



Flying Gurnard, Mgarr Ix-Ini in 8m water depth natural light. Taken with ProCamera App on a iPhone 11 Pro Max.

distortion created by the app gave me what I was looking for. Naturally, this is hardly how it appears in real life!

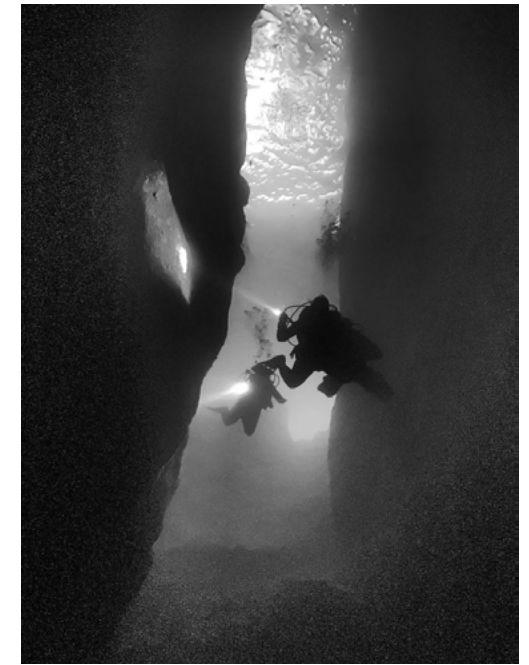
Moving over to Gozo, the picture one remembers most is the Azure window which subsequently collapsed in 2017. However, this site offers reef/wall dives, a chimney, the Blue Hole. The Inland Sea is a collapsed cave connected to the sea by a 200m long tunnel. The dive along the wall outside the tunnel is not very inspiring however the tunnel itself is much more interesting.

The tunnel starts at a depth of barely 2 meters and descends to 26 meters where it enters the open sea. Divers need to be particularly careful when entering at the shallow end as the tourist boats are constantly going back and forth through the tunnel entrance.

Mgarr Ix-Ini is at the end of a long, narrow sheltered inlet on the south coast of Gozo. The water is shallow, no deeper than 6m m before it meters the open sea. There are two caves and another gulley below the Ta Cenc Hotel and Resort. The bottom is sandy with sea grass and is home to a few sea horses in the summer months. It is a good place to find flounders, octopus, moray eels,



Inland Sea Tunnel, Dwejra, Gozo

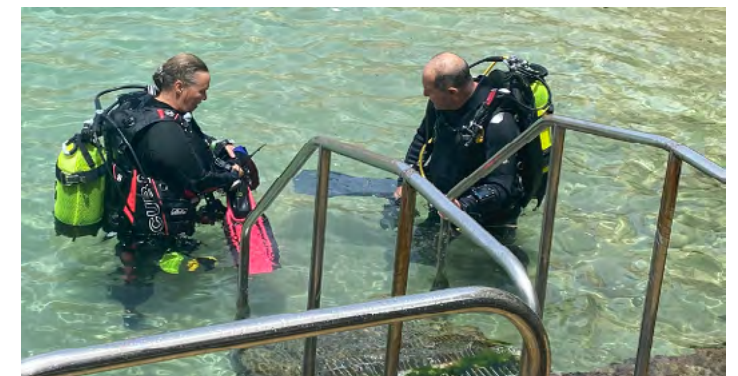


*Inland Sea Tunnel, Dwejra, Gozo.
iPhone 11 Pro Max. Available light.*

cuttlefish and Flying Gurnards as shown in the accompanying photo.

There are some 70 dive sites which can be reached from the shore in the Maltese Islands. This is a tiny selection of the most popular places to dive.

Sabine Roesel & Mark Fothergill
[Instagram](#)



A new technique for over/under shooting

by Pete Atkinson

The established protocol for shooting half and half pictures is to focus on the underwater subject, use a small aperture and hope the background falls within the depth of focus. For full frame cameras, f20 or f22 is required. With a crop sensor or APS-C sensor f16 is sufficient because of the apparent 'greater depth of focus' with a crop sensor.

The problem with this approach is that acceptably sharp areas closer than the underwater subject are wasted. If the closest acceptably sharp area is actually on the subject (and the sharpest area is now just behind the subject) it increases the likelihood that the above water background will also be acceptably sharp. But how do you achieve this?

My technique is to test the lens above water. With the Nikon Z50 on a tripod, I focus the Sigma 8-16mm lens and FTZ converter at f16 on infinity. I take a picture, including objects a hundred metres away. Incrementally manually focus closer and closer making a note of where focus lies on the lens barrel. Take a snap of each lens position with your phone and

make a note of the frame number. Look at the sequence of pictures at 100% on your monitor. Choose the closest focus position where the background is still acceptably sharp. Acceptably sharp is variable; sharp enough for the intended use. So for big glossy prints you might choose a different focus position than for a use on social media. With a mirrorless camera you can use manual focus and just focus as close as you can but still retain ifocus peaking highlights on the background. The in-focus indicator in the viewfinder will indicate what is at sharpest focus when underwater, and peaking highlights should indicate what else will also be in focus below.

Once you have determined this sweet spot you can tape the lens in position. For my 8-16 Sigma it's roughly at 0.4m with an 8.5" dome.

As for exposure, if the topside part is a stop over and the underwater part is a stop under this can be corrected in Lightroom easily. In swimming pools the difference in exposure above and below is small and needs little correction. If you want to shoot in the evening and have a



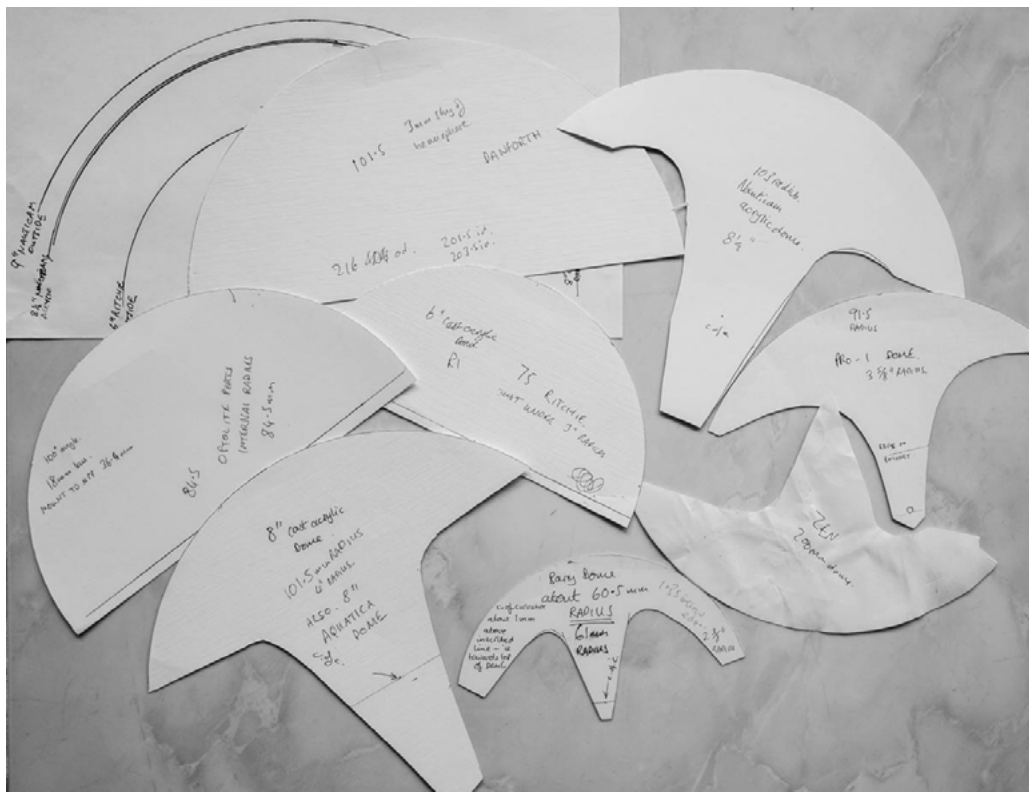
A small dome can emphasise irregularity in the meniscus. Focused underwater. 6" Ritchie dome. Nikon D800E, 1/20th at f22, ISO 400

This 14" dome was initially built for a Seacam housing then converted to a Subeye Reflex with an 18mm lens

person or reef underwater you will need flash. Even during the day a flash can be useful on the underwater part, particularly if you have a model close to the camera. Don't expect to light a model underwater more than 2m away at f16 and ISO 200.

So to summarise: the aperture is determined by wanting above and





Patterns for some of the domes that I have measured over the years



Darryl Torckler making a pattern to measure the radius of one of his dome ports

below both acceptably sharp. F16 for crop sensor or f22 for full frame.

I like to use a shutter speed of at least 1/200 but I can't use faster than this if I need to use flash with the Nikon Z50. The meniscus at the dome will be sharper with a faster shutter speed.

The ISO can be then adjusted for the amount of light. I much prefer to work on sunny days when my base settings are f16, shutter 1/200th and ISO 200. So I don't need to adjust anything on the camera, I just pay

attention to the film of water on the dome.

The size of the dome determines the look of the picture too. Bigger domes make it easier to focus above and below simultaneously because the virtual image is further away and less curved.. The largest I made was 14" which is a problem for travel! It needed a substantial rotating lead weight to persuade it to float at roughly the half way position. It's also easier to control the meniscus with a large dome. Waves are less of an issue.

With a small dome even a small ripple will have a big impact. But an unusual meniscus line can add interest to any picture.

We use wide lenses underwater so that we can get close to the subject and reduce the amount of water we are shooting through. Always, water is the lowest quality of anything in the optical path. Reduce it as much as possible.

Wide lenses behind flat ports narrow the field of view, produce chromatic aberration, and create

pincushion distortion.. A dome port reduces all three. But it acts as a negative lens underwater and produces an image of infinity at 3 x the radius in front of the dome. The lens has to be able to focus on this close virtual image. This virtual image is curved and concentric with the dome so if you focus on the middle of it, it's possible that the corners will fall outside the depth of focus and be blurred. This softening of the corners is worse at wider apertures. So even when not shooting over/under we try



Bobbing the housing up and down created these ripples in the pool at Oasis Spa in Kamala, Phuket. Nikon Z50, FTZ, Sigma 8-16, 1/250th, f16, ISO 250

to use f11 or smaller to improve the corners of an image. Water contact optics reduce this issue considerably but most can't be used for over/under shots unless you are using the Nauticam WACP 1 or 2. So for good over/under shots this underwater virtual image needs to be in focus, but also the topside view needs to be included in the depth of focus.

The dome needs to be placed so that the center of curvature of the dome and the apparent front entrance pupil (or no-parallax point) of the lens are in the same place. Panoramic

photographers have calculated this front entrance pupil position for many wide lenses. For example, the no-parallax point of the 8-16 Sigma at 8mm is 73mm in front of the lens mount. Port extensions are used to ensure that the dome is in the right place. Domes can be glass or acrylic; acrylic is less expensive, lighter and easier to polish if it gets scratched. I prefer acrylic.

Domes can be hemispherical or a section of a hemisphere. Measuring the internal radius of an unknown dome can be done in this way. Draw



The underwater part of a model bisected by the meniscus is larger. In Photoshop select everything below the meniscus and use Edit, Transform, Scale to align everything and then crop. Nikon D800, 16-35 at 35mm, 1/200 s at f13, ISO 400

a circle with compasses about the right size and cut a pattern out with scissors. Fold the paper pattern enough to get it inside the dome and see if it fits perfectly against the inside of the dome. It's easy to see if it's too large or small. Adjust the size, cut a new pattern and try again. Pretty quickly you will have a pattern the right size. Measure from the compass pin hole to the edge; that's the internal radius of your dome. With this information you can calculate what dome extension, if any, is needed to place the dome so that the centre of curvature is coincident with the front entrance pupil of the lens.

It is also possible to shoot two photos, one focused above and one

focused below and put them together in Photoshop. If shooting a person both above and below, the bottom part will appear larger than the top. You can match the underwater torso with the above water part by bringing the image into Photoshop, selecting everything below the meniscus and going to Edit, Transform, Scale. Squash the bottom of the picture so it lines up with the top, then crop off the edges as needed. For people close to the camera, I prefer to focus above water so that the face is sharp as it seems more natural if the underwater part is slightly softer.

To keep the dome free of droplets there are two approaches; beading agents and wetting agents.



Le Meridien hotel in Phuket has four pools; in one I have seen 60m visibility. Fisheye lenses are not the best for architecture! Nikon Z50, FTZ, Tokina 10-17 prefocussed at 0.4m, 1/200 s, f16, ISO 200

Some people like Pledge Lemon as a beading agent. You polish the dome with this and as you lift it out of the water the drops will run off cleanly. If there is surface scum from, for example, sunscreen lotion, the polish will only last for about 30 minutes before it breaks down and droplets adhere to the surface. Rain-X is a beading agent for glass but don't use it on acrylic. Rain-X Plastic can be used, but I haven't tried it.

The second approach is a wetting agent. With a glass dome, I found that a freshly cut potato worked well. With

acrylic, spit is very good. Ideally pre-spit the dome and smear it around with a tissue, not with greasy fingers. You can do a pre-spit well in advance, let it dry and then re-spit before you go into the water. (I don't remove the dome shade.) So if using a wetting agent, dip the dome underwater, lift it out and gently rub off any residue with your fingers. On the next dip a thin layer of water should be retained all over the surface of the dome for several seconds, time enough for a few shots through that layer of water. Re-dip for each sequence. Another



A child's life jacket can be used to float the housing at precisely the right depth. Here my D800 housing also has a foam buoyancy collar around the port extension

advantage of this method it tends to hide any scratches in the dome. And of course, spit is something you always have with you when you need to reapply.

I encourage models not to use suntan or body lotion, as a film of that on the surface sticks to the dome and attracts dirt every time you dip!

You can use detergent as a wetting agent instead, but I have found spit to be longer lasting and more convenient.

Working in most swimming pools you can stand on the bottom,

or on tiptoes in fins. If it's deeper and you can't touch the bottom it is better to float the camera housing on something, a child's lifejacket can be used to support it so that you are not trying to lift the housing partially out of the water. Maybe try wearing a lifejacket yourself!

I have shot hotels with a fisheye lenses but they are not kind to architecture even though they are fun to shoot. The 8-15mm Nikon fisheye is far more use on a crop sensor camera than on a full-frame for which it was designed as it reproduces much of