Focus Magazine

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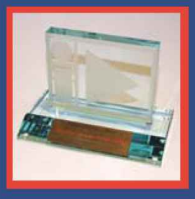
Feature Creature

Mark Brindle builds a feature film camera rig around Panasonic's AF101

also this month

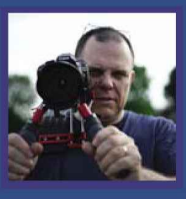


The 2011 IOV Awards is open for entries

By Kevin Cook

3D Facilitator - a review of Cineform Neo 3D

By Ian Sandall



Tech Talk - Habbycam and the Cinevate Atlas Slider

By Kevin Cook

INSTITUTE OF VIDEOGRAPHY

Feature Creature

Mark Brindle builds a feature film camera rig around Panasonic's AF101

In 2006 I wrote an article for Focus entitled 'Creating the film look', which discussed using the RedrockMicro Depth of field adapter (the Redrock M2), attached to an HD video camera (Panasonic HVX200) and Nikon 35mm stills camera lenses to create video that looked like it had been shot with a film camera – using selective focus with shallow depth of field to create the 'film look'.

The camera rig worked very well most of the time and we shot lots of great looking footage from drama and documentary to music videos and corporate video, but the system had a few inherent problems like the size and weight of rig; the time to attach and align the DOF adapter; light loss across the adapter and the general poor low-light capability of the video camera plus video monitoring issues when the focal plane got very shallow!

Move to DSLR

Moving on, in 2009 we took the plunge into video DSLR when the Canon 7D came out with full 1080 HD video support. This saw the size and weight of the camera rig drop as dramatically as the low light capability increased due in part to the larger and more sensitive image sensor on the 7D and the lack of 'lens adapter'.

The APS-C sensor 7D (and the full-frame 5D MkII) are extremely popular for creating selective focus /shallow depth of field and for general low light video filming. We own quite of few of these cameras and use them with similar tripod and handheld rigs that we built for the original DOF adapter rigs – with the same follow focus, matte boxes, ND filters, same Nikon lenses (with Canon EOS adapters) and similar battery systems using 'dummy' Canon battery adapters to allow the use of larger V-lock style batteries for all-day shooting.

The accessory market is full of competing products to help you use your DSLR to its full potential - as well as practices for you to employ to try to work around some of the DSLR limitations, such as:

- Lack of support for professional XLR audio (external pre-amps can help).
- Lack of audio gain controls (some firmware workarounds or use external recorder).
- Lack of built in ND filters (use screw-on fader NDs or Matt box ND filters).
- HDMI or composite video out turns off LCD on the back (use HDMI splitter with EVF and HD monitor).
- Over heating issues with long duration filming (use dummy battery adapter in camera).
- CMOS rolling shutter 'wobble effects' with some fast movement (some post production tools for this - or move camera slower).

Other limitations are harder to get away from such as:
Recording format (sub 50mbps HD 4:2:0 with no 'clean' external recording possible); lack of timecode (audio sync slip); single card slot so no continuous recording; single clip length limitation less then size of card; limited shutter angle/shutter speeds (i.e. potential flicker issues filming some pc screens due to frequency); aliasing and Moiré imaging problems with certain scenes. The only thing you can do is learn about the issues and avoid them if possible.

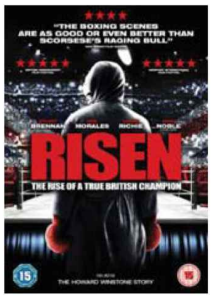
These limitations are not show stoppers but they do hamper the use of video DSLRs for certain types of filming - like long-form events/ live performance, unless you plan in advance (i.e. coordinated card swaps across multiple cameras to ensure full coverage) and have adequate video monitoring to ensure good focus when handheld.

On the plus side, these shortcomings have resulted in some great products from manufacturers like RedrockMicro who have been building complimentary accessories like matte boxes, follow focus, focus whips, lens rings, hand grips and rod adapter rigs and added DSLR specific rigs and products. They are also working on new developments like Electronic Viewfinders (EVF) and remote follow focus systems (both yet to come to market). In addition, innovative niche manufacturers like Viewfactor Studios supply Canon 5D/7D cages for use on steadicam or crane/jibs and make wired and wireless mini controllers that allow focus adjustments from iPhone and iPod.

Blood Sucking Vampires

Part of my business is providing camera equipment rental and in August 2010 I was asked to put a kit list together for low budget horror feature film 'The Reverend', shooting in early 2011. The Director, Neil Jones, was thinking of using several video DSLRs (Canon 5D mkII), but was concerned with the image quality when blown up for a cinema screen. There wasn't enough budget for the RED cinema camera and so I was looking for alternatives – something in-between the two really.

The last film we worked on with Neil (biopic boxing feature film 'Risen') was shot on a mix of 2/3inch CCD cameras - the Panasonic Varicam HPX2700 (shooting AVC Intra) and Sony F900 (shooting HDCAM), but Neil wanted a more shallow depth of field look this time and needed two cameras fully rigged up in the budget. I had been involved in some of the filming of Risen but mostly in the colour grade and visual effects at the end and knew I would be doing the same for The Reverend, so I wanted the best 4:2:2 codec we could get.



Large Sensor Cameras

Early 2011 saw the introduction of several new large sensor video cameras from Sony and Panasonic, aimed specifically at the video DSLR market (Indie/ low budget filmmaker, promos, ads, music video etc) but with characteristics that solve some of the existing DSLR issues and would allow usage in other sectors (especially long form video).

The Sony F3 was introduced with a PL lens mount system and full frame image sensor but with a price tag that was also out of reach for us. Panasonic brought the substantially cheaper AF101 to market, albeit with a smaller sensor, and this camera seemed to be the ideal choice for 'The Reverend' in terms of features and functionality (and budget).

The AF101 video camera 'hybrid' comes with a micro 4/3rds lens mount and no lenses as standard. It supports both PAL and NTSC with a switchable system frequency to allow shooting in a very wide variety of frame rates. It looks very much like a slightly smaller Panasonic HVX200 (or HVX171) with the front lens half cut off. It also has many features in common with the HVX range and uses scene files to control gamma curves, detail, skin tone detail, colour balance and anyone familiar with Panasonic video cameras will see very familiar controls.

The menu is easy to operate but it's fairly easy to lose a feature so you have to keep looking in all the menus to find it again! There are a lot of extra features such as face tracking, focus meter, iris meter and a small function knob which allows you to check focus and iris at any point in the image.

It has built in ND filters (4 positions) and has real XLR inputs (two) with all the standard audio features you expect like 48v phantom power, mic/line, level controls, gain control, headphone socket with volume level.

Codecs, Compression and Recorders

Unlike the HVX200 and its DVCPROHD 4:2:2 codec and P2 cards, the AF101 shoots to two SD card slots (with relay from one card to the next) at a low data rate AVCCAM 4:2:0 codec. The camera standard video actually looks fantastic but it's not 4:2:2 which we needed for the films colour grading and VFX.

I knew the AF101 could output 4:2:2 8bit video from its built-in HD-SDI output (as well as its HDMI port at the same

time) – so we just needed a recorder (or two) to record the video signal from the camera. At the time there were several new camera-attached recorders coming out – including the Atmos Ninja (hard drive based Apple Prores 422 codec but HDMI-only at the time) and the AJA Ki Pro Mini (Prores 422 native up to 270mbps) as well as the Nano flash (Long gop MPEG or Iframe only up to 220mbps).

After a lot of calculating cost differences, re-reading marketing hype and waiting for product to be actually available, I went with the Nano flash. A no-nonsense, tried and tested unit with low power consumption, dual CF card slots with relay recording, basic controls and operating system menus and a host of after-market accessories readily available – such as a mounting bracket specifically for the AF101 and power cables to fit DTAP connectors on our Vlock battery plate that powered the whole rig. Subsequently, the BBC ratified the AF101 HD output for use at 50Mbps with an external recorder, (they used a Nano flash I believe) so were in good company.

Pimp my Rig

The camera rigs started to take shape, using some of our existing RedrockMicro 15mm rod mounting brackets, 15mm rods, Light weight Vocas mattbox, Redrock Follow focus, Ronford-Baker front handles, Hawk Woods Vlock battery plates with some extra cabling to allow one battery to power the camera and the Nano flash. We got quality Nikon lens mounts from MTF for each camera to make use of our wide range of Nikon prime lenses and looked for a decent Canon EF mount to use other zoom lenses we had got in for the Canon DSLRs over time.

The Micro 4/3rds mount is pretty standard and you can get adapters for PL mount cinema lenses plus lenses from Leica, Minolta, Olympus, Pentax, Medium format lenses, M42, Sony Alpha and Contax amongst others, plus lenses made especially for the M43/MFT standard. But, getting a Canon EF mount was proving difficult. I had toyed with the idea of getting a set of Zeiss compact prime lenses (CP2) which can be fitted with Canon EF or PL mount to allow them to be used on Canon video DSLRs and PL mount cameras like the RED, AF101, Arri Alexa and Sony F3 but just couldn't justify the cost.

Birger Engineering had announced an electronic lens mount for Canon EF lenses on the AF101 (they ship one for the RED camera already) but it wasn't shipping in time so we ended up with a basic 'aperture' control mount from Kipon which allowed us to connect lenses and have some control over aperture plus infinity focusing, but it wasn't ideal. We are still waiting for the Birger adapter to be released to give us wireless remote follow focus for canon EF lenses but that will be subject of a future Focus article.

Backwards compatible add-ons

We found the AF101 still works with various older adapters made for the HVX200 – like the Bebob Foxi focus and Iris controller and an old Panasonic LANC start / stop/zoom controller we had in the drawer. Unfortunately, the older Panasonic batteries do not work with the AF101 so we bought in a few long life IDX batteries when using the camera in its fully de-rigged guise.

The top handle can be removed easily with a Phillips screwdriver and the side handle comes off too, leaving behind a cold shoe adapter in a handy spot for a radio mic. The microphone shock mount comes off and can be placed in two positions – at the front near the top cold shoe adapter and one at the rear near the Electronic Viewfinder (EVF) so you can still remove the top carry handle and have the shock mount in place which is handy.

Monitoring

The AF101 provides video out to both its HD-SDI and HDMI at the same time as the flip out LCD or on-board EVF (and also the composite video out). This makes monitoring options seem very easy compared to video DSLRs.

We have several HDMI and HDSDI field monitors along with HDMI splitters, HDMI to HDSDI adapters and various bits and bobs needed for video DSLRs to be useful handheld as well as tethered, so I was confident we had what we needed already.

The AF101 built-in EVF is very poor – its in the wrong place for the type of rig we were using (for any handheld work at least) but its also got some strange rainbow strobe effect on the display when you move the camera which makes it difficult to use. The AF101 flip out LCD is brilliant by contrast, with useful peaking detail feature and a great little waveform monitor, but sadly it has no expanded focus (nor does the EVF) – and no way to zoom in for checking critical focus (especially as your using prime lenses mostly).

This is a major flaw and means you must use some form of external monitoring at all times if your using any kind of shallow depth.

I was scheduled to work on filming The Reverend this time as 1st AC (aka Focus puller) and I knew there would be times when I would have to pull focus just from a monitor or EVF when ☞

using a two camera setup so I needed a decent EVF for handheld work. We had recently purchased an HDMI EVF from Korean manufacturer Cineroid to use with our video DSLR's and so I tried this out with the AF101. It is a small LCD style viewfinder with a flip over magnifying eyepiece. We coupled the EVF with a Zacuto arm and an add-on battery adapter to allow us to power the EVF from the same Vlock battery to make the rig more easily powered. The Cineroid has a good pixel to pixel zoom function, peaking options (ok) and a black and white function which is useful. This unit supports HDMI (with HDMI loop through) and composite SD video with audio and can be powered by canon DSLR batteries too.

The Cineroid does suffer from a bit of fogging, even coupled with microfleece/chamois leather eyepieces from Bluestar, but its better then the AF101 EVF. Zacuto also have a similar LCD style EVF along with Redrockmicro who have designed one from scratch (but not released it yet). The Cineroid is good but could be better and I will be investigating alternative EVFs as they become available.

24p workflow

With the AF101 rigged up with Nano flash I worked on the 24p workflow, using the camera stop/start timecode to trigger recording on the Nano flash. Unfortunately the AF101 24p over 60i output cadence wasn't supported by the Nano flash, so it couldn't remove the pulldown signal properly (like it does with most other 24p cameras), so we had to use the special 24psF mode on the AF101 instead. The Nano flash manufacturer, Convergent Designs were very responsive trying to help isolate the problem but I am not holding my breath for a firmware fix just yet.

This led to new issues with monitoring video. 24psf is not supported on the HDMI so the AF101 would not send out video on the HDMI in this mode and so the Cineroid EVF could not be used in HD mode and would only work with composite video out (so again no expanded focus!). The Nano flash has an option to do some reprocessing from its HDSDI to HDMI and with certain setups we could use a Marshal HDMI monitor connected to the Nano flash (on our second camera rig), but the Cineroid EVF, the Small HD DP1x HDMI monitors would not support the 24psf reprocessed signal. We tried a loan blackmagic design HDSDI to HDMI adapter to see if they could output a usable signal in this mode (thank you Richard Payne from Holdan) but we were foiled. Our Panasonic and Tamuz HD monitors worked fine in 24psf mode on HDSDI but no EVF in HD mode – only composite video out. It was better then nothing but it was disappointing to not solve this problem.

The other side to the workflow was the output of the Nano flash. We chose I-frame only recording at 180mbps to maximise quality without having to buy too many more CF cards. Even though the cards we had were 'ok' for higher data rates (in theory) we encountered a few problems at 180mbps and so ended up filming at 140mbps XDCAM 422 codec. The Nano flash automatically ramps down if it encounters problems (i.e if it thinks the speed of the cards is too slow), and one of the consequences of having the Nano flash recording start triggered by timecode from the camera meant whenever we dropped into playback/preview mode on the camera by mistake and played a clip that way – the Nano would start to re-record the same clip! Not ideal, but this wasn't a real problem except when sometimes it would drop the recording rate to 100mbps which went unnoticed for a while. The normal playback method was to playback from the Nano flash – sometimes a bit clunky trying to find the clip you wanted but in general very easy to do.

Card offloading and our DIT

We had a Digital Imaging Technician (DIT) for The Reverend (Dan the DIT!) who was responsible for making multiple copies of the CF cards and SD cards from the cameras and Nano flash and to log all the video clips and audio recordings so that the Director could make a rough cut of the film as we filmed (Neil never seemed to sleep!).

I supplied a couple of Nexto 2700 card offload units for copying – these are essentially hard drives with SD and CF card adapters on the side and a basic operating system that copies and verifies cards at high speed. These units were invaluable for making the initial fast copies of the cards on set. We were double recording on both the AF101 SD cards and the Nano flash CF cards as a precaution and both sets of data were logged. The SD card AVCCAM video data was automatically converted into Apple Prores 422 when ingested into Final Cut Pro, but as it started as 4:2:0 in the camera this was not being used really – except for the 60p footage.

Dan was also working on the graphic novel and some of the EPK photos for The Reverend so wasn't just waiting for us to hand over cards!

One great feature of the AF101 is the ability to do variable frame rate in 1080p mode and not just in 720p mode like most other cameras. We shot some sequences at 1080/60p slow mo although we knew the Nano flash recorded version would not be usable, as 1080/60p is not a standard yet and so even though the Nano recorded 'something' its not usable. Hopefully no one will notice the slow mo material looking any different to the normal stuff once its graded though.

Panasonic supply a couple of utilities for AVCCAM – a rudimentary clip viewer and a card recovery utility. I have had a couple of instances with long form recording where a long clip may be corrupted in some way. This was only noticed when transferring into FCP and annoyingly it crashing the program. So far, the AVCCAM recovery software has quickly and easily fixed the clip problems and I have been able to ingest footage, perhaps losing a few frames at worst case. I guess this was a consequence of inferior SD media cards (compared with say P2 cards) and a reason this camera also supports SDHC and larger capacity SDXC cards.

Wide Open

One new lens acquisition that we made specifically for the film was the m43 mount Voigtlander 25mm f0.95 prime. I knew The Reverend would be shooting at night a lot (it is a vampire film after all!) and so I thought the very wide aperture would help in case the low light and high ISO capabilities of the AF101 were not as good as I had read about. Unfortunately, it seems many other AF101 owners thought the same and coupled with the aftermath of the Japanese Tsunami, this lens was on order for a very long time and missed the first 4 weeks of shooting. We did receive it in time for the delayed final week of shooting (which included the opening shot of the film). And yes, it is an awesome lens!

It was nice to have the option of f0.95 and higher ISO but I was very pleased with the low light capability although I think we never went higher then ISO 500 for the whole shoot (max is ISO 3200). The DOP Alessio Valori (AIC) preferred to light more, although we did have a limited lighting budget too so occasionally I had to ask to up the ISO so we could close down the aperture a bit to help with focus.

Conclusion

Aside from the expanded focus I am very happy with the AF101 camera. With a large enough sensor for shallow DOF, good low light performance, built in ND filters, good XLR audio and dual card slots the camera ticks all the boxes as a video DSLR / replacement. The slightly smaller sensor means its less sensitive to low light then the Canon 5D MkII and Canon 7D and you need wider lenses for wide angle shots, but it's a newer sensor and seems to not exhibit much Moiré or aliasing and we saw no CMOS rolling shutter wobble even when shooting fast action scenes.

There are a few features I haven't tried yet like Optical Image stabilization (OIS) and face recognition/tracking – features which need an electronic auto focus lens like the Panasonic Lumix 20mm f1.7 or Lumix 14mm f2.5 pancake lenses plus many more zooms lenses in the micro 4/3rds range. It's a versatile camera and not just in the video DSLR niche – but its certainly not a 'point and shoot' solution. I've since used it for corporate video (interviews and long form conference filming) and had it side by side with the Canon 7D, but I prefer the AF101 for functionality and image.

Neil is very happy with the footage we shot for 'The Reverend' and I have more rentals lined up for the summer so I am happy too! ■

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Notes: Panasonic AF101 £3500+vat from www.productiongear.com