

24 HOURS IN A&E

A VIEW FROM THE GALLERY

This year's *24 Hours in A&E* is the ninth location shoot by The Garden Productions and facilitated by CTV, with record and post covered by The Farm. The programme is recorded at St George's Hospital, Tooting, South London. The 2019 recording of the BAFTA-nominated show will take place over 56 consecutive days and nights, totting up more than 9400 hours of recorded material, or more than 263 terabytes of data, and resulting in 34 episodes to be shown worldwide. So how is it done? As Vision Guarantee on this fixed-rig show, GTC member **Richard Carroll** literally sees the action from all angles.

On this year's *24 Hours in A&E*, we have 111 remotely operated cameras, working to two production galleries: Majors and Minors. Majors covers the resuscitation (resus) area plus a separate area of bays where the ambulance patients arrive, while Minors covers the walk-in injuries (marble up nose, nasty splinter, etc.). Each gallery houses a gallery director, hot head operator, producer and researcher, and in addition there is an assistant producer in Majors; each has its own dedicated sound control room. This all takes place in two adjacent portacabins located in the hospital car park.

The 111 cameras are spread across the A&E department and are able to cover a range of selected areas, including the helipad. The Majors gallery has access to 84 cameras and Minors to 53. You may have noticed these numbers don't add up... this is because each gallery has access to many of the same cameras, including exteriors, corridors, the helipad, etc. Shooting like this in a 'fixed-rig' environment has been a mainstay of British TV for some years now and has its own unique advantages. Dave Symmons, Senior Gallery Director, explains: "The benefits of using fixed-rig cameras are absolutely massive. The fixed rig enables us to gather the footage remotely, leaving the staff to carry out their more important duties of saving lives. Because the cameras are completely silent, small and unobtrusive, it

means people tend to forget they're being filmed, making them less self-aware and enabling the truth of their emotions and personalities to shine through." Naturally, shooting in this style has its disadvantages too, with inevitable compromises at times in the choice of shots and framing due to the cameras' fixed locations. Plus, more importantly, the inability to control the environment – there's no chance of a 'take 2'!

Evolving PTZ cameras on fixed-rig shows

This year we are using a combination of Panasonic AW-HE50, HE60 and the newer '4K' UE70 cameras. CTV has been using Panasonic PTZ (pan-tilt-zoom) cameras for a number of years now. CTV's Chief Commercial Officer, Adam Berger, says: "We chose Panasonics because of performance at a realistically good price. They have proven to be more robust than we imagined as a number get whacked occasionally – whether accidentally or on purpose." From an engineering point of view, they offer good-quality pictures considering their size, plus excellent usability for the operator. When fixed-rig shows first started (*Big Brother*, *Fame Academy*), the mini hot head facility didn't exist. The original technical brief for *Big Brother* was for CCTV cameras, which is essentially what Roll to Record provided. For the first series of *Fame Academy* (2001, facilitated by CTV), the remote cameras were supplied by GTC sponsor Camera Corps and, although these gave a decent SD picture, the cameras and mounts were big. Eventually, Sony came out with their BRC300. This is when the remote camera evolved into the smaller PTZ format we see today. Then Panasonic launched its high definition (HD) AW series and quickly became the preferred camera of choice.

The newer UE70 model features a better, more sensitive, chip (offering '4K' from the HDMI output) and also has the advantage of optical ND filters – perfect when working outdoors, for example on the helipad. It can also be powered via Ethernet, which can save a lot of hassle getting mains to individual locations. Camera operator James Newman



The Majors gallery with its large monitor array

comments: "As an operator, I really like the Panasonic cameras – especially the UE70 heads, which are now used on 90% of rig shows. They offer a great picture and operationally they are very smooth. I also like the Sony Q-Ball heads, but these seem to be mainly used in sport."

A very busy shift

With each gallery having just one hot head operator working at any time, achieving all the right shots can be challenging. Steve Lintern has worked on a number of series of *24 Hours in A&E*: "The Majors area is a fast-paced environment with multiple areas and stories being covered at any one time. As the only hot head operator in control of 80 cameras covering all aspects of a busy resus and Majors department (including the work of the staff, treatments taking place, comings and goings relating to multiple stories), this role can be very demanding. Working out and anticipating where the next action will happen can be extremely tricky. Deciding which cameras are available to cover the action from multiple angles is key to good coverage as the cameras can often get blocked due to the nature of the location (a working hospital)."

Camera control

The camera control system on *A&E* is IP network based. Every camera has its own individual IP address, allowing full remote control of the PTZ head and colorimetry. The camera can be controlled over good old serial data too but this brings its own challenges and, ultimately, having the cameras controlled over IP for a system this size works much better. For this year's *First Dates Hotel*, CTV has deployed a fully integrated IP system with video, audio and camera control all done over an IP network. On both shows, the whole system is controlled by a clever piece of software from Axon called Cerebrum, which provides the control interface for the entire rig, managing the camera data, audio distribution and video routing. Cerebrum is a very powerful piece of software – but

only once it's been set up correctly in the first instance. As an engineer, I have to work with a variety of software types and it's one of the freelance challenges to remember how a certain program works when not using it on a daily basis. Thankfully, Cerebrum is quite intuitive to my brain and so it's relatively easy to get it to do what I want it to!

The system revolves around a modest 192 input x 192 output Probel HD video router. CTV has a small MCR pod (ex-SIS Formula 1), which houses the technical 'glue'. The camera feeds arrive on fibre optic cable from custom hubs on the roof of the hospital and are fed into the video router. The directors in each gallery have a bank of router control panels, via which they select the cameras for recording. On *A&E*, seven streams are recorded, named A to G (Minors comprising A, B and C; Majors D, E, F and G – although G can be controlled from either gallery). This allows the directors to cut three or four ISOs, respectively, to enable the editors to build each story in post-production.

A streamlined network

CTV has installed four sheds on the roof of the A&E department to house the far-end technical equipment – or hubs as we call them. This year we acquired two new 6x4ft beauties... very exciting, but also a bit odd when erecting a wooden garden shed becomes part of your working day as a vision engineer! One shed houses the audio gear, another the electrical mains, and the remaining two the video. These sheds mark the conversion points from copper to fibre optic.

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Richard gives camera 78 some TLC

PHOTO: ROB EMMANUEL



A&E's 'Staff Room' vision shed, housing the conversion equipment for 78 cameras, erected on the roof of the hospital

Because of the distance from A&E to the portacabin production area, CTV has installed armoured fibre optic cabling between the roof and the MCR pod. Using fibre not only brings greater flexibility of cable length, it also allows many things to be sent down one single strand of fibre, meaning a reduction in the number of cables. Before the introduction of fibre, everything was connected by individual copper cables! We now use a combination of external fibre equipment types, some of which allow two HD video sources down a single strand, others of which can carry up to eight HD video sources down one strand. We also use a very clever piece of kit called a Stage Racer, made by Ereca. This is a one U box, which, using just four strands of fibre, can carry up to 12 HD video sources, two network connections, black and burst sync, analogue and AES audio – all bidirectional and controlled over a web interface. Using these has cut out the need for additional single items for one-off functions, such as transmitting the camera network data or sending video reference.

There are three video hubs in total: two on the roof above A&E and one by the helipad. These hubs comprise small racks housing all the necessary equipment to receive the HD

camera signals, and to distribute reference and control data for each camera. From a non-TV perspective, the hubs might seem like a chaos of wires, but each wire has its purpose and is essential to the system working smoothly. At the receive end in MCR, the fibre signals are returned back to a copper base band video signal, ready to be distributed locally into the router and beyond.

Sound

For audio, there are 113 microphones in total, including 30 personal radio mics. Wired 'fixed' effects mics are dotted around the department in various locations where they can pick up any audio not captured on the personal mics worn by A&E staff members, because, as Adam says: "You don't get a second chance." The appropriate mics are available on each sound desk, and also grouped and embedded into the video of their nearby camera, which can later be picked out in post-production (for example, Camera 30 is in reception, so has the reception area mics associated with it). The audio mixers on site have to keep up with the fast pace of action and coverage, which often involves the coverage flip-flopping from external ambulance arrivals to, say, a trauma in resus. As a backup, all the personal radio mics are ISO recorded, as is the associated fixed mic audio for each camera. Like the video signals, the audio is sent from the audio hub on the roof to the audio equipment in the sound galleries, all via fibre optic cables and using Calrec Hydras (remote audio boxes that allow for the fibre connectivity of many sources). Comms are handled by a Reidel system, which is interfaced with Motorola radio handsets for the production team based within the A&E department. "Audio always seems to be sidelined... in this case, the uninterrupted RF coverage from 30 radio mics is because of imaginative antenna placement and sophisticated RF combiner technology," explains Adam.

A lot of data!

As the name of the programme suggests, *24 Hours in A&E* is manned 24 hours a day, this year for 56 days in total. All of this equates to 4.7 terabytes of data recorded per day. The record is run by post giants The Farm. Dan Searle is in charge of the record and quality control of the ingest at St George's: "Because of the sheer amount of material, we record in a storage-friendly DNx50 codec. The whole edit is done on the high res footage, so there's no need to encode a lower-quality proxy file. This saves a lot of time and extra storage – which isn't cheap." It wasn't all that long ago that shows like this were recorded onto tape. I remember *Big Brother* churning through boxes and boxes of Betacam SX tapes! A&E also has an element of shooting PDs recording on a variety of cameras; this year they've been using Sony α7s, Canon C300 and XF305 cameras. This can generate another 100GB of data per day. All in all, that's a lot of data – hence why everything that happens is meticulously logged in the galleries.

Preparing for the unpredictable

The gallery directors build a picture for each moment but, as Dave explains, it's not always plain sailing: "The biggest difference when directing on a rig show like A&E is that you have no control whatsoever over the action; literally anything can happen at any point and you have to be reactive to it. This is why we rely on the floor and gallery producers to gain information from the department and to feed it through to the gallery. We can then make informed decisions about what we follow and how we follow it. It's then down to the skill of

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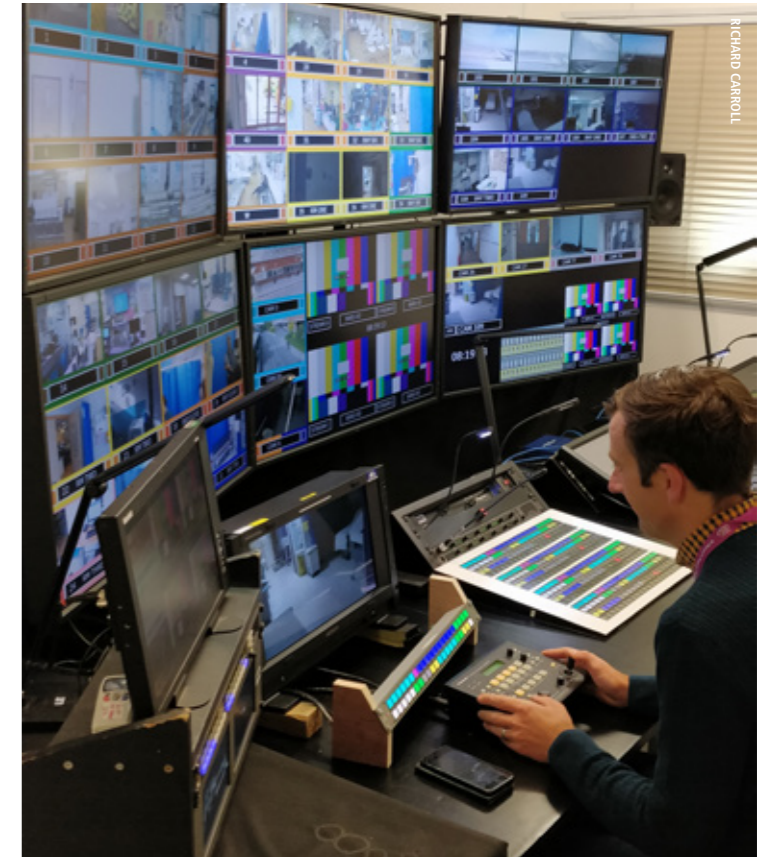
the hot head ops, sound engineers and gallery directors to tell the stories as they unfold.”

The camera placement around the A&E department is decided in advance by Dave. He prepares a camera plan detailing each location: "When camera planning for any fixed rig, many elements need to be thought through. Firstly, what are the stories you will be trying to tell? Where are the areas of interest? Where's the action going to take place? Then, purely on a practical level, the cameras need to be placed where they're not going to affect the staff carrying out their duties or cause damage to the building. The only way really to find the answers to these questions is to spend some time in the environment. I will always spend a day or so immersing myself in the location, noting all the small details that go into making the bigger picture when storytelling. Getting the camera height and placement correct is extremely important, being mindful of not crossing the line and designing a camera plan that will give you singles at eye level plus wides that complement them. For the A&E rig we also use a lot of top shots to cover the medical details."

A new niche camera skillset

Controlling the 111 cameras is a skilled job in itself. The rise of the hot head operator over the last decade has resulted in a whole new niche skillset. Using the Panasonic AWP-RP50 controller can take some getting used to, but as a tool it is very much up to the job. The operator has 10 presets per camera at their disposal, essential for the fast-paced work in the busy A&E department as James explains: "Preparing the presets for each camera can be time-consuming, but it's worth it for the coverage during the shoot."

Some of the hot head operators on A&E have added this as an extra skill alongside their existing work, while others have taken up the role full-time. James has worked on the show since 2012 (series 2 at King's College Hospital, London): "I did some hot head work experience at Big Brother in 2005 during my second year at Ravensbourne College and I really enjoyed it. I gathered contacts from that time and it has snowballed since then. After graduating, I worked for six years in BBC post-production, but kept my foot in the door with Big Brother doing hot heads at the weekends. I made the decision to go freelance in 2012 and to concentrate on the hot head work. This has also led to directing and rig consulting abroad." With this genre looking like it's here to stay, James is confident there is career progression moving forward: "The natural path is to gallery direct, as the hot head op and gallery director work closely as a pair; however, I have found there is more work available as an operator. I've done a bit of gallery directing, which I enjoyed, but it really depends on how skilled your hot head op is. I enjoy the camera racking side of things too, which has led to me racking on some sports jobs."



Dan Smith, the CTV Unit Manager, checking the cameras from the hot head operator's position

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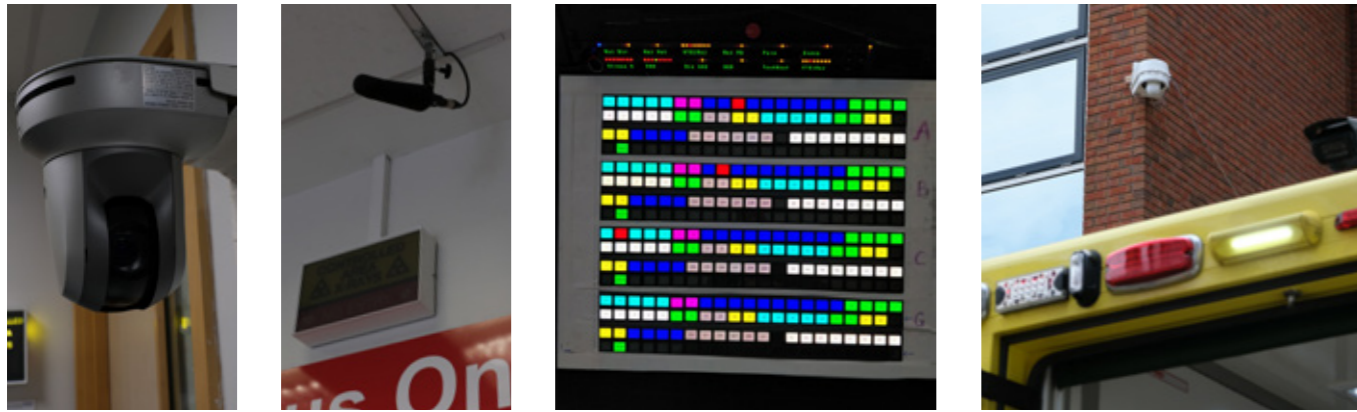
Steve has been operating hot heads for 18 years and, quite apart from the work side of things, perhaps surprisingly finds it to be a transferable life skill: "Because of the remote nature of hot head operating, I need to be able to imagine myself in the space and know where all my cameras are around me to work out how to cover a scene. This can be applied to other situations in life. Being able to imagine a scene and plan them in my mind is actually really useful!"

Real-life trauma

Working on *24 Hours in A&E* can be demanding both emotionally and professionally. The content is not on a schedule, so there can be times when even this busy department has its lulls, which gives everyone a moment to breathe. But what of the many times when it's full on and there are life-and-death situations unfolding? "I definitely used to struggle in the early years," says James, "but I'm more used to it now. Discussing your emotions with fellow colleagues helps and I speak to my wife about it a lot, which helps. I've found that, on the whole, I'm fine with the blood and gore, but trauma involving babies and children is tough to film,

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PHOTOGRAPHS BY ROB EMMANUEL AND RICHARD CARROLL



Above (left to right): CTV's custom mounting for the Panasonic cameras; Sennheiser 416 microphones are placed around the department for atmos audio; Axon router control panels allow the director to select the cameras, with custom colours for each unique area; Camera 0 overlooking the ambulance arrivals
 Left: Panasonic AW-RP50 controller – a robust tool allowing sensitive camera control
 Below: The MCR pod is collected from CTV for delivery to site



especially now I have a 6-month-old daughter. The hardest thing to film is when relatives are given bad news." Steve also experiences the highs and lows of filming, but overall finds the job very fulfilling: "Seeing how professionally the staff in this department deal with every person that comes through the doors, no matter what their ailment, is emotionally uplifting. I have nothing but total respect for these people – they are truly amazing. I feel it is very important that we cover them in their day-to-day work life." For Dave, working on A&E can be difficult at times too: "There are, of course, times when we

see things in the gallery that are unpleasant or upsetting, and it can be a rollercoaster of emotions. I'm sure it affects people in different ways, but I find concentrating on telling the story and getting the best possible coverage enables me to detach myself from the reality."

Annual setup

CTV has been involved with the show since its conception in 2011. This first series used a mere 70 SD cameras, controlled from a modified OB truck, recorded to Betacam SX tapes. For series 2, the show moved to HD, CTV used a fly-pack system and the record changed to a nonlinear disk-based operation. The move to St George's happened the following year and brought about an increase in camera numbers to 106. Adam estimates there is now approximately 20km of cable rigged in the hospital.

This is my second year being entrusted to guarantee the setup and running, and it's a very rewarding job. Building the system in base at CTV, alongside staff engineer Mark Ewens, starts from scratch each year. The MCR pod is empty at the start of the build but eventually houses everything perfectly and, importantly, fits very easily onto the back of a lorry for delivery to site. We had six days at the hospital to build the full system. Small teams from each department tackle the work, which can be difficult in A&E, as James explains: "Fellow operator Niki Jupp and I did the camera rig this year. Rigging more than 100 cameras is tough as it's difficult getting access into the resus and Majors bays while the hospital is busy. Thankfully, the hospital staff are extremely accommodating and helpful." Installing the four cameras on the helipad at St George's brings its own challenges too, with two of the four camera positions requiring a professional abseil team to reach the tricky overhanging sites.



RICHARD CARROLL

Hot head operator Niki Jupp setting up the all-important presets in the Majors gallery

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The fixed-rig style of shooting is here to stay – and, maybe, in the full IP remote production future, operators will be doing it from their bedroom!

Thankfully, this wasn't my first *24 Hours in A&E* build, so when the roller-shutter of the 10-tonne delivery truck opened to reveal a very large pile of gear I wasn't too daunted. It's a great team effort and this year the install was the quickest and smoothest yet. On a day-to-day basis, the engineer on site gets asked many things, from fixing air con issues to making a portacabin door handle work to replacing damaged cameras. Naturally, in full "Isn't working in TV glamorous!" mode, much of my 12-hour shift involves sitting inside the tiny MCR pod trying to regulate its temperature to a level where both personnel and kit are comfortable. Overall, this year's *24 Hours in A&E* has been technically a quiet one – which, in short, means everything is working perfectly (although I shouldn't speak too soon, of course).

As for the future of the fixed-rig show? "There is a vastly growing amount of remote camera jobs within TV," says James, "whether it be for documentaries like A&E, sporting events or concerts." I can certainly see this style of shooting is here to stay – and, maybe, in the full IP remote production future, operators will be doing it from their bedroom!

Richard Carroll



Richard Carroll is a freelance broadcast engineer and vision controller. He started his career as a multi-skilled operator and has taken in many disciplines along the way from studio operations to transmission control, PSC camera, studio lighting, directing and even presenting. Career highlights include: vision supervising HBO's coverage of the Beyonce and Jay Z 'On the Run' concert from Paris (13 Sony F55, 3 Sony 2500 and 2 HFR Phantom cameras and a slew of minicams; dir. Jonas Akerland); vision control for the GTC award-winning 'one-shot' Commonwealth #BRUM handover; the Hampstead Theatre production of 'I and You' shot in portrait mode (see Zerb issue 89).

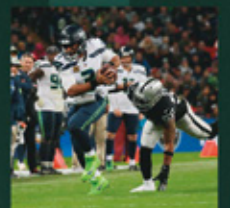
Other credits include: Mandela Global Citizen Concert Johannesburg, 2018 Ryder Cup, Laureus Sports Awards, Amazon Prime ATP Tennis, Remembrance Sunday Cenotaph, BRIT Awards, IMG Premier League Channel, Isle of Wight Festival.

As well as engineering, Richard has tech managed and tech produced for clients including CTV OBs, NEP and Creative Broadcast Services.

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