The 35mm Album Master Fad

135th AES Convention, 2013-10-19
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A Brief History of 35mm Magnetic Film

- Post WWII – Magnetic tape recording migrated to the U.S. from Germany.
- 1947 – DuPont produced 35mm magnetic film, RCA produced a conversion kit for the PR-23 optical recorder.
- By 1951 – RCA produced 35mm recorders for 1, 2 and 3 tracks, and Westrex entered the business with magnetic recorders for 35mm and 17.5mm.
- SMPTE Progress Report of 1952 stated that by the end of 1951, “approximately 75% of the original production recording, music scoring and dubbing in Hollywood was being done on magnetic recording equipment.”
RCA PR-23 Optical/Magnetic Film Recorder
Westrex RA-1231 Optical/Mag Recorder

Westrex RA-1231 optical recorder with the magnetic conversion. It could be used for either optical or mag recording as long as the reel adapters were changed. Record head is on sound drum and play head is to the right.
Westrex RA-1231 Optical/Mag Recorder

Close-up of RA-1231 Recorder with the magnetic monitor adaptation for immediate playback.

Western Electric RA-1231, Photographic Recorder equipped with magnetic adaptation parts.

RA-1231 Recorder — front open.

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Westrex Series 1000 Magnetic Recorder

Magnetic Recording is the newest development of Western Electric.

The Magnetic Recorder uses perforated film impregnated with iron oxide particles which faithfully record the sound spectrum when passed by the magnetic recorder head.

This method gives a signal-to-noise ratio greatly improved over any previously obtained by photographic means. It offers economy in operation in that (1) it requires no processing and can be played back immediately and (2) the same magnetic film can be used over and over again.

Westrex offers not only a complete lightweight portable Magnetic Recording System (The Westrex Series 1000) but also magnetic adaptation parts for all of its post-war Recorders, Re-recorders and Reproducers. New magnetic recording, therefore, does not render obsolete any Western Electric post-war studio equipment.

[ Note: Magnetic film in the U.S. was actually coated with iron oxide particles, not impregnated with them. ]

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35mm: 1950’s High-Resolution Medium

- Film moves at 18 in/s, vs 15 in/s for tape.
- Film stock’s base is 5 mil (acetate) or 3 mil (polyester), vs. 1.5 mil for 2500’ NAB reels of tape. Result: lower print-through for film. Some film types also had thicker magnetic layer. Result: more maximum level before saturation.
- 3-track 35mm spec is for 200-mil track width (only slightly smaller than full-track ¼” tape). 3-track ½” tape spec is for 100-mil track width.
- Sprocket film drives maintain consistent speed and wow/flutter specs throughout the roll. Tape machines of 1958 tended to move tape at slightly different speeds at both ends of the reel, noticeable in pitch shifts if portions from the beginning and end of a reel were spliced together. Westrex testing found that wow and flutter was worse at beginning of reel, best at end.
- Wider tracks and faster speed produce about 13 dB better signal-to-noise ratio for film, according to Westrex tests presented to AES 1959 Convention. Tests compared acetate-base film and ¼” tape (with 72-mil track width), so somewhat better performance could be expected from 3-track ½” tape.
- RIGHT: Width comparison of 35mm, ½” tape and ¼” tape.
Everest Records

- Harry Belock was Hollywood sound man in the 1920’s, knew about film-sound techniques and technology. Also worked for CBS, designing disk-recording equipment.
- Audiophile Belock met audio dealer/engineer Bert Whyte. They had mutual enthusiasm to start a new record label as the stereo era dawned.
- Company built a studio in Bayside, Queens.
- Initially recorded on 3-channel ½” tape, but acquired 3-channel 35mm equipment in 1959.
- Westrex engineering manager John G. Frayne profiled Everest’s 35mm equipment and techniques for AES Convention/Journal.
JAES Article Describes Everest Records

Fig. 5. Westrex 35-mm three-track magnetic recording portable unit (Everest Records).

Fig. 6. Main recording room showing two Westrex 35-mm three-track recording machines (Everest Records).

Fig. 7. One of the Everest's disk recording rooms showing a special Westrex 35-mm three-track reproducer and associated equipment.

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Westrex RA-1532 Magnetic Film Recorder

RA1532 Multi-Track Magnetic Recorder.

Front view of Recorder, open.

Close-up of Multi-Track Magnetic Film Recording and Monitoring Heads.

Rear view of Recorder, open.

© 2013 by Thomas Fine
Everest Records: 3-Track ½” Tape at First


LEFT: Engineer Joe Kane at custom Westrex 3-channel mixer

BELOW: Members of the LSO listen to tape playback

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Everest Records: Switch to 35mm Mag-Film

Everest 35mm recording at Walthamstow Hall, U.K., 1959-June.

LEFT: Engineer Joe Kane (blue shirt, glasses), assistant engineer Ed Abele

BELOW: Leopold Ludwig/LSO record Richard Strauss’s “Ein Heldenleben”
Everest Records Reissues

Above and Below: Vanguard Classics CDs, early 1990’s

Above: Classic Records LPs and DVD-A/CDs, late 1990’s

Below: Countdown Media/BMG downloads and CDRs, late 2013

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Fine Recording Bayside

• Belock Instruments’ board shut down Everest in late 1960.

• By spring, 1961, Fine Recording Inc. acquired the studio in Bayside, Queens and all of the recording equipment. Former Everest engineer Ted Gossman was hired. Facility renamed Fine Recording Bayside.

• Owner C. Robert Fine had many years’ experience in film-sound production and working with magnetic film. Fine Recording’s studio in Manhattan already had extensive sound-for-picture business.

• Fine Recording clients Mercury Records, Command Records and Cameo/Parkway expressed interest in 35mm recording.
Mercury “Civil War” Production Session
Mercury Living Presence 35mm

- First MLP recording on 35mm took place May, 1961 in Rochester – SR90245 / Fred Fennell – The Music of Andrea and Giovanni Gabrieli.

- 35mm recordings made in London, Moscow, Detroit, Minneapolis, Rochester and at Fine Recording Bayside.

- Mercury recorded Richter/Liszt (Philips PHS 900 000) in London 6/61 on 35mm.

- 35mm equipment traveled to Moscow 6/62.

- Final 35mm recordings made in London, 7/63.

- Surviving 35mm masters were used to make MLP CD reissues in the 1990’s. Playback on original Westrex equipment.
Mercury Living Presence 35mm LP Covers

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Mercury announces the first Living Presence recording made directly from 35-mm. magnetic film

**RACHMANINOFF:** Piano Concerto No. 3. Byron Janis, pianist; London Symphony, Antal Dorati.

**SR90278—stereo; MG30278 — monaural.**

This disc, either stereo or monaural, has virtually no background hiss. Its frequency and dynamic ranges seem almost limitless. In this perspective, clarity and distinctiveness of tone are so realistic and all the instruments of the orchestra sound so completely natural that you will probably think it's a live performance.

Put Mercury’s marvelous new recording—an album of Rachmaninoff’s Third Piano Concerto on your turntable, and listen. It’s a disc with a difference.

**Berg:** Excerpts from "Wozzeck"; Suite from "Lulu". Helga Pilarczyk sings the parts of Marie and Luise from two of the twentieth century’s most lyric and impassioned operas, and Antal Dorati brings other parts of the scores to equally full life. London Symphony.

**SR90278—stereo; MG30278—monaural.**

Mercury Living Presence plus

**NOW!**

**FROM 35MM FILM**

**LIVING PRESENCE plus**

**● plus** increased realism. Broad, clear musical sound, more natural than you have ever heard on a recording.

**● plus** wider dynamic range. Fortissimos and pianissimos that were never before possible.

**● plus** incredibly quiet surfaces. No tape hiss. No flutter. All you hear is the music.

Mercury artists, as always, provide superb plus performances. Hear these newest (and other)* Living Presence albums today.

© 2013 by Thomas Fine
Mercury Living Presence 35mm Ads

"When the cannonade was at its height, a Confederate band of music began to play polkas and waltzes which sounded very curious, accompanied by the hissing and bursting of the shells."

COLONEL ARTHUR J. L. FREMANTLE, British military diarist with Lee at the time of the Battle of Gettysburg

THE CIVIL WAR
ITS MUSIC AND ITS SOUNDS

This unique album tells the story of the Civil War through its music and the men who made it—shellbands, fifeleers, fiddlers and drummers. The Union and Confederate songs recorded here are taken from actual Civil War band books and played on authentic Civil War instruments. Included are such favorites as Hail to the Chief, Lonely, the Mockingbird, Ditty and Bonnie Blue Flag; Camp, Garrison and Field Calls for Fife and Drum; and Cavalry Rappal signals.

For this deluxe TANGENT SOUND SERIES presentation, Mercury has combined over 1500 shots from authentic Civil War weapons in 33 separate battle sound tracks to re-create the bellow of Gettysburg’s awesome sounds of conflict. Martin Gold conducts this spectacular dramatic sequence.

FREDERICK FENNEl
EASTMAN WIND ENSEMBLE

There has never been a record album like this one—it is a lasting and inspiring recorded DOCUMENT FOR THE ENTIRE FAMILY.

LIVING PRESENCE SOUND SERIES 35 M
AN ORIGINAL 35MM MAGNETIC FILM RECORDING

April 1962

© 2013 by Thomas Fine
Mercury Living Presence 35mm CDs
Mercury Living Presence 35mm CDs
Mercury Living Presence 35mm CDs

© 2013 by Thomas Fine
Mercury Pop 35mm – f:35\textsuperscript{d}

- Mercury’s pop and jazz divisions already had the audiophile-oriented “Perfect Presence” series. 35mm recordings were added under the “f:35d” banner.
- Recordings were made at: Fine Recording Bayside; United Recording Studios, Hollywood; Radio Recorders, Hollywood; Universal Recording, Chicago.
- Artists included David Carroll, Xavier Cugat, Fred Fennell, Pete Rugolo, Herman Clebanoff.
- Packaging featured gatefold covers, gold-colored labels, detailed information about recording setups and 35mm technology, etc.
Command Records 35mm

• Enoch Light’s Command Records, owned by ABC Records, was established in 1958 to produce “stereo spectacular” audiophile recordings. Succeeded right away with “Persuasive Percussion,” “Provocative Percussion,” “Bongos,” etc.

• Command jumped into 35mm with both feet. Pop album “Stereo/35mm” topped Billboard’s Stereo LP chart.

• After signing William Steinberg/Pittsburgh Symphony, Command Classics launched. All orchestral titles recorded on 35mm.

• Various Command pop and classical titles were recorded on 35mm through 1968.

• Enoch Light left Command in 1967 to start Project 3.
The first time you hear this record will be one of the most startling experiences of your entire life.

For the very first time you will hear sound that is completely, unalloyed, sound that is totally true-color, full, honest sound with no mechanical restrictions whatsoever.

No record like this has ever been made before. It is a remarkable achievement in recording techniques since the first commercial recordings were made.

For the first time you will hear music reproduced exactly as it was originally recorded.

The sound is so real, so totally true, that it is impossible to reproduce music of such great intensity that it actually approaches the threshold of pain.

Listening to this record can be a shocking experience. It can be exhilarating, it can be exhausting. But it is not a casual experience. This is an adventure in listening that you will never forget.

Three main elements have made this fantastic record possible:

1. The unique Command recording technique that has made Command the most distinguished name in sound recording.

2. Natural acoustic by using the acoustics of Carnegie Hall in New York.

3. The extraordinary close-mic technique of the recording engineer.

Perfect, Uncolored Sound

In attempting to achieve perfect, uncolored sound reproduction, the recording of large orchestras, even the most advanced tape techniques are used.

Command Records "Stereo 35/MM" Ad

The key to this breakthrough is a new recording technique. InCommand's new "Stereo 35/MM" tape is a revolutionary recording technique that has been developed by Command's engineers for recording sound that is completely, unalloyed, sound that is totally true-color, full, honest sound with no mechanical restrictions whatsoever.

command limitations which create minor distortions that affect the ultimate purity, freedom and fullness of the reproduced sound. These limitations are known as flutter, hum, and buzz. Flutter is the noisy sound that is caused by the vibration of the recording head on the tape surface. Hum is the sound that is caused by the vibration of the recording head on the tape surface. Buzz is the sound that is caused by the vibration of the recording head on the tape surface.

In Command's new "Stereo 35/MM" tape, there are no flutter, hum, or buzz. The recording head on the tape surface is completely eliminated, allowing the recording head to reproduce sound without distortion. This means that the recording head can reproduce sound with absolute fidelity, allowing the listener to hear the true sound of the original source.

Superb Recording

Despite the limitations of both flutter and buzz, it is possible to do excellent recording on tape. Command's engineers have developed a new recording technique that has been used to record the recordings on this record. The key to this breakthrough is a new recording technique. InCommand's new "Stereo 35/MM" tape is a revolutionary recording technique that has been developed by Command's engineers for recording sound that is completely, unalloyed, sound that is totally true-color, full, honest sound with no mechanical restrictions whatsoever.

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For the first time you will hear sound that is completely, unalloyed, sound that is totally true-color, full, honest sound with no mechanical restrictions whatsoever. No record like this has ever been made before. It is a remarkable achievement in recording techniques since the first commercial recordings were made.

For the first time you will hear music reproduced exactly as it was originally recorded.

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Command Classics 35mm Ad

Command records, originators of the world’s leading stereophonic records announce an important new advance in the recording of great classical repertoire and world famous artists.

Command CLASSICS

designed for the most discriminating and demanding individuals.

35mm

Original master recorded on 35 millimeter magnetic film.

For the very first time you will hear sound that is completely liberated, sound that is totally free—pure, full, honest sound with no mechanical restrictions whatsoever.

You will hear sound so intensely real that you can actually feel the presence of each individual musical instrument.

You will hear exciting performances recorded with utter clarity and truth from triple piano (PPP) to triple forte (fff).

Produced by Enoch Light and the COMMAND research team of music and sound experts these new COMMAND CLASSICS offer performances that are an unprecedented combination of musical brilliance and startlingly real, completely unlimited sound reproduction.

© 2013 by Thomas Fine
Command Records 35mm

The Nation's No.1
Best-Selling Stereo Album

ENCORE LIGHT and HIS ORCHESTRA, 60 of America's Finest Musicians performing at Carnegie Hall, recorded on 35 mm magnetic film.

“TRANSPARENCY, clarity, and sound balance are the hallmarks of the COMMAND recording. Every detail of the orchestra is vividly portrayed.”

BRAND NEW RECORD: "For sparkling sound, STEREO 35/MM, Volume 1, with Encore Light playing pop standards is the season’s biggest sensation.”

BRAHMS Symphony No. 2 in B, Op. 73

CHOSEN THE BEST CLASSICAL ORCHESTRAL ALBUM OF 1961

William Steinberg and the百老汇交响乐团, Original COMMAND master recorded on 33 1/3 rpm vinyl LP.

THE NEW YORK HERALD TRIBUNE: “This is the finest Brahms record to date, and one of the finest ever released.”

AMERICAN RECORD GUIDE: “The result is the involvement and emotional intensity of the Brahms Second Symphony as you have never heard it before. The COMMAND label offers recording masterpieces of the most desirable nature of the month, yet affordable.”

AND JUST RELEASED...

STEREO 35/MM
VOLUME 2

ENCORE LIGHT and His Orchestra

COMMAND's COMPLETE CLASSICAL SERIES...

...all master-recorded on 35 mm magnetic film.

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Other 35mm Players

- Cameo/Parkway released a series of 35mm records, made at Fine Recording Bayside and on-location by Fine Recording.

- After leaving Command Records in 1967, Enoch Light launched Project 3. Initial recordings on the new label were 35mm. One of the early sessions, at Fine Recording in Manhattan, was detailed in a Popular Science article. Project 3 later moved most recording to A&R Studios and continued to record on 35mm until the late 1960’s.

- Reprise Records, at the time owned by Frank Sinatra, issued some “Dual 120CMPS 35MM” albums, made by Bill Putnam at United Recording in Hollywood.

- Still others??? Who? Where? When?

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Cameo/Parkway

TECHNICAL DATA

The use of 4-channel, 35-millimeter film instead of conventional magnetic tape is responsible for the radical improvement in sound quality that can be heard on this record. Because of the greater film width, each recording track is 2½ times the track width on conventional tape. This extra-wide track results in a greatly improved signal-to-noise ratio and a consequent reduction of hiss to the point where it is virtually inaudible.

Like movie film, 35-millimeter film is sprocket-driven. It moves across the recording heads in a “closed loop” which permits a very fine control of film speed. As a result, disturbances due to speed fluctuation—“wow” and “flutter”—are reduced to a level that even the most sensitive ear cannot detect.

Finally, 35-millimeter film is more than three times as thick as ordinary magnetic tape. For this reason, “tape print-through,” which is the undesirable transfer of sound from one turn to another in the tape roll, is eliminated along with other spurious noises.

The original 35-millimeter film “takes” were made with a custom-built Western Electric and Westrex RA 1532 film recorder. To cut the record masters, the tape was played back on a Westrex RA 1532 film transport. The signal was fed through Pultec equalizers and 200-watt McIntosh amplifiers into a Westrex 3A stereo cutter mounted on a Studly arbor for the stereo version, and a similarly mounted Miller cutter for the monaural version.
Project 3

Stereo has come of age. Project 3 records surpass the state of the art. Project 3 records have achieved total sound.

Total Sound is the full impact... distortion-free sound. You can play a Project 3 record or tape or cartridge at full volume or at lowest volume, and you will consistently enjoy the pleasure of complete musical definition of instruments, natural presence, and perfect musical balance.

In preparing for a Project 3 recording session, selection of microphones is one of the important decisions. The microphone most complimentary to the particular instrument being recorded is chosen; these microphones are matched to our console equipment, incorporating the latest technological advances, which passes the musical information to the 35 mm. magnetic film recording equipment. This insures a distortion-free, natural-presence sound.

Project 3 albums are master recorded on 35 mm. magnetic film. In spite of the fact that the film is fifteen times more expensive than most studio tape, the advantages of recording on film are irrefutable. The use of 35 mm. magnetic film recording equipment, because of its sprocket-driven, closed-loop recording, insures extremely stable, flutter-free sound. The film, with its wider tracks, allows for improved signal to noise ratio; and the substance and solidity of the magnetic film completely eliminate print-through, a form of distortion.

The master disc is cut directly from the film, rather than from any intermediary mix-down step, using specially designed recording amplifiers, capable of delivering two hundred watts of power per channel, in connection with a Westrex type cutter. The master is cut and re-cut until it meets the rigid quality of our engineers.

All of the above-mentioned characteristics are important and represent a significant advance and improvement in recording; but the ultimate test of any record is in the listening. Hearing is believing; and we believe that Project 3 records have achieved Total Sound.

Performers are recorded on dual 35mm magnetic film recorders (above). Magnetic film, although superior to conventional magnetic recording tape in most respects, is not used universally in the recording industry because of its high cost: roughly 15 times the price of magnetic tape.

Film-recorded “takes” are transferred to two master disks—one for each side of the finished record—by a complex electromechanical, lathe-driven cutting head. The two cut masters are playable one-sided phonograph records, complete with lead-in and lead-out grooves and blank bands between tunes.

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Reprise “Dual 120CMPS 35MM”

35 MM TAPE RECORDING
Many distracting noises and sounds, which are familiar to the critical listener, are eliminated or reduced to an imperceptible level when the original recording is made on 35 mm film instead of conventional tape.

The annoying sound of hearing a repeated echo when a soft passage follows a loud crescendo, which is due to “print thru” on tape, is eliminated by the use of 35 mm film.

The “masking” of soft, high frequency sounds, pianissimo violins, a soft finger cymbal, a harp glissando, is no longer possible when 35 mag is used in the original recording.

The delicate high frequency sounds have a transparency and “clean” sound which is so obvious to the listener that the impression of realism is greatly enhanced.

THE “120” SYSTEM
The mastering technique of the “120” system (120 centimeters per second) means that the final record quality is improved beyond that which conventional mastering methods will allow.

One of the weak links in the chain of operation which is necessary to produce the final record is the electro mechanical system which actually engraves the grooves on the master record. This device is called the recording head or cutter head and is driven by a high power audio amplifier, anywhere from 75 to 400 watts depending on the power required to properly actuate the particular cutter head.

With the evolution of the “120” system of mastering the power required of the recording driver amplifier and the cutting head is less than one-fourth that used by conventional systems. Therefore the distortion is reduced to a level unobtainable by conventional methods.

Since more power is normally required to handle loud instantaneous peaks at high frequencies this reserve power of the “120” system results in better high frequency response and improved quality as well.
The End of An Era

- 35mm fad seems to have completely died out by 1970. First-hand participants often cited the high cost of magnetic film and somewhat more costly and complex production techniques as the main reasons.
- Also, Dolby NR and quieter tape formulations came along. And professional tape machine designs improved through the 1960’s.
- Plus, recording of pop and rock music moves to many tracks with overdubbing, remixing, etc. Fast-winding, pick-up recording, auto-locate, etc, became mandatory.
35mm Preservation Issues

- Time has not been kind to the master films from the 35mm Fad.
- 35mm mag-film from that era was acetate-base and tends to suffer from “vinegar syndrome” and other deterioration/shrinkage.
- Record companies were not vigilant in their vaults. Many 35mm masters are now lost. Some were ordered destroyed.
- Those masters that survive tend to be in very poor condition.
- Some Mercury 35mm masters survived and were reissued on CD in the 1990’s. Ditto for some Everest masters. A few Command Classics 35mm masters were reissued on CD by MCA Classics.
35mm Preservation Issues

• Below is an example of early 1960’s magnetic film damaged by time.

• Nick Bergh: “A mix of all sorts of problems. The dimples are caused by uneven shrinkage and breaking of the acetate polymer chains. The white is hardened plasticizer crystals that must be cleaned off. Under the old (film) is a new piece of (film) so you can see the amount of shrinkage. The width is about 33mm.”
Further Reading

• AES Convention Preprint #114 (1959-October): “The Use of 35mm Sprocket Type Magnetic Film In Recording Phonograph Masters” by John G. Frayne, Westrex Corp.

• JAES Vol. 8, Issue 3 (1960-June): “The Use of 35mm Sprocket-Type Magnetic Film in Recording Phonograph Masters” by John G. Frayne and J. W. Stafford, Westrex Corp.


• Classic Record Collector, Spring 2007: “The Ascent and Descent of Everest” by Lonn Henrichsen and David Patmore.


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Available Recordings (as of 2013)

- Many Everest 35mm recordings were reissued as Amazon disc-on-demand CDR’s and in various download formats by the current Everest owner, Countdown Media, a unit of BMG.
- All of the Mercury Living Presence 35mm masters that survived in 1990 were remastered for CD. Although most of the single-CD albums are now out of print, all of the 35mm remasters were included in the two recent Living Presence box sets, available through Amazon and Amazon.uk.
- The Richter/Liszt 35mm recording made for Philips was remastered in the 1990’s. The single-CD album is now out of print, but the disc was included in Decca Classics’ Philips classical box set, available through Amazon and other retailers.
- No Command or Command Classics recordings are currently in print from the current owner, Universal Music Group/Decca Classics. Various gray-market and pirate “reissues” are sold in various countries, none remastered directly from the 35mm magnetic films. Original LPs are common at vinyl resellers.
- Cameo/Parkway, Project 3 and Reprise 35mm recordings have been out of print for decades and were never remastered for CD. Original LPs are available at many vinyl resellers.
Thank You