New toys on Mutants

Geoff Boyle tests two new cameras on the second unit and miniatures shoots for Mutant Chronicles: the Phantom high-speed camera and the Silicon Imaging 2K Mini.

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So, I wrote about the main unit photography on *Mutant Chronicles* last issue. Now I get to write about the model and second unit photography. This is unusual in that normally a different DP would be responsible for these areas, but I wanted control over the image, so I've done it all except for a part of the second unit where Dan Lightening my AC took over and did a great job.

I did have a clear secondary motive as well – I would get to play with a whole bunch of new toys. The model unit would use the Viper and Zeiss DigiPrimes to S.Two, as before, but would add the Optex Excellence probe system and – and here's where I was getting excited – high-speed cameras capable of 1000fps. The second unit would use the Silicon Imaging 2K Mini in addition to the normal Viper kit. We had intended to use this camera more on the model unit as well, but more on that later.

The search for high-speed cameras was a difficult one. There are a lot that are 'nearly there' or 'coming real soon', but they aren't available yet. Arri has one that will do HD at 300fps, but it has to go through a converter and it wasn't available anyway. We looked at the Arri 435 – yes, shooting on film – but we really wanted to stay digital, so I talked to John Hadfield at Green Door and he promised to come along with his Vision Research Phantom 5.1. This camera would 'only' do 1024x1024, but would do rates up to 1000fps – and I knew that it worked well :-)

Then Vision Research emailed me and asked, "would like to test the Phantom HD that I'd seen at NAB?" Err, well, if you insist! It's 2048x2048 and also goes to 1000fps. John Hannaford of Photosonic UK, the importers, offered to come to Bray Studios to operate it for us on the first day of testing and make sure it all went well. I was then going to keep it for another couple of weeks. John Hadfield of Green Door has specialised in high-speed cinematography for a long time. I worked with his Photosonics film kit years ago, and I was really pleased to have him join us, as I new that whatever other cameras we played with, John would get the goods for us with his Phantom 5.1. This he did, supplying a set of Nikon primes into the bargain.

The Phantom HD that John Hannaford was initially looking after came with a PL mount, which initially caused us a minor panic as all our lenses were B4 mount and we hadn't budgeted for any other lenses. So we hired in a 14mm Zeiss Ultra Prime going for the wideangle to get the most dramatic images of an escape pod crashing through a skyscraper.

This brings me to an important lesson I've learnt on my first feature: even though there appears to be a lot of money, there's never enough. And although I got nearly everything I asked for, I had to ask for it well in advance in order for it to be budgeted for. Last minute requests – the lifeblood of commercials – were very, very unpopular. The natural response to a late request was, 'no!'. This was a bit difficult when you have a camera and no lenses. I'm sure Tim Dennison our producer has spent years learning that pained 'how can you do this to me?' expression.

Phantoms in operation

I guess I'd better explain how the Phantoms work, as it's quite a bit different from a 'normal' camera. They have a large RAM store in the camera head that is continually refreshing itself. Once you've recorded a shot, you have to stop. We were initially very nervous as we'd been told that the Phantom HD we were getting would only record 987 frames. Now this may seem like a lot, but at full speed it's not even a second in real time! This was causing us to be very twitchy, as we were worried we'd never be able to stop the camera in time. Crash, stop, damn! Missed it again! Luckily the camera was delivered with five times that memory, so none of us had to worry about our reaction times.

This then brings us to a useful facility in the software: the ability to play back a sequence and select just the bit you actually need to transfer rather than the whole of the RAM contents. The data are then reviewed on a laptop (they can also be fed to a floor monitor in HD), then if the take is right you transfer it to the laptop in a custom format and later translate it to the preferred format for your job – in our case, 16bit TIFF, but there's a huge selection, including QuickTime.

The cameras are fairly insensitive – around 100 ISO for a 'normal' looking picture on the laptop – but Vision Research recommend that you rate them at 500 ISO, which retains highlight detail. We shot mainly at 250fps, but even at this 'slow' speed we needed 10 times the light that we normally required. This isn't usually a problem with models, as they're small, but thanks to Mattes & Miniatures our models were bloody huge! The top section of the skyscraper we were going to crash in to was about 18 feet high. This meant lighting it with 20K's all round. We still only got a shooting stop of T2.5 or so.

We aimed both Phantoms at the building and fired the space ship escape pod, painted green, at it the results were spectacular! We intended to shoot this sequence from many angles but as it took two hours to re-build the impact point, we went off to shoot an office being destroyed next before having second and third goes at the skyscraper! This is now going to give Sean our editor a bit of a challenge, it takes about 1.5 seconds for the pod to go through the building, but we have so much footage of it from so many angles, including interior offices, that the sequence could easily last 20 minutes.

An interesting thing about the way we were able to use the lower res 1024 camera was to make sure that we only used one side of the 1:85 frame when using this camera, ensuring that the other side was greenscreen (to be filled with a cityscape later). So we shot the wider shots with the 1024 x1024 and the more extreme CUs with the 2048x2048. This meant that all material was fully usable.

We had great fun using salt as snow, and blasting it with compressed air at 1000fps gave us an amazing rippling snowstorm: we could have spent days playing with this kind of effect, and it's an area where the shoot and review before you decide to save the sequence is really useful, as it takes five to 10 minutes to save each take.

The pictures look great and I had been intending to include some here, but my main video PC blew up. The power supply overheated and failed, but it put a spike out as it failed that destroyed the motherboard, the CPU and, as I've just found out, my RAID. So, go to www.cinematography.net and follow the comparative tests link and shortly there will be full-res frames from all the cameras mentioned in this article, together with a few QuickTime slomo sequences.

I have to say that overall I was very impressed with the Phantoms, new and old. The images were a lot smoother than I expected, and I can see no problems at all in cutting them in with 'normal' pictures. The software betrays the scientific origin of the cameras, but I'm sure it's not that much of a job to make them a bit more film-user friendly. Having said that, I took over operating the cameras and the software after the first day and had no problems at all. We ended up having to buy a 500Gb ICY Box USB hard drive to deal with all the material we produced, and this had to be shipped to Men from Mars a couple of times to get them to transfer off the material from the Phantom and the SI.

Silicon Imaging 2K

That brings me neatly to the Silicon Imaging 2K Mini. This is based on the camera I saw it NAB, but it has been developed well past that. What we had was essentially the imager with a PL-mount attached, and instead of the full camera we had alpha – yes, alpha – software to run the image creation on a laptop.

So we had a camera head that was about the size of a pack and a half of cards, so that the PL mount dwarfed the camera! At this point I have to say thank you to James Eggleton our data monkey. Sorry, but that's his working title. Without James we'd never have got the SI camera working. I stressed earlier that we were using alpha software, and oh boy, were we!

The first software had no install routine, so James had to load it by hand and correct the inevitable errors as it went. I have to say that this is in no way a criticism of Silicon Imaging – quite the contrary – I think it took a lot of guts to send out a camera this early in its software development, and I have to say that their support was amazing. With new software builds every day, fixing whatever we'd found the day before, it was only a couple of days later that we had a fully auto install system up and running, with new improved features being regularly added. These were not gimmicks, but useful and fully usable additions, getting to the point where, just before we had to send the camera back, we had added the facility to load SpeedGrade-generated looks into our preview system and could view either a RAW picture or one with a look applied.

To give you an example of how responsive they are, here's an extract from an email from them after we'd casually mentioned that as we could grab individual frames then some way of comparing them might be useful: "As you requested, we have implemented the first phase of the FRAMESTORE functions: SAVE IMAGE, LOAD IMAGE, GRAB FRAME, RECALL FRAME.

"SAVE IMAGE = Saves JPG, DNG, DPX and BMP;
LOAD IMAGE = Load BMP file into FRAMESTORE and turn on RECALL 100%;
GRAB FRAME = Places current live image in FRAMESTORE;
RECALL FRAME = Toggles between 100%, 50%, OFF.
"We know the BMP has the default Color Matrix turned off… will enable soon. Middle-Right Hot-Spot produces a black image – new feature in development not completely implemented.

"Other features/fixes (Alpha196):Exposure Meter – Clip Indicator, Sticky Exposure settings. Audio is now enabled for all non-72p/timelapse modes. Moved set black processing into its own thread. Fixed LUT problem with SIV playback (was using sRGB). Any other high priority requests for the project (eg, you had mentioned some custom high framerate mode options)?"

It did none of those things when we received the camera 10 days earlier.

I'm not going to go into a detailed spec of the camera (we've done that before and Jason Rodriguez expands on it later in this issue). However, it's worth noting the major differences between this model and the prototype we saw at NAB. The SI camera will now give you a full 2K image from which you can extract your 1920 at rates of 24p, 25p and 30p; it will also shoot 720p at 72fps. We found endless uses for it and, as one of the illustrations shows, a favorite mounting point for it was on the matte box bars of the Viper so that we could shoot a scene at 24 and 72fps simultaneously. You'll probably also notice the custom waterproof cover for the SI camera. It's a shower cap from the Holiday Inn I was staying in.

We used the SI for all kinds of small shot's that are vital to the film; in 72fps mode we shot troops and explosions to be inserted into parts of main Viper images; at 1080 we shot 24p and got the camera into places the Viper just wouldn't go. After grading, the difference is unnoticeable. The main comment that everyone made about this camera is how smooth the pictures looked; really nice looking stuff.

Have I got anything negative to say about it? Yes – it's still difficult to get a good black balance and this is something you have to be very careful about. I'm sure that they'll fix it: in fact, they probably already have.

What else? Well we did have a problem with material shot at 72fps: some frames were dropped. This was traced to us not using an Intel GigaBit connection; SI wrote new code that bypassed this and all was fine.

That is what impressed me most: not the great pictures, but the level of commitment and support they were willing to put in: long phone calls and emails and the willingness to listen to our daftest ideas and incorporate them in many cases. I think when they release the camera they'll have only one major problem to deal with – making them quickly enough.

This is close to the camera that the Kinetta promised to be and hopefully we'll soon see that available too. It is a major step forward for all filmmakers. Oh, and as a quick postscript, I never thought that I'd see a compression system that didn't make me want to vomit. I was wrong; the Cineform Codec is amazing. Of course, there's some loss, but nothing like any other system that I've seen. JPEG2000 promises this, but has yet to deliver.

The way the system is implemented is really interesting and useful. Without the full Cineform codec you get a half-size proxy to work with. I have to admit that I didn't realize this at first and was straight on the phone to Ari at Silicon Imaging: "What's going on? Our AVIs are only 540x960!"

"They're meant to be that way, Geoff," was the calm reply, "just play them in any program that has the Cineform codec loaded and they'll play full res." And they did.

It was incredibly useful to be able to grab full-size frames from a sequence and then use them for comparison. This, as you can see from the email extract above, has grown into a very useful facility now, with mix and overlay built into the camera.

Silicon Imaging 3D

The potential of this camera for 3D work are truly astounding. If you were to use C-mount lenses instead of PL-mounts, then you could have full HD-res 3D in a package the size of three packs of Benson & Hedges. That is just mind-boggling. They're well aware of this potential and are adding sync facilities at the camera head to allow cameras to be locked together easily. Then you just have two Ethernet cables coming back to your laptops [more on this in a future article].

You've probably guessed by now that I like this camera, so let's make a few things very clear: it's a single chip Bayer camera; it can't have the same resolution as a camera that starts with three HD chips – I reckon it comes in at around 1500 across, but considering that an F900 is only 1440 across… well, that's not bad at all. And to me the pictures look very smooth and more eye-catching. If I were still buying kit, I wouldn't hesitate to get one of these – either in the Mini mode or in it's full one-piece camera mode. After all, you can always unclip the sensor section and use the full version as a Mini anyway.

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.