

GOPROIN'

By Christopher Hamilton

As most of you know, the latest generation of digital SLR's are equipped with very high quality HD video capabilities. For those of us that have already invested more than our share in an older yet perfectly adequate camera system, there is now an affordable solution to our video yearnings.

The GoPro Hero HD camera was introduced a few years ago and has taken the market by storm. It is tiny, powerful and best of all it is cheap. It even comes in a waterproof housing with a dome port, which is rated well beyond recreational scuba depths. However, there are a few problems that shooting underwater presents that GoPro did not consider.

The first drawback is that its fixed focus does not match the size and shape of its dome port. The lens is focused well beyond the virtual image created by the interaction of the dome port with water. The reason the GoPro is blurry underwater is due to the dome on the housing having a magnifying effect, which shifts the nodal point of the lens, creating a virtual infinity that is much closer. With a normal SLR lens we often use



Backscatter's flat port is glass with a 55mm filter thread in the mount.
www.backscatter.com

a diopter to bring the close focus of a lens closer and make it work with our dome ports. However the dome ports we use are typically 8" or larger. Roughly speaking, when you use a dome port underwater the new infinity is twice the diameter of the dome (i.e. if you focus a lens at about 16" with an 8" dome underwater, you will be in focus at infinity). Of course you can't see that far underwater....

The most common solution to this problem is to use a flat port instead of the dome. This is an easy fix with very promising results. There are a variety of options available. All these options are good. And with the exception of the UK housing and the Sartek GoPro Deep Housing,



Swiss company Subspace use a dome port and a dioptre lens
www.subspace.ch

which cost up to double the GoPro itself, they are all very fairly priced. However flat ports won't allow full 170° wide angle (R3) with good quality, and as we all know flat ports cause chromatic aberration in wide angle lenses.

Flat ports are a good start, but I wanted to shoot super wide, and get close. Shoot like an underwater photographer! I found one option that looks very promising by Subspace Pictures.

This product integrated a magnifying element of glass that brings the focus closer, and a dome port. Which should make for very high quality optics. I haven't seen it in the flesh yet, nor have I seen the



UK Germany make a complete housing waterproof to 100 metres.
www.uk-germany.com



My GoPro mounted on my SLR housing



Photo taken using my refocused gopro, with a drop of water between the dome and a red filter. Note that the area of the image that was shot through the water is in focus.

footage it produces, but the inventor is a Subeye Reflex user from way back and I have a good feeling he knows a thing or two about sharp optics. If anyone has one please let me know!

I was intrigued from the start by the dome port the GoPro comes with. It seemed a step back words to change it for a flat port. I kept thinking it was only a matter of pulling focus. It took some time to work up the nerve, but finally I took the little thing apart,

twisted the lens out a bit, and with a little trial and error, was able to get the right focus distance for the original dome, and I am now able to shoot in R3 underwater.

Like the principle of extension tubes, as you move the lens further away from the sensor you make the focus closer. That is all it took, a quarter turn and without spending any extra money, you too can have a GoPro that is in focus underwater.



A bit of PVC pipe and some bike grips and you have a sturdy base to hold on to, mount accessories on, and protect the camera with.

Of course it is out of focus above water, but who wants to shoot on land anyway?

The next hurdle is getting a steady shot. That is mostly up to you, but I have found a few ways to make this more achievable. Firstly you need a stable platform to hold the thing with. I have found the best way is to lock off the shot with a tripod; I like the waterproof, light



and easy gorillaPod. For hand-held shots I have a mount on my housing, and a device I made for a few bucks out of PVC pipe. Simple and cheap solutions that have been very successful so far.

The last thing I would like to mention is the lens. If you thought the GoPro was only for wide angle shooting, think again; you can get anything from circular fisheye to extreme telephoto from Ragecams, either pre installed as a package with a camera or as a do-it-yourself quiver of "primes". Twist to focus (fixed once you are underwater) and capture macro with your GoPro. This has proved to be a challenge, but that is part of the fun.

Christopher Hamilton
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