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Degrees of latitude

You can tell a lot about a camera by its exposure latitude. Geoff Boyle puts the Arri D20, GVG Viper, Dalsa Origin and Sony F950 to the test over a 14 stop exposure range.

Article first published: Winter 2005

Geoff sets up the charts to test the oldest camera of the bunch – the GVG Viper.

Co-tester Jessica Gallant gets to grips with the Dalsa Origin 'handheld'.

Editor's note: You can review the resultant images from these tests at www.cinematography.net/digital-latitude.htm

We are told again and again that digital acquisition is the way forward, that it's "better than film" – or at least as good. Is this the truth or is it just PR spin? Are we being Bliared to again? I decided that the only way I would be happy was to go ahead and test all the high-end digital-origin cameras myself. This proved to be much harder that I expected.

I wanted to start with something very simple: a latitude test. I was going to take the same two charts that I use to tests a new film stock and use them in exactly the same way that I would to establish a film's latitude – a Gamma and Density chart with a Macbeth chart alongside it. These would be exposed from 7 stops under to 7 stops over at half stop intervals. This would clearly show where the highlights clipped and where the blacks lost detail.

Simple! All I had to do was to get Arri, Sony, Dalsa, Panavision and GVG to agree to help me with these tests. This is where the problems started. I thought I'd begin with the oldest of the cameras, the GVG Viper. This camera was released nearly four years ago, so it had to be easy to find. No. The two that Arri has were out on a long-term hire. The four that Motion FX has were all out on Highlander. That's OK, I'll call my mate Danys in Paris; he's got two, and a day return to Paris would be fun. No, they're out on a movie.

OK, let's try the Sony F950. Ah, Sony doesn't sell this in Europe. There is one in Northumberland, but it's built into a helicopter gyro mount and I didn't think that was going to be easy to shoot chart tests with.

Panavision! They've got bases all over the world; they've got to have a Genesis for me. We tried to get access to one in London but no luck.

Arri D20

Let's try and get an Arri D20. I mean, Arri's HQ is in Munich and the head of the D20 project is based in London. Well, we were luckier here: after a couple of attempts we managed to synchronise schedules.

The only small problem we had is that their S2 hard-disk recorders were out, so I had to use the Sony SRW1 recorder. I have nothing against this recorder; it's 4:4:4 and in HQ mode has only a tiny amount of compression. But it did mean that I would have to somehow get individual frames off the tape, whereas if I'd recorded to disk I could just grab a frame.

We went ahead with the tests and I was really happy with the approach and the information that I got from them. Arri was a great place to start the series of tests, as an exposure range of 14 stops is actually quite large, and we needed a lot of light at one end and very very little at the other. By doing the tests at Arri we could just grab bigger lights when we needed them.

But how was I going to progress on these tests when none of the other cameras were available? Well, the Dalsa is only available in Los Angeles, so I was going to have to go there to test that camera, so maybe I'd be able to find the other cameras there?

We started emailing Panavision, but after an initial positive-sounding response, the airwaves went quiet. However, other people were wonderfully helpful. Dalsa was the first to respond and offered the use of its test facilities whenever I wanted them. Pace Technology

offered to help with the Sony F950 – it only have 14 of them. Plus8 Digital offered to help with the Viper – it has 14, but I was also offered an F950 at the same time, as they have five of them as well.

I tried emailing Panavision again. Still waiting. But it was obvious that if I was going to complete this test I was going to have to go to Los Angeles. Luckily, American Airline has very cheap last-minute tickets for their AAdvantage members!

Dalsa Origin

The test at Dalsa was the first and took a little time, as we had to find more light than they normally use to test cameras, but it went fine. While I was there, they were talking among themselves about 'The Disney Test'. What Disney test? "Oh the one they did last week of all the cameras that you are testing – would you like to see the results?" Would I!? Disney had got Daryn Okada ASC to spend two days doing thorough tests of all the cameras I was wanting to test – with the exception of one. It appeared that Panavision wasn't returning Disney's calls either. OK, they returned Disney's calls, but they still didn't get a camera. Whereas I was doing simple latitude tests, Daryn had shot a mini-story with high-contrast exteriors and low level interiors. I saw the Dalsa footage projected at 2K and also on a monitor at 4K. It looked great. I'd have graded it differently and brought out more in the shadows, but the point is that the detail was there to bring out. One interesting issue was that, looking at it at 2K, the focus all looked fine, but at 4K we could see the focus 'hunting' as the camera tracked back. Of course, the Disney tests allegedly cost $300,000; mine had a total budget of $1500 (*one day, Geoff – Steve*).

GVG Viper and Sony F950

On with my own tests and off to Plus8 to shoot with the Viper and the F950. This time we were recording to the S2 DFR hard disk recorder, so I was able to grab frames instantly. Later I went to Pace Technology to look at the F950s that Vince Pace had modified and that apparently have a better latitude than the standard F950, and at the same time picked up a very interesting story for the next issue of Showreel. Vince made the housings for Titanic and the housings and 3D camera for the 3D Titanic that James Cameron followed up with. In fact, Cameron is an investor in the company.

Still no reply from Panavision, so I guess I'll have to confine my tests to cameras that are actually available.

All the tests were done in exactly the same way: the two charts lit first to T22 with the cameras rated at 320 ISO; the lens was then opened at half stop intervals until we got to T2. The charts were then re-lit to T2 and the exposure decreased in half stop increments until we got to T22. The large chip cameras – the Arri and the Dalsa – had the 100mm Zeiss Ultra Prime, whereas the smaller chip cameras – F950 and Viper – had the 40mm Zeiss DigiPrime lenses.

All the cameras were in 'standard' mode, as you would get them from a rental house without any modifications to the camera response. I know that with careful 'tweaking' we could have got a little more detail from the cameras, but the point was to test them in the condition that most people will use them. We are doing follow-up tests with 'tweaked' cameras, but that will take a bit more time.

Results

Unfortunately, there is no way that the magazine can reproduce the fine differences between the cameras, so I'll just have to try and describe them. If you would like to see them for yourselves, you can download full resolution frames from all the cameras at all the exposures at www.cinematography.net/digital-latitude.htm

So what were the pictures like?

The handling of colour on the D20 was outstanding – probably the best Macbeth chart reproduction of all the cameras tested. Highlight handling and overexposure response was again terrific. There has to be something wrong with this camera doesn't there? It can't all be good news can it? Well no, it's not all good news.

Shadow response is poor. At only 1.5 stops underexposure noise was increasing significantly and detail was going fast. This is really interesting, as the accepted 'truth' about digital cameras is that they have great shadow response, but limited highlight handling. Arri has turned this on its head. All the other cameras conform to the accepted 'truth'.

With the Sony F950 the results were pretty much exactly what I expected to see: the highlights clipped very quickly. The Gamma and Density chart has a large calibrated greyscale going from -2.5 stops to +2.5 stops in half stop intervals. At only one and a half stops of overexposure the difference between the +2 and +2.5 stops on the chart had vanished. This means that the F950 has only one stop of overexposure latitude in its standard setting: a very poor result. In the shadows it performed much better; at 3 stops underexposed it was still just possible to see the difference between the -2 stops and -2.5 stops on the chart. Noise was very low too: overall a very good shadow response.

GVG Viper. This is the oldest camera here, available for three years longer than any of the other cameras, so it must have a worse response than any of them, surely? Technology moves on. Hmm, they must have been a long way ahead three years ago because the highlight test went to +3 stops before we lost separation between the top two chips on the chart. I know! They've hugely compromised the shadow response to get the highlight result. Err, no, the shadow response was exactly the same as the F950, and the noise was probably/possibly lower as well.

The Dalsa pictures are natively recorded at 4K – four times the size of any of the other cameras. For these tests the pictures were rendered out at the same size as all the other cameras. Dalsa results: this is where my review of the Dalsa results was supposed to go; unfortunately, because the Dalsa records 4K pictures in RAW mode, they have to be rendered before they can be properly examined. They haven't managed to get them to me in time for this article. I guess that Disney's bigger budget, only by a tiny margin, got them to the front of the queue. But I know from other material that I've seen from this camera that it puts out a well-balanced picture [note, the Dalsa images are now available at www.cinematography.net//largel-chip.htm].

Just for the hell of it we tried using it hand-held; strangely enough it wasn't as bad as it looks: it's big, but not that heavy. Unfortunately the high centre of gravity can cause problems.

Although we couldn't test the Panavision Genesis, it's based on the Sony F950, which performed significantly worse than any other camera in this test. In fact, a much older camera had two stops more latitude than this camera, and when it failed in the highlights it failed very gently and not with a hard clipped look.

From the remaining cameras I'd pick the Arri D20 and the Viper: very different cameras. I'd happily use either for commercials – my usual work.

As a finale to my LA trip I visited the set of David Fincher's latest movie. He's shooting with two Vipers in a totally digital workflow. The pictures I saw in the edit suite were really impressive – partly the camera and a lot of Harris Savides the DP.

I aim to include an article on how the cameras perform on the Fincher set in the next issue.

Geoff Boyle

Reel Show cinematography editor Geoff Boyle's recent feature films as director of photography include The Mutant Chronicles, Dark Country and, currently, Street Fighter 2. He received his first camera, a Brownie 127, when he was eight. From then on the future was clear. After art school in the late 60s, he worked as a stills assistant. One day he was asked if he knew anyone who could film a concert. Of course he did! He moved into film and shot documentaries for TV, 10 years or so of 20/20 for ABC and a lot of music videos. In 1985 he shot a 'making of' about the Pirelli calender. Terence Donovan liked the way he lit and asked him if he shot commercials. From 1990 to 2005, he has shot almost entirely commercials, with occasional sidetrips into drama, a short he shot – About A Girl – winning a BAFTA in 2001. He also shot special effects on Enemy at the Gates, won the SMPTE Eastman Gold medal in 2000 and was made a fellow of the BKSTS that year. He started the cinematography mailing list (CML) in 1996 with 60 members. It now has over 3,000 members in 148 countries and is acknowledged as the pre-eminent internet site for cinematography.