Digiscoping with Swarovski 80mm and 65mm Spotting Scopes

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1) **Digiscoping -**

Most of the point-and-shoot digital cameras on the market have built-in, non-interchangeable lenses, either fixed focal length or zoom, so they cannot be attached to either of the Swarovski Camera Adapters (see "SLR Photography with Swarovski Spotting Scopes"). However, the camera can be held up to the viewing eyepiece of the spotting scope, the image can be framed and focused using the camera's LCD viewing screen, and the photo taken that way. This type of photography has been christened "Digiscoping".

The beauty of this system is that you start out with the base magnification of the spotting scope's eyepiece, and then multiply it by the amount of magnification in the camera's OWN lens. Example – my Pentax digital camera has a lens that corresponds to a 35-100 lens on a 35mm camera, so the telephoto setting magnifies the image 2x. Holding my digital camera up to the 20-60x zoom eyepiece of my ATS-80 HD, I see my scope's image surrounded by blackness, called **image vignetting**. When I zoom the ***camera's lens*** to full telephoto, the vignetting disappears, and it takes the scope's 20x image and doubles it to 40X! That is the equivalent of using a 2000mm lens on a 35mm camera! If I then zoom the scope eyepiece to 60x, with the camera's lens at 2x, my final image magnification is 120x, like a 6000mm lens for 35mm! Fantastic!

2) **Which scope?**

It does not matter if you are using the old-style AT or ST 80 scopes, the new ATS or STS 80 scopes, or the compact ATS / STS 65 scopes. The camera adapters will work fine with any scope. The High Definition (HD) version is the recommended type of scope for photography – it has superior contrast and color saturation when compared to the standard models. This will result in brighter colors and a crisper image. As to scope style, I usually use the AT (angled eyepiece) because it allows me to set the tripod lower, and thus get a more stable base to shoot from. However, if you already have a straight-through (ST) scope there is no disadvantage to using it, and you probably will be a little more comfortable with the ST for finding and following a moving subject.

3) Which Camera?

(For model recommendations, see "Camera Choices" at the bottom of this document)

If you are interested in a particular camera and cannot find it recommended or even listed in any digiscoping articles or websites, try it out! Take your spotting scope to the store and simply turn on the camera's LCD screen and hold the camera up to the eyepiece. You should see the scope image as a bright circle surrounded by black – photographers call this vignetting. Work the camera's zoom from wide-angle to telephoto, and see if it eliminates the vignetting. If it does, the camera should be a good choice for digiscoping.

Digital point-and-shoot cameras cost anywhere from under $200 to over $1000, depending on how much detail the electronic sensor can record (listed as "megapixels"), the lens type (look for "optical zoom"), and whatever other features are designed into it. The high-end cameras are usually called "pro-sumer models"), since they combine professional-type system overrides and flexibility with point-and-shoot convenience for the general consumer.

In many cases, the photographic results are surprisingly good, especially with the recent improvements in image sensor quality. The early reviews of digital photography said that it was convenient, but the image quality was poor when compared to 35mm film. However, my 3.3 megapixel camera yields some excellent 8x10s! More recent cameras are sporting 4.0 and 5.0 megapixel sensors, which yield better image quality for 11x14 prints (and larger), but they also require greater storage capacity. In August 2004, a slew of 7 megapixel consumer cameras were announced for fall shipment. Personally, I think that level of image quality is unnecessary if you do not plan on making prints any bigger than 11x14. In the field, the bigger files will fill up a storage card more quickly, so be sure to buy a big memory card and always carry a spare.

An important fact – ***NONE*** of the digital cameras on the market were designed with digiscoping in mind. Some digital camera lenses work well to eliminate the black vignetting of the scope's image, while other designs do a lousy job. In some cases, zooming to a higher magnification causes a dramatic loss of contrast in the image. Unfortunately, there do not seem to be any hard-and-fast rules to predict whether a particular camera / zoom lens combination will work well behind a scope eyepiece. There are many "external" zooms that change their overall length when focusing and zooming, and others that use internal moving lens elements to focus and zoom without changing length – I have found examples of both types that work well on a scope eyepiece, and others that work poorly. If the diameter of the camera's front (objective) lens is any bigger than a nickel, it will probably have vignetting problems.

One fact that seems to hold true is that any digital camera that has an Optical Zoom of ***greater than 4x*** will ***NOT*** work well as a digiscoping camera. Don't pay any attention to Digital Zoom figures – they are worthless for this application. Actually, when digiscoping you should turn the Digital Zoom function "OFF".

It is handy to have some control over the camera's systems, but not critical. See "In the Field".

4) Mounting the camera to the scope

At first, digiscoping was done by simply holding the camera's lens up to the scope eyepiece. However, it was not all that easy to obtain consistent results - the camera must be held perpendicular to the scope eyepiece, and must be perfectly centered on the image. Trying to hold everything in place, steadying the image, and pushing the shutter button with a minimum of vibration is easier said than done.

The early digiscopers were creative tinkerers that fashioned elaborate mounting systems to hold their cameras in place. Unfortunately, that changed the spotting scope into

a full-time photographic lens, and you couldn't view through the eyepiece unless you detached the camera. Birders and nature watchers want to have a spotting scope that can also take good pictures when the occasion arises. Simply holding the camera up to the scope eyepiece works OK, but there are problems.

There are many companies that have designed adapters to hold digital point-and-shoot cameras behind a scope eyepiece, but the main problem is not with attaching the adapter to the scope, it is attaching the adapter to the camera. Most point-and-shoot digital cameras are designed for novice photographers that have no use for accessories like remote shutter releases, photo filters, or accessory telephoto and close-up lenses. Making the process more complicated is the fact that the cameras come in all shapes, sizes, and designs – there is NO "universal" digital camera adapter.

The Swarovski Digital Camera Adapter (DCA)

Any camera that has threads to accept photo filters and accessory lenses is a good place to start. Some have the threads on the lens itself, but a few of the recent models have an accessory "filter adapter" available from the camera manufacturer.

In April 2003, Swarovski Optik introduced a method of attaching a digital point-and-shoot camera to our spotting scope eyepieces. The Digital Camera Adapter has no lenses - it simply allows the camera to be positioned behind any of the new "S" Series Swarovski viewing eyepieces. It is quick to attach and detach from the eyepiece, and comes in two versions – the DCA-Fixed for use with the fixed-power, wide-angle eyepieces (20xSW, 30xSW, 45xSW), and the DCA-Zoom for the 20-60xS zoom eyepiece. Neither of the DCAs will work directly on the older Swarovski spotting scope eyepieces, although it is possible to make an adapter. All the new "S" eyepieces will work on the older (gray) AT 80 and ST 80 scopes, so buying an "S" eyepiece and a DCA will work fine.

Here's the catch – your digital camera MUST have the ability to accept threaded photo filters

The DCA has three components – the inner (eyepiece) tube, the outer (camera) tube, and the camera mounting ring. The inner tube clamps onto the zooming ring of the scope eyepiece, so it can remain attached to the scope at all times. You can still zoom the scope by twisting the zoom ring. The mounting ring attaches to the camera's filter threads, and the outer tube attaches to it. Four different mounting rings come with the DCA, in commonly-used standard filter sizes – 28mm, 37mm, 43mm and 52mm. Any camera that uses different-sized filters will need a step-ring, available from any well-stocked camera store.

Example – the Sony DSC-W1 has a filter adapter (VAD-WA) that accepts 30mm filters. To attach the DCA-Zoom to the DSC-W1 and VAD-WA, you would need to purchase a 30mm – 37mm Step-up Ring.

The Digital Camera Bracket (DCB)

The Swarovski Digital Camera Bracket was first shown on the Swarovski website, and promised to be the solution to the problem of a camera that had a great lens for digiscoping but had no filter threads or filter adapter available. The DCB clamps onto the back of the "S" series spotting scope bodies and holds the camera in position behind the scope eyepiece. There are two versions – the DCB-Angled for the ATS scopes, and the DCB-Straight for the STS scopes. The DCB will not fit on the older AT and ST scope bodies.

Its unique design allows the camera to be held in place behind the scope eyepiece for photography, but the entire assembly flips up out of the optical path to allow the operator to view through the scope eyepiece. When in "viewing" mode, the camera arm locks in place above the eyepiece. Flip a release lever and the camera instantly positions itself behind the eyepiece for photography.

The only real disadvantage of this design is that it initially takes a few minutes to properly align the camera behind the scope eyepiece – since every camera is different, it must be properly centered on the eyepiece and positioned so that the lens does not hit the eyepiece when zooming or focusing. The camera can easily be removed from the DCB, but reattaching it will take a few seconds to realign the camera. On a day where there is blowing dust or rain sprinkles, keeping my camera mounted atop the spotting scope would make me uncomfortable.

In August 2004, the first Swarovski DCB-Angled models were delivered to the US, and the DCB-Straight models are scheduled to be delivered in the Fall of 2004.

5) **Which Tripod?**

The brand is not as important as the size – the heavier the better. At high magnifications the image is very sensitive to motion, and the slightest shake will result in a blurry picture. Keep the tripod legs and center column as low as possible when shooting, so they will dampen vibrations more efficiently (a good reason to use the AT-80). A wooden or carbon-fiber tripod will dampen vibrations more efficiently than an aluminum tripod, but the two drawbacks there are weight and cost, respectively. Another alternative is a weight bag – an accessory that hangs below the center column and can be filled with rocks, sand, etc., and provide additional vibration dampening.

When a camera is mounted on the scope, it now becomes very tail-heavy, and a sturdy tripod head is a good thing. A "fluid head" for video tripods usually does not solidly lock down, and the resulting play in the system will be very annoying. The Swarovski FH 101 Tripod Head moves smoothly in all directions, yet locks solidly with the flip of a lever. It will attach to virtually any tripod, regardless of the brand.

Some people use a separate brace that threads into the camera tripod socket and then clamps to one of the legs of the tripod. This works well, but severely limits the ability of the camera to track moving subjects. A monopod attached to the camera body will support the scope / camera in the vertical direction and still allow lateral motion to follow

moving subjects. The most stable solution is two tripods – one mounted to the scope, and one mounted to the camera. Needless to say, this is not a very portable setup, and you can forget about following moving subjects.

Swarovski Optik has announced plans to market a Balance Beam assembly that would mount onto the tripod head and move the scope / camera assembly forward, putting the center of gravity directly above the tripod head, with availability by late 2004.

The ultimate setup for stability would be a sliding rail system, similar to what is used on professional view cameras. Two movable mounts on a rail would attach to the camera and scope, while the center mount attaches to the tripod head. The whole, rigid assembly now can slide forward until the camera / scope balance point is above the tripod head. This would be a heavier system, but the perfect balance point and stable scope would make for better control and image stability.

6) **In the Field**

Practice assembling the system quickly and efficiently – an eagle sitting in a tree will probably not wait around until you to figure out how everything is supposed go together.

In the field, you will be able to use your scope normally – focusing, zooming, etc. The camera will have the mounting ring / outer tube attached to it, ready to shoot pictures. When you see a subject you want to photograph, slide the camera / DCA assembly down over the eyepiece / inner tube assembly, tighten the locking screw, view the scope image on the camera's LCD view screen, and take pictures. I set my screen's brightness at Max setting, so I can see if better during bright sunlight. If you have accurately focused the scope on the intended subject, the camera's autofocus system usually locks in on the subject and the autoexposure takes care of the camera settings. If the camera allows, I usually set it to a center-weighted or spot meter setting, and the focus to a spot-focus setting. Any cameras that feature a "focus confirmed" signal on the screen are very handy.

Take your first few shots at fairly low power and a high ISO setting, so the chances are good that you will immediately get decent results. Review the images on the LCD screen, magnifying to see how the fine details are rendered. Once you have a few "good ones", you can lower the ISO for better image quality, or crank up the zoom power.

High-power settings are very sensitive to camera shake, so using the camera's self-timer or a remote shutter release (if available) is advised. I usually set my camera's exposure system to Aperture-Preferred Auto, so I can change f/stops to get the fastest shutter speeds possible for the lighting conditions. The higher you set the magnification, the less light hits the sensor, and the camera will need slower shutter speeds.

TAKE LOTS OF PICTURES – If taking photographs with long telephoto lenses were easy, everybody would be doing it! There is no way to get good results without putting in the time and effort. As you become more familiar with the system, you will end up with better results. The beauty of using a digital camera is that you can immediately post-view the picture and enlarge it on the camera's LCD screen to see how the image quality came out. Any bad shots can be deleted, either in the field or later, after the files have been

saved to a computer hard drive. In any case, you can clean out the memory card and take more shots.

MAKE SURE YOU HAVE SPARE BATTERIES – Using the LCD screen eats up power, and as soon as the "Low Battery" signal comes on, your shooting time is limited. The more recent cameras are wonderfully energy-efficient when compared to those of just a few years ago, but you should have two or three sets of rechargeable batteries all charged up and ready to go for a day in the field.

I always turn the LCD monitor off when I am not actively framing a shot – it saves power, the camera remains on, and I can recall the monitor in a matter of a second or two.

Another really cool feature that is becoming more common with the digital point-and-shoots is a "movie" setting. While the image resolution of the short movie clips is not as good as the still photos, the ability to film moving subjects is pretty useful. The duration of the film depends on the camera, but my Nikon CoolPix 4500 takes 35-second clips. If the subject is a rare bird, a 30-second movie viewed frame-by-frame can show details that are only fleetingly glimpsed and hard to capture with a single shot.

Camera Choices –

Here are some cameras that will give a good, full-frame image when held up behind our 20-60x zoom eyepiece.

Those with * are ones that WILL attach to the DCA using the camera's own filter threads
Those that have ** will attach to the DCA, but need an add-on filter adapter from the manufacturer.
All others will need the DCB to hold them up to the eyepiece.

This list has probably changed, since the camera models are introduced and discontinued at a bewildering rate.

Nikon –
*CoolPix 900, 950, 990, 995, 4500
**CoolPix 770, 880, 885, 4300, 5000
All current CoolPix models EXCEPT the CoolPix 5400, 5700 and 8700 – their lenses do not work well for digiscoping!
Pentax – all cameras with 4x optical zooms or smaller.
Canon –
**Power Shot A80, A85, A95
Power Shot S30, S40, S200 Elph, (adapters made by www.ckcpower.com may fit specific cameras to the DCA)
Olympus – D-40, **C-5060
Minolta – Dimage X,

Fuji – FinePix F601Z,
Kyocera – FineCam S3X,
Sony – **DSC-W1
Most DSC P-series cameras
Kodak –
**DX 6440, 4530,
Most others with 4x optical zooms or less should work

Video Cameras –

Everything I have said about attaching a digital point-and-shoot to the DCA or DCB is the same with any number of the video cameras. Since the image sensor on video cameras is usually smaller than those on digital still cameras, there are some models that work well even though they have optical zooms of greater than 4x. If the front lens diameter is small, you probably can get a decent image, and the final magnifications are even greater than with the still cameras. However, I would "test-fit" the video camera's lens to the scope and view the image on the LCD screen before buying.

Most of the video cameras accept photo filters, so it is simply a matter of attaching the DCA to the front of the lens. If not, see if the DCB has enough adjustability to hold a mini-camera up to the scope eyepiece.

Proceed as before.

Feel free to contact me if you have any questions,

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