

Analogue and Digital Preservation in Difficult Times

Reto Kromer • AV Preservation by reto.ch

Open-Source Tools and Resources for Audio-Visual Archives

Elías Querejeta Zine Eskola
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Global Emergencies

- climate emergency
- war
- sanitation emergency

→ **slow down**

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Climate Emergency

- embrace low-technology...
... and low-energy solutions
- use less resources...
... and recycle whenever possible

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War, fire, natural disasters etc.

- protect yourself
- protect others
- protect your collections

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Sanitation Emergency

- hand hygiene
- physical distancing
- surgical masks to protect others (or FFP2 masks to protect yourself)
- stay home when feeling ill
- vaccination

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Workflow

- prepare the source elements
- digitise the source elements
- digitally restore the files
- conserve the source elements
- conserve the archive files
- generate derivate files

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Preparation

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Digitisation

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Restoration

Live in the real world!

There is only one efficient way:

- keep the analogue source elements as long as possible
- more prevention:
 - better insulation
 - more efficient air conditioning
- less handling of the source elements
- make digital masters and access copies

[illegible]

Conservation

- de-restoration
- cleaning
- preparation

- de-restoration
- cleaning
- preparation

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Working Place

- manual rewinder
- ventilation
- illumination

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Consumables

- protection masks
- nitrile (and cotton) gloves
- tissues
- solvents
- film cement

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Infrastructure

- proper vaults with climate control

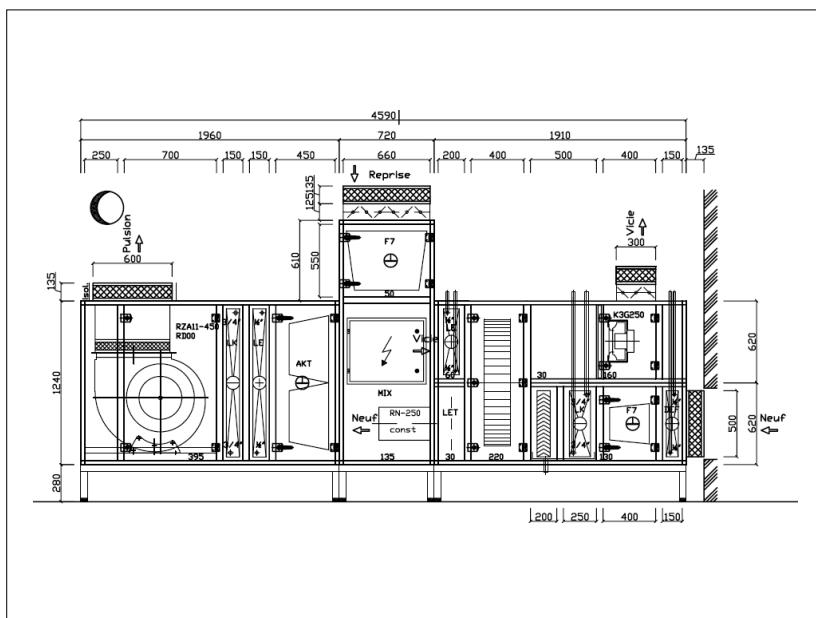
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Active measures

Air conditioning system:

- refrigerate
- dehumidify
- filter

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Air pollutant

- $\text{SO}_2 < 1 \mu\text{g}/\text{m}^3$
- $\text{NO}_x < 5 \mu\text{g}/\text{m}^3$
- $\text{O}_3 < 25 \mu\text{g}/\text{m}^3$

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Outgassed acid

- $\text{CH}_3\text{COOH} < 1 \text{ ppm}$
- $\text{HNO}_3 < 1 \text{ ppm}$

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Air flow

Outgassed acetic acid or nitric acid are heavy gases:

- air supply at the ceiling of one wall
- air exhaust at the bottom of the opposite wall
- air supply and air exhaust on the full length of the opposite longer walls

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Passive measures

- location
- orientation
- exterior paint colour
- shadow
- insulation
- humidity barrier
- apertures

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Digital Conservation

0111010100101010100010110101011110
0100110101010101010100001011101010
0111010100101010100010110101011110
0001110101010101010100001011101010
0110101010010101010001011010101111
0010101010101010101010101010000
0111010100101010100010110101011110
010101010101010101010000101100110
1001011101010010101010001011010101
1110010101010101010000101110101010
0111010100101010100010110101011110
0101010101010101001101010100000001
0010100010101010101010010101010101

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Equipment

- servers
- network
- storage
- ventilation (cooling)

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Working Place

- software
- computer with at least one good monitor
- storage
- illumination
- chair

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Plan the Next Migration

- file naming
- barcodes
- checksums
- write the full index onto the cartridge
- technical metadata
- code to retrieve the files

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File Naming (Example)

- title_codec.container
- title_codec_container_algorithm.txt

- film_H264.mp4
- film_H264_mp4_md5.txt

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Checksums

cryptographic

- MD5
- SHA-1
- SHA-256
- SHA-512

non-cryptographic

- CRC-32
- xxHash 32
- xxHash 64
- xxHash 128

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Longterm

- storage of the cartridges
- three copies...
... in geographically distant locations
- data integrity check
- data migration
- availability of LTO desks

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Equipment

- LTO desk or library
- software
- network

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Working Place

- small computer
- software

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Consumables

- LTO cartridges

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Access

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AV Preservation by
reto.ch

Sandrainstrasse 3
3007 Bern
Switzerland

reto.ch
info@reto.ch



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