1.377"
(34.98 MM)

.040"
(1.016MM)

0.170"
4.318MM
(NOTE 2)

0.978"
(24.8 MM) (NOTE 2)

0.149"
(3.79MM)
(NOTE 2)

.040"
(1.016 MM)

TRACK #2
(CENTER)

TRACK #3
(RIGHT)

TRACK #1
(LEFT)

.033"
(0.84 MM)

TRACK #4
(EFFECTS AND/
OR CONTROL)

GUIDED EDGE

.050"
(1.270MM)

SCANNING GAP

THE

REEL THING XLII

AMIA NEW ORLEANS - PRYTANIA THEATER

NOVEMBER 29, 2017

.010"
(0.25MM)

.010"
(0.25MM)

.063"
(1.60MM)

.029"
(0.74 MM)

.015"
(0.38MM)

.010"
0.25MM

0.252"
(6.40MM)

0.213"
(5.4MM)

.008"
(0.20MM)

.008"
(0.20 MM)

.015"
(0.38 MM)

.015"
(0.38 MM)

.063"
(1.60MM)

.063"
(1.60 MM)

.078"
(1.98MM)

.019"
(0.48MM)

0.78"
(1.98MM)

NOTES

1. PICTURE SHALL PRECEDE SOUND BY A DISTANCE EQUAL
   TO 28 FRAMES MEASURED FROM CENTER OF CORRESPOND-
   ING PICTURE FRAMES.

2. CENTER LINES SHOWN ARE FOR RELEASE PRINT TRACKS.
   (ACTUAL MAGNETIC REPRODUCER HEAD CENTER LINES ARE SHOWN
   ON DRAWING E-3592 ISSUE 2.)

PROJECTOR APERTURE

ACETATE FILM
AS SEEN FROM BASE SIDE
MAGNETIC COATING THIS SIDE.

HEAD

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:

The staff of the Prytania Theater,
Laura Rooney, Krystina Kersels, Beverly Graham
and Gary Adams

The Reel Thing is made possible by the active and engaged support of some of the most important and innovative institutions in the archival field. These firms work side by side with scholars, archivists and asset managers to compile and disseminate information critical to the archival mission, raise the standard of preservation and restoration, and to find new ways to ensure that moving images from public collections and the private sector will retain their quality and remain accessible as a resource for future generations. We offer our gratitude for their indispensable support of The Reel Thing.

Iron Mountain Entertainment Services   HGST, a Western Digital brand
PRO-TEK | an LAC Group company
Deluxe Entertainment Services Group, Inc.
Roundabout Entertainment   Allied Vaughn   Crawford Media Services
Digital Film Technology (DFT)   Digital Bedrock
Digital Preservation Laboratories   Digital Vision
FOTOKEM   Fuji Motion Picture Film
Kodak   The MediaPreserve
MTI Film   MPS Labo
NBC Universal StudioPost   Prasad Corporation
Prime Focus Technologies
Tuscan Corporation Verbit HBO Archives

T H E
R E E L T H I N G XLII
AMIA Annual Conference
Prytania Theater - New Orleans
Wednesday November 29. 2017

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Data Migration, Our Frenemy
Reto Kromer, Reto.ch

❧

Compound Flicker Repair in Archival Material
Kevin Manbeck, MTI

❧

Case Studies in Silent Film Restoration:
The Perfect Woman (Kirkland, 1920) and *Seven Sinners* (Milestone, 1925)
Heather Linville, Academy Film Archive

❧

Managing Active and Static Metadata in Support of Content Preservation
Linda Tadic, Digital Bedrock

❧

B R E A K

❧

Unique Challenges of Restoring 4-Track Stereo CinemaScope Sound
John Polito, Audio Mechanics

❧

Solving the Digital Dilemma
Larry Blake, Swelltone Labs

❧

FILMIC : A Progress Report on Research
Jim Lindner and Tyler van Drell, FILMIC

❧

Case Studies in Silent Film Restoration: *Rosita* (Lubitsch, 1923)
Sean Coughlin, Image Protection Services

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Data Migration, Our Frenemy
Reto Kromer, Reto.ch

One of the most significant problems for archivists attempting to store digital video over long periods of time is to find a codec which has desirable archival characteristics - open source, lossless, efficient, and with a sufficiently large base of users to make technical support and collective problem-solving possible. Reto Cromer has been a leading proponent of this activity in Europe and has served as a bridge to AMIA, often through The Reel Thing. Some of the key features, definitions and areas of exploration can be found at: https://retokromer.ch/publications/JFP_96.html   This article is also published in *Journal of Film Preservation*, n. 96 (April 2017), FIAF, Brussels, Belgium, p. 41–45. In this update on these efforts, he will focus on issues of migration. Migration is often considered a problematic part of the process of digital archiving because of the expense and transfer of media, the requirements for verification and regenerated metadata, and the possibility of error or artifacts impeding the migration workflow. But migration also allows for inspection of the archived data, is a point where important changes and upgrades can be introduced, and presents an opportunity to integrate the data resource into evolving digital asset management systems and other data management initiatives.

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Compound Flicker Repair in Archival Material
Kevin Manbeck, MTI

The transition of production from film to digital promised many important benefits for archives, and those benefits are being realized. Many of the physical problems with film such as dirt, abrasions and color instability can now be addressed before productions are archived. Flicker has a long history as a challenging problem in image correction, and now digital tools are being brought to bear on the analysis and correction of this artifact.

Image flicker in motion pictures frequently presents as a combination of long-term temporal undulation and short-term temporal random fluctuation. The most challenging examples of image flicker also exhibit zonal variation where the amount of corruption in one spatial region is different than that found in others. In order to address the problem, it is necessary to analyze it. This process involves measuring the extent and magnitude of compound flicker, followed by the creation of mathematical models that describe the nature of the corruption. Once the flicker has been accurately characterized, the affected data can be submitted to programs which alleviate flicker and improve image quality. The algorithms employed on recent projects automatically adjust themselves to the competing effects of temporal undulation, temporal fluctuation, and spatial variation. Examples of compound temporal and spatial corruption will be presented to illustrate the nature of flicker in archival material.

In addition to recent developments and inventions in compound flicker repair, this presentation describes several inter-related perils inherent to modern film making. Digital image sensors, high dynamic range imaging, and dimmable LED lighting are new film-making technologies which are becoming ubiquitous and are likely to be used in production more or less permanently. However, these technologies interact in surprising and unexpected ways, producing new classes of artifacts that require identification and remediation.

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Case Studies in Silent Film Restoration:
The Perfect Woman (Kirkland, 1920) and *Seven Sinners* (Milestone, 1925)
Heather Linville, Academy Film Archive

The Academy Film Archive recently completed several digital restorations of silent films. This presentation will highlight the restoration of two features which hold their own unique challenges, given the state of the sole surviving elements. *The Perfect Woman* (1920, David Kirkland) is a Constance Talmadge feature that exists only in a 35mm tinted nitrate print with French intertitles, as part of the Lobster Nitrate Collection at the Academy Film Archive. In this 2K digital workflow, the nitrate print was scanned and all cards were translated and digitally recreated in English. Visual effect techniques were used to recreate the English version of a special insert shot, which contains a close up of a hand writing text in French. This restoration premiered at the Academy's Linwood Dunn Theater in Los Angeles last year as a DCP presented at 120fps, simulating the film's original 20fps rate, using Jonathan Erland's method of DCP theatrical presentation of films created in non-standard frame rates.

Seven Sinners (1925) is the directorial debut of Lewis Milestone. Previously considered a lost film, a 35mm tinted nitrate print was identified in a private film collection in Australia and acquired by the Academy Film Archive in 2015. In a partnership between the AFA and Warner Brothers, the nitrate print was scanned at 4K at Warner Brothers Motion Picture Imaging (MPI). A 35mm digital intermediate was created to preserve the nitrate source. While most of the feature survives, of the one hour and two minutes represented in the nitrate print, 12 minutes contains severe levels of deterioration. From the DPX files of the 4K scans, the Academy Film Archive completed a recreation of Seven Sinners, making decisions on how much of the deteriorated sequences to leave in and utilizing production stills from the George Eastman Museum to fill in the most deteriorated shots where image was indecipherable. Since no script survives, original publicity documentation and critic reviews were used to determine the lost opening scene and one lost plot point toward the middle of the film.

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Managing Active and Static Metadata in Support of Content Preservation
Linda Tadic, Digital Bedrock

Digital content being preserved for future use requires careful management of the assets. Equally important to preserve are the potentially hundreds of metadata elements describing the digital object's creation, characteristics, environment, and sustainability that should be retained along with the assets. Encapsulating critical metadata in a container along with the objects is one metadata preservation method. However, objects that are actively managed for preservation will also have metadata that can change over time.

The Open Archival Information System Reference Model (OAIS) (ISO 14721) is the current data preservation workflow standard. It provides recommendations on how to create "packages" of data so the digital content can be preserved and understood over time, but its application in the archives and libraries space has been to create relatively static packages. Data packages are created, set aside with scheduled fixity checks, and only retrieved when needed. But data is preserved because there is an intention it could be used in the future, and the technical supporting environment can (will) change over time, meaning the package so carefully created today might not be usable in the future due to obsolescence. To be future-proofed, one must track the metadata on the digital object's purpose, as well as the relationships with other files. Obsolescence vulnerability factors must be monitored over time, as well as performing bit-level preservation.

While container-based packages such as AXF and MXF AS-07 are valuable static containers, active metadata is usually managed in a detailed database, where every bit of metadata about the digital files are indexed and events tracked. This presentation identifies the metadata types that can be considered static or active, with recommendations on metadata management methodologies for preserving the metadata along with their related objects.

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B R E A K

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Unique Challenges of Restoring 4-Track Stereo CinemaScope Sound
John Polito, Audio Mechanics

One of the important aspects of the original CinemaScope system was its 4-channel magnetic sound presentation. CinemaScope created a dramatically wide image that expanded the possibilities of cinema visually. However, the combined use of magnetic sound and stereo playback was equally significant as an enhancement of the theatrical experience. At the inception of CinemaScope in 1953, magnetic audio was a relatively new technology which had developed in post-war America from important work done in Germany before the war. Magnetic audio had a much higher signal to noise ratio than optical sound, which means that it was capable of representing both subtleties and powerful dynamic contrasts more effectively. Despite Disney's precocious introduction of stereo with *Fantasia* in 1940, prior to 1953, most theatrical sound was mono, and it emanated from the front of the theater. The introduction of stereo audio allowed sound to come from both sides as well as the center and the back of the room, allowing for greater exploration of "realistic" sound as well as experimentation with music and concrete audio that brought new dimensions to the theatrical audio experience. This new capability was an important complement to the enhanced field of vision provided by the Scope image. For a few years, the studios created films with four tracks, and the art of sound recording, mixing and editing advanced to take advantage of the enriched format. But stereo increased production costs, and the use of magnetic stripes on film required a high degree of engineering and quality control, so stereo prints and the magnetic CinemaScope format declined, although magnetic six-track audio survived in the 70mm format. Nevertheless, some of the most enduring masterpieces produced by Hollywood were made in 4-channel magnetic stereo. Over time, the original stereo tracks were lost or discarded, and so finding resources for the restoration of original stereo is almost always difficult. This presentation will reveal some of the unique challenges of restoring the format and making this form of audio available in our world of multi-channel digital audio.

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Solving the Digital Dilemma
Larry Blake, Swelltone Labs

In 2013 Larry Blake presented a paper entitled "What Dilemma?" This presentation was an acknowledgement of the Academy's *Digital Dilemma* publication and discussion of the author's experiences as a post-production supervisor and digital archivist. While confronting the challenges associated with digital archiving, Blake also began to derive some solutions to these challenges which he revealed in his case study on digital archiving. This time, Blake will present a case study of the post-production hand-off and archiving phase for Steven Soderbergh's feature *Lucky Logan* (2017). Blake has developed a number of solutions he deploys in his on-going work. The design of "Rosetta Stone" leaders documenting the colorimetry (including color gamuts), methods for utilizing and archiving check-sums, and flexible, real-world adaptations for creating a sustainable archive in the midst of the flux of post-production and distribution are among the topics to be discussed.

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FILMIC : A Progress Report on Research
Jim Lindner and Tyler van Drell, FILMIC

FILMIC is a project that, among its other objectives, is concerned with developing methods for analyzing the physical status of film resources. As the era of mass production of film comes to an end, archives and studios are now holding billions of feet of film that must be conserved, and while there are usually adequate inventories that generally describe the film, normally little information is obtained or saved about the physical conditions of given pieces of film unless they are being preserved. When films are preserved, the information that is recorded may not be comprehensive. FIAF is actively involved in the study of this issue. At the same time, FILMIC is attempting to design and standardize objective methods for examining film, capturing, structuring and storing data about moving image resources on celluloid and polyester. The collection and collation of this kind of data is useful in understanding what methods of treatment are appropriate for a given film. This information can also be important in understanding the aging characteristics of entire archives and thus for designing large scale programs such as storage environments, treatment protocols, inspection frequency, separation of materials, and so forth. Metrics data can make an important contribution to development of plans for long term storage of large masses of film material, and for the design of devices such as projectors, scanners and other equipment that may be developed to work with aging celluloid. A discussion of the progress of FILMIC in several areas will be followed by a focused presentation on a quality control system using computer vision.

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Case Studies in Silent Film Restoration: *Rosita* (Lubitsch, 1923)
Sean Coughlin, Image Protection Services

Many historians have charted the arc of Ernst Lubitsch from UFA to Paramount. One of the most successful and acclaimed directors in Europe, Lubitsch excelled at historical epics and more intimate comedies, and when he emigrated to Hollywood, he was already a highly-regarded and sought-after director. Lubitsch had come to the attention of Mary Pickford, actor and producer and one of the most successful figures in Hollywood's silent era, and she thought that Lubitsch was a good match for *Rosita*, a "historical" film set in a mythical Spain, that would be her first role as an adult on the silver screen. The film would combine the sweep of an epic (a cast of thousands, large sets and complicated mise-en-scene) with a "bittersweet Romantic comedy." Despite the film's success (both critically and in terms of box office), its powerful producer neglected the negative. To this day, no one knows why Pickford turned against the film, but she seems to have removed it from distribution and intentionally allowed it to decay.

By the 1960s, archivists and historians were very interested in reconstructing the film. The Museum of Modern Art repatriated an eight reel nitrate print from Gosfilmofond and a dupe negative was made on acetate stock, but no further work was done on the film because of the expense and difficulty of recreating the English intertitles. Eventually, a complete continuity script surfaced in the collection of the Margaret Herrick Library of the Academy, and this script provided the full English version of the intertitles. A dupe negative of reel four of the film had been retained in the Pickford collection, and this provided historically accurate type fonts so that the English intertitles could be accurately regenerated.

The recent restoration began with an evaluation of the nitrate print (now only reels 1-7 because reel 8 and some other sections of the print succumbed to deterioration) and the eight-reel duplicate negative on acetate made from the Russian material by MoMA. MoMA's acetate dupe yielded protection for parts of the feature, and the Reel 4 dupe found in the Pickford library provided another source for the reconstruction. These sources have combined to yield the nearly complete Russian distribution version.

Technical work on *Rosita* began with print prep, followed by a 4K wetgate scan of the incomplete nitrate print and the final reel from the safety dupe negative. Digital restoration of the image included removal of

positive and negative dirt, scratches and other defects printed into the source material, minor image stabilization where appropriate, and grading of the image to restore the original tone scale. Sections deteriorated or damaged in the print source were replaced with material from the available duplicates. Tinting, toning and hand-coloring found in the original print were meticulously analyzed and then recreated digitally based on the available models and records.

Working from the music cue sheets surviving at the Library of Congress, musicologist Gillian Anderson recreated the original theatrical score. MoMA will produce a full symphonic recording of this score for use in venues that cannot provide live music. A 35mm polyester preservation negative was output, and DCPs were created for exhibition in theaters not equipped for film. A specially formatted DCP running at 60 frames per second was created to accurately render silent motion using multiple iterations of a single image. Archivists have long been interested in recovering this significant cinema milestone, but it was only with the advent of digital tools that this restoration become feasible.

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