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Magnetic Tapes

Workshop Fribourg 22 June 2022





We can separate the magnetic tapes in two categories:
open reel tapes and self contained cassette

Open reel analog tapes



Width from 1/8" to 2", mono, stereo, 4/8/16/24 tracks

Pro Tapes and consumer version. Noise reductions dolby A/SR/dbx



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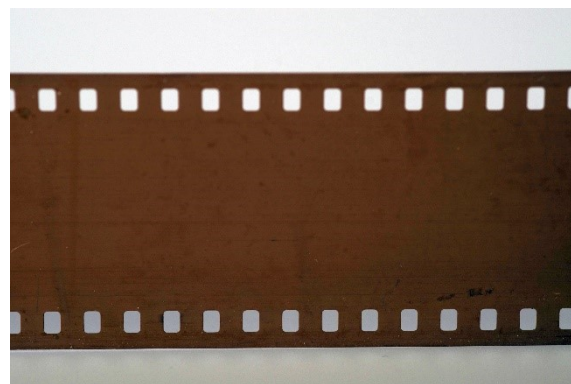
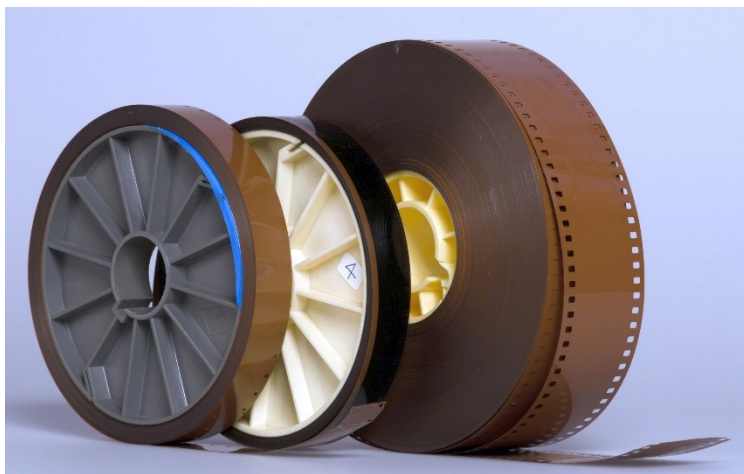
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Sepmag or perforated audio tapes 16mm and 35mm

Perforated audio tapes have been designed
for sound recording in the film industry



It can have from 1 to 4 or 6 tracks



Open reel digital tape (DASH format)



1/4" stereo and 1/2", 24 and 48 tks



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Analog self contained cassette



stereo8



Microcassette
and minicassette



musicassette



Micro cardridge



Elcasett



Digital self contained cassette



DAT



DCC



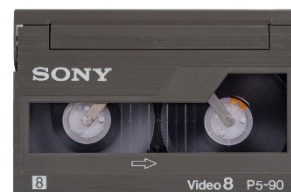
SVHS, ADAT format



Umatic digital (Sony PCM-1630)



Beta (pcm-f1 pcm-701)

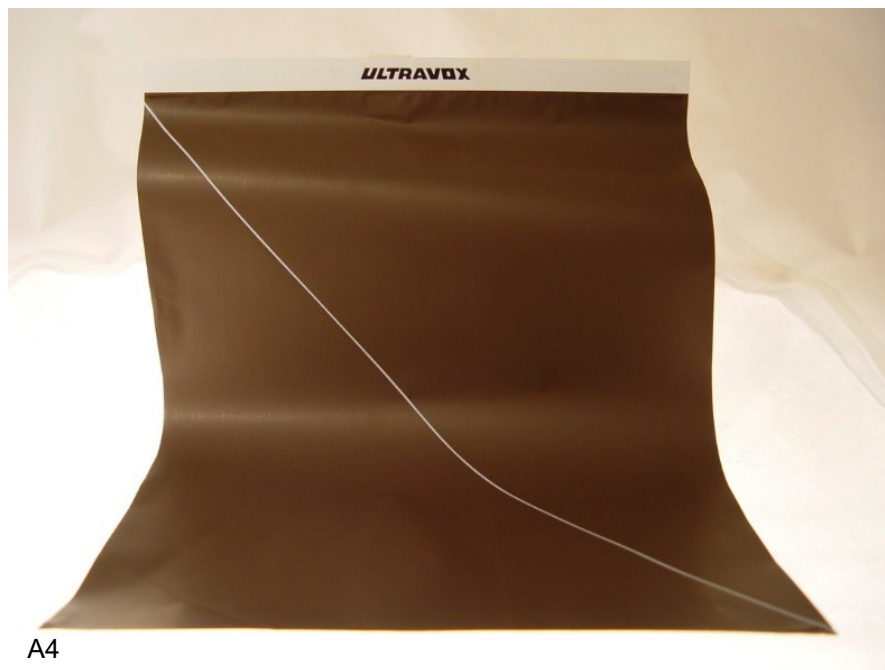


Video 8, ADAT format



Others...

Magnetic foils



A4



Track configuration

Full track mono one direction

Half track stereo one direction

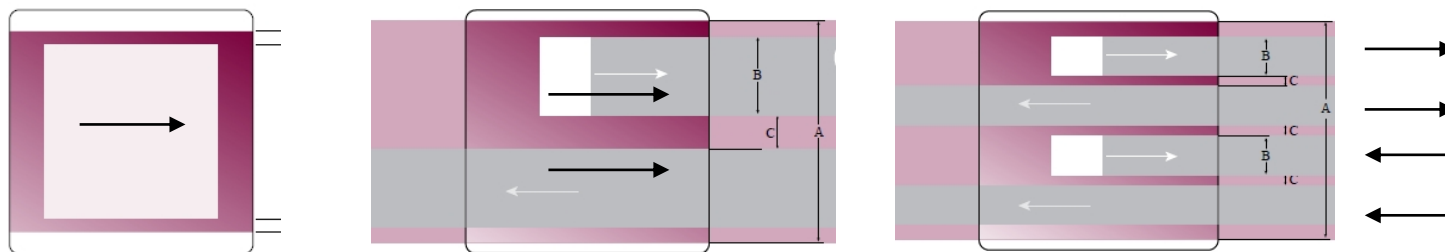
Half track mono two direction, one program per track

Quarter track stereo two direction, one program for 1/3 2/4 tracks

Quarter track stereo two direction, one program for 1/2 3/4 tracks (MC)

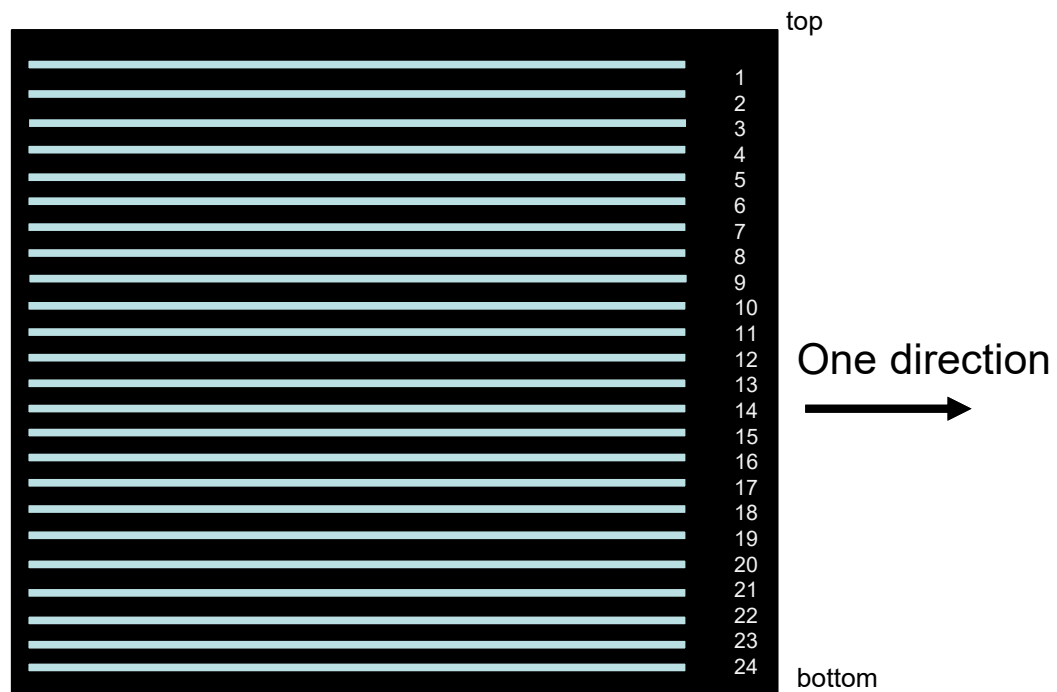
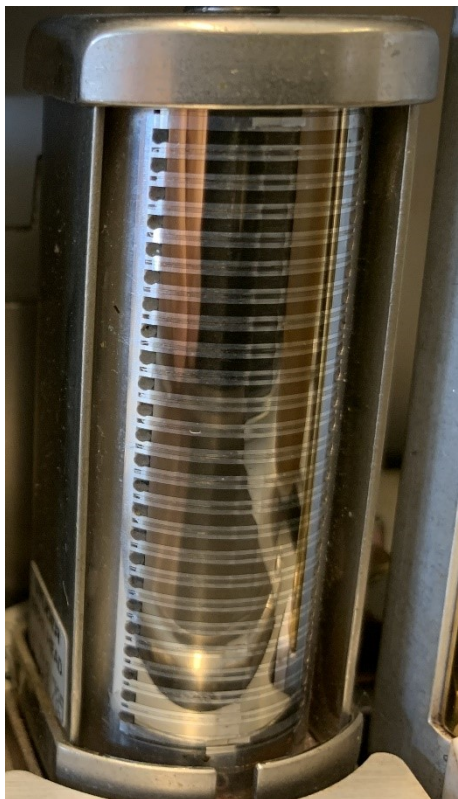
Quarter track mono two direction, one program for track

Quarter track mono one direction, one program for track (MC Tascam 234)





Typical Tracks configuration for analog multitracks tapes



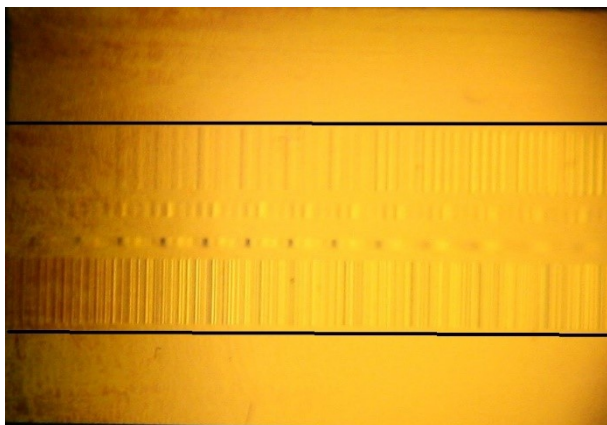


Digital tapes have the same direction

The track configuration of an open reel tape can be identified by listening or by using a magnetic viewer.



Magview



Neopilot system sync
recording view 1/4"



Recording speed

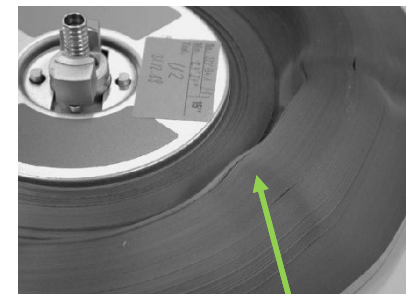
2.375 cm/s, 4.75 cm/s, 9.5 cm/s, 19 cm/s
38 cm/s, 76 cm/s

Recording speed, in digital tapes, depends on
the sampling rate.



Preservation problems

- Bad conservation



Deformed tape pack

Cause: stored in poor condition, variations in temperature and humidity, and bad position, tape pack tension is too high or too low. Tape tension is too low, tape layers can slip past each other

Solution: Rewinding and repositioning manually the tape on a new reel with the right tension, this can reduce considerably the fold.



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Creased and wrinkled tape,
caused by a defective recorder



Magnetic tapes

Gabriele Franzoso www.fonoteca.ch



Fungus and mold

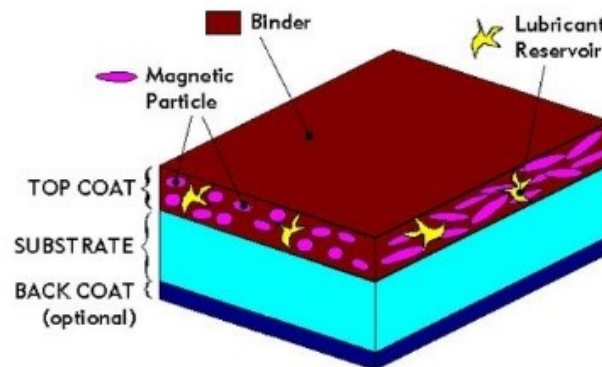
Storage at high temperature and high humidity levels may lead to the growth of fungus or mold on the tape.



Before to handle the tapes, wear a mask and use the gloves.
Ventilate the room during and after the cleaning job.



Magnetic tape composition



The materials that bind the magnetic particles to the tape substrate, called binders, are often identified as that part of the tape most susceptible to chemical breakdown

Tapes base or substrate

Four types of base films have been used for open reel tape: cellulose acetate (1935-1947), PVC (polyvinyl chloride), paper, and PET (late 1960s) also known as polyester or mylar. Magnetic tapes with paper base are very rare.

Tape thickness: Thinner tapes are less stable than ticker one.

Thinner tapes are more prone to breaking, streaching and other problems, for example the print-through issue.



Common problems for tapes

- **Print-Through:** Print-through is the unintentional transfer of magnetic fields from one layer of analogue tape to another layer on the tape reel. It reveals itself as the pre and post echoes to the main signal.
- To decrease the effect, rewind the tapes before to reproduce it



To prevent this problem, wind and rewind all tapes one time a year at least and archive the tapes at the end of the program.



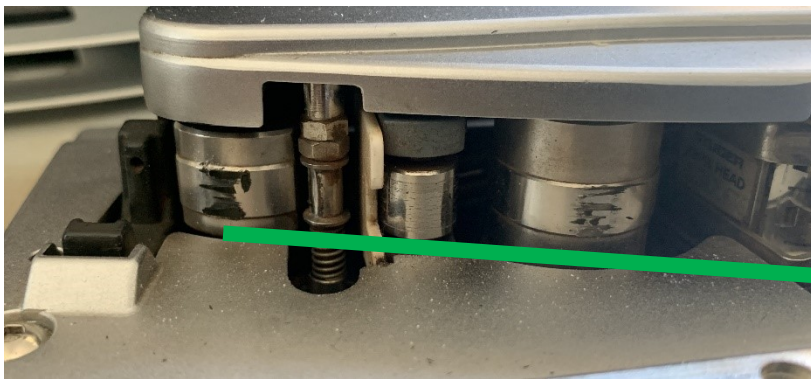
- **Hydrolysis (Sticky Shed Syndrome):** many of the tapes manufactured since the 1970s (polyester tape) show the artefacts of a chemical breakdown of the binder. Often described as sticky shed syndrome, the main component of the reaction is hydrolysis. It is typified by a sticky brown, black or milky deposit on tape heads and fixed guides, often accompanied by an audible squeal and reduction in audio quality.
- Solution: bake the tape in an oven , temperature 55 degrees

Tapes that usually have the problem are:

Agfa PEM469, PEM468

Ampex 406,407,456, 457

Basf Sm911, Sm468, Sm900



Dark spots brown



How long Does tape have to bake ?

it depends on deterioration grade, tape size and length



NO this one!



NO this one!!!

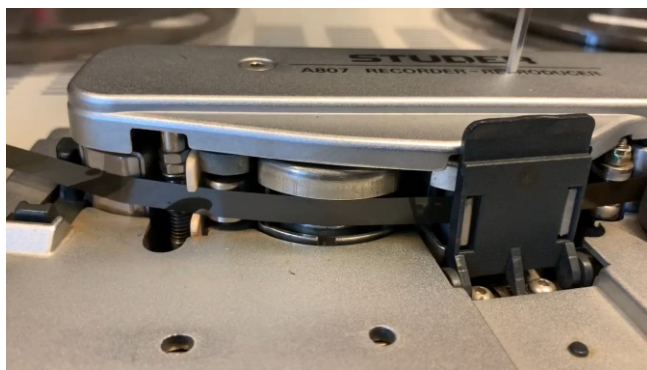


Use this !



- **Soft binder Syndrome:** this condition result in a squeal, but does not have a the same results of dirtying like sss.

Solutions: cold playback or playing with a lubricant (relubrication), control tape tension



Scotch 175
Sony PR-150



BASF LH super (red label)

- 1- remove from the tape all dirty, cleaning it with a cloth (mikrofiber, cloth)
- 2- use a lubricant (ie cyclomethicone D5) and lubricate all tape.

D5 is a volatile siloxane that completely evaporates.



Vinegar Syndrome: Acetate tape becomes brittle with age which may make it difficult to play a tape without breaking. Vinegar syndrome is a slow form of chemical deterioration that causes tape to shrink, buckle, and emit a strong smell of vinegar.

Solution: playing with a low tape tension to avoid the break of the tape.

A/D strips. They are paper strips designed to detect and measure the severity of acetate deterioration.



Isolate these tapes from the others,
Vinegar syndrome is contagious!





Binder-base adhesion delamination:

This is a failure of the binder/oxide (magnetic pigment) coating to adhere to the substrate film, resulting in the delamination of one from the other.

This problem is rare. *Scotch 201 presents this problem!*
It has also occurred with Type III, Ferric Chrome, cassettes.



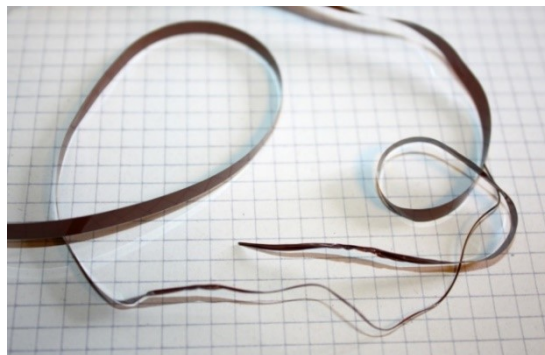


It is very important that all recorders are well serviced
and calibrated to avoid these damages

Bad tape tension



Stretched tapes





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www.iasa.org TC04

www.fonoteca.ch