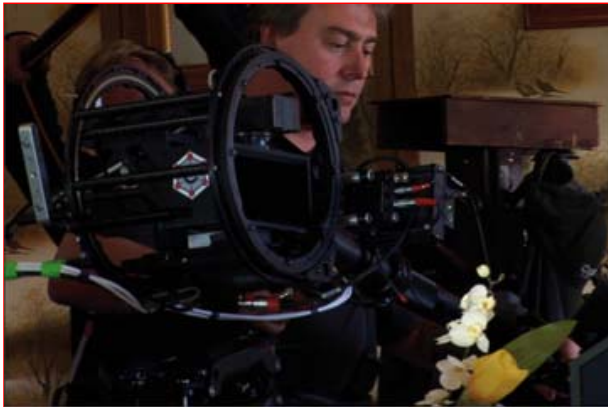


# Milling and the rigging

ParadiseFX's Tim Thomas details the work required to create the three stereo rigs used in *Dark Country*, and Howard Smith explains the theory behind the MK-V-AR rig.

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Howard Smith with the MK-V-AR rig and two SI-Minis.



Max Penner of Paradise FX with the Red 3D rig.

One of the most innovative elements of *Dark Country* is its use of custom-built 3D rigs for the Red and Silicon Imaging cameras. "Ray Zone and I started having meetings with different 3D companies," says the movie's director Thomas Jane, "and we met ParadiseFX, who had done *Terminator 2* in 3D. They had all the equipment, and they promised they could make the smallest 3D camera rig the world had ever seen, capable of housing two Silicon Imaging Mini cameras.

"Then Howard Smith became involved with his groundbreaking AR rig, which is absolutely fantastic, and combining them gives us shots that have never been used before. For the first time with live action we have dynamic interocular! Which means we can change the distance between the two lenses during a take.

"I'd worked with Geoff Boyle on *Mutant Chronicles*, and then I read his piece in *Showreel* about shooting 3D with the Silicon Imaging cameras, and I realized, 'he's the man who knows about this technology'. So having all those rigs, combined with forcing Geoff to come across the pond and do the movie with me, really formed the basis of a fantastic crew capable of delivering something that had never been done before. And that's how we have *Dark Country*."

## Welcome to Paradise

Paradise FX has been in business since 1991. Joint owner Tim Thomas sits on a comfy chair in the middle of the shop. Finally, he can relax. The completed 3D rigs have just been loaded on to a truck ready to drive the roughly 700 miles from Van Nuys to Albuquerque, for a shoot that begins in mere days. His partner, Max Penner, is taking a short but much-needed nap.

The two met on the set of *A Nightmare on Elm Street: Freddy's Dead* back in the 80s. Tim was working for a visual FX company and Max had stepped in to replace the 1st AC, who had been injured in a battery explosion. "Max is a mechanical and optical engineer," explains Tim. "He doesn't just conceive the project but actually makes it. We started out in 35mm and graduated to 65mm, and now go from IMAX all the way down to material suited for iPod. We still do some film, but we've moved more into the digital realm recently, particularly with the Red camera and the SI Mini.

"We've been working with Thomas Jane and his associates to kind of get this project off the ground for nearly 11 months now. We've been testing the SI Mini for other projects, as well as *Dark Country*, but the movie has always been the carrot in front of the cart. We enjoyed the script a great deal, and we believe Thomas has got the chops to pull this off – especially with Geoff Boyle involved – so we've put a lot of energy and effort into developing the SI Mini 3D system."

## The SI rigs

"This is unlike anything we've done before," Tim continues. "The SI Minis in a 3D rig have a form factor that compares with regular 2D studio cameras, because they're so small and tidy and can record for such long periods of time. We can record for almost two hours on a laptop with a single SI, and the 11 stops of latitude the 2K chip provides gives us almost film quality to work with. The SI Mini underwent a lot of growing pains in the last 11 months. Hopefully, we were able to help it grow – by field testing and providing feedback to Silicon Imaging. They've been great about supplying us with the tools we needed from their arsenal.

"The target was to build a 3D rig that would be small enough to complete what Thomas had envisioned for his film: a lot of really tight close-ups, cramped quarters inside the car, a lot of running and gunning, and the kind of shots you just can't do with a regular camera. So time passed, and the film was finally funded by Sony, to be produced by Hyde Park. Once the check cleared the bank, we had 11 days to

fabricate the package – not the nine weeks we had asked for in our proposal!"

"The SIs are in a new Mini-Paracam designed and built with the help of Stephen Pizzo and Hector Ortega at Element in LA," adds Geoff Boyle. "Element has been involved in the development of the Paracams for the past 16 years, and is also producing a number of accessories for the Red camera. Because this project was a late green light, Paradise had to ask Element to turn around the parts needed in less than four days. Max then worked around the clock for three days to get the rig built and mounted in the AR. After rushing home for some spare clothes and to kiss his family farewell, he jumped straight on a plane to New Mexico, which probably explains why he's a bit grumpy on set!"

"The SI Minis are tiny, and we're using Fujinon C-mount primes on them," continues Tim. "We have 4.8mm, 8mm, 12.5mm and a 25mm. These will record to two Mac PowerBooks running Boot Camp and Windows XP, using the Cineform wavelet code. It's a lot like film because you have to render out proxies before you can view the footage, so this is going to be a lot like shooting in the wilds with film – it's going to require some work before you can actually see the scene you've just shot. So we'll be working much like we were in the old days with the IMAX cameras, waiting for reports back from the lab before we could actually feel comfortable that we'd got the shot.

"But the biggest banana peel thrown in front of us by Mr Boyle was the introduction of Howard Smith and his AR Steadicam rig, which allows the operator to hold the horizon and go from low mode to high mode in a heartbeat. It has a cage on one end, so whatever we built had to fit inside that cage. And they also wanted 2.5in of travel on the interocular distance, which is the cinematographic replication of what your eyes do. So now we've got two tiny cameras in a tiny box with 2.5in of travel and this weird Steadicam device, and this very energetic operator who wants to run and jump off cranes and run around on the end of our tether, as these systems are tethered to laptops. Otherwise they won't record any images."

### The AR rig

The aforementioned Howard Smith is sitting in the back room of Paradise FX, explaining what makes the AR rig different from traditional camera supports. "Normally with a Steadicam, you'd have the camera mounted either on the top or on the bottom," he says, "for either a high shot or low shot, and it can take up to 20 minutes to change from one to the other. It doesn't physically take 20 minutes to re-rig, but by the time you get the actors back out of the trailers and everything set up again, it can take that long. The AR system was primarily designed as a cheat's way of moving from high to low or vice versa in a second rather than 20 minutes."

The rig is built around a pole about the same height as the operator, with a cylindrical cage for the camera at one end and a weight at the other, and it comes with the usual harness for the operator. "Once I'd got the camera stabilization working and the controls in place, I was able to add rotation to the moves," explains Howard, "so you can go from ground level to eight feet in the air and up to four feet away from your body, as well horizontally – all in a single fluid movement.

"It gives you a look more akin to a Technocrane than a Steadicam, and most of the jobs it's done have been replacing a Technocrane. But the main thing with the AR is that I can put a film camera anywhere you can put a little Handycam camera with your hand. If you can bend down to the floor with it and put it up to the ceiling and lean over a railing with it, I can do that with a film camera. So I can go anywhere you can go, but with the look of a Technocrane. So by using ramps and cranes and cherry pickers, you can create an incredible sequence.

"There's a new Eddie Murphy film called *Starship Dave*. They had a 360deg spaceship set with interactive lighting in the walls of the set, so they couldn't fly walls out. But they were doing full-on Technocrane-type shots using the AR system to fly around and over objects, without taking out the walls of the set."

Howard is looking forward to trying his hand at 3D with the AR rig. "We have a full 3D rig for the SI Minis and it's yay big," he says, holding out his hands to encompass a space not much larger than a housebrick. "Once it's inside the AR, we should be able to create the most amazing shots, because we can actually go from 2D to full 3D during an elaborate AR move. Hopefully, you'll be able to keep your popcorn down when your watching!"

### The SI rigs in use

Geoff Boyle is contemplating the use of the SI rigs prior to shooting. "With the fixed interocular rig – the side-by-side SI Mini rig – we can't use those cameras closer than five feet to anything, but that's great for a pursuit vehicle. If it does get closer, then we're probably going to have an accident anyway. There are some shots we will be doing that are a lot closer, but they will be done off the ATV with the AR Steadicam. We'll just have to replace Howard when we kill him.

"One of the key questions is whether we can undercrank or not. We are hoping to be able to run the SIs at 21 frames, but at this point we're not sure that we can do that at 2K. Theoretically, we should be able to, but I've a feeling the software in the SIs will only let you do totally variable speeds at a lower resolution. It's just a case of Silicon Imaging changing the software. It's not a problem with the camera; it's just that no one's asked them for it yet. They are very good at changing things when you ask them. When we were using the SI on *Mutant Chronicles*, they managed to get us an update overnight, with us downloading them as we went. I'm sure if I emailed Ari and Jason they'll have a low speed option available within a day or two. In fact, I'll do that right now."

### The Red rig

Tim has moved on to talking about the Paracam rig for the Red camera, which is a modification of the same rig used to shoot Terminator 2 in 3D. "When we first started talking to Thomas, we were looking at the SI Mini as the A camera, but we thought we'd need something a little bit more mainstream for some of the shots, such as the Grass Valley Viper or one of the Sony cameras." In fact, once Geoff became involved, the decision was taken to use two Red cameras in a 3D rig. When you're trying out so many innovations in one movie, you might as well go the whole hog and try out a 4K camera that might rightly be described as an 'in production beta'.

"Things are a lot easier with the Red rig than with the SI rigs," Tim explains. "On a remote head the Reds can be completely wireless and cable-free. The camera wasn't as difficult as dealing with the SI Mini because it's more of a form factor we're used to. It records to flash cards, although it's still a little glitchy. At this point there's no hard drive backup, so it's exactly like shooting with film. The flash cards are extremely expensive and they record almost six minutes of footage. This then has to be converted to viewable proxies, so playback with the Red 3D system is not instantaneous."

### The Red rig in use

Geoff is more circumspect about the Red rig. "I'm kind of thinking that we'll mainly use the Red for background plates," he concludes. "That's not really the fault of the Red camera as such – although it's partly down to the record time. We can only get five minute loads on the compact flash cards, and when you're shooting car to car and rushing round, and when you've got an actor/director, you want to be able to shoot more than that, to give the director the chance to do a few takes. However, it's also because of the size of the Reds. Even though they're relatively small – similar in size to many HD cameras, by the time you've put two of them, each equipped with an Optimo 15-40mm lens, into a stereo housing, you end up with a monster. It weighs 105lbs (48kg). You try and use that on a thriller car chase movie and you're out of luck. I think the size of the rigs is what has held 3D back in a big way.

"So we're concentrating on using the SIs. The variable interocular rig weighs about 10lbs (4.5kg) and the fixed interocular only weighs about 3lbs (1.36kg), and you can mount either of them more or less anywhere. Most of the time, the SI Minis are in the AR, and it gives us movement that you've never see in a 3D movie before; if we were to have used the Red cameras, it would be like any other 3D movie – it would have been like going back over 50 years in terms of camera movement.

"Apart from that, because of the way that I do post and the way I previz looks, I prefer the SI, because I can sit down with frames that Joe Vandalsem grabs for me, put them on my laptop, grade them, put those grades back into the SI system, and then we're actually shooting with the finished look – or close to it."

### Data wrangling

Joe Vandalsem of ParadiseFX is handling the digital workflow on *Dark Country*. He will also be involved in the post process. "The Silicon Imaging 2K cameras are capturing directly to a couple of Macbook Pros running BootCamp," he says. "With the Red cameras, you shoot to compact flash cards – the same as you'd use in a high-end digital stills cameras. Each 8GB card holds around five minutes of footage.

"For the dailies, we're sending in an NTSC feed out of the cameras to a clamshell. Then we can make dailies really quickly using DV tapes – or DVDs. For higher end dailies, we'll be using Iridas Frame Cyclor Pro. And we're going to have a 56in Samsung TV. This is special technology that allows you to watch 3D on a rear projection DLP TV with shutter glasses, so that's going to be really cool.

"We're going to be using After Effects for minor previewing, but our main software for doing 3D conforming is Iridas SpeedGrade 2K, and we may also use Final Cut Pro, but that may change. SpeedGrade is a pretty cool program because you can load your looks into it on-set and see your final grade superimposed on the raw data you've shot. All that look information is stored in the headers of the files, so it can be changed without affecting the raw data. Once we've finished, we'll be using SpeedGrade DI, which has all the output options you need for a film-out.

"Compositing is going to be a little more difficult than with a 2D movie because you have to do everything twice: left eye, right eye. We've actually been talking with The Foundry, who make 3D compositing package Nuke. They are developing some stereo tools that we're pretty excited about; they're not released yet, but we hope to get hold of them for *Dark Country* because the new tools are going to allow us to do the compositing once, then it'll interpolate for the other eye fairly quickly, which will make it much easier than it has been in the past.

"It's a totally digital tapeless workflow. So all of the footage goes on hard drives directly to my station. From there, we make the proxies for offline and that should be a fairly quick process. It used to take quite a while, but now, with the Reds and the SI-2K technology, it's a lot quicker. As far as the 3D is concerned, the offline editing is going to happen remotely. We will then get that EDL and conform the left eye and right eye. So, basically you have two full versions of your movie – the 2D version and the 3D version, and we'll grade each, and send one out to film and the other out to digital for Real-D display."

### The science project

"As I say," concludes Tim Thomas, "this is bit of a science project. We're going out into the desert at night and shooting with SI Mini rigs that we've only just finished – and I don't think the paint's even dry on the Red 3D rig. But I can confidently say that they are both technical firsts in our industry.

"The truck has just pulled out on its way to Albuquerque, New Mexico to film *Dark Country* with not two digital 3D rigs, but three! This is because Geoff Boyle got involved and added a completely different twist to everything. It's a pleasure to try to hit the target he's dangling in front of us, but it's going to be a challenge, because it's ridiculous to conceive that in 25 days we can shoot 280 different scenes, at night, in the desert, in freezing cold in Albuquerque, with a rig that's never been shot with before! Some of the shots Thomas and Geoff have dreamed up would be difficult to do with a lipstick camera, and we're being asked to do it with a digital 3D rig at 2K resolution!"

So perhaps this isn't the time to relax, after all.



## Steve Parker

**Steve Parker is editor of the Reel Show. His degree course in linguistics and ergonomics was completely wasted on him. He stood for election for the position of President of the Students Union (and won) so that he could spend a year organizing parties and drinking cheap alcohol. He became a journalist while at university and has been a slacker ever since.**