

# 695 QUARTERLY

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# 695 QUARTERLY

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# 695 QUARTERLY

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**Cover: Filming Ride on the beach.**  
**Photo by Coleman Metts**

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## From the Editors



When it became necessary to film additional material for *Dick Tracy*, the original Mixer, Tom Causey, wasn't available and Jim Webb was brought in for the extra scenes. Hearing that Jim Webb was mixing, Warren Beatty asked Duke Marsh, the Boom Operator, to have him come on the set so they might meet. As Webb appeared, Beatty extended his hand and said, "I'm so pleased to meet you. You're a legend in this business."

We are most pleased to offer a profile of this living legend so his accomplishments might become more widely known, especially among our younger members.

We also offer Coleman Metts' account of a uniquely California experience on the surfing film *Ride*. Making a film on the water is always difficult; making one while balanced on a paddleboard is a particular challenge.

Jim Tanenbaum's explanation of the Motion Capture and Performance Capture process is welcome and timely. This is a direction taken by more and more projects and we will all need to be familiar with the specifics.

It's a diverse mix of topics that we hope you'll find interesting and useful.

Fraternally yours,

Eric Pierce, Richard Lightstone,  
and David Waelder



While David Waelder and I were comparing the ongoing progression of our toolset for sound mixing, I began to reminisce about the 1980s and my

intermittent pilgrimages to the manufacturers of those tools. There was a moment when I looked at my sound cart and realized that I knew very little about why we did this work the way we did, and even less about how the tools we used came to be, or who created them. I began to read and search (pre-Google era) and collect antique gramophones, phonographs, cylinder recordings, and period publications related to the development of sound recording. I became aware of the contributions of the individuals who developed the tools we all use, going back to Thomas Edison's invention of the tin foil phonograph in 1877. David suggested I share my visits with our members.

In 1987, I traveled to Europe for work and decided to visit the Nagra factory in Switzerland. I was using Sonosax mixers at the time, and since Sonosax was also in Switzerland, I extended my stay so I might see both.

That summer, I pulled up to the Kudelski facility, parked, and entered. I was warmly greeted by a gentleman in a long white lab coat and taken behind the "black curtain" of the Nagra. This was just when timecode Nagras were being introduced to the market and the staff projected a sense of intensity and purpose, almost a religiosity, as this was the next big thing for them, as, indeed it would soon be for us.

We toured the design lab, the prototype room and, very interestingly, the "motor board room," where at least a dozen Nagra motors were lined up and running continuously 24/7 since their manufacture. They would be stopped only momentarily to change the worn carbon motor

## From the President

brushes. The earliest motors had ostensibly been running since 1959! This partially explains why 98% of the Nagra III's in the world were still being used internationally almost twenty years after manufacture (genuinely by hand) had ceased. Damn good stuff.

The mood at Kudelski was very formal: Swiss button-down shirts, lab coats, ties—a laboratory staffed from central casting. The facility mirrored the personality of Stefan Kudelski, the inventor of the Nagra.

Twenty minutes down the road, I found the Sonosax shop, housed in a recycled brick building much like the loft conversions I had experienced while living in NYC in the 1970s (including my own). Jacques Sax was the resident genius inventor, occupying a position at Sonosax analogous to that of Kudelski at Nagra. We met at the door and walked together up the stairs to a converted loft, Swiss-style. There was not a lab coat to be found, everyone wore blue jeans and T-shirts and loud rock music was pervasive. It was a revelation to see the diversity of creative spirit in the design and fabrication of professional sound equipment. There was no one way to approach these things; it was the results that mattered.

The experience of meeting these folks in their actual work environments forever informed my subsequent conversations and interactions with them. I've continued this "pilgrimage" idea even today, visiting Schoeps in Germany, Rycote in the UK, Lectrosonics in New Mexico, Zaxcom in New Jersey and Denecke and Chinhda and others. These tinkerers and inventors have become a part of my professional family; my close association with them has enhanced my professional life, the growth of my skill, and my understanding of the design process. Each of them is a creative artist in their own right. Ours is an enterprise that depends on many varied creative energies and we each have a role to play.

Warm regards to all,  
Mark Ulano  
President  
IATSE Local 695

# Our Contributors



## Coleman Metts, CAS

Coleman has been a Production Sound Mixer for 20 years and a surfer and paddleboarder for even longer. Some of his credits include *Donnie Darko*, *Bobby* (about the assassination of Robert Kennedy), *Project X*, and the TV series *Awkward* and *Dollhouse*. With *Ride*, he was able to combine two passions.



## James Tanenbaum, CAS

With decades of experience as a Production Mixer, Jim Tanenbaum, CAS is known to many as the man who "wrote the book" on timecode (*Using Timecode in the Reel World*) and as an educator. He has taught sound classes at UCLA since 1988, and traveled to Japan (1995), China (2010 and 2011) and Vietnam (2012) to train other mixers and film school students in the discipline of sound for movies and TV. He continues to work in production, most recently completing the first season of the reality series *Jim Henson's Creature Shop Challenge*. He worked on the last three years of James Cameron's *Avatar*, and hopes to do *Avatar 2*, 3, and 4.



## David Waelder

David has recorded sound for films for several decades and has been an editor of the *695 Quarterly* since its inception five years ago.

# 695 QUARTERLY

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Production Sound Technicians,  
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# From the Business Representative



## In Perspective: Awards and Accomplishments

Whenever I meet with representatives from the AMPTP, I make a point of emphasizing that our members are the best craftspeople and technicians available anywhere. They are well informed on the latest technologies and skilled in their application. They work efficiently and provide the employer with the best quality outcome. The money paid in wages yields a dividend in results and productivity.

I urge members to continue to take advantage of courses and training opportunities offered through the Local to maintain that advantage in skill.

But, in this awards season, when Local 695 technicians feature so prominently among the nominees, I ask that you just take pride in the accomplishments of our members.

Please send me your thoughts on this perspective at [jimo@695.com](mailto:jimo@695.com)

James A. Osburn, CAS  
Business Representative  
Executive Director

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Image courtesy of  
Sound Mixer, Percy Urgena

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## A Tribute to Edison



Menlo Park laboratory. (Photo from Wikipedia.org)

Thomas Alva Edison, born in February 1847, is the father of the research lab and also, particularly, the father of recording sound for movies. His phonograph, invented in 1877, was the first practical recording and reproducing device. The initial design worked with a cutting tool to scratch the vibrations into tinfoil wrapped around a rotating cylinder. Later improvements enhanced its utility.

He also pursued the development of motion pictures and obtained a patent for the kinetograph, a film camera.

In 1879, the sale of an improved telegraph design to Western Union provided funds that he used to build Menlo Park, an industrial research laboratory that systematically sought to develop new products that might be marketed. It was the model for all the R&D labs that followed.

Not all his activities were beneficial. He also started the Motion Picture

Patents Company (aka the Edison Trust) limiting access to motion picture technology to licensed companies. This forced potential competitors, like Cecil B. DeMille, to flee to California to pursue their ambitions away from patent enforcement agents. But, on the whole, his inventions were seminal and we acknowledge his accomplishments.



Thomas Edison with his phonograph in 1878. (Photo: Mathew Brady. Courtesy of the U.S. Department of Interior, National Park Service, Edison National Historic Site.)

## Fiona: Denny's Job Action



From left: Leslie Simon, Local 871 (Script Supervisors) Business Agent; Dean Striepeke, Local 695 Special Representative; Bob Schuck, Local 695 member

Local 695 members turned out to support a job action at a Denny's restaurant in North Hollywood. Fiona, a New York-based production company, was shooting a commercial but was forced to suspend production when key crew members refused to cross the picket line. We hope this will encourage them to bargain in good faith but the situation was still in flux as we went to press.

## In Memoriam

**GARY THEARD**  
Boom Operator

July 13, 1938 – Jan. 7, 2014

**THOMAS A. MOORE JR.**  
Mixer

July 7, 1951 – Jan. 30, 2014

## Update: Larry Levinson Productions

In the 2009 summer edition of 695 Quarterly, nearly five years ago, we reported on a job action at the Studio City offices of Hallmark Movie Channel. At that

Wong, producers previously associated with Larry Levinson, split off and formed their own company, Silver Spring Pictures. Their company now supplies most of the Hallmark projects under an IATSE contract.



We believe the job action five years ago was instrumental in this change. It's not important whether

time, Larry Levinson Productions supplied much of the product for Hallmark. They pursued exploitative labor practices and vigorously resisted all organizing efforts. Since Hallmark is a company focused on family events, the union reasoned that they might feel more vulnerable to an action that brought attention to the family-unfriendly behavior of their main supplier.

er Hallmark insisted on the change or whether Levinson associates, reasoning that Hallmark would welcome a relationship with a production company holding union contracts, sought to provide it. Either way, members working Hallmark projects can earn hours toward health and welfare and have a contract that pays overtime wages.

More than two hundred union members turned out for three demonstrations in May and June of that year, communicating to Hallmark that they could not count on business as usual while a major content supplier denied overtime and health benefits to employees. After three days of action, the IATSE withdrew the picketers. This represents a strategy shift: sometimes the union will refrain from taking on an adversary in a fight to the death. Sometimes it's better to give a company a little room to consider the advantages of cooperation.

I am pleased to report that circumstances today are much improved. While Larry Levinson Productions continues to supply product to Hallmark, and continues to intransigently resist organizing efforts, their role is now significantly diminished. Kyle Clark and Lina

There is much yet to be accomplished. Silver Spring Pictures is operating under a low-budget contract, not the Basic Agreement. It's an incremental process but the first step is bringing them into the tent.

There are, I believe, lessons to take away from this. The first concerns the importance of responding to job-action calls whenever you can. The beneficial outcome of these actions may not be immediately apparent but they all carry a message to exploitative employers. The second takes the form of a challenge: The Hallmark demonstration was effective because more than two hundred turned out in support. Imagine what might have been accomplished if two thousand had answered the call and flooded Ventura Boulevard with protesting technicians.

—David Waelder

## THE EXPANDED FILM AND TELEVISION JOB CREATION ACT

Although California's incentive program has been credited with preserving as many as 51,000 well-paying jobs in the state and generating \$4.5 billion in economic activity, it falls well short of the need. Under its restrictive provisions, hundreds of film and television productions failed to qualify. Applicants for a California incentive had about the same chance of acceptance as a student applying to Harvard. Even producers wanting to shoot in California often felt compelled to take their projects to states with better incentives.

To address this need, Assembly Members Mike Gatto (D-Los Angeles) and Raul Bocanegra (D-Pacoima) have introduced The Expanded Film and Television Job Creation Act (AB 1839). Their bill, co-authored by fifty-nine additional Assembly Members and nine State Senators, opens eligibility to a wider range of productions. It lifts the budget cap, extends eligibility to include pilots, makes television shows eligible regardless of the medium of distribution, extends the program for five years and offers additional incentives to stimulate production in California.

Sponsor Mike Gatto says, "This effort is a rare example of government appropriately taking steps to stem the loss of jobs out of state."

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with its progress at  
**www.BackToCA.com**  
and at  
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# LOCAL 695 SALUTES THE 2013 CAS AWARDS NOMINEES

Local 695 honors the art of production sound through the success of all the Oscar, BAFTA and CAS award nominees.

The 50th Annual CAS Awards Final Five Nominees were announced on Jan. 14, 2014, and the awards ceremony was held February 22 at the Crystal Ballroom of the Millennium Biltmore Hotel, Los Angeles, California.

## MOTION PICTURES – LIVE ACTION



### **Captain Phillips**

**Nominees:** Chris Munro CAS, Michael Prestwood Smith, Chris Burdon, Mark Taylor, Al Clay, Howard London CAS, Glen Gathard  
**Production Sound Team:** Steve Finn, Jim McBride, Tim Fraser, Will Towers, **Pud Cusack, Richard Bullock, Joel Reidy**



### **Gravity**

**Nominees:** Chris Munro CAS, Skip Lievsay CAS, Niv Adiri, Christopher Benstead, Gareth Cousins, Chris Navarro CAS, Thomas J. O'Connell, Adam Mendez **Production Sound Team:** Steve Finn, Will Towers, Jim McBride



### **Inside Llewyn Davis**

**Nominees:** Peter F. Kurland CAS, Skip Lievsay CAS, Greg Orloff CAS, Bobby Johanson CAS, George A. Lara **Production Sound Team:** Randy Johnson, Timothia Sellers, Julian Townsend, Egor Panchenko



### **Iron Man 3**

**Nominees:** Jose Antonio Garcia, Michael Prestwood Smith, Michael Keller CAS, Joel Iwataki, Gregory Steele CAS, James Ashwill **Production Sound Team:** Jonathan Fuh, Jenny Elsinger, Peter Devlin CAS, Mike Schmidt, Kevin Summers, Carl Rudisill



### **Lone Survivor**

**Nominees:** David Brownlow, Andrew Koyama CAS, Beau Borders CAS, Satoshi Mark Noguchi, Gregory Steele CAS, Nerses Gezalyan **Production Sound Team:** Eduardo Santiago, Rob Hidalgo

## MOTION PICTURES – ANIMATED



### **The Croods**

**Nominees:** Tighe Sheldon, Randy Thom CAS, Gary A. Rizzo CAS, Dennis Sands CAS, Corey Tyler



### **Despicable Me 2**

**Nominees:** Charleen Richards, Tom Johnson, Gary A. Rizzo CAS, Chris Scarabosio, Alan Meyerson CAS, Tony Eckert



### **Frozen**

**Nominees:** Gabriel Guy, David E. Fluhr CAS, Casey Stone, Mary Jo Lang



### **Monsters University**

**Nominees:** Doc Kane, Michael Semanick CAS, Gary Summers, David Boucher, Corey Tyler



### **Walking With Dinosaurs**

**Nominees:** Chris Navarro CAS, Andrew Koyama CAS, Martyn Zub, Rupert Coulson, Sam Rogers

Names in bold are Local 695 members

## TELEVISION MOVIES AND MINI-SERIES



### **American Horror Story: Coven**

#### **"The Replacements"**

**Nominees:** Bruce Litecky CAS, Joe Earle CAS, Doug Andham CAS, James Levine, Judah Getz, Kyle Billingsley **Production Sound Team:** Steve Hursertel, **Betsy Lindell**, Eric Heigle, **Erik H. Magnus** CAS, Leonard Suwalski, Daniel Kuzila



### **Battlestar Galactica: Blood and Chrome**

**Nominees:** Rick Bal CAS, John W. Cook II CAS, Peter J. Nusbaum CAS **Production Sound Team:** Greg Hewett, Matthew Willoughby-Price



### **Behind the Candelabra**

**Nominees:** Dennis Towns, Larry Blake, Thomas Vicari, Scott Curtis **Production Sound Team:** Javier M. Hernandez, Gerard Vernice, Mark Agostino



### **Bonnie and Clyde: (Night Two) Part Two**

**Nominees:** Erik H. Magnus CAS, R. Russell Smith, Robert Edmondson CAS, **Shawn Murphy**, David Weisberg, Jeff Gross **Production Sound Team:** Matthew Armstrong, Daniel Kuzila, Carlos Wilkerson, Leonard Suwalski



### **Phil Spector**

**Nominees:** Gary Alper, Michael Barry CAS, Roy Waldspurger, Christopher Fogel CAS, Michael Miller CAS, Don White **Production Sound Team:** Tim Elder, Jason Stasium

## TELEVISION SERIES – ONE HOUR



### **Boardwalk Empire: "Erlkönig"**

**Nominees:** Franklin D. Stettner CAS, Tom Fleischman CAS, Mark DeSimone CAS, George A. Lara **Production Sound Team:** Sam Perry, Peter Fonda, Toussaint Kotright, Egor Panchenko, Larry Provost, Dale Whitman



### **Breaking Bad: "Felina"**

**Nominees:** Darryl L. Frank CAS, Jeffrey Perkins, Eric Justen, Eric Gotthelf, Stacey Michaels **Production Sound Team:** Bil Clement, Allen Crawford



### **Game of Thrones: "The Rains of Castamere"**

**Nominees:** Ronan Hill CAS, Richard Dyer, Onnalee Blank CAS, Mathew Waters CAS, Brett Voss **Production Sound Team:** Simon Kerr, James Atkinson, Daniel McCabe, Richard Dyer, Bradley Kendrick, Luke McGinley



### **Homeland: "Good Night"**

**Nominees:** Larry Long, Nello Torri CAS, Alan M. Decker CAS, Paul Drenning CAS, Shawn Kennelly **Production Sound Team:** Matt Fann, Jack Hill



### **The Walking Dead: "Home"**

**Nominees:** Michael P. Clark CAS, Daniel J. Hiland CAS, Gary D. Rogers CAS, Greg Crawford, Eric Gotthelf, Stacey Michaels **Production Sound Team:** **Robert Maxfield**, Jason Lewis

## SALUTES THE 2013 CAS AWARDS NOMINEES

### TELEVISION SERIES – HALF-HOUR



**Californication**  
“I’ll Lay My Monsters Down”  
**Nominees:** Daniel Church, Todd Grace CAS, Edward Charles Carr III CAS **Production Sound Team:** Abel Schiro, Lance Wandling, Mike Mesirov



**Modern Family**  
“Goodnight Gracie”  
**Nominees:** Stephen A. Tibbo CAS, Dean Okrand, Brian Harman CAS **Production Sound Team:** Srdjan “Serge” Popovic, Dan Lipe, Ken Strain



**Nurse Jackie**  
“Teachable Moments”  
**Nominees:** Jan McLaughlin CAS, Peter Waggoner **Production Sound Team:** Brendan O’Brien, Joe Savastano



**The Office**  
“Finale”  
**Nominees:** Benjamin A. Patrick CAS, John W. Cook II CAS, Robert Carr CAS **Production Sound Team:** Brian Wittle, Nicolas Carbone, Damon Harris



**Parks and Recreation**  
“Leslie and Ben”  
**Nominees:** Steven Michael Morantz CAS, John W. Cook II CAS, Kenneth Kobett CAS **Production Sound Team:** Adam Blanz, Mitch Cohn

### TELEVISION NON-FICTION, VARIETY, MUSIC SERIES OR SPECIALS



**2013 Rock and Roll Hall of Fame Induction Ceremony**  
**Nominees:** Michael Minkler CAS, Greg Townsend, Jay Vicari, John Harris



**Deadliest Catch**  
“The Final Battle”  
**Nominee:** Bob Bronow CAS



**History of the Eagles**  
“Part One”  
**Nominees:** Tom Fleischman CAS, Elliot Scheiner **Production Sound Team:** Alan Barker, Tyler Wood



**Killing Lincoln**  
**Nominees:** William Britt, Stanley Kastner **Production Sound Team:** Douglas E. Bischoff, David Strayer



**Mike Tyson: Undisputed Truth**  
**Nominees:** Mathew Price CAS, Michael Barry CAS

### BAFTA NOMINEES

**Gravity** won the the EE British Academy Film Award for “Best Sound” at the ceremony held Feb. 16, 2014, in London, England. The nominees below were announced on January 8.



**All Is Lost**  
**Nominees:** Micah Bloomberg, Gillian Arthur, Richard Hymns, Steve Boeddeker, Brandon Proctor



**Captain Phillips**  
**Nominees:** Chris Munro CAS, Oliver Tarney, Chris Burdon, Mark Taylor, Mike Prestwood Smith **Production Sound Team:** Steve Finn, Jim McBride, Tim Fraser, Will Towers, Pud Cusack, Richard Bullock, Joel Reidy



**Gravity**  
**Nominees:** Chris Munro CAS, Oliver Tarney, Glenn Freemantle, Skip Lievsay CAS, Christopher Benstead, Niv Adiri **Production Sound Team:** Steve Finn, Will Towers, Jim McBride



**Rush**  
**Nominees:** Danny Hambrook, Martin Steyer, Stefan Korte, Markus Stemler, Frank Kruse **Production Sound Team:** Adam Laschinger, Stefan Muller, Dickie Earl, Paul Paragon, Nick Gillet, Rashad Omar



**Inside Llewyn Davis**  
**Nominees:** Peter F. Kurland CAS, Skip Lievsay CAS, Greg Orloff CAS, Paul Urmson **Production Sound Team:** Randy Johnson, Timothia Sellers, Julian Townsend, Egor Panchenko

### OSCAR NOMINEES

The Oscar nominees for “Best Sound Mixing” were announced on Jan. 16, 2014. The 86th Academy Awards ceremony has been scheduled for March 2 at the Dolby Theater in Hollywood, Calif. ABC Television has renewed broadcast rights to the event that is also distributed to more than 225 countries and territories worldwide.



**Captain Phillips**  
**Nominees:** Chris Munro CAS, Chris Burdon, Mark Taylor, Mike Prestwood Smith **Production Sound Team:** Steve Finn, Jim McBride, Tim Fraser, Will Towers, Pud Cusack, Richard Bullock, Joel Reidy



**Gravity**  
**Nominees:** Chris Munro CAS, Skip Lievsay CAS, Niv Adiri, Christopher Benstead **Production Sound Team:** Steve Finn, Will Towers, Jim McBride



**The Hobbit: The Desolation of Smaug**  
**Nominees:** Tony Johnson, Christopher Boyes, Michael Hedges, Michael Semanick CAS **Production Sound Team:** Corrin Ellingford, Steven Harris, Joel Ancombe, Chris Hiles, Sam Spicer



**Inside Llewyn Davis**  
**Nominees:** Peter F. Kurland CAS, Skip Lievsay CAS, Greg Orloff CAS **Production Sound Team:** Randy Johnson, Timothia Sellers, Julian Townsend, Egor Panchenko



**Lone Survivor**  
**Nominees:** David Brownlow, Andrew Koyama CAS, Beau Borders CAS **Production Sound Team:** Rob Hidalgo, Edwardo Santiago

# Jim Webb: A Profile

by David Waelder

*“He was the most perfect Sound Mixer I ever worked with.”*

—Chris McLaughlin

*“I would say that Jim was the father of multi-track. I really would.”*

—Harrison “Duke” Marsh

*“He seemed to field a lot of curveballs very elegantly.”*

—Robert Schaper

*“He was a great educational source to learn from.”*

—James Eric

*“Jim Webb is a crusty old pirate of a man who has a heart bigger than words can describe.”*

—Mark Ulano, CAS



Jim Webb demonstrating the microphone collection. (Courtesy of Rob Janiger)

James E. Webb Jr. is justifiably renowned for his work developing multi-track recording on a series of films for Robert Altman. He captured the dialog from multiple cast members and interlocking story lines on such iconic films as *Nashville*, *Buffalo Bill and the Indians*, *3 Women*, and *A Wedding*. He pioneered the multi-track process.

The scenes were so complex, so intricate and so audacious that Altman himself parodied the style in *The Player*.

And yet, this was really just the beginning of Jim Webb’s career.

He studied film in college, first at Northwestern University in Evanston, Illinois, and later at USC in the Department of Cinema. In 1962, he was drafted into the Army and, after training in radio and as a radio teletype operator (RTTY), served in Germany at an Army Aviation Repair Company that occupied the old Luftwaffe hangars on the military side of Stuttgart’s main airport.

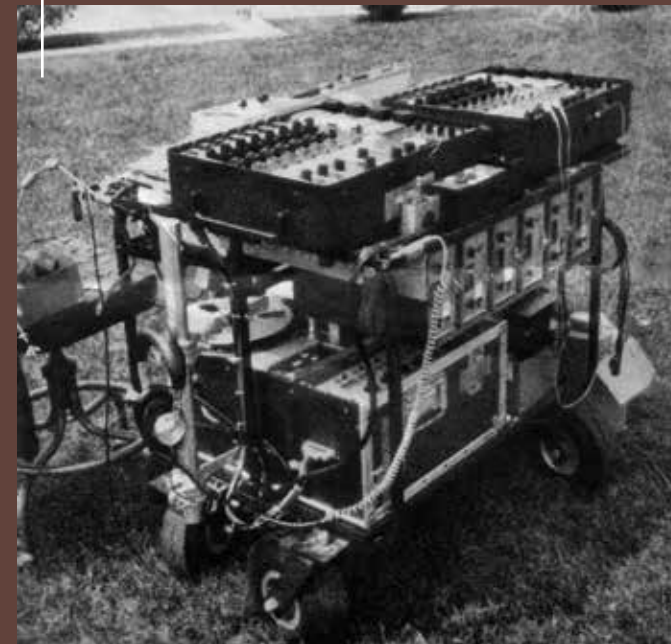
Discharged in 1964, he worked for about a year at USC and then took a job, first at KTLA and then at the CBS station KNXT. The stations had contracts with IATSE and he got his IA card at that time.

## ROCK & ROLL

Work in feature films was the goal but opportunities were scarce for recent film school graduates and new members of the union with limited contacts and seniority. Seeking to create their own work opportunities, he formed an independent production company with Pierre Adidge, a friend from Northwestern, and Bob Abel.

The newly formed production company did music specials for PBS and also documentary concert features. The Joe Cocker film, *Mad Dogs & Englishmen*, was the first feature, followed by *Soul to Soul* (as a consultant) and *Elvis on Tour*. These projects taxed his technical skills to keep everything in sync and sensibly organized. He was well aware that *Woodstock* required a full year of work to get

The first cart configured for multi-track work used two linked mixers (8-in, 4-out) to achieve eight discrete tracks. The Stevens one-inch recorder is on the lower shelf. This rig was used on *California Split*, *Nashville* and several other pictures. (Courtesy of Jim Webb)



The second iteration of the multi-track system added the refinement of a single mixing console, greatly simplifying monitor routing. Primary recording is still to a multi-track Stevens recorder; the Nagra is a backup. This system was used on *3 Women* and *A Wedding*. (Courtesy of Jim Webb)

everything synced and worked strenuously to avoid a calamity of that sort. He insisted on shooting regular slates and on assigning one track on the eight-track recorder to a sync pulse. His commitment to good protocol was not always adhered to but his efforts were at least partially successful and the films were all released in a timely manner.

## ROBERT ALTMAN AND MULTI-TRACK

His Army training and experience with radio mikes and multi-track music recording on concert films gave him a good foundation in skills needed to implement a production style that Robert Altman was developing. Traditionally, films had treated their subject matter as if they were stage plays seen with a camera. Close-ups and tracking shots provide changing perspective but the action unfolded as a linear narrative. Altman saw the world as a messy place where events didn’t always proceed in an orderly way. Sometimes everyone would speak at once. Sometimes, with multiple participants, it wouldn’t be clear who was driving the action until the event was over. He wanted to bring some of that messy uncertainty to his film projects.

Altman used a loose and improvisational style in films like *MASH* but encountered difficulties with sound for *McCabe & Mrs. Miller*. Without precise cues to know when each character might speak, it was difficult for the Sound Mixer to deliver a suitable track, especially when action was staged in authentic locations with hard floors and other acoustically difficult features. Having multiple microphones, and assigning the outputs to isolated tracks, was the obvious solution. Altman brought in Jack Cashin to design a system of multi-track recording that might be used on location. Most of the equipment then available was designed for use in a studio and it required some ingenuity to adapt it for location use. But assembling the hardware is only part of the equation; someone

must operate it effectively and this presented challenges to the Production Mixer.

The system Cashin developed used a Stevens one-inch, eight-track recorder. With one track assigned to a sync signal, seven tracks were available for discrete audio. No multi-track mixing panels that could work off DC were available at that time so 2 eight-input, four-output consoles were linked to supply the needed signal feed. The whole business ran off a 12-volt motorcycle battery with a converter circuit to provide the higher voltage needed by the recorder.

Paul Lohmann, Altman’s Director of Photography, recommended Jim Webb for the multi-track skills he had demonstrated on the concert films. And that was the beginning of collaboration among Robert Altman, Jack Cashin and Jim Webb on a series of films.

## Jim Webb:

They had everything together but they didn’t have any idea about how to use it. And I said, “Well, the only thing that makes any sense is to put radio mikes on everybody.” You can’t have open mikes because if you add those back in the pre-dub, the background is going to be astronomical—you won’t be able to tell anything. You have to do a lot of close mic’ing to make this work. So my contribution was radio mikes.

The first picture made with this multi-track technique was *California Split*. It was a fortuitous choice because it made good use of improvisational technique but was less ambitious in that application than subsequent projects. It provided an opportunity to shake out the system.

By the time we got to *Nashville*, we pulled out all the stops and went blasting our way through it. We shot that film in eight weeks at a dead run.



The newsroom set from Warner Bros.' *All the President's Men*. The low camera angles favored by Gordon Willis and the overhead fluorescent lights made it a difficult show to boom.

Putting radio mikes on each performer and assigning them to discrete tracks was an obvious approach but there were also limitations. Post work required an additional two weeks to deal with all the different tracks. There was also an inherent lack of audio perspective. Jim Webb explains it best himself:

There's no perspective. We ran into that immediately on *Nashville*. There's this scene that opens the movie which is where they're all in a recording studio and I went about putting radios on everybody, even the ones behind the recording glass. And I went over to Altman and I said, "Are you sure we're doing this right? We're throwing perspective just completely out the window." And he said, "Yes, yes, of course we are." I went back to putting radios on. About twenty minutes later, he comes over and says, "Are we doing this right?"

A little late to change the action now. And it worked out. I would have people come up to me and say, "That was the most realistic sound I've ever heard." Well, there was nothing real about it. You're not hearing people shooting through a double-plate glass and hearing all the conversation inside there, as well as what's going on outside.

But it was primarily designed for overlapping dialog and improv and things of that nature where you never knew what anybody was going to say.

And you can't possibly listen to it all because it's just a Tower of Babel. So once I previewed all the radios and made sure they were working, you were just watching the meters.

Capturing the dialog with individual radio microphones was a complex undertaking that required all of Jim Webb's skill but it accomplished what Robert Altman needed to fulfill his vision for the film. According to the Supervising Sound Editor, only two lines weren't recorded in the original production track.

One was a failed radio on Henry Gibson and the other one was an added line of Allen Garfield's back as he was walking away from us. That was it; the rest was all stuff that we did.

## THE ULTRASTEREO MIXER

Very little was available in the way of a portable mixing panel at the time Jim Webb was working the multi-track pictures with Robert Altman. The specialty mixing panels that Jack Cashin adapted for those pictures had liabilities that make them cumbersome for use on most pictures. He and Jack Cashin set to work to address this need with a capable mixer.



Ultrastereo mixer developed by Jim Webb and Jack Cashin

In the late to mid-fifties, [Perfectone] had a little three-pot black mixer that was very popular in the studios; it was a little rotary pot thing and everybody used it. And it was around a lot. And then they updated their little portable mixer with a straight line. And they had six in and one out—it was still a mono mixer. And I liked the straight-line faders because you could handle them a lot easier than trying to wrangle three rotary, four, five rotary pots. So I said to Jack [Cashin], "Can we modify this and make it two track?" And we looked it over and said, no, it's

going to be simpler to make our own version of this. And he designed it and I built it. I built a dozen of them, maybe 12 to 14 of them. Sold them all.

## ALL THE PRESIDENT'S MEN AND A RETURN TO BOOMING

Right after *Nashville*, Jim Webb was hired to do *All the President's Men*, largely because his multi-track skills were applicable to situations where actors might have to interact with video monitors playing in the newsroom. He was also particularly skilled at recording telephone conversations and there were many of those in the script. Although he had his own working prop phones, the Special Effects Department supplied the multi-line key phones used in *All the President's Men*. Webb provided a phone tap to record the phone-line conversations on a separate track from the on-camera dialog. He would supply an audio feed to actors brought in just for their off-screen dialog. Because everyone heard everyone else, either through the phones or via a specially provided feed from the mixing panel, overlaps were possible and could be recorded naturally. It was expensive because of the need to bring in actors who didn't appear on screen but freedom from the pace-killing process of having lines read by a script supervisor allowed the filming to fly and yielded more natural performances.

When we rehearsed it, it went like lightening. And when we got through, Bob [Redford] said, Holy cow! ... He was shocked at how fast it went and that's how we did the scene.

It's not often that the Mixer gets a chance to dabble in how the scene plays.

*All the President's Men* was more tightly scripted and allowed a more normal recording technique than the Altman pictures. It came at a good time:

I remember going into an interview one time and I said, "I've done this Altman this and that." And the guy looks at me and says, "OK. What else have you done besides that?" And I didn't have anything so I was thinking to myself, it's better to work around; it's better to do different formats and utilize them when you need them.

Chris McLaughlin was his Boom Operator on the film but the newsroom scenes presented particular challenges. The Washington Post set was gigantic, consuming two linked stages, and lit naturalistically from overhead fluorescent lights. Fortunately, due to the heat they generated, the ballasts for all those lights were mounted in a shed outside the stage so there wasn't a serious problem with hum. Director of Photography Gordon Willis favored up-angle shots that showed all the lights in the ceiling. When Jim Webb asked if it would be OK to boom, Willis held out his hand, casting multiple soft shadows and said, "I don't care what you do as long as you don't make any shadows on my set." "That was the end of that conversation," says Webb. Chris did manage to boom the picture using primarily a Sennheiser MKH 815 from below, flitting in and out of the performer's legs.

According to Chris McLaughlin, Webb entrusted the microphone selection to his Boom Operators. But the big Sennheiser was clearly a favorite. He describes using one on *The Long Riders*. The Keach brothers were fitted with wireless mikes when Jim Webb learned that they intended to ride into the Chattahoochee River at the conclusion of the dialog. Concerned about immersing the radio packs in the river, Webb resolved to boom the scene. Chris McLaughlin thought that he could capture the dialog with a Sennheiser 815 off a 10-foot ladder. He turned the mike back for maximum rejection of the sound of the river and they accomplished the shot. At the end, the Keach brothers did ride into the river and Webb didn't lose any mikes. "So I have a lot of respect for the 815," he said, "it got me through a lot of tough places."

It's key to an understanding of technique that there was no agenda, no rules about how each scene needed to be recorded. Jim Webb approached each project with an eye to achieving the Director's vision and capturing the elements needed for the picture as a whole.

Duke Marsh says: "I think with Jim it was, if I'm [Post] mixing this thing, or I'm going to do the Post work on it, what do I want to hear?"

And Jim himself says, "You just gotta do what you gotta do, you know. And I never worried, pretty much at all, about what people thought about what I was doing. If I saw a way to do it and it felt right, that's what I was going to do."

Each project presented its own set of challenges to test his skills and preparation. *Noises Off* presented a particularly complex situation. Originally a stage play, it concerns an acting company rehearsing and presenting a play on an elaborate set. Come opening night, everything goes awry, cues are missed, props misplaced, and the comic errors pile one atop the other. The two-story set mirrored the set that would be on stage. To accommodate the perspective of the Stage Manager, a key character, the entire set was built ten feet above the sound studio floor, complicating any work from the stage. Peter Bogdanovich, the Director, intended to shoot the entire film using a Louma crane that had the ability to swoop in on individual performers, further complicating efforts to capture the audio with a boom microphone. Moreover, the script took the actors up and down stairs and through doors at a frenetic pace.

The actors hoped to avoid using radio mikes, in part because there was often little costume to conceal them. But they needn't have worried as the pace and frequent costume changes made that an inconvenient choice.

The original plan was to distribute plant microphones throughout the set and go from mike to mike as the action required. After a rehearsal, Webb said, "Guys, I don't know."

McLaughlin thought he could capture the dialog using Fisher booms and had a plan for how to accomplish it. They would use two of the big Fisher booms and, to get them high enough to work the elevated set, they would replace the regular bases with purpose-built scaffolds and mount the booms to the top rails of the scaffolding. Wheels fitted to the scaffolding allowed moving the booms into position as needed.

Jim Webb was open to the idea and brought in Fisher booms with 29-foot arms fitted with Neumann KMH 82i microphones. Randy Johnson joined Chris to operate the second Fisher and Duke Marsh was brought in to work from the greenbeds with a fishpole to catch anything that fell between them. After hearing a rehearsal, Jim Webb said, “This is the way to go. Pull those plants.” They did use a few of the plants to pick up dialog occurring well upstage, under the set overhangs where the booms couldn’t penetrate, but using the big Fisher booms simplified the plan considerably. The plan still demanded considerable mixing skill to blend the two main booms, the fishpole operated by Duke and the occasional plant mike, but there was logic to the operation and the team successfully recorded all the dialog.

Other films presented challenges of their own. The Bette Midler films, *The Rose* and *For the Boys*, each presented playback challenges because of the large audiences or the complex shots envisioned by Mark Rydell, the Director. Webb worked with Re-recording Mixer Robert Schaper on *For the Boys* to build modern elements into period microphones so they might accomplish live-records at the highest quality levels. Robert Schaper recalls:

We ended up stealing vocals off of those mikes in the playback situations. One of Bette’s songs to her husband, when she is reunited with her husband, had a very silky, lovely, studio playback [of] “I’m Going to Love You Come Rain or Come Shine.” And she had a very silky rendition of that. [But] it didn’t match her acting performance at all because she was crying, overwhelmed with seeing her husband that she hadn’t

seen in months and she was very worried about it and everything else. And we had planted ... a Shure 55 with a rebuilt Shure capsule in it. Even with playback coming at her, the isolation was good enough on her actual live vocal—and she always actually sings all of her lip syncs. And she performed the heck out of the song ... I ended up compiling all of that and using her live vocal—rather than the pre-record ... from the plant that we had out there ... and it turned out to be a really great acting performance.

## CREW RELATIONS

*“He left a lot of it to the boom man. He walked on and said the boom man was the money-man, the boom man, he believed, controlled the set.”*  
—Duke Marsh

*“He put great trust and faith in his Boom Operator. It was a collaborative effort.”*

—Chris McLaughlin

Over the course of a career, every Sound Mixer works with many Boom Operators, Utility Technicians, and Playback Operators. All who worked with Jim Webb praise his skills, his concentration, his commitment both to the project and his crew. A few brief stories from Duke Marsh illustrate:

[From *Beaches*] I would go and grab the snakes at wrap and he comes up behind me with gloves on and he said,

“No, I do that.” “But I’m the cable guy; that’s a cable.” And, instantly we were buddies. And he’d go, “But, Duke, you gotta understand, those snakes are for me so I can work off the truck.” And in my whole career with him, in the rain, in the mud, in the snow, he’d always come off that truck. And there were days when I would say, “But you’re the Mixer.” “Well, you got other stuff to do. Go do that, come back, give me a hand.” That was Jim. He would always back his crew.

And then, in 2001 when he was receiving the CAS Lifetime Achievement Award:

I get a phone call and Jim says, “I want you to come. You’ll be at my table.” Well, he invited Doug Vaughn and Chris McLaughlin. [He delivered a speech accepting the award] then he says, “Those three guys at that table are responsible for a lot of this in my career. If it wasn’t for the boom man, putting that mike in the right spot, I wouldn’t be here.” And he had us stand up and we got an ovation. And I’m thinking, how many mixers pay attention to the guy that’s out front?

## AWARDS AND ACHIEVEMENTS

In addition to the CAS Award, Jim Webb won the Academy Award for *All the President’s Men* in 1977 and the BAFTA Award

Jim Webb’s extensive collection of microphones used in motion pictures

for *Nashville* in 1976. He received one other Oscar nomination and three additional BAFTA nominations.

*Nashville* and *All the President’s Men* are each featured in both the Criterion Collection and the Smithsonian List. While Robert Altman and Alan Pakula, respectively, are recognized for their vision, Jim Webb shares in the accomplishment through his skill and inventiveness in facilitating that vision.

It’s also instructive to note the Producers and Directors he’s worked with multiple times. The list of three or more film collaborators includes Robert Altman, Francis Ford Coppola, Garry Marshall, Walter Hill, Bette Midler, and Paul Mazursky. Mark Rydell is one of several directors who employed him twice.

For each of these directors, Jim Webb contributed a sense of the role of sound as part of the whole and adjusted his technique to meet the needs of each particular project and the vision of that particular filmmaker. In talking with him, it is apparent that he has taken great pleasure in the process.

Jim Webb: “Good production sound has production value! Don’t give up. Be consistent and do the best you can.”

### Interview Contributors

These colleagues of Jim Webb assisted in the preparation of this profile by making themselves available for interviews:

Crew Chamberlain was Webb’s Boom Operator on several films including *The Milagro Beanfield War*, *Legal Eagles*, and *Down and Out in Beverly Hills*.

James Eric knew Jim Webb from his days working the microphone bench at Location Sound. Later, he served as Utility Sound on *Out to Sea*.

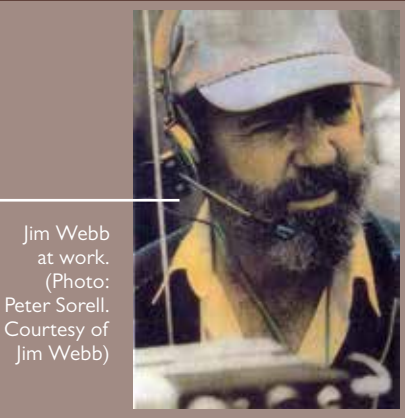
Robert Janiger is a Sound Mixer and friend who collaborated on further development of the Ultrastereo mixer.

Harrison “Duke” Marsh worked with Jim Webb on seventeen films including *Pretty Woman*, *For the Boys* and *Noises Off*. He worked variously as Playback Operator, Utility Sound and Boom Operator.

Chris McLaughlin boomed twenty-one films for Jim Webb starting with *California Split* and continuing through *Noises Off*. Among others, he did *Nashville*, *3 Women*, *The Rose*, *The Long Riders*, and *Hammett*.

Robert Schaper was Supervising Music Engineer on *For the Boys*.

Mark Ulano is an award-winning Sound Mixer who considers Jim Webb a mentor.



In *California Split*, it started there and at the end of the scene there was going to be—and I found out this about two minutes before we were going to shoot it—there was a piano with tacked hammers in the bar and there was a lady that would play the piano and sing. Elliott Gould was going to be sitting there and they were going to talk a bit while she was playing the piano—and eventually they were going to sing “Bye Bye Blackbird.”

And I said, oh my God, it would be nice to know about this a little bit earlier. So I

## Mic’ing the Instruments

*In the course of interviewing for this profile, Jim Webb shared many great stories that didn’t fit neatly into the narrative. This is one of the stories rescued from the trim bin.*

ran back and the only things I had around in those days were the old ECM-50s which were some of the first electrets from Sony. And I had a bunch of those. So I ran over to the piano, raised the lid and put one taped to the cross bar pointed down and the other one pointed up to the top end. I connected cables from the mixing panel, closed the lid, put a radio on each performer, ran back, turned the equalization all the way up—all I had—and prayed. So I laid down four tracks and it worked pretty well. In fact, they couldn’t duplicate it.

The scene didn’t really make the film but the song is in there, at the end, over the credits.

Anyway, they discovered that I could do that. So, in the smaller scenes in *Nashville*, where there were just the two gals singing in a place and the piano and whatever, I would do that mike, if it was an old upright, I would stick a couple of mikes in there ...

and as long as I hadn’t filled up the eight tracks, I could do that.

Well, they decided that I had so much dialog going on that I couldn’t cover all the music too; I just didn’t have enough tracks. So, they hired a guy named Johnny Rosen to come in and they had a sixteen-track truck and they hired him to do the Opryland stuff and all that. And their mixer, I think his name was Gene Eichelberger, was shadowing me just to see what I was doing. And he saw me doing this lavalier routine and I’m thinking to myself, I can’t tell anybody in Nashville that I’m using lavaliers to mike instruments because they’re going to laugh me out of town. Next thing I know when I get to Opryland, Eichelberger is over borrowing every ECM-50 I’ve got and he’s taping them to fiddles and everything in the orchestra he can find. So, I thought, well, OK, that’s how we’re going to do this. And that’s how it all kinda went down.



# My Wild Ride

by Coleman Metts, CAS

Things got hairy sometimes

All images courtesy of Coleman Metts

Filming off Venice Beach



My friend and colleague, Scott Harbor, who was having a scheduling conflict, referred me to the movie *Ride*. He thought, “Coleman surfs and stand-up paddleboards, so he’ll be great for it.” When the Producers initially contacted me, they said, “We are keeping it simple, but we want the actors, Helen Hunt and Luke Wilson, to talk to each other as they’re going out through the waves and catching the waves.” Well, I thought, perhaps the new wireless microphone transmitters from Lectrosonics might work. I told them it would be an experiment, but I felt pretty good about being able to pull it off.

My initial plan was to cut holes in the wet suits and have the microphones exposed but removed with computers in Post. The Producers responded they could not afford to do that for every shot. After considering a range of alternative options, we eventually agreed to cut small holes in the wet suits and attach the microphones behind each hole with tape. We then began an exhaustive process of trial and error in an attempt to mount the microphones. We could not find any tape that would effectively work in saltwater! Eventually, we settled on using Velcro to mount the microphones. However, it was not long before we learned that the Lectrosonics waterproof transmitters are not saltwater proof!

Lectrosonics was very cooperative about minimizing the L&D expenses, but the wireless transmitter failures forced my crew to



Working in the surf, Johnny Evans booming

capture all the sound sequences, both on the ocean and in the surf zone, with an old-fashioned overhead boom microphone. On the water, I used a Sennheiser 60. We got basically traditional coverage, so we were very lucky in that respect, and the microphone worked perfectly. I used the Lectrosonics plug-on transmitters to get the sound from the boom microphone back to me. My recorder for the movie was the Zaxcom Fusion. Working in this environment is incredibly hard on every piece of equipment. I am still finding sand in various places among my sound gear, months later.

We did not make any technological leaps on this movie; it was just persistence, and positive attitude, that solved our problems.

The initial schedule showed us on and off the water a lot, so I had a small ENG-type package built for the ocean, and my main rig I left built for filming on the land. Even at sea, I managed to send an IFB feed to video village and, particularly to Helen Hunt, who was directing as well as acting. I also supplied signal to the Script Supervisor and the Video Playback Operator, fellow 695 member Anthony Desanto.



Booming from a paddleboard. (Photo: Coleman Metts)

We did not have a lot of prep for this project, so we had to improvise and figure it out as we went along. A nice benefit of the show was that I was able to bike to work every day for three weeks. Also, I got to wear my sandals at work every day for about a month.

So began my two weeks out on the water. I was placed in everything from zodiac-type boats to the back of wave runners. I eventually spent much of my time on a large stand-up paddleboard as no motorized craft were allowed in the designated surf zone which, in the Marina Del Rey/Venice area, extends from the beach out three hundred yards.

My Boom Operators, Johnny Evans and Jim Castro, also operated from large stand-up paddleboards for significant portions of their time on location. When not on a stand-up paddleboard, the Boom Operators were standing directly in the surf zone. Doing so, however, required the use of Watermen/Stuntmen who would position themselves directly behind my crew and grip them tightly to prevent them from being knocked over by the oncoming waves. My Utility, Ace Williams, did a phenomenal job in these trying condi-



Luke Wilson and Coleman Metts

tions. Oftentimes, I was texting Ace what resources I needed sent out on the next supply boat.

It was not long before I realized that working on the water is very different from playing on the water. Being out on various watercraft all day was pretty fatiguing. Communication was limited. In the beginning, we also had a failure in the transfer process when the facility transferred all the tracks for dailies. That added some stress at the start of the show. Eventually, we got it all sorted out—just about the time when we moved off the ocean and started filming on dry land.

What did I learn from this project? Well, I guess I learned that when they say it’s going to be simple, it’s not. And I learned that you need more than one plan to deal with any eventuality plus enough resources for almost any scenario.

The process of filming on the beach, on the water and on multiple locations throughout Venice made *Ride* the hardest show I’ve done by far. But the amazing people I worked with made it a memorable and positive experience. The Director of Photography and his crew, the Key Grip and his team and our Stunt Coordinator and the Waterman were outstanding. They solved amazingly hard challenges every day. They all displayed the best positive attitude and everything seemed easy for them. After eighteen years in the business, I’ve learned not to take these things for granted. *Ride* restored my enthusiasm for making movies; it was a bright spot in my career.

# P-Cap, MoCap, and All That Jazz Part 1

by Jim Tanenbaum, CAS

Capturing a scene for *Avatar* on the surface of the moon Pandora  
[Playa Vista Studios, Playa Vista, California]  
(Photo: 'AVATAR' ©2009 Twentieth Century Fox. All rights reserved)



As sound people, we live in (according to the old Chinese curse) interesting times. Our technology is advancing at an exponential rate ... with a very large exponent. The analog Nagra ¼-inch reel-to-reel tape recorder was used on almost all of the world's movies for more than thirty years. Then DAT (Digital Audio Tape) cassette recorders (though more than one brand) held sway for another ten. Hard-drive recorders (I beta-tested a Deva I) led the race for five years, then DVD optical-disc recorders (albeit still with an internal HDD) for only three. Sony's magnetic mini-disk unit never made significant inroads in production recording. Now we're using flash-memory cards, and I'm surprised they've held on for more than a year, but the original choice of CF cards seems to be giving way to SD ones (except for Zaxcom). Next year?

But it is not only the technology that is changing—so is the product. Made-for-Internet drama or documentary shows aren't that much different from their predecessors, but reality shows certainly are a new breed: dozens of radio-mic'd people running around, in and out of multiple cameras' view, and in and out of multiple Production Mixers' receiver range. Fortunately, we have Zaxcom transmitters with onboard recorders. Still, things aren't that different.

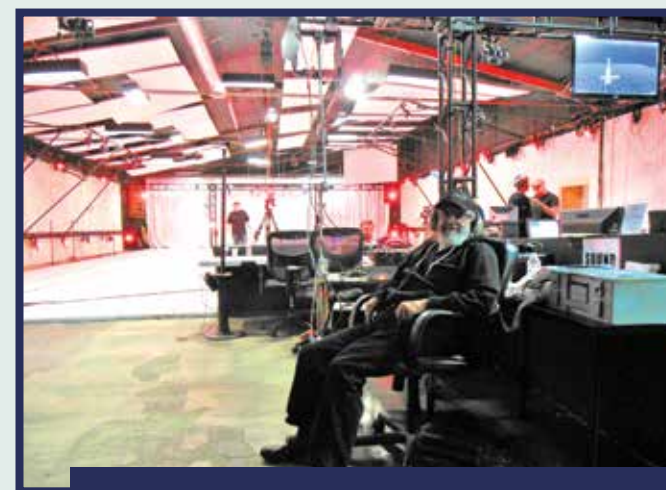
But "capture" shoots are. Almost entirely different from anything that has gone before. And capture for Computer-Generated Image (CGI) characters (sometimes called "virtual characters") is different than capture for live-action shoots. Also, Motion Capture (MoCap) is different from Motion Control (MoCon), though these two techniques are sometimes used together, along with Motion Tracking (MoTrac). And then there is Performance-Capture (P-Cap). They will be described in this order: CGI MoCap, P-Cap, live-action MoCap, MoCon, and MoTrac. Following that, working conditions and esthetics for all types will be discussed.

So now, for those of you who have yet to work on a capture job, here is a primer (pronounced "prim-er"; not "pry-mer"). The rest will be on-the-job training.

## CGI MoCap

For starters, the capture stage is called a "volume"—because it is—a three-dimensional volume where the position and movement of the actors (often called "performers") and their props are tracked and recorded as so many bits. Many, many bits—often terabytes of bits. You can expect to record many gigabytes of audio per day.

The stage containing the volume has an array of video cameras, often a hundred or more, lining the walls and ceiling, every one interconnected with a massive computer. Each camera has a light source next to, or surrounding, its lens, which special reflective markers on the actors will reflect back to that particular camera only. This is known as a "passive" system, because the markers do not emit any light of their own. The camera lights may be regular incandescents or LEDs, with white, red, or infrared output. More about that later.



A small (but quiet) volume with red LED capture-camera lights. (Note that the cameras are mounted on thin, fairly delicate struts, also note one of the reference video cameras on tripod in BG)  
[Just Cause Studios in Marina Del Rey, California]

If the cameras aren't uniformly spaced, the calibration procedure will compensate.  
(Photos by Jim Tanenbaum)



Capture cameras mounted on more rigid columns, but still subject to displacement if hit.  
[Formerly Giant Studios, now Digital Domain's Playa Vista, California, stages]

The cameras are mounted either directly on the walls and ceiling, or on a latticework of metal columns and trusses. WARNING: It is vitally important not to touch these cameras or their supporting structure. If you do, you must immediately notify the capture techs so that they can check to see if the volume needs to be recalibrated.

The actors/performers wear black stretch leotards studded with reflective dots. The material is retro-reflective, which means it reflects almost all the light back in the direction it came from, in most cases utilizing tiny glass spheres. Scotchlite™ is a typical example, used on license plates, street pavement stripes, and clothing. For use with the capture suits, the reflective material is in the form of pea-sized spheres, mounted on short stalks to increase their visibility from a wider angle. The other end of the stalk terminates in a small disc of Velcro™ hooks, so it can be attached anywhere on the capture suit's fabric.



As an aid in editing, the capture suit usually has a label indicating the character's name. Hands and/or feet may be color-coded to distinguish left from right.



The horse doesn't need a capture suit, just the reflective markers (Note the actor standing in a "T-pose," to be discussed later). (Photo: 'AVATAR' ©2009 Twentieth Century Fox. All rights reserved)

The markers in the image above are glowing because a flash was used when the picture was taken. The camera was very far away, and the stage lighting completely washed out the light from the strobe on the people and objects, but the markers reflected most of the flash back to the camera lens.

If MoCap is to be used on the actors' faces, smaller, BB-sized reflective spheres are glued directly to the skin, sometimes in the hundreds. When too many have fallen off, work stops until they can be replaced, a process that takes some time because they must be precisely positioned.

Props and certain parts of any sets or set dressing (particularly those that move, like doors), also get reflective markers. Unlike "real" movies, props and set dressing do not have to look like their CGI counterparts, only have certain dimensions matching. They are often thrown together from apple boxes, grip stands, and "found" objects, and may be noisy.

Here is a description of the mechanics of MoCap.

The floor of the volume is marked off in a grid pattern, with each cell about five feet square. This array serves two purposes: 1, it allows the "virtual world" in the computer to be precisely aligned with the real world; and 2, it allows for the accurate positioning of actors, props, sets, and floor contour modules.



\$6.5 million custom race car. (Note stacks of floor contour modules in background). (Photo: Jim Tanenbaum)

The capture process is not like conventional imaging—there are no camera angles or frame sizes. The position and motion of every "marked" element is simultaneously recorded in three-dimensional space. Once the Director is satisfied with the actors' performances in a scene, the capturing of the scene is finished. Later on, the Director can render the scene from any, and as many, POVs and "focal lengths" as he or she wishes.

But for this to be possible, every actor must be visible to (most of) the capture cameras at all times. This means that there must not be any large opaque surfaces or objects to block the cameras' view. If there need to be physical items in the volume for the actors to interact with, they must be "transparent." But glass or plastic sheets can't be used, because refraction will distort the positions of markers behind them as seen by the cameras. Instead, surfaces are usually made out of wire mesh or screening, e.g., a house will have thin metal tubing outlining the doors and windows (to properly position the actors), with wire mesh walls (so the actors don't accidentally walk through them). In the virtual world, seen from a POV at some distance from the house, the walls will be solid and opaque, but as the POV is moved closer, at some point it will pass through the "wall" and now everything in the room is visible. Tree trunks can be cylinders of chicken-wire fencing, with strands of hanging moss simulated by dangling strings.

Props need only to be the same size and overall shape, and weight, to keep the actions of the actors handling them correct. They will have a number of reflected markers distributed over their surface. Live animals, if not the actual living version, are made as life-size dolls with articulated limbs and appropriate markers, and puppeted by human operators. This gives the actor something "living" to interact with.

Since the motions and positions are captured in three dimensions, if the ground or floor in the virtual world is not flat and/or level like the volume's stage floor, the bottom of the volume must be contoured to match it. This is done by positioning platform modules on the grid squares to adjust the surface accordingly. (More about this later.)



Floor contour module (Note large flat-panel monitor with real-time-rendered CGI scene). (Photo: 'AVATAR' ©2009 Twentieth Century Fox. All rights reserved)

The gnomon has three arms at right angles to each other, tipped with reflective markers to allow the MoCap system to create its CGI doppelganger in the virtual world. To align the real table with its "twin" in the virtual world, the gnomon is placed at one of the real table's corners, and then the table is moved in the volume until the virtual gnomon is exactly positioned on the corresponding corner of the CGI table. This is usually the simplest method. Another possibility is to go into the virtual world and mouse-drag the CGI table until it lines up with the virtual gnomon. The entire virtual world could also be dragged to position the table, but this might throw other objects out of alignment. Global position shifts like that are limited to adjusting the virtual ground with the volume floor after the contour modules are in place.

It is necessary to precisely align the real world of the capture volume with the CGI virtual world in the computer; otherwise, parts of the CGI character's bodies may become imbedded in "solid" surfaces. The first step in this process involves a "gnomon" (pointer) that exists in both the real and virtual worlds.



Real-world alignment gnomon and "transparent" table with wire-mesh surfaces. (Photo: 'AVATAR' ©2009 Twentieth Century Fox. All rights reserved)



Multiple hard-wired HD reference cameras (although these have DV cassettes as well). (Photo: 'AVATAR' ©2009 Twentieth Century Fox. All rights reserved)

Multiple conventional HD video cameras are used in the volume for "reference." These cameras cover the scene in wide shots and close-ups on each character. This allows the Director to judge an actor's performance before the data is rendered into the animated character. A secondary function is to sort out body parts when the MoCap system gets confused and an arm sprouts out of a CGI character's head. Looking at the reference shot, the Editor can figure out to whom it belongs, and mouse-drag it back into its proper place. In most stages, the cameras are hard-wired into the system so they have house-sync TC and do not normally require TC slating. They may use DV cassettes and/or send the video directly into the system.

Until a few years ago, it was not possible to see the CGI characters in real time, but now Autodesk Motion Builder™ software allows real-time rendering, albeit in limited resolution. Warning: The flat-panel monitors on the stage have cooling fans that may need to be muffled or baffled. Video projectors' fans are even louder.

Lighting in the volume is very uniform, soft and non-source, to ensure that the reference cameras always have a well-illuminated image. In addition, having no point-source lights ensures that there will be few, if any, specular (spot-like) reflections that might confuse the MoCap system's cameras.



Soft lighting minimizes boom shadows, but they don't matter anyway (Note hard-wired reference cameras in background) [Digital Domain's Playa Vista, California, stages]. (Photo: Jim Tanenbaum)

To capture motion effectively, the system must measure the marker positions at least twice as fast as the temporal resolution required. For 24-frame applications, this means a minimum 48 Hz rate. Currently, much higher rates are used, 120 Hz to 240 Hz. If "motion blur" is desired, it can be created in Post.

P-Cap

Motion Capture was developed first, and initially captured only

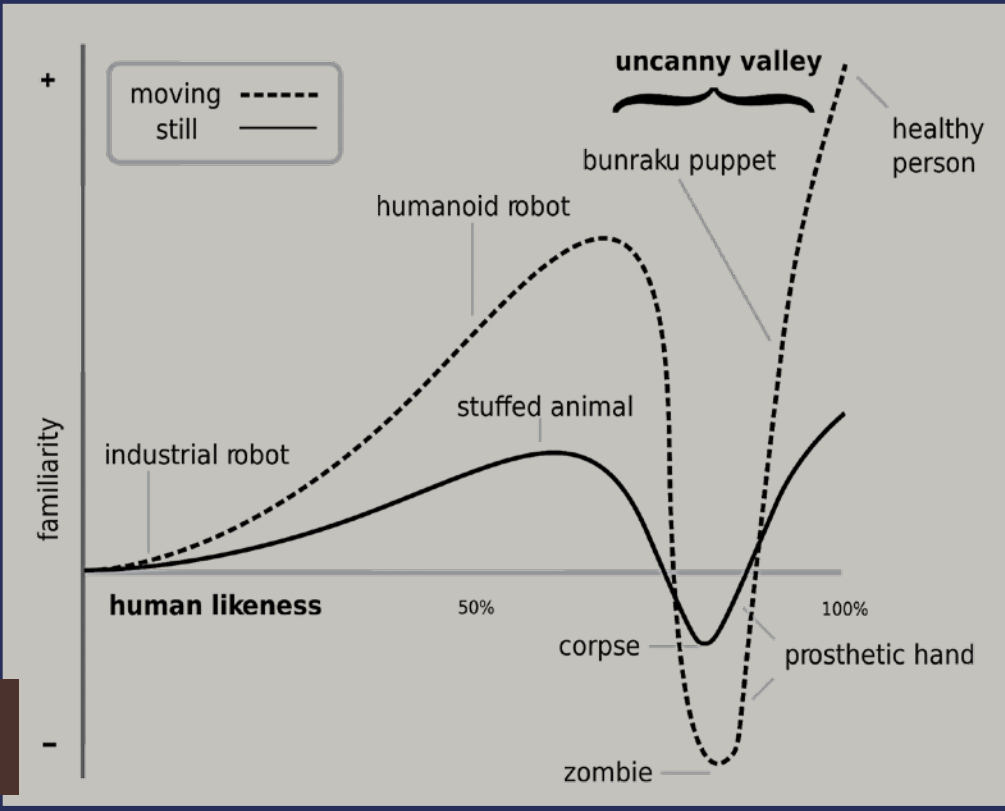
the gross motions of the actor's body. The facial features were animated later, by human operators who used mouse clicks and drags. Then, smaller, BB-sized reflective balls were glued to the faces, in an attempt to capture some of the expressions there. Unfortunately, this process couldn't capture the movement of the eyes, or the tongue, or any skin wrinkles that formed. And since the "life" of a character is in the face, these early CGI creations failed the "Uncanny Valley" test.

It turns out that human beings evolved a built-in warning system to detect people that weren't quite "right." Back in the "cave people" days, subtle clues in a person's appearance or actions were an indication of a disease or mental impairment that could be dangerous to your continued good health or even your very existence.

A graph of the "realism" of a character versus its acceptability starts at the lower left with obvious cartoon figures and slowly rises as the point moves to the right with increasing realism. But before the character's image reaches a peak at the right edge, where photographic images of actual human beings fall, it turns sharply downward into the valley, and only climbs out as the character becomes "photo-realistic." Even an image of a real human corpse (possible disease transmission) is in the valley, as would be that of a super-realistic zombie.

When you watch a Mickey Mouse cartoon, you know the character isn't "real," so its completely "inhuman" appearance is not a problem. Likewise, when you watch a live-action movie, the characters are real, so again there are no warning bells going off in your brain.

Current computer-animated cartoons like *Despicable Me* or *Mars Needs Moms* don't have a problem because their "human" char-



acters are so obviously caricatures. The trouble began when CGI characters developed to the point of being "almost" human, and started the descent into the uncanny valley. The 2001 video-game-based movie *Final Fantasy: The Spirits Within* was the first attempt at a "photo-realistic" CGI feature movie using MoCap. Although an amazing piece of work for its time, it didn't succeed visually or at the box office. But it didn't quite fall over the precipice into the uncanny valley, either. The characters' faces all had that "stretchy rubber" look when they moved, the motion of their eyes and mouths weren't close enough to human, and most of their exposed body parts (except for hair, which was quite good) were rigid and doll-like, moving only at the joints. It still was "only" video game animation, and back then, nobody expected that to be real.

The stylized 2004 feature *The Polar Express* had an intentionally non-realistic, stylized look to its settings and characters, but since the MoCap process was used, their now, much more realistic motions caused a slight uneasiness among some viewers.

It wasn't until *Beowulf* (2007), that the CGI capabilities increased to the "almost photo-realistic" level and a larger portion of the audience was disturbed by their being in the uncanny valley, albeit subliminally. It was mainly that the characters' eyes were mostly "dead," moving only on cue to look at another character, and never exhibiting the minor random movements that real, liv-

ing eyes make continuously. The interior details of their mouths were also deficient.

Interestingly, the same capture volume that was used for *The Polar Express* and *Beowulf* was also used for *Avatar* (2009), but only after James Cameron spent a great deal of time and money to upgrade the system. *Avatar* successfully crossed the uncanny valley because the facial-capture cameras worn by the actors allowed for the recording and reproducing of accurate eye and mouth movements, and the formation and elimination of skin wrinkles. "Edge-detection" software made this possible. Thus was born the "Performance Capture" version of MoCap.

P-Cap volumes have the same soft, non-directional lighting as MoCap, plus additional lights mounted next to the facial capture cameras to make sure the face is never shadowed. *Avatar* used a single CCD-chip mounted on a strut directly in front of the performer's face, and many systems still use this configuration. To avoid having the distraction of an object continuously in the actor's line of sight, by the time *A Christmas Carol* went into production in 2009, four cameras were used, mounted at the sides of the face, and their images were rectified and stitched together in the computer.

At the beginning of the production of *Avatar*, Cameron used a live

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microwave feed from the face camera to “paint” the actor’s human eyes and mouth onto the CGI Na’vi’s face as an aid to judging performance. But after a while, this proved not to be that useful and was discontinued.

Face-Only P-Cap

For certain action scenes, the actors cannot safely wear a camera head rig. For these situations, only the body markers are used, and conventional MoCap is employed. Sound is recorded with a boom mike or wireless mike with a body-mounted lavalier, but will (normally) serve only as cue-track. Afterward, P-Cap techniques will be used to capture the face and dialog. If the director does not automatically ask for it, I recommend that you suggest he or she have the actors attempt to reproduce their body motions from the MoCap sessions as accurately as possible, because this will induce a form of realistic stress to their voices. These setups should be mic’d in the same manner as the rest of the project.

Alternate Techniques for Face-Only P-Cap

The capture infrastructure is continuously evolving, and several new technologies are emerging. Unfortunately, because of NDAs (Non-Disclosure Agreements), I cannot describe the projects I

worked on in any detail. The information here comes from public sources such as Cinefex magazine and Wikipedia.org.

Real-time LIDAR (Light Detection And Ranging) scanning is used to measure the shape and position of the performer’s head, down to sub-millimeter resolution. (This technique is also used to capture GCI data from large motionless objects like buildings, statues, vehicles, etc.)

Real-time multiple-camera, multiple-angle views are used to compute 3-D data from the different 2-D images of the performer’s face.

For both of these, you must usually keep the mike, the boom, and their shadows out of the working volume.

Live-Action MoCap

Live-action scenes, often shot against green- or blue-screen backings, need to have dramatic, sourced lighting. There are also many shiny wardrobe items and props, some of which even emit light themselves, and all these would confuse the passive MoCap system. Exterior scenes shot in direct sunlight can completely wash out the reflected capture-camera lights. For all these reasons, the reflective marker passive system cannot be used. Instead, “active” markers are used. These are larger, ½- to 1-inch cubes, with an LED array

on each visible side. The markers emit a pattern of light pulses, either red or infrared, to uniquely identify each individual marker. Externally mounted markers that are visible in a shot can be eliminated with “wire-removal” software in Post. Infrared markers may sometimes be concealed under clothing to avoid this extra step, along with its attendant time and cost.

MoCon

Motion Control was developed long before any capture processes. A camera was mounted on a movable multi-axis platform that ran on tracks, and had sensors to record its motion, position, and lens settings. The initial shot was made by a human operator, then the subsequent ones could be made by playing back the recorded data and using it to control servo motors that moved the camera in a duplicate of whatever dolly, pan, tilt, zoom, focus, etc., moves were made the first time. This allowed “in-camera” compositing of multiple scene elements without the need for optical film work in Post, with the attendant problems of generation loss, color shifts, etc. A typical use would be to shoot a night scene of model buildings with illuminated windows using a large outdoor model city street. To get uniform illumination, the tracking shot past the buildings is shot in daylight, with the camera stopped down to reduce the exposure. This would require impossibly intense (and hot) lights to illuminate the windows brightly enough to read in direct sunlight.

Instead, a second, matching, pass is made at night with the lens opened up, so that low-wattage bulbs will provide the proper exposure. The original Star Wars movies used this method extensively. While this system is still in use, it is now possible to use markers to track camera position, particularly with handheld cameras.

MoTrac

Motion Control requires a large amount of expensive equipment, but now that computers have become so much more powerful, digital manipulation can accomplish some, but not all, of the tasks formally done with MoCon. And of course, many that were impossible with MoCon. And sometimes MoTrac can be used instead of needing MoCap to record camera positions and moves.

MoTrac has two main applications. First, green- and blue-screen work where there will be camera moves that must be coordinated with an added background plate. To do this, an ordinary non-MoCon camera is used, and visible “fiduciary” marks are made on the screen as a reference for how the plate image must be shifted to have the proper parallax for the moving camera. Usually, the mark is simply an “X” made with pieces of contrasting color tape. Enough marks are placed on the screen to ensure that some of them will always be in frame. The computer tracks the motion of these Xs and then adjusts the position of the background plate to match.



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Second, smaller marks, often ¼-inch red dots, are stuck on real objects that will have CGI extensions added on to them. The moving ampsuits used in *Avatar* existed in the real world only as torsos on MoCon bases. The CGI arms, legs, and clear chestpiece were attached later in the virtual world. If you are planting/hiding microphones, be careful not to tape over or otherwise occlude any of these marks.

While not commonly used at present, it is possible to put fiducial marks on a mike boom as an aid in removing it Post. And the recent *Les Miserables* used them to help remove the exposed lavaliers that were mounted outside the wardrobe.

### MoTrac MoCap

This hybrid has limited capabilities, but is often used for live-action shoots on real locations or sets, with CGI characters that are human-shaped and slightly larger than the human performers. No reflective or active markers are used because the scenes often involve action and stunts, and the markers could injure the wearer or be damaged or torn off. Typical examples are the *Iron Man* suits and the humanoid droids in *Elysium*.

This method does not capture 3-D position information directly, and is used to simply “overlay” the CGI image on top of the capture performer’s on a frame-by-frame basis. Perspective distortion of the shape and size of the marker squares can be analyzed by the software to properly rotate and light the virtual character.

The actors wear grey capture suits with cloth “marker bands,” consisting of strips ranging from ½ to 2 inches in width having alternating white-and-black squares with a small circle of the opposite color in the center. The bands are fastened around the portions of the actor’s body that are to be captured: head, torso, arms, and/or legs. Only gross body movements are captured with this system; not details such as fingers or facial features.

If wireless mikes are used, there is no face-cam mounting strut available to mount the microphone, but neither it nor the transmitter has to be hidden. Like a regular shot, boom shadows have to be kept off anything visible in frame, except for the capture suit. (The shadow will not be dark enough to be mistaken for black makings.)

*Editor’s note: Jim Tanenbaum’s explanation of P-Cap and MoCap practices will continue in the next issue of the Quarterly with specific guidance for sound technicians working these projects.*

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