the background instead of on the main subject. Choose for subjects that are difficult to photograph using a single focus point. If faces are detected in single-servo AF (**AF-S** or single-servo AF selected in **AF-A**), the camera will give priority to portrait subjects.
- **Auto-area AF:** The camera automatically detects the subject and selects the focus point (in the case of portrait subjects, the camera is able to distinguish the subject from the background for improved subject detection). The active focus points are highlighted briefly after the camera focuses; in **AF-C** and **AF-A** modes, the main focus point remains highlighted after the other focus points have turned off.

Autofocus Cases in AI Servo Mode (Canon)

- Slightly different, but just as comprehensive as Nikon!
- Canon has preset cases:

Case 1 - Versatile multipurpose

Case 2 - Continue to track subjects, ignoring obstacles

Case 3 - Instantly focus on subjects suddenly entering AF points

Case 4 - For subjects that accelerate or decelerate quickly

Case 5 - For erratic subjects moving quickly in any direction

Case 6 - For subjects that change speed and move erratically

- All of the above can be fine-tuned by the photographer!

Focusing Summary and Conclusions

- This has been a brief look at Canon and Nikon focusing.
- Apologies to Olympus and Fuji users, but I think the same principles apply.
- Whatever Mode you use, care must be taken to ensure you get the results you want. Don't expect the camera to get it right on its own!
- Practice and get to know your camera. Find what works best for you.
- If you are trying to catch a fast-moving subject and you know where it will appear (e.g. a racing car), try locking the focus at that point (half-depress shutter button) before taking the photo.
- One final point. After preparing your image for competition, zoom in on the screen and be critical. Is it all sharp where you want it? Check all round the edge of your image. Is there anything distracting there? Bright areas, taking your eye away from the subject?
- Good luck with your images! Thank you for listening.