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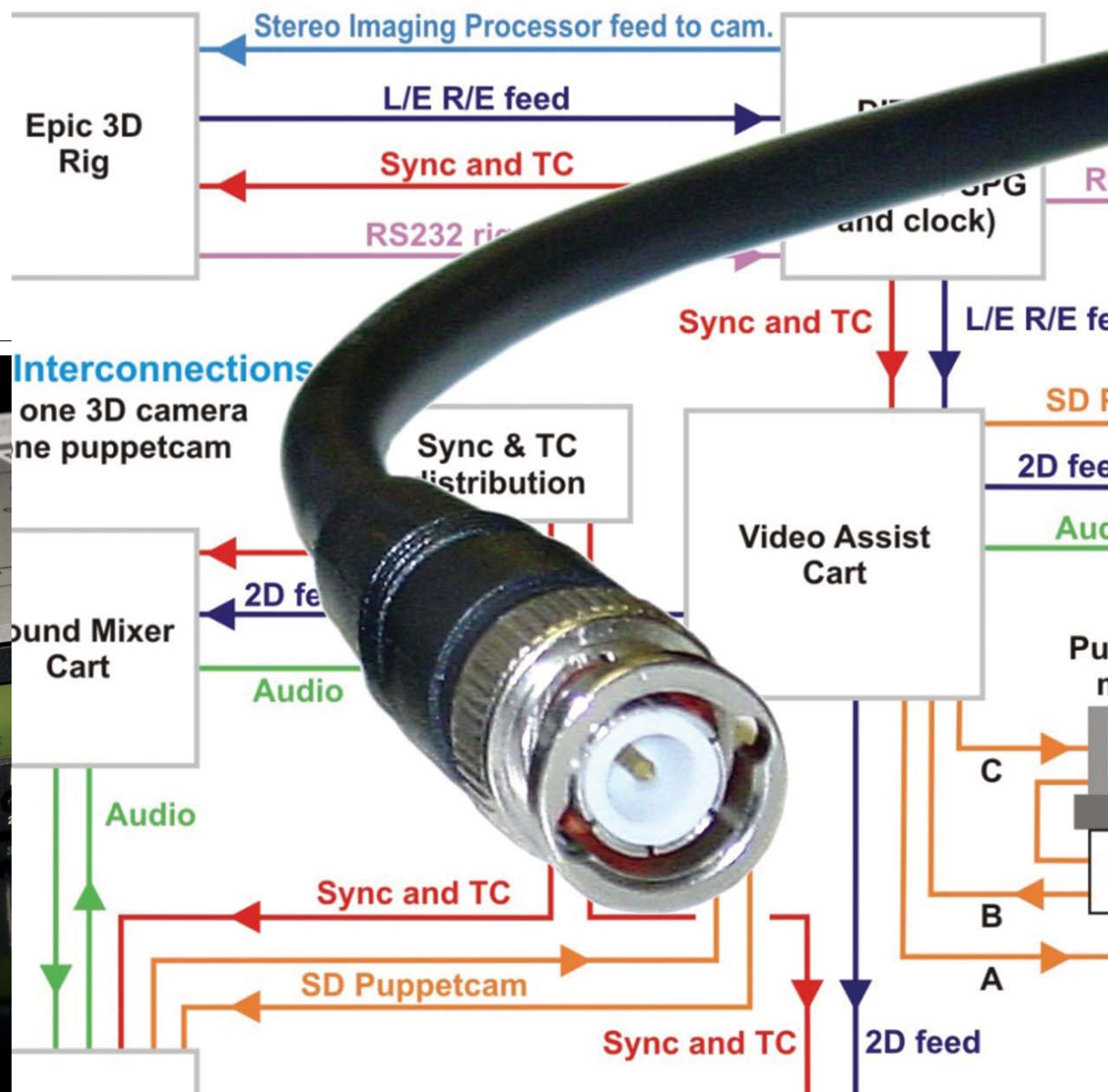
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“HUGO” UNLOCKS THE HEARTS OF ALL WHO LOVE THE MOVIES
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The film beckons audiences into a world of wonder through the eyes of a young hero, a world alive in new ways through Robert Richardson’s resplendent use of 3D. This dazzling adventure is also a meditation on life and loss, deeply rooted in the powerful role movies play in our reality. With a proper tip of the beret to early pioneers Harold Lloyd and Georges Méliès, we are reminded that each film is a gift, and that when the masters intone, “Come dream with me,” through the magic of the movies, we do.

11 ACADEMY AWARD® NOMINATIONS
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A MARTIN SCORSESE PICTURE

HUGO

GK films



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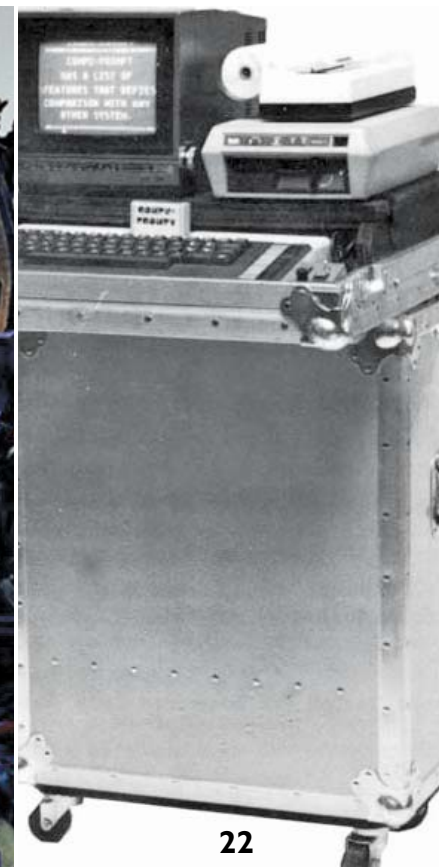
695 QUARTERLY

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About the cover: The on-set workflow designed by Local 695 engineer Ian Kelly for the film *Oz: The Great and Powerful* is revealed on page 18.

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From the Editors



We would like to wish all of you a Happy New Year! Each new year brings feelings of promise, good health and great success.

There is something about the calendar page turning to January 1 that makes all of us extremely hopeful for the future.

As 2012 begins, we can also celebrate the end of our third year of publishing the 695 Quarterly. That is quite an achievement for any new publication and a testament to our contributors as well as you, our readers.

Our goal has always been to highlight the membership of Local 695 and the incredible talent that we bring to our industry. These are dedicated technicians and innovators, always at the 'bleeding' edge of technology.

Every current development has a past to build on and Scott D. Smith, CAS explains it in "When Sound Was Reel 8." But there is more; the second part of the profile of Courtney Goodin by David Waelder and "The Workflow of OZ" by Ian Kelly.

Great reading.

Faternally,
Eric Pierce, David Waelder
and Richard Lightstone

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"THE YEAR'S MOST THRILLING, FEELING MOVIE."

Richard Corliss, Time Magazine

"'SUPER 8' IS A STUNNER,

A MOVIE THAT SUCKS YOU IN FROM THE START AND SPITS YOU OUT THE OTHER END WITH A SENSE OF WONDER TO GO WITH THE TEARS IN YOUR EYES."

Marshall Fine, The Huffington Post

"THIS MOVIE, A TRUE BEAUTY, WILL PUT A SPELL ON YOU."

Peter Travers, Rolling Stone

DIRECTED BY
J.J. ABRAMS

SUPER 8



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From the President

When we start
All fire in the belly
To get to excellence
To make it
To make it right

This union thing
off the radar at first
Under the first layers
of what we think
we need know

Time pushes and pushes
Till it's clear, looking back,
Tools we need to have
How to get good at this

Less about the hammers and nails
More about the blueprint,
a larger purpose
the overall

And the humans
We journey with...

This Union makes sense
To me, in this way
Another essential piece

A connection
Professional, personal
A solution seeking problems
Not perfect
but then, what is?

We are musicians,
sidemen,
session players

Perpetual students
Always practice, practice, practice
This is the task
This is the passion
This is the discipline

Fraternally,
Mark Ulano
President, IATSE Local 695



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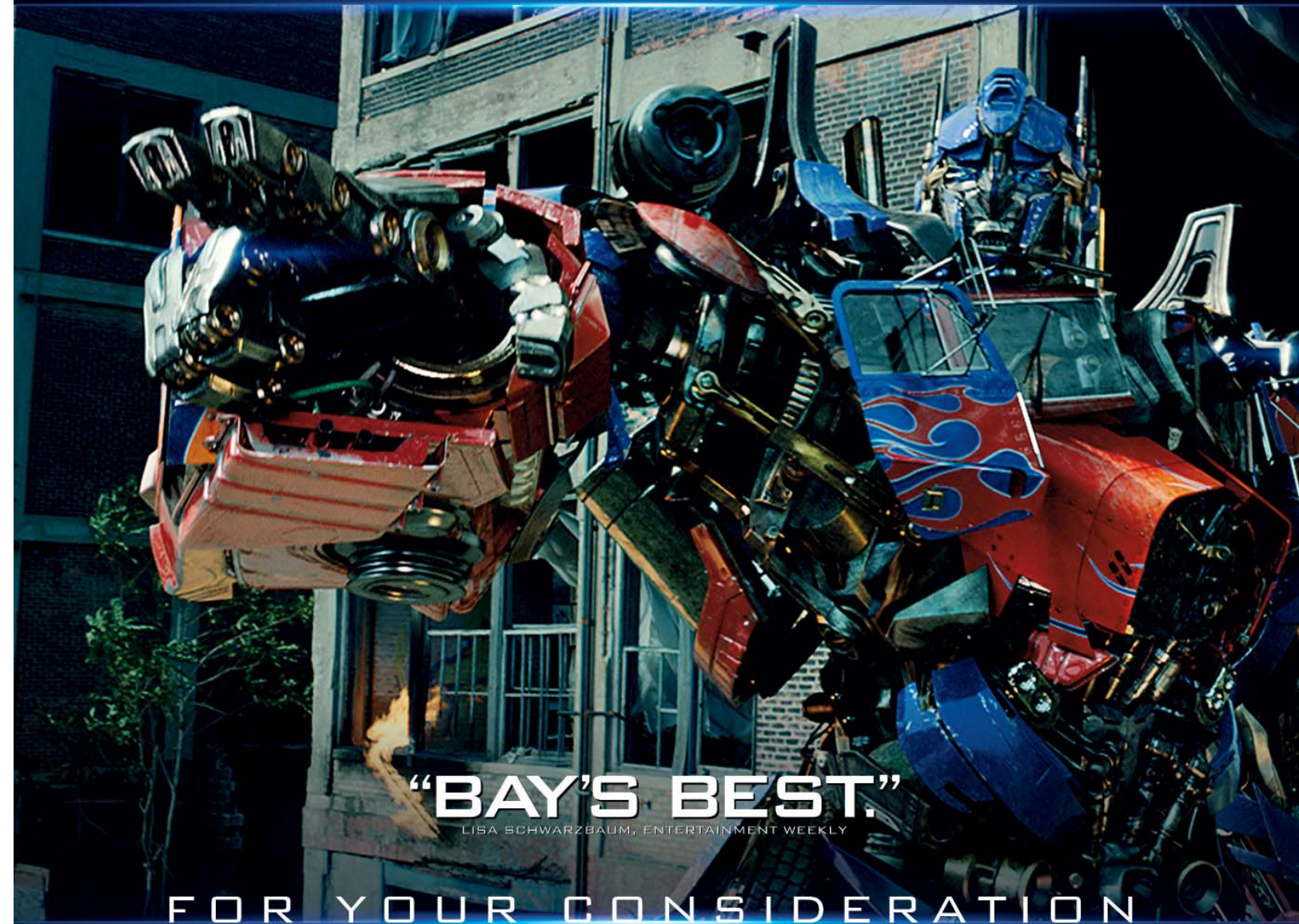
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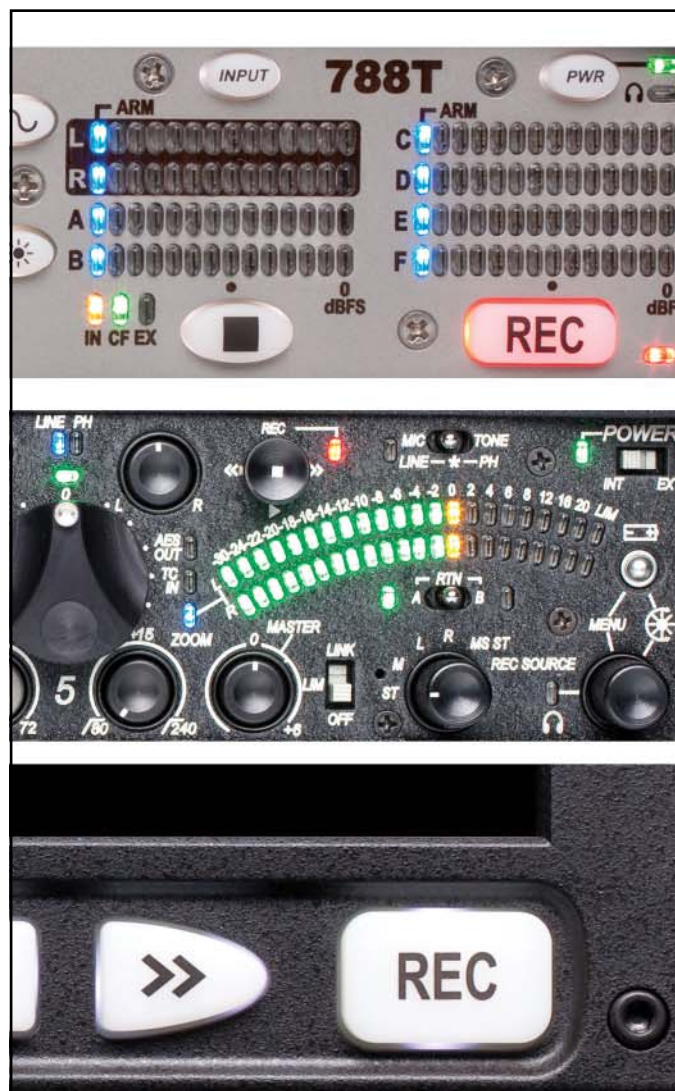
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From the Business Representative

In Perspective

Workflow in its legal definition is a term covering all forms of physical and mental exertion to achieve an objective other than recreation or amusement.

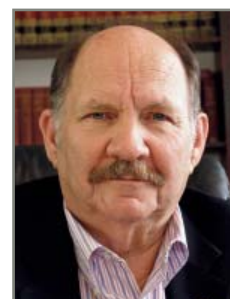
In our industry, "workflow" has particular specialized meanings that apply to recording and transferring data at each stage of the process. A fundamental point is sometimes lost in all the technical specifications: skilled people perform these tasks; the people run the machines, not the other way around. A workflow, then, is simply a map of the tasks engineers and technicians undertake to produce a result.

In a workflow plan for managing digital images and sound, the tasks necessary at each stage include recording and transferring data, making computer entries, manipulating data files, servicing the audio and video equipment and similar chores. The technicians and engineers performing this work, both historically and contractually, do so under the jurisdiction of Local 695. Specific language in the IATSE-Producer contracts, as well as custom and practices agreed to between the parties, affirms the essential role of Local 695 bargaining unit employees in data management.

As the industry continues its migration to digital technology, there will be new challenges and a need for flexible new workflows. But it's important to keep in perspective that these all refer to tasks performed by people, tasks that have been performed with skill and distinction by our members.

Should the reader require further information regarding this *perspective*, please address your inquiries to the Local 695 Business Office.

Very best wishes,
James A. Osburn, CAS
Business Representative
Executive Director



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Do you want to cruise previous issues of the Local 695 Quarterly? Send a link to an article to a friend or read the current issue on set? All issues of the Local 695 Quarterly are online at www.695.com. The entire catalogue of the 695 Quarterly is available in a PDF format whenever you want it.

While you're there, click on the "695 Gear" tab to see all the cool swag available. New items are added continuously, so check back often. The latest additions are 10 packs of "Local 695" stickers.

Southern Hospitality

Whit Norris held a gathering with Local 695 members from Los Angeles and Atlanta's sound crews at his home in Atlanta, Georgia, on Sunday, November 6. Sound and video crews represented by Locals 695 and 479 enjoyed barbecue and beverages together on a pleasant Georgia afternoon.



Front row: (l-r) Aron Siegal L479, Allen Williams L479, Paul Sorohan L479, Jim Hawkins L695-479, Chris Durfy L479 and son Devon, Richard Lightstone L695, Whit Norris L695-479, Bartek Swiatek L695-479, Jeff Wexler L695, Mary Ellis L695-479, Alex Lowe L479, Don Coufal L695, Bill Kaplan L695, Tommy Giordano L695

2nd row: (l-r) Hank Martin L479, Michael Clark L479, Bob Branam L695, David Goldstein L695, Glen Valentino L479, Matt Robinson L479, Eric Pierce L695, John Tendrich L695, Jorge Delvalle L479, Michael Wynn, Kevin Raser L479, Matt Durber L479

In Remembrance Alan F. Bernard

Alan Bernard passed away in the presence of his family on December 11, 2011. He leaves behind his wife Linda, daughter Cindy and sons Scott and David, both members of Local 695, and four grandchildren.

Alan was a member of Local 695 for more than 50 years, and was an IATSE Gold Card member. Much of his time was devoted to the service of Local 695, volunteering for many committees and holding elected office.

Alan was profiled in the fall 2011 edition of the 695 Quarterly, and can be read online at <http://695quarterly.com>

A "Celebration of Life" for Alan was held on February 12 at Local 80.



Alan F. Bernard
January 30, 1934 – December 11, 2011

Production Tracking Database

The Local 695 Production Tracking Database has been proving to be a great tool to help the office answer member's questions about contracts and conditions on various productions. Keep filling out your job reports at www.695.com/mbri/jobreport.php

Building the Buy Union! Movement

LA Labor 411 is committed to empowering American consumers to buy quality products that are safe, made here in the U.S., and at a price point that means value. Union-made products enhance our community and build the cornerstone of our society—the middle class. Each one of us can make a difference every time we shop by choosing American-made, union-made products.

Visit LALabor411.org for more information, and to use their online directory.

In Memoriam

DEAN G. HODGES

Mixer

May 14, 1926 – Jan. 4, 2012

ALAN BERNARD

Mixer

Jan. 30, 1934 – Dec. 11, 2011

FRANK A. RAINEY

Maintenance Engineer

Feb. 2, 1954 – Nov. 9, 2011

ALBERT AQUINO

Boom Operator

Aug. 7, 1957 – Jan. 9, 2012



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"Creative America continues to look for ways to eliminate the threat of digital content theft by rogue offshore websites. Recent debate on the issue is leading legislators toward solutions that effectively protect the rights and interests of all involved. Creative America is the grass-roots coalition formed by labor unions, guilds, studios and networks

to look for ways to protect the jobs of more than 2 million Americans whose livelihoods are supported by the film and television industry. Visit www.creativeamerica.org to learn more about the impact of content theft on jobs, benefits and future work opportunities and to find out how you can help put an end to piracy."



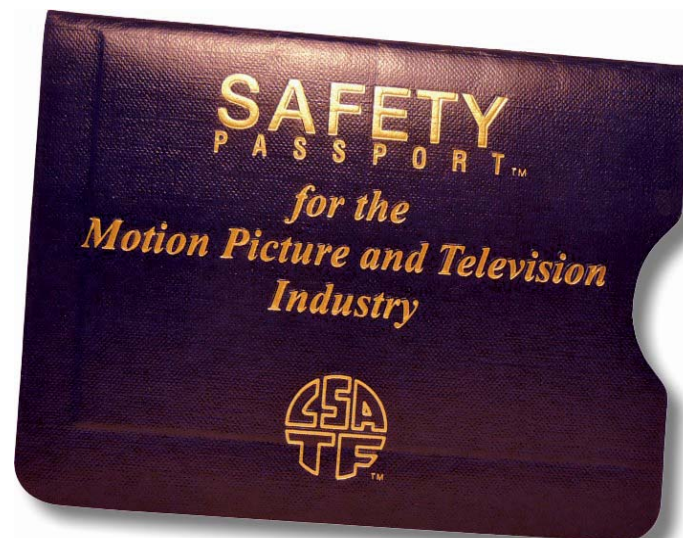
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Deadline Passed for Safety Pass Class



Most of our members have already completed the required "A-2 Environmental Safety" course, which is the most recently added course in the Safety Pass Training Program, but there may still be some who have not yet attended this class. Be aware that Contract Services has announced that individuals who do not complete all required classes will be suspended from the Industry Experience Roster and may be considered ineligible for employment. For those who

haven't yet taken it, the three-hour "A-2" class is offered daily, Monday through Saturday, and provides a great deal of information that relates to the work we do. For details about this training and easy online registration, see www.csatf.org/safety.shtml. If you have questions about the Safety Pass Program, you can call Contract Services directly at 818.565.0550 ext. 1100.

Fisher Microphone Boom Training

Once the tool of choice for nearly every motion picture and television production sound team, the Fisher microphone boom has seen much less use in recent years. Nonetheless, it is a hugely valuable tool that becomes more relevant today, as multi-camera HD shoots place impossible demands on the boom operator with a fishpole. Local 695's **Fisher Microphone Boom: One-on-One Intensive Training** is a unique and important training opportunity that is exclusive for Local 695 members and cannot be found anywhere else. Microphone Boom Operators, Utility Sound Technicians and Production

Sound Mixers are strongly encouraged to attend this ongoing program that provides personalized hands-on instruction for the Model 2 and Model 7 Fisher microphone boom arms and the Model 3 and Model 6E Fisher boom bases. HD cameras and long shooting takes have changed the way we do our work and have given you good reason to be fully trained on the use of a Fisher. The AMPTP's endorsement Extended and Successive Shooting Takes" (see www.695.com/html/long-takes.php) makes it clear that your producers are aware of the significant

health and safety issues associated with long shooting takes and that they are on your side, ready to provide a Fisher boom when one is needed. Local 695's Fisher boom training is free to all 695 members, is entirely supported by the Local and is independent of the CSATTF training requirements. For details on how to schedule one of these appointment-only Fisher boom training sessions, visit www.695.com/mbr/edu-fbt.php



Pro Tools Training

In coordination with Contract Services Administrative Training Trust Fund's skills training program, Local 695 members just completed a four-day Pro Tools class at the Guitar Center Studios training facility in Woodland Hills. The Avid-certified PT-101 class conducted during January 2012 covered all functionalities of the software, with emphasis on location recording and playback. This training was free to members qualified for the Contract Services skills training grant. If the grant is approved for the year starting February 2012, we anticipate additional PT-101 classes as well as expanding to include the advanced PT-110 class.

This training is free for Local 695 members who meet these CSATTF training requirements:

- Must be on the Industry Experience Roster. (If you're not currently on the Roster, see www.695.com/html/roster.php)
- Must have completed all required Safety Pass Training. (If you haven't completed the training, see www.695.com/html/saftpsprt.php)
- Must have an unexpired I-9 on-file at Contract Services. (For details about the I-9, your current I-9 status and the renewal process, see www.695.com/html/edu9.php)



For members who aren't already registered on the Local 695 website with a current email address, you may want to do that now. The most effective way for you to stay informed about educational resources, upcoming training announcements, updates and news about the Local is via email and the Local 695 website. If you haven't done so in a while, please log on to the website at www.695.com to make sure that you are registered and that your email address is correct.

Software Tutorials

Members of Local 695 still have the opportunity to take advantage of free access to more than 1,000 comprehensive online software tutorials. The list of courses grows continually as new software and versions are released. These self-paced online tutorials allow you to stop and start and review as needed. And since you can keep multiple windows open, it's easy to switch back and forth and experiment with the actual software while the tutorial progresses. The list of available courses covers an enormous variety of topics, including Avid Pro Tools, Apple Logic, FL Studio, Steinberg WaveLab, Adobe Audition, Adobe Soundbooth, Apple Soundtrack Pro, Cubase, Sony Sound Forge, Adobe Premiere, Apple Final Cut Pro X, Adobe After Effects, Sony Vegas Pro 10, NewTek LightWave, Adobe Flash, Adobe Director, Adobe Dreamweaver, Adobe Photoshop, Apple Shake, Cleaner Pro, Adobe Fireworks, networking, databases, digital photography, website design and much more. This training is completely free to all 695 members and paid for by the Local and is totally independent of the CSATTF training requirements. Take advantage of this free training while it remains available. Further details and information about signing up for access to this training is at www.695.com/mbr/edu-vtc.php.

SALUTES THE 2011 CAS AWARDS NOMINEES

It's awards season and we're proud that Local 695 is well represented in the sound categories. Here's a salute to all those nominated, and their production sound teams!

The nominees were announced for the Cinema Audio Society's 48th Annual Awards. Ceremonies were held on January 19 at the Millennium Biltmore Hotel.

The Satellite Award for Best Sound (Editing and Mixing), presented by the International Press Academy on December 18, 2011, went to:

Drive

Robert Eber CAS, Dave Paterson, Lon Bender, Robert Fernandez, Victor Ray Ennis, **Scott Edelson**, **Sean Byrnes**

Congratulations to the rest of the nominees:

Super 8

Mark Ulano CAS, Andy Nelson, Anna Behlmer, Ben Burt, Matthew Wood, Tom Johnson, **Adam Blantz**, **Juan Cisneros**, **Jesse Kaplan**, **Eric Pierce CAS**, **Brion Condon**

The Tree of Life

John Pritchett CAS, **Kirk Francis CAS**, Christopher Scarabosio, Craig Berkey, Erik Aadahl, Jeremy Peirson, **David Roberts**, **Scott Jacobs**, **Shawn Harper**, **Kay Colvin**

War Horse

Stuart Wilson AMPS, Andy Nelson, Gary Rydstrom, Richard Hymns, Tom Johnson, Orin Beaton, Mitch Low, Thomas Fennell, Alan McFeely, Danny Hambrook, Christian Joyce, Matt Taylor

Transformers: Dark of the Moon

Peter J. Devlin CAS, Erik Aadahl, Ethan Van Der Ryn, Gary Summers, Greg P. Russell, Jeffrey J. Haboush, **Kevin Cerchiai**, **Scott Solan**, **Kevin Summers**

Harry Potter and the Deathly Hallows Part 2

Stuart Wilson AMPS, Adam Scrivener, James Mather, Mike Dowson, Stuart Hilliker, Orin Beaton, Mitch Low, John Casali, Gary Dodkin, Chris Murphy

Names in red are Local 695 members

MOTION PICTURES



Hanna

Roland Winke, Christopher Scarabosio, Craig Berkey CAS, Andrew Dudman, Thomas Wallis, Noah Timan, Hunor Schauschitz, Jeanne Gilliland, Nourdine Zaoui



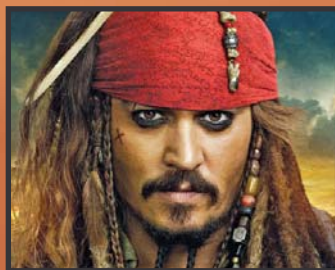
Hugo

John Midgley, Tom Fleischman CAS, Simon Rhodes, Mike Reardon, Charlotte Gray, Dash Mason-Malik, Peter Clarke, Martin Seeley, Clive Osborne, Andrew Sissons, Simon Brown



Moneyball

Ed Novick, Deb Adair CAS, Ron Bochar CAS, David Giammarco, Brad Haehnel, **Knox White**, **Chris (Catfish) Walmer**, Marc-Jon Sullivan, **Andy Edelman**, **Glenn Berkovitz CAS**, **Bill King**, **Bob Tiwana**, **Niel Riha**, **Joel Reidy**, David C. Manahan



Pirates of the Caribbean: On Stranger Tides

Lee Orloff CAS, Paul Massey CAS, Chris Boyes, Alan Meyerson, **Jeffrey Humphreys**, **Jonathan Fuh**, **Joseph Magee**, **Michael Anderson**, John Gareth, Ivan Sharrock, Paul Schwartz, Christian Joyce, **John Reynolds**, Richard Linke



Super 8

Mark Ulano CAS, Andy Nelson, Anna Behlmer, Dan Wallin, Tom Johnson, **Adam Blantz**, **Juan Cisneros**, **Jesse Kaplan**, **Eric Pierce CAS**, **Brion Condon**

TELEVISION MOVIES & MINI-SERIES



Cinema Verite

Petur Hliddal, Lora Hirschberg, Scott Lewis, Douglas Murray, Greg Townley, Carl Fisher, Frank Stettner, Amanda Jacques



Innocent

Shane Connelly, Mark Hensley, Tamara Johnson CAS, Chris Higgins



The Kennedys

"Hour 7"
Henry Embry CAS, Frank Morrone CAS, Stephen Traub, Larold Rebhun, Denis Bellingham



Mildred Pierce

"Part 5"
Drew Kunin, Leslie Shatz, Todd Whitelock, Mark Goodernote, Paul Koronkiewicz, Jason Staium



Too Big to Fail

James J. Sabat CAS, Chris Jenkins, Robert J. Beemer CAS, Chris Fogel, Michael Schmidt, James J. Sabat Jr.

TELEVISION SERIES



Boardwalk Empire

"To the Lost"
Franklin D. Stettner CAS, Tom Fleischman CAS, Sam Perry, Peter Fonda, Toussaint Kotright, Egor Pachenco



Breaking Bad

"Face Off"
Darryl L. Frank CAS, Jeffrey Perkins, Eric Justen



Dexter

"Just Let Go"
Greg Agalsoff, Pete Elia CAS, Kevin Roache CAS, **Ken Keauchene**, **Kim Podzimek**



Game of Thrones

"Baelor"
Ronan Hill, Mark Taylor, Derek Hehir, Billy Quinn



The Walking Dead

"What Lies Ahead"
Bartek Swiatek CAS, Gary D. Rogers CAS, Daniel J. Hiland CAS, **Kevin Summers**, Brian Didsbury, **Drew Ponder**, Anthony Cargioli, **Robert Maxfield**, James Peterson, Adam Mohundro, Christopher J. Harris, Michael P. Clark, Aron Siegel

TELEVISION NON-FICTION, VARIETY, MUSIC SERIES OR SPECIALS

On January 12, 2012, the 17th Annual Critics' Choice Movie Award for Best Sound went to:

Harry Potter and the Deathly Hallows Part 2

Stuart Wilson AMPS, Orin Beaton, Mitch Low, Gary Dodkin, Chris Murphy

Congratulations to the rest of the nominees:

Hugo

John Midgley, Mike Reardon, Charlotte Gray, Dash Mason-Malik, Peter Clarke, Martin Seeley, Clive Osborne, Andrew Sissons, Simon Brown

Super 8

Mark Ulano CAS, Adam Blantz, Juan Cisneros, Jesse Kaplan, Eric Pierce CAS, Brion Condon

The Tree of Life

John Pritchett CAS, Kirk Francis CAS, David Roberts, Scott Jacobs, Shawn Harper, Kay Colvin

War Horse

Stuart Wilson AMPS, Orin Beaton, Mitch Low, Thomas Fennell, Alan McFeely, Danny Hambrook, Christian Joyce, Matt Taylor



American Experience "Triangle Fire"

G. John Garrett CAS, Rick Angelella, Everett Wong, Coll Anderson



Bobby Fischer *Against the World*

Mark Maloof, Bill Marino



Deadliest Catch "New Blood"

Bob Bronow CAS



Great Performances *at the Met:* *Nixon in China*

Ken Hahn CAS, Jay David Saks



Lady Gaga Monster Ball Tour

John Harris, Brian Riordan CAS

BAFTA NOMINEES

The nominees for the **Orange BAFTA (British Academy Awards)** for Sound were announced January 17, 2012. Ceremonies will take place at The Royal Opera House on February 12, 2012.



The Artist

Michael Krikorian CAS, Nadine Muse, Gérard Lamps, Valeria Ghiran



Harry Potter and the Deathly Hallows Part 2

Stuart Wilson AMPS, James Mather, Stuart Hilliker, Mike Dowson, Adam Scrivener, Orin Beaton, Mitch Low, John Casali, Gary Dodkin, Chris Murphy



Hugo

John Midgley, Philip Stockton, Eugene Gearty, Tom Fleischman CAS, Mike Reardon, Martin Seeley, Charlotte Gray



Tinker Tailor Soldier Spy

John Casali, Howard Bargroff, Doug Cooper, Stephen Griffiths, Andy Shelley, Chris Murphy, Tim White, Orin Beaton, Alan MacFeely, Márton Kristóf, György Rajna



War Horse

Stuart Wilson AMPS, Gary Rydstrom CAS, Andy Nelson, Tom Johnson, Richard Hymns, Orin Beaton, Mitch Low, Thomas Fennell, Alan McFeely, Danny Hambrook, Christian Joyce, Matt Taylor

OSCAR NOMINEES

The Academy of Motion Picture Arts and Sciences announced the nominees in the category of "Achievement in Sound Mixing" on January 24. The Oscars will be presented at the 84th Academy Awards on Sunday, February 26.



The Girl With the Dragon Tattoo

Bo Persson, David Parker, Michael Semanick, Ren Klyce, Stefan Ljungberg, Jonas Rudels, Mark Weingarten CAS, Michael Primmar, Mark Gretch, David Raymond, Daniel Greenwald, Chris Munro, Steve Finn



Hugo

John Midgley, Tom Fleischman, Mike Reardon, Charlotte Gray, Dash Mason-Malik, Peter Clarke, Martin Seeley, Clive Osborne, Andrew Sissons, Simon Brown



Moneyball

Ed Novick, Deb Adair, Ron Bochar, Dave Giammarco, Knox White, Chris (Catfish) Walmer, Marc-Jon Sullivan, Andy Edelman, Glenn Berkovitz CAS, Bill King, Bob Tiwana, Niel Riha, Joel Reidy, David C. Manahan



Transformers: Dark of the Moon

Peter J. Devlin CAS, Greg P. Russell, Gary Summers, Jeffrey J. Haboush, Kevin Cerchiai, Scott Solan, Kevin Summers



War Horse

Stuart Wilson, Gary Rydstrom, Andy Nelson, Tom Johnson, Orin Beaton, Mitch Low, Thomas Fennell, Alan McFeely, Danny Hambrook, Christian Joyce, Matt Taylor

The Workflow of Oz

by Ian Kelly

Facing high-stakes challenges on a big-budget digital 3D feature film, Local 695 video engineer Ian Kelly makes it sound easy as he describes the unique production workflow he designed for the film Oz: The Great and Powerful.

The way it was...

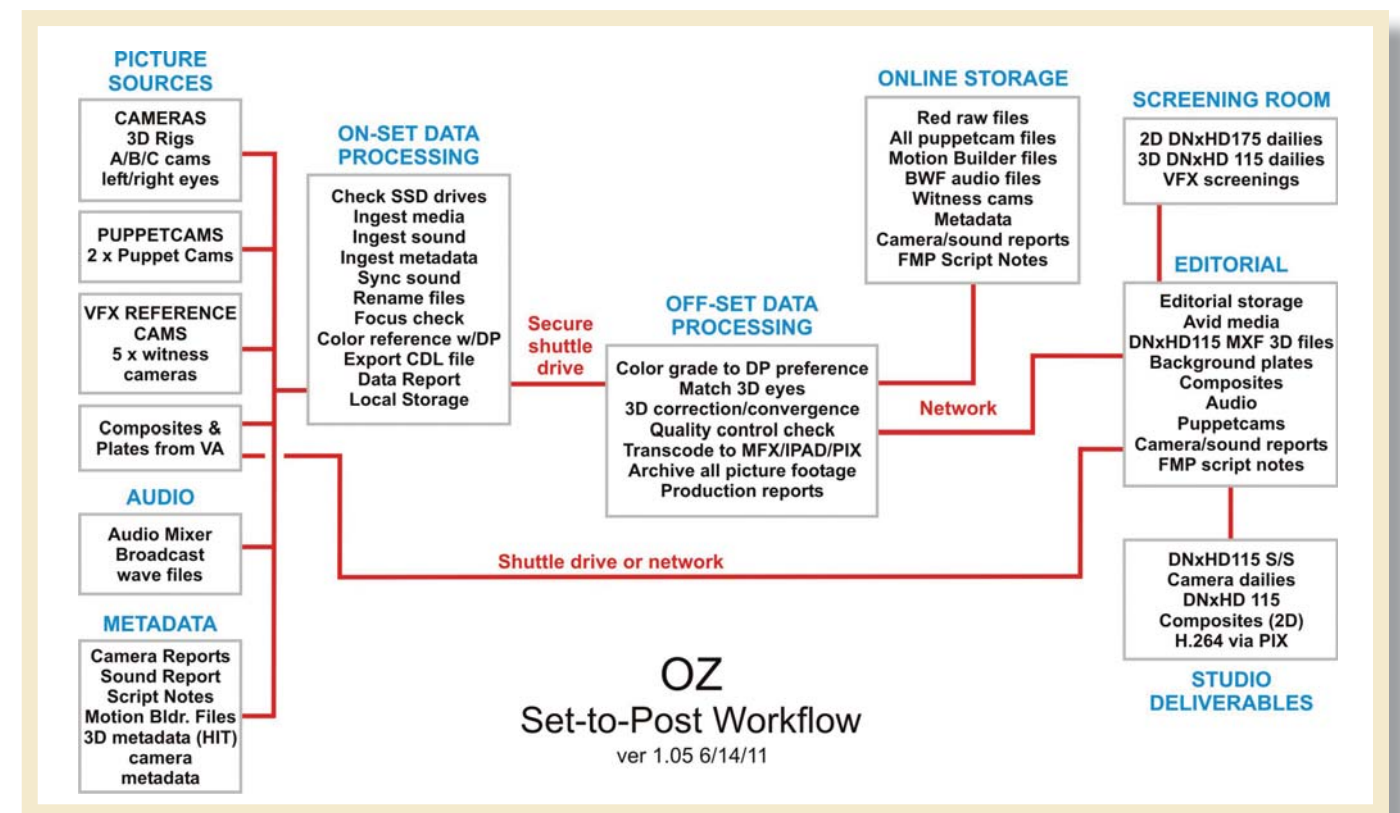
In the days of film, everyone knew what the workflow would be, from the producers to the lowliest camera assistant. Film went in the camera, was exposed and then sent off to the lab and everyone watched the dailies the next day. Sometimes magic happened, sometimes it didn't. But for everyone, right through post, capturing the image and manipulating it had been refined over time right through to making release prints. Not anymore. New cameras and workflows emerge on a regular basis and unlike with film, there is no one correct way to make a movie. And added to that, the massive increase of visual effects means that ways to help the process have to be invented. 3D has further complicated workflows. Pity the poor producers with only a sketchy knowledge of the digital processes involved having to make very expensive decisions. For me, the most interesting part of a project is the design and the planning. It is the time when everyone's needs on the production have to be assessed from what cameras are being used and what the deliverables are to what the workflow will have to be in order to accomplish the needs of the production through post. I usually try and map this out well ahead of time but it frequently changes as more information emerges.

Oz: The Great and Powerful

This film, which just wrapped principal photography, is a case in point. To be directed by Sam Raimi with Peter Deming as DP, it was to be a prequel to *The Wizard of Oz* and would be shot on recently completed soundstages in Pontiac, Michigan, thanks to generous tax incentives provided by the state of Michigan itself. Sam and his editor, Bob Murawski, are both from the area so that added an additional incentive to go there. My job was to be production video supervisor, a post I have occupied before on *Alice in Wonderland* for Tim Burton as well as *The Polar Express*, *Beowulf* and *A Christmas Carol* for Bob Zemeckis.

My work on the production began some three months before shooting began, starting with a test shoot in April of last year. For *Oz*, we tested both Red Epic and Arri Alexa 3D rigs. This was over three days at Universal on their new virtual stage and we tested cameras, recording systems and data management systems.

Once the test shoot was over and the dailies viewed, it was time to really start planning workflows for both cameras and recording and the data management once the shooting stopped. The DP obviously makes the decision as to which camera system but that will then dictate which hardware will need to be used and what



software management systems will be used. *Oz* is a Disney film and the studio is very hands-on with regard to systems management so several meetings were held to discuss the best approach.

For the test, the Red Epics recorded to on-board SSD cards and the Alexa to a portable Codex recorder and there was considerable discussion about data management. For *Alice*, we had recorded to the big Codex studio deck and archived to LTO4 tape. I really like the virtual filing system on that deck although the machine is a bit of a boat anchor out in the field. Online storage was too expensive at that point (the movie was shot using Genesis and Dalsa cameras—file sizes were 8MB and 16MB per frame respectively) and largely untried to that date so the movie was completely tape based on LTO data tape, a somewhat painful way of working. For *Oz*, because of the number of VFX shots and the need to pull clips for turnovers on a weekly basis, it was decided that we would use online storage to keep all the media available although we were still going to archive to LTO5 data tape. For data management, we tested both FotoKem's nextLAB and Light Iron Digitals' OUTPOST systems. Both have their strengths but ultimately, we chose nextLAB.

For the actual shoot, it was decided that Panavision would supply three Red Epic 3D rigs plus two 2D Epic rigs—two on the 1st unit and one on the 2nd unit, with the 2D rigs for VFX shots such as reflection passes. Recording was to be on-board camera to SSD cards. Both units would have 3D video assist as well as 2D monitors for use on the set.

To add to the complications, there would also be three or more witness cameras and two remote recording booths for two of the characters who would later be animated with reference camera recordings made which would be used by the animators in post. Plus we had Encodacam that tracked the camera moves and drove

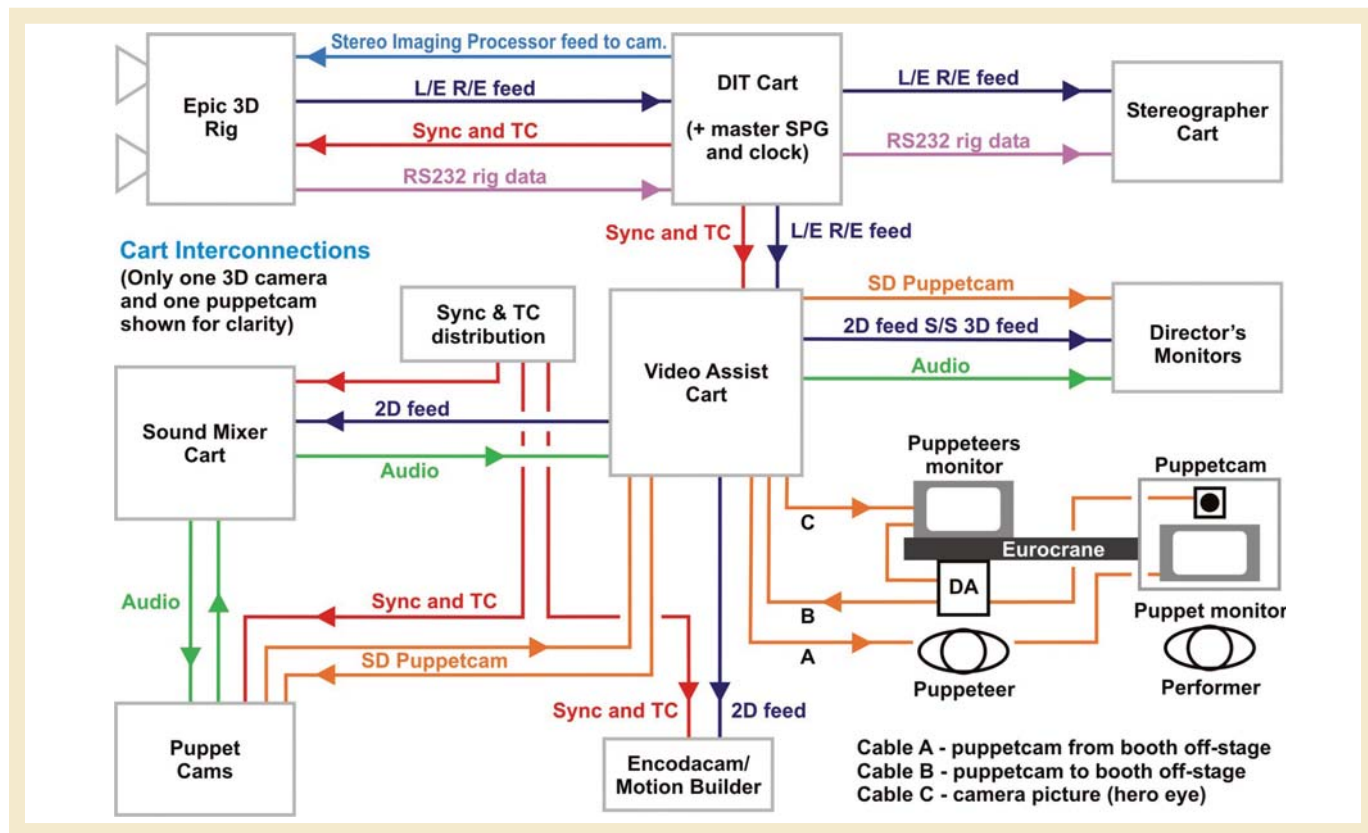
Motion Builder backgrounds for real-time compositing—essential when so much of the movie was shot against blue screen. Both the composite and the background plates needed to be recorded.

Planning

All of this has to be tied together in post of course, and this is where I insisted on the use of central sync and timecode for all cameras and recorders plus sound and witness cameras. This we achieved by using an Evertz 5600MSC master clock for each shooting unit with distribution amplifiers and patch panels built in to each DIT cart. We then made custom camera looms that carried sync and timecode, left- and right-eye pictures, return SIP (stereo imaging processor) feed and 3D rig control cables. I wanted to use fiber optic links to the cameras as we had done on *Hugo* but production ruled that out on expense grounds. As the movie was to be shot all on soundstages, that didn't prove to be a big deal though. I did make "all-in-one" re-clocking boxes, for long cable runs, with BNCs on each side and AJA HD10DAs inside and these worked well.

I also wanted the different carts involved—DIT, stereographer, video assist, sound, Encodacam and puppetcam—to be tied together in a logical way, with a minimum of separate cables between them, to speed up setups. More cable looms and lots of sleeving later, I am now a familiar face at Pacific Radio in Burbank.

Prepping was done at Panavision through late May and June and much liaising was needed between camera, sound, video assist, VFX, FotoKem and Disney to make sure all the details were in place. We would be shooting in Pontiac—a long way from our usual suppliers of last-minute 'stuff'—and Production wanted to know how much it would all cost. Finally, just after July 4, we loaded a 53-foot semi-trailer full to the brim with all the gear and sent it on its way.



Shooting crew

As well as the regular complement of Local 600 camera crew (who did a first-rate job of keeping all the gear organized), we had a DIT, a 3D rig technician and a stereographer for each unit. Working with DIT's Ryan Nguyen, who I had previously worked with on *Alice*, and Paul Maletich, I pushed the idea of central sync and timecode distribution as that would really help our post workflow.

Originally, the color was to be graded after shooting (and after the SSD cards had been pulled from the cameras) but our DP wanted real-time color correction so Fotokem figured out a way to incorporate 3CP-created CDL file metadata into their workflow.

Kyle Spicer did media management on-set and Bryan and Eric from Fotokem did the work off-set in day and night shifts. All three did an excellent job.

The video assist was ably handled by the Local 695 team of Mike Herron and Roger Johnson on the main unit and Sam Harrison on the 2nd unit. Mike had opted for a Raptor 3D rig with four machines—one each for A and B cameras plus one for composites and one machine for playback reference. Mike could also drive the puppetcam recorder (also a Raptor 3D in dual recording mode) and the Encodacam background recorder with the big advantage that all the files were named and he could start and stop all of them centrally for playback to the director. Naming the files per the slate and take saved me hours in post!

Mike was kept extremely busy as Sam Raimi, our Director, made good use of video assist and of reference material from editorial as much of the movie had been storyboarded.

The witness cameras were handled by the VFX crew and were mainly used to provide shooting references for Sony Pictures Imageworks, who would be doing all the VFX work. These cameras all had Locket boxes that were jammed on a regular basis so at least the timecodes were correct even if the files had to be named later. But the guys proved to be very good at slating shots and keeping good reports even if some of them were quite hilarious.

The puppetcam setup was very complicated. The idea was that the actors providing the voices and facial performances for the two animated characters would be outside the stages in a trailer with soundproof booths. They would watch the action taking place on stage on large-screen monitors via cameras mounted on lightweight Eurocranes cranes operated by puppeteers. It would be their character's POV if you like. The on-stage actors would see the off-stage performers via small screens mounted on the crane arms under the cameras. The pictures came from Sony EX3 cameras mounted vertically in the booths. They shot performers via half-silvered mirrors with the camera images flipped vertically, rather like a teleprompter arrangement. The pictures were recorded in HD and then downconverted to send to the set. It was a good idea and it worked quite well. But the twelve-foot-long Eurocranes, operated by puppeteers wearing Steadicam belts, were awkward and got in everyone's way so we didn't use them much. But we did use the HD recordings of the actors in the booths who mainly watched the shooting camera's images. The director was able to watch their performances on the set as Mike, the video assist technician, was in full control of the Raptor HD recorders and could play back everything simultaneously.

We used Sony EX3 cameras for all VFX-related reference material as they could take external tri-level sync and timecode.

An early test I sent to Imageworks proved that Avid DNxHD115 files were quite acceptable and would be used for turning over shots. I could have hugged them all for that decision as conforming the original media to the editor's cut would have been very painful.

Sound wasn't a problem—it was well taken care of. Our sound mixer was Petur Hliddal from Local 695, who I had previously worked with on *Batman Returns* with Tim Burton and on *Old School*. And I've worked with Local 695 microphone boom operator Peggy Names many times—always a delight to work with. They were ably assisted by Local 695 members Gail Carroll Coe, also a microphone boom operator, and John DeMonaco, working as the utility sound technician.

What could possibly go wrong?

Well, first off, during prep, the Red Epic cameras would lose sync occasionally. The rig techs said they had a lot of trouble with this on a previous show and here it was happening again. I had my 'scope with me and, on checking the tri-level sync through the chain, all was well except for the output of the little Distribution Amp feeding the cameras. It was low, by .1 volt, despite getting the correct level in. I had a couple of little 1x2 D.A.s with me and they solved that problem.

It then transpired that the nextLAB system could not deal with AVI or Sony XDCAM files or transcode them. It ended up being my job to deal with any files that weren't R3D files (which became known as Altmedia) and to transcode them to DNxHD115 using my Avid Media Composer and XDCAM transcoding software.

There is a common misconception that shooting digital means never having to say 'cut' as digital doesn't cost money the way that film does. I had to explain to the producers that it takes 10 hours to archive one hour of material and that if we went over 2.4TB a day, simple arithmetic said that we would need more equipment and

personnel or we wouldn't keep up. That had the effect of concentrating people's minds so that we returned to shooting an average of 1.5TB a day. All of this was archived on LTO5 tape and kept online on network-attached storage which ultimately reached a total of seven trays of 42TB each.

A further problem arose with our Red Epics. Latency became a big issue on some tightly operated shots. The minimum picture delay was two frames with the on-board Red display. To external displays, the delay could be up to five frames, depending on the monitor. I don't think there is any way around this with 5K sensors and 2K monitoring with the current design of the camera. Our operators always managed to get the shot, although they had to be creative about anticipating movement.

Conclusions

We wrapped on December 22 after some 108 days of principal and four days of blue screen photography. Would I do it exactly the same way next time? Maybe. As I pointed out at the beginning of this article, there is no one 'correct' way to make a movie with digital cameras. Color correction on-set? Not necessarily. On *Hugo*, all color correction was done off-set as the DP was also the operator. Pre-built LUTs were used in Black Magic HD Link Pro boxes to approximate 'the look' that Bob Richardson wanted. And for 3D—should you converge on-set or shoot parallel and converge in post? Both ways are valid.

Technology is moving so rapidly that what was state-of-the-art six months ago isn't necessarily so now. Techniques that weren't available then are coming online all the time so 'keeping up' is essential. But not at the expense of risk. As I said to one of the producers—making a movie is like a swan sailing across a lake. You should be able to admire the artistry of the swan gliding along on the surface without any awareness of its little legs paddling away like crazy underneath. That's our job, to make it look easy.



The author, Local 695 Engineer Ian Kelly, is seen here overseeing video operations on Robert Zemeckis' feature film *The Polar Express*.



Courtney at the offices of Intervideo

a profile of Courtney Goodin

by David Waelder

Part Two: Digits and Widgets

The project that shaped the direction of Courtney Goodin's career began on a dare. In 1982, he and Laurence Abrams were working on a commercial for Members Only clothing and the spokesperson was being cued with a QTV Teleprompter. Cuing devices (then and now) work by reflecting an image of the words onto a partially silvered pane of glass mounted in front of the camera lens at a 45-degree angle. The speaker can read the text while looking directly at the camera. It's an ingenious device but the process of scrolling the text was quite primitive at that time.

The copy was printed onto rolls of paper with tractor-feed perforations at the sides. A mechanism with motors, belts and pulleys would roll the paper from one spool to another to move text across the screen. The potential for intrusive noise was obvious and the clattering machinery was a particular nuisance on that assignment. At lunch, Courtney sat down with the prompter operator and asked him, "Is anyone making a computer prompting system?" He replied, "Nah, it's impossible to do on a computer. Computers just aren't fast enough. There's no way to do it on a computer." Courtney just said, "OK," but he took that as a challenge.

Courtney was familiar with the graphic capabilities of the Atari computer from his experience developing the Graphic Master image-editing program that he was marketing. He thought that the advanced graphics chipset used by the Atari was up to the task but there were some programming challenges. An effective prompting system must work smoothly; glitches or herky-jerky movement would be a distraction and undo the benefit of the prompting. There is a natural hiccup as the computer periodically refills its memory cache and Courtney had to devise a workaround that would permit smooth scrolling through lengthy passages. And it was important that it scroll smoothly both forward and backward and permit quick, jerk-free changes of direction. When he had that worked out, he developed a remote control using the same boxes he had used for the Goodsound Talk Back units. An operator would be able use the remote to scroll the text forward and back and smoothly ramp the speed up and down to match the reading pace of the talent.

With the software issues largely resolved, he and Abrams, his partner in this venture, turned their attention to designing a marketable product. Courtney redesigned the camera-mounted beamsplitter and devised more flexible support hardware to accommodate 16mm and 35mm film cameras and smaller video cameras as well as pedestal-mounted studio TV cameras. Previous teleprompters were designed for permanent installation in environments like news studios but their device could be quickly attached to a wide range of cameras without adapters or a bulky three-foot base plate. They also designed a custom case that opened into a freestanding operator's console for quick setup. They called their new product "Compu=Prompt." It was the first personal computer-based prompting system. This accomplishment was honored with an Emmy Award in 2010.

Courtney also devised a digital dongle to provide copy protection. A dongle is a device that must be plugged in to a computer to authorize use of a software program. Very little was available at the time to protect against an unscrupulous user simply copying the software and building a unit. While the use of an electronic key to restrict unauthorized use of software was fairly common, most of these devices were a simple resistor circuit and were easily circumvented. Courtney's use of a digital code in the dongle was sophisticated for its time.

Producers were hesitant to adopt the new device but Courtney and Laurence knew they had a winner when they wrapped a commercial several hours early. Looking back on the day, the only factor that was different was the performance of the prompter. There was no downtime for copy to be reprinted and threaded onto a roll, no crinkling paper spoiling takes, no difficulty matching pace of the copy. When they needed to re-cue to the beginning, it was accomplished instantly with the push of a button, no more waiting for the prompter to roll the long roll of paper script back to the beginning. In short, there were no prompter delays at all.

It was a triumph of clever programming and engineering. A \$150 Atari computer with a hand controller and Courtney's proprietary software replaced a \$12,000 mechanical prompter and did so with much greater efficiency. Courtney was able to sell the Compu=Prompt system for \$4,000, an enviable markup.

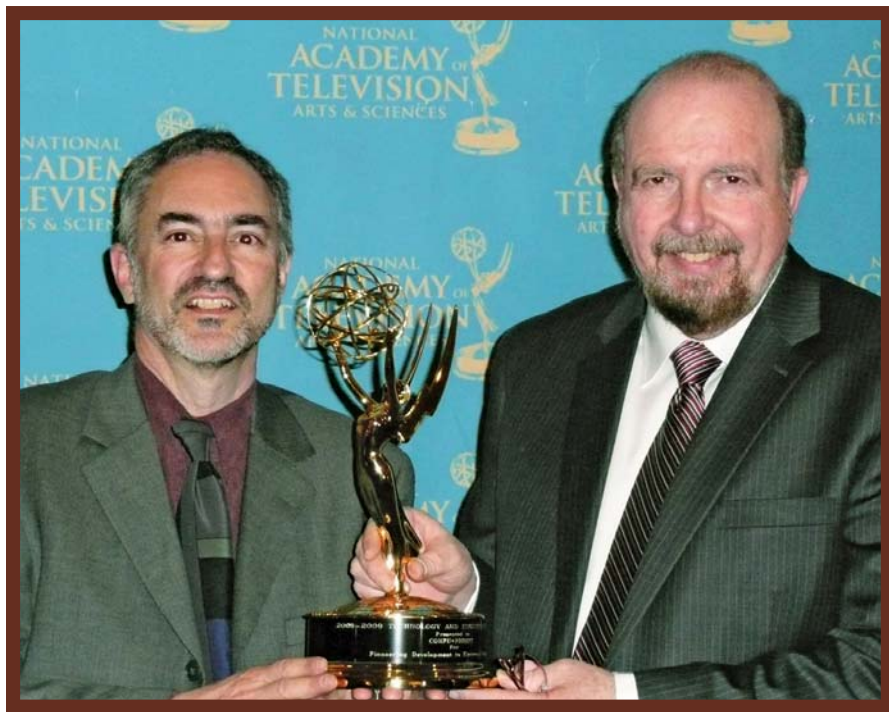
As producers became aware of the advantages of this more

flexible system, demand grew and Courtney had inquiries from all over. He even managed to sell several of his Atari-powered devices to IBM! He demonstrated a prompter for the Reagan White House but had no answer for their dilemma of what to do when the President would wander off script; for someone determined to go their own way, even a prompter was no help.

Regrettably, Courtney was a much better inventor than businessman. Although he had some interest from Panavision, the industry leading camera company, he elected to license the Compu=Prompt technology to Dreamdata, a partnership with two other people originally formed to market computer video games. But Dreamdata had no vision, no data, only dreams; sales and rentals of Compu=Prompt products became their only source of revenue. After several years of increasing sales and expansion, the other partners conspired to divert that income to themselves. It took a lawsuit to wrest the rights away from his former partners



First prototype Compu=Prompt operating console



Courtney (right) and Laurence Abrams holding the Compu=Prompt Emmy

program just to listen to his own audio and check timecode. Learning that there was no reasonably priced software to do this, he turned his attention to making his own. A healthy part of success in any venture is recognizing exactly what needs to be accomplished and what is already available. Microsoft Windows comes bundled with Media Player software that can play any standard audio file. Moreover, Microsoft permits users to devise programs that use the core features of the Windows software so long as they don't change the control interface. He wrote code that would use the Media Player engine for the audio reproduction while reading the metadata and displaying running timecode in a large window that could be used as a digital slate. It consolidated the metadata from many

files into a human readable spreadsheet-like format that could be saved to disk. He also envisioned an application that might free him from the process of keeping sound logs, a laborious process with his cramped handwriting.

The resulting software, BWF Widget, has become an essential tool for both editors and sound professionals and is now available in a suite of variations. Licensed to Sound Devices, it is the basis for their original Wave Agent program.

In the course of developing BWF Widget, Courtney confronted the problem of an absence of file standards among audio equipment

and Courtney and Laurence were unable to develop the product in a competitive market until the suit was settled 2½ years later. ProPrompt, the new company they formed, was successful in the rental market but found sales difficult since the Compu=Prompt system was still being marketed by the former partners during the lawsuit. By the end of the lawsuit, it had been more than seven years since the introduction of Compu=Prompt and competing computer systems from other prompting companies had been able to establish a foothold.

The bad experience recovering the rights to his prompting invention discouraged Courtney from developing other products that would need to be built and sold. He continues to provide the C-stand to microphone adapters sold through LSC and Coffey but is otherwise out of the hardware market. Our very small market didn't support volume manufacturing so Courtney needed to fit components into boards and solder them by hand to make his preamps and talk-back boxes. Writing software offered the same satisfaction of finding a solution to a problem without the necessity of breathing toxic fumes from a hot iron.

He would soon have an opportunity to practice those code-writing skills. He purchased a Sound Devices recorder to transition from DAT to nonlinear sound. Right away, he was frustrated by his inability to listen to the recorded audio and also see a timecode display as the file played. This could be accomplished by playing the file in the recorder, of course, but not once the file was transferred and played in a computer. When he inquired, he was told that Pro Tools would accomplish this but he balked at purchasing a \$1,200+



BWF Widget Pro software

COMPU = PROMPT FIRST IN COMPUTERIZED PROMPTING



OPERATOR'S
CONSOLE

Compu=Prompt final console design

manufacturers. The various companies, from Aaton to Zaxcom, would interpret timecode implementation protocols differently and each was loath to bend their practices to match the other. Acting as an outsider with no personal agenda or competitive hardware to market, Courtney helped persuade the various companies to come to an agreement on how timecode would be applied in various frame rates and at different sample frequencies. Attempting to bring order to this Babel may be his greatest single contribution to professional audio.

The limited success of ProPrompt meant that Courtney had to continue working regular sound and video playback assignments to earn a living. Recently, he has been doing the video playback for *Dexter*. In some ways, his need for regular work has been our gain as he is presently serving his third term on the Local 695 Board of Directors and he has served several times on the Constitution and By-Laws Committee. He continues to refine BWF Widget and remains active in the field so there is no telling where his fertile imagination may yet take us.



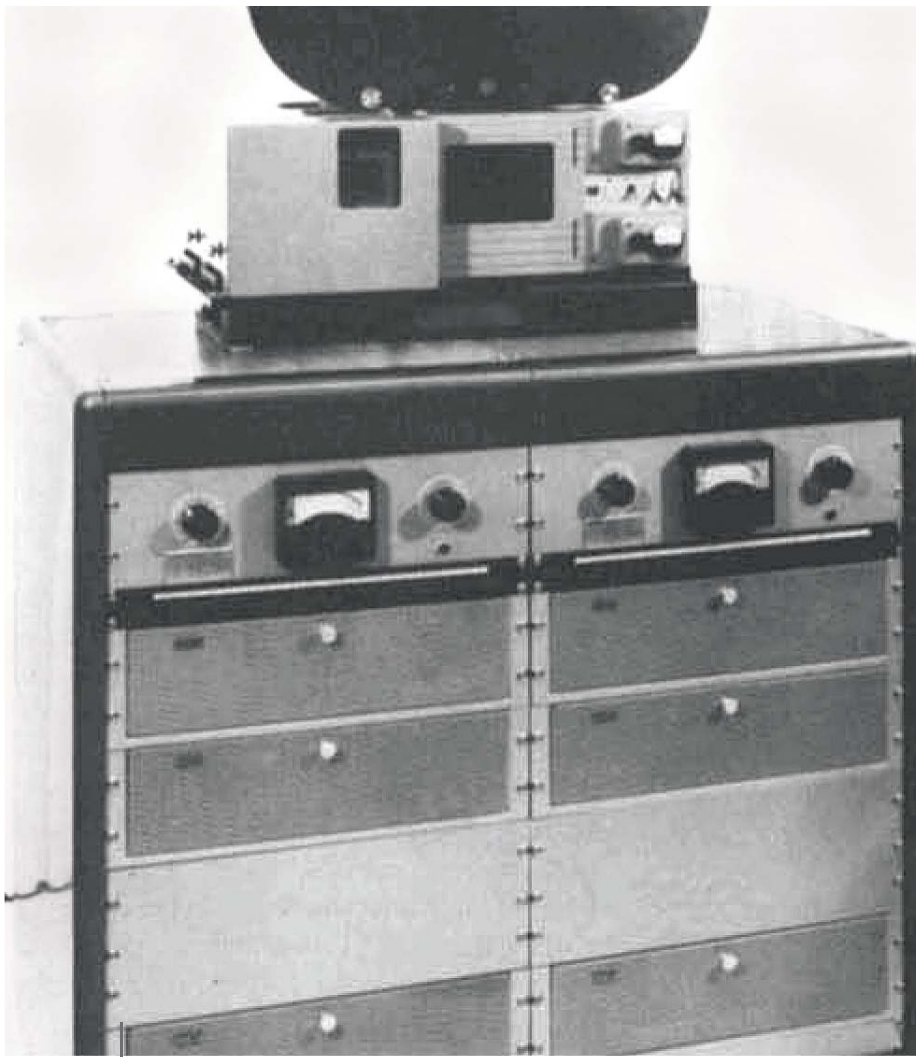
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When Sound was Reel 8



Original RCA stereo variable area optical recorder used at Elstree Studios in 1974. This was the same recorder used at Eastman Kodak for the 16mm stereo experiments, but converted to 35mm. (Photo courtesy of Ron Uhlig/SMPTE)

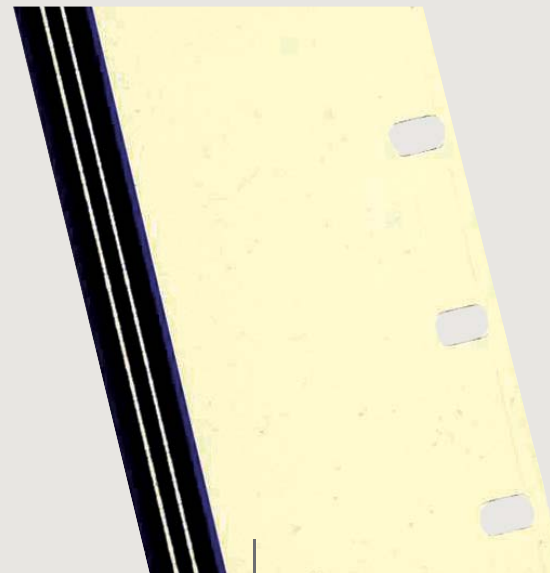
DOLBY NOISE REDUCTION IN THE '70S

In the previous installment of "WSWR," we examined the development of Dolby noise reduction and its application to film sound recording. This issue looks at the further work done by engineers at Eastman Kodak, RCA and Dolby Labs in relation to film sound during the 1970s.

The Problem

Ever since the production of Disney's *Fantasia* in the 1930s, studios and film producers had been looking for a low-cost method to distribute release prints accompanied by high-quality multi-channel soundtracks. The first multi-channel optical sound system developed for *Fantasia* in 1940 proved so costly (at least \$45,000, in 1940 dollars) and cumbersome that only about a dozen road show engagements were mounted utilizing the full stereo sound system (outside of its initial 57-week run at New York's Broadway Theater). While Fox's Cinemascope system with four-channel magnetic stripes offered a less costly alternative (about \$25,000), it still required the striping and sounding of prints on special "Foxhole Perf" film base and constant maintenance of the projection system mag heads. This applied to Todd-AO 70mm six-track systems as well, which only saw use in road show engagements of big-budget studio releases. By the end of the 1950s, research pertaining to improved film soundtracks was pretty much at a standstill and interest in multi-channel film exhibition waned. The exceptions were a few landmark films such as *Woodstock* and *2001: A Space Odyssey*.

In the meantime, the general public was enjoying high-quality album fare on quarter-inch tape in the comfort of their homes. With the advent of consumer reel-to-reel recorders, record companies began releasing albums in quarter-inch stereo and even quadraphonic tape formats. The quality of a standard 35mm mono Academy soundtrack reproduction was rather dismal in comparison, especially when played through loudspeaker systems designed in the 1940s. Clearly, there was a real disconnect in the marketplace.

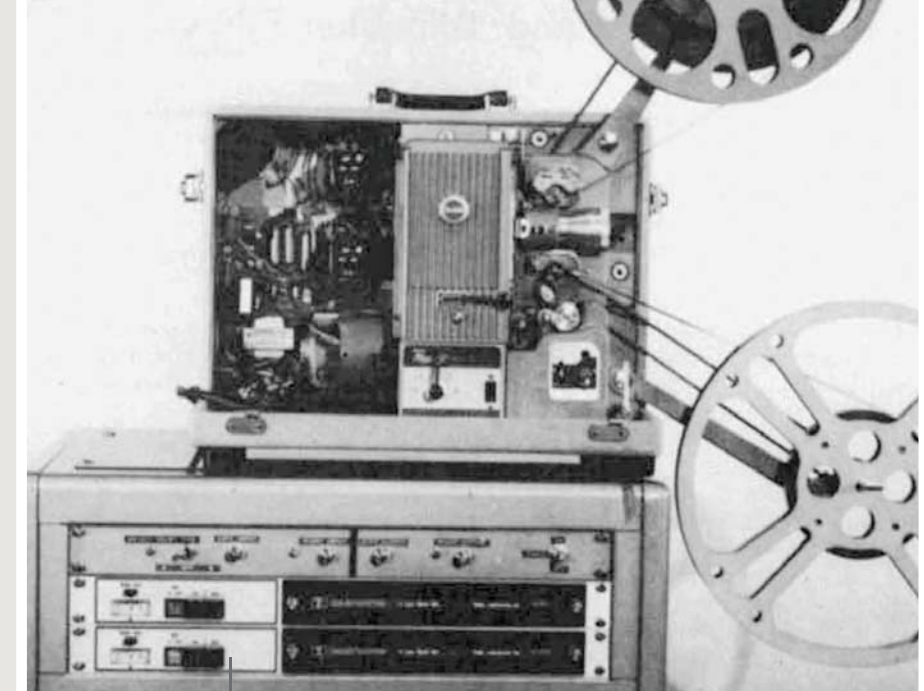


Sample of 16mm stereo optical negative (Photo courtesy of Ioan Allen-Dolby Laboratories)

Nearly a decade would pass before any further work pertaining to multi-channel sound was mounted. The medium of optical soundtracks hadn't really seen any significant improvement since the 1940s, except for incremental improvements in film stocks and minor upgrades to the recording chain. The optical film recording transports made by both RCA and Westrex all dated back to original systems designed in the 1930s and '40s.

While the Academy Research Council had conducted work on a push-pull color three-channel optical sound system in 1973, for various reasons it was deemed impractical at the time. At the same time, efforts at improving the quality of 16mm optical sound were undertaken by Ron Uhlig at Eastman Kodak, with help from Jack Leahy and RCA engineers. Their focus, however, was on technology for producing 16mm stereo variable area optical soundtracks, which was intended to compete with Sony's three-quarter-inch U-Matic video format in the industrial film and educational markets (still a substantial source of revenue for Kodak). Despite the fact that the system never gained any traction in the commercial marketplace, their work did pave the way for similar developments pertaining to 35mm optical sound recording.

One of the key problems related to 16mm stereo optical tracks was the dismal signal-to-noise ratio which, even in mono, was pretty poor: about 50 dB "A" weighted on a good day. Splitting the area used for the 60-mil wide soundtrack into two 25-mil tracks (with 10-mil track separation) just exacerbated the issue. The application of the consumer Dolby B improved upon this by 6 dB, but it was still a far cry from the quality of even an average mag stripe print. Although the Dolby A multi-band processor could improve on this, it would mean a significant additional cost for the projection systems typically employed in the industrial/educational markets. In addition, the inherent constraints of 16mm optical limited the response of release prints to about 7 kHz at best. With few market prospects for the system, RCA and Kodak eventually abandoned their work for 16mm soundtracks.



Kodak 16mm Pageant projector modified for stereo playback (Photo courtesy of Ron Uhlig/SMPTE)

35mm Stereo Optical Sound... A Long Time Coming

While stereo optical sound was nothing new (Alan Blumlein had developed a system in 1934 and John Frayne did further work in 1953), successfully marrying a two-channel soundtrack to a composite release print for commercial release was a daunting task. Among the issues of the day was the fact that theater projection systems would need to be modified for dual photocell tubes, using a prism optical system of the type that normally would only be encountered on (expensive) studio reproducers. Further, standard mono soundtracks of the era did not have much HF response past 12.5 kHz, and signal-to-noise ratio was still rather abysmal when compared to magnetic soundtracks.

Ray Dolby and Ioan Allen, along with engineers at Dolby Labs, had already tackled these issues as they pertained to mono soundtracks, and applied the same engineering approach to a two-channel variable-area soundtrack on 35mm film. The issue of improved HF response was addressed by reducing the height of the scanning slit on the optical reproducer, and removing the low-pass filter typically employed during the recording of the optical soundtracks. In addition, the advent of the solar cell allowed for an improved optical reproducer system that did not require expensive optical splitters in the projector penthouse.

The first optical recorders (one in the UK and one in the United States) used for striking stereo negatives were based on the RCA dual galvo system as originally conceived by Uhlig and Leahy. Later on, Westrex RA-1231 optical recorders were rebuilt using a modified version of the four-string light valve that dated back to 1938.

At the same time, newer electronics for the optical recorders were developed, which allowed for better control of exposure, as well as improved driving of the low impedance ribbon light valves. Further improvement was accomplished by using analog delay lines to compensate for the slow response of the "ground noise reduction" system (known as GNR), employed in optical recording. The GNR system was required to control the area of exposed track, reducing the un-modulated track area to a narrow "bias line." Adding a delay

by Scott D. Smith, CAS

to the actual program audio fed to the galvo allowed for sufficient time for the NR shutters to open completely during heavily modulated passages, thereby preventing clipping of the first few cycles of the waveform.

The 3 dB of S/N ratio that was lost due to the halving the soundtrack area for stereo was compensated by the application of Dolby A noise reduction. Film labs made additional efforts to control “printer slip” and irregularities in soundtrack print densities, factors that contribute both HF loss and inter-modulation distortion. While the resulting soundtrack was still not as good a magnetic track, it was an improvement over the 40-year-old Academy tracks. Most importantly, laboratories could strike high-volume release prints using conventional printers and processing equipment.

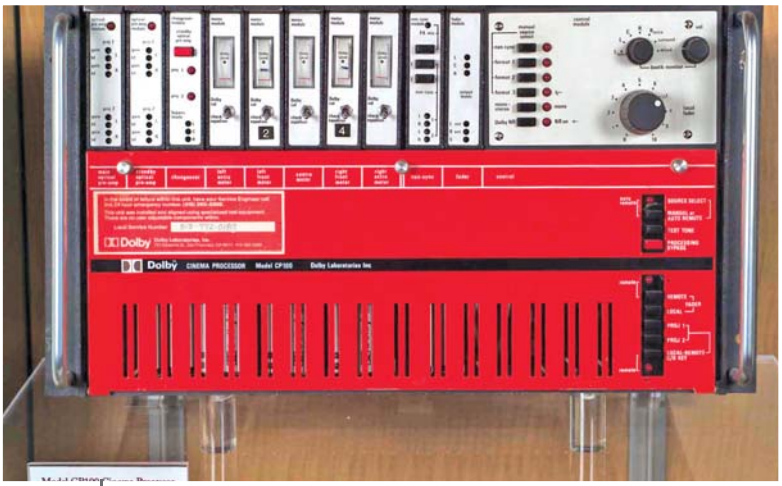
That’s Great; Now How About a Couple More Channels?

At this point, engineers now had a working model for a standard two-track, three-channel stereo recording that could be recorded and reproduced on film using a basic decoding matrix to extract the center channel. Looking back at these developments from the vantage point of 2012, it may not seem like much, but the engineering effort involved in upgrading a nearly 45-year-old format was no mean feat. However, for real-world application in the cinema, it was lacking in one crucial area: it needed four channels.

While consumer stereo systems of the era only employed two (or in the case of quad, four) channels of program material, film reproduction in large cinemas required at least three channels, preferably four. This was to provide for the center channel speaker needed to anchor dialog, as well as providing for audience coverage in large venues. The Fox Cinemascope magnetic system had four channels and the Todd-AO system had six. If stereo optical soundtracks were to be commercially viable, they would need to accommodate at least four independent channels to match the Left/Center/Right/Surround speaker systems already in place in many theaters.

Fortunately, as a result of the “Quadraphonic” fad of the early 1970s, there was a solution to be had. For those not familiar with consumer Quadraphonic (usually referred to as “Quad”), systems of the era, a bit of background is required: Thinking that consumers were yearning for something beyond just two channels, record companies began experimenting with four-channel surround sound for home reproduction. Like the VHS and Beta wars soon to be launched, there were competing systems introduced in the early 1970s. Of course, they were all incompatible with each other. Of these, there were only two using a matrix approach that had any real commercial acceptance. The first to be introduced was the “SQ” system, based on work originally done by Peter Scheiber in the late 1960s. It was first used by CBS for selected record releases in 1971 and was later adopted by at least 11 other record labels.

The competing system was called “QS” for Quadraphonic Sound, (later referred to as “RM” for “Regular Matrix”). How’s that for generating confusion in the marketplace?! Developed by engineer Isao Itoh at

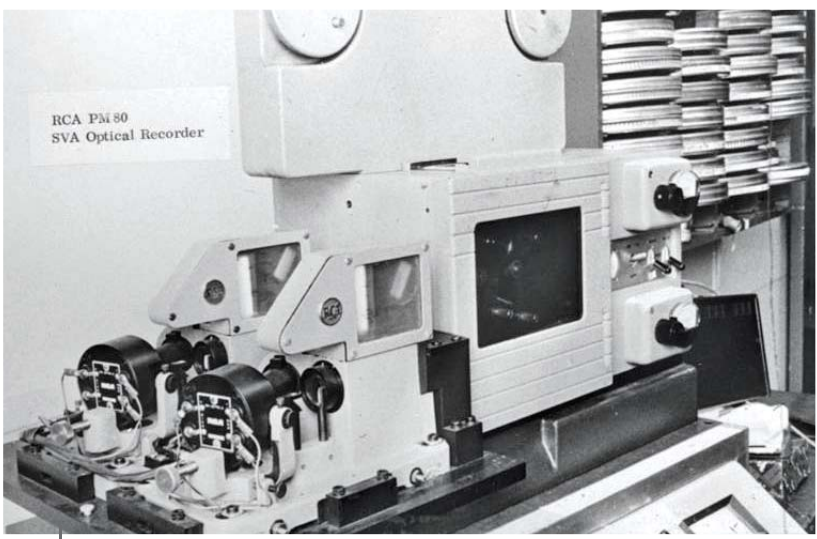


Early Dolby CP-100 processor, similar to the first units installed at the Leicester Square Theatre in London for the premiere of *Tommy*. (Photo courtesy of Ioan Allen-Dolby Laboratories)

Sansui Electronics, it was conceptually similar to the Scheiber system but utilized a different algorithm to extract the encoded four channels from the two-channel source. Alas, the general public was not ready for quadraphonic sound and except for a diehard group of audio enthusiasts, interest in the format died out after about five years.

However, both systems allowed for four channels to be encoded onto a two-channel carrier, thereby allowing them to be adapted to the standard L/C/R/S speaker configuration already in place in theaters that had been converted to magnetic. (Note, however, that the speaker configuration and recording techniques used for consumer quadraphonic systems were completely different from cinema loudspeaker layouts.)

In the beginning, Dolby opted to use the QS matrix technology, resulting in the “3:2:3 matrix” system. The entire system process was dubbed “Dolby Stereo.” The QS matrix was originally employed by Dolby for the release of *Lisztomania* and several other films. 1976 saw the release of *A Star Is Born*, the first film to employ Dolby Stereo surround technology. QS was also used to generate the five-channel Quintaphonic magnetic soundtrack used on the film *Tommy* in 1975. However, Dolby abandoned the use of the QS matrix in 1978, opting for a custom built matrix that employed a variation on the Scheiber system, which was referred to as “MP Matrix.” This was the system that was employed for the release of *Hair* in 1978.



Converted PM 80 recorder (Photo courtesy of Ioan Allen-Dolby Laboratories)

Star Wars

While movies like *Lisztomania*, *A Star Is Born* and a handful of others helped to generate industry buzz for the Dolby Stereo format, theaters were slow to jump on the bandwagon. Owners were reluctant to invest in yet another sound system after the demise of the Cinemascope four-track magnetic and 70mm six-track systems.

This all changed, however, with the release of George Lucas’s groundbreaking *Star Wars* in May of 1977, followed by Spielberg’s *Close Encounters of the Third Kind* in November of the same year. Now, theater owners began sit up and take notice. With more than \$353,668,000 in combined domestic rentals, these two films were largely responsible for the sudden interest on the part of theater owners to adopt the Dolby Stereo system. (It should be noted that both of these films were also released in Dolby Stereo 70mm six-track magnetic for their road show engagements, with 35mm Dolby Stereo optical prints being struck for smaller markets and second-run. In addition to ramping up sales of the Dolby SVA processors, it also helped to reinvigorate interest in 70mm for road show releases, using the modified L/C/R/S format of Dolby Six Track Magnetic.)

When *Star Wars* opened in May of 1977, there were only 46 theaters in the U.S. equipped for Dolby Stereo. By the time Richard Donner’s *Superman* opened in December of 1978, there were 200 theaters and, within three years, that number increased tenfold to 2,000. Clearly, the folks at Dolby were onto something, and they went on to establish a firm foothold in both the domestic and international theatrical market, a position that they would enjoy exclusively until the release of the competing “Ultra Stereo” system in 1984.

One of the key aspects in acceptance of the Dolby Stereo SVA (for stereo variable area) system was the fact that prints struck in the format were backward compatible (in varying degrees) with the original mono Academy optical format. This reduced the need for dual print (optical and magnetic) inventories, greatly simplifying distribution. While it is likely that the format would still have won out even without this compatibility aspect, it went a long way in helping to convince both studios and theater owners of the long-term viability of the system.

A Few Little Problems...

Despite the relative success of the Dolby Stereo variable area system, there remained a few issues. Chief among these was the poor separation between channels due to the limitations imposed by the surround decoder technology. To overcome this, Dolby employed a logic steering system, which would assist in “steering” the signal to the appropriate channel, thereby curtailing some of the problems of crosstalk between channels. However, this system required diligence during the mix to ensure that nothing ended up where it shouldn’t be due to the random phase relationship between channels. Therefore, all mixes destined for matrixed Dolby Stereo release employ a combination encoder/decoder on the dub stage to facilitate monitoring final results.

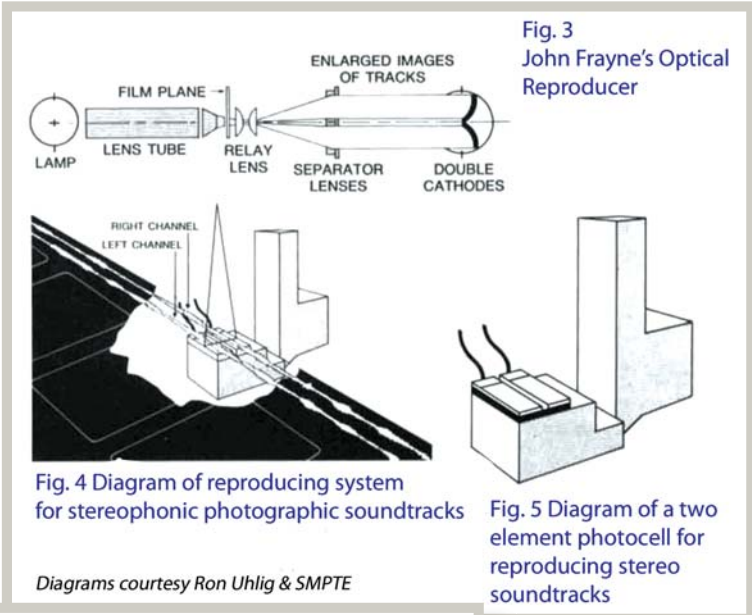


Fig. 4 Diagram of reproducing system for stereophonic photographic soundtracks

Fig. 5 Diagram of a two element photocell for reproducing stereo soundtracks

Diagrams courtesy Ron Uhlig & SMPTE

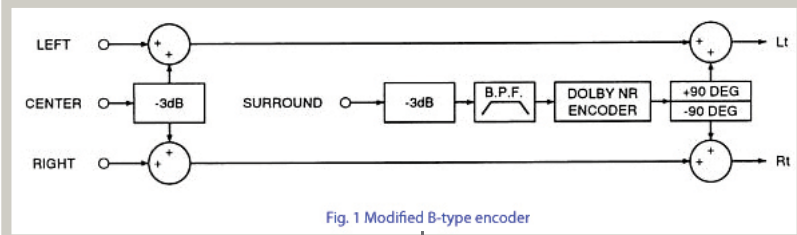


Fig. 1 Modified B-type encoder

Fig 1 (Courtesy of Dolby Laboratories)

SMPTE “Stereophonic Photographic Soundtracks,” Ron Uhlig (Eastman Kodak). SMPTE Journal, April 1973, Volume 82, pp 292-295. DOI 10.5594/JO8887 Copyright 1973 SMPTE

A further issue involved the quality of the surround channels, which is produced by taking the difference signal of the encoded left and right signal channels (called Lt and Rt in Dolby parlance), and routing it through a delay network in the playback processor to the auditorium surrounds. (The delay is always applied during reproduction instead of during the final mix, as every theater has different delay characteristics.)

The limitations of most auditorium surround speakers also made it necessary to limit the surround bandwidth to 100 Hz–7 kHz to avoid overloading the drivers. Due to the proximity of the speakers to the listener, combined with issues related to HF sibilance “splash” (caused by projection reproducer azimuth errors and uneven slit illumination), it was necessary to apply a further 6 db of noise reduction to the surround channel in the form of Dolby B.

While all this processing and signal manipulation may look inordinately complicated to some, it must be remembered that in 1975 the only other alternative available for getting four channels onto a film print involved expensive mag striping and sounding of prints, which also meant dual inventory for distribution.

Fig 2 (Courtesy of Dolby Laboratories)

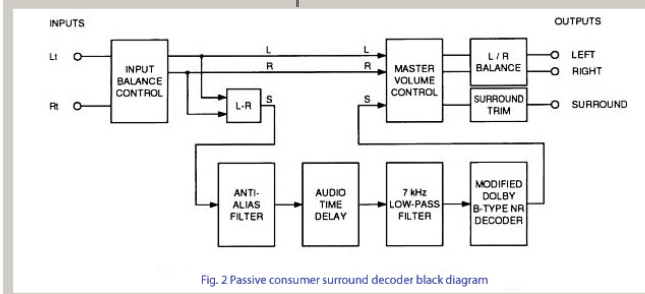


Fig. 2 Passive consumer surround decoder block diagram



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While various improvements were made to the original MP matrix technologies over the years, the system still remains backward compatible with films made after about 1978.

What About the Folks at Home?

Having firmly established their brand in the cinema industry, Dolby wasted no time in applying the technology they had developed for theater applications to the consumer market. The arrival of the improved Hi-Fi versions of both Betamax and VHS in 1982 provided the first practical mass-market opportunity to distribute feature films with surround sound to the public for home viewing. With a catalog of film releases that dated back about seven years, Dolby saw an opportunity to exploit the market for movie aficionados who were craving something beyond standard two-channel reproduction (These were of rather poor quality in the early versions of both VHS and Betamax). Thus was born "Dolby Surround," which was the moniker used to denote the consumer version of the Dolby Stereo cinema system. The major difference between the early consumer systems and the more sophisticated theater version was that the consumer version consisted of only three output channels; Left, Right and Mono Surround.

While this approach helped to provide a sense of spatial imaging for Dolby Stereo films, the lack of a separate center channel to anchor the dialog was a noticeable deficiency, which Dolby addressed with the release of the consumer version of Dolby Surround with Pro Logic in 1987. This system was licensed to various consumer audio manufacturers, who created packaged audio receivers employing the Pro Logic decoder. Further refinements were offered in 2000, when Dolby adopted technology developed by Jim Fosgate to encode and extract five channels of audio (Left, Center, Right and Stereo Surround).

While the Pro Logic system was the pre-cursor to the discrete 5.1 systems we enjoy today, the actual 5.1 channel format was first employed for the six-track 70mm releases of *Superman* and *Apocalypse Now* in 1979. The first use of 5.1 on 35mm film was the release of *Batman Returns* in Dolby Digital in 1992.

One reason for the rapid adoption of the Dolby Surround system was its backward compatibility with the earlier Academy mono systems that were still prevalent in the '70s. This meant that films mixed in Dolby Stereo for cinema release could be directly mastered for home video using the matrixed two-channel (Lt/Rt) soundtrack masters. The only work typically required was to decode the Dolby A noise reduction used on the Lt/Rt magnetic print masters. This saved a considerable amount of money for studios wishing to license their back catalog into the burgeoning home-video market. Were it not for this, it is doubtful that Dolby Surround would have gained the market acceptance it did, which likely would have meant the public would have had to wait at least a few more years to enjoy the quality of sound that was already available to them at home.

Next: Digital sound comes to the movies

Many thanks to Ioan Allan of Dolby Labs and Ron Uhlig for their contributions to this article.

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