Optex and Century Optics Anamorphic Adaptors

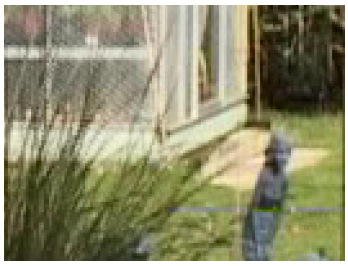
Gordon at GTH reviews the versions for the Sony VX2000/VX2100/PD150/PD170

This review was prompted by a need for high quality widescreen material for demonstration of aspect ratio conversion. As for most videographers with the Sony VX2000/PD150 or their successors the decision was between using the built in electronic widescreen scaling, an anamorphic adaptor lens or scrapping the camera and buying one with a CDD with direct widescreen capability.

Anamorphic Lens Advantages

As always there are advantages and disadvantages of each solution. Cameras with widescreen CCDs will no doubt eventually take over but the popular Sony VX2000/PD150 do have full 720 by 576 pixel CCDs. With a good optical adaptor they are thus capable of giving full resolution in widescreen format. Electronic aspect ratio conversion is fine when converting anamorphic to letterbox, often giving the appearance of improved vertical definition due to the compression of detail. However electronic conversion from 4:3 to 16:9 anamorphic uses only 430 lines of the 4:3 source. So, even with the newer improved Sony scaler on the VX2000/PD150, the result must inevitably have lower vertical resolution than optical conversion as shown below at f5.6 (images cropped to 1/6 size and expanded by simple pixel duplication to show detail):

Sony 16:9, f5.6, Wide Zoom.



Optex, f5.6, Matching Zoom.

As well as better definition in normal use the adaptor also gives a wider field of view, similar to the Sony VCLHG0758 wide angle adaptor. Of course, like this and any other wide angle adaptor, the anamorphic adaptors also worsen barrel distortion at the widest zoom settings, roughly doubling that of the unadapted camera lens. They also suffer from some residual second order chromatic aberration at the extremes of field (red image slightly wider than green and blue) and a small loss of definition in the corners. All of these effects are insignificant when the field of view with the adaptor is adjusted to be similar to that of the camera lens alone at its widest setting as can be seen below in this stunning image taken at about one quarter zoom:

Lens Comparisons
So, having established that the anamorphic adaptors are worth using, the next question is which is best. Visual inspection of both lenses produced the conclusion that they are identical optically and use many of the same mechanical components with the only difference being in the outer housings! The Optex lens is slightly deeper front to back with what looks like a vestigial lens hood. This offers some small reduction in the risk of flare from sunlight etc. but slightly increases the chance of vignetting as discussed later. Testing confirmed their optical similarity so these are the only functional differences between the two lenses.

Optex OTDV58ANA

Century Optics DS-1609-SB

Anamorphic Lens Disadvantages
So, what are the disadvantages of an adaptor lens? First there are limitations on high levels of zoom. At wide angle settings the adaptors cause no significant loss of resolution at any aperture compared to the Sony electronic scaling and as seen above do considerably improve vertical definition over most of their field of view. However there is increasing astigmatism as you zoom in, negligible to about half zoom but becoming significant at around three quarters zoom. Since the Sony camera's auto-focus operates on vertical edges the effect shows as a loss of sharpness on horizontal edges, i.e. loss of vertical definition. Use of manual focus can allow you to trade off vertical and horizontal sharpness but does not solve the problem which can only be reduced by stopping down. The effect is worst at short distances but fairly consistent from about 4 metres upwards. For much of the zoom range this loss is less than that due to the electronic scaling and for example at f5.6 the Optex matches the Sony's 16:9 scaling even at full zoom. So at normal distances with good light levels it is possible to use full zoom with the adaptor as can be seen below (images cropped to approximately one third size then expanded by simple pixel duplication to show detail):

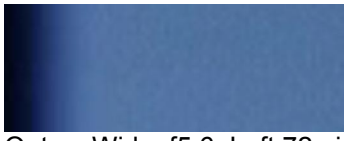
Optex. Full Zoom at 4m & f2.4

Optex. Full Zoom at 4m & f9.6

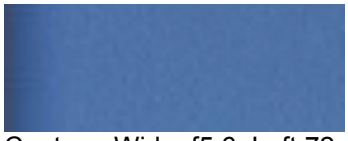
Secondly I was warned by Optex about the risk of vignetting on some of the VX2000/PD150 cameras although assured this was small and not present on other cameras with smaller lenses (e.g. 52mm rather than 58mm) such as the Sony PD100, TRV900, VX9000, DSR200, VX1000 or Canon XM1 & 2. My camera does show a totally black strip on the left hand side with this lens, due to a slight off-centre placement of the CCD sensor array, calculated at 8 pixels. In fact the Optex lens at full wide setting transmits about the 702 pixels of the analogue active line length, rather than the 720 pixels of the full digital line length. With a centred sensor this would be perfectly acceptable for all but web use as all TVs must be designed for the analogue line length so the vignetting would never be seen. It is also invisible in the viewfinder. Even for web use you would only need to crop off 2% and would still have a much wider field of view than the unadapted Sony lens. The Century lens is better in this respect on the VX2000/PD150 but neither lens should suffer from this effect on the other cameras listed. The images below show the worst case at wide-angle with full aperture and normal apertures on my VX2000 with offset sensor but the effect reduces gradually to zero as you zoom in. Only the left 72 pixels (10%) of the centerline of the images are shown as all are reasonably consistent over the whole image height and on my camera had insignificant vignetting on the right hand side. Any vignetting would of course be shared equally on both sides on cameras with a centred sensor:

Optex, Wide, f1.6, Left 72 pixels

Century, Wide, f1.6, Left 72 pixels



Optex, Wide, f5.6, Left 72 pixels



Century, Wide, f5.6, Left 72 pixels

Lens Use and Limitations

So, what else should you consider? Both lenses come in screw mount but the Century lens is also available in a Sony Bayonet fitting. Both have rotatable mounts to allow for vertical alignment. Suggestions that this can be performed looking through the viewfinder should be ignored. The only accurate method of alignment is to adjust the lens so its internal framework is parallel to the base of the camera. Once this is done and the adjustment screw tightened it is possible to remount the lens without re-adjustment by using the same torque during fitting. In this regard the bayonet mount is no better than the screw mount because although the bayonet fitting itself has an end stop the lens actually continues to rotate in order to clamp it tightly to the front face of the camera lens! Many will prefer the screw mount for its flexibility of use with a variety of cameras by adding adaptor rings - in fact the VX2000/PD150 version of the Optex lens is made with a 52mm thread and comes with a locked adaptor ring for 58mm but can be bought for £25 less without this for use on the VX1000 etc.

Visual Alignment Method

Sony VX2000 with Century Optics Lens

It is also worth noting that the price of these lenses is partly due to the difficulty in manufacture. An anamorphic lens uses two matched cylindrical elements, one positive and the other negative. Their spacing reduces the image horizontally from 16:9 to 4:3. Unlike a normal lens where grinding or matching errors simply cause a change of focal length which can be easily corrected by refocussing, with anamorphic adaptors any mismatch causes astigmatism which cannot be corrected and results in a different focal point for horizontal and vertical edges. Design of these non zoom-through adaptors is balanced for distant scenes and normal angles of view but their correction fails at very close distances or higher zoom. Under these conditions the only solution is to stop down the camera lens to reduce the error. Thus high zoom or close-up use in poor light must be avoided - under these conditions the built in conversion should be used but otherwise the adaptor is better. So if you want a close-up in poor light “to catch the tear in the eye of the Bride’s mother” don’t use the adaptor!!

Conclusions

The Optex OTDV58ANA and Century DS-1609-SB widescreen adaptors seem to be identical optically which is not surprising as they appear to use the same components apart from the housings! Both offer superior vertical definition over most of the field of view compared to the Sony electronic conversion. This is true at all apertures over at least the wider half of the zoom range and the adaptors hold their superiority in the centre at smaller apertures even at full zoom, remaining on a par at the edges. With their wider field of view they therefore offer very useful benefits over the Sony 16:9 scaling providing their limitations are remembered.

The choice then for the PD150 is between Century at £620 (possible discounts in this price) or Optex at £475, both plus VAT. The Optex shows some vignetting over part of the zoom range but I am assured this does not happen on all PD150s or on the other cameras listed above, presumably due to different front element sizes and different wide angle capabilities. This vignetting is invisible in the viewfinder and on normal TVs but may need some cropping if used for the web. Otherwise both behave identically. The choice is yours! Because of the off centre sensor on my camera and a slight preference for the bayonet fitting I bought the Century lens. For those who are happy to pay more it is worth noting that Century Optics have now developed a new zoom-through adaptor at a recommended price of £995+VAT though how this compares must be the subject of another review.

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