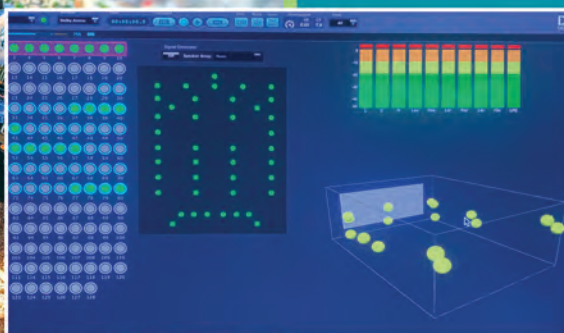




the official quarterly of the cinema audio society

CAS • QUARTERLY

FALL
2026



New CAS Awards Categories • Localization Mixing for Animation • ATSC Loudness Spec Update
Jeff Wexler Award Recipient Interviews • Score Mixing in Atmos • Studio Ergonomics and You!
Reality Cowboys: Mixing for Reality TV • Permanent Dialogue Separation • My Mentor Kirk Francis CAS

7 EMMY® AWARD NOMINATIONS

INCLUDING

OUTSTANDING SOUND MIXING

FOR A COMEDY OR DRAMA SERIES (ONE HOUR)

"CHAPTER EIGHT: THE RIGHTSIDE UP"

MARK PATERSON • WILL FILES CAS • STEVE NEAL CAS • CARLOS RAMIREZ

MICHAEL P. CLARK CAS • PETER PERSAUD

"A MAGNUM OPUS."

THEWRAP

"THERE WILL NEVER BE ANOTHER SHOW LIKE IT."

IGN



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STRANGER THINGS

THE FINAL SEASON

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Hello from the Cinema Audio Society!

I want to lead off by recognizing Phillip W. Palmer's selection as the next CAS Career Achievement Award recipient. Phil has had an outstanding career with 11 Emmy Nominations including a win for *Glee* and 11 CAS Award Nominations, including a win for *Better Call Saul*. He has also contributed a huge amount of time and effort to the CAS, serving on our Board of Directors several times and as Vice President. He has been very helpful to me in my time on the Board, and has bailed

me out on location in New Mexico, loaning equipment on short notice. I am delighted for my friend's achievements!

I'm also happy to announce the formation of two new CAS Award categories! As the industry changes and release platforms evolve, we have noticed a growing number of entries which don't fit well into the seven existing categories. To resolve this, we have created a Short Form category covering non-animated material under 21 minutes, and a Non-Theatrical Animated category covering those animated projects that did not receive theatrical release. We hope this will allow more submissions to compete against similar projects. Category details and submission rules are available on the CAS website.

CAS is continuing with some great events this year. As you may have seen, we just completed a great event in Chicago and our first "Ask Me Anything" (aka AMA), a members-only meeting where a selected individual or group will join one of our forums to talk about a topic, whether a technique or tool they use, or facets of their career. Moderated by Charles Dayton CAS MPSE, the first AMA had Marc Fishman CAS and Jon Greasley CAS discussing their work with the CAS Industry Technical Standards Committee and the establishing of updated ATSC loudness specs and dialogue standards. A recap of the event along with a full article discussing the changes are included in this issue. Future panelists will be announced to members via email and other CAS membership communication channels. Links to these events will be provided upon receipt of a member's RSVP. If you have an idea for a topic, let us know.

For those in the Los Angeles area, we just held a miniature golf event. I hope you were able to attend! A recap is in this issue, and photos are on our website. Future events will be announced soon, including The Sounding Board v6.0 taking place in Los Angeles on November 15.

This issue of the *Quarterly* is packed with some great articles that I encourage you to read, but I'll specifically mention CAS member Chris Welcker's great memories of working with production sound mixer Kirk Francis CAS. I never worked with Kirk, but I did do movies with his boom and utility and heard wonderful stories. I also ended up with a copy of his cookbook!

Happy reading,

Peter F. Kurland CAS



CINEMA AUDIO SOCIETY MISSION STATEMENT

To educate and inform the general public and the motion picture and television industry that effective sound is achieved by a creative, artistic, and technical blending of diverse sound elements. To provide the motion picture and television industry with a progressive society of master craftsmen specialized in the art of creative cinematic sound recording. To advance the specialized field of cinematic sound recording by exchange of ideas, methods, and information. To advance the art of auditory appreciation, and to philanthropically support those causes dedicated to the sense of hearing. To institute and maintain high standards of conduct and craftsmanship among our members. To aid the motion picture and television industry in the selection and training of qualified personnel in the unique field of cinematic sound recording. To achieve for our members deserved recognition as major contributors to the field of motion picture and television entertainment.

FALL 2026 NEW MEMBERS

Active

Nick Bergh CAS
Scott Gershin CAS
David P Hill CAS
Dean F. Howard CAS
Bradshaw Leigh CAS
Dennis Leonard CAS
David Mitlyng CAS
Tom Paolantonio CAS
Tami Treadwell CAS
Von Varga CAS

Associate

Lily Adams*
Sofia E. Kornemann
Yameng Li
Nathaniel Smith

Academic

Jonas A. Baker
Yonatan Cohen
Daphne Moller
Ryan Newhams
Chase Wainscott

*Upgraded from Academic status

5 EMMY AWARD NOMINATIONS

INCLUDING

OUTSTANDING VARIETY SPECIAL (PRE-RECORDED) SOUND MIXING FOR A VARIETY SERIES OR SPECIAL

TAYLOR SWIFT | THE ERAS TOUR THE FINAL SHOW

“ONE OF
THE MOST
IMPORTANT
MOMENTS
IN POP
CULTURE
HISTORY.”

THE GLOBE AND MAIL



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There have been some pretty big developments behind the scenes since our summer “Meet the Winners” issue, including two new CAS Awards categories—Short Form and Non-Theatrical Animated—and the selection of this year’s CAS Career Achievement Award recipient, production sound mixer Phillip W. Palmer CAS. Press releases containing additional information will be out shortly. We’ve also launched our new “Ask Me Anything” sessions, with the first one taking place in late July and covering the updated A/85 specifications—Ceri Thomas CAS provides a recap.

On the topic of A/85, Jon Greasley CAS disseminates information about the update and what it really means to us as mixers in his article, “ATSC Loudness Spec Update: A Dialogue-Gated Squeaky Wheel.” Speaking of dialogue, in his article, “Permanent Dialogue Separation: Isolating Voice, Reverb, and Noise Across All Stages of Post for Improved Control,” Gregor Bonse CAS shares an interesting workflow approach where the shotgun’s audio is separated into those three main ingredients before things hit the dub stage—allowing greater control during the mix. Continuing with the dialogue theme, through his own experience and interviews with others, Daniel Vasquez V. CAS discusses processes for dubbing animation in different languages and approaches for retaining the same directorial intent across languages in his “Localization Mixing for Animation: How to Avoid Getting Lost in Translation” submission. Ever watch a reality competition show like *Survivor* or *Fear Factor* and wonder what those mixes look like? Terry Dwyer CAS shares his evolution of re-record mixing reality over the past 30 years—including for many reality competition shows. In his submission, “Music in the Mix: Score and Song in Dolby Atmos,” Dennis Dembeck CAS MPSE interviews mixers about working with music in Dolby Atmos and the different considerations based on their particular job, speaking with a composer/scoring mixer, a scoring mixer, and a dialogue/music re-recording mixer.

At the CAS Awards ceremony in March, the inaugural Jeffrey S. Wexler Award for Advancement in Sound Technology was bestowed on recipients Evan Brooks and Peter Gotcher for the creation Pro Tools, and Glenn Sanders and Howard Stark for the development of the Zaxcom Deva. Interviews with the inventors are included here and were conducted by Whitney Worthen and I. In an effort to encourage a healthy working environment, Charles Dayton CAS MPSE discusses important layout considerations when designing a home studio—from desk height, speaker and monitor positioning, lighting, etc., in his article, “Studio Ergonomics and You!”

One of our core missions here at the CAS is education—with a strong emphasis on mentorship. Chris Welcker CAS shares his memories—both professional and personal—working with his mentor, production sound mixer Kirk Francis CAS, who passed away in February. Chris’s is a warm story of how one person’s faith in the abilities of another gave that person the confidence to grow in their craft.

Be sure to review the “Events Wrap-Up” and “Announcements,” along with the “Been There Done That” and “The Lighter Side” submissions. If an article makes you think of a friend or colleague, send a link to the online version of the *Quarterly*, available on the CAS website. Have something to share? We’d love to hear from you! Email us at CASQuarterly@CinemaAudioSociety.org.

Finally, I’d like to congratulate all our members who worked on Emmy-nominated shows or who themselves have received a nomination. Best of luck to you in September!

Matt Foglia CAS



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COLLABORATORS

Gregor Bonse CAS is a re-recording mixer and supervising sound editor originally from Berlin, Germany. From 2016 to 2024, he worked as senior re-recording mixer and creative lead at Rotor Film, one of Germany's leading post-production studios, before relocating to Los Angeles in 2025. A two-time winner and four-time nominee of the German Film Award (LOLA) for Best Sound, Bonse is best known for the German Oscar entry *System Crasher* (2024). His credits include three films selected for the Cannes Competition: *Ayka* (Kazakhstan, 2018), *Compartment No. 6* (Finland, Cannes Grand Prix winner and Golden Globe nominee, 2021), and *Holy Spider* (Iran, 2022). Recent projects include *The Outrun* (Sony Pictures Classics, 2024) and *The Assessment* (Magnolia Pictures, 2025).



Devendra Cleary CAS is a Los Angeles-based production sound mixer who just completed the Starz limited series *Gaslit*.

He is the Vice President of IATSE Local 695 and a frequent contributor to the *CAS Quarterly*. He joined as an Associate member in 1999 and became a full member in 2008.



Jon Greasley CAS MPSE is a Los Angeles-based, Brit-transplant sound designer, re-recording mixer, and general

noisemaker with more than 10 years of experience designing and mixing for film, TV, and streaming. He has been nominated for multiple awards, been a featured speaker for "Mix Presents: Sound for Film & TV" and Grammy Museum events, and has contributed multiple articles to the *CAS Quarterly*. Recent standout credits include *Your Honor*, *Mr. Harrigan's Phone*, *The Orville*, and *Cosmos: Possible Worlds*.



Charles Dayton CAS MPSE has been a member of CAS since 2004, is a member of MPSE, and is on the AES Los

Angeles executive committee. Charles owns and operates Twisted Avocado Post Audio, a 7.1.4 Dolby Atmos mix stage with a Foley and ADR stage. Current projects include *Penn & Teller: Fool Us* for The WB, *Shelter Me* for PBS, *Cancer Pioneers* for PBS, three short films, and an independent feature. He has been nominated for a primetime Emmy and a Golden Reel. Though he is very tired, Charles also works with the UCLA Film Department by awarding a mix and sound edit to a first-year grad student's short film, as selected by the faculty, and finds it very rewarding to help educate the next generation of filmmakers on the importance of sound in their films. Charles wants it to be known that he is also a personal friend of Bob Bronow.



Dennis Dembeck CAS MPSE is a sound editor and re-recording mixer currently based in Los Angeles. Originally from

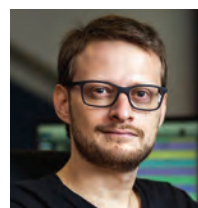
Detroit, Michigan, he first studied film at Grand Valley State University before earning a master's degree in music technology at New York University. He began his career as a composer at Flavorlab, landing theme songs and music placements on shows for Viceland, Nickelodeon, and MTV, before joining Harbor Picture Company in New York City. While much of his work is now in sound effects editing, his mixing credits include the features *No Hard Feelings* (Sony), *Suncoast* (Searchlight/Hulu), *A Little Prayer* (Music Box Films), and *Eric LaRue*, the directorial debut of Michael Shannon, along with series work for networks, including A+E, Viceland, and History Channel. Outside of work, Dennis plays tennis, is a green tea connoisseur, and lives with his wife Maddie and their three cats, Apple, Sunny, and Peach.



Terry Dwyer CAS is a re-recording mixer with more than 35 years and some 1,400 episodes behind the console. He has mixed every

episode of *Survivor* since the series premiered in 2000 — more than 800 consecutive shows across 50 seasons — and spent seven seasons on *Fear Factor*, along with *Stars Earn Stripes*, *Wipeout*, *American Gladiators*, *The Biggest Loser*, *The Apprentice*, and many others.

A two-time Emmy Award winner, Dwyer took his second for *Operation Homecoming: Writing the Wartime Experience*, the Academy Award-nominated PBS feature documentary. His feature credits include *Monte Hellman's Road to Nowhere*, a Special Lion winner at the Venice Film Festival. He is the founder of Mixers Post Sound in Burbank, California, where he continues to mix *Survivor 51* in Atmos —still in the same chair.



Daniel Vasquez V. CAS is a re-recording mixer and supervising sound editor whose career began in the United Kingdom, continued in his

home country, Colombia, and is currently established in Los Angeles. Daniel is a two-time Colombian Academy winner for Best Sound, with 12 additional nominations. He studied recording arts and earned a master's degree in audio post-production in London. He has over 18 years of experience working in television and film in more than 15 countries. Daniel was co-creator of SoundNode in England and co-founder of Clap Studios in Colombia, both sound post-production facilities. He is currently a member of the Board of Directors of the Colombian Film Academy and serves as Chair of the sound branch. He has worked as a teacher and guest lecturer at universities, academic institutions, and various events. Daniel also shares his passion for sound with aviation, as he is also a private pilot.

**Ceri Thomas CAS**

is the founder of IMMERSV, a consultancy dedicated to advancing immersive audio

technologies and modern production workflows. With over two decades of experience across studio design, spatial audio implementation, and workflow optimization for film, television, and music facilities in the UK and the U.S., Ceri has played a key role in shaping how creators approach immersive content production in real-world studio environments.

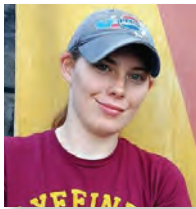
Ceri spent six years at Dolby Laboratories, where he was deeply involved in the development and global adoption of Dolby Atmos for cinema, home entertainment, and music production. His work included designing reference immersive mixing environments, developing best practices for Atmos workflows, and collaborating with leading studios, engineers, and content creators worldwide to support consistent, scalable immersive production. Following Dolby, Ceri joined Apple, advising on the design and implementation of immersive audio production facilities, including the state-of-the-art studios at Apple's Culver City campus. Through IMMERSV, he continues to work with studios, technology companies, and creators on spatial audio workflows, modular studio platforms such as Nu. Studio, AI-driven tools with Forte.ai, and immersive audio solutions for live events and broadcast. His work bridges technical innovation and creative practice, ensuring emerging technologies truly serve artists and engineers.

**Chris Welcker CAS**

is a production sound mixer with roots in New Orleans and a background in jazz performance. After

working in commercial scoring, he transitioned into film and television, rising through the ranks under the mentorship of Oscar winner Kirk Francis CAS. His credits include *Keanu*, *The Dirt*, *Bill & Ted Face the Music*, and *Daisy Jones & The Six*, which earned him both an Emmy Award and a Cinema Audio Society Award nomination.

Recent projects include the IMAX 70mm feature *Sinners* and the musical comedy sequel *Spinal Tap II: The End Continues*, where his music-focused approach and collaborative mindset helped shape the sound of each production. Chris continues to pursue work that blends musicality with the craft of cinematic storytelling.

**Whitney Worthen**

studied communications with a focus in film at Grace College, but unsure of her place in the film

world, headed back home to rural Indiana where she jump-started her journalist career. She began professionally writing in 2016 as a sports journalist for the *Pilot News*, covering high schools across North Central Indiana. After two years, Whitney moved to L.A. to pursue a career in production sound. She jumped in feet first, learning the ropes from a number of great mentors and getting to know the sound community better. She has since served as utility, boom operator, and sound mixer for series, shorts, and long-form. An avid *Harry Potter* fan, Whitney is often seen wearing a Pepsi hat while out-and-about.

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CINEMA AUDIO SOCIETY
**63rd ANNUAL
CAS AWARDS**

**THE CAS PROUDLY ANNOUNCES
THE ADDITION OF
TWO NEW CATEGORIES
CELEBRATING
OUTSTANDING ACHIEVEMENT
IN SOUND MIXING:
NON-THEATRICAL ANIMATED
&
SHORT FORM**

These join the standing categories recognizing
Outstanding Achievement
in Sound Mixing:

Motion Pictures – Live Action

Motion Pictures – Animated

Motion Pictures – Documentary

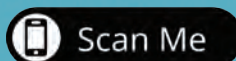
Television Series – One Hour

Television Series – Half Hour

Non-Theatrical Motion Pictures or Limited Series

Television Non-Fiction, Variety or Music – Series or Specials

Scan the QR code for submission information.





16

EMMY® AWARD NOMINATIONS

INCLUDING

OUTSTANDING SOUND MIXING FOR A LIMITED OR ANTHOLOGY SERIES OR MOVIE

PENNY HAROLD CAS • ANDY LANGE CAS • DEVENDRA CLEARY CAS • SEAN O'MALLEY CAS
JONGKUN PARK • JUDAH GETZ CAS • ILLIA POPEL



FROM EMMY® WINNER LEE SUNG JIN

BEEF

THE MOST NOMINATED LIMITED SERIES IS "HANDS DOWN, THE BEST TV SHOW OF THE YEAR." *Esquire*



N

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ANNOUNCEMENTS

Do you enjoy writing and connecting with your sound peers?

If so, the CAS Quarterly invites you to contribute to our magazine. We have topics that volunteers can choose to cover and are also open to content ideas from our collaborators. All membership levels are welcome to contribute. And, if you write four articles each year, your CAS dues are waived! For more information, drop us an email at:

Publishing@CinemaAudioSociety.org



Congratulations to the 78th Emmy Award nominees for Sound!

EMMYS

NOMINATIONS



The CAS is especially proud of our member nominees:

Niv Adiri CAS	Todd M. Grace CAS	Sean O'Malley CAS
Patrick Baltzell CAS	Jamie Hardt CAS	Nick Offord CAS
Ethan Beigel CAS	Penny Harold CAS	Sal Ojeda CAS
Larry B. Benjamin CAS	Craig Henighan CAS	Phillip W. Palmer CAS
Steve Bucino CAS	Tim Hoogenakker CAS	James Parnell CAS
Edward C. Carr III CAS	Mark Jensen CAS	Gary A. Rizzo CAS
Bob Chefalas CAS	Alex Jongbloed CAS	Keith A. Rogers CAS
Patrick C. Christensen CAS	Jim Lakin CAS	Matthew Sanchez CAS
Michael P. Clark CAS	Andy Lange CAS	Tami Treadwell CAS
Devendra Cleary CAS	Bradshaw Leigh CAS	Von C. Varga CAS
Ryan Collison CAS	Mark Mandler CAS	Anna D. Wilborn CAS
John W. Cook II CAS	Phillip McGowan CAS	Randy Wilson CAS
Phil DeTolve CAS	Ron S. Mellegers CAS	
Paul Drenning CAS	David Mitlyng CAS	
William Files CAS	Steve Neal CAS	
Judah Getz CAS	Ed Novick CAS	

63RD | AWARDS TIMELINE

The entry submission form will be available online on Tuesday, October 27, 2026, on the CAS website at:

www.cinemaudiosociety.org.

- Entry Submissions due Online – 5 p.m. PT, Monday, December 7, 2026
- Nomination Ballot Voting Ends Online – 5 p.m. PT, Wednesday, January 6, 2027
- Final Nominees in each category announced – Tuesday, January 12, 2027
- Nominee listing error and omission deadline – Friday, January 22, 2027
- Final Voting Ends Online – 5 p.m. PT, Thursday, February 18, 2027
- 63rd Annual CAS Awards – Saturday, March 6, 2027

Applications for the Jeffrey S. Wexler Award for Advancement in Sound Technology have closed.

SAVE THE DATE

Nov. 15th, 2026 9am - 7:30pm PT



THE SOUNDING BOARD

a Cinema Audio Society & Motion Picture Sound Editors event

Join us in Los Angeles, CA for a day of in-person discussions about the practical, creative, and technical art of sound for picture. Panels, Best Practices, Vendors & the Hands On Lab.

Watch your email for info on Sounding Board v6.0!

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New CAS "In Conversation" Podcasts Available!

Eighteen CAS "In Conversation" podcasts are available. For "In Conversation," Ep.18, Paddy Hanlon CAS sits down with Oscar-winning sound designer and re-recording mixer Randy Thom CAS of Skywalker Sound. From his radio roots to shaping the sonic landscapes of classics like *The Right Stuff*, *Return of the Jedi*, *Forrest Gump*, and *The Incredibles*, the CAS Career Achievement honoree reveals the stories and philosophies behind decades of groundbreaking movie magic. This episode was recorded in New York and California.

All episodes are available here:

<https://cinemaudiosociety.org/podcasts/>

90 EMMY® AWARD NOMINATIONS

INCLUDING



OUTSTANDING COMEDY SERIES

OUTSTANDING SOUND MIXING
FOR A COMEDY OR DRAMA SERIES
(HALF-HOUR) AND ANIMATION

JOHN W. COOK II, CAS
JAMES PARNELL, CAS

Re-Recording Mixers

JIM LAKIN, CAS

Production Mixer

FERNANDA DOMENE

ADR Mixer

DAVID STAL

Scoring Mixer

JACOB McNAUGHTON

Foley Mixer



OUTSTANDING SOUND MIXING
FOR A REALITY PROGRAM

MICHAEL ABBOTT
JEFF FUSTING

Production Mixers

RANDY FAUSTINO
TIM HATAYAMA

Music Mixers

SHAUN SEBASTIAN

Monitor Mixer

RYAN YOUNG
PHIL DETOLVE, CAS

Post Sound Mixers





The Cinema Audio Society is now accepting submissions for its 2026 Student Recognition Award. Students may submit a written or video application.

This award is intended to encourage students' interest in production and post-production sound mixing and to recognize individuals with exceptional and demonstrated passion for the field. The selection criteria will focus on the student's responses to questions via a written or video application, as well as a professor's recommendation letter and school transcripts.

Finalists will be selected and invited to attend the 62nd Cinema Audio Society Awards as guests of the CAS (travel expenses are not included). The Awards ceremony will be held on **March 6, 2027** at the Beverly Hilton Hotel in Los Angeles, CA, where the Student Recognition Award winner will be announced. The winner will receive their Award plus \$5,000, and all finalists will take home a gift bag filled with a variety of outstanding tools of the trade contributed by top audio manufacturers.

The Student Recognition Award competition is open to any student in good standing currently enrolled at an accredited institution. Students may be pursuing any major, but should have a demonstrated interest and some experience in sound mixing for audio production and/or audio post-production.

Please encourage all qualified students to apply.

A stylized, handwritten signature of Peter Kurland in white ink.

Peter Kurland, CAS President



CAS STUDENT RECOGNITION AWARD

CAS will begin accepting applications on **August 17, 2026**.

All applications must be completed and submitted online no later than **November 10, 2026**.

The finalists for the CAS Student Recognition Award will be posted on the CAS website on Tuesday **December 15, 2026**.

The CAS Student Recognition Award winner will be announced at the 63rd Cinema Audio Society Awards on **March 6, 2027**.

ELIGIBILITY

Students must be enrolled and in good standing at an accredited college or university during any school term between **January 1, 2026** and **December 31, 2026**. Students at US or International institutions are eligible provided the school is accredited. All application materials must be submitted in English. Applicants cannot compete for more than 2 years consecutively. Student applications must be accompanied by a recommendation from a professor or instructor.

SELECTION CRITERIA

The CAS Student Recognition Award is given to an individual based on their enthusiasm and demonstrated potential in the field of sound mixing and/or sound recording, their academic accomplishments and the recommendation of a professor or instructor at the student's educational institution. It is not an award for excellence based on a specific student project. This award is intended for those students who have aspirations of pursuing a career in sound mixing and not for those seeking a career in sound editorial or film-making. From the eligible applications received, finalists will be selected. The finalists will then be required to submit a five-minute video example of their work, accompanied by a short explanation of the submission and their role(s) in its creation. We will also request a simple five-minute (maximum) video to introduce yourself to the judging panel.

APPLICATION REQUIREMENTS

Students must submit the following materials online:

- A. Unofficial transcript (please highlight and explain relevant coursework).
- B. List of projects in which you were the primary person responsible for production and/or post-production sound mixing.
- C. Either written or video application.
- D. A recommendation letter from a professor or instructor.

Please note: Once you have completed and submitted portions A through C of your application, a link will automatically be sent to your professor (via the email you provided) for them to submit their recommendation. We highly recommend that you follow up with your professor regarding their receipt of this link! Applications without recommendations will be considered incomplete.

Shortly after submitting your application and required documents, you will receive an email confirmation that your materials have been received.

Applications and all accompanying documents must be submitted no later than November 10, 2026 at 5:00 pm PT. Incomplete or late applications will not be considered..

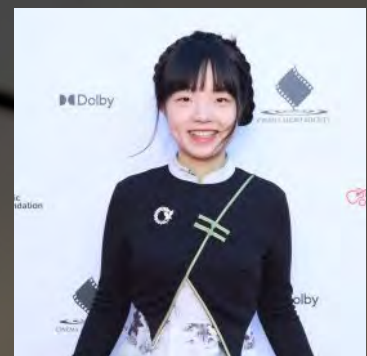
ADDITIONAL INFORMATION

The CAS Student Recognition Award winner will be announced at the 63rd Cinema Audio Society Awards on **March 6, 2027**. The finalists will be invited to attend the Awards celebration as the guests of CAS. All travel expenses are the responsibility of the student nominees.

The Student Recognition Award and \$5000 will be presented to the winning student. All finalists will receive gift bags with a variety of outstanding tools of the trade contributed by top audio manufacturers. Any tax liability related to the cash award or gift bag is the responsibility of the student. The CAS will cover shipping charges up to \$300 USD.

All submitted materials become the property of the CAS and no materials will be returned. By submitting their materials, the applicant agrees to any usage by the CAS for educational and/or promotional purposes.

2025 AWARD RECIPIENT



MINGXI XU | National Film and Television School

PLEASE VISIT OUR WEBPAGE FOR THE ONLINE APPLICATION

CinemaAudioSociety.org/student-recognition-award



SCAN ME



Events Wrap-Up

CAS Chicago Mixer Party



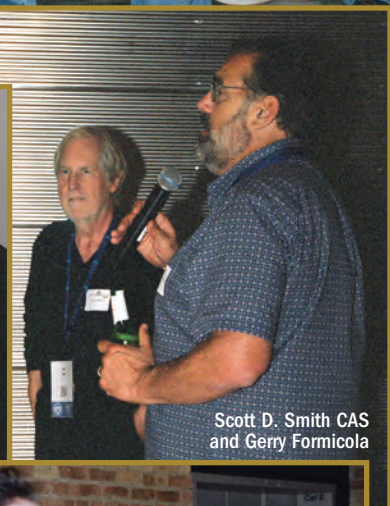
All photos - which were shot on 35mm - courtesy of Chris Nawrocki

The first-ever Chicago area CAS event was held June 27 as part of the Filmscape Chicago show at CineCity Studios (a support facility which operates a couple of blocks away from the Cinespace stages). Over 40 people covering a diverse swath of the film/video industry were in attendance, providing a rare opportunity to gather and exchange notes about the state of the business while making some new connections.

Gerry Formicola of Second City Sound assembled an extensive presentation of photos from various shows being shot in Chicago, and spoke to the importance of having an organization that is dedicated solely to the aspects of sound for film and video. Emerson Cole assisted with outreach to members of various sound



Justin Dieczorek and Andrew Jones



Scott D. Smith CAS and Gerry Formicola

teams that work outside the realm of major film and TV shows, giving newcomers an introduction to what the CAS does.

Longtime CAS Chicago member Scott D. Smith provided some history about the formation of the society and its role in the fight to, among



Nicky Ray Harris and Tim Edson



Jimmy Heitz and
Gerry Formicola



Larry Kapson, J.T. Mueller CAS,
Scott D. Smith CAS, and Kat Williams

other topics, have the “actual” working members of sound teams given due credit for the projects they work on. Attendees who weren’t familiar with the organization were pleased to learn of its history and its function and look forward to learning how the CAS can benefit them in their careers.

CAS Family Mini Golf



On Saturday, July 25, the CAS had a TEE-rific time at Holey Moley Mini Golf in Santa Monica, CA. Over 30 members, along with their family and friends, gathered for laughs and lively conversation. A light lunch of pizza, sliders, ribs, and other options was provided. Thanks to all who attended!



CAS MIXER PARTY!

CHICAGO
JUNE 27, 2026

THE CAS WOULD LIKE TO INVITE YOU AND A GUEST TO JOIN US FOR A MIXER PARTY!

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Moderator Charles Dayton CAS MPSE with panelists Jon Greasley CAS and Marc Fishman CAS during the first CAS Ask Me Anything.

1770" has told you nothing, because 1770 does not specify a target level or which element you anchor to. A/85 does, and A/53 then mandates that the dialnorm value in your metadata match the loudness you reported. Put those together and dialogue-anchored measurement is enforceable by law.

Ask Me Anything: Loudness Standards and Dialogue Intelligibility

by Ceri Thomas CAS

The revised ATSC A/85 did not start with a regulator. It started with us.

The Cinema Audio Society asked ATSC to clarify rules that were being widely misread in delivery specs, and while that request was working through the process, California passed legislation, effective July 1, 2026, extending the CALM Act to video streaming services. Illinois has since passed its own version. Nobody is going to author a California cut and a rest-of-country cut, so in practical terms, A/85 now governs streaming nationally. A small revision team, a re-recording mixer, a streaming specialist, and a codec expert, turned the update around quickly and it was accepted without technical challenge. Jim Starzynski walked through the result at SVG in July: a new Annex L with guidelines specific to internet streaming, and Annex M, a one-page tear-out summary aimed squarely at the people who actually write spec sheets. Alongside it sits AES TD 1009, a 40-page open document covering dialogue intelligibility across the whole chain, from human hearing through

content creation to the down-firing speakers in the back of a modern TV.

That is the context for the first CAS Ask Me Anything, held July 25 with Marc Fishman CAS and Jon Greasley CAS, moderated by Charles Dayton CAS MPSE. Jon chairs the CAS Industry Technical Standards Committee and co-authored the A/85 revision. For the first session of these new AMA events, the authors and architects of the new specification made themselves available to the membership for an hour and a half on a Saturday morning and answered whatever was put to them. Ask Me Anything is meant literally, and the questions came from members working on exactly the deliverables the standard governs.

1770 Is Not a Spec

Early in the session the panel drew the distinction between the specification and the measurement method. ITU-R BS.1770 is a measurement methodology. ATSC A/85 is the practice recommendation. A spec sheet that says "deliver per

Not everyone has caught up. Several major distributors still measure full program, and at least one measures act by act, which is close to the worst possible choice: set up your plot for three acts, let everything break loose in the fourth, and the algorithm decides your dialogue should get quieter. Anchor to full program across a season and you can see 8 dB of dialogue variation between a talky episode and an action episode of the same show. The committee is now writing to plugin manufacturers and distributors on exactly this point. The plugin vendors have been delighted to receive it. The distributors, predictably, less so, and the one genuine success so far came from sitting in a room rather than sending an email.



The choice you are actually making is long form or short form, and it determines which gate you use. Long form, meaning movies and episodics, is dialogue-gated using Dolby Dialogue Intelligence, which is now free. Short form, meaning commercials, is full program with the relative level gate, which exists because commercial mixers used to game the measurement with pockets of near silence. Those are two different presets for two different jobs, and they are not meant to be combined. Unless you are delivering a spot, full program is rarely the right method, which makes it worth reading a spec sheet carefully enough to spot when someone has asked for it by accident.

Chasing LRA Is a Fool's Errand

The best technical moment concerned loudness range. A/85 allows plus or minus 2 dB. Some platforms have specified plus or minus 0.4 dB on dialogue plus a hard LRA ceiling, and that is where it gets interesting. LRA discards the loudest and quietest percentile bands before computing the range. Change one thing and the whole measurement re-runs, which means it can re-select which events are inside and outside the window. Turn a loud element down to shave 0.2 off your LRA and the number can go up because you just changed what qualifies as an outlier. Three hours disappeared on the panel chasing 0.2 on a single episode. The A/85 team treated the old silence on LRA as a sin of omission and now explicitly cautions against it, along with dialogue intelligibility scores.

Craft, Not Compliance

In the spirit of "ask me anything," attendees filled the Zoom chat with questions about mix approaches. The mix advice was refreshingly

unglamorous. Threshold-based attenuating EQ parked permanently at roughly 1 kHz, 4 kHz, and 6 kHz, engaging only when something pushes into it, so you keep the weight and lose the fight. Clip gain on word onsets, frame by frame, because a de-esser or compressor removes the transient while clip gain keeps it. Do not over-compress dialogue; peaky is intelligible, flat is fatiguing and people tune out. Couple a small fader move and a small curve so it reads as neither a hole nor a scoop.

None of that is new. What is new is that CAS members can now ask the authors of the standard why the number is behaving the way it is and get an answer. Jon's included an insightful summary of the process and guidelines in his article for this issue. The updated A/85 documents are going up on the member forums, and the AMA runs monthly. Use it.

MEMBERS check your e-mails for the next AMA session happening later this month!

CINEMA AUDIO SOCIETY

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JEFFREY S. WEXLER AWARD

MEET THE RECIPIENTS

DIGIDESIGN: EVAN BROOKS AND PETER GOTCHER

By Matt Foglia CAS

Peter Gotcher and Evan Brooks' first company, Digidrums, was founded in 1984. Peter, who was a drummer, owned an E-mu Drumulator, which was the first affordable programmable drum machine. The company initially focused on creating drum samples to work with the machine—which they successfully did. Samples from their “Rock Drums” set can be heard on “Shout” by Tears for Fears and “Beastie Groove” by Beastie Boys, among others.

This led to the creation of the Sound Designer software. “[T]he original usage of all this came from wanting to edit sounds for the drum chips that we had, and that’s how Sound Designer came into being,” Evan recalls. “That was our original package ... it had nothing to do with audio recording. It was all destructive editing on individual samples, and it was meant to be used in concert with a digital sampling keyboard as kind of the front and back end.”

While they initially wanted to add more features, there were two main limitations. “One was the fact that the Mac just wasn’t fast. It wasn’t fast enough to do everything that we wanted to do because, ideally, you want it in real time, right? You want that modify listen cycle to be instantaneous. You turn a knob and you’re hearing it. You don’t want to turn a knob and then have to get a cup of coffee and come back and hear the result of that.” Evan continues, “And the second problem we had was audio quality. The Mac was forward-thinking enough to have 8-bit audio—it was compounded, but it had an 8-bit output. So, we had some digital audio output, but it sounded like crap, and that’s why we were using the digital sampling keyboards as front and back ends. So, we had these two problems: Lack of power and lack of high-quality audio I/O.”



E-mu Drumulator.
Photo courtesy of Andreas Gortan.

"The solution came to us in the form of Motorola's 56000 digital signal processor from a fellow named Terry Schultz, who used to work for E-mu. He called me up one day and said Motorola's got these new signal processing chips, they're not 8 or 16 or 32 bits like these other ones are, they're 24 bits—they're designed for audio. And they were looking for applications for them and thought we should check them out. And I said, you know, we're really a software company, we really don't do [hardware creation]."

Even so, Terry sent Evan the development kit, the compilers, and the development board that had one of the chips on it. "At that time, Apple had come out with Macs that had NuBus slots. I put it all together and got it up and working, and it was fast—very, very fast! So, I ended up designing a pretty simple NuBus card that had a 56000 on it and one channel of 16-bit digital output, basically CD-quality output. I added hooks into the Sound Designer application so that when you went and tried to do a filtering operation, it would actually send all that stuff out to the card and do it in real time. So, you could hear the output from this nice 16-bit audio in mono—and it was so stunning. There could be such a difference in productivity because you suddenly had this real-time system that could process and monitor in real time and high quality. We decided to follow that whole thing and go with it."

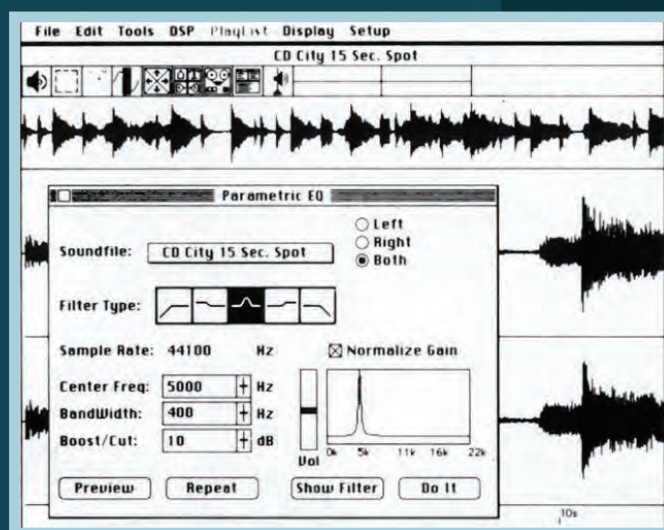
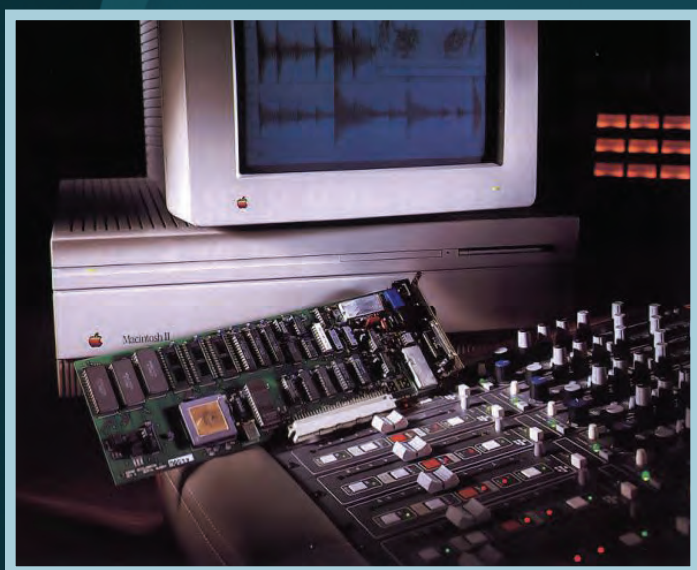
Around the same time, hard drives were becoming fast enough that stereo audio files could be played in real time, removing the need to load audio into memory before playing it back. Given these improvements, "We basically rewrote Sound Designer so that it became real time so you could sit there and record long segments of

audio in and play them back out in real time. You could do non-linear, non-destructive editing and have real-time signal processing."

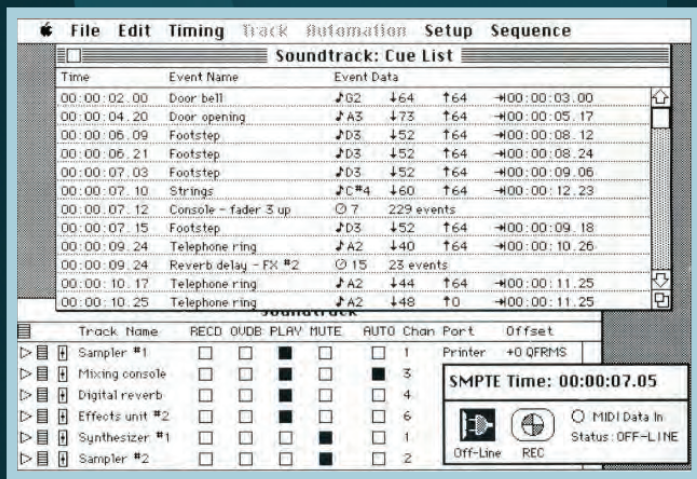
The program, named Sound Tools, debuted at NAMM in January of 1989. "I think people were impressed. But it was very humbling," reveals Evan. "I remember I had given a demo to a recording veteran. I'm in my mid-20s and this guy must have been in his 70s or something, he's probably been doing this all his life, and he's very, very patient. He listens to the whole demo with me and at the end, he goes, 'Sonny, this is all very interesting, but you got it all backwards.' I looked at him and I couldn't quite figure out what he was getting at, and I asked, what do you mean we've got it all backwards? He says, 'Sonny, sound doesn't go from left to right—it goes from right to left.'"

Visually, the audio was playing back from left to right—like you'd read a book. "This is something that just makes total sense to us, because we hadn't spent our life with tape. But for somebody who spent their life with tape, it's a complete paradigm shift. It was a completely different way of thinking and visualizing the whole world in which [audio engineers] lived in, because if you're [working with] tape, sound and time go from right to left."

Recalling how I would see Digidesign audio interfaces on Avid Media Composer systems when I first started in post in 1995, I asked about that relationship with Avid. "We had this sound card that we really used as an accelerator. People would have a Sound Designer system and they weren't really recording and editing non-linearly, necessarily, but they were just using it to accelerate things. We OEM'd this card and sent it out to a number



Sound Tools hardware and software as featured in *Sound On Sound*, August, 1989.



"Q-Sheet" sync software.
Photo from *Music Technology*, January, 1988



Digidesign ProControl

of people who used it. Bill Warner, who started Avid, reached out to us, and they became one of our first, if not our first, third-party developer. So that was a brilliant thing that came from Peter—this concept of having a third-party developer program. It was kind of modeled on what Apple did. They had all these third-party developers that made their platform work, so Apple didn't have to develop all these applications."

Peter recalls, "Our long-term strategy was to replicate/enhance the functionality of a recording studio in an integrated computer environment. Analog studios were 'multi-vendor' systems—you might have a Neve console, Lexicon reverb, UREI dynamics processors, API EQ's, etc. We were replacing outboard with algorithms, but we knew we couldn't replicate every 'flavor' of processing, and there were many companies that had spent years perfecting their sound. I thought the best way to provide a wide range of choices was to open the system up. Some computing platforms had started to do this, notably engineering CAD workstations from Sun Micro, HP, etc. That gave me the idea. It was very controversial in the company at the time as third-party developer programs require developing API's, documentation, support, etc. My sales team thought we needed to prioritize features, bug fixes, etc. Fortunately, as CEO I got to override the short-term issues and prioritize the long-term vision. I believe that the rich ecosystem of third-party plugins, apps, hardware add-ons, etc., are perhaps the number one reason for Pro Tools' longevity."

Evan continues, "So, we adopted a third-party developer program. We said we've got these hardware products; you can put them into whatever you want, we'll write all

the drivers for you, we'll work with you, we'll make all these things work. So Avid had their own software that they wanted to write to do the audio part of their video editor, and they OEM'd our products. As our hardware products evolved and we started adding hardware interfaces for the audio I/O, they ended up adopting those and it became an integral part of their whole system."

Peter shares, "Bill Warner, the founder and then CEO of Avid, found me. They had pioneered non-linear video editing, but their customers were complaining about their minimal audio capabilities. They first became a third-party developer, but when they decided to include our hardware and software in every Media Composer system the relationship grew."

Digidesign seemed to really keep up with advances in computer processing power—developing TDM with real-time processing and expansion abilities up to 16 tracks. Peter shares, "I give Evan a ton of credit for keeping us on the cutting edge of computing technologies. He had experience with both hardware and software, and he was very good at keeping up on the latest developments. We had a great symbiotic partnership—he knew what current technology was capable of, and I was able to matchmake that with the functional product vision. There were multiple recent tech innovations that made Pro Tools possible, from Motorola general purpose DSP processors, to low-cost monolithic 16-bit A/D and D/A converters, to FPGA ASIC's (they made TDM possible), to updates to NuBus and eventually PCI that allowed DMA, etc., etc. Evan explained these to me as we tried to figure out how to coax the most out of the Mac environment. We were

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Version 1.0

3rd Printing
May 3, 1994

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definitely on the bleeding edge of what the platform could do!”

When asking Peter about the motivation behind even the first version of Pro Tools having the ability to sync with video using SMPTE, he said, “At the time, virtually all serious audio post involved syncing analog multitracks to pro format video decks using SMPTE. The Mac wasn’t a powerful enough platform to integrate pro quality video and audio, and we felt that supporting the industry sync standard was ‘table stakes’ to integrate into existing pro workflows.”

Speaking more to the audio post side, Peter continues, “I need to give a huge shout-out to Bill Koepnick of Advantage Audio. My background was music—I had no idea what audio post was. Bill was an early Sound Designer user who convinced us to develop Q-Sheet. Evan worked closely with Bill and developed the app single-handed. It wasn’t much of a money maker, but it was our intro to post and started our education on SMPTE timecode and many other post requirements.” Q-Sheet was, essentially, a sequencer that allowed timecode to be entered for events (such as sound effects) to be triggered via MTC on playback.

One of the game changers in audio post was the implementation of OMF. I was a Pro Tools editor and studio assistant in Sony Music Studios NYC’s audio post department starting in 1995 and, shortly thereafter, we were beta testing the OMF Tool software because Sony

had a bunch of Media Composer systems and a handful of PT systems. I asked Peter about this development. “As Media Composer and Pro Tools users tried to collaborate on projects, there were many areas of workflow pain. OMF Tool was an early effort to improve interoperability. Those early versions had a lot of issues, but our dedicated user base put up with a lot because they could see the potential.”

Speaking of another big product, their first control surface, Peter shares, “ProControl was a very controversial product at Digi and we had several false starts. Some people in the company thought we would never be capable of building a professional-grade control surface, but I felt it was an essential nut to crack if you are trying to build the studio of the future. Early third-party options like the Mackie control surface convinced me that we could never get the experience right, or tightly integrated, if we didn’t do it ourselves.”

Personally, I feel the successful interchangeability of media from Media Composer to Pro Tools that OMF provided, along with the stability and real “feel” of the ProControl—not to mention the somewhat more “affordable” price point of Pro Tools software and hardware (relative to some other proprietary DAW’s of the time such as AMS AudioFile and SSL ScreenSound)—allowed Pro Tools to become the standard in post that it is. The CAS celebrates the vision, ingenuity, and drive of Evan Brooks and Peter Gotcher.



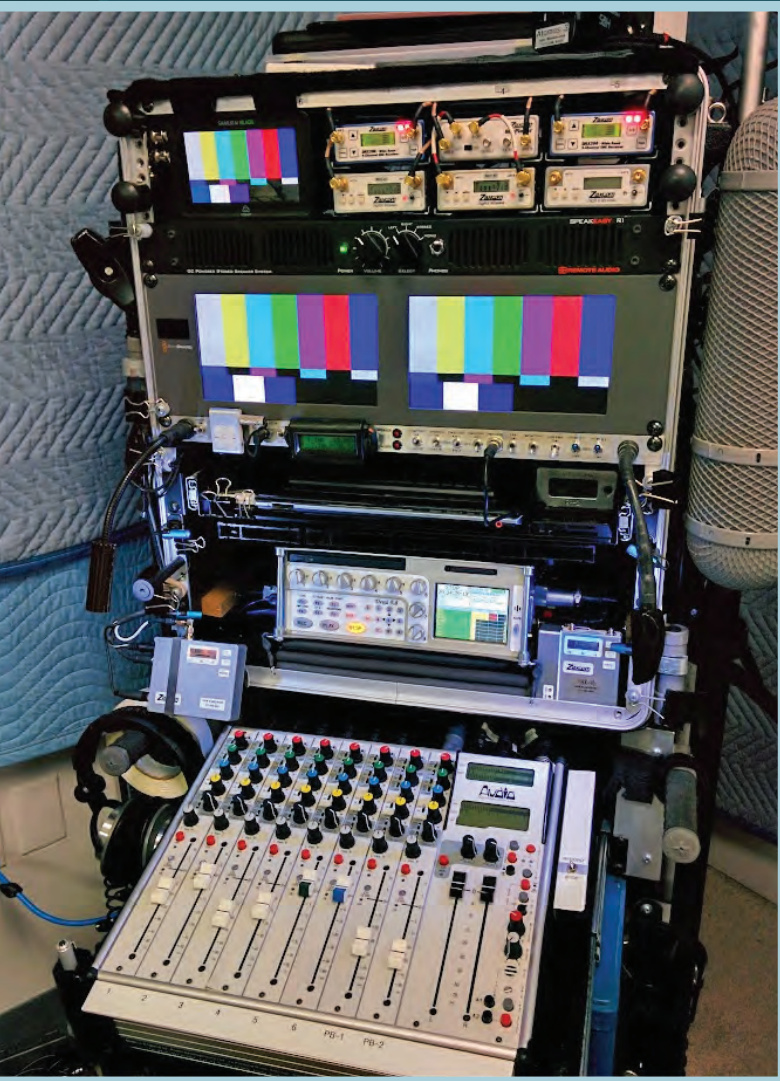
Peter Gotcher and Evan Brooks

JEFFREY S. WEXLER AWARD

MEET THE RECIPIENTS

ZAXCOM DEVA: GLENN SANDERS AND HOWARD STARK

By Whitney Worthen



A Zaxcom Deva 5.8 in use on set.

Sound's existence in film started 100 years ago in 1926 with *Don Juan* having synchronized music and sound effects. It took another two years before the first feature film, *Lights of New York*, donned the big screen with completely synchronized sound.

While many departments phase in their fourth or fifth technological revolution, the Sound Department works to revolutionize into its second era. As a result, most revolutionary sound inventions remain young and fairly new to film. From the mechanical ingenuity of the Laff Box (1953) to the audio precision of the Sennheiser MKH 416 (1975), the late 20th century grew to become a golden era for sound engineering in film.

Today, the CAS honors revolutionary inventors and inventions with the Jeffrey S. Wexler Award. The award honors the advancements in sound technology that have significantly improved existing methods or have materially changed how sound is recorded, edited, mixed, or delivered. The 2026 Jeffrey S. Wexler Award named Zaxcom founder Glenn Sanders and Zaxcom Chief Engineer Howard Stark amongst the inaugural recipients

for their development and manufacturing of the Deva—the first portable hard disk, file-based recorder.

“Howard and I developed the original Deva in about a year,” said Sanders. “It was the first mixer/recorder Zaxcom ever built, and there really wasn’t a direct predecessor. Because of our background in digital mixing consoles, we approached the problem differently than traditional recorder manufacturers.”

Some of the most notable innovations introduced with the Deva are basic features every mixer now uses today. “Being digital and nonlinear gave us opportunities that simply didn’t exist with tape,” explained Sanders. “We introduced features like pre-record, which allowed audio to be captured before the record button was pressed, and we were the first to embed metadata directly into production sound files. Those innovations became fundamental parts of modern production recording.”

The Deva went on to push fundamental boundaries of sound mixing. Instead of being a recording device, it became a storage information system with sophisticated mixing capabilities, wireless integration, and high track counts. It pushed the boundaries of production mixing for television and features and found its way on notable movies like *Fight Club* (1999) and *The Last Samurai* (2004), and TV series, including *Sex and the City* among many more. The Deva continues to be used today on sets across the world with its latest model, the Deva 24.

Z A X C O M A U D I O



PROUDLY PRESENTS

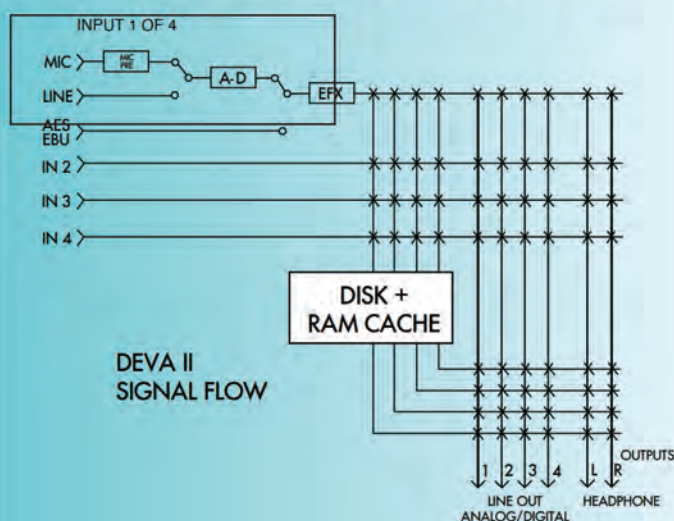
Deva II



The world's first portable 4-channel
24 bit uncompressed hard disk
recorder/player/mixer.



Deva II Audio Flow





Howard Stark and Glenn Sanders



Glenn Sanders, Jeffrey Wexler, and Colleen Goodsir



Howard Stark, Colleen Goodsir, and Glenn Sanders

Many acclaimed production sound mixers would flock to the innovation over the years, but Jim Tanenbaum CAS took the first leap of faith to use the untested mixer on set. "We were incredibly fortunate that many of the industry's most respected production sound mixers believed in what we were trying to accomplish from the very beginning," remembered Sanders. "Their willingness to embrace a completely new workflow helped demonstrate what nonlinear production recording could accomplish and played a major role in the industry's transition away from tape."

Jeffrey Wexler would be the second to go on and use the Deva on acclaimed films such as *The Siege* (1998) and *42* (2013). "Jeff Wexler was a close friend of Howard, Colleen (Goodsir), and mine for more than 25 years. His passion for advancing production sound created an immediate connection between us.

"Jeff was someone I could always bounce ideas off." Sanders described, "He wasn't afraid to tell me when he thought I was wrong, and he was just as quick to encourage an idea that he believed would benefit the industry. That honesty and collaboration made him an invaluable partner in developing new technology."

Sanders and Stark shared a close relationship with Wexler, making receiving the award truly special. "Receiving the inaugural Jeffrey S. Wexler Award is especially meaningful because it honors someone who had such a profound influence on both our work and our lives. To be recognized in Jeff's name is truly humbling," said Sanders.

While Sanders and Stark went on to change the way sound is mixed on set, they believed it was about more than innovation. They sought to improve the life of the sound mixer on set. Their goal grew deeper than a chase for awards and revolution. "Innovation only matters if it helps the people using it every day," advised Sanders. "From the beginning, our goal wasn't simply to build new technology, it was to solve real problems for production sound mixers and make their work easier and more reliable."

The Zaxcom Deva has received awards, including a Television Academy Engineering Emmy Award, an Academy of Motion Picture Arts and Sciences Scientific and Technical Award, and two Cinema Audio Society Technical Achievement Awards.

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ATSC Loudness Spec Update: A DIALOGUE-GATED SQUEAKY WHEEL

by Jon Greasley CAS with Jamie Hardt CAS

Here I am again, still ranting about the loudness specs we mix to for broadcast and streaming. This time though, it actually feels like progress has been made.

The story so far—since the CALM Act took effect in 2012, we’ve all seen loudness spec sheets from the networks and cable channels specifying a LKFS target our mixes must conform to. This was based on a solid concept: Adverts are too loud—obnoxiously so, in many cases. ATSC, the Broadcast Standards Association, authored the document “A/85: Techniques for Establishing and Maintaining Audio Loudness for Digital Television,” which laid out the best practices for achieving a more consistent listening level between shows and commercials and between channels. All loudness measurement is based on BS.1770, issued by the ITU, and there have always been a few ways to apply it in a practical sense. The most important distinction is what you are measuring. In the simplest terms, it’s either going to be the full mix (termed “Full Program”), or one element of the mix, referred to as the “anchor element,” which is almost always dialogue.

Ad mixes tried to game the system with tricks such as inserting silence for a moment to skew the measurement down so the overall level could be boosted. And over the years, 1770 was updated to be more agile, account for these tricks, and be more accurate in its measurements. This is where problems started to arise.

As 1770 evolved to better track the loudness of commercials, many distributors mistakenly thought that the way to measure loudness of the actual programs was also supposed to change, and this was never the intent. Dialogue is and has always been the anchor, and A/85 has never said otherwise. We’ve all been told that a mix with an average dialogue loudness of -24 LKFS (within the ± 2 tolerance) is “not CALM-complaint” by someone who literally doesn’t know what they’re talking about.

What this means in practical terms is that when you throw away anchored loudness measurements, the perceived volume of the dialogue in any mix is going to vary greatly depending on what sort of other content you have. And by “vary greatly,” I mean get quieter.

A dialogue-centric show with few big sound effects moments or a soaring score will have a similar dialogue and Full Program loudness measurement. But a big, epic, cinematic “premium episodic” show (or indeed a movie) may have its dialogue pushed down 6 dB, 8 dB, or even more depending on the creative choices the mixers and producers wish to make. This is categorically at odds with the intent of A/85, and categorically not CALM-compliant.

That frustration is why we are here. The people who mistakenly thought mixes were all supposed to be Full Program weren’t people who were, generally speaking, particularly creatively invested in the mixes, so they were simply

following instructions and didn't have the decision-making power to change anything. Either that or they did actually have some power but didn't have the correct knowledge and were too stubborn to admit it. Yeah, I said it. You know who you are...

A few years back, Jim Starzynski, NBC-Universal's chief audio engineer, Chair of ATSC's S42 Audio Group (and longtime sympathetic ear to us mixers), asked me to contribute to an AES paper about the recent rise of subtitle use "AES TD1009—Improving Dialogue Intelligibility in Media." (It's a great report, and if you haven't checked it out, it merits some of your time.)

In the course of contributing to this paper, it became clear to me that by leveraging the weight of the CAS, we could lobby the ATSC (being the body that regulates broadcast television in the United States) to update A/85 based on the real-world experiences our members and the mixing community have had since its inception in 2012. At the same time this was going down, Marc Fishman CAS, Jamie Hardt CAS, and a group of our members formed the Industry Technical Standards Committee. The goal was to pool and leverage the knowledge and enthusiasm of CAS members into a brain trust that could do outreach and try to positively influence the industry in technical matters that affect what we do in the real world.

Early on, we focused on that all-important concept, the "Anchor Element," which had become almost universally neglected by the broadcast networks and cable channels—and one notable big streamer. The approach that a mix should have its loudness measured according to an audio element that the home viewer will perceive as the consistent "center" of the program makes so much sense that it's been mind-bogglingly frustrating to have to argue for it. For almost all narrative programming, the listener's focus will be the dialogue. For music videos or

A GLOSSARY OF STANDARDS

There is a veritable alphabet soup of standards and specifications pertaining to television sound, and it can be very intimidating—or at least mind-numbing—to mixers just trying to get the show to pass QC. Part of the goal of our committee is to try to demystify these and put them in their appropriate creative context. With that in mind, we've put together a short list of terms and concepts you may run into in an audio spec sheet.

Anchor Element — The loudness "reference point" around which the other elements of a program are mixed. If the program is dialogue-driven, the anchor element may be dialogue; if it's a music video or musical program, the anchor element may be music. The idea is that the anchor element is what a viewer would be paying attention to when they set the volume on their television, so if the anchor element is at a consistent loudness, they will never touch their remote.

ATSC — The **Advanced Television Systems Committee**, the body that develops the standards for high-definition television in most of the territories that had previously broadcast using the NTSC television standard: the United States, Mexico, Canada, South Korea, and several countries in the Caribbean (Japan previously used NTSC for television but does not use ATSC).

ATSC A/85 — The ATSC recommendation for the loudness of television programming on ATSC television. The ATSC recommends that for a long-form program, the anchor element meters at -24 LKFS, ± 2 LU. Short-form programs, such as commercials or interstitials, are measured over their whole program mix, not just the anchor element.

CALM Act — The **Commercial Advertisement Loudness Mitigation Act** of 2010 (Public Law 111-311), the U.S. federal law that authorizes the FCC to regulate the loudness of television broadcasts. The FCC in enforcing this law endorsed ATSC A/85 as the standard for audio loudness on US television broadcasts.

dBTP — Decibels True Peak. The projected maximum signal level of a recording after it has been converted back to analog or to a different sample rate.

Dialnorm — A metadata field present in a Dolby AC-3 audio stream that can signal to a decoder the relative level of the dialogue in the program at that time. If the broadcaster sets this field accurately when the program is transmitted, the receiver can adjust its output level to keep dialogue at a consistent level between programs.

Dialogue-Anchored — A qualification on a loudness specification, where dialogue is designated as the Anchor Element. Long-form content, according to the new A/85 recommendations, should be dialogue-anchored.

Dialogue-Gated — An Integrated loudness measurement that only counts those sections of the mix that contain speech, as detected by Dialogue Intelligence.

Dialogue Intelligence — An algorithm developed by Dolby Laboratories for detecting if speech is present in a short sample of audio. Dialogue Intelligence is used by loudness meters to implement their dialogue gating feature, to reject audio that doesn't contain dialogue from the integrated sum. Dialogue Intelligence is a trained machine learning model, with open weights, based on zero-crossing rate, spectral skew, and other audio features.

EBU — The **European Broadcasters Union**, an international organization of national broadcasters, mostly though not entirely in Europe that have created several standards for the exchange of programming

between their members. (Fun trivia: The EBU also operates Eurovision and the Eurovision Song Contest.)

EBU R128 — The EBU loudness recommendation among its member broadcasters. The EBU recommends, broadly, that a program to be mixed to an integrated level of -23 LKFS, ± 0.5 LU, although it does discuss anchor elements and makes recommendations thereof.

ITU — The **International Telecommunication Union**, a United Nations agency and successor to the International Telegraph Union that drafts voluntary standards over a broad range of communications technologies, including radio bands, television, satellite orbits, Internet protocols, and other things. The ITU publishes several standards related to the measurement of audio that ATSC and EBU standards rely upon.

ITU BS.1770 — The mathematical definition of an **LKFS meter**, as used by ATSC A/85 and EBU R128 to calculate LKFS, True Peak levels, LRA, and other measures. Any meter that has the three bars of momentary, short-term, and integrated loudness, such as the Nugen VisLM, Youlean Loudness Meter, Avid Pro Limiter, etc., is a BS.1770 meter. BS.1770 has multiple annexes ("-1," "3," etc.) that qualify the behavior of the meter and define how to measure wide multichannel formats and Dolby Atmos. LFE material doesn't count against the measurement, while surround channels are weighted at 1.41 to 1.

K-Weighting — A weighted spectrum used by BS.1770 to measure the perceived loudness of a program. K-weighting applies a high-pass filter with a corner around 40 Hz, and a high shelf with 4 dB of gain at a center frequency around 1,500 Hz.

LRA — Loudness Range. The difference between the loudest and quietest short-range measurements (in dB), after having discarded the quietest 10% and loudest 5%. ATSC A/85 does not recommend a loudness range, though some platforms maintain a voluntary standard as part of their specifications.

LU — Loudness Units. The unit of measuring program loudness defined by BS.1770. LU's are meant to be a subjective measure, reflecting how a listener experiences the loudness of a program or the subjective jump between a louder and quieter program, and is based on empirical studies. LU's are logarithmic over signal levels (an LU is equal to one decibel, after weighting and gating), and relative.

LUFS — Loudness Units, Relative to Full Scale. A measure of the loudness of a program in LU's relative to full scale. See also:

LKFS — Loudness, K-Weighted, Relative to Full Scale. BS.1770 Annex 2 tweaked the definition of the meter's pre-emphasis filter and named it the "K-filter," and accordingly renamed the relative measure "LKFS" to make this change clear. "LUFS" and "LKFS" are identical in modern usage.

Momentary Loudness — The integrated loudness, in LKFS, of the previous 400 milliseconds of audio. In a running program, momentary loudness is calculated every 100 milliseconds (each window has a 75% overlap with the previous window).

Per Segment or Per Act — A requirement, in some broadcaster specs, that each segment or act of a program independently have a complying integrated level. This is, we can accurately state, a folly.

Short-Term Loudness — The integrated loudness, in LKFS, of the previous three seconds of audio.

concerts, it will be the music. Although it does get a little less cut-and-dry for concert films, as the music can end up being pushed down relative to how the music is played in narrative shows. (This is detailed in the new A/85 under “Edge Cases,” along with narrative filmmaking that contains little to no dialogue, such as the film *All Is Lost* or the animated feature *Flow*.) Once the home viewer sets their volume to a level that is comfortable for the anchor element, other elements can be appropriately louder or quieter, and it won’t disturb the viewer as long as the anchor remains consistent.

A few years back, I was mixing a cinematic sci-fi show that would originally air on Hulu. It was around the time of the Disney acquisition, and we were originally sent the Disney+ -27 LKFS dialogue-anchored spec to mix to. Great, we said. Once we had mixed four episodes and started delivering, Hulu said, “Hang on, our spec is -24 Full Program.” To which I said, “Yeah, that’s a huge mistake, especially for a show like this.” Back-and-forth we went, and our showrunner got involved once he realized how much quieter it would make the dialogue. In the end, we convinced Hulu to let us deliver using the -27 dialogue-gated spec.

A while later on, Marc Fishman experienced the same thing with HBO on *The Last of Us*, as did Ron Bartlett while doing the nearfield mixes for *Dune*. Theatrical nearfield mixes are interesting because we often have to deliver multiple versions for multiple platforms with disparate specs. For the nearfield mix of *Dune*, the adjustment to Full Program Loudness for HBO Max pushed the dialogue considerably lower than the Netflix version. This delta can sometimes be in excess of 10 dB depending on the type of content you’re mixing. (In my opinion, *Dune* is almost the poster child for maximum dynamic range.) For high-concept episodics like *The Last of Us*, this can mean the dialogue level between

episodes can shift by a similar 6-10 dB. Again, Full Program Loudness for anything other than commercials was never the intent of A/85.

Marc and Ron had voiced concerns to WB about all this, and Kim Waugh scheduled a meeting with Tony Pilkington and Miles DelHoyo to discuss ways in which their loudness spec for streaming could be updated to provide a better experience for their customers. Ron and I had just mixed together, and he knew that I’d have something to say on the matter, so he asked me along. In that meeting, we explained the importance of dialogue as the anchor element; how this is the underpinning of A/85 and the CALM Act, and how it indeed also underpins how we mix. HBO listened. We had a very constructive conversation, and they updated their delivery spec as a result.

This shift away from anchor-based measurement results in a mix that meets the spec on paper but sacrifices significant dynamic potential and forces the re-recording mixers to meet a “budget” of loudness across the entire program. It also uniformly causes significant jumps in loudness at commercial breaks or between episodes, depending on whether or not a particular episode is very quiet or action-packed. It also creates inconsistency between episodes, which can become particularly evident when binge-watching. We set our sights on addressing this.

I joined the CAS ITSC (Industry Technical Standards Committee) after that meeting, and I succeeded Marc as Chair of the committee the following year. It quickly became clear to us that it made sense to combine the work I was doing with the AES, with the CAS committee, and with the ATSC, since we all seemed to be pulling in the same direction and identifying the same problems. So we wrote to the ATSC to ask them to consider updating A/85 based on lessons learned over the years.

The ATSC agreed and I represented CAS on the ATSC Sound Group (S42) meetings, chaired by the aforementioned Jim Starzynski, and we began crafting the update that would hopefully clarify, streamline, and remove all ambiguity from the concepts that underline A/85 and the CALM legislation.

During this period, it happened that the California legislature enacted SB576, which mandates that all streaming platforms available in California mitigate loud commercials by following the same standards as North American broadcasters via the CALM Act and A/85. This essentially means all streamers in the U.S. will be obliged to follow the same rules as broadcast TV, as they aren’t going to want to master everything once for California and then again for the other 49 states (similar to emissions standards). Illinois has already passed a similar bill. We see this as a very welcome development as it offers an opportunity to align streaming and “legacy” broadcast standards ... and hopefully, an opportunity to do it correctly.

ATSC S42 tried to move through the update in time for it to be approved ahead of the July 1 deadline for this law to take effect, and it passed on July 8 (so close!). The new version is in effect, actionable, and enforceable, and is available at <https://www.atsc.org/atsc-documents/a85-techniques-for-establishing-and-maintaining-audio-loudness-for-digital-television/>

One of the things Scott Kramer and I pushed for is Annex M, which appears at the end of the document, and is a handy, single-page table that essentially says, “If you’re making this, do this.” Hopefully, the simplicity of this goes some way to clearing up the misinterpretations of how to implement loudness measurements. The web page for A/85 now also contains a direct link to this quick reference table.

The ITSC is in the process of doing outreach to all broadcast and streaming

companies to assist in compliance with A/85. I will admit that after having spent the last decade arguing with mix recipients about what the correct loudness delivery should be, I take a small amount of Schadenfreude in being a contributing author to A/85. I promise not to lord it over anyone, though.

WHAT SETTINGS SHOULD I USE?

The key loudness takeaway from all my bluster is as follows:

Recommendations for Program Loudness Measurement (ATSC A/85, 8 July 2026 Draft)

For Long-form Content (feature films, episodic television, etc.)

- Long-form Program Content, excluding commercials and interstitials, is to be measured using **Dialogue (Speech)-Gated Loudness** per ITU-BS.1770.
 - Using BS.1770-1
 - Speech Gate should be **ON**
 - Using BS.1770-2/3/4/5
 - Relative Gate should be **OFF**
 - Speech Gate should be **ON**

For Short-form Content. (commercials, PSA's, interstitial content, music videos, etc.)

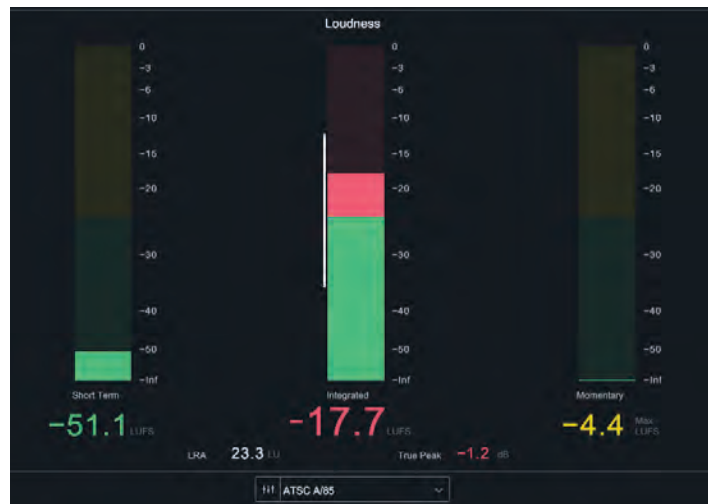
- Short-form Content is to be measured using **Full Program Loudness** per ITU-BS.1770.
- Use **BS.1770-03 or later**
 - Relative Gate should be **ON**
 - Speech Gate should be **OFF**

For both content lengths, the target loudness for content lacking loudness metadata should be **-24 LKFS, ± 2 LU**. The True Peak limit should not exceed **-2.0 dBTP, ± 0.5 dB**.

The updated A/85 will contain an annex to address the impending enforcement of California SB576, which will recommend a streaming loudness target within a range designed to accommodate existing standards and metadata-based workflows, with the same gating intentions laid out above.

ARE MY PLUGIN READINGS ACCURATE?

A slight sidebar here regarding a question I've fielded a few times between the Sounding Board events and general conversation, is why the various measurement plugins give different readings when they are supposedly measuring using the same algorithms and base-code for BS.1770 and Dolby Dialogue Intelligence. Until recently, I could never answer this, but through all I've learned from the brain trust that contributed to our weekly meetings, and by playing with the settings in the various plugins, it's become clear that it is down to incorrect settings in the included presets. Most presets for A/85 only include Full-Program gating, and if both

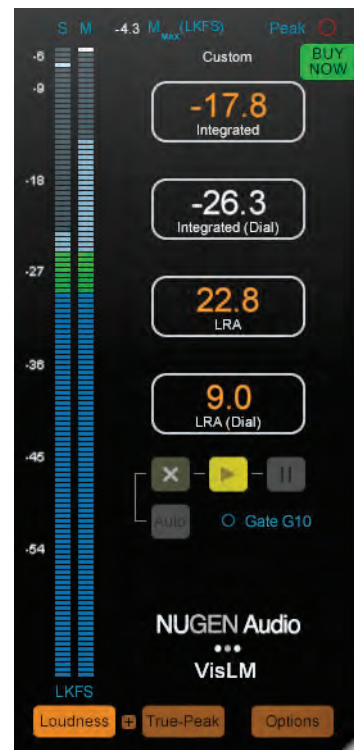


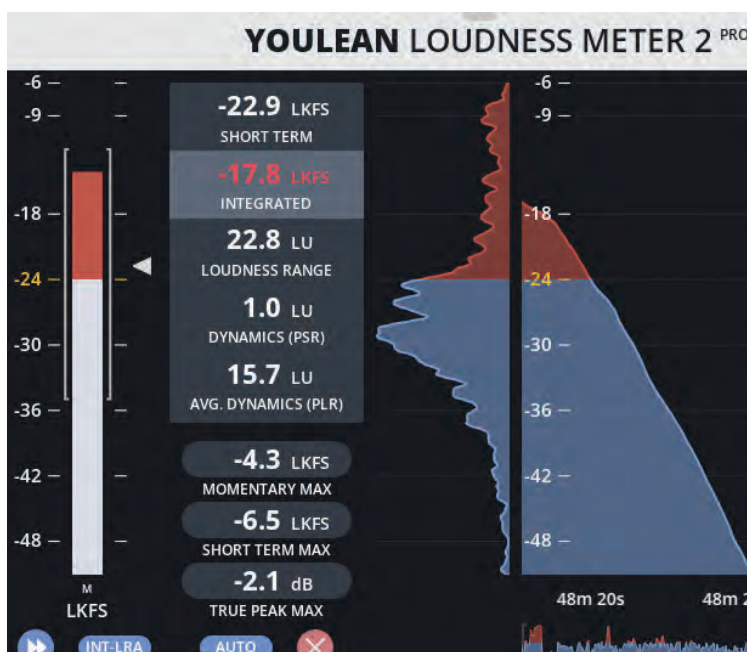
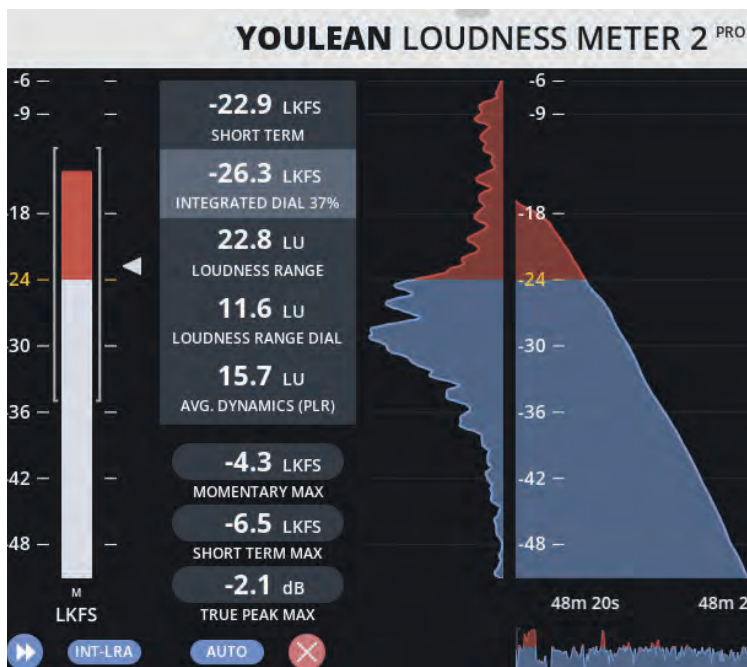
Top, iZotope Insight 2 displaying Integrated Dialogue vs. the same content measuring Full Program. NUGEN's VisLM displays both at the same time. Next page, YouLean Loudness Meter 2 Pro displaying Integrated Dialogue (top) and Full Program.

gates are enabled (dialogue and relative level), then it will give inaccurate measurements, along with inconsistent measurements between plugins.

As you can see on this page and the next, when Nugen VisLM2, YouLean Loudness Meter 2 Pro, and iZotope Insight 2 are set up correctly, they give very consistent results.

The ITSC outreach to the plugin manufacturers mentioned above will advise as to the correct settings to be accurate and compliant with U.S. loudness laws.





- It is important to note that with the exception of the range recommended for streaming, the fundamental recommendations of A/85 have not changed. The new recommendations primarily clarify language and address misapprehensions that have slipped into broad industry practices and parlance.
- Another noteworthy clarification is that ITU-BS.1770 is not a specification, but a technical white paper for the implementation of loudness measurement. A/85 is the North American loudness reference document.

Details on normalization, metadata workflows vs. non-metadata workflows, and edge-cases with little or no dialogue are provided in the A/85 revision released on July 8.

The ITSC is currently sending a letter to broadcasters and streamers to inform them of the updates, the correct implementations, and outline the specific areas that need review.

We are also doing outreach to plugin manufacturers to ensure that any presets intended for use in the U.S. accurately reflect the recommendations laid out in A/85 (these have historically been as varied and confused as the loudness spec sheets have been...).

So, if you run into any loudness specs that deviate from what's contained in this article, you can confidently say, "Your specs aren't CALM & CA SB576-compliant." And if you do, please feel free to include Standards @CinemaAudioSociety.org in your email chain.

INDUSTRY TECHNICAL STANDARDS COMMITTEE:

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 Scott Kramer

Back to the main takeaways from the update to A/85:

- Whichever loudness target is chosen, it is essential that the target should be the same for Long and Short-form Content in order to have smooth transitions between programming and commercials on any given platform. For example, if a platform normalizes its Long-form Content to -27 LKFS Dialogue Gated, it should normalize its Commercial Content to -27 LKFS Full-Program.

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Jim Lakin, CAS, Production Mixer
Fernanda Domene, ADR Mixer
David Stal, Scoring Mixer
Jacob McNaughton, Foley Mixer



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STUDIO ERGONOMICS

Since the lockdown in 2020, many of us have either started building or have built a personal edit or mix room. In the planning process, I often see posts on social media asking about the best kind of monitor, monitor controller, control surface, soundproofing and acoustical treatment, software, etc. Then I see the pictures of finished studios. These rooms look professional, well equipped ... and painful. Speaking from personal experience, I see futures of neck and back pain. I see carpal tunnel syndrome, tennis elbow, eye fatigue, and any number of creeping, long-term physical and mental issues with these workspaces.

by Charles Dayton CAS MPSE

As audio professionals, we tend to think in terms of the tools we need to do our jobs. But we don't think in terms of the human factor of ergonomics: How does the space fit you?

According to the Human Factors and Ergonomics Society, "Ergonomics is concerned with the application of what we know about people—their abilities, characteristics, and limitations—to the design of products they use, the environments in which they live and work, and the jobs they perform."

Here is an illustrative Venn diagram from the International Ergonomics and Human Factors Association because who doesn't love a great Venn diagram?

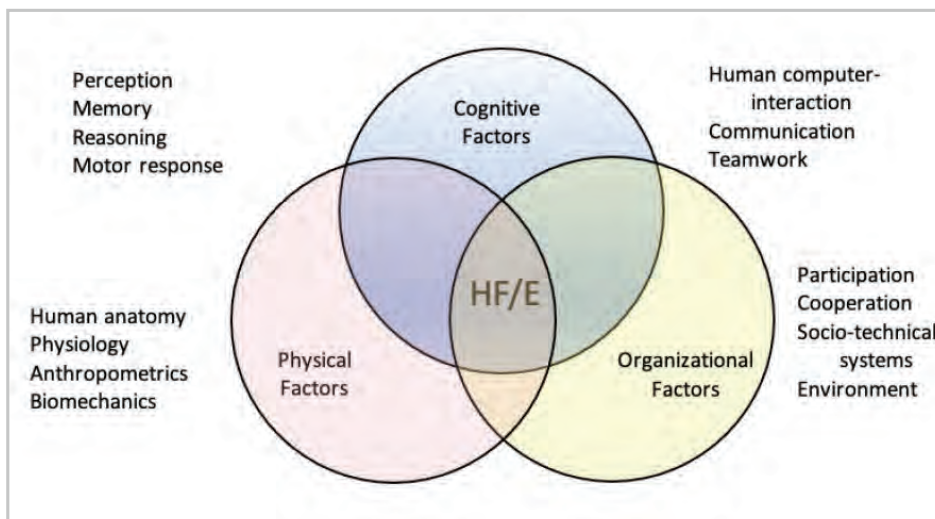
SITTING POSITION

Colleen Carroll is an adjunct assistant professor of clinical occupational therapy at USC. Colleen has a unique perspective on sound studios and ergonomics: Her husband, Joshua Reinhardt, is an ADR mixer and

sound editor. "In studios particularly, but with just about anyone who works at a desk, there's little awareness around body mechanics and how they come into play when people start experiencing issues like back injuries and neck issues. It's not typically on people's radar." She had her husband, Joshua, trade his conventional desk for a standing desk and anti-fatigue mat. This isn't a scenario for everyone. I couldn't stand and work, but for some, it's a solution. "It's good to take quick, short breaks where you're standing in between periods of sitting," Carroll observes. "The standing desk helped him."

Making sure your sitting position is optimal is equally important, she adds. "There's no one specific chair that anyone will recommend, especially ergonomists. It really depends on the person and their body. What we look at instead is the positioning of your joints. You want to make sure that your elbows are near your side and at 90 degrees, and your knees are at 90 degrees—that you're basically bearing weight through your feet. Make sure your feet are touching the ground; your chair doesn't go all the way to your knees. You want about two inches from your knees so that you're bearing weight through your thigh bones, along with some kind of lumbar support so your pelvis is in a neutral place of alignment. Adjustable armrests are advisable so you're bearing weight through your forearm and also making sure to have some support under your wrists, like a wrist cushion or similar. Neck support will help your neck stay in alignment as well."

An all-too-common assumption is that investing in a Herman Miller Aeron chair will resolve your studio's ergonomic issues.



AND YOU!

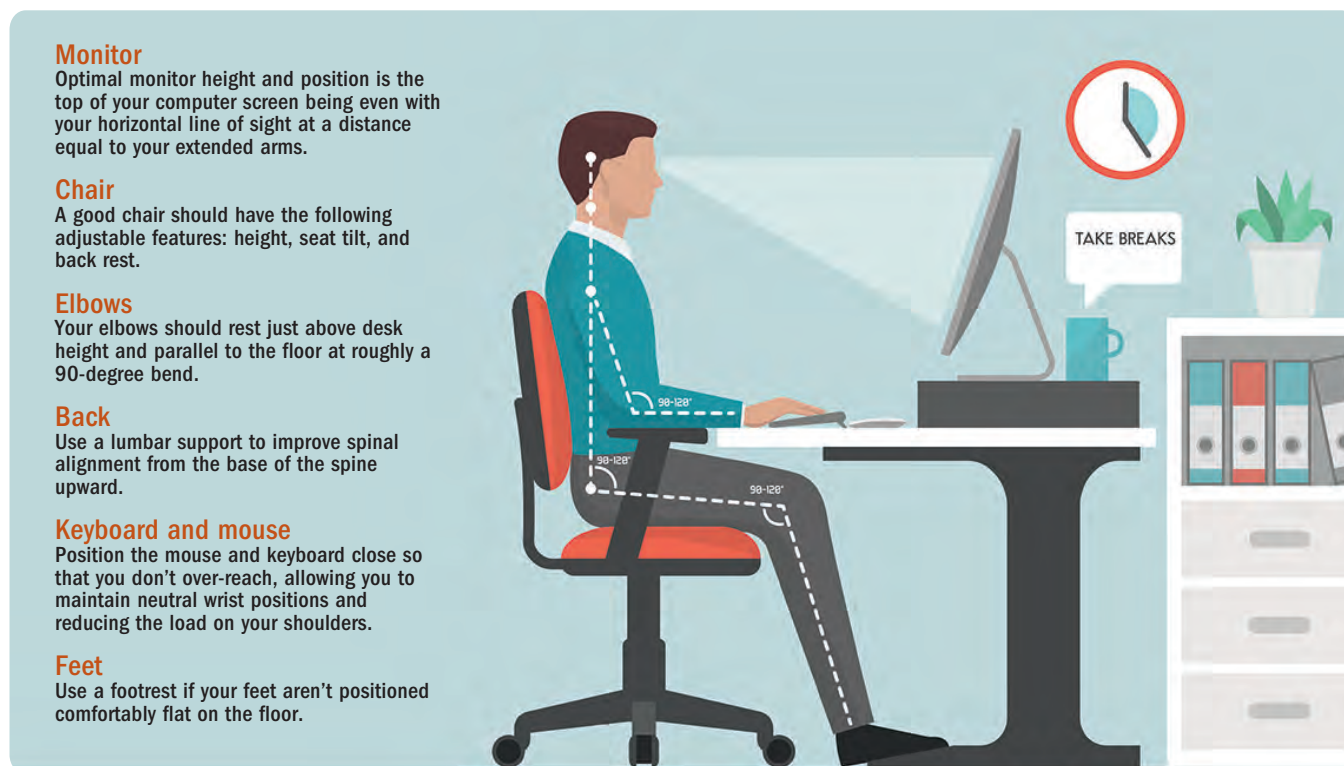
"A chair doesn't make you sit properly," Carroll observes. "It doesn't matter how expensive the chair is. If you don't have the musculature to support your joints being in proper alignment, it doesn't matter. Get whatever chair helps you to sit properly, even if it's just a cheap office chair. It doesn't really matter what chair you're sitting in, as long as you're in proper alignment."

She also stresses the importance of taking breaks. "You can be in proper alignment for hours and hours, but that's still going to cause strain on your body. That's why ergonomists don't recommend a particular chair. So, make sure you're still strengthening and conditioning your muscles. Anything that just sits stagnant for that long is going to atrophy. Making sure you're taking the movement breaks and doing some stretches will always help."

Russ Berger, FASA, founder of Russ Berger Design Group, whose projects include NPR Headquarters, NFL Films, World Wrestling Entertainment, and Steve Miller's Studio, remarks, "People will go out and buy one of the old Aeron chairs and not realize that for many, that particular design tends to cut into the back of your legs." Berger, who has designed and consulted on more than 3,000 studios, agrees that no one chair is right for

everyone. "Your back's in a chair eight hours a day, maybe more. And it's really important that it's comfortable. I mean, you start with the person. Are they tall, are they short, are they skinny, fat ... everything from the chair to the room has to start from there." It's here that I think Russ gets to the heart of it. The chair AND the room should be designed to a particular reference for the work you do, but also around the physical structure of the person using it.

Peter Grueneisen, FAIA, of nonzero\architecture (+studio bauton), Greeniron Constructs, whose projects include the Newman Scoring Stage at Fox and Levels in Hollywood, agrees. "Certainly, much has to do with the chair, but it's also the actual workstation. A lot of people build their keyboards into the desk, which is great because then you can fit more things in that are actually at the ergonomic height they should be. You have a center channel, you have computer monitors, and you have a TV or a big display for the picture; all these things really want to be in the same place. Basically, you want them to be in front of you. If you're sitting at a computer doing office work with just a computer monitor, that's very easy. But when you also need to somehow accommodate speakers and an additional larger display, you have to kind of stack it so they're almost vertically layered, which means at least one of those things is probably very high up. And that's where back and neck pain begin."





Russ Berger, FASA



Peter Grueneisen, FAIA



Colleen Carroll

SPEAKERS & SCREENS

That pesky center channel! If you put your picture above it, you're now craning your neck to look at the picture; I see that a lot in home mix and edit rooms. According to Colleen Carroll, "Your computer screen should be no more than two feet away when you're sitting. Your picture monitor is typically above it. That's bound to create some strain." Eye strain is fatiguing, as is craning your neck. Both can cause long-term injury.

So, what's the solution? Russ Berger prefers a projected image on a screen with speakers behind, rather than having your left, center, right speakers underneath. Projection and a woven or perf screen solve the problem of where to put the center channel without hurting your neck and back. But most budgets only allow for a flat screen TV, which begets the question: Does the center channel go above or below the television set?

"The real problem whenever you're setting up a dub stage or even a small mix room is getting that placement of picture," says Berger. "What if we raise someone in relation to the screen? Now we might have two rows, and somebody has to see over the head of the person in front of them—it's all the ergonomics again. It's an easy decision for me in making a recommendation—audio wins, of course! When you have a screen, you don't have to make those compromises, and many of today's projectors are quite low noise, making that a viable solution." It may be more expensive than a flat screen, but Russ' motto is, "Do the bare maximum!" Spend the money creating a space to do the job you need to do at your highest level. Find the pain point, budget-wise, you are willing to go to. This is your career, but also (one would hope) your passion.

That still leaves the issue of your computer monitors. As Peter Grueneisen explains, some clients like the large, curved monitors for their edit and mix screens. This,

again, presents the problem of the center channel being blocked. "Those wide, curved monitors eliminate any opportunities for putting speakers in between. So you really have to stack them vertically, because they basically take up the whole width of the room.

Often a better solution is to use two smaller screens and place the center channel in between."

"Every room, every technical space has the same challenge," says Berger. "We want to be in a room where we can see the picture we're working on. We want easy access to all our equipment at the right height, the right distance, the right reach. And we want to be able to hear in the room. All three of those elements need to align and the mix has to translate well to other systems. Ergonomics plays a big part in getting your room to reference accurately. When a client comes in and brings their color-corrected product, you want the image to look good; you need to be able to present something that's right. The picture really affects your judgment."

Russ continues, "When you're working as an audio professional, trying to get a mix to match the picture, the action, and the dialogue, working with a giant screen and little bitty audio, or big giant monitors and a little postage stamp screen, you know those don't reference right. Of course, you can do it—you're an audio professional and that's what you're used to doing. Getting elements from the field and working miracles is what you do. But you're burning brain cells to make that work right, and you shouldn't have to eliminate obstacles within your own space. What I'm getting at is, you really have to size up the person who's going to be working in the space, their physicality and how they're going to move around within that space, and then build the space around the healthiest way for them to do that." Anything you have to constantly adjust to is causing stress and fatigue, making you mentally tired, and possibly injuring you.

WINDOWS & LIGHTS

This gets us to the environment itself. Most of us sit in dark rooms all day. We are deprived of sunlight, greenery, fresh air, and bright colors. Lack of sunlight has been linked to depression. It decreases serotonin production

and vitamin D, both of which are necessary for our health. There's a joke about mixers and editors being like mushrooms: We sit in a dark room all day, and get fed bulls#\$t.

Our OT, Colleen Carroll, says, "Access to daylight is going to drastically improve your mental health. If you can see sunlight, maybe some trees, that can also help with your biorhythms, your circadian rhythm, and with your energy levels." Needless to say, not every studio can add windows or a skylight.

"Another thing you can do is add what we call 'glimmers.' It's something we use in mental health counseling. It's basically adding things into your environment that help create these micro moments of joy, peace, or just happiness that cue your nervous system to feel calmer. Maybe it's a bouquet of flowers or maybe a nice plant. Maybe it's a picture of your favorite landscape that's in your line of sight. When you look at it, it helps you to regulate in that moment. Maybe you can't add a skylight, but you can put up a picture of a nice landscape or the ocean or hang some plants.

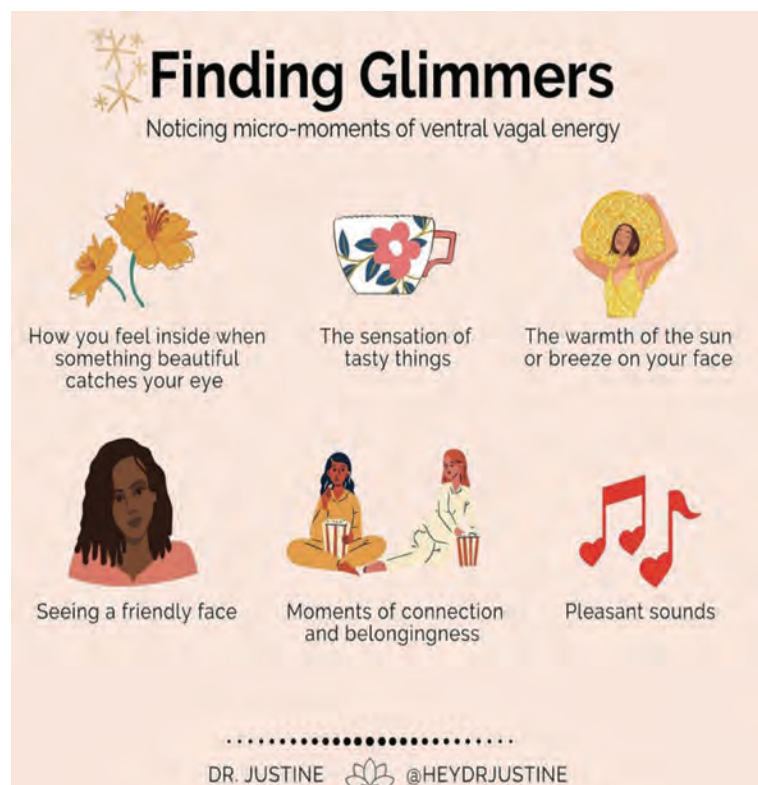
"I work in a basement with no windows, and I have house plants. You can get those little grow lights that plug into USB and they grow just fine. And because I work in a basement and don't have a window, I filled my office with pretty fairy lights, as well as the plants. These are things that bring me joy and help me feel more comfortable in the space that I'm in for hours and hours every day. There are LED bulbs where you can change the colors, and dimmers to adjust the brightness. You can use bright colors like yellows to help increase your energy levels. There are different sensory cues you can tap into to help you be more productive."

There's a mistaken notion that you can't have windows in a sound studio. Russ Berger likes to put windows in all his studios. "If you don't have something to look at, if you can't orient the building and everything so you've got a view, then we cut clear story windows in up above. A clear story window starts at about seven or eight feet and is maybe a couple of feet high or more, depending on your ceiling. You can have runs two, three, four feet wide, and you have pushed openings like that to the outside. So now, when you look up, you're looking at sky. It's very calming and pleasant."

If you can't have a window to the outside, there are lights that are full spectrum for people with seasonal

affective disorder. The type of lighting in your space can make a difference between being in a dim, uninviting cave, or a comfortable, properly lit space. Bad lighting along with bad monitor placement can lead to eye strain, fatigue, and burnout. This gets to the aesthetics of the lighting in the room. Is it inviting? Is it going to be stressful on the eyes? Are the colors going to be comfortable to work in? Peter Grueneisen agrees, "Lighting is a very good example of what we use to make a space comfortable and functional. One of the things we try to establish early on is where the client and workstation would be located, because that allows us to place lighting so you don't have any glare in your or your client's eyes, but also, where you don't have a shadow from your own head. That's something that often gets overlooked. And we do like to have things clean, so recessed lights are what we use. Spend time on finding the right spot from the beginning. A lot of lighting in studios, as you know, is pretty low and dimmed down. To have the ability to dim, without cutting off or flickering or buzzing is important. Getting the sort of lighting that won't get in the way of you being able to see the picture properly is a necessity."

Peter continues, "And there are a lot of options—different beam widths and angles and all that. And then, maybe you want some ambient lighting that kind of gives you a comfortable feeling in the room that's not actually task lighting. You need to go with fixtures that are really commercial grade where you have this type of setup. If you just go and buy it at a hardware store, a lot of times you don't have any of these options and it's just a light





THE HAND

Let's talk about mice. There are trackball mixers and editors and there are mouse mixers and editors. I'm sorry, trackball enthusiasts, but you are headed toward carpal tunnel syndrome. Oh, and mouse lovers, stop gloating, you are, too.

Not only CTP, but also tennis elbow, pinched nerves in your shoulder, etc. Colleen Carroll does not understand the attraction to the trackball. "What is the fascination with that?! It is not ergonomic! It makes you bend your wrist more. You can use a standard mouse with a wrist rest, but an ergonomic mouse is better."

Colleen continues, "When we look at the wrist, we want it to be in what we call 'functional position.' So, you're in this 90-degree position, kind of like you're holding a sandwich with your fingers. It supports all the bones in your wrist and all the ligaments so you're not overly straining them. It does take some getting used to, but it also helps because you're bearing more weight through the bottom of your hand, which can take more of the weight. You're not creating the carpal tunnel effect, like when you're bearing weight through your palm and the bottom of your wrist. This is a position we put people in when we splint them for hand or wrist injuries. We put them in this position because it is the most efficient way to help the joints heal. It's the one that's going to cause the least amount of strain."

Even though I am hyper aware of wrist placement, I still ended up with wrist pain from using a mouse. When you're tired, no amount of "knowing correct form" will keep you from losing it. You need something that supports proper position, even when you're tired. There are wrist rests and little bean bags that can help keep a wrist straight, but the ergonomic mouse and trackball mouse, which takes a little getting used to, is better.

We have talked about chairs, monitor placement, lighting, mice, mental stimulation... Did I mention getting out of your seat for 10 to 15 minutes every two hours? Get up! I once had a client call me the "long haul trucker of mixers. You haven't left that seat in over six hours!"



that's like any other light that people would put in a bedroom or a garage." You don't want to be squinting and fumbling to find the knob or button on your amazing mix surface. It slows you down and creates frustration and stress, along with eye and back strain.

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**“A WHOLLY
UNIQUE SERIES
THAT HAS
NO EQUAL”**

Collider



Fallout

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My first studio. Notice the two computer monitors to the side. You can't see the non-adjustable office chair. I'm smiling here, but when the neck and back pain started, the smiling stopped. (That TV was on an electric lift!)

Not good. Have I mentioned drinking lots of water? Coffee doesn't count! Get one of those bottles everyone is carrying around these days. Fill it with water—and make sure you finish it every day. Trainers and nutritionists recommend a half ounce for every pound of body weight. This will have two positive effects. One, you will stay hydrated and your kidneys will thank you. Two, it will make you get out of your chair—and walk to the bathroom! Your kidneys, legs, and back will thank you.

Your physical and mental health is a cooperation between yourself and the environment. The ergonomic chair is only as good as your ability to use it properly, which includes making sure you have some core strength to sit up straight. Same for the mouse, the lighting, and the glimmer.

LET'S WRAP IT UP

There is so much to cover. We haven't talked about how those amazing, huge, distortion-free monitors—in your

small room—are letting you listen at high levels without fatigue. This is one instance where no fatigue is still good, but a caution flag needs to be thrown on high SPL over long periods. Take a listening break.

I could go on, but my editors have informed me there are actually other articles that need to fit in this issue, and I'm costing them a fortune in printing. [Thanks, Charles. —Ed.]

Here is the big takeaway. You are the most valuable asset in your business. Take care of yourself. Get great equipment but make sure you are healthy and happy enough to use it by making sure your space isn't hurting you.

One more comment from our OT Colleen Carroll: "When you are starting to feel that strain on your body physically, it can also affect you mentally. This translates to having less energy and less motivation, feeling more downtrodden. It's hard to be creative and productive when you don't feel good. Having the proper setup in the studio where you work every day is going to set you up for success and make you feel like you're thriving and want to do the things you're passionate about. This is called 'behavioral activation.' I think it's really helpful to have that foundation so you can be successful physically and mentally. This is your livelihood. You have to make sure you're focused and clear-headed. Fatigue and injuries can pile up and sap your creativity and will, and it can lead to depression."

Don't let that happen to you!

Happy ergonomic studio planning and building!

Functional Position of Hand



- Wrist is in 20 to 30 degrees of extension and slight ulnar deviation
- Fingers in 45 degrees of MCP, 15 degrees of PIP and DIP flexion
- Thumb is in 45 degrees of abduction



Ergo mouse



Ergo ball

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Widow's Bay

Music in the Mix: SCORE AND SONG IN DOLBY ATMOS

by Dennis Dembeck CAS MPSE

Dolby Atmos is now the standard for theatrical film sound. But while the format has transformed the way sound designers and re-recording mixers approach their craft, the workflow for music—for scores, songs, and the full orchestral palette of a studio film—has its own practices and disciplines. How do you plan a music mix when dialogue and effects need their share of a finite pool of objects? How does a scoring mixer prepare stems that give a re-recording mixer real creative options in the final mix? Where does the orchestra actually live in an immersive sound field—and when should it move? How do you build reverbs for a format with so many possibilities?

There's no single answer, but there is a single thread. The mixers who do this well share one habit: They plan the music long before anyone touches a fader. To see how that discipline plays out across the pipeline, we spoke with three of them—a re-recording mixer, a scoring mixer, and a composer-mixer who does both. In addition to being a former CAS president, **David E. Fluhr CAS** is the Supervising Re-recording Mixer at Walt Disney Animation Studios, an Atmos practitioner since the format's earliest days, and the architect of the studio's native Atmos workflow. CAS Career Achievement Award recipient **Dennis Sands CAS** is one of Hollywood's most accomplished scoring mixers, with more than 400 scores to his credit who, in 2013, opened the first film music mix room in the world outfitted with Dolby Atmos. **Michael Phillips Keeley CAS** is a re-recording mixer and composer who built one of the earliest certified Dolby Home Atmos studios where, occasionally, he handles both the writing and the mixing himself. Three vantage points on the same craft—and a shared conviction that the format should serve the music, never the other way around.

How do you think about what Atmos brings to music—your overall philosophy with the format?

David Fluhr CAS: For me, it's about supporting and enhancing the story using sonic imaging. When I started working with objects, I realized you could give the orchestra a presence in the room that we've never had before without disembodimenting what the score mixer has done. It's not about taking the strings and flying them around. It's about creating elevation and using objects to create "custom arrays," so the orchestra is no longer competing for the same sonic screen real estate as the dialogue and effects. You can actually hear more of the music, with more definition, because you've given it space. And for source music, you can place specifically pinpointed on the wall, or right in the space—we couldn't do that as accurately before.



Dennis Sands CAS



David Fluhr CAS

The other part is that a well-planned Atmos mix improves all your other versions, too. The LCR and sub are consistent across every format and rarely change—theatrical Atmos, 7.1, 5.1, except for IMAX (but there is a separate workflow to generate IMAX from Atmos). It's the surrounds and the immersive layer where the versions differ. The soundtrack tends to get a bit heavy in the surrounds when folding down, so I like to balance the weight back toward the screen while creating custom 7.1 and 5.1 print masters in a deliberate, listened-to process—not an automatic downmix.

Dennis Sands CAS: I've aligned my monitoring to the Atmos format, so I'm always thinking spatially even when I'm not delivering a full Atmos mix. If I could, I'd do the whole mix using objects—they can really create great definition in a mix. I don't typically use the overhead channels in the beds, though. I've found it can make the whole thing sound smaller for some reason, and a bit blurred. If I'm using the overheads, it's always with object placements. The reality is I'm limited by how many objects I'm allowed to allocate based on the I/O of the re-recording stage—dialogue and effects need their object count as well.

Michael Keeley CAS: On projects where I serve as both composer and re-recording mixer, one of the greatest advantages is being able to make creative decisions much earlier in the process. When I write a cue, I'm already hearing it in three-dimensional space. Because I compose directly within my Dolby Atmos template, spatial choices become

part of the writing itself. A synth texture can wrap around the audience, a percussion hit can feel physically present in the room, and an intimate piano can occupy its own precise space without competing with dialogue or other elements. Rather than trying to create that dimensionality later in the mix, it is built into the composition from the very beginning.

Walk us through your prep. How do you plan a music mix before you start?

David: I have what I call an Atmos planner—a detailed spreadsheet that maps out all 118 dynamic objects and the beds before we ever hit the mix stage. The full soundtrack is planned this way. But for music specifically, every lead vocal gets its own object (or shared objects if voices are far enough apart in time), and every principal orchestral stem channel has pre-assigned objects as well—front, back, overhead—each one placed and sized in advance. The music reverbs can live as beds or objects depending on the number of allocations I need, again, planned in advance, along with other music stems like most percussion, bass, and miscellaneous tracks.

On a heavy musical like *Moana*, I was given 19+ 7.1 stems from the scoring stage. *All* the LFE went to the music bed. The orchestral stems became objects—high strings, low strings, ethnic percussion, keys, guitars, synthesizers, ethnic woodwinds—each placed in a custom array I'd designed before we started. The original song orchestra, which is recorded separately but in the same space as the score orchestra with the same 19+ stem layout, was planned the



Dennis Sands' room at Sound Waves SB

same way in the same room and the same stem formats, so the score and songs shared a continuous sonic world. Those stems share the same custom arrays as the orchestral stems so that there are seamless transitions. I send my planner to my mix tech several days before we hit the stage, and I build my music and vocal sessions in my own room before we even set up on day one. That way, when we walk onto the mix stage, we're not planning on day one—we're mixing.

Dennis: I'm always thinking about the re-recording stage when I'm mixing the score, no matter what format. If there's an intimate dialogue scene with a woodwind solo running through it, I'll put that solo on a separate stem so the re-recording mixer can adjust it without pulling all the music down. If there's a big bottom-end sound effects moment and I've got heavy orchestral drums underneath, I'll stem those separately so they can be managed against the effects. I'm always preparing for the re-recording mixer while being loyal to the composer's vision—and usually it's not too complicated a process. Good composers are filmmakers. They're writing their music to get into the movie, not to fight with it.

Michael: Most of the time, I'm working either as a composer or as a re-recording mixer, so I maintain two separate custom Atmos templates that are tailored to those workflows. My composing template is built around a large collection of hardware synthesizers, software instruments, custom plugin chains, and Atmos native routing that lets me create and hear ideas in an immersive environment from the very beginning.

Over the years, both templates have evolved organically. Rather than starting from the same template every time, I typically build on the workflow from my most recent project and use that as the foundation for the next one. That way, the

template is constantly improving based on real-world projects and new creative or technical discoveries. The templates include custom plugin settings, SoundFlow automation, and routing that allows Atmos, 7.1, 5.1, stereo, and binaural outputs to all come from the same session.

The goal is to remove as much technical friction as possible. When deadlines are tight and budgets are limited, I don't want to be building sessions or troubleshooting routing. I want to be making creative decisions. Having those templates already built means I can focus on the music, the story, and the emotional impact of the mix or score.

How does that planning extend to your relationship with the scoring mixer or composer?

David: I have a few conversations with the scoring mixer and the composer weeks before the score is recorded—sometimes months before, because I've been living with the film through all the temp mixes for several years in most cases (being in-house allows this). I'll discuss what stems I'm going to need and why. For a musical, I might request that the high strings and low strings be separated, that the different percussion such as orchestral, drum kit, and ethnic percussion be on their own stems, that the song orchestra record in the same room and the same stem format as the score orchestra—so when you move from a score cue into a song, it doesn't sound like a needle drop. The imaging transitions naturally because both were conceived the same way. All of that is decided before a note is recorded.

Dennis: Typically, I'm delivering 7.1 or 5.1 stems—sometimes 7.1.2 or 7.1.4 to the re-recording stage. There have been mixes where I've delivered my Atmos score mix to the stage

by sending Pro Tools sessions, but that can become a cumbersome workflow for the music editor and the re-recording mixer. Keeping my deliverables channel-based keeps an efficient workflow, and I'll communicate any creative Atmos ideas to the re-recording mixer directly. So, I usually give them a well-thought-out 7.1 or 5.1 stem set with meaningful separations and the flexibility to do what they need in the final mix.

From the scoring side, I'm the one preparing those stems, and I'm always thinking about giving the re-recording mixer real options. The solo woodwind on its own stem, the heavy drums separated from the rest of the orchestra—those decisions exist so the person at the stage can solve problems without throwing the whole cue out of balance. Good composers make this easier because they're already writing with the dialogue and the effects in mind. They want the music in the movie.

Michael: On one of my most recent projects, an independent horror feature called *Valley of the Horntak*, I served as both the composer and re-recording mixer. Working in both roles allowed me to plan the entire sonic process from the earliest recording sessions through the final mix. We recorded percussion at LA Percussion Rentals in Santa Clarita, which has an incredible collection of instruments heard on scores ranging from *Back to the Future* to *Star Wars* and many others. The percussion was captured in 9.1.4, allowing the size, movement, and spatial detail of those performances to carry all the way through to the finished soundtrack. When we played the recordings back in my 9.1.4 studio, it felt as though you were standing in the room with the instruments. Achieving that level of immersion on an independent horror feature was especially rewarding. Although the film may not receive a full theatrical Dolby Atmos release, we screened it in 7.1 at AMC for the cast and crew, and the benefits of building some of the instrumentation natively in Atmos were still clearly audible. Even in a traditional surround environment, the added depth, scale, and spatial detail translated great.

Where does the music actually live in the room? How do you think about placing it spatially?

David: I create and use custom object arrays to place the 5.1 or 7.1 orchestral stems. I'll place an object in the room respectively for each

channel and adjust the height and size for each object based on what's working for the story. The low strings might sit in a base layer, just slightly elevated off the screen. The woodwinds a little higher. The brass a little higher than that. I'll also sometimes have the surround objects sitting a bit higher than the LCR, which creates a sort of ramp from the screen to the audience. The imaging gives the orchestra spatial definition, but it still feels unified—you're immersed in it, not disoriented by it. And by lifting it slightly off the screen, we're not sharing real estate with sound effects and dialogue. The music has its own consistent sonic image in the room.

Dennis: The orchestra needs to be the anchor and stay grounded for the most part. I'll use elevation with objects. For something like choir, I'll often elevate it separately from the orchestra—not to disconnect it, but to give clarity. You can hear the choir and the orchestra as distinct things without them feeling disconnected. Someone like (composer) Danny Elfman uses choir on almost everything, and that separation can be the difference between a muddy texture and a genuinely immersive one.

Michael: For me, the biggest thing is being able to place something exactly where you want it and let it own that space. Instead of panning a piano off to the side and adding reverb to push it back, I can place it right up front with real size and presence, while giving the bass and other instruments their own defined locations. A lot of the power comes from confident placement—deciding where something belongs and committing to it. When every element has its own space, the mix feels bigger, clearer, and more immersive.



Michael Keeley CAS



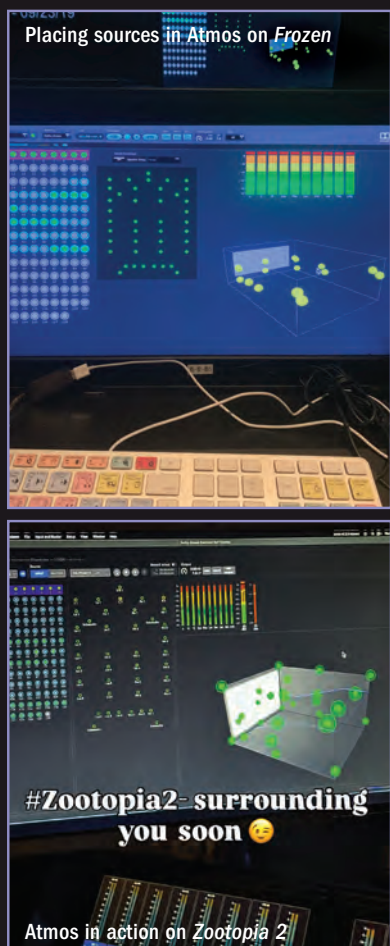
Michael Keeley's room at Sound Striker

know what dialogue and sound effects are doing in the same spots. It gives us the creative control we need to play well together—as well as handle any notes from the directors or executive teams.

Dennis: Typically no, not for the core orchestral elements. But there are specific things—electronic effects, pads, little events that happen in a big hybrid score—where moving them around the room is really cool and really effective. That's where objects shine for music. There's so much to choose from in these big hybrid scores, and some of those electronic elements lend themselves beautifully to placement and movement in the space.

Do objects move much in your music mixes?

David: Once the foundational orchestra is set, I don't like to move it. It can become distracting. But story-driven moments are different. In *Zootopia 2*, Gary De'Snake had a flute theme, and after discussing with the music team and composer Michael Giacchino, added movement that lived directly overhead every time he appeared on screen—with enough reverb that it bloomed across the top and draped down the sides, so it wasn't a jarring "look up" effect but a thematic presence that set his character apart from the orchestra. In *Moana*, the Pacific Islands voices would move overhead and around the audience at specific spiritual moments in the story. But in both cases, the story was telling me what to do. The format was serving the narrative, not the other way around. These are examples of why we prefer to leave the Atmos musical imaging to the final mix and not be locked in before we



Michael: For music projects, I'll move things when it serves the music, especially electronic and synth-based elements where movement can become part of the performance itself. But I'm not moving things around the room just because Atmos makes it possible. The placement is usually the statement; the movement is the exception.

One example was mixing Jónsi, the lead singer of Sigur Rós, on his *Obsidian* album. I experimented quite a bit with the Atmos Music Panner, moving instruments through the room in ways that became part of the composition. In one case, I was simply experimenting and ended up drawing my initials in the Atmos Music Panner and having an instrument follow that path rhythmically in time with the track. What started as me just playing around actually created a unique motion and energy that we didn't anticipate. It sounded different, interesting, and ultimately made its way into the mix.

How do you approach reverb when mixing music in Atmos?

David: I use a combination of multiple stereo reverb instances as well as multichannel reverbs in beds or objects to be utilized as needed for crafting the final mix—using front, back, and sometimes overhead reverbs and or delays, each with slightly different settings; different pre-delays, slightly different EQ on the input, maybe a little longer decay in the back. This gives me independent control over the reverb image in each part of the room, and it makes folding down to 7.1 and 5.1 much cleaner—I can just ride faders to tailor it. I'm generally conservative with reverb when it comes to the music, though. Too much blurs the image. I mostly use it for extending tails or for establishing a specific space the story

calls for, not for automatically “blanketing” the score in halls.

Dennis: I build a lot of my own multichannel reverbs within Pro Tools. I might love a particular stereo reverb, like the UA EMT-140, and want to use it in an Atmos context, so I build it manually using multiple stereo objects, one per point in the space. It works, but it takes time. One of the current limitations I’d love to see Dolby address is object linking. Right now, you can only link a pair of objects. So if I’ve built a reverb across many objects and I want to move it in the room, I have to do it two objects at a time. There have been mixes where I’ve wanted to do something genuinely creative and build custom setups with my vintage outboard gear, where the sound is unmatched compared to digital plugins, but sometimes I have to stick with what’s fast and efficient.

If I am using a multichannel reverb, I’ll go straight to something like iZotope Symphony 3D or LiquidSonics Cinematic Rooms. Reverbs were always one of the weakest, last things to become really usable in the plugin realm for music. Most of them took a while to get to where they were sonically pleasing and felt natural and real. Those are two I trust now.

Michael: Lately, I’ve been loving incorporating hardware reverbs into Atmos mixes. I still use plugins like Seventh Heaven, which I love, but there’s something special about running a pair of Lexicon Model 200’s as front and rear quads and then building an immersive environment around them. Sending my Prophet 5, Xpander, or Juno-60 through those reverbs creates a depth and character that’s hard to replicate any other way. The combination of classic hardware and Atmos can sound absolutely incredible, giving the listener the feeling of being completely surrounded by the space rather than just hearing a reverb effect.

For mixers who don’t have your resources—time, gear, a dedicated stage, engineering staff—do you have any advice?

David: Whatever time you have, spend a meaningful part of it planning before you hit the stage. Even if you don’t have weeks, you can have a conversation—communication is very important with everyone involved. Talk to the composer, music editor, or post supervisor if there’s no dedicated score mixer, before you receive music turnover. Find out what stems they’re delivering. Tell them what you’re going to need. Even on a tight schedule, knowing in advance how to set up your template will save time in the mix.

If you’re working in Atmos, build even a simple object plan. Know how many objects you’ll need for each food group, and if objects are limited for music, make sure there’s a plan. You don’t need all 118 objects and six beds to benefit from the format—you just need to arrive with a mapped-out plan for

the mix. And keep it simple. I’ve seen mixers hurt themselves with templates so complicated that when something failed, they couldn’t troubleshoot it with a room full of people behind them. As with *any* format, Atmos can “get away from you” and get gimmicky. I’ve had challenges in the early days as we were doing the R&D, but I’ve now learned what I can manage—and it works. Start with what’s reliable and build complexity slowly. Above all, use the format to serve the story, not to demonstrate the format. The question is never “What can I do with Atmos?” It’s “What does this scene need?”

Dennis: I have two recommendations for all mixers—one is personal and one is technical. On the technical side of mixing, always think of balance. I feel that’s the single most important aspect of a good mix. It speaks to panning, EQ, production, reverbs and will, at least in my opinion, make or break a mix.

On the personal side, be nice and always remain calm. Be nice to everyone you work with. We live in a very high stress environment and business. People have a lot of pressure to create a great product. Additionally, in the film world I work in, there’s a lot of money riding on the film’s performance. Finally, remain calm especially when technical issues stop the flow of the session. We work in a very intimidating environment with equipment that most people don’t understand and certainly don’t know how to operate. So when something goes down, they get concerned and if you display anxiety, they will freak out. Find a way to work around the problem calmly (there’s almost always a way around any issue). That’s your job! If you’re nice and calm, people will want to have you around. That’s a huge part of success.

Michael: Don’t get caught up in thinking you need a huge stage or unlimited resources to work in Atmos. Start simple and focus on the creative decisions. The technology will keep evolving, but good storytelling and good musical choices don’t change. If you can, build your project in Atmos from the beginning so those decisions carry through every deliverable. Most importantly, spend your time listening rather than fighting the workflow. The simpler and more reliable your setup is, the more creative you can be.

For all the differences between a Disney dub stage, a scoring room, and a home Atmos facility, the three keep circling the same idea. What unites them isn’t a plugin or a speaker count—it’s that they all do the hard thinking early so that when the room is full and the clock is running, they’re free to listen to the music instead of fighting the format. The objects, the beds, the custom arrays, the reverbs built one channel at a time—it’s all just scaffolding for a decision that hasn’t changed since long before Atmos existed: Where does the music need to be, and what does this moment need to feel? The format only gave them more room to answer.

Localization Mixing for Animation: How to Avoid Getting Lost in Translation

by Daniel Vasquez V. CAS



Daniel Vasquez V. CAS

I remember talking to a cinema theater complex manager in South America about 10 years ago who told me that presenting the original language only—instead of the localized, dubbed version—could drop ticket sales by up to 90% for certain titles. That shocked me.

Upon research, I found that according to the Film Distributors' Association¹ international markets account for approximately 73% of worldwide theatrical box office and, as an example, consumption of dubbed programming on Netflix grew 120% from 2020 to 2021, as published by the *LA Times* in 2022². And that is something that concerns us as mixers as it is directly related to our craft, which involves storytelling, narrative, creativity, technical mastery and of course, it has an impact on the business side of the industry.

The question about the need for localized or dubbed content constantly arises, and data shows that audiences are demanding content in different languages. Some people prefer the original language with subtitles, often referred to as "domestic" when English is the original language. While others, for different reasons like cultural links, language abilities, reading abilities, or talent preference, prefer the localized version. Research shows that in dubbing-dominant markets—like Russia, Germany, Spain, and France—most audiences prefer dubbed content. In the U.S., however, there is a slight preference for subtitled content, but dubbing still accounts for a significant percentage of viewers³, especially with more mature audiences.

In the Winter 2024 edition of the *CAS Quarterly*, Kurt Kassulke CAS published an article called "Localization Mixing," in which he interviewed Bob Bronow CAS and Serge Perron CAS. They explored the craft of mixing and provided great insights on the topic—which sometimes is an overlooked and underestimated process that is vital for connecting with audiences worldwide and for the financial success of many productions.

This current article develops further on localization and dubbing, focusing on animation and covering aspects like pipelines, recording, differences between types of animation, and specific differences with live-action dubbing, and contrasts the process between some independent facilities and major studios.

Beyond expressing my personal experience on this topic, I also had the opportunity to discuss this with other professionals. **Serge Perron CAS**, a re-recording mixer with extensive experience in dubbing for live-action and animated productions, whose credits include *Squid Game*, *Godzilla Minus One*, *Blue Period*, among others. He currently works at VSI, an international company specializing in localization. **Nicholas Fluhr** is a dialogue

mixer and recordist for localization who works for Dubbing Brothers, a multi-national company with vast experience in dubbing. **David E. Fluhr CAS**, Supervising Re-recording Mixer for Disney Animation, CAS Award winner, and former CAS President, takes us in-depth into the details of how thorough and meticulous Disney Animation's approach to localization is, and how he has played a vital part in building such a system, elevating the brand, and taking care of audiences worldwide.

What Happens Before Any Line of Dubbed Dialogue Is Recorded?

Before any line of dubbed dialogue gets to the mix stage, a huge amount of work is carried out by a multi-disciplinary team. Once a project is ready to be dubbed, the dialogue needs to be translated, adapted, and recorded.



Nicholas Fluhr has worn different hats at Dubbing Brothers and currently works mainly on the recording and editing side of the process. He explains the overall process from the producer's point of view. For a localization project, the producer is responsible for managing the project, with two main areas of responsibility. This can, of course, vary from project to project and from facility to facility. On one side, the producer hires the directors, adapters, and talent. On the other is audio, with mixers, recordists, and editors.

Directors oversee the overall creative aspect of the dubbing process—they do the casting if it isn't given by the studio, select the talent, and guide them through the desired performances. "Casting directors would work with a director, and we can do auditions, depending on the complexity of the role. It's a very collaborative process.



Nicholas Fluhr

However, for some projects, the directors are the ones directly in charge of casting. Directors who have been doing this for a long time know a lot of the voice actors—there are a lot of regulars,” explains Nicholas.

The adapters are the scriptwriters that take the direct translation of all the dialogue lines and adapt them into the new language, considering cultural aspects for specific terms or expressions and semantics. They are also responsible for the synchronization of each syllable to ensure lip sync. They use systems to identify the plosives and closed consonants, to ensure these are properly synchronized, as these are the letters and sounds that have the most impact on perceived lip sync.

Producers analyze the project carefully to put directors and adapters on the same page “so that when we get into the recording stage, everything is right—this is the right currency, this is the right number, this is the right name,

this is how you spell it. So it is important to coordinate all of that, and your project manager is the key to that. Once everything’s written, your director watches the show, everyone’s caught up on the show, then you’re ready to go into recording,” he adds.

Then there is the other side of the process—the audio. Here, dialogue mixers or recordists are in charge of recording the adapted dialogue on the stage, and usually the takes are selected at this point. The recordings are then passed onto the editors who ensure that sync is correct. They tidy up the fades, clean noise or any inconsistencies, and make sure every character is on their corresponding track, and the session is ready to be mixed. Then the re-recording mixer takes the dialogue plus any assets like M&E, stems, or the original session, and performs the mix—more on this later. The final step is QC, where they make sure that the localized version effectively replicates the intentions and technical

characteristics of the original language, and that technical specifications are met.

The Recording Session

Nicholas mentions that in his experience, the recording process of an episode for each language could take anywhere from a week to four weeks, depending on the size of the show. “Obviously, if it’s a 30-episode show, you’re going to be working on it for a couple months. You make sure that there’s a lot of communication between production, engineering, and the recording team because there’s bound to be some confusion.” Some problems that could arise are, for example, missing lines of dialogue, mispronunciations, and even changes of lines or cast. Therefore, coordinating pickups is also part of the production process.

Nicholas explains his process. “I set up the Pro Tools session. It’s ready to go with the original dialogue mix and the M&E in the session. Once the Pro Tools session is set up, I do a quick mic check. We use different microphones depending on the scenario. Right now, I’m using a U87. We’ll change the mic depending on the show. Then I’m constantly riding the gain. You watch the original language with the actor once they’re in—you clock that as a recordist. Okay, they’re really whispering here, and then they get loud, and then they’re whispering there. I have to track that on my setup and make sure that I get the signal without clipping. It’s a very collaborative process with the director. I’ve worked with some amazing directors—they’re paying attention to the performance, I’m honing on the sync and the quality, like checking for phlegm, plosives, color, and sync, while the director is listening for inflections and emotion. That collaboration makes the product better.

“Listening to the original language for reference is king. Our actors are really good at picking up those little nuances that you get from the original language that you need to replicate. And that combines everything. That’s your mic placement, that’s you riding the gain, that’s your director talking about the performance, that’s capturing those subtle breaths. When you see the actor move. When you see the actor talk. If we can get as close as possible to that, using all the technology, all the performance, then we’ve done our job, and that’s the most important thing,” explains Nicholas. And when asked about the selection of takes, he mentions that usually selected takes are comped on the recording

stage—sometimes from one take, sometimes with bits from different takes.

There’s of course, a current trend, since COVID-19, of some talent recording from their homes without the desired control. That just adds to the challenges of the mix, and although convenient for getting the talent for dubbing or for pickups, it tends to be less than desirable, as acoustics, audio chain, and overall control are compromised, not to mention the challenges on technical direction and performance guidance.

Cues for the Talent

There are different methods for cueing the lines for the actors to be in sync—or as close as possible—from using streamers, sync beeps, and colors on screen, to word-by-word karaoke-style systems that cue every word in sync, making it easier to follow and stay as close as possible to the original sync since each syllable has already been cued and adjusted by the adapters, making sure that the B’s, P’s, T’s, and similar sounds are properly adapted.

“Listening to the original language for reference is king. Our actors are really good at picking up those little nuances that you get from the original language that you need to replicate. And that combines everything. That’s your mic placement, that’s you riding the gain, that’s your director talking about the performance, that’s capturing those subtle breaths.” –Nicholas Fluhr

would get access to the original sounds so audiences in the territories would have an even closer experience to the original language. For instance, robots and creatures were some of those specific elements that he benefited from when given the original session. Carlos was truly a master of dubbing content for other territories; his understanding of story and impact on perception was evident in his work.



Serge Perron CAS

Serge Perron CAS has mixed experiences on this topic. “I rarely receive the original PT mix session. When I do, it’s a love-hate thing. It can take a long time to reverse-engineer the mixer’s session because I do it so infrequently and I never get another project from the same mixer twice. There is rarely the opportunity to communicate with the original mixer for various reasons.

“For the last animation I did, which was quite recently, I did get the original Pro Tools mix sessions, but in reels, without the media. So, I just got placeholder regions for where the dialogue, music, effects stems, and video were on the timeline. I was mixing to the long play, so I had to conform all the automation from the reels. Finding the sync for R1 was not trivial. Logos were added before hour one and there weren’t any standard tail pops. I wasn’t sure where the reel started or ended. I found sync by visually aligning the long play OVDX (original dialogue) stem waveforms to the blank placeholder regions in such that all dialogue waveforms in the stem were fully encompassed by their corresponding region boundaries. That and looking for abrupt automation moves which would suggest scene changes. I was sure I got the sync within a frame. Finding the FFOP for the other reels then became easy. I stripped out all the non-dialogue tracks, since I already had a long play M&E. And, of course, you never have all the plugins contained in the OV mix

session. You have to determine which of the missing ones you absolutely need and be creative in getting them. I used some of my personal plugins for this project. In the end, you don’t save time. I liked the reverbs, that’s why I decided to do it—they had some crazy panning, which I duplicated, and I used some of the fuzes. I checkerboarded all the reverb aux returns when assembling the long play: a set for the odd-numbered reels, another for the even-numbered ones, otherwise the automation got screwy at the beginning of a reel. And then I tweak it. It’s never exact. I still have to use my ears.” The final decisions are still human.

The M&E—the mix of everything but the dialogue—is not to be touched, especially for animation. Everything should already be contained and ready to match all different languages.

Some studios and projects are much stricter in terms of handling the M&E and stems. As David E. Fluhr CAS explains, in Disney Animation, for example, the M&E is not altered in any way for any of the languages.

However, other projects from different studios and content coming from different regions without a standardized worldwide original mix and dubbing process—like anime mixed to different specs—might need adjustment. In my case, I try not to touch the M&E or stems, but sometimes a dB or two here and there helps enormously with rhythm, intelligibility, and dynamics, and does more good than harm. It’s adapting not only the words and expressions, but also the rest of the sonic elements. Minor adjustments only. The consensus is not to touch it, but certain circumstances might call for it on certain projects. Communication is key, as it is respect for the original version.

Oftentimes as Serge recalls, you only get a rendered M&E and the original dialogue: no session, no automation, no notes. So you have to play it by ear and mix by the seat of your pants. That’s an open door to get more creative and bring all the arsenal of tools, knowledge, and creativity you have.

He shares the experience for the last project he did. “I was informed how the original language mixers treated three of the characters, and I had to interpret those instructions. I never communicated with those mixers directly. Did I do it by ear? Yeah. For one of the characters, they said it was reversed dialogue combined with the original, but it

wasn't quite that. I used the reverse rendering on an AudioSuite reverb plugin—combined with layered pitch shifting and regular reverb on all layers. Sometimes it takes a while to get that. Other times it's easier, but you can usually get it close. And the audience—I don't think they say, 'Aha! You used a different reverb, and it sounds different in this language.' It doesn't have to be precisely imitated—it has to be believable. So even in the rare occasion when I get mix notes, I'm using my ears, skills, and experience."

At Scale: 47 Languages!!!

When we think about the whole process of dubbing a show or movie into another language, it already involves a comprehensive group of people and a good amount of time, resources, and effort to make it right. What happens when, instead of a handful of languages, a production needs to be localized and dubbed into 47 languages—on top of that, with tight deadlines for worldwide releases? Things escalate quickly, and a system must be in place to ensure that it is done the right way: technically, artistically, and with cultural and language accuracy.

That is the case with most major studios, and in the case of animation, we talked to **David Fluhr** who is clearly aware of the responsibility he has on his hands—and ears—to ensure that the brand and the productions, animated feature films, are held to the highest standards.

"We must protect the brand. The genesis was about that: people around the world can enjoy this," informs David, who has seen the evolution of the process—from something done on a per-availability basis many years ago, to a well-structured and supervised production of all foreign languages, with currently between 45 and 50 languages per production. According to David, that is almost double the number used for live-action features on average.

David explains how the whole process works for his team, worldwide, for Disney Animation features: "The way it works is we have territories, and we have directors in each of the territories, and each one might be responsible for six, seven, or more languages. Some of the Slavic countries would have one central point. The Scandinavians and Italy, they're by themselves; the larger territories are sort of by themselves. Spain would handle Castilian Spanish, Catalan, and Portuguese, while Latin American Spanish is treated as separate, along with Brazilian Portuguese. The turning point was *Frozen* (2013)—and that was our first native Atmos mix.

"The post executives running the studio at the time sat me down and said I need you to go to Shepperton Studios in England and make sure all the languages are reflecting the creative intent of the domestic mix. It's very centralized in terms of the control. All the territories are all going through a central place so that their recordings get then



Nicholas and David at Dubbing Brothers



vetted by DCVI—Disney Character Voices International—in terms of the quality, the characters, the casting, and then it goes to the mix stages. Some languages might get dubbed here at Disney in Burbank, CA. For instance, the Latin American Spanish or Brazilian Portuguese may be dubbed here. And so I'll connect in remotely, listen, and give notes. We also do some language versioning at Dubbing Brothers in Paris, where they'll do multiple languages there—usually including French, French-Canadian, Arabic, Hebrew, Turkish," recalls David. "It's not my job to worry about the translations, but I can pick up on things that might be low or missing or incorrect, and so I'm there to protect the story.

"We finish the domestic mix, and we do our theatrical Atmos, 7.1, 5.1, IMAX 12 and 5, if required—then home Atmos, 5.1, and stereo. All handmade. Nothing's just an automatic downmix. As soon as we're done with the mix, literally, I get on a plane that night to England to supervise the foreign-language versions. If we finish the stereo at four in the afternoon, I'm on the plane at 8 p.m., going overseas, because it's day-and-date release, and time is of the essence.

"As soon as we finish a reel, we send it to their editorial, they QC everything on the spot (This is after the mix is done). They're using rooms all over Pinewood and Shepperton to be editing, bringing in the dialogue. Mixers usually get three or four days to pre-dub dialogue (and/or

vocals) for each language. If it's a musical, potentially more, depending on the number of songs, and then we do a printmaster. The printmaster involves the head of the territory, me, the mixer, and usually one or two of the managers at Shepperton Studios. We will divide to be able to supervise all 47 languages. I focus on territories like China, Italy, Germany, the Spanish versions, the bigger territories that are going to have more theaters.

"I get there just having finished the domestic mix. I know it well, and I've seen it probably 80 times. We have a screening of the film in Atmos with all the editors and mixers, and then we do a Q&A session with the whole team so that I can assist with the creative intent of the mix and pass it along to the mixers and editors on all territories.

"I also create a creative letter that talks about the different spaces and why we're doing things a certain way, and all of it is documented. If something is a rendered treatment, I have a document that describes it, like the formula for this pitching or this speedup or specific processing—and it all goes into the template.

"They really appreciate my notes. Before this workflow was implemented, they'd have to go through and manually identify panning and processing. Now we have all the automation, everything is virtual in Pro Tools. But even before that, it was all by hand. Extremely tedious. And so, I was given the opportunity, starting then, to work on a workflow that would coordinate with Shepperton," shares David.

Templates and Track Order

When asked about the template and session management he uses across formats for the Disney Animation features, David explained that he has developed a system that is well documented even down on spreadsheets to allocate tracks and clips, as well as responsibilities and notes. Then for the dubbing process, they create a template that creates all the theatrical and home versions in it, including home entertainment, except IMAX. "You need a separate Atmos printmaster, all the object automation—it's a very sophisticated mix template, and they get all my automation of the domestic version and all the treatments. Everything I'm doing is virtual—all the reverbs. 90% of the work, all the panning. I'm working in native Atmos, and I make a 7.1 session when I'm done, and then a 5.1 session. The vocals get handled the same way as the dialogue does,



and they're all in objects. I do all this planning in advance so that the templates have dialogue, group, lead vocal, background vocals." He adds, "I plan everything in advance in terms of what's going into each stem, so that we have separation and control—what goes into the M&E and what doesn't. Sometimes we have neutral voices, so all the loop group goes in its own bed stem and never gets used in a foreign, because it's human voice generated. So, we will create a neutral group. Additionally, all the territories will do group walla based on our cue sheets. We send them the cue sheets, and they record loop group for the language, so that the show has the flavor of each language. For Disney Animation, there is nothing that is generated by a human voice that can be in an M&E, including efforts, even non-English. For us, it's a matter of taking the dialogue out, and there's your M&E," says David.

David emphasizes proper planning. "*Zootopia 2* had 85 speaking characters. I work hard on getting very solid track layouts on my end. I send those along to DCVI, they send that to the territories, and the territories work on a tracksheet that matches mine. We give them my session with the media taken out, but the clips are all in there, so they know who's on what track — visually, you can see if something's missing or if there's an effort missing. There's a lot of QC that goes on before it even hits the stage. My template is the foundation for the foreign-language dubbing.

"There are many markers on my template sessions, which give comprehensive information to dubbing mixers for creative insight so that if something seems like it should be played very forward but it shouldn't be for creative reasons, that's in a marker. And they're surrounded by people who understand the concept of A/B-ing, comparing back-and-forth with the domestic. It's all just a button push to A/B between the domestic and where you're at to ensure accuracy with the domestic or original dialogue version."

What Is Negotiable and What Isn't?

"There are certain things that are not flexible, and other things that are. I'm very flexible when it comes to them needing to change lines that may not look in sync but must be done to ensure the proper cultural context for each language. For example, if you look at German, there can be many syllables for every one of ours. They do a brilliant job of making it fit, but they also must make it work for their language. But there are certain things that we have to be

really careful of—like avoiding changing the story. That has to be vetted very carefully. Our goal and everyone's goal is to make the film as close to the domestic as possible, to the filmmaker's vision. Our mixers really understand that we're not doing our own mix, we're emulating. That's really hard to do. It's a very different mindset from regular mixing because you really have to pay attention to what the intent was, the amount of reverb, and each detail," adds David.

Big Scale vs. Independent Facilities

Discussing bigger projects with Serge, he shares a similar concept when dealing with multiple languages at once. "I personally like the approach of track assignments designated before they start recording. When you're dealing with centralized mixing of a whole bunch of languages, they all share the same mix template derived from the original language mix. That's how it should be done."

Such a carefully supervised and prepared process contrasts with independent post houses and other workflows. Like myself, Serge tends to mix localizations alone on the mix stage, and feedback is usually given only upon delivery of the mix. This contrasts with the constant supervision of the process described by David, in which each step is carefully monitored, as there is little room for deviations, and to detect and fix possible inconsistencies.

What Is Different Between Animation and Live Action?

Sometimes live-action productions have less than ideal production sound and having clean recordings for the dubbed languages can become a challenge because they are different from their core. The dubbed dialogue still needs to have, somehow, the same sonic color and tone as the original. A very reverberant and filtered production dialogue needs to be matched by a dynamic and clean sound recorded in studio. A lot of EQ and some reverb is crucial—even adding distortion to the dubbed dialogue. Mic technique is also important. For example, recording with perspective and selecting the right type of microphone.

Good lip sync—both for animation and live action—greatly contributes to a better experience, helping the audience believe what they're hearing and creating a more cohesive mix. Bad lip sync is distracting and takes the viewer out of the story.

Why would someone choose the dubbed version over the original with subtitles? For animation specifically, Serge points out that “It’s clear. Everything is manufactured from the start—all the backgrounds, the effects—so it’s a lot easier to dub into other languages while maintaining sonic consistency.” That ease, however, comes with higher expectations. Certainly, lip sync is more demanding than it used to be. Clients and audiences are more aware—the bar is being raised continuously. We want to make sure that we’re ahead of the audience, of course, and get the sync right. However, we need to remember that it’s still localization—it will probably never be “perfect,” but we work to get it the best possible. “Sometimes I tweak sync, sometimes I split tracks for perspective, like an editor. We just do whatever we need to do to make the experience better,” reveals Serge.

However, it’s not only the dubbed dialogue that changes; the whole session architecture and the M&E’s change, too, because of the nature of production sound and its own sonic and technical characteristics and aesthetics. Recording qualities, noise floor, acoustic properties, and other aspects define the sonic qualities of production sound. These tend to be more controlled for dubbing in a sound recording stage environment.

“There tends to be more panning in many forms of animation. It depends entirely on the project, but when characters have few human constraints, they can fly around the room, and often it’s being tracked panning-wise. We have Atmos and surround, so why not? We’re not constrained either,” adds Serge.

Not All Animation Is Equal

In recent years, I’ve had the opportunity to work on some English-dubbing mixing, and one of the main takeaways is that each genre must be honored—there are aesthetics and conventions for different genres within animation. Anime, for example. I remember the first anime mix I did—I sent it to the director. It was a great mix, and he acknowledged it, but he told me: “Hey, it sounds great, well balanced, warm, dynamic, it really does, but it does not sound quite like anime.” It was an interesting discovery for me. There are different paradigms with what the audiences expect. For instance, for Japanese anime, they like it brighter, with mid-frequencies cutting across, and they like to detail all the words.



What Audiences Expect

In dubbed-dominant markets in Europe, 65% of audiences stopped watching a movie or TV show because of poor localization quality, while 30% were abandoning content monthly as a result⁵, according to the report by the Entertainment Globalization Association, as reported by *BusinessWire*. That is the opposite of what we mixers, directors, and the studios aim for. Technical aspects aside, the main goal we share is to tell the story as originally intended, matching it as closely as possible while keeping the audience engaged with the same emotions and feelings that the original language creates.

For Serge, the main thing that audiences expect from the dubbed version is dialogue intelligibility first, then authenticity. That begins with well-written dialogue, as a good translation and adaptation are the basis for good recording and subsequent mix. Everything based on the story—that's the top priority, besides being entertaining.

David recalls on his most memorable experiences with the process: "When we did *Moana* and I got to fly to Tahiti and do the Tahitian language version, which had never been done by our studio before. Disney just did it, didn't advertise it, didn't say, hey, look at us. And I spent a week there with the culture, with the people, doing screenings of the film—10,000 people outdoors in the stadium watching *Moana*. I was blown away at the appreciation people had for doing a film like this in their language, and it stays with me to this day."

A closing thought from Nicholas, "If we can make it so that someone turns on the dub and says I didn't even notice this was dubbed, then we've done our job," says Nicholas.

To this topic, Nicholas adds, "You have these different recording qualities and different inflections in the voices. That happens a lot with anime. It feels like there's this crazy spike in the high-mid frequencies, but also their voice is so full—there are different frequencies that are being elevated, and you can't change that. It's just the inflection," it just cuts through, and it's already embedded into the culture and the audience. It is not something to take lightly, reminding us that each project, as well as each format and genre, have their own characteristics that must be respected for the audience. Around 80%–90% of Netflix anime viewers globally choose dubbed audio over subtitles, as published by *The Hollywood Reporter* in 2025⁴.

I recall two Japanese anime dubbed into English projects that I mixed last year in which talking robots were heavily involved, although very different between projects. Processed and stylized voices for the robots were present in the original and had to be recreated by ear as no session notes or parameters were included. After filling my track with plugins, trying to emulate the sound as closely as possible, I ended up with just a couple of plugins with very basic processing used smartly. It's a process that might take time, although it's not an element to spare in the workflow and timeframes of dubbing and localization, with fast turnarounds for the mix. And often, the simplest solution is the one that better tells the story—the most honest one. It was believable, close enough to the original, and suited for the English-dubbed dialogue.

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PERMANENT DIALOGUE SEPARATION: Isolating Voice, Reverb, and Noise Across All Stages of Post for Improved Control

by Gregor Bonse CAS

What Happens If We Separate Production Sound Into Voice, Reverb, and Noise in the Dialogue Edit—and Preserve That Separation Throughout the Mix?

Last year at Sounding Board v5.0, I attended the “Surviving AI” panel, and one thought stayed with me: If and when we incorporate machine learning into our craft, it should 1. replace no humans, 2. perform only non-creative tasks, 3. not lead to less work, but better results.

So, let’s say we fulfill the first two conditions by hiring the same crews and automating only highly repetitive tasks. Where exactly will the better mix results come from, other than by having more time to mix creatively? Can we automate tedious tasks in ways that change the creative process that follows? Can we create a different starting point altogether—one that allows us to work in a more playful and exploratory way?

I found that permanent dialogue separation could be one of the answers.

Why Separation Matters

At its core, mixing is built on separation. Our craft depends on the ability to isolate elements, control them independently, and combine them into a coherent whole. Arguably, the more meaningful separation we can achieve before a mix begins, the greater our creative control will be.

We already go to great lengths to produce score in separate instruments and stems, Foley and sound effects in separate layers and groups, dialogue with separate microphones for individual characters. Yet some forms of separation are temporary by nature and are effectively undone before the mix. Noise reduction, for example, is a form of separating dialogue from noise. De-reverbing is a form of separating dry signal from wet. Modern machine-learning tools such as Hush Pro, Supertone Clear, iZotope RX Dialogue Isolate, Acon Digital Extract:Dialogue, Accentize dxRevive, and Cedar Audio VoicEX have dramatically improved dialogue editorial and rescued

production recordings that might previously have required ADR. But have they expanded the creative possibilities of the mix itself? I would argue that they have not.

The separation achieved by these tools, whether used in editorial or on the mix stage, rarely survives past the render button. Once processed through AudioSuite, the relationship between voice, reverb, and noise is effectively locked in place before mixers ever touch a fader.

And for many other tasks, that is perfectly acceptable. Destructive processing remains an efficient solution for those artifacts we either want to preserve or remove entirely, such as distortion, crackles, clipping, clicks, and pops. Voice, reverb, and noise, however, are different. All three are fundamental components of the production track, and each serves a distinct purpose within the mix. They do not require removal. They require *balance*.

If mixers wish to define this balance, they are routinely left with two options. They can render clips from the mix stage, each time interrupting the creative flow as they move back-and-forth between console and mouse. Or they can work with real-time tools, much like they had in the days of the Dolby Cat 43 and early Cedars.

Since the arrival of iZotope RX, however, technology’s momentum seems to have largely shifted toward AudioSuite and offline workflows. While most manufacturers offer real-time alternatives, most of them operate at lower capability or quality than their offline counterparts. Notable exceptions are Cedar VoicEX and Accentize dxRevive Pro, though they do not separate reverb.

That limitation led me to explore a third possibility: an approach that separates production sound with the full potential of AudioSuite tools but maintains that separation throughout the entire sound post. As a result, mixers end up with three dedicated VCA’s on the console: one for voice, one for reverb, and one for noise.



Accentize dxRevive



Ian Sampson's Hush Pro



Acon Digital Extract:Dialogue



Supertone Clear



iZotope RX Dialogue Isolate

The term “noise” is admittedly imperfect. In this context, it refers to everything that is neither direct dialogue nor reverb—including footsteps, movement, and many of the subtle production details that normally remain embedded within the recording.



Cedar Audio VoicEX2



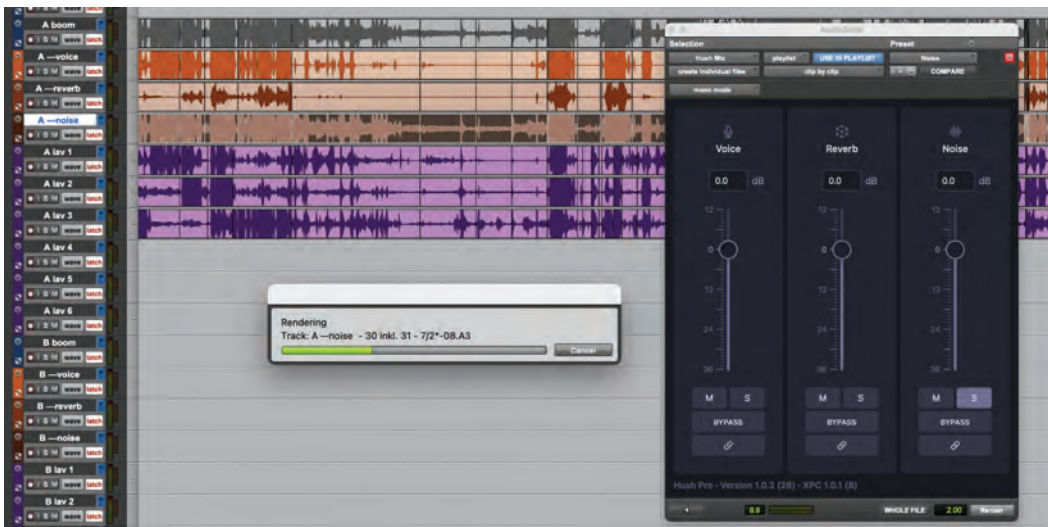
The Experiment

I first tested this workflow on *Eurotrash*, directed by Frauke Finsterwalder and adapted from the novel by Christian Kracht. My first call was to Gaston Ibarroule, whom I wanted as dialogue editor on the project. The production track layout was going to be more extensive, immediately revealing perhaps the biggest eyebrow-raiser of the experiment:

The system was built around four track packs—A, B, C, and D—each containing:

- Boom
- Voice
- Reverb
- Noise
- Lav 1
- Lav 2
- Lav 3
- Lav 4
- Lav 5
- Lav 6

In total, the production track layout expanded to 40 tracks, excluding PFX and ADR.



Using a SoundFlow macro, boom tracks are split into voice, reverb, and noise, while preserving three-second handles

Dialogue editorial began by sorting through the fully referenced dialogue build and transferring booms and lavalieres to their corresponding tracks. Because picture editorial had largely maintained dialogue on a single track with crossfaded edits, most referenced material initially landed in the A pack. At this stage, we deliberately avoided introducing checkerboarding.

All lavalieres were phase-aligned to their corresponding booms using Auto-Align Post 2. Processing was performed clip-by-clip with three-second handles across the entire timeline. On this project, the process worked flawlessly, although earlier versions of the plugin had occasionally produced hiccups that required manual correction.

The boom tracks were then separated into voice, reverb, and noise. For the separation, we used Ian Sampson's Hush Pro, which, at the time of writing, comes closer than any other tool I have tested to achieve convincing separation. Anyone interested in exploring this workflow should, of course, feel free to use other tools. The larger concept is not tied to a particular plugin—the idea is permanent separation as a creative framework.

Even so, no current solution is perfect. Hush can still produce artifacts during aggressive processing, particularly on breaths, where the results occasionally take on an almost reptilian quality. Encouragingly, Ian Sampson recently told me that a Version 2 release is planned for this fall and is expected to address this very issue.

Counterintuitively, Hush Split itself proved unusable for our purposes as it supports only “create continuous file” and entire duration processing due to Pro Tools' limitations of multi-channel files. To preserve fades, handles, and editorial flexibility, we built a SoundFlow macro that processed all boom tracks globally at the click of a button.

Automating the Separation

The macro workflow was straightforward:

1. Copy and mute A boom.
2. Paste the material onto A —voice, A —reverb, and A —noise.
3. Process Hush Mix Pro three times across the entire timeline using clip-by-clip with three-second handles—once each for voice, reverb, and noise.

We chose not to separate the lavalieres. Because they were unlikely to contain reverb or production noise worth preserving as independent mix elements, they were later cleaned in a more traditional workflow.

Thanks to the neural engines in Apple Silicon machines, machine-learning processes such as Hush can operate remarkably fast. Processing an entire feature still involves waiting through a considerable number of progress bars, but that was, in many ways, the point.



Dialogue edit before treatment of the noise floor



Dialogue edit after treatment of the noise floor

The goal was to consolidate all automated tasks into a single morning of prep work and then use that time productively—answering emails, reviewing ADR requests, or handling other production responsibilities—rather than spreading repetitive processing tasks throughout editorial and mixing.

Once all renders were complete, we generated short equal power crossfades globally on the noise tracks only. The material was then organized so that each scene occupied one of the A, B, C, or D packs before creative dialogue editorial began.

What Changed During Editorial?

The workflow immediately began affecting editorial decisions in ways we had not fully anticipated. Some changes were practical. Others fundamentally altered how we interacted with the material.

Voice and Reverb Become Largely Fade-Free

One of the first things we noticed was how little fading was required on the voice and reverb tracks. Once the noise component is separated onto its own track, natural silences emerge between words and lines of dialogue. As a result, leveling dialogue often requires nothing more than clip-gain adjustments on the voice and reverb tracks, without the constant need for fades or crossfades unless they are creatively motivated.

The ability to choose different clip boundaries for each of the tracks allows for more precision when it comes to abrupt cuts between takes. Voice can cut right where a line ends and a new one starts, reverb can cut or fade later dependent on the location's reverb time, and noise might have yet another

transition that best serves its purpose.

Managing Noise Becomes Dramatically Easier

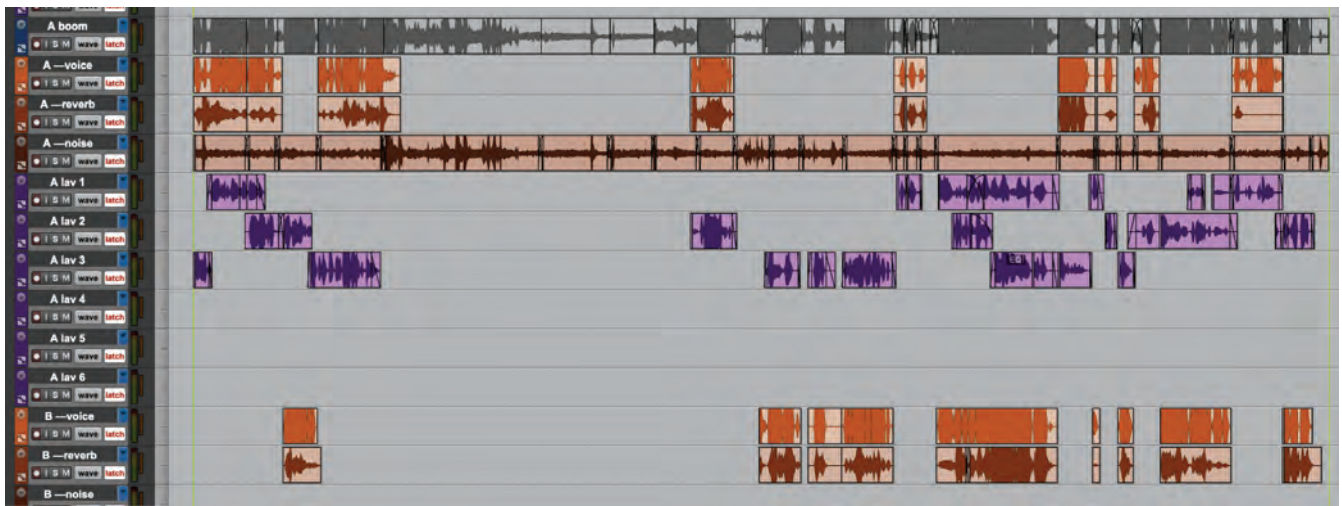
The benefits became even more apparent when shaping and matching noise. Imagine a scene built from numerous cuts, each carrying a slightly different noise floor, now crossfaded neatly on a scene's single noise track. Simply looking at the waveform provides immediate visual feedback about where inconsistencies exist. It's usually best to resist the urge of reducing this track altogether or simply attenuating any outliers.

More important than the general amplitude will be each take's level of harmonics caused by lights, generators, or cameras. First, we often batch-loaded all clips into iZotope RX via clip-by-clip to remove such harmonics, for instance, via spectral repair and vertical attenuate with 4,096 bands. Crucially for any dealings with harmonics is that none of these cleanups affect the dialogue itself, which also naturally consists of its own set of harmonics that might normally be affected, making the process far more forgiving and intuitive.

After those spectral issues were addressed, smoothing a scene often became little more than clip gaining the noise clips until everything flowed naturally.

The Noise Track Becomes Room Tone's Natural Descendant

Historically, room tone that is added to the dialogue edit has always been something of a compromise. Whether captured on set, assembled from snippets between lines, or generated through tools such as Undertone and Ambience Match, it often functions as a patch for an edit that would otherwise reveal



Checkerboarding may be applied as a mixer's preference

itself by adding more of the same noise that is already present.

The separated noise track offers a different possibility. Because the environmental information already exists independently of the dialogue, it becomes possible to establish a scene's background character only once—directly from production recordings—and then extend that material wherever necessary.

This became particularly useful when dealing with ADR. Since all dialogue had been processed clip-by-clip with three-second handles, both preceding and following noise segments could often be extended naturally across ADR gaps. More importantly, those extensions contained not only the ambient background of the location but also subtle movements of the characters in that very moment.

Rethinking PFX

The separated noise track also raises interesting questions about production effects. In traditional workflows, dialogue-free sections, footsteps, doors, and other production sounds are often transferred to PFX tracks for independent control and eventual use in M&E versions.

With permanent separation, much of that material already exists in the noise track. After appropriate cleanup, that track can frequently contribute directly to M&E creation while preserving details that help foreign-language versions feel connected to the original production recordings.

In fact, many mixers are already moving in this direction. During M&E mixes, tools such as Hush and Clear are often used to remove dialogue and its reverb from production tracks while retaining environmental content. Seen from that perspective, our traditional workflow begins to look surprisingly inefficient: We de-noise during dialogue editorial. We often

de-noise again during the mix. Then, during M&E creation, we effectively perform the process a third time—only in reverse—rendering yet another balance between voice, reverb, and noise.

Permanent separation eliminates much of that repetition.

Taken to its logical conclusion, one could even imagine replacing the PFX tracks with the noise tracks entirely. Doing so would require careful consideration of signal flow and delay compensation, particularly if this track were to undergo a different signal flow than the dialogue, for instance, to avoid compression or de-essing. Even so, the possibility is difficult to ignore.

Checkerboarding Becomes More Nuanced

In a traditional workflow, alternating boom recordings across separate tracks often serves practical mixing purposes. One character may require a different EQ than another. A reverse shot may need different treatment or panning than the corresponding wide. A passing airplane may need to be faded out on one take while another plays in parallel.

Once voice, reverb, and noise exist as independent elements, however, those decisions become far more flexible. Material that naturally belongs together can often remain together. Checkerboarding can then be introduced only where it genuinely improves the workflow.

For example, voice and reverb might alternate between tracks to accommodate changing perspectives or characters, while noise remains continuous. In other situations, voice and reverb may stay inline while noise alternates to accommodate that airplane fade-out or a character's footsteps as they leave the room.

What Happens on the Dub Stage?

All of these editorial advantages were interesting. But to me, the mix was where the workflow became most compelling.

More Natural Reverb and Noise End Up in the Mix

Any offline rendering—whether performed during editorial or on the mix stage—is ultimately an educated guess. Deciding in advance how much noise reduction or de-reverbing will serve a mix remains somewhat speculative since it is first rendered and only then heard in context. As a result, processed dialogue often trends toward the dry side. It is safer. Cleaner. More controlled.

But it can also lose some of the qualities that made the original recording feel alive, which also happens to be a common feedback of production sound mixers when asked about mixes today. Maintaining voice, reverb, and noise as separate elements changes that relationship entirely.

Instead of committing to a balance before the mix begins, mixers can explore it in real time. Dedicated VCA's allow the relationship between the three elements to become a creative decision at the mixer's fingertips. A single fader move can shift a scene from an auteur cinema sound reminiscent of Godard or Antonioni to a highly polished studio-style dialogue that leaves plenty of room for action sound effects and a fully filled Foley track.

The reverb component becomes particularly powerful. The combination of today's perfectly phase-aligned lavalieres, aggressive de-noising, and modern cleanup tools has undoubtedly improved intelligibility. Yet it has also involuntarily created a tendency toward an increasingly dry and direct sound that can sometimes feel disconnected from performances.

With dedicated control over production reverb, it becomes possible to move in the opposite direction when appropriate. Raising the reverb component above unity can often restore a sense of space and perspective that aligned lavaliers tend to mask. Sometimes that first reflection of the studio floor is just what is needed before extending the space further using additional multi-channel reverb.

Perspective changes and the spatial depth of characters within a room can be designed and fine-tuned in detail. Those wide shots, where the boom could not get close enough, are easily dialed back into foreground. In many cases, the result feels less processed, less manufactured, and more truthful to the performances on set.

Practical Limitations

Of course, the workflow is far from perfect.

The first challenge is simply visual. Anyone opening a permanently separated session without prior warning will likely be greeted with confusion. At first glance, the session appears unnecessarily complex. Tracks multiply rapidly, and the familiar relationship between production recordings and editorial organization becomes less obvious.

Then there is the listening experience. Soling any individual component can sound strange because none of them were ever intended to exist independently. Voice without noise feels unnaturally isolated. Noise without voice can sound compromised, but might pass in the context of an M&E. The system only truly makes sense when the entire crew is on board with the workflow.

More importantly, today's separation tools make mistakes. With Hush Pro, fragments of speech occasionally appear in the noise track. Transient sounds such as doors may spread unpredictably across all three tracks. Clicks can end up on either voice or noise tracks. And under difficult conditions, aggressive processing can produce the aforementioned reptile voice artifacts.

That reality inevitably raises a question: Is it worth building a workflow around technology that has not yet fully matured?

Looking Ahead

What interested me most about this experiment was not the current state of separation technology. It was the creative possibilities that emerge once separation stops being a temporary editorial process and becomes a permanent part of the production track.

The tools available today are almost certainly just the first generation. Future systems will separate voice, reverb, noise, and perhaps additional production elements with increasing accuracy. Artifacts will diminish. Processing speeds will improve. What currently feels experimental may eventually become routine.

When that happens, the more important question will no longer be how we achieve separation. It will be what we choose to do with it.

If machine learning is going to become part of our workflow, that is the future that interests me most. Not fewer people making fewer decisions, but the same creative teams working with more freedom, more flexibility, and ultimately more time to focus on the art of mixing.



Terry Dwyer CAS at Mixers Post Sound

Reality Cowboys

by Terry Dwyer CAS

Reality Before the Name

Reality television didn't have a name when I started mixing it. They were quasi-documentary, sensational, and cheap—and almost no one in post treated them as a genre, much less one that deserved craft. My first network mix was 1994's *U.S. Customs Classified*, featuring Stephen J. Cannell, followed by *How'd They Do That?* Then, Barry Diller bought the studio out from under us and showed us the door. So, I went where the work was: editorial gigs and low-budget features. The one I remember best is *Hulk Hogan's 3 Ninjas at Mega Mountain*—not for its place in cinema, but because I mixed it in 5.1 on Pro Tools 4, panning with a mouse on a system that crashed every 15 minutes. The most valuable reflex a mixer owned in those days was Command-S.

Then the dam broke. I landed at a small, ambitious post house called Wild Woods and mixed dozens of these pre-reality shows, including *I Survived a Disaster*, *When Disaster Strikes*, *World's Scariest Police Chases*, *World's Nastiest Neighbors*, *In the Line of Fire*, *Doomsday Plan*. Disaster everywhere. I felt like a first responder. There were so many of them, the genre got its own parody, *When Cars Attack*, which I also mixed and was narrated by Richard Belzer. There was music in the mix, too: *Dick Clark's Your Big Break*, in 1999, may have been the first of the music-competition shows, and it handed me my first run at a box just out of the gate—the Antares ATR-1 Auto-Tune.

I took to the action because I loved building and mixing effects, and because I came to it with a conviction carried over from film: A proper soundtrack has a full plate; dialogue, effects, Foley, backgrounds, and music. *All*, not some. That's the classic approach, and it's how I've worked ever since. I don't think we ever thought of these as "reality" shows. We mixed features. Clients were forever surprised by how much detail we layered into shows with no budget, but they liked the result. The shows got better, and we got popular.

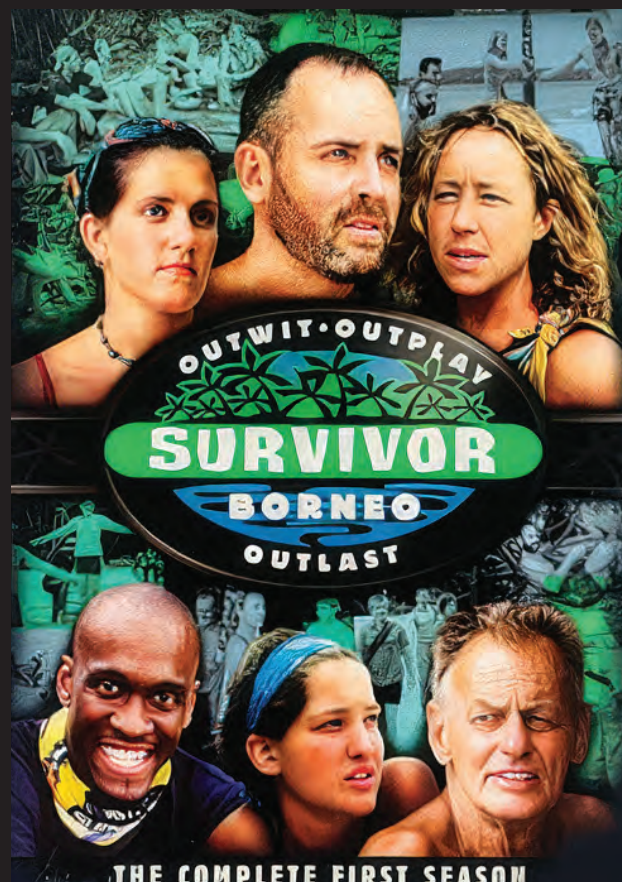
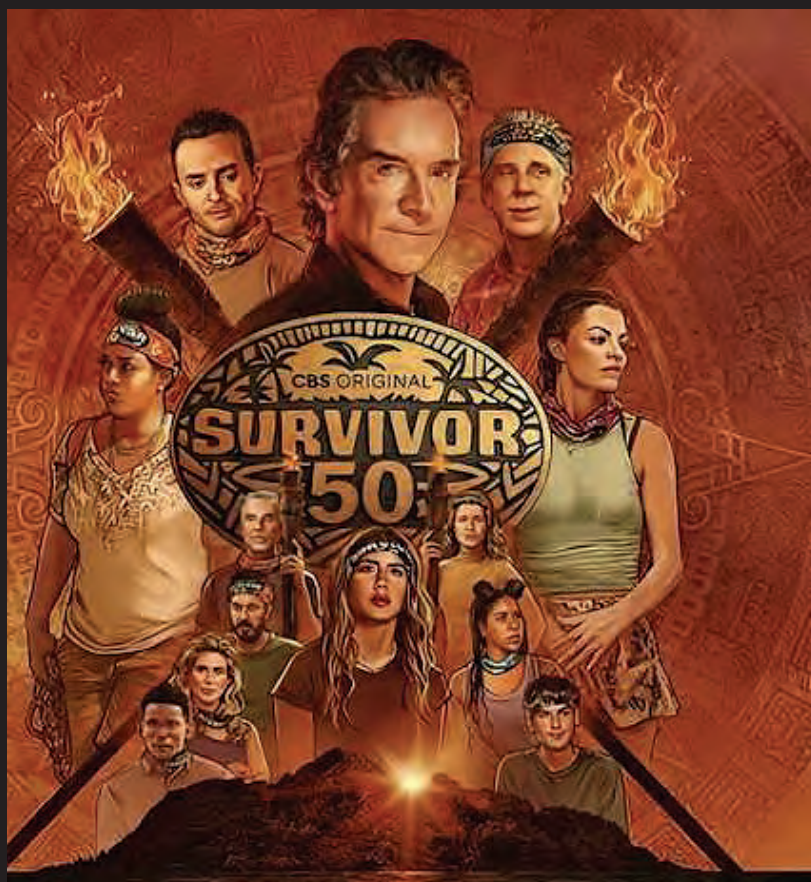
Those programs came alive in the details we cut, even

when the producers couldn't see the value. No one reading this needs convincing—you live in those details. But this is my reality sound story—35 years and some 1,400 episodes in. I'll highlight a few that defined the reality genre.

The hardest part of reality sound is always squaring ambition with the budgets and turnarounds reality allows. The early shows were filler and priced like it. But better shows were coming, and so were EP's who understood what good sound was worth to an audience.

Survivor: The Foundation

I was mixing a series called *Worst Case Scenario*—scored by David Vanacore—for an EP named Craig Piligian at around the same time a special called *Dave Barlia: Extreme Stuntman*, hosted by an unknown named Jeff Probst. When we wrapped *Worst Case*, Piligian said, "I've got something good for you coming up. See you later." A few months later, that something walked back through the door carrying Piligian, Probst, and Vanacore in a new package. Wild Woods CEO Derek Luff told me Craig had been in with a new show called *Survivor*—with my name on it.



Everything the pre-reality years had taught me—that brutal schedules demand purpose-built workflows—suddenly had a stage worthy of it.

Building the Reality Template

It was obvious at first watch: This show was epic. Beautiful, alive, gorgeously shot, a score and a theme to match. And then there was Jeff Probst, pulling it all together.

I argued that the location itself should play like a silent contestant—that the audience should feel the grit, the grime, and the splendor of the beach—and EP Craig Piligian agreed. I pitched the classic approach: Foley, effects, backgrounds. Not the ever-present whooshes-and-a-hit-here-and-there that passed for an effects job. It was an epic show. The sound should be equal to it. The show's execs agreed, and it became their directive.

And so, the first of our action/adventure reality shows launched, with me in the mix chair. And I've been there ever since. But how do you pull off the show we'd imagined in a single week, ingest to review?

What follows is the template that answered that. It began with *Survivor*, became company policy while I was the company's supervising re-recording mixer, and went on to shape the many seminal reality shows we mixed in those years. It's still how I work, 25 years later.

The key was a streamlined editorial process. No mixer did everything, and no show changed hands week to week. All the reality series the company did had a dedicated mixer and a dedicated edit team. This was my policy, and the company adopted it as theirs.

We needed dialogue editors who were fast, which meant the table had to be set for them before they ever sat down. Track management was its own art, and I wanted my editors editing, not sorting the 100-track OMF's of bedlam provided us. All of it depended on clean, constant communication between the production company and the dub stage. To the client: provide only what you want in the show. If we need more, we'll issue requests.

It's worth saying why this was unusual. The custom of the era was to hand a mixer the OMF and a deadline—"16 hours to client review"—and let the mixer do everything. But it was terribly inefficient. There really weren't

meaningful workflows for "reality" shows early on. Mixers didn't get what they needed from editorial, and editors didn't know what mixers wanted, so mixers quit trusting the handoff and did it all themselves—ingest, editorial, mix. We were cowboys.

It tied up the most valuable real estate in the building—the mix stage—with work that didn't belong there and turned the highest-paid person in the room into a very expensive assistant.

Rule: Use the mix stage for mixing.

Rule: Mixers mix. Editors edit.

So, the process starts with the mixer sitting down with the client to understand the client and their goals, as I had done with many shows. Not the owner or the machine room manager. In doing this, I was amazed at how little many clients asked of us. It could have ended there with "Okay, that's great, we'll clean up your temp and give it back to you," as some would. But we had a trusted standard with action shows, and if we wanted second seasons, we knew the way to go. Or we thought we did. We weren't going to force our "approach" on anybody, but it was usually accepted, and it ultimately defined us. *Survivor* knew what it wanted, and it wasn't small ball.

Rule: The mixer is team leader. Sound supervisors don't play that role in reality TV.

Rule: Each re-recording mixer developed an editorial team that worked consistently with that show.

Rule: New editors and mixers were required to sit with a "staff" mixer for half a day to understand what was expected. Experienced editors often did more or additional things than was needed, and green editors didn't do enough, so that half day settled it. It isn't batch fades, kids. Editing dialogue in noisy reality settings requires its own bag of tricks. New mixers also had to understand and embrace this philosophy. More often than not, the mixer sitting with the new talent was me, since I was supervising, so I had a good look at the incoming.

Maintaining those teams was a constant slog. In reality TV, you're often working with newly minted talent, and once trained, they wander. And soon the editors we'd trained were all over town. But there was a lot of work, and everybody was happy.

We also rejected the revolving-door mixer/editor policies that some audio houses used.

Rule: A mixer was assigned to a show, and it was his or her show. Reality is a one-mixer discipline—one re-recording mixer carries the entire show—so swapping mixers in and out week after week struck me as both inefficient and unfair to the client. I'd seen as many as eight mixers on a single series in a year. We didn't believe it served the show, so we didn't do it. The mixer also understood the show was their responsibility, and they were to see it through. In my 25 years with *Survivor*, I've been in the chair on every mix. I've never missed one.

In fact, I was never an employee of any of the companies I worked with in those days. I felt my obligation was to the show, and I was rewarded with more shows than I could handle.

I also had capable assistants. Matt Slivinski, who handled laybacks and setup but doubled as a stage editor and assisted in my duties as chief engineer. And his successor of the last dozen years, Lauren Alvarado, now a director at Mixers Post Sound. Having someone who could jump in the chair and handle an import, or re-edit a sequence or conform, is sanity-saving. Our typical track count on a reality show was 225 tracks—not counting stems.

Which brings to mind another.

Rule: Wear many hats. Matt and Lauren wore many hats.

As I said, reality editorial requires its own bag of tricks. We spent real time training editors in the specific techniques' reality demands: cutting and filling noisy/clean overlapping dialogue, smoothing transitions over rocky material, sneaking in and out of noisy scenes, managing "Frankenbites."

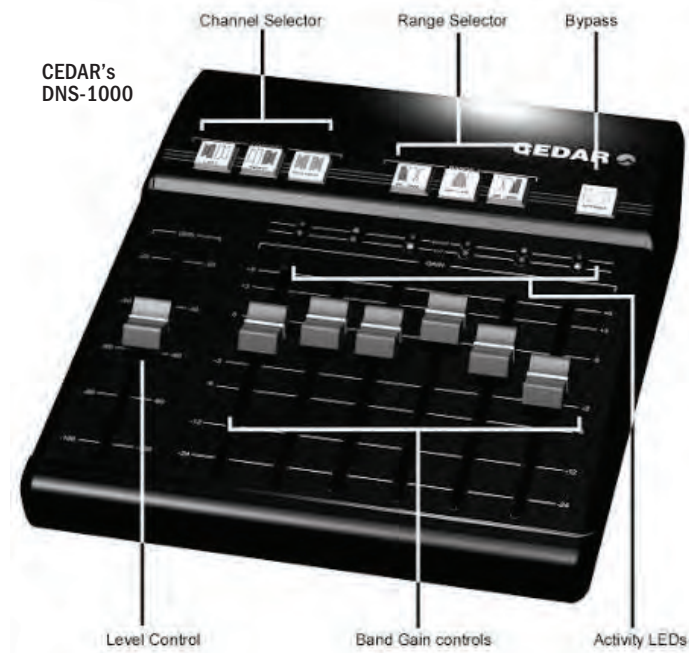
That was reality TV. A single sentence might mix interiors with exteriors across 20 edits, splitting words, shifting pitch, changing cadence, and volume. That was the real work of reality for mixers and editors.

FX editors needed "reality" guidance as well. Don't overcut, which was a common gripe. We don't want options. Just nail it. The mixer doesn't have time to sort through dozens of tracks evaluating your FX build. FX were very deliberately organized by the FX editors per the

mixer's request. And when the mixer pushed an FX group fader up there had better be a sequence that worked. The style and nitty gritty had already been decided. We also did not encourage clients to provide their own FX. There wasn't time for the duplication of effort and chaos that created in the mix. "Temp love" was dangerous ground.

We had a consistent, focused team, and we eliminated much of the chaos that kills schedules. By the fourth episode of any series, reviews were smooth—and only a few hours long. Most of the time. And the shows repeated. We were busy.

Music editorial and delivery is a mixed bag in reality. A rough edit is usually performed by the video editor, with a quick cleanup done at the sound house. There is rarely a proper music editor involved. *Survivor* is an outlier on this. Their music editor, Michael Dobbins, is one of the best, as are their composers. On some shows—*Fear Factor*, for instance—the composers, Russ Landau (*Survivor*, *Fear Factor* theme) and Paul Haslinger, were highly involved week to week. But often it's just library tracks strung across a stereo pair. It's a big swing from newly scored weekly to library tracks, and the mix complexity and track counts span that range.



The Noise Wars

Reality is run-and-gun, and it's tough on dialogue. The noise demon is ever-present, and you learn to embrace it. *Survivor* is shot on a beach, with lots of whispering. Noise. Ugh. When I began, I reached for the only thing

that could touch it: a CEDAR DNS 1000, which cost \$10,000 in the year 2000. What reality house spends that? Wild Woods did. It tamed the surf but couldn't lay a finger on the cicadas, the crunching leaves, and the other gremlins of the jungle.

Dialogue was, and is, every producer's focus. So, job one was taming the noise, and that began a seesaw battle with the elements. The cicadas were the worst of it—crews used to whack the trees with sticks to shut the buggers up—until Season 4, when I finally exterminated them. Pest control was my business.

I demo every plugin, and I'd been fooling with a CEDAR music plugin called ReTouch, a \$4,000 tool I had no intention of buying, when I found it could lift the cicadas out without touching the dialogue underneath. A notch filter couldn't do it usably. ReTouch nuked them. Our equipment sales rep saw me using it and mentioned it to Mark Ethier, who came by to see for himself—he'd just founded a company called iZotope, and this was up his alley. We talked through the noise-reduction strategies I was hoping for down the road, and he later sent me a rare ANR-B reduction box as a thank-you. For years, that box furthered our quest for quiet. It's still in my rack.

On the operator's instinct:

"A great reality sound operator becomes a story hunter—tracking activity beyond the frame, positioning microphones where the next moment is likely to happen. Success comes from being present before the story reveals itself."

On the scale of it:

"Survivor is one of the most demanding wireless environments in television—as many as 99 transmitters, a single challenge running more than 40 simultaneous sources, through saltwater, heat, rain, and remote jungle. We don't stop for weather. Some of the most important moments happen when conditions are at their worst."

Scaling the Model: Fear Factor

If *Survivor* proved the approach, *Fear Factor* tried to break it. It was an FX monster, and its director, J. Rupert Thompson, set the design bar on day one. Our very first episode—number seven—ran about 20 hours in review, almost all of it FX adds and rebuilds. We'd met our match. We went through a number of editors. A few left babbling, their minds broken by the pace and the density



iZotope's hardware noise suppressor, the ANR-B

The DNS 1000, the ANR-B, and ReTouch became the chain that quieted the show. iZotope's many tools, such as Dialogue Isolate, came later—though still with their own issues when signal-to-noise is bad. So, we run NR in parallel and keep some of the original underneath to mask the artifacts.

Reality Production Sound

Another gift on *Survivor* was, and is, a large and deeply dedicated production sound team, headed for many years by Rian Engelen. Here, he provides some thoughts on reality from the production side.

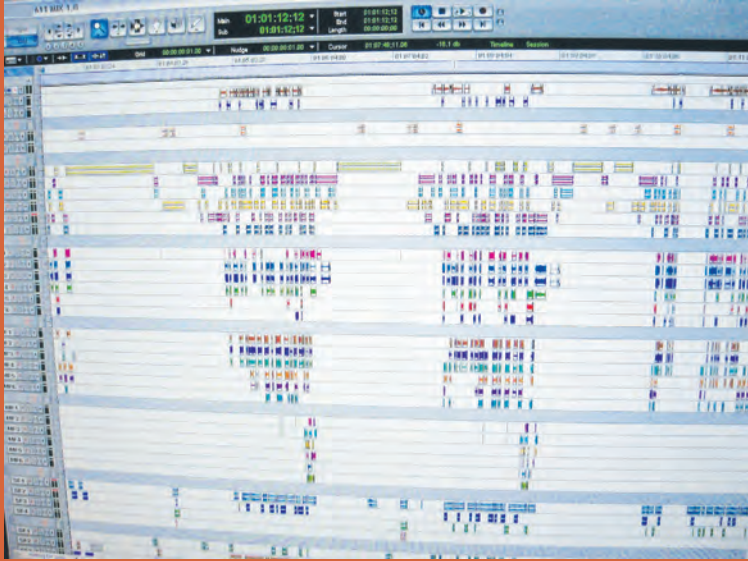
On what makes reality unique:

"In reality, there are no second chances. Our job isn't just to record dialogue, but to anticipate where story is about to emerge and be ready before it does. We don't get a second take."



Production sound mixer Rian Engelen

of FX. The FX budget was generous for reality, but the mix schedule wasn't; 12 hours. The work never stopped: explosions, crashes, rigging, skids, a car zig-zagging under a semi, two helis dangling a car between them, creaking rigging, rippling flags, hands, feet, breathing, a 22-minute demolition derby—no time to second-guess, a week for three acts, in and out.



A 7-minute snapshot of FX groups minus Foley and BG's from a typical action-adventure "reality" show mix circa 2006.

Matt Slivinski—my second through many of the early *Survivors* and Rogan—*Fear Factors*, and later a mixer in his own right (*The Bachelor*, *Fear Factor/Ludacris*)—captured the essence of those mixes:

"These weren't ordinary [FX sequences]. Everything was cut to extreme perspective, often with sounds that didn't exist, at the pace and hyper-realism the show demanded. I learned to build that design on the fly—under the gun, in client review, as an assistant. That's where I learned what actually serves a show versus what just fills the tracks—and I've since applied it to elevate shows that might not have come out the same with other sound teams."

And then there were the food stunts.

Our Foley artist, Monique Raymond, must own a piece of TV history for her work on the food and creature scenes. The slither and crawl, the cockroaches and worms, a helmet full of tarantulas tapping softly at the glass, and of course a mouthful of squirming insects. Those were the sounds she created.

Fear Factor ran seven seasons with us from 2001 to 2012,



Monique Raymond's Foley elevated the sound of fear on *Fear Factor*.



170 or so episodes. Again, I never missed a mix—and I don't think anyone inside the show doubts how much its sound did to move the series forward. Action needs big sound. As with *Survivor*, we were blessed with great composers, and again with a great friend of audio post, director J. Rupert Thompson. A believer.

Every one of these high-energy shows runs into the same wall: television's narrow dynamic range. *Fear Factor* Seasons 1–6 were analog broadcast, and getting the mix to land the same everywhere is one of the hardest things we do. Those broadcast limiters could be brutal, but as every Beatles fan knows, heavy compression isn't necessarily bad. Embrace it. So I emulated the Optimod "wall" the networks used and "played" into it for reference until I heard what I wanted. I also ran the music stems through a Neve Series 54 console I kept around, with a touch of top and bottom added. We mixed *Fear Factor* Monday and Tuesday and *Survivor* Wednesday through Friday, with *Survivor* airing the following Thursday. That's a reality schedule, and down the road it only intensified.

Those Rogan-era *Fear Factors* still put a smile on my face.



Is There a Line You Shouldn't Cross?

There's a boundary in reality I don't cross. Suspension of disbelief is generous in a feature. John Wick's punches can be as big as you like because it's make-believe. We know they don't sound like that but we love it! Reality gets no such grace. The instant a sound is too big, it tips its hand and reads as fake. Maybe I'm crazy, but it's something I pay attention to. And that makes for a very delicate FX mix.

Stars Earn Stripes

A short-lived Dick Wolf/Mark Burnett series, *Stars Earn Stripes*, may have been the most elaborate reality show ever attempted—director J. Rupert Thompson again, with *Fear Factor* alum and showrunner David Hurwitz. It was the first of the special-ops-meets-celebrity shows, featuring Chris Kyle, the real "American Sniper," and a host of other Special Forces operators, and narrated by Gen. Wesley Clark.

The production mixer, Curtis Rohm, went where few reality production mixers go: second unit audio. He spent a day with the armorer, handling and firing guns, and built an amazing weapons library for the show. One sequence featured live fire. The cast had to swim to and



A contestant on *Wipeout* being pummeled.



board a rubber boat, land on a beach, shoot live rounds at targets, and run through a muddy field to rescue a downed soldier while Hueys flashed overhead, *Apocalypse Now* style. FX and Foley cut to match. This is reality TV? Yes. Who knew?

The arsenal ran deep—a .50 cal, every modern military automatic, Kyle's sniper rifle, a lot of guns. It's one of the few times reality and feature work truly merged for me. And the iZotope ANR-B I mentioned earlier saved the day again, this time on the command-center tent scenes with Gen. Clark, where the lighting fans were a problem that magic box solved. Curtis provided the production audio for *Fear Factor*, *Wipeout*, *Stars*, and many others I mixed.

The Other: *Operation Homecoming: Writing the Wartime Experience*

As we headed into a Christmas break, a beautiful PBS feature documentary arrived: *Operation Homecoming: Writing the Wartime Experience*. It earned an Academy Award nomination and won the whole sound team Emmys—my second. We used the same approach for this that we did for all the reality shows.

Wipeout and *American Gladiators*

Wipeout was a tough show. Its “Wipeout Zone” had impact-machine sounds—like the punching machine landing blows every two seconds for the first 20 minutes. And we cut every machine, every blow, every footstep. *American Gladiators* was a similar story, this time in 5.1, with ball cannons bouncing off the surrounds. Director J. Rupert Thompson wanted to see what the boundaries of surround reality were—it was great fun. This one was climbing rigging, body impacts, and crowds. By 2009, I had a weekly show on ABC, CBS, and NBC—three a week.

Reality Today

We'll end here with these shows, but my company, Mixers Post Sound, recently completed *Survivor*'s 50th season—and I'm still in the chair, 800-plus consecutive episodes and counting. We've done many, many other shows, but I think the longevity of a show speaks to the effectiveness of sound done right—everything done right—and I play my part to the best of my ability. Regardless of genre, great sound moves audiences and we can all be proud of our contributions.



Remembering My Mentor Kirk Francis CAS

by Chris Welker CAS

For those who knew of Kirk Francis CAS, a few thoughts may come to mind. They may have known him as the Oscar-winning production sound mixer for *The Bourne Ultimatum* or from any of the incredible films he had recorded the sound for over his impressive career. They may have heard stories of a man who had grown up in San Francisco and had the experience of recording sound for famed author Ken Kesey. Or perhaps heard stories of a curmudgeon who perfectly embodied the reputation that so often plagues production sound mixers. I was fortunate to know Kirk Francis as an incredible mentor.



My initial meeting with Kirk came about when I received a phone call asking if I was available to work as the utility sound technician on a movie that would be filming in New Orleans by the name of *12 Years a Slave*. I was recommended by a gaffer, Andy Ryan, who thought I would be a good fit for Kirk's team. I was very interested in this project, but I was unsure about working with Kirk Francis. He was described as a very interesting man who does not suffer fools and could be quite cranky.

There was one story I heard where the location department had placed traffic cones and caution tape around Kirk's sound cart with a sign that read, "Beware of the Cranky Sound Mixer!"—written in 14 different languages. I was very intimidated, but rather than just saying no thank you, I tried to price myself out of this opportunity. After speaking with the line producer, I wrote to Kirk explaining that unfortunately I would not be able to do the project for the rate that was being offered. However, something about my email had the opposite effect of what was intended. Kirk pulled some

strings and found a way to make my deal work. I was caught off guard and with no way to gracefully back out. This made me quite anxious as I was now about to embark upon a very difficult and extremely intense project with a boss that I was unsure about.

The time came for our first meeting where I would help Kirk receive several shipping pallets sent from the Pacific Northwest to a warehouse in New Orleans, LA. I began walking around the nearly empty warehouse looking for my new boss. Cautiously turning each corner, I eventually spotted the only person around. In the distance stood an older man with wiry gray shoulder-length hair. He was wearing a basic cotton T-shirt that was stained with the ink of a leaky pen that was still in its pocket. He was wearing what appeared to be khaki shorts that were frayed in various places. And most notably, he was wearing flip-flops. Then came the sound of a gravelly voice yelling from a distance, "Aloha, kid!"

As I got nearer, I was surprised by a very friendly smile. As I recount these events, this is the point when I begin to feel my eyes welling up with tears as I am reliving a moment when my life would take a major turn for the better. He greeted me and asked that I help him use a hand-pallet jack to maneuver these blocks of tightly packed equipment to a place where we could organize and build up his carts. He began directing me as to what to do next. I would use a box cutter to remove the cellophane and place his cases where he wanted them. Now, by this point in my career, I previously had the opportunity to help several other sound mixers who had come to the region with this portion of their prep. But this time, there was something that struck me as quite different.

As I removed a case and would look for my directions as to where to place the item, I found myself encountering a variety of guitar cases. He would growl, "That one will go in the pile of things that go to my apartment." I began to find that the amount of guitar cases was growing quite large. "That one goes on the trailer." Then there was a two-burner propane camping stove (more on this later). "Apartment," he said.

After we finished organizing things and building up the carts, I was taken aback by the minimal amount of audio equipment that was actually for the purpose of recording the sound for this film. I had worked with production mixers that were maximalists in their approach. Kirk was



then make assessments about the current and approaching conditions. When the rain and lightning finally caused delays, he would run back to the trailer and grab his Hawaiian lap steel guitar and put in some practice time.

It was a good thing he brought along so many guitars and ukuleles because we got shut down quite often! I would sit and listen to the private performances while the rain would pour down over our trailer. Eventually, he invited me to accompany him on guitar so that he could get more opportunities to solo on his Weissenborn



not that kind of mixer. He was the first mixer I had worked with that used a Cantar recorder. The system he had built was very streamlined and fairly weather proofed. His minimal approach made him very adaptable to changing conditions. Kirk was not concerned with the aesthetics of the gear or the cases. He was about getting the job done and done well. The idea of geeking out over gadgets or remembering specifics of model numbers was definitely not of interest to him. I came to realize that he wasn't incapable of retaining these bits of information—it was more a matter of principle as he knew every breed of bird and species of plant in existence.

Regarding the job, he was the sort of sound mixer who knew what was important to worry about and what was ultimately unimportant. Kirk was very much interested in shooting exteriors as this put him closer to what mattered most to him. Being outdoors was his happy place, and I was always amazed at how comfortable he was even in the toughest conditions. The man never wore sunscreen or used bug spray. His skin was immune to the sun's rays, and his blood was rich with enough garlic to make any insect regret biting him. I had learned the details of how he spent years as a falconer where he trapped a wild red-tailed hawk and trained it to hunt rabbits for him while his crew of Jack Russell Terriers would help him track them down. And, whenever the weather was brought into question, I had a tendency to look at my phone and radar app to make my predictions. He, instead, used his handheld anemometer to check the wind speeds and

lap steel guitar. I wasn't the best at guitar and told him that my primary instrument was the saxophone. "Bring it tomorrow," he grumbled, and so I obliged. Before you knew it, we had worked up a playlist of "Ain't Misbehavin'" and "Summertime," and a few other tunes that we would put on for whatever crew was near the back of the open sound trailer. It became our own little live-music venue among the sugarcane fields.

Being Italian, Kirk was an exceptional cook and had even written his own book that came with recipes and personal stories from the various locations he visited during his extensive career. You would know if Kirk liked you if you were the recipient of his book. I finally learned why he traveled with that propane camping stove. He knew that his apartment for the duration of the shoot had a convection top and that would definitely not do. He required cooking with gas. Kirk learned that my wife was an avid baker and this helped solidify my value on his team. One day, she volunteered to bake him anything he wanted. He requested chocolate croissants, to which my wife exclaimed, "Of course, he would ask for those!" That is when I learned how much work and skill was required

to make them from scratch. She proudly took on the challenge and when she had completed the mission, came out to set to meet Kirk for the first time. My memory is that Kirk greeted her with a smile, ate his fill of chocolate croissants, grumbled his compliments to the chef, and then he went back to his work. Having lived through my experiences while getting to know Kirk, she took that as the highest compliment!

Over the course of the filming of this movie, it became clear to me that Kirk had taken to me. He began looking for opportunities to help me move along in my career as he knew I had dreams of one day becoming a production sound mixer. He tasked me with recording the sound for the second unit. He worked it out with the producers that I receive my first mixing credit on the film as he saw that opportunity as being something that would greatly help my career.

Eventually, our time on *12 Years a Slave* was wrapping up. It occurred to me that I was not ready for my time with Kirk to come to an end. This was such a strange realization for me as it was in stark contrast with how I began the job. I was disappointed to be saying goodbye, especially since I had heard that this was to be his last film project before entering retirement. He gifted me a ukulele that I began practicing daily—as well as that propane camping stove. We stayed in touch almost daily.

A couple of years later, I got an urgent phone call from Kirk. He asked if I still had that stove top, which I sure did. He was coming back to New Orleans to shoot *Jurassic World* and wanted to make sure I was available! We picked right back up where we had left off. Our summer weather setlist expanded as we were right back to playing tunes for anyone within earshot of our sound trailer. The biggest difference this time was that a good portion of the film was shot on a soundstage. Kirk absolutely hated being indoors. So, we set him up outside under a tent with his Cantar recorder on his cart and we ran an analog snake into the set so the transmitters and receivers could be sacrificed to the inhumane conditions of a cold and dark soundstage.

There were times when the rain would be absolutely pouring. I remember one particular time hearing the sound of what seemed like deafening white noise over his slate microphone as his voice yelled, “SPEED!” I immediately ran out to check on him, and what I saw upon opening that door is still seared into my brain to this

day. Kirk, who was wearing a light rain jacket, shorts, and white shrimp boots was completely drenched. He was fiercely holding onto the tent with one hand, mixing with the other hand, and the wind and rain were coming in sideways! I panicked and grabbed hold of the tent to help him so he could continue to use both hands, but he ordered me to go back inside and that he was perfectly content. And I knew that he was. It was his preferred place to be indiscriminately alongside nature—armed with his binoculars, his trusty anemometer, and his headphones regardless of the conditions.

Again, Kirk arranged for me to mix the second unit on this movie. He was always looking out for me and offering me his guidance every step of the way. The first day on this massive set, he left me a clipboard for my sound reports with his personal words of wisdom written with permanent marker, “Don’t Fuck It Up, Kid!” It gave me a huge smile and all the confidence I needed to succeed. I knew he was in my corner and that he trusted me with the keys to the car.

We shared more meals on that job and played a lot more music. I got to know his lovely wife Leslie when she came for a visit. Upon wrapping this film, we again said our goodbyes. However, this time it didn’t feel quite as sad since I knew it would not be the end of our friendship. He went back to his home in Whidbey Island, Washington, and I continued along as normal in New Orleans.

I got another call from Kirk sometime after he had officially retired from the film industry. He and his wife had finally fulfilled their dream of living on The Big Island of Hawaii. He broke some news to me that would again have a significant impact on my life. He decided to send me his remaining sound equipment so that I could finally make the leap into becoming a production sound mixer. I was thrilled and asked what I could do in return, to which he asked that I use some of my earnings to “Come to Hawaii to visit your ol’ pal, Uncle Kirk.” Deal!

Over the next several weeks, box after box began to arrive at my doorstep. And, before long, I had just about everything needed to mix a small movie. The timing perfectly aligned with an opportunity that presented itself to me to mix my very first feature—a comedy by the name *Keanu*. I was thrilled and scared out of my mind, but Kirk was just a phone call away. He reminded me routinely of that most important piece of advice that he had scribbled across the clipboard.



was spot-on. There were the red-carpet events and all the parties. We got dressed up and had the best time. We were at the Oscars! How crazy is that? Then came a turning point for my night. Kirk Francis appeared on the screen as the room celebrated the In Memoriam portion of the ceremony. There he was; an image of Kirk Francis wearing his Hawaiian shirt under his tuxedo jacket and holding his Oscar statue that was decorated with a small Hawaiian lei. Below it read:

Kirk Francis 8/27/1947 - 2/6/2026

When trying to process the loss of someone, it is natural to try to encapsulate who that person was and why they mean so much in our lives. There is a tendency for us to tie a person to their work. Sure, Kirk was an Oscar- and BAFTA-winning production sound mixer of some very impressive films. But the thing that occurs to me most is that Kirk Francis was a cultivator. Whether it was an orchid, a song, a meal, a rain delay, a young utility sound technician, or a corner of a Hawaiian hillside, Kirk had the ability to recognize what it could become. Then he patiently invested time, encouragement, and the care necessary to help it flourish. That is the Kirk Francis I am fortunate to know, and I am forever grateful that I answered his first phone call.

After the project wrapped, I made good on my promise. My wife and I set out to stay with Kirk and Leslie at their new home. It was incredible and exactly as he had described. He took me all around his property showing me the varieties of palms that he had planted, as well as coffee plants, exotic tropical flowers, his chickens, and his new prized tractor/mower. He had swapped a life of sitting on set and listening to actors talk with now sitting on a tractor while wearing noise-suppression headphones. He was living his best life and had grand plans for this chapter of his life.

I continued to receive career and life advice almost daily from Kirk. Then, this past year, I got word that I was nominated for an Oscar and BAFTA for my work on the film *Sinners*. I was so excited to share this huge milestone with my mentor. I know he was very proud to have been such a huge part in helping me grow from the utility sound technician he had hired almost a decade prior into the production sound mixer I had now become. I was thrilled at the idea that Kirk would see me at these award ceremonies. Unfortunately, I received the devastating news of his passing before this would become a reality. It was a really tough thing to grapple with the loss of someone so important to me at a time when I was celebrating a moment that he had been so integral in making into a reality. I attended the Oscars with my wife, and we had the experience of a lifetime. Kirk had prepped me for everything that we would soon encounter and he



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BEEN THERE DONE THAT

Richard Lightstone CAS, boom operator

Eddie Casares, and 2nd boom operator Jennifer Winslow continue on Season 5 of *Criminal Minds: Evolution*, the re-boot of the original long-running *Criminal Minds*, marking the 20th year of this very successful episodic!

Dave Griffiths CAS is in the Vancouver BC area on the *Durango* pilot for Hulu with boom op Murray Forward and sound assistant Chia-Hua Chan.

From **Josh Berger CAS** It's been a busy year in New York, and I'm looking forward to a full slate of releases this fall. I recently wrapped work on *East of Eden* for Netflix with showrunners Zoe Kazan and Jeb Stuart; *Paper Tiger*, reuniting with frequent collaborator James Gray following its premiere at this year's Cannes Film Festival; and *Focker-In-Law* for John Hamburg and Universal Pictures. I'm grateful for the opportunity to work with such talented filmmakers and am excited for audiences to experience these stories in the months ahead.

Philip Perkins CAS has been very busy mixing a number of docs, including *Amos Brown*, *Assata Michelle*, *Fault of Freedom*, *Born Kicking*, *Oakland Original: Gilbert Gong*, *The Dreamers and I*, and *From Inside of Here*.

From **Antoin Cox CAS**: Greetings from the Netherlands! In July, we did a shoot during the Down the Rabbit Hole 3-day music festival in the Netherlands for the project *Campingflight to Paradise*. The logistics were difficult, so we used many cart setups, and had many moves across many locations. In addition to walking with carts and bags, our main setup was on a Gator (4-wheel drive cart) with a Deva 24D, Cedar, Rack24, 12 RX, and a Mix16. (See photo in "The Lighter Side" submission.) Our small cart had a Nova 2, Cedar, and nine RX channels. Our small bag used a Sennheiser AMBEO for wild tracks into a Nova 1. Since we were recording while the festival was

going on, we had to work with the RF consultant and change frequencies multiple times across the three days for everything to work—and not interfere.

Karol Urban CAS MPSE and **David Tichauer CAS** have been hard at work mixing Season 2 of *The Hunting Wives*. Karol has also been working hard on a theatrical documentary to be announced soon.

From **Chip Sovek CAS**: It was quite a bit of fun to record the flyover, taxi, and propellers for a one-of-a-kind B-29 Superfortress bomber from WWII in Hagerstown, MD. "Fifi" is one of only two still flying in the U.S. and was featured over the Hudson River/NYC as part of the Sail250 commemorative events on July 4. The film, *The 510th: A Fighter Squadron in WWII*, will be headed to film festivals this fall, keep your eyes and ears out. (See photo in "The Lighter Side" section.)

Jon Ailletcher CAS is back in the chair for Season 14 of *Chicago P.D.* after a wonderful hiatus and time at home. I'm joined this season by my outstanding crew, Jason Johnston on boom and utility Carly Perkins. Our Sound PA's this season are Jonah Fiden for the first month and then Trinh Vo taking over the rest of the season.

Devendra Cleary CAS writing from set: I'm currently spending the summer in Los Angeles with some local locations and stage work at Warner Bros. on *Paris Paramount*, a feature film written and directed by Nancy Meyers. The sound team is myself, Patrick Martens on boom, and Maribeth Powers as utility. We also have Craig Dollinger joining us most days as an additional boom operator. Thank you, Michael Kaleta, for day playing with us as well! This shoot should carry us through September.

Scott Carr CAS has been doing a little bit of this and a little bit of that—working on a few documentaries, a

few live internet interviews, a few spatial sound effects sessions, and a few mocap projects.

From **Tom Hambleton CAS**: 2025 saw the end of one set of studios and the birth of one that is still going strong in 2026! Completed the original score, along with sound edit and mix for *Blue Eyed Girl*, starring Marisa Coughlan, Beau Bridges, Lisa Gay Hamilton, Sam Trammell, and Eliza Coupe. Recently completed sound edit and mix on a host of great documentaries for PBS and streaming, including *Liminal*, *Daniel's Garden*, and *Full Stops*, along with *Bison* and *The Death and Life of Martha Roth*. Interspersed with those were ADR sessions for *Super Troopers 3*, *Maximum Pleasure Guaranteed*, *Grey's Anatomy*, *9-1-1: Nashville*, *Chicago Fire*, and the upcoming *Altar*. So very grateful to be working so much in these challenging times and wish the best to all my colleagues in CAS!

Sean Byrnes CAS is enjoying positive reviews for *Sugar* Season 2, which wrapped this time last year. Hoping for a Season 3 pickup! In the meantime, Sean just started rolling sound on the feature film, *They Follow*, the long-awaited follow-up to the horror hit from (2014), *It Follows*. Once again working with master boom op Gunnar Walter and welcoming utility sound Chris Hall to the team.

Daniel Vasquez V. CAS recently completed work on *James*, the anticipated Netflix docuseries about Colombian soccer/football star James Rodríguez, which was released ahead of the World Cup. Daniel co-supervised and mixed the project with Sebastian Alzate and Juan Saldarriaga. Produced by Clover Studios, directed by Simon Brand.

Amanda Beggs CAS is wrapping up Season 2 of *All's Fair* with boom op Eva Rismanforoush, utility Zach Wrobel, and trainee Reanna Peters. Hopefully, everyone tunes into Season 1 of *The Shards* so a second season

gets greenlit and Amanda can continue her run of apparently only working on shows at Sunset Las Palmas stages in Hollywood!

From NBCUniversal StudioPost: Congratulations to the talented teams of this year's Emmy nominations! Our StudioPost teams garnered seven nominations in the sound editing and mixing categories for shows such as *Fallout*, *Pluribus*, *Hacks*, *Widow's Bay*, *Black Rabbit*, *DTF St. Louis*, and *Spider-Noir*... Currently on the feature-front, **Jon Taylor CAS** and Martyn Zub are on the Hitchcock mixing *Zeus* for Legendary Entertainment, and **Darin Heinis CAS** is mixing the first temp for the independent feature

film *Nightwatching*... On the television side, Mark Fleming and Myron Nettinga wrapped up the last season of *The Hunting Party* for NBC... **Keith Rogers CAS** and **Steve Bucino CAS** are in Mix 2 mixing *Nobody Wants This* for Disney, *Joseph of Egypt* for Amazon, and *Five Star Weekend* for Peacock... **Tim Hoogenakker CAS** is remixing several Lionsgate titles for Dolby Atmos release, including *Saw 6*, *Sorority Row*, *Suicide Kings*, *Clerks 2*, and *Passion of the Christ*. Tim will circle back with **Larry Benjamin CAS** in August to start mixing *Tracker* for CBS, and Season 2 of *Presumed Innocent* for Apple... On Mix 14, **John Cook CAS** and **James Parnell CAS** are mixing

Season 2 of *The Paper* for NBC, *Rambler* for Apple, and *Nobody Wants This* for Disney... The mix team of Pete Elia and Jason Coleman finished mixing the first season of *Nemesis* and are now mixing *POWER: Origins* for Starz... Peter Nusbaum and Whitney Purple mixed the pilot for NBC's *Newlyweds*, and are currently mixing the first season of the Amy Poehler comedy series *DIG*, also for NBC... **Todd Morrissey CAS** and Milo Train just completed Season 2 of *Blood of My Blood* for Apple... **Bob Edmondson CAS** and Ruben Ripley are mixing Season 1 of *CIA* for NBC... Andy King and Jon Mete completed the 27th season of *Law & Order: SVU* for NBC... And **Darin Heinis CAS** and Alex Lee completed the 25th season of *Law & Order*.



IN REMEMBRANCE

We cross paths with many people over the course of a career. Some are quick acquaintances, some become regular colleagues, while still others we are fortunate to call friends.

Paul Trautman CAS

Production mixer Paul Trautman CAS passed away at his home in Los Angeles in March 2026 at the age of 70. "Traut," as he was affectionately known by his peers, began his sound career in the transfer department at Location Sound Services in the early 1980's. One day, he answered a call from producers Gail and John Purdy requesting a sound mixer for a bank commercial in Glendale. Since Paul knew no others were available, he said he could do it. Then he quickly called people he knew to answer questions as to what he needed to know and borrowed or rented equipment—and from there on became a sound mixer.

Traut worked primarily on documentaries, many with The Cousteau Society and National Geographic. He also mixed on commercials and feature films, including *An Inconvenient Truth* and *It Might Get Loud*. He had a close and ongoing relationship with Erich Joiner and the production company Tool.

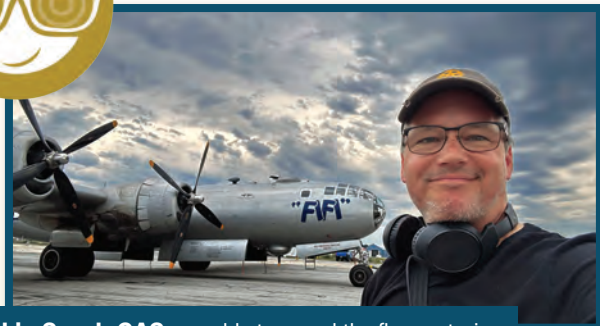
His longtime boom swingers included Alenka Pavlin and Tove Hoch, who boomed for him for 25 years. Bruce Bisenz was a major influence on Paul's career.

Traut was known for his particularly generous treatment of crew, his love of quality audio gear, and his electric blue VW Eurovan. He was known as a happy, positive guy with a great ear. Cinematographer and good friend Bob Yeoman put up this marquee when they were working together once. The CAS extends our condolences to Paul's family and friends.





THE LIGHTER SIDE



Chip Sovek CAS was able to record the flyover, taxi, and propellers for this one-of-a-kind B-29 Superfortress bomber "Fifi" from WWII in Hagerstown, MD. (See his "Been There Done That" submission for additional info.)

Ready for action, the sound team of (L-R) Zsombor Farkas (3rd), **Tamas Csaba CAS** (sound mixer), Gabor Mate (1st), and Viki Magyar (2nd) on the set of **3 Body Problem** Season 3 for Netflix.



School is in session for the sound department on the set of the Netflix comedy **I Suck at Girls**. (L-R) Boom op Tony McCovey, sound utility Kelsey Zeigler, and sound mixer **Devin Golub CAS**.



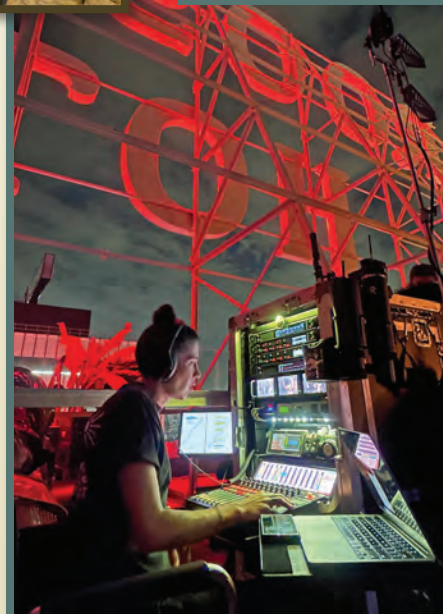
From the set and village of **Moana**, (L-R) sound trainee Sawyer Burke, sound utility CAS Associate **Matt Thompson**, sound mixer **Whit Norris CAS**, boom operator and CAS Associate **Kevin Cerchiai**, and Pro Tools mixer **Derek Pacuk CAS**. (Photo by Frank Masi)

Amanda Beggs CAS mixing **All's Fair** on the roof of the Roosevelt Hotel.



Boom operator and CAS Associate **Peter Deutscher AMPS**, sound mixer **Ken Ishii CAS AMPS**, and sound utility Dave LaVenture overlooking the Manhattan skyline on the set of **A Quiet Place 3**, being released by Paramount Pictures July 2027.

Re-recording mixers **Onnalee Blank CAS** and **Greg P. Russell CAS** just wrapped the new **Spider-Man: Brand New Day** film, directed by Destin Daniel Cretton (center) at Sony Studios in the Cary Grant Theatre.



A Gator became an all-terrain sound cart for production sound mixer **Antoin Cox CAS**, outfitted with a Deva 24D, 12 RX, and a Mix16 (among other gear), during a shoot for **Campingflight to Paradise** which took place during the Down the Rabbit Hole Music Festival in the Netherlands.



On the set of **Paris Paramount** at Warner Bros. (L-R) boom op Patrick Martens, utility Maribeth Powers, and production sound mixer **Devendra Cleary CAS**—with photo bomb by video playback Max Comejo.



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