



1

Film Materials, Formats and Processes

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On the Materiality of Audio-Visual Heritage

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17–20 October 2023

2

Observations

- 16 mm
- black and white
- reversal
- silent
- cellulose diacetate



3

Common Film Formats

professional formats

- 35 mm, Super 16

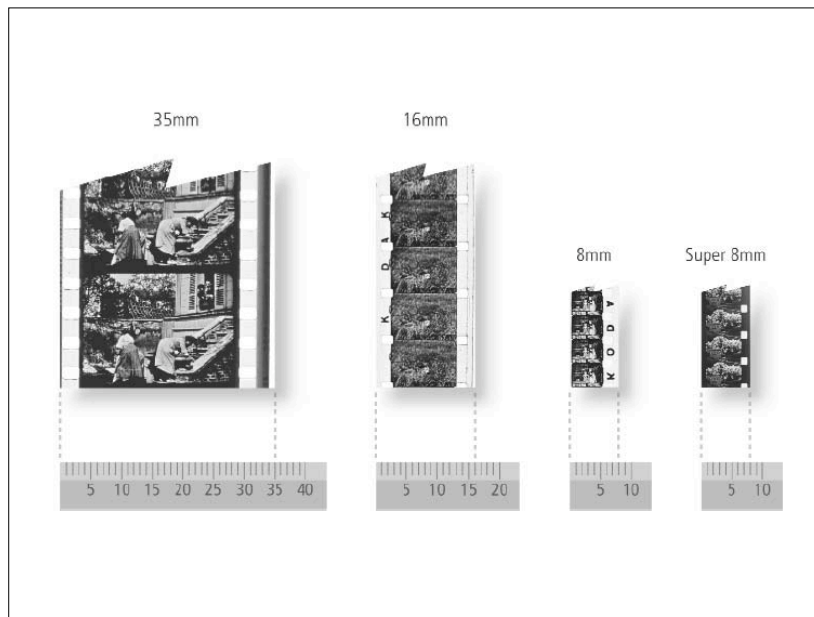
universal format

- 16 mm

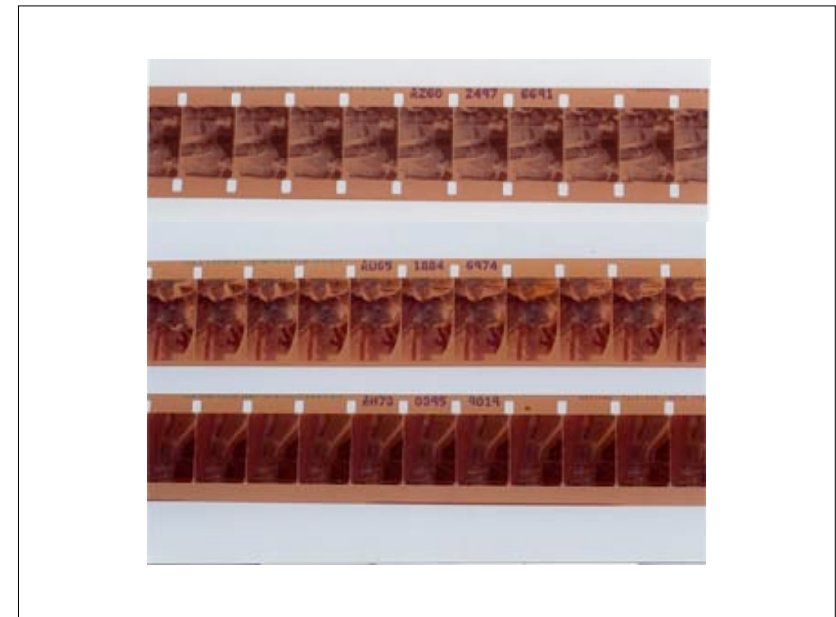
amateur formats

- 9.5 mm, 8 mm, Super 8

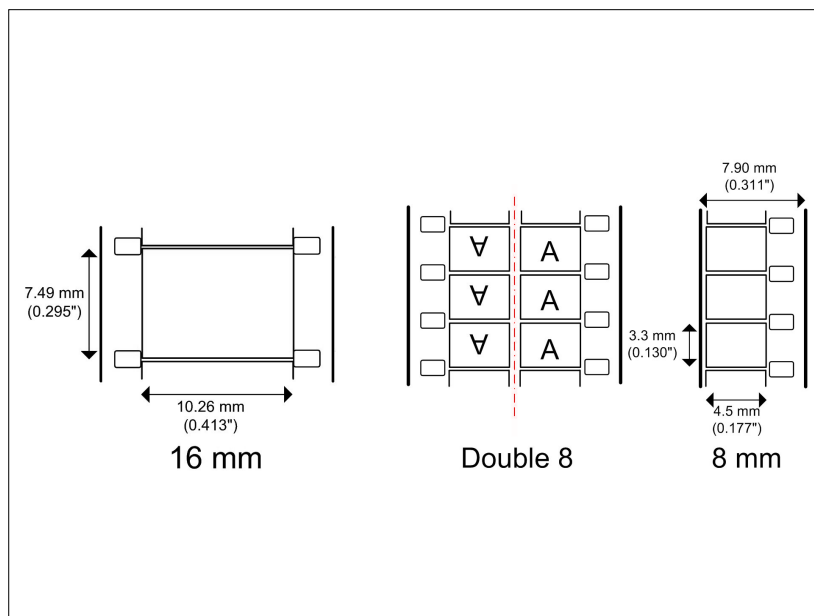
4



5



6



7

Common Magnetic Formats

audio

- 2", 1", 1/2", 1/4"

cinema

- 35 mm, 17.5 mm, 16 mm, 8 mm

video

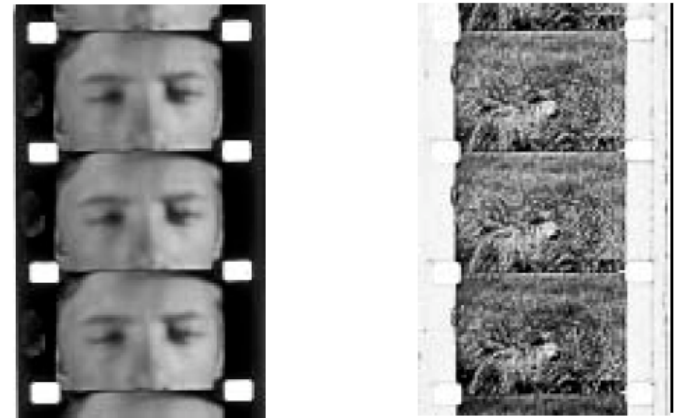
- 2", 1", 3/4", 1/2"

8

Film Polarity

- negative/positive
- reversal

9



10

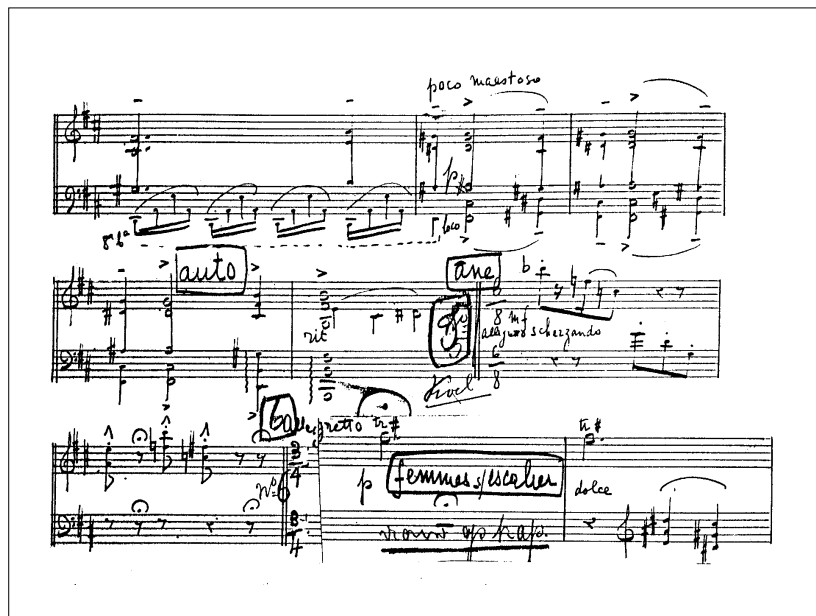


11

"Silent Film" Sound

- musical improvisation
- cue sheet
- "Kinemathek"
- score
- film narrator or Benshi
- voices from behind the screen
- sound effects
- sound on disc or tape cassette

12



13

20

Achtung! Auf das Segeltuch legt an!

Geistlicher schlägt zweimal mit dem Kreuz.

Und die Verurteilung...

Trp. gest. Har m. (Tambour ad libitum)

Gebt Feuer! Brüder! Auf wen schießt ihr? Feuer! Feuer! Feuer!

Daziffern die Gewehre

Offizier stirbt auf die Knie los. (Ab hier großer Lärm im ges. Schlagzeug)

Presto

vivace

14

Sound Film

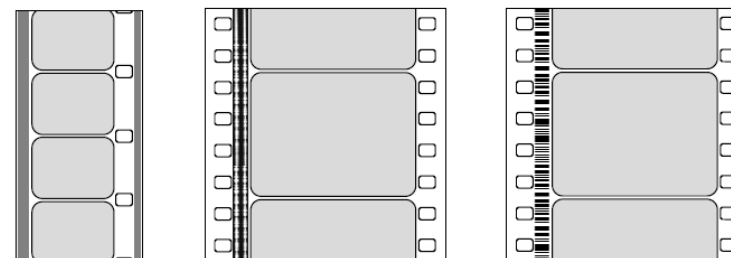
comopt = composite optical sound print
(variable density or variable area)

commag = composite print with magnetic
stripe

sepmag = magnetic sound only

sepopt = optical sound only print

magopt = both optical and magnetic sound on
one film

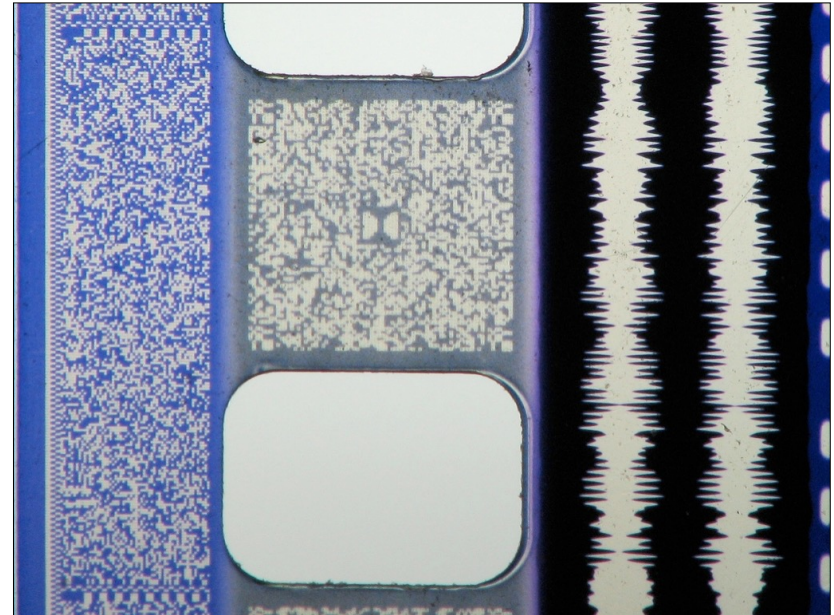


16

15



17



18

Sound Film Production

image	sound
photochemical	photochemical
photochemical	magnetic
photochemical	digital
photochemical + digital	digital
digital	digital

19

Flavours of Film Colour

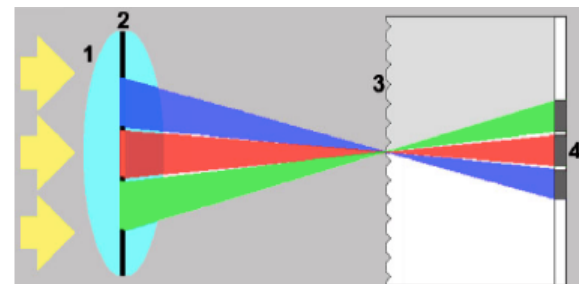
- hand coloured
- stencil
- tinting
- toning
- additive colour
- subtractive colour

20



21

lenticular film



22

Dufaycolor



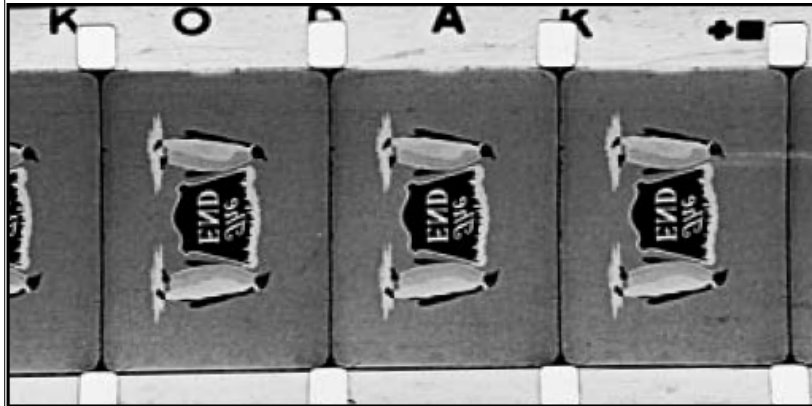
23

Other Information

- raw stock: manufacturer and type
- type of camera
- image format
- wind (winding A; winding B)
- generation/type of element: camera original, print, internegative, interpositive, dupe neg, fine grain; A and B rolls (sometimes more)
- Filmographic data in titles and credits; people, places, etc.

24

Edge code



25

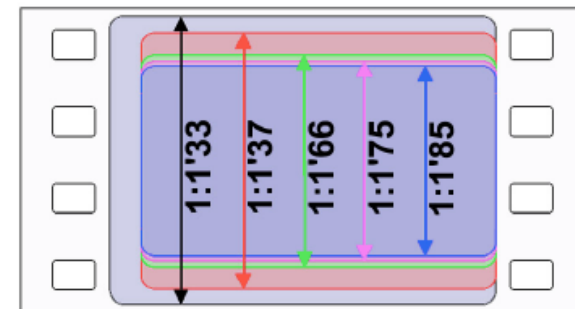
EASTMAN KODAK DATE CODE CHART

1922	1942	1962	●■	1982	●■X
1923	1943	1963	●▲	1983	X▲X
1924	1944	1964	▲■	1984	▲■▲
1925	1945	1965	■●	1985	■●▲
1926	1946	1966	▲●	1986	▲●▲
1927	1947	1967	■▲	1987	■▲▲
1928	1948	1968*	●●●	1988	++▲
1929	1949	1969	+	1989	X+▲
1930	1950	1970	▲+	1990	▲+▲
1931	1951	1971	●+	1991	X+X
1932	1952	1972	■+	1992	■+▲
1933	1953	1973	+▲	1993	+▲▲

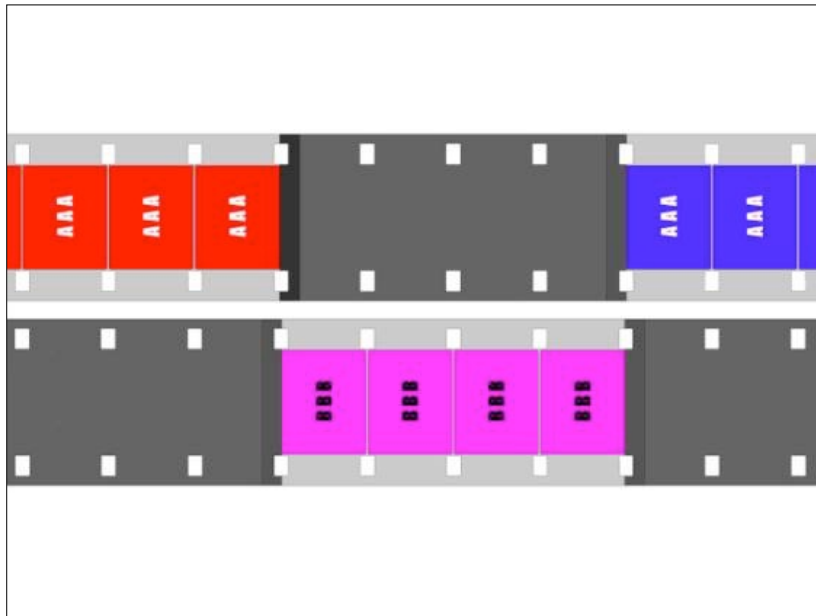
26



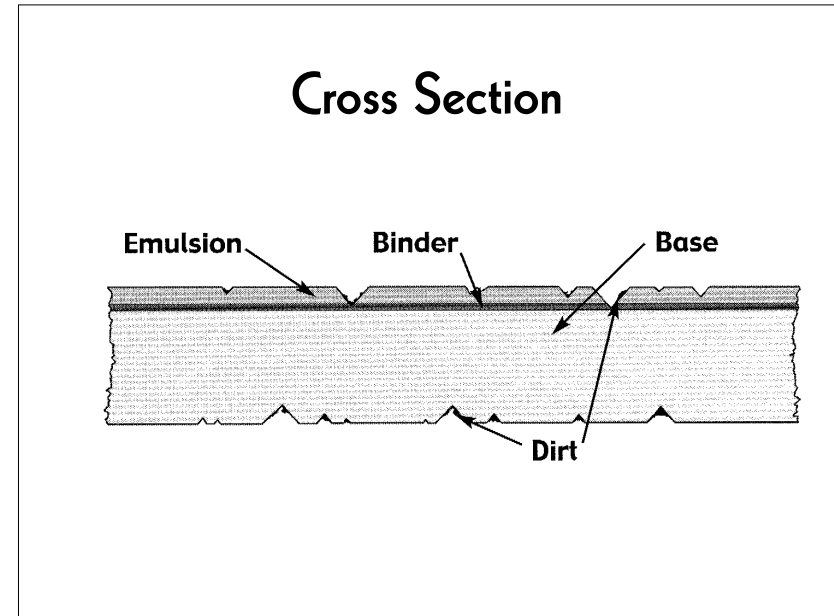
27



28



29



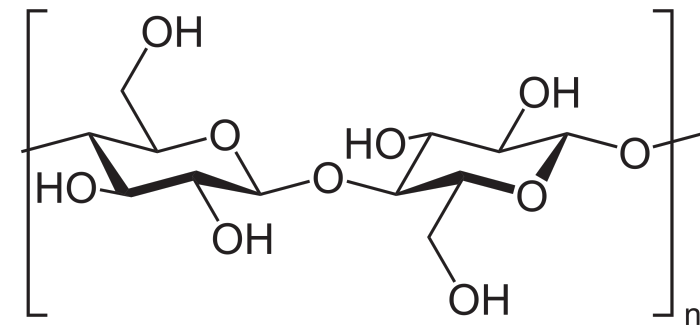
30

Film Base

- cellulose nitrate
- cellulose diacetate
- cellulose triacetate
- polyester

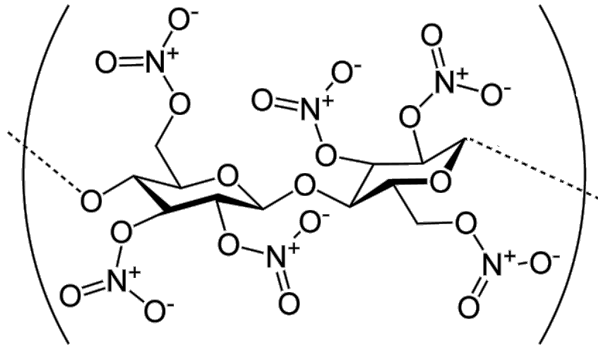
31

Cellulose



32

Nitrocellulose



33

Nitrocellulose

advantages:

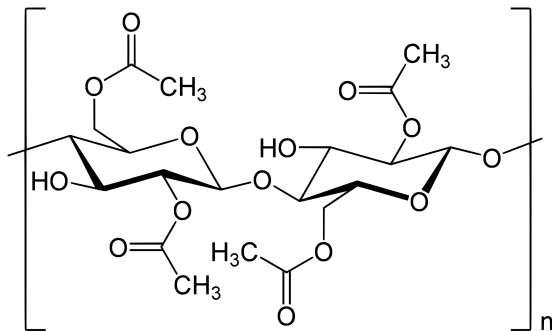
- excellent transparency
- best flexibility

disadvantages:

- highly flammable
- out-gasses nitric acid

34

Cellulose Acetate



35

Cellulose Diacetate

advantages:

- lower flammability than nitrate (but still flammable)

disadvantages:

- becomes brittle at low temperatures
- pronounced shrinkage in dry conditions
- out-gasses acetic acid ("vinegar syndrome")

36

Cellulose Triacetate

advantages:

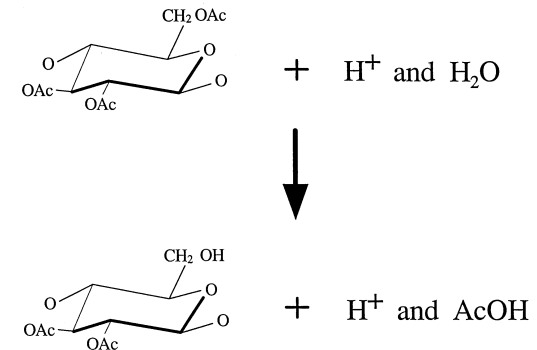
- low flammability
- easily cement spliced

disadvantages:

- out-gasses acetic acid ("vinegar syndrome")

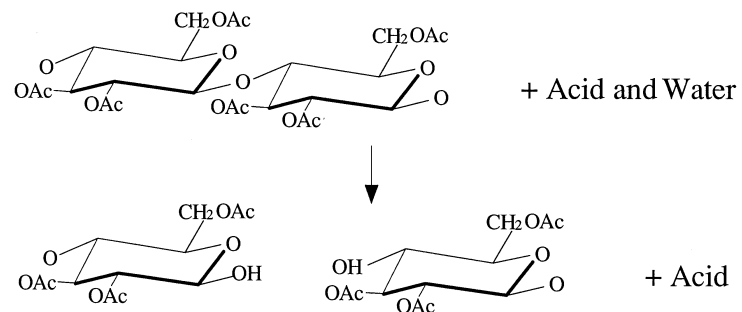
37

Acid Catalysed Hydrolysis



38

Glycosidic Cleavage by Hydrolysis



39

Polyester

advantages

- strongest and most stable carrier
- manufactured without solvents
- does not shrink

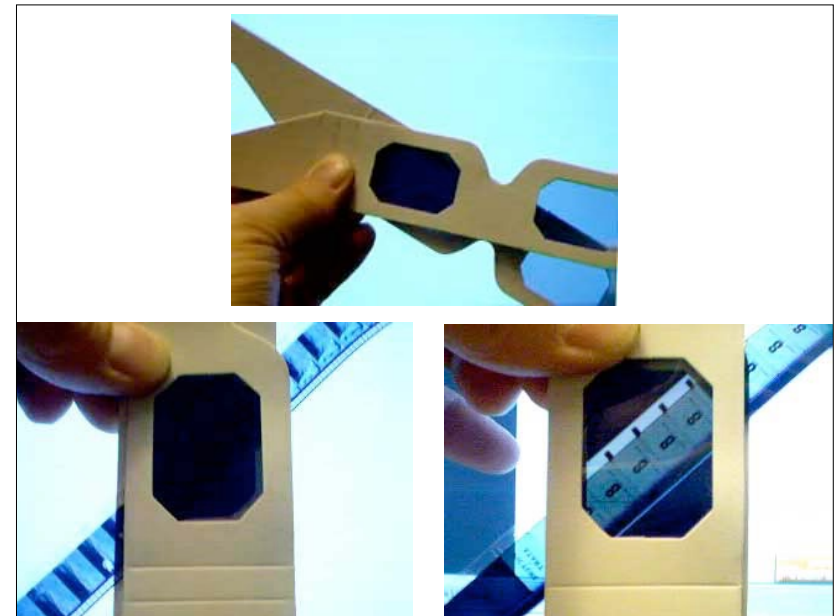
disadvantages

- static charge attracts dust
- can only be spliced ultrasonically

40

base	since	main uses (Kodak)
Nitrate	1869	for still and cinefilm from 1888 until 1951
Diacetate	1909	<ul style="list-style-type: none"> • from 1915 until 1937 for home cinema distribution of cinema classics • from 1923 until 1948 for amateur films
Triacetate	1936	<ul style="list-style-type: none"> • since 1948 for film und magnetic tape • replaced nitrate in 1951 for projection prints • still used today in most camera negatives
Polyester	1940s	<ul style="list-style-type: none"> • since 1955 for magnetic tape • occasionally for Super 8 (Fuji) • 1990s for 35 and 16mm prints and duplicates

41



42

Bibliography

The Film Preservation Guide. The Basics for Archives, Libraries and Museums. National Film Preservation Foundation, San Francisco CA 2004

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43

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44