

Production and Post Production of HD Content for Digital Broadcasting

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Synopsis: Hopkins will share digital production and post production experiences gained by the Sony Pictures HD Center during a decade of making high definition content. Four specific programs will be highlighted: "Falcone" -- a one-hour television drama shot on 35 mm film and transferred to HD; "Sordid Lives" -- a movie shot with 60 Hz HD equipment and transferred to 35 mm film; "Timecode" -- a movie shot with four simultaneous standard definition cameras with the four individual images placed in a single HD frame and transferred to 35 mm film; and "The Mask of Zorro" -- a movie shot on 35 mm film with anamorphic lenses in a 2.4:1 aspect ratio and transferred to HD.

Good morning Ladies and Gentlemen. I would like to describe to you some of the things we have been doing at the Sony Pictures High Definition Center. And, as they say, a picture is worth a thousand words, so I will save my breath by showing you a lot of pictures. Let me get to that right away. Let's look at a couple minutes from a TV show, "Falcone", that will air tonight at 10:00 in high definition on CBS.

Tape of "Falcone"

TC 1:00:00:00 (1:02:10:04 end, 2:10:04 duration)

That scene was from the fifth episode of "Falcone", courtesy of CBS Broadcasting Incorporated. It is a nine-episode Columbia Tristar drama that is airing on eight nights this week and next on CBS. "Falcone" is based on the book "Donnie Brasco" written by Joseph D. Pistone, an FBI agent who infiltrated a mob family. Tristar Pictures' 1997 movie "Donnie Brasco" was based on the same book and starred Al Pacino and Johnnie Depp. This episode of "Falcone" was directed by Rick Rosenthal and shot by Steven Danyluk.

"Falcone" is shot with 35 mm film. To save film costs, it is shot 3-perf. Normally you would shoot with four perforations per frame giving an image aspect ratio of 4:3. If you are going to finish the show with a 16:9 aspect ratio, it makes sense to use three perforations per frame. Then the image is already 16:9, and you use 25% less film and film processing per minute of program. For NTSC broadcasting, the center 4:3 is protected. There is no separate delivery of a 4:3 version.

We transferred dailies five nights a week using the new Sony Vialta telecine and Sony HDCam tape format. We worked from the original camera negative. We delivered both HD and downconverted copies to our client. Sometime later they come back with an edit list and we cut the HD to conform with their offline. Typically we did the final color correction a day or two later, and then titles a day or two after that. Finally we added the audio and then dubbed to Panasonic HD-D5, the delivery format requested by CBS.

We had planned to do this show using the new 24P format, but we didn't have all our equipment at the time the show began shooting. We do have the equipment now.

While the topic of this session is broadcasting, I do plan to spend some of my time talking about movies. Movies are a big part of broadcasting, but also the techniques being used may be of interest to you. The first example I would like to use is “Sordid Lives”. This movie was shot using the Sony HD camcorder. It was shot 60 Hz interlaced. It was shot in traditional film style using a single camera with film lighting techniques. Dailies were downconverted and the offline was done in standard definition. When the shooting and offline were completed, we cut the HD to conform with the online. Then we did color correction, titles, and added the audio. Then we converted the 60 Hz high definition to 24 frames per second 35 mm film.

The “old fashioned” way to convert 60 Hz video to 24 frame film is by dropping every fifth field, and combining the remaining pairs of fields to make frames of film. This produces a motion judder, though. We have a proprietary technique where we combine multiple fields, and then effectively re-sample at a 24 frames per second rate. This does produce some “blur” in each frame, but it simulates what happens in a film camera. Film cameras have a shutter that must close during the film pulldown. Typically the shutter is open 50% of the time and closed the other 50% of the time. That means that the exposure is usually 1/48 second, which also produces blur when there is any motion. After converting to 24 frames per second, we use an electron beam recorder to make black and white separation prints. These black and white prints are then step-printed to make a color negative.

Let’s look at a clip from “Sordid Lives”. I am showing you the original 60 Hz version, not the 24 Hz version.

“Sordid Lives” is based on the play written by Del Shores. The movie was directed by Del Shores and stars Olivia Newton-John, Beau Bridges, Bonnie Bedilia, and Delta Burke. Beau Bridges plays a cheating husband whose wooden legs accidentally contribute to his mistress’s death. Delta Burke plays his revenge-seeking wife.

“Sordid Lives”, produced and shot by Max CiVon, had its world premiere at the Palm Beach Film Festival on February 4th. It will be screened at the Memphis Film Festival later this month.

Tape of “Sordid Lives”

TC 1:02:15:16 (1:05:53:23 end, 3:38:07 duration)

The next example I would like to give is a new and quite different movie called “Timecode”. Mike Figgis, the Director of “Leaving Las Vegas”, wanted to tell a story with more details than you normally can get in a movie. He used four cameras, each with a 93 minute load, to shoot a single-take movie. It’s kind of tough to carry 93 minutes of film, so he used digital video. He picked a camera based on its tape load. The cameras were standard definition, Sony DSR-130s. Four camera men followed the different actors who sometimes crossed over, and sometimes were separated. There was no script, only a general description of the action. The actors were free to give their own interpretations. The movie was shot 15 times. The 15th take was the one used in the release. There is no cutting, the entire piece had to be accepted or rejected in full.

The four camera images were each placed in a quadrant of a high definition frame. Originally the plan was to use four 4:3 images, but later each individual image was modified by a vertical “pan & scan”, called a “tilt & scan”, to be 16:9. These images were placed in the HD frame, like a “cut & paste”. The audio comes from one or more of the individual images and is moved around as appropriate.

The premiere of the movie was a couple weeks ago at the Yahoo Internet Life Film Festival. It was a digital presentation using one of the projectors with the Texas Instruments’ digital mirror device. We have completed the 35 mm film using the proprietary technique described earlier. The Screen Gems film will open April 28.

Now let’s watch a bit of “Timecode”. Again, I am showing the 60 Hz version.

Let me give you a bit of the story line. “Timecode” is a black comedy thriller directed by Mike Figgis starring Holly Hunter, Stellan Skarsgard, Saffron Burrows, Salma Hayek, and Jeanne Tripplehorn. Patrick Alexander Stewart was the Director of Photography. You will see Salma Hayek and Jeanne Tripplehorn in the upper left quadrant. They are a couple. Jeanne Tripplehorn’s character has placed a bug on Salma Hayek’s character, concerned that she is seeing somebody else, and she will be listening-in with headphones. They are in a limousine headed to a movie casting session.

Tape of “Timecode”

TC 1:05:58:24 (1:09:51:03 end, 3:52:09 duration)

The type of work we do the most of at the HD Center is transferring movies to high definition. So, I guess I should take a couple minutes to talk about it. We normally transfer from an IP, or inter-positive. This is the first copy of the original camera negative. What you see in the theatre is a release print, a fourth generation print. It is made from an inter-negative which is made from the inter-positive.

At this point, we have transferred about 500 movies to HD. They are sitting in the vault just waiting to be used. We are big advocates of using pin-registered telecines with intermittent motion and area-array CCD cameras. We originated the concept of doing primary color correction by changing the color temperature of the lamp in the telecine. This copies what happens with a film printer. If you want the print to be redder, for example, you use a redder light!

We downconvert the HD video for NTSC and PAL. We faithfully preserve the 3:2 pulldown so that we can flawlessly make PAL versions by dropping the redundant fifth field to make a 48 Hz tape, and then playing back at 50 Hz.

I have not said much about 24P. This is a story I have been preaching for several years. Gradually, virtually all of the HD Center work is expected to move to the 24P rate. Only equipment limitations has kept us from doing it already. It will make our lives easier, and it will increase the quality of our work.

Consider a TV show. About 75% of prime time is shot with film at 24 frames per second. In the past, that film was transferred to 60 Hz video. Some film frames made two fields, some made three fields. When the editor wants to cut together two film frames that are both represented by two fields, he has a problem. It doesn't work right for the film. It's OK for video, but not for film. The 3:2 pulldown has been lost. In the past, we didn't pay much attention to this, but with digital broadcasting and DVDs, it does become important. The quality, for a given number of bits per second, will be higher if you preserve the 3:2 pulldown. Or, for a given quality, you need fewer bits which will allow more programs in a multi-program bit stream. Or you have more bits left over for opportunistic data. When you post the TV show in 24P, this problem disappears entirely.

Also, we want to be able to shoot digitally and release in film without any 60 Hz artifacts. You can do this with a 24P digital camera. And you can cut seamlessly back and forth between film and digital video.

But that's enough of this boring techno-babble. Let's look at some more pictures. Let me close with my favorite clip.

It is from "The Mask of Zorro", a 1998 Tristar Pictures and Amblin Entertainment movie starring Antonio Banderas, Anthony Hopkins, and Catherine Zeta-Jones.

Tape of "The Mask of Zorro"
TC 1:09:56:00 (1:14:31:29 end, 4:35:29 duration)

I thank you very much for your attention.