

# P2 TAPELESS WORKFLOW HELPS REWRITE HISTORY

**Editor Shane Ross uses his work for The History Channel to illustrate end-to-end workflow using P2 media and the Panasonic HVX-200**

It has been almost a year since the Panasonic HVX-200 was released. There have been many questions since then, starting with how to get the footage off of the solid state P2 cards (as well as from the Firestore hard drives) and into your edit system. From there, the questions are about the workflow of shooting and archiving the footage in the long term. I am going to lay out the workflow we used in our production of "The Mexican-American War" for the History Channel to help answer some of those questions.

In its finished form, the special was about half interviews, and half historical re-creations. We started the project using the Panasonic AJ-HDC27 Varicam, which we used to film all the interviews and Mexico B-roll. But when it came to shoot the re-creations, we knew we needed more than one camera, and our budget was too tight to include

another Varicam package, much less the two more that we knew we'd require.

At NAB 2005 in Las Vegas, the Producer and Director of Photography saw the HVX-200. It appeared to be the camera that would solve all of our problems. It shot in the same format as the Varicam (DVCPRO HD 720p), also features VFR (Variable Frame Rate) and cost substantially less. We also like the fact that DVCPRO HD has a better color space — 4:2:2 as opposed to HDV's 4:2:0

After a long wait — it was finally released that November — we were able to test it alongside the Varicam. We sent the footage off to the History Channel for QC and the camera passed with flying colors.

Now, at the time I am writing this, both The History Channel and

Discovery Channel — whom I also work with — do not accept HDV cameras as "B" cameras. The footage from the camera looks fine, and many people can make it look *great*. But it shoots MPEG-2 to tape and there are some production issues associated with that format. These networks set their lower limit on the HVX-200 and its 100MB/s data rate.

Still, even with the HVX-200 as an acceptable B-camera, both Discovery and The History Channel put limits on the percentage of footage from it that can be used in the final project — no more than 25%. We pushed that limit pretty hard.



## BEFORE THE SHOOT

Before we started shooting, we had to work out the logistics of shooting with this format. We received our two cameras *two days* before principal photography, so we didn't have much time. Well, to tell the truth we had been working out a workflow before we even touched the camera. We spoke with various Panasonic representatives about how this camera worked, and developed what we believed would be the best way to ensure that the shoot went smoothly. We just had two days to verify our ideas.

We already had the shooting format chosen, 720p24 at 23.98, which both the Varicam and HVX shoot. We also planned to shoot a few scenes at 59.94fps so that we could extract smooth slow-motion shots. And I made sure that I could still use the 59.94 fps footage in a 23.98 timeline. After a short render, the footage matched the 24p material just fine.

Plus the HVX-200 offers the ability to shoot 24PN...that is 24 *native* frames per second. Unlike the Varicam that records 24 frame footage in a 60 frame format — the extra frames discarded when you capture — the HVX records *only* 24fps. So this is how you can get such small file sizes when recording in high-quality HD.

## WEEK ONE: P2 & LaCIE

We figured out that shooting 720p24 at 23.98 saved us *lots* of space, and gave us more shooting time on each card. That frame rate uses around 22GB/hour, so we could get about 8min on each 4GB card. We had five 4GB cards, since that was the only size initially available. With five cards, we were sure to have enough to cover continuous shooting with the cameras.

But, would we store this footage on? We needed to re-use the cards. So, for the first week of production we purchased a couple LaCie® 60GB Porsche bus-powered Firewire drives.

How were we going to get the footage from the cards to the drives? We didn't want to use the cameras for this because then we'd lose

valuable shooting time. At the time my producer had a 12" Powerbook and I had an iBook — neither machine had a PCMCIA slot.

So we opted for a cheap PC with a PCMCIA slot that accepted and read the P2 cards just fine. Since the P2 camera was designed around a PC — the viewing software is PC based — this worked out to be the perfect solution.

We tested this workflow, as well as the settings on the camera, for two full days prior to the shoot. By the time we got into the field, we had it down pat.

Because the P2 cards were

copy protection tab was flipped to protect against accidental erasure.

Then the cards were brought to the download station where a tech would slide the P2 card into the PCMCIA slot of the Dell® laptop and copy the footage from it to one of the four 60 GB LaCie Porsche drives.

We pre-labeled folders on the drives so that we could just drag the "Contents" folder and "Lastclip.txt" file into them — this is critical, you need both. Since it was the Mexican American War, the folders were MAW B1, MAW B2, etc., (B-Camera) and MAW C1, MAW C2 (C-Camera) and so on. Once we copied files into



Shane Ross at work on a project for The History Channel

going to be used again and again — with footage being copied off the card and the card then being erased — we wanted to make sure that we didn't erase anything before it was backed up. Losing footage can be very costly. So my producer came up with a brilliant idea...

## LABELING P2 CARDS IN THE FIELD

Each card has a rubber cap to protect it from damage, and so you can clearly tell which side of the card is up. So using a white permanent marker he wrote "full" on one side of the cover, and "empty" on the other side. When a card was full, it was ejected and the cap was put on with the full side face up. Also the

a folder, we labeled it in **red**.

It takes about a minute a gig — 4 minutes for 4GB — to copy the footage over. Plenty of time seeing that each card recorded 8 min. This helped as we needed time to get the cards from the camera to the download station.

After the contents of the card were copied over, the card was then erased. We put the rubber cap back on with the "empty" side up, and returned it to the camera to be reused.

By the end of the two day shoot, there were three full 60GB drives with all the footage on them. At the end of the day, back at the hotel, my producer consolidated the

# CAPTURING LIVE MUSIC FOR VIDEO

by Michael Hanish

People write long and detailed books on this subject for good reason: it is complex, infinitely variable, and much more an art or alchemy than a science. But even artists and alchemists have a starting point which varies depending on the intended outcome. So with that in mind, here are a few questions you can use to help you find your own starting point for capturing live music for video.

## BEFORE THE GIG

Have pre-production meetings. Pre-production should be the place you start for every kind of shoot, but it's especially important when shooting music. Just a few minutes of conversation will often make the difference between production success and failure.

### Talk to the Performers

Start by talking with performers to get a sense of the nature of their performance. Performers will also tell you how they feel about cameras. Some won't care about roving shooters on stage getting a close-up. Depending on what kind of performance it is, they may not even notice. In other cases, they very much will.

Related to that, you need to consider what impact your camera position will have on others besides the performer. Especially if the

performers will be stationary, the audience is going to have fixed sightlines. This will dictate whether you can use a single handheld camera, or whether you need to be on a tripod. It will also start to shape your decision about how many cameras to go with.

### Talk to the Sound People

Also feeding into this is that whoever runs the soundboard is going to insist on an unobstructed view of the stage. Talk to the mixer about the PA configuration. You may be able to take a line level feed from the mixing board *if* every instrument and performer is being mic'd through the board. You'll learn a lot about what to expect from the show if you've gotten even these few answers from the mixer.

### Consider the Lighting

Of course, you'll need to consider stage lighting. Will you be able to use what's available? Do you only need to augment what's there? Or do you need to handle the lighting yourself?

### Scout the Location

Scout the location as the pre-production conversation may have taken place somewhere besides the venue. If so, verify your set-up decisions. If all else fails, you can use your camera's microphone, but

you don't want to be surprised by camera and lighting requirements.

You'll want to scout proposed camera locations and confirm sight lines. Confirm mic placement, also. Often the room itself determines whether you can use room sound or will need to use close mic-ing.

In any case, room sound will influence the recording. Start by checking the obvious — air conditioning and heating ducts, fans, or pinball machines.

### Electrical Power

The venue is the right place to pin down whether power is available, how much and where it's located. If you're going to be using house power, check for AC power hum.

### Take a Test Run If You Can

If at all possible, record during the sound check or dress rehearsal —not just to check tech details or for backup, but because often there are pleasant performance surprises. Knowing what's coming will help shape your decisions.

## AT THE GIG

Set and secure all of your microphones and/or cable runs. Distance, direction, aim, and type of microphone will all influence the sound quality and color. Use your ears to determine the best/most appropriate stereo mic-ing

technique. Stereo mic placement is a whole article by itself, and I'll talk about it next time. For now, note that mic placement is usually a variation on one of two themes.

You can get a more spatially accurate stereo image with a pair of crossed directional cardioid mics, 55 degrees left and right of center, roughly 5 feet in front of an acoustic group or 15 feet in front of an electric group. For a warmer, more diffuse stereo image, try a spaced pair of omnidirectional condensers aimed at the performance area.

Place either array high enough off the floor/ground to avoid direct audience noise.

Secure the camera set up. Secure a perimeter around each camera set up; sand bags and razor wire can help (depending on the nature of the gig).

While you're at it, secure the mic stand and *all* cable runs; otherwise, it's a guarantee they'll get knocked into and tripped over.

### Monitoring

Monitor! Needless to say, you need to be able to hear clearly and in detail what is going to the camera. As importantly, you need to be able to hear those details over the ambient noise and amplified sound of the performance space.

### Listen Up!

The bottom line for all of the above is to use your ears and brain. Listen!! If you set up the mics in a certain way and the sound you are monitoring is distorted and muddy, vary the directionality and distance, and see how it sounds.

Experiments and experience are the keys. All the guidelines in the world can give you only a starting point to build your own ways of doing the task. But they're a starting point. Tune in next time for where to go from there.

Michael Hanish is a noted writer who has written over the years for many industry publications. We first met Michael over a decade ago when he penned one of the very first articles that we ever published online.

is that it's a physical thing you can put on the shelf. People know what it is. If something happens to your project or your drive, the tape is there waiting for you. Tape feels hardier than almost anything else you can work with.

But say I have a bunch of older 3/4" tapes. They're durable, but I'd be hard pressed to find a functional deck. So I have to take those 3/4" show masters and dub them to DV or Digibeta or something else current. Then they might have to be dubbed again to some newer format in five to 10 years if I want to keep having access to them, because the technology keeps changing.

### DELIVERING MASTERS

Many networks require that the shooting masters be turned over to them when the show delivers. Up until now the masters have always been on film or tape. But now there is the issue about how to deliver the MXF files that the P2 records.

The issue that cropped up was that the P2 footage only existed on our hard drives. Sure, they are physical things that you can put on a shelf, but they aren't what you'd call "durable." HD DVD and Blu-Ray DVDs have a larger amount of storage that makes them a viable option, but until they become more prevalent they aren't a solution that I can explore.

To make things even more complicated, The Discovery Networks flat out will not take data files. They require tapes and tapes only. So the workflow I developed for a company using these cameras as B-roll on a Discovery Channel series meant taking all the P2 footage, stringing it out on a timeline and outputting to tape. Then those tapes are the masters, and could be captured as you would any tape.

In the specific case of this company, they were using older Avids that don't read the MXF data that the P2 records, so I brought the footage into Final Cut Pro. Recent Avids read the MXF natively.

In my talks with the engineers at the History Channel, they decided that they would accept data files as masters. So this meant figuring out how to archive the MXF files and how to deliver them to the network.

My initial thought was DVDs, since the 4GB cards were separated into folders that would easily fit onto a DVD-R. But I'd need to burn 88 DVDs!

The Blu-Ray and HD-DVD formats would reduce the number of disks, but don't solve the bigger problem: DVDs aren't the sturdiest format. They are prone to scratches and cracking, and no one knows how long the recordable surface will last.

No, I opted for a larger format of storage that was also rather inexpensive as well: internal SATA hard drives. As I write this, you can get a 250GB drive for about \$80. For the terabyte of storage that I needed, I bought four drives for \$320. Then I purchased an empty Firewire case in order to attach these drives to the computer without having to install them internally and swap them out. You can also buy USB 2>SATA Adaptors for under \$20 and do the same thing. So I copied over all the 'Contents' folders to these drives, wrapped them in the plastic they were shipped in, and sent them off to the network.

But many people question the validity of this archival format. Drive technology is always in flux and a drive format

that is popular today is old within 5 years. Look at SCSI and IDE technology. They were each THE format in their day, and now they are on the rare side.

So what do you do in cases like this? Well, you make sure that you will always have an adaptor to connect those drives to current technology, or you transfer to the newer drive format when adaptors become unavailable.

#### WEIGHING THE WORKFLOW

Because we shot in the winter, we had limited daylight and we had a lot of scenes to shoot. So while the Varicam was busy at the main location, the two HVXs were off on two separate remote locations shooting other scenes. We knew that the footage from all the cameras was shot in the same format and the quality would match nearly perfectly. So we were able to cover a lot of ground and get a lot of scenes shot in a limited amount of time, and reduce production costs.

Still, one of the drawbacks of P2 shooting, and one that people are quick to point out, is that the cards are expensive. They say, "A 4GB card costs \$600 dollars, and 8GBs over \$1000." As an independent producer, that's a lot of money up front. A small handful of P2s is the same cost as a fully loaded computer. Even with prices coming down fast, you can easily equal the cost of the camera itself with what you spend

on the necessary P2 cards.

The positive side for us is that you spend that much money up front, but the costs go down fast from there. The DVCPRO HD tapes we use in the Varicam are \$40 each, so by the time you shoot your 20 or 30 or even 70 half-hour tapes for a single show, you're talking about a lot of money.

That money is gone, as tape stock is referred to as an "expendable." And you can't re-use a tape for broadcast production because they're much more prone to dropouts after each use — and you might not have them if you've turned it in to the network as a master.

Between the fixed cost of the P2 media, and how cheap the SATA drives you back them up to are, we've found that using P2 cards is actually cheaper over time. Again, over time.

There are also production advantages that the HVX-200s with P2 cards offer us. The film-style workflow fits the way we work. You don't need to stop the camera during interviews as you can pull a card out as soon as it is full. Or, if you want to make sure to avoid the camera jitter that might occur as you pull out the card, you pause the subject as you extract the card — just as you would when you change tapes. With two 4GB cards you get 22 min, and with two 8GB cards you get about 45 min, so you have plenty of time.

Shooting re-enactments is exactly like film production. You have actors, locations, horses, effects. You know *exactly* where the cameras are going to be and about how long each shoot will last. If the card fills up, you swap it out and head to the download station.

This might not be as viable for run-and-gun shooting, *cinema verite*, or nature documentaries where you wait all day for the rabbit to come out of the hole or lion to yawn impressively. In that situation, the Firestore and Citidisk products are available to get you longer recording times.

On the other hand, we prefer the solid-state media. At one point during the historical recreations that were part of our Mexican-American War documentary, a cameraman was in the thick of it. One of the re-enactors spun around and nailed him. The camera and everything was fine — and I used the shot because it was great. But if that camera was equipped with a hard drive, all that footage might well be toast. Hard drives can't take a pounding like that, but the P2, with no moving parts, could and did.

In the end, we don't find the challenges of working with P2 to be much different than shooting with anything else, and the combination of P2 with the HVX-200 gives us advantages we can't get any other way. The P2's solid state media is durable and economical over the long haul for the amount of footage we shoot. The card can record the 24PN format which is a huge space saver. We love the quality, including the deeper color space. We love the VFR shooting and how well the HVX200 footage inter-cuts with our Varicam footage.

It might not work as well for everyone as it has for us, but we find the solution a very elegant one.

■  
*Shane Ross is a Los Angeles-based broadcast editor whose work is regularly seen on cable networks like The History Channel and Discovery. He is a popular host in Creative COW and you will find him hosting in the Panasonic P2 and Apple Final Cut Pro forums.*



On the set of the Mexican-American War for The History Channel

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**WEEK TWO:  
THE P2 STORE READER/DRIVE**

We used another option for field archiving for the next week of shooting, the P2 Store (AJ-PCS060G). It's a combination card reader and hard drive rugged enough for the field. It's also small and light — about 4 inches wide, approx. 2 inches high and 7.5 inches long, weighing about a pound and a half — and works fine with both PC and Mac. It's very easy to use.

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**ALTERNATIVE FIELD RECORDING**

Some people express concern over the low recording times available when you record your footage onto the P2 cards.

Because my producer, DP and I all come from a film background, the P2 workflow is very familiar to us. In film, your 400-foot load of 16mm film would get you 11 minutes. And when the roll ran out, you'd detach the magazine from the camera, snap on another and run to

approximately 100 min, but there are some drawbacks. You can't record any of the HVX-200's native modes (24PN). The drive is formatted Fat32, so it has a 2GB file size limit. But, it's an elegant solution for those looking for longer record times.

There are also the CitiDisk HD by Shining Technology and the forthcoming Cineporter by Specialized Communications.

**POST PRODUCTION & DELIVERY**

When editing is completed we need to deliver an edited master to the network. Currently the specs require



The HVX-200 captures a reenactment of a battle scene from the Mexican American War for broadcast on The History Channel.

It's just one button to load the contents of the cards onto the hard drives, one button to erase the card, and — *once you've copied the footage off it* — one button to erase the P2 Store itself. The P2 Store creates a separate partition on its internal hard drive, which also makes it easy to keep your P2 "master tapes" straight. Because the hard drive in the P2 Store is 60 gigs, it holds the equivalent of 15 four gig cards.

Again, at the end of the day we'd back up the footage. This time we'd back up the footage from the P2 Store onto the LaCies, and onto

the film loading table and in a dark bag, remove the exposed film and load another magazine. Well, the 2<sup>nd</sup> assistant would do this. So we were used to the slightly interrupted workflow and short record times.

However, if you come from a tape background where you get 30 to 60 minute loads, this workflow won't work for you. In fact, it can be downright annoying.

So, in this case, a Firestore® FS-100 hard drive capture device by Focus Enhancements® would be a good option. You can get longer recording times with this device,

an HDCAM or D5 master at 1080p24 (23.98fps). Even though our editing format was 720p24 at 23.98, we were able to up-convert on the fly via the Kona 3 card from AJA. And even though the History Channel isn't airing shows in HD yet, they are requiring this format for future use. So we also deliver DigiBeta down-converts of the D5 HD masters.

**LONGTERM ARCHIVING**

But what about the source footage? Until now you would have a box of source tapes. The merit of tape

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 Affordable CD & DVD digital desktop printer & publisher lets you design, burn & print graphics & text directly to your CD or DVDs. Plus, it is easy to install so you can have a printed disc within minutes of taking it out of the box. The Rimage 360i combines the world's leading print technology with the best recording to give you and your discs the sharpest image possible. *Special starter kit with discs & ink included!*

**\$1,749**

**NEW! Medea VideoRaid FCR2**  
 VideoRaid FCR2 SAN-READY disk arrays feature fail-safe operation & a high-performance 2-Gbit Fibre Channel interface supporting professional applications including real-time uncompressed & HD editing systems. VideoRaid FCR2 is the industry's most affordable fibre channel video storage solution.

**\$3,495**