

# THE REEL THING XX

AMPAS • LINWOOD DUNN THEATER  
HOLLYWOOD  
JUNE 6-7, 2008



No enterprise in the non-profit world can accomplish much without the enlightened, altruistic cooperation of its benefactors. The Reel Thing has been privileged to enjoy the generous support of the professional community since its inception. The organizers of The Reel Thing would like to recognize and thank all the individuals and organizations who contributed their considerable skills, energy and enthusiasm to the symposium. As always, we thank our presenters, who share their knowledge and experience in this symposium. And we would like to recognize the following individuals for their support and collaboration:

**Todd Best**

**Michael Blaylock**

**Helena Brissenden**

**Bill Drishchel**

**Marshall Gitlit**

**Beverly Graham**

**Moray Greenfield**

**Carol Hung**

**Helmut Kaczmarek**

**Hajime Kamata**

**Laura Rooney**

**Andrew Stucker**

**The Academy of Motion Picture Arts and Sciences**

**The George Eastman House Film Department**

**The Library of Congress Motion Picture Broadcasting  
and Recorded Sound Division**

**The UCLA Film and Television Archive**

**Sony Digital Cinema**

THE  
REEL THING XX  
Hollywood, California  
PROGRAM



**Thursday, June 5: 7:30 pm:**

**The Linwood Dunn Theatre: Two Digital Restorations:**

***Ride Lonesome* (1959; directed by Budd Boetticher; cinematography by Charles Laughton Jr.) Digital Projection**

***Down Argentine Way* (1940; directed by Irving Cummings; cinematography by Ray Rennahan) 35mm Film Projection**



**Friday, June 6: 9:00 am**

**The Linwood Dunn Theatre**



**Screen Snapshots: The Making of *The Bitter Tea of General Yen***



**Keynote: In the Beginning of Digital End-to End**

**Leon Silverman, Laser Pacific**



**Dickson Experimental Sound Film**



**The Phonautogram: Recorded Sound's First Medium**

**David Giovannoni, First Sounds**



**BREAK**



**Restoring French Heritage: the classic films of Marcel Pagnol**

**Bruno Despas and Jean-Yves Deschênes, Vision Globale**



**New Trends for AudioVisual Preservation following  
European Research Initiatives**

**Didier Giraud, Institut National Audiovisuel**



***Screen Snapshots* [excerpt] featuring Mary Pickford**



**It's Not Just Analog - Recovering Problematic  
Digital Audio Tracks**

**Robert Heiber, Chace Audio**



**LUNCH**



**Managed Archival Storage & Automated Repurposing  
on a Single Platform**

**Chip Aycock, Mosaic Digital Studios**



**PERGAMUM - An Evolvable Architecture for Reliable  
Disk-Based Archival Storage**

**Ethan Miller, UCSC**



**4K Archival Mastering**

**Jim Houston, PostWorks LA**



**Digital Linear Magnetic Data Tape Normalization for Existing Content**

**Steve Kochak and Craig German, Ascent Media**



**BREAK**



**4K Digital Workflow and Archiving**

**Mitch Bogdanowicz and Denis Leconte, PostLogic**



**Open Forum Discussion- Data Archiving**



**Friday, June 6: 7:30 pm:**

**The Linwood Dunn Theatre:  
Film Restoration and Digital Restoration**

***Hearst-Metrotone Newsreel: Year-End Round-Up (1934)*  
35mm Film Projection**

***Bonnie and Clyde* (1967; directed by Arthur Penn; cinematography by  
Burnett Guffey) Digital Projection**



**Saturday, June 7: 9:00 am**

**The Linwood Dunn Theatre**



***Washington Parade* : "The Archives"**



**Keynote:**  
**Film Grain - Digital Restoration's "Get Out of Jail Free" Card**

**Rob Hummel, Dalsa Digital Cinema**



**Visual Color Matching for Digital Archives**

**Bruno George, Pacific Title**



**Image Calibration Exercise: High Density Scanning/Large Format Film**



**BREAK**



**2-Color Motion Picture Processes Redux**

**Ralph Sargent, Film Technology**



**The Kammatograph: Screening of pre-1900 silent films**

**Piano accompanist: Alan Stark, Film Technology**



**The Digital Restoration of Max Ophuls' *Lola Montes***

**Tom Burton, Technicolor Digital Services**



**LUNCH**



**Unique Challenges Associated with Restoring Perspecta Sound**

**John Polito, Audio Mechanics**



**Digital Restoration Techniques Developed for *Down Argentine Way***

**Kevin Manbeck, MTI**



**After the DI - How to Organize, Catalogue and Protect  
the Original Negative**

**Mo Henry, D. Bassett/Deus Ex Machina**



**BREAK**



**The ASC - CDL in Theory and (Mal) Practice**

**Josh Pines, Technicolor Digital Intermediate**



**Restoring Cinerama - *How the West Was Won***

**Ned Price, Warner Bros and Bill Baggelaar, MPI**



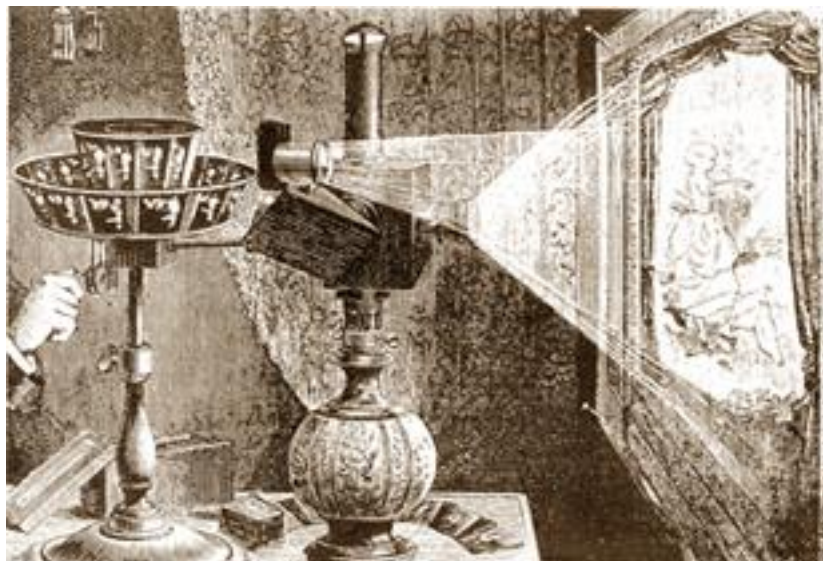
**Saturday, June 7: 7:30 pm: The Linwood Dunn Theatre**

**Screening: Digital Restoration**

***Surprise Screening***

**A recently restored large format film will be screened. Contractual  
arrangements preclude us from mentioning the name of this epic feature.**

**Digital Projection**



THE REEL THING XX

Hollywood, California

ABSTRACTS and SCREENING NOTES

Screen Snapshots: The Making of *The Bitter Tea of General Yen* (Columbia, 1933)  
A behind-the-scenes look at motion picture technology as it began to stabilize in the early  
sound era, with Frank Capra. 35mm film; @ 10 min.

Keynote: In the Beginning of Digital End-to End

Leon Silverman, Laser Pacific

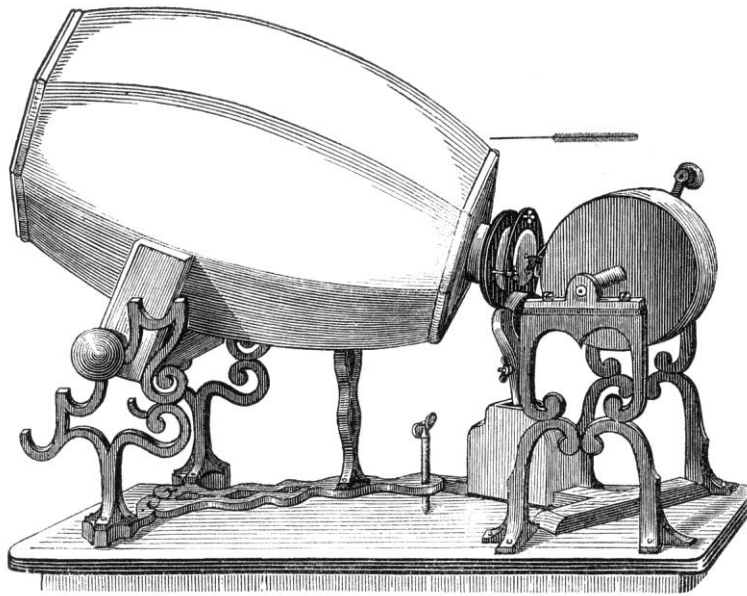
In the beginning there was film. In the end, it will be digital. What must we do to  
avoid wandering in the desert for the next 40 years hoping for the promised land of  
an industry whose approach to workflow and archive was as elegant as the last 40  
years?

*Dickson Experimental Sound Film* (@1894; directed by W. K. L. Dickson; music by Robert  
Planquette; cinematography by William Heise)

The Dickson Experimental Sound Film is a film made by William Dickson in late 1894 or  
early 1895. It is the first known film with live-recorded sound and appears to be the first  
example of a motion picture made for the Kinetophone, the proto-sound-film system  
developed by Dickson and Thomas Edison. (The Kinetophone—consisting of a Kinetoscope  
accompanied by a cylinder-playing phonograph—was not a true sound-film system as no  
attempt was made to synchronize image and audio throughout playback.) The film was  
produced at the "Black Maria", Edison's New Jersey film studio. There is no evidence that it  
was ever exhibited in its original format...

The movie features Dickson playing a violin into a recording cone for an off-camera wax  
cylinder.[1] The melody is from a barcarolle, "Song of the Cabin Boy", from *Les Cloches de  
Corneville* (literally The Bells of Corneville; presented in English-speaking countries as *The  
Chimes of Normandy*), a light opera composed by Robert Planquette in 1877. In front of  
Dickson, two men dance to the music. In the final seconds, a fourth man briefly crosses from  
left to right behind the cone. The running time of the restored film is seventeen seconds; the  
accompanying cylinder contains approximately two minutes of sound, including twenty-three  
seconds of violin music, encompassing the film's soundtrack. [this text from Wikipedia]  
35mm film; @ 1 min.

This film was restored by the Library of Congress in 2000 and we would like to recognize the  
cooperation of the Motion Picture, Broadcasting and Recorded Sound Division



## **The Phonautogram: Recorded Sound's First Medium**

### **David Giovannoni, First Sounds**

The first carrier of recorded sound was not a tinfoil sheet or a wax cylinder. It was a soot-covered piece of paper called a phonautogram. The First Sounds collaborative recently recovered the sounds captured on the earliest phonautograms - advancing by 17 years the advent of audio recording and by 28 years the oldest sound available to us today. David Giovannoni, a principal in the collaborative, discusses the making and makeup of phonautograms, issues concerning their identification and conservation, and the challenges of restoring the world's oldest sound recordings.



**BREAK**





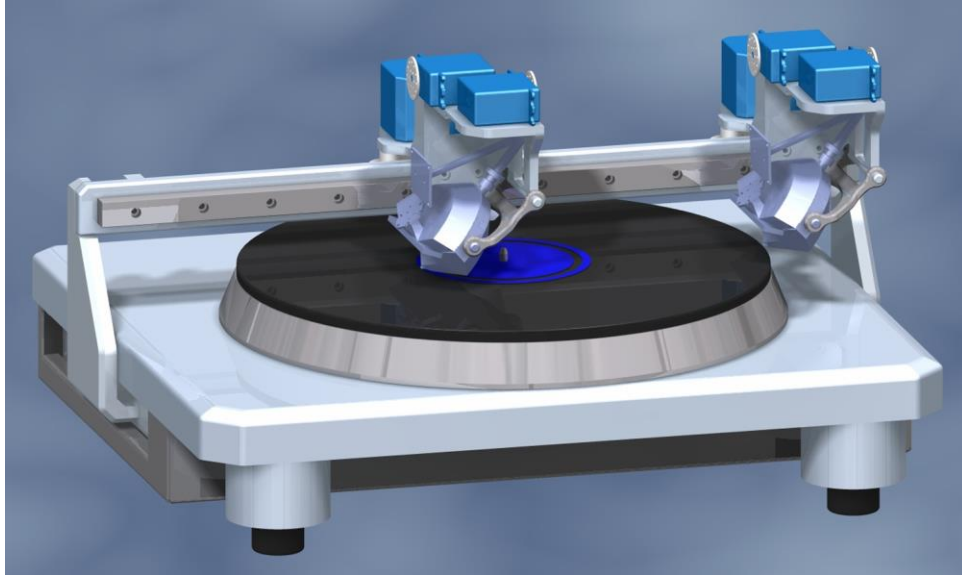
## Restoring French Heritage: the classic films of Marcel Pagnol

**Bruno Despas and Jean-Yves Deschênes, Vision Globale**

Marcel Pagnol was a French novelist, poet, playwright and film-maker. He was one of the most well-known and popular figures in 20th century France. He made 35 films between 1931 and 1967, mostly photographed and directed in the beautiful and charming French region of Provence. Several of them went on to enjoy great success in the French cinema. The Compagnie Méditerranéenne de Films, legal owner of Marcel Pagnol's films, began a restoration process in 2007, the purpose of which was to completely restore the entire catalog of his films. This project was meant to support the distribution of the films in the multiple formats of today (and those of tomorrow), and to insure the preservation of the catalog. The first 2K restorations, *Le Schpountz* (1938), *Naïs* (1945) and *Topaze* (1950) have already been completed.

As always, the adaptation of elements created in obsolete technologies many generations ago proved to be problematic. The 2k data was extracted from new black-and-white interpositives printed by wet-gate from the nitrate negatives. Once the interpositives were scanned, the picture restoration was essentially a digital intermediate workflow, with the processing phase primarily supported by GeneSys®, Vision Globale's proprietary restoration software.

The restored elements include 35mm negative and print, HDCAM SR and Digital Betacam video masters, as well as 2K digital files containing both the native scans and the restored versions of the data. The soundtrack was also digitally restored from the original optical tracks. Several short clips will present the restoration problem set, demonstrating various defects and how they were corrected by the means of specially developed tools. The problem of picture, sound and metadata preservation in a fully-digital world will be emphasized.



## **New Trends for AudioVisual Preservation following European Research Initiatives**

**Didier Giraud, Institut National Audiovisuel**

**This presentation will focus on exercises recently conducted by the European project PrestoSpace (<http://www.prestospace.eu>). This project was a collaboration in four areas of work: (1) preservation, (2) restoration, (3) storage, archive management and (4) metadata, and access and delivery.**

**The conclusions regarding preservation will be presented in detail. The results of this research include the specification of a number of dedicated devices optimized for archival work, such as a dedicated archival film scanner, an audio disk player that reads phonograph disks without contact, and a new type of audio tape player. These implements, designed to meet both archival quality standards and the cost and speed requirements for mass migration of legacy collections, are considered to be critical to successful preservation of media collections.**



***Screen Snapshots [excerpt] (Columbia, 1930; Series 10#5): Mary Pickford and Mei Lan Fong. A prominent Chinese actor's visit to Los Angeles provides the opportunity for Mary Pickford to highlight some of the technical community's advances in sound equipment. 35mm film; @ 5 min.***



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## **It's Not Just Analog - Recovering Problematic Digital Audio Tracks**

**Robert Heiber, Chace Audio**

It has been well documented that acetate and polyester based analog audio media is highly susceptible to physical deterioration, often making the recovery of the audio difficult or even impossible. However, archivists and asset managers are now facing similar problems with digital formats that are often less than half as old as their analog counterparts.

In fact, digital formats often display multiple issues that make recovery of the audio more challenging. The problems range from physical deterioration of the media to more critical problems such as format/equipment obsolescence, to poorly maintained equipment no longer capable of making recordings to factory specifications. Unlike analog recordings, which will often yield audio under extreme conditions of deterioration when a digital format exceeds its error correction capabilities, the loss of audio is complete.

This presentation excavates the conditions that lead to a complete loss of the audio and identifies methods that can be employed to recover the tracks and addresses linear, tape based formats like DAT cassettes, DTRS (DA-88) and 1/2" DASH tape that are quickly approaching the end of their useful lives.



## **LUNCH**

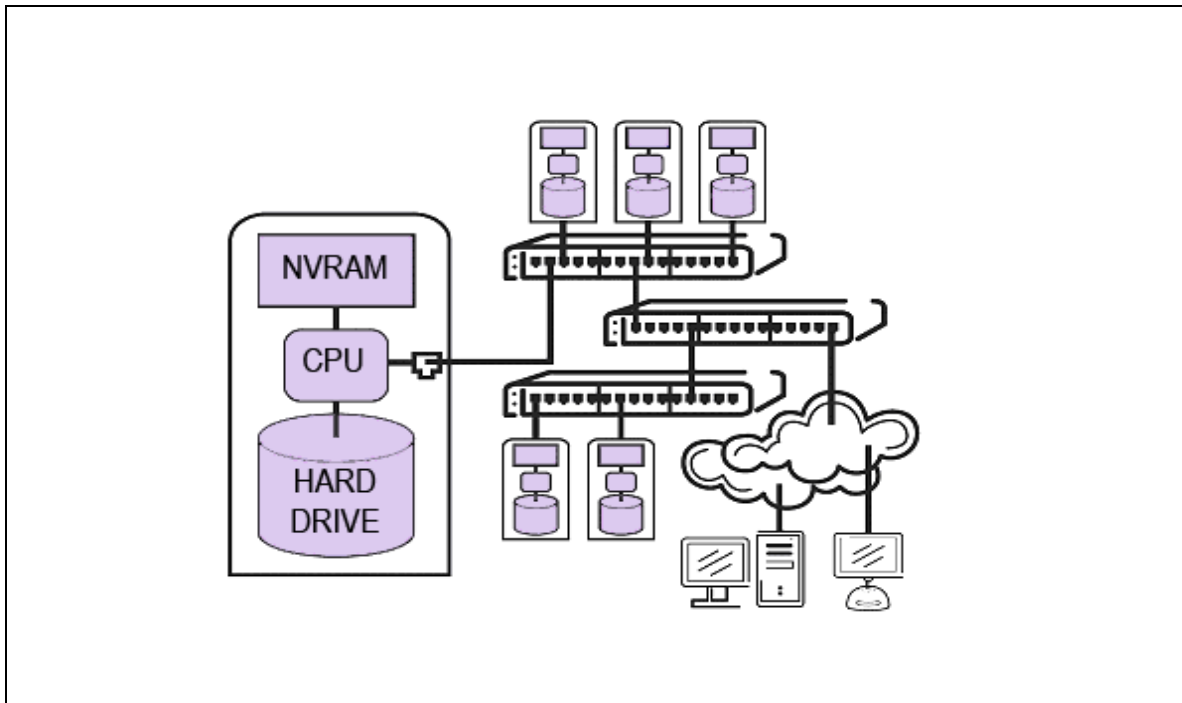


## **Managed Archival Storage & Automated Repurposing on a Single Platform**

**Chip Aycock, Mosaic Digital Studios**

Digital technology affords the opportunity to rethink the paradigms of asset management and distribution, and to reconceptualize the functions and borders of the archive and its dissemination. This discussion will focus on the entertainment industry rush to create large digital archives of mezzanine files that may become useless as distribution requirements change. An alternative is available to encode once and make the digital archive the cornerstone of digital distribution now and in the future by unifying these objectives on a single platform





## **PERGAMUM - An Evolvable Architecture for Reliable Disk-Based Archival Storage**

**Ethan Miller, University of California at Santa Cruz**

As the world moves to digital storage for archival purposes, there is an increasing demand for reliable, low-power, cost-effective, easy-to-maintain storage that can still provide adequate performance for information retrieval and auditing purposes. Unfortunately, no current digital archival system - tape, disk, or optical disk - adequately fulfills all of these requirements. To address this challenge, we developed Pergamum, which stores data in a network of "bricks", each of which contains a disk, low-power CPU, and flash memory. Pergamum stores additional redundant information on each brick, allowing the brick to repair itself in many cases, and takes advantage of the bricks' network connections and low-powered flash memory to constantly verify storage integrity between bricks, ensuring data preservation with low power needs. If an error is found, Pergamum can rebuild the lost data with low peak energy consumption, avoiding the need for large-scale power and cooling infrastructure.



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## **4K Archival Mastering**

**Jim Houston, PostWorks LA**

Only recently, HD was regarded as the “final” requirement in terms of resolution and image quality. But the advent of the digital intermediate, digital cinema, large-screen display formats for the home and high-density optical disk formats has once again raised the bar. 2k provides only a small overhead with respect to HD and digital cinema itself is already established at 2k. Thus, we are experiencing the advent of 4k imaging as a way of “future-proofing” high value moving image productions. But 4k does not affect the high-end DIs alone. This quality standard affects many aspects of asset management, including the use of digital media for restoration and preservation of legacy film productions. This presentation will examine issues related to current film scanning practices for archival purposes, the effect of 4K workflows on digital restoration processes, the requirements for digital archival masters, the Academy Image Interchange Framework, and the practical limits of current 4K pipelines.



## **Digital Linear Magnetic Data Tape Normalization for Existing Content**

**Steve Kochak and Craig German, Ascent Media Group**

Content creators and owners often wish to make a backup of digitally created 2K and 4K assets. This backup usually serves as a non-permanent archive and at some point there will be a desire to include it in a larger asset management strategy. Unlike a traditional studio master such as film or video tape, there is no generally accepted standard for how feature films are written to digital linear magnetic data tape and, as a result, a myriad of different formats, specifications and proprietary hardware and software tools are used during the non-permanent archive process. At the point when a content owner chooses to incorporate these data into a larger asset management system, a number of problems (including inadequate labeling of media, improper QC of content, lack of digital checksums and standards for reel segmentation) come to the fore and impact negatively on archival workflow. The purpose of this presentation is to identify problems content owners may face when incorporating feature film data into asset management systems and explore some solutions to safely normalize existing linear magnetic non-permanent archive data tapes that, in fact, actually become permanent.



**BREAK**





## **4K Digital Workflow and Archiving**

**Mitch Bogdanowicz and Denis Leconte, PostLogic**

This presentation outlines the varied image sources, workflow and archiving for a 4K digital pipeline. The topics include a comparison of film vs. digital acquisition for a 4K digital element, a discussion of the factors that influence the true resolution inherent to a 4K image file, storage requirements for a 4K theatrical project and the impact on the hardware that is needed to handle the data. The speakers will present an example of a 4K Dalsa camera project workflow with a 4K projector display venue, a discussion of the practicality of a full 4K workflow with today's technology and challenges for the archiving of a 4K project, including the consequences of large scale data projects for restoration and the archive.



## **Open Forum Discussion- Data Archiving**



**Friday, June 6: 7:30 pm:**

**The Linwood Dunn Theatre**

**Screening: Film Restoration and Digital Restoration**

***Hearst-Metrotone Newsreel: Year-End Round-Up* (Volume 6 Issue 226; December 19, 1934) Preserved on film by the UCLA Film & Television Archive    35mm Film Projection**

***Bonnie and Clyde* (1967; directed by Arthur Penn; cinematography by Burnett Guffey) Digital Projection**





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**Saturday, June 7: 9:00 am**

**The Linwood Dunn Theatre**

***Washington Parade* (Columbia, 1940; Series 2, No. 5): "The Archives" – A short report on the modernizing efforts of the National Archives. 35mm film; @ 10 min.**

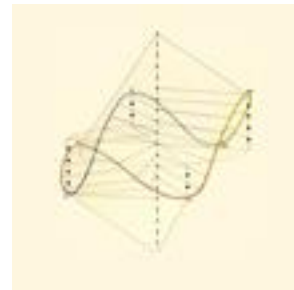
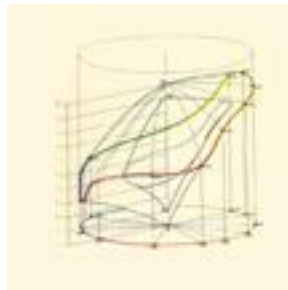
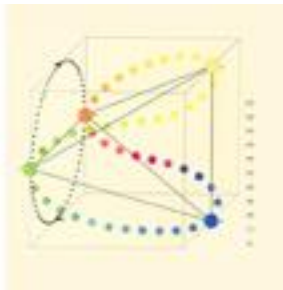


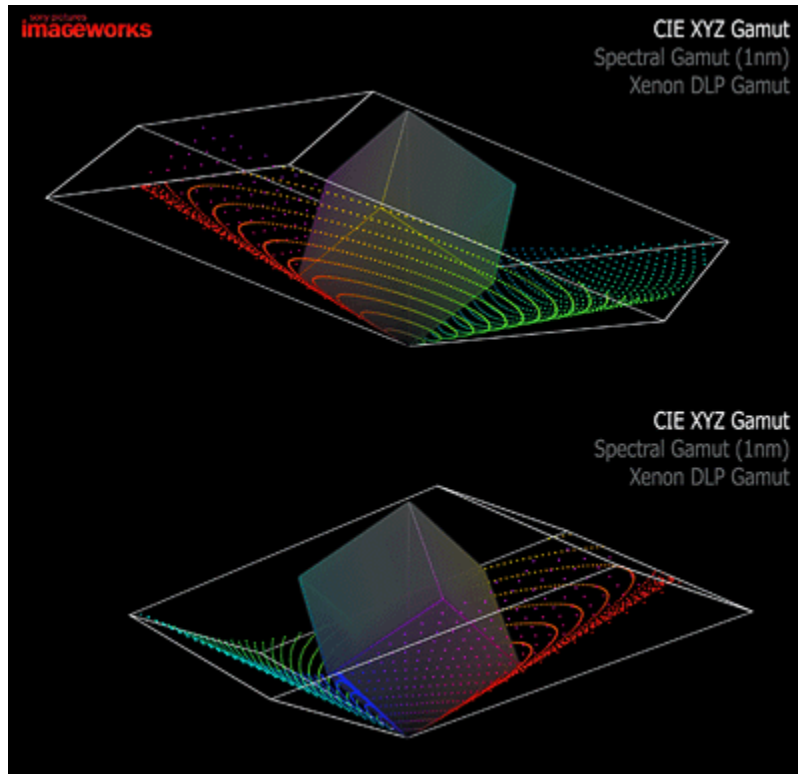
**Keynote:**

**Film Grain - Digital Restoration's "Get Out of Jail Free" Card**

**Rob Hummel, Dalsa Digital Cinema**

**We are experiencing an era wherein technicians from the digital and video imaging arenas (many of whom have no substantive experience in the film world) are increasingly involved in restoring our motion picture legacy. Many have a limited perspective on film imaging, and tend to dismiss image artifacts as native to the film original, without determining that an artifact originates in the film rather than being the effect of digital processes. These mis-estimations can have profound and far-ranging effects for the digital archives of legacy film that are now being created, and may also impact the new archives for digital intermediate productions.**





## Visual Color Matching for Digital Archives

**Bruno George, Pacific Title and Art Studio**

Creating an archive implies a permanent record of creative intent. In motion pictures where the final intent was achieved on film, the archive needs to be matched to a film guide print. Frequently, the actual approved guide print isn't available for matching, so some care needs to be applied to the task of matching, depending on the generation of the provided guide print. This discussion lays the groundwork for a more profound examination of the issues of color management as they apply to the archive, and of the long-term aesthetic requirements of a digital archive.



### Image Calibration Exercise: High Density Scanning/Large Format Film

Projection of legacy images captured on large-format film, reproduced on film and also scanned at high resolution (above 4k) data files.



**BREAK**





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## **2-Color Motion Picture Processes Redux**

### **Ralph Sargent, Film Technology**

**In the evolution of the motion picture, there have been many technologies employed to capture or render colors on the screen, from tinting and toning in the earliest days to today's three layer color emulsions. While it is axiomatic that three colors are necessary for the reproduction of color, the development and persistence of two-color systems represent an important part of the technical and aesthetic history of the cinema. History shows us that these two-color systems were not just precursors to the three color systems, but that they co-existed with those systems (Dufaycolor, Kodachrome, Technicolor and the three-layer negative systems) for decades, and continued to be refined even as the more effective methods of capturing natural color advanced. While two-color films remained at the margins of the mainstream development of the cinema, they nevertheless had specific values and aesthetic characteristics that need to be captured in the process of preservation. emulating those values -- which were produced by specific and long obsolete emulsions, lenses, filters, printing techniques and so forth -- presents one of the significant challenges of archival restoration. This presentation, which includes a variety of process samples, covers the technological theory and history of two-color movies.**



●

**The Kammatograph: Pre-1900 silent films, with live musical accompaniment. On piano, Alan Stark, Film Technology**

**Twelve Kammatograph Disks from the Collection  
of the George Eastman House**

These images from the 1890's were originally captured on emulsion coated glass disks, each containing several hundred individual frames. The Kammatograph camera employed a mechanical system which both rotated and horizontally translated the glass plate, thus creating a series of images which spiraled from the outside to the inside of the circular glass plate, not unlike the manner in which a record player replays sound.

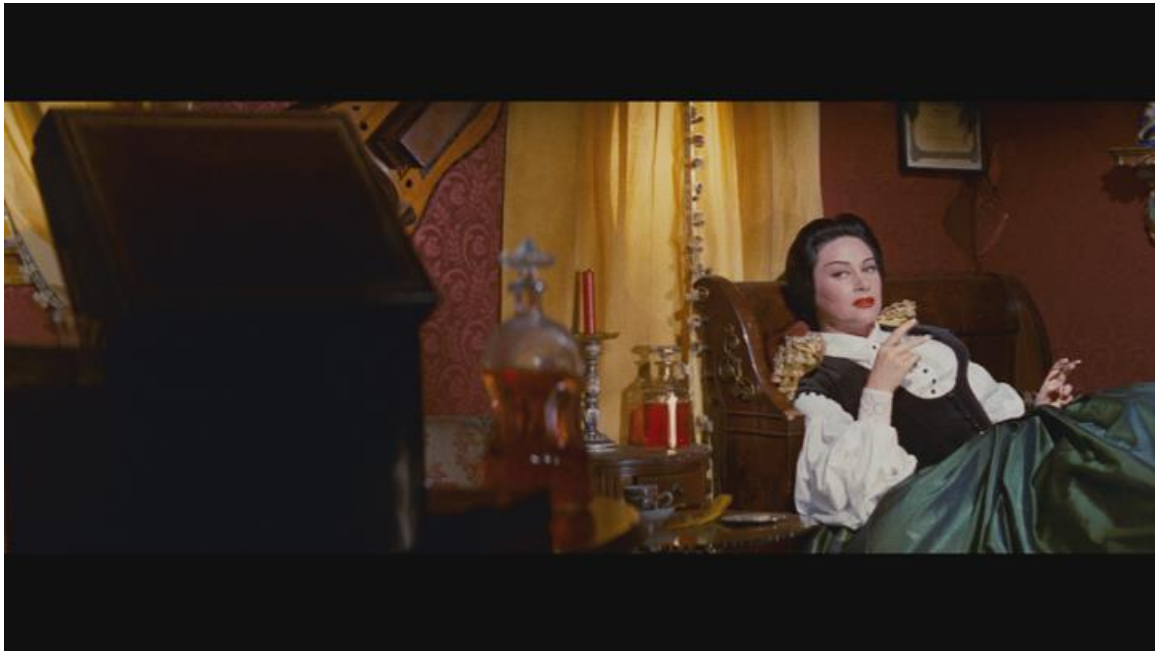
The initial approach in determining a method to make the images accessible was to duplicate the Kammatograph mechanism. Since the Kammatograph plate was both photographed and projected by the same mechanism, any mechanical differences from device to device would be self-cancelling within a particular camera/projector, hence there seemed to be little point in attempting to duplicate the mechanism itself. The final decision was to photograph and re-format the images onto 35mm film to be projected at a standard 24 frames per second. Each of the original Kammatograph frames were double-printed, from 12 fps to 24 fps, to achieve a close approximation of the correct running speed.

The method adopted to re-photograph the individual Kammatograph frames was relatively simple. A disk the same size as the Kammatograph, made of translucent white acrylic, was horizontally mounted on an optical bench on a translation stage with a manual micrometer drive. The Kammatograph was placed on the acrylic disk, a light source illuminating each frame, with some surrounding imagery, from below. This image was reflected via a 45° angle surface-silvered mirror to a printing relay lens and then to a 2 million pixel CCD camera (Sony HDC-500). By this method, each image was roughly registered manually and recorded on a disk array (Digital Video Systems, Germany.)

Each of the Kammatographs was then rendered back to film via Sony's electron beam recorder. Eleven of the twelve subjects are presented in widescreen format to illustrate frame position, interframe motion and other technical characteristics. No attempt was made to remove physical defects or enhance the original optical qualities of the image.

The Kammatograph Restoration Project, an experiment in reformatting an obsolete moving image format for scholarly access and preservation purposes, was conducted at the Sony Pictures High Definition Center in Culver City, California in 1997 and 1999. The technical team consisted of John Galt, James Pearman, Rafael Adame, Ken Huber, Michael Schwartz, Ed Armstrong, Les Vary and Dale Hunter.

Grover Crisp of Sony Pictures Entertainment, Michael Friend and Michael Pogorzelski of the Academy Film Archive supervised the project. Film laboratory services were provided by Cinetech. 35mm film; @ 10 min.



## **The Digital Restoration of Max Ophuls' *Lola Montes***

**Tom Burton, Technicolor Digital Services**

Now considered to be Max Ophuls final cinematic masterpiece, “Lola Montes” was, despite high expectations and significant production expense, a certifiable failure upon its release in 1955, rejected by critics and the public alike. Shot in Cinemascope on Eastman 35mm, 5248 color negative at 2.55:1 anamorphic aspect ratio, Ophuls' original 1955 story is told in a non-linear, flashback-based structure, as an ailing, failing Lola reflects between her current circus performer reality and lost moments of former love and turmoil, as courtesan to kings, mistress of the rich and famous, notorious exotic entertainer and renowned femme fatale.

In an attempt to avoid financial failure, the film was shortened and recut, undergoing many major changes and straying greatly from Ophuls' original creative intent. Under the pressure of a disappointing box office, Ophuls conceded to his distributor's demands, agreeing to a second, slightly different cut of the film which included redubbing of the film's German dialogue with French voices. Sadly, the new edit did not result in success at the box office.

Finally, in 1957, despite the objections of Max Ophuls, the film was re-cut into a linear, chronological, much abridged version of the film (nearly 30 minutes were removed) with voice over, completely destroying the director's intended structure. This version was also released in 2.35:1 anamorphic, an aspect ratio different from the original Cinemascope, 2.55:1 aspect ratio. To accomplish this, the film was simply cut off on one side, leaving all cinematic composition off-center.



**Digitally Restored Negative Element (after color correction)**

An attempt in 1966 by producer Pierre Braunberger, who acquired the film that year, to faithfully reconstruct the film from the original outtake negative misplaced in the previous editing process did not fully succeed. He was unable after several years of searching to locate all of the deleted negative. He was, however, able to reproduce the cut and fill in for some of the missing negative by creating internegatives from the film's YCM positive color records, which had been made on 5216 fine grain stock. The quality of much of the existing material, however, remained visually compromised in several ways.

In 2007, at the request of the film's rights holder, Les films du Jeudi and Laurence Braunberger, daughter of Pierre, and La Cinematheque Francaise, in association with The Thomson Foundation and The Franco-American Cultural Fund, our Technicolor Digital Services team undertook the challenge of preserving Max Ophuls' vision by faithfully reconstructing and restoring the original director's cut of the film.

Because the original outtake negative segments have long since disappeared, the restoration required utilizing a wide array of carefully evaluated source elements, including the remaining original negative (still cut in its 'unauthorized' chronological structure), internegative derived from Pierre Braunberger's photochemically recombined YCM records, optical-source YCM separations and a single faded print element, for which no alternate source elements survive.



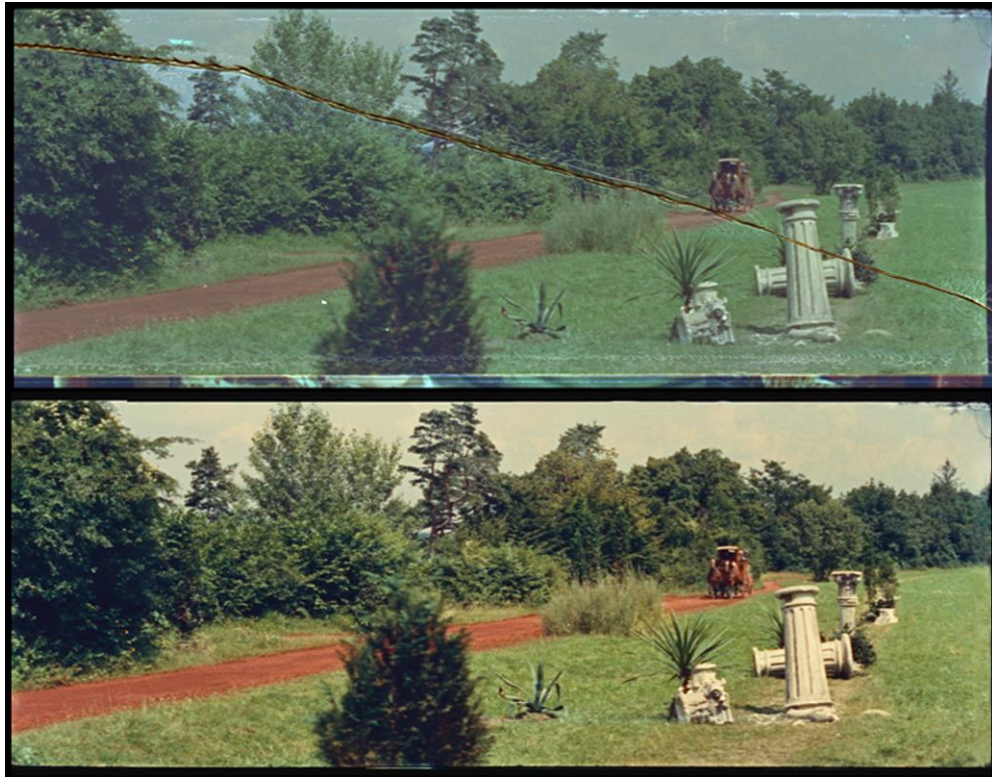
Digitally Restored Negative Element (after color correction)

Prior to beginning the actual restoration process, an HD offline version of the 'preferred cut' was assembled from scanned original negative, duplicate negative, single color record YCM elements and several sequential shots that exist only in a single remaining print, in order to recreate the accurate editorial conform. Capitalizing on a rare opportunity to consult with Marcel Ophuls, the son of the director, who both worked on the film's crew and is also in the film as an extra, it was possible to reproduce the exact structure of the original cut, and with Mr. Ophuls' approval, create an accurate, locked template over which the final restoration would evolve.

A critical goal of the restoration project, in addition to the faithful recreation of the original cut, was also to recreate the proper viewing experience, displaying the full image aspect ratio of the 2.55:1 image in its new, restored form. Since the 2.55:1 aspect ratio can no longer be easily screened in its native state, calculations were made to determine the image area that would have been seen inside the projector gate when originally screened in Cinemascope / 2.55:1. This aspect ratio was then accurately placed within the 2.35:1 frame, resulting in "2.55 anamorphic, letterboxed in scope," so that contemporary projection would allow viewing of the full image area as it was seen in the film's 1955 screenings.

The parameters of the restoration were thoughtfully established at the outset of the project: we would endeavor to frame-accurately replicate the original edit, inter-cutting disparate source elements within a shot only where necessary, but doing so when there was no alternative. This approach also included the digital reconstruction of missing frames where necessary, to address the fact that the previous re-cut of the film had lost not only entire shots, but had shortened many remaining shots, losing the trimmed frames in the process.

**This presentation explores the various solutions and techniques employed throughout the restoration process, including the seamless integration and color matching of elements from disparate source types, the re-balancing of fluctuating separation densities, the extraction and reproduction of missing color information from faded print elements, the repair of severely scratched, torn and dirt-imprinted sequences, and the de-warping of shrunken or stretched elements.**



**Digitally Restored Negative Element (after color correction)**

**The restoration effort resulted in the creation of new digital 5242 negatives and release prints, as well as a Digital Cinema DCDM/DCP with and without subtitles, and Rec 709 HDCAM-SR elements.**



**LUNCH**



## **Unique Challenges Associated with Restoring Perspecta Sound**

**John Polito, Audio Mechanics**

There were a number of systems deployed in the early years (1926-1928) of conversion to sound in the cinema. The introduction of stereophonic sound in cinema was a similar moment, and in the 1950s, there were several competing approaches to multi-channel sound that offered different economic, aesthetic and technical values.

Perspecta Sound was a unique sound encoding format used from 1954 - 1957 in the United States to create a pseudo-stereo theatrical sound field from a monophonic soundtrack. This presentation offers a brief overview of the technology and the challenges faced in re-mastering Perspecta Sound titles. Specific examples from the restoration of *INVASION OF THE BODY SNATCHERS* (1956) will be played in both mono and Perspecta Sound.



## **Digital Restoration Techniques Developed for *Down Argentine Way***

**Kevin Manbeck, MTI**

*Down Argentine Way*, directed by Irving Cummings and starring Don Ameche, Betty Grable, and Carmen Miranda, is a 1940 musical made by Twentieth Century Fox. The film, shot using the three-strip Technicolor process, is a good example of high-end production of its period. It combines music, moving camera and the Technicolor three-layer dye matrix process to deliver an integrated, diverting spectacle for its audience, and one that is a challenge to reproduce today, nearly six decades later.

The restoration of *Down Argentine Way* presented a major challenge because the original three-strip nitrate negative is no longer available. In the 1960's, the three negative strips were photo-mechanically registered and printed to create a CRI color negative. In addition to the limitations of printing methodology in the 1960s and the issues native to reversal emulsions, the extant CRI was also manifesting characteristics of aging. MTI Film was provided with a 2K digital scan of this CRI.

This restoration project provided the opportunity to develop custom algorithms to address the damage inherent to the film. This presentation will describe three of the algorithms developed in the course of restoring *Down Argentine Way*: three-layer registration, red channel blooming correction, and flicker/color breathing correction.

Because of errors introduced by the mechanical alignment and optical printing techniques in the creation the CRI, all of the material had objectionable misregistration between the three color layers. As a result of geometric distortion induced by the printing process, the misregistration was not uniform. Generally, the left edge of the frame had more misregistration than the right. Additionally, each shot had its own degree of misregistration, and sometimes the registration errors were dynamic within a single shot. The three-layer registration algorithm developed here is a fully-automated technique to measure the degree of misregistration and adaptively correct it.

Once the three colors were properly registered, it became evident that the red channel was slightly less focused than the green or blue channels. This red channel blooming was induced by the printing process. An automated erosion algorithm to refocus the red channel and mitigate visible red halos around objects was developed to address this defect.

Lastly, the film suffered from color breathing, or uncorrelated flicker in the three color channels. The color breathing was not uniform throughout the frame, with some parts of the image more affected than others. Each shot had its own level of color breathing, depending on the colors and image intensities present. The third algorithm developed for the restoration is an automated method to measure and correct for color breathing. The corrections automatically adapt to the nature and degree of color breathing present in each shot.

These corrective measures essentially reverse the defects that were imposed by the unfortunate printing history of the film, and allowed significant recovery of the original, valid color data that once existed on the three-strip negative. In addition to being an automated and thus cost-effective approach to restoration, these algorithms allowed a restoration that would not have been possible using traditional photo-mechanical techniques.

The final data product of the restoration was used to manufacture an HD master and was also printed back to film.



## **After the DI - How to Organize, Catalog and Protect the Original Negative**

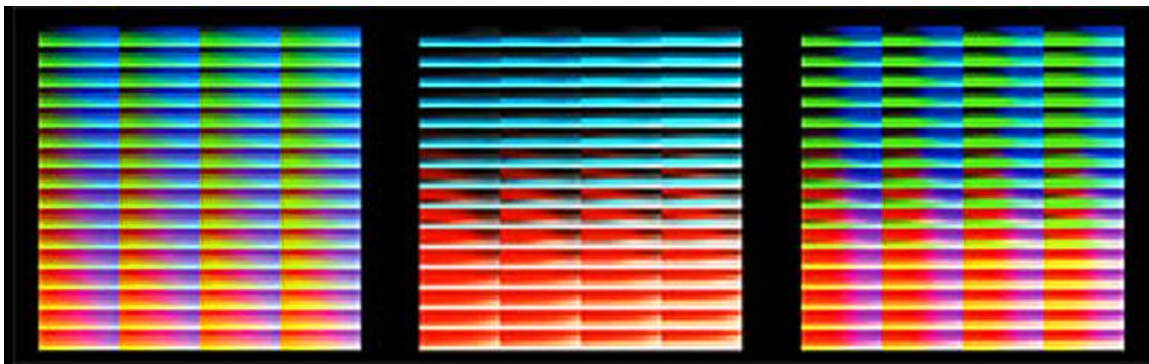
**Mo Henry, D. Bassett and Associates/Deus Ex Machina**

Most people will agree that the Digital Intermediate process has opened up a vast opportunity for filmmakers to manipulate, repair, improve or just simply change the original images shot for their motion pictures.

Among purists, there are countless arguments against the process and huge applause when word gets out that someone like Chris Nolan, the director of the upcoming *Batman*, has chosen the “old school” path and is having the negative cut traditionally. Regardless, about 80% of studio films now are finished as Digital Intermediates, and with digital cinema as a delivery requirement for most major studios, this is not going to change until the day in the near future, when negative isn’t even considered as a source material. Until that day, however, it makes sense to have a plan to extract, separate and store the actual shots used in the creation of the DI.

This presentation will explain the two most common scenarios when negative is moved to the Digital Intermediate facility for the scanning and conform process, and what role the negative cutting facility will have in that process. The archiving of the data out of the DI is a major concern for many studios and producers. The archiving of the original camera negative should also be a factor in this current hybrid film-and-digital DI world. As content owners may wish to go back to the most original elements from production, for restoration or a variety of reasons, an efficient and methodical plan needs to be in place to allow for such a scenario.

☯  
**BREAK**  
☯



### **The ASC - CDL in Theory and (Mal) Practice**

**Josh Pines, Technicolor Digital Intermediate**

The ASC-CDL represents the work of the ASC Technology Committee towards the creation of a protocol for associating metadata to color corrected images so that reference information be accurately and automatically carried through the workflow from dailies to editorial to digital intermediate (and by extension, to the digital archive) by linking the ASC CDL to the EDL. This is a case study of the use (and potential misuse) of the ASC - CDL, from on-set basic color correction to final DI.



### **Restoring Cinerama – *How the West Was Won***

**Ned Price, Warner Bros and Bill Baggelaar, MPI**

An examination of the digital restoration of *How the West Was Won*, focusing on how the new work captures the essence of the production's original Cinerama Roadshow exhibition by combining the three Cinerama film strips into a single seamless 2.89:1 image.



Cinerama camera

The original 3-panel Cinerama negatives were each scanned at 2K resolution, then digitally stitched together to make a single 6K image. Digital software was created specifically for this restoration to resolve camera alignment and image linearity issues inherent in the original photography.



**Saturday, June 7: 7:30 pm: The Linwood Dunn Theatre  
Screening: Digital Restoration**

***Surprise Screening :*** A recently restored large format film will be screened. Contractual arrangements preclude us from mentioning the name of this epic feature. Digital Projection



#### **The Reel Thing**

The organizers of The Reel Thing are always interested in new and important developments in conservation, preservation, restoration and digital asset management. If you have a project or a technology that you would like to share with the community, please contact us at any time during the year. We are also interested in feedback, criticism, and suggestions for future presentations. Let us know how we can make The Reel Thing better and more useful for you.

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