

# Endangered Archives Programme: Audio Preservation Resources and Equipment

*Adam Tovell, Karl Jenkins, Tom Ruane, Kevin Lemonnier*

*Sound & Vision Technical Services, The British Library*

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*Disclaimer: The links provided in this document do not constitute recommendations but are intended as a resource to help practitioners understand and identify suggested tools and accessories for the replay, digitisation and preservation of sound collections.*

## Sound and Audiovisual Preservation Organisations

### **Association for Recorded Sound Collections (ARSC)**

<https://www.arsc-audio.org>

A not-for profit organisation dedicated to the preservation and study of sound recordings, in all genres of music and speech, in all formats, and from all periods. ARSC brings together private individuals and institutional professionals - everyone with a serious interest in recorded sound.

### **Audio Engineering Society (AES)**

<https://aes2.org>

A professional body for engineers, scientists, other individuals with an interest or involvement in the professional audio industry.

### **Digital Preservation Coalition**

<https://www.dpconline.org/>

A not-for profit organisation, bringing together institutions, organisations, and individuals with a shared interest in ensuring the long-term accessibility and usability of digital information.

### **International Association of Sound and Audiovisual Archives (IASA)**

<https://www.iasa-web.org/>

A not-for profit organisation, bringing together institutions, organisations and individuals with a shared interest in ensuring the preservation of recorded sound and audiovisual documents.

## Online and Printed Resources

### **The Safeguarding of the Audiovisual Heritage: Ethics, Principles and Preservation Strategy (IASA TC-03)**

<https://www.iasa-web.org/tc03/ethics-principles-preservation-strategy>

Fundamental principles and strategies for the preservation of sound collections.

### **Guidelines on the Production and Preservation of Digital Audio Objects (IASA TC-04)**

<https://www.iasa-web.org/tc04/audio-preservation>

Wide-ranging technical guidelines for the preservation of sound formats, covering standards, principles and metadata; signal extraction from original carriers; target formats.

### **Handling and Storage of Audio and Video Carriers (IASA TC-05)**

<https://www.iasa-web.org/tc05/handling-storage-audio-video-carriers>

Recommendations for the handling and storage of physical sound collections, covering physical and chemical stability of sound formats; environmental concerns, storage concerns and disaster preparedness.

For a list of multi-language IASA guides, see: <https://www.iasa-web.org/iasa-special-and-technical-publications>

### **Sound Directions (Indiana University, Harvard University, 2007)**

<https://dlib.indiana.edu/projects/sounddirections/index.shtml>

Best practices for the preservation of audio materials.

### **Media Preservation and Digitization Principles (Mike Casey, Indiana University, 2022)**

[https://scholarworks.iu.edu/dspace/bitstream/handle/2022/27446/casey\\_principles\\_final\\_20220326\\_.pdf?sequence=1&isAllowed=y](https://scholarworks.iu.edu/dspace/bitstream/handle/2022/27446/casey_principles_final_20220326_.pdf?sequence=1&isAllowed=y)

A thorough set of principles, along with several associated policies and practices, for entities developing or assessing media preservation programmes.

### **Quality Control for Media Digitization Projects (Mike Casey, Indiana University, 2019)**

[https://scholarworks.iu.edu/dspace/bitstream/handle/2022/27410/casey\\_qc\\_iasa.pdf?sequence=1&isAllowed=y](https://scholarworks.iu.edu/dspace/bitstream/handle/2022/27410/casey_qc_iasa.pdf?sequence=1&isAllowed=y)

Defines types of quality control and explores risk management strategies that are broadly applicable to any organization engaged in media digitisation for long-term preservation.

**Meeting the Challenge of Media Preservation: Strategies and Solutions**

[https://scholarworks.iu.edu/dspace/bitstream/handle/2022/14135/iu\\_mpi\\_report\\_public.pdf?sequence=1&isAllowed=y](https://scholarworks.iu.edu/dspace/bitstream/handle/2022/14135/iu_mpi_report_public.pdf?sequence=1&isAllowed=y)

**ARSC Guide to Audio Preservation (2015)**

<https://www.clir.org/wp-content/uploads/sites/6/pub164.pdf>

A practical introduction to caring for and preserving audio collections.

**Fundamentals of Audio Preservation (North East Document Conservation Centre, 2017 revised 2022)**

<https://www.nedcc.org/av-textbook>

**Format Characteristics and Preservation Problems (Mike Casey, 2007)**

[https://dlib.indiana.edu/projects/sounddirections/facet/facet\\_formats.pdf](https://dlib.indiana.edu/projects/sounddirections/facet/facet_formats.pdf)

**Cylinder Recordings: A Primer**

<https://cylinders.library.ucsb.edu/history.php>

## Analogue Magnetic Tape Digitisation

### Resources

#### **The History of Magnetic Recording**

<https://www.aes-media.org/historical/html/recording.technology.history/magnetic4.html>

#### **IASA TC-04: Reproduction of Analogue Magnetic Tapes**

<https://www.iasa-web.org/tc04/reproduction-analogue-magnetic-tapes>

#### **Let's Talk Tape (Kodak, c.1960s)**

[https://www.youtube.com/watch?v=VQSpI3\\_agMo&ab\\_channel=PeriscopeFilm](https://www.youtube.com/watch?v=VQSpI3_agMo&ab_channel=PeriscopeFilm)

#### **Manufacture & Use of Agfa Gevaert 1/4" Magnetic Recording Tape (German)**

<https://www.youtube.com/watch?v=AKr0AMbcmRU>

### Tools and Equipment

#### **Calibration Tapes (Open Reel)**

<https://www.test-tape.com/en/>

For calibration of open-reel tape machines.

For a guide to which tapes you need, see: <https://www.mrltapes.com/which-cal-tape.pdf>

#### **Splicing tape**

[https://www.thomann.de/gb/splicit\\_splicing\\_tape\\_1\\_4.htm](https://www.thomann.de/gb/splicit_splicing_tape_1_4.htm)

1/4" adhesive tape for joining sections of tape together; replacing old splices and attaching leader tape.

#### **Leader tape**

[https://www.thomann.de/gb/search\\_dir.html?sw=leader%20tape&smcs=cf2f2b\\_1406](https://www.thomann.de/gb/search_dir.html?sw=leader%20tape&smcs=cf2f2b_1406)

To attach to the head and tail of a tape, to allow handling without touching the tape surface.

#### **Single-edge razor blades**

<https://thescratchdoctor.co.uk/product/single-edge-steel-safety-blades-100-pcs/>

For cutting tape, leader tape and splicing tape.

### **Splicing block**

[https://www.thomann.de/gb/splicit\\_tape\\_splicing\\_block\\_1\\_4.htm](https://www.thomann.de/gb/splicit_tape_splicing_block_1_4.htm)

Aluminium block for accurate cutting of recording tape, leader tape, splicing or hold-down tape with razor blades. With notches for 90 or 45 degree-angle cuts.

### **Hold-down tape**

[https://www.thomann.de/gb/splicit\\_hold\\_down\\_tape\\_1\\_4.htm](https://www.thomann.de/gb/splicit_hold_down_tape_1_4.htm)

Adhesive tape for attaching loose ends of tape to the surface of reels, for storage.

### **NAB adapters**

[https://www.thomann.de/gb/tascam\\_nabadapter.htm](https://www.thomann.de/gb/tascam_nabadapter.htm)

Used for mounting reels with large central holes onto the trident hubs of most open-tape machines.

### **Scientific oven**

<https://www.thelabstore.co.uk/heating-and-cooling-equipment/laboratory-ovens/binder-series-e-classic-line-drying-and-heating-chambers-with-mechanical-adjustment-natural-convection.html>

Controlled heating for sticky tapes.

### **Dehydrator**

<https://www.nesco.com/product-category/dehydrating/dehydrators/>

Low-cost alternative for tape baking.

### **Spare reels**

[https://www.thomann.de/gb/rtm\\_plastic\\_reel\\_26.5\\_cm.htm](https://www.thomann.de/gb/rtm_plastic_reel_26.5_cm.htm)

### **Spare boxes**

[https://www.thomann.de/gb/splicit\\_reel\\_box\\_white\\_1\\_4\\_x\\_7.htm](https://www.thomann.de/gb/splicit_reel_box_white_1_4_x_7.htm)

### **Magnetic viewer**

<https://maurermagnetic.com/en/measuring-instruments/products-measuring-devices/magnetic-viewer>

<https://store.arnoldmagnetics.com/product/284/magnetic-viewer-b-1022>

Portable device used for displaying the configuration of tracks on a magnetic tape; vital for selecting the appropriate equipment for replay.

### **Degausser**

<https://www.juno.co.uk/products/tonar-tape-head-demagnetizer-for-reel-to/567759-01>

For de-magnetising tape paths as part of routine maintenance of open reel and cassette machines.

### **Cotton buds**

[https://www.canford.co.uk/Products/55-141\\_COTTON-BUDS-box-of-200](https://www.canford.co.uk/Products/55-141_COTTON-BUDS-box-of-200)

Long, wooden shafted cotton buds for application of isopropyl alcohol or other solutions for cleaning of replay equipment, &c.

### **Isopropyl alcohol**

[https://www.canford.co.uk/Products/2025656/55-175\\_CANFORD-ISOPROPYL-ALCOHOL-500ml-bottle](https://www.canford.co.uk/Products/2025656/55-175_CANFORD-ISOPROPYL-ALCOHOL-500ml-bottle)

For cleaning of tape paths, including magnetic heads. May be used in solution for cleaning of e.g. mouldy tapes.



## Cassette Digitisation

### Resources

#### **IASA TC-04: Reproduction of Analogue Magnetic Tapes**

<https://www.iasa-web.org/tc04/reproduction-analogue-magnetic-tapes>

### Tools and Equipment

#### **Cassette splicing tape**

[https://www.thomann.de/gb/splicit\\_splicing\\_tape\\_1\\_8.htm](https://www.thomann.de/gb/splicit_splicing_tape_1_8.htm)

1/8" adhesive tape for joining sections of tape together; replacing old splices and attaching leader tape.

#### **Cassette splicing block**

[https://www.thomann.de/gb/splicit\\_tape\\_splicing\\_block\\_1\\_8.htm](https://www.thomann.de/gb/splicit_tape_splicing_block_1_8.htm)

Aluminium block for accurate cutting of recording tape, leader tape, splicing or hold-down tape with razor blades. With notches for 90 or 45 degree-angle cuts.

#### **Cassette shells/donor cassettes**

[https://www.thomann.de/gb/rtm\\_fox\\_c60\\_type\\_1.htm](https://www.thomann.de/gb/rtm_fox_c60_type_1.htm)

#### **Calibration tapes (cassette)**

[http://www.ant-audio.co.uk/index.php?cat=post&qry=alignment\\_tapes](http://www.ant-audio.co.uk/index.php?cat=post&qry=alignment_tapes)

## Analogue Disc Digitisation

### Resources

#### **IASA TC-04: Reproduction of Historical and Obsolete Mechanical Formats**

<https://www.iasa-web.org/tc04/reproduction-historical-and-obsolete-mechanical-formats>

#### **IASA TC-04: Reproduction of Microgroove LP Records**

<https://www.iasa-web.org/tc04/reproduction-microgroove-lp-records>

#### **Evolution of a Recording Curve (R.C. Moyer, 1953)**

[https://www.aes.org/aeshc/pdf/moyer\\_evolution-of-a-recording-curve.pdf](https://www.aes.org/aeshc/pdf/moyer_evolution-of-a-recording-curve.pdf)

#### **History of Disk Recording (John G. Frayne, 1985)**

[https://www.aes.org/aeshc/pdf/frayne\\_history-of-disk-recording.pdf](https://www.aes.org/aeshc/pdf/frayne_history-of-disk-recording.pdf)

#### **How a Columbia Record is Made (1928)**

[https://www.youtube.com/watch?v=8d9sNe2OWyI&t=313s&ab\\_channel=Larry%27sVintageAudio%26Vinyl](https://www.youtube.com/watch?v=8d9sNe2OWyI&t=313s&ab_channel=Larry%27sVintageAudio%26Vinyl)

#### **How Shellac Records Are Made (1942)**

[https://www.youtube.com/watch?v=2zL53iEHf\\_0&ab\\_channel=althazarr%27sgoodtimeoldies](https://www.youtube.com/watch?v=2zL53iEHf_0&ab_channel=althazarr%27sgoodtimeoldies)

#### **The Sound and the Story (1956)**

[https://www.youtube.com/watch?v=10CKG-1DD20&ab\\_channel=PeriscopeFilm](https://www.youtube.com/watch?v=10CKG-1DD20&ab_channel=PeriscopeFilm)

#### **How to Make Vinyl (2023)**

[https://www.youtube.com/watch?v=Yd2SW-Fys6I&ab\\_channel=WIREDO](https://www.youtube.com/watch?v=Yd2SW-Fys6I&ab_channel=WIREDO)

#### **Equalisation curves for 78rpm shellac and early 33rpm LPs**

<https://plugins.audacityteam.org/additional-resources/eq-curves/playback-equalization-for-78-rpm-shellacs-and-early-33-lps>

## Tools and Equipment

### *Turntables*

#### **Technics 1210 Mk7**

[https://www.thomann.de/gb/technics\\_sl\\_1210\\_mk\\_7.htm](https://www.thomann.de/gb/technics_sl_1210_mk_7.htm)

Popular, reliable and well-supported turntable. Parts and modifications are available. Plays 33, 45 and 78rpm as standard with +/- 8%/16% pitch control.

Good, refurbished and modified examples available on the second-hand market.

#### **Audio Technica AT-LP140XP**

<https://www.audio-technica.com/en-gb/at-lp140xp>

Essentially a cheaper 'clone' of the Technics with the same feature set, including direct-drive motor and 78rpm speed.

### *Coarsegroove Styluses*

For correct replay of coarsegroove discs (shellac or lacquer).

<https://www.av.com/Hi-Fi/Ortofon-Stylus-78-Replacement-Stylus-For-OM-Cartridges/4D80>

Spherical stylus for Ortofon Super OM, OM, OMP, TM and Concorde cartridges.

#### **Expert Stylus**

[http://www.78tours.com/Expert\\_Stylus\\_Company.html](http://www.78tours.com/Expert_Stylus_Company.html)

Supplier of styli with a wide variety of sizes and profiles for correct coarsegroove (and microgroove) disc replay.

#### **Esoteric Sound**

<https://www.esotericsound.com/CartStyli.htm>

A variety of cartridge and stylus options for coarsegroove disc replay.

#### **Ortofon**

<https://www.av.com/Hi-Fi/Ortofon-Stylus-78-Replacement-Stylus-For-OM-Cartridges/4D80>

Spherical stylus for Ortofon Super OM, OM, OMP, TM and Concorde cartridges

### *Microgroove Styluses*

For the replay of microgroove vinyl LPs, singles and EPs.

#### **Jico J44A-7 cartridge and stylus**

<https://www.jico-stylus.com/product/j44a-7-dj-imp-sd/>

#### **Ortofon 2M Blue (cartridge and stylus)**

[https://www.thomann.de/gb/ortofon\\_2m\\_blue.htm](https://www.thomann.de/gb/ortofon_2m_blue.htm)

#### **Ortofon 2M Black (cartridge and stylus)**

[https://www.thomann.de/gb/ortofon\\_2m\\_black.htm](https://www.thomann.de/gb/ortofon_2m_black.htm)

### *Headshells*

To house cartridge and styli (where not provided as part of a set). For a variety of options see:

<https://www.analogueseduction.net/search/for/headshell/>

### *Flat Preamplifiers*

For transfer of e.g. coarsegroove discs without the application of an equalisation curve (i.e. for acoustical recordings, or for applying equalisation curves in software).

#### **Tracertek CTP-1000**

<https://tracertek.com/Item/CTP1000>

#### **Groove Sleuth MICRO**

[https://www.phaedrus-audio.com/GS\\_micro.htm](https://www.phaedrus-audio.com/GS_micro.htm)

#### **Groove Sleuth Adaptors**

<https://www.phaedrus-audio.com/phonophone.htm>

### **RIAA Pre-amplifiers**

Required for replay of microgroove vinyl discs. For a variety of options see:

[https://www.thomann.de/gb/phono\\_preamps.html](https://www.thomann.de/gb/phono_preamps.html)

*Switchable EQ Pre-Amplifiers*

Hardware pre-amplifiers with selectable equalisation curves, for use when transferring coarsegroove discs, to be used as an alternative to a flat pre-amplifier with software equalisation.

**Vadlyd Elberg MD12 MK4**

[https://www.vadlyd.dk/RIAA\\_and\\_78\\_RPM\\_preamp.html](https://www.vadlyd.dk/RIAA_and_78_RPM_preamp.html)

**Rek-O-Kut Re-Equalizer III**

<https://www.esotericsound.com/elect.htm>

*Spirit Levels*

For levelling turntables.

**Ortofon Libelle**

[https://www.thomann.de/gb/ortofon\\_libelle.htm](https://www.thomann.de/gb/ortofon_libelle.htm)

*Stylus Force Gauges*

For measuring the weight applied to a cartridge.

**Pro-Ject Measure It-E**

[https://www.thomann.de/gb/pro\\_ject\\_measure\\_it\\_e.htm](https://www.thomann.de/gb/pro_ject_measure_it_e.htm)

*Disc Clamps*

Tool to secure discs (shellac, vinyl or otherwise) to the platter

**Pro-Ject Puck-E**

[https://www.thomann.de/gb/pro\\_ject\\_record\\_puck\\_e\\_silver.htm](https://www.thomann.de/gb/pro_ject_record_puck_e_silver.htm)

**Audio Technica AT618A**

<https://www.audio-technica.com/en-gb/at618a>

*Cartridge Alignment Protractor*

For alignment of cartridges in headshells

<https://www.analogueseduction.net/alignment-tools/pro-ject-two-point-cartridge-alignment-protractor.html>

*Azimuth / Vertical tracking alignment gauge*

For alignment of tonearms and of stylus/cartridge/headshell assemblies

<https://www.analogueseduction.net/alignment-tools/ASalignementblock.html>

*Tachometers*

For measuring the rotational speed of a turntable (for setting non-standard speeds)

**RPM Speed & Wow (smartphone app)**

[https://play.google.com/store/apps/details?id=com.AM.AM.RPMSpeed&hl=en\\_GB&gl=US&pli=1](https://play.google.com/store/apps/details?id=com.AM.AM.RPMSpeed&hl=en_GB&gl=US&pli=1)

**Clarke CT-1 Laser Tachometer**

<https://www.machinemart.co.uk/p/ct1-digital-laser-tachometer/>

*Digital Microscopes*

For close-up viewing of disc grooves, inspection of damage, dirt, mould, etc.

**Generic 4K WiFi Microscope**

<https://www.amazon.co.uk/dp/B09SNSPHXX/>

*Disc Cleaning*

Spondex sponge cloths (with distilled water and mild detergent)

<https://www.spontex.co.uk/product/specialist-sponge-cloths/>

**Knosti Disco Antistat**

<https://www.mcru.co.uk/product/knosti-disco-antistat-record-cleaning-machine/?v=79cba1185463>

**Pro-Ject VC-E2**

[https://www.thomann.de/gb/pro\\_ject\\_vc\\_e2.htm](https://www.thomann.de/gb/pro_ject_vc_e2.htm)

**Keith Monks Record Cleaning Machines (various options)**

<http://www.keithmonks-rcm.co.uk/range.html>

**Bandelin Sonorex Ultrasonic baths (various sizes)**

<https://bandelin.com/en/products/ultrasonic-baths/sonorex-rk/>

### *Disc Sleeves*

Suppliers of conservation consumables for housing of archive collections

#### **CXD International**

<https://www.cxdinternational.com/>

#### **Preservation Equipment Ltd.**

<https://www.preservationequipment.com/>

<https://snvinyl.co.uk/10-EP-HDPE-White-Inner-Sleeve-Anti-Static-Polylined>

<https://www.walvisproducts.eu/a-41214207/10-inch-record-sleeves/polylined-paper-10-inner-vinyl-record-anti-static-sleeve-white-70-grs-paper/>

<https://covers33.co.uk/shop/for-your-vinyl/12-vinyl/12-paper/12-white-paper-polylined-sleeve-pack-of-50/>

### *Disc Equalisation Software*

#### **Brian Davies' Equalizer**

<https://archive.org/details/de-noise>

Free software for processing of digital audio files with configurable equalisation curves.

#### **Audacity**

<https://www.audacityteam.org>

<https://plugins.audacityteam.org/additional-resources/eq-curves/playback-equalization-for-78-rpm-shellacs-and-early-33-lps>

Free software including options for digital equalisation of audio files.

## Optical Disc Digitisation

### **Asus SDRW-08U9M-U**

[https://www.amazon.co.uk/gp/product/B074SFZNG6/ref=ppx\\_yo\\_dt\\_b\\_asin\\_title\\_o08\\_s00?ie=UTF8&psc=1](https://www.amazon.co.uk/gp/product/B074SFZNG6/ref=ppx_yo_dt_b_asin_title_o08_s00?ie=UTF8&psc=1)

Example optical disc drive with C2 pointers for error detection and correction.

### **dBpoweramp**

<https://www.dbpoweramp.com/cd-ripper.htm>

Audio CD ripping software with secure rip settings and error detection logging.

### **Exact Audio Copy**

<https://www.exactaudiocopy.de/>

Free alternative audio CD ripping software.



## MiniDisc Digitisation

### **Sony MZ-RH1 MiniDisc Recorder**

<https://www.minidisc.wiki/equipment/sony/portable/mz-rh1>

Example NetMD player for ripping MiniDisc audio faster than real-time over USB. Discontinued and only available on the second-hand market. For a list of other NetMD players supporting ‘homebrew’ features for ripping, see: <https://www.minidisc.wiki/guides/exploits>

### **PlatinumMD**

<https://platinum-md.app/>

Free MiniDisc ripping software that extracts and converts native ATRAC files to WAVE files.

### **Web MiniDisc Pro**

<https://webmd.pro/>

Free browser-based MiniDisc ripping software that extracts and converts native ATRAC files to WAVE files.

### **Zadig**

<https://zadig.akeo.ie/>

Installs USB drivers required for MZ-RH1 player, PlatinumMD and Web MiniDisc Pro.

## Digitisation Hardware/Software

### Digital Audio Workstations

#### **Audacity**

<https://www.audacityteam.org>

Free software for digitisation and basic editing and processing of digital audio files.

#### **Reaper**

<https://www.reaper.fm/>

Low-cost software for digitisation, monitoring, analysis, editing and processing of digital audio files.

#### **Steinberg Wavelab Elements/Pro**

<https://www.steinberg.net/wavelab>

Fully featured professional audio recording and editing software.

## Digital Audio Interfaces

### **HiFiBerry DAC2 ADC Pro for Raspberry Pi**

<https://www.hifiberry.com/shop/boards/dac2-adc-pro/>

Low-cost 2-input audio interface for Linux-based Raspberry Pi systems (analogue inputs only). For a Raspberry Pi system, see: [https://thepihut.com/products/raspberry-pi-5?srsId=AfmBOorHda87Ac0\\_LwmIE5chWUqtI530eUzrIhBLmIzhf6IOYMWvVLfG](https://thepihut.com/products/raspberry-pi-5?srsId=AfmBOorHda87Ac0_LwmIE5chWUqtI530eUzrIhBLmIzhf6IOYMWvVLfG)

### **HiFiBerry Digi+ I/O For Raspberry Pi**

<https://www.hifiberry.com/shop/boards/hifiberry-digi-io/>

Low-cost audio interface for Linux-based Raspberry Pi systems (digital inputs only).

### **Focusrite Scarlett 2i2**

[https://www.thomann.de/gb/focusrite\\_scarlett\\_2i2\\_3rd\\_gen.htm](https://www.thomann.de/gb/focusrite_scarlett_2i2_3rd_gen.htm)

2-input, low cost USB audio interface (analogue inputs only).

### **Steinberg UR44C**

[https://www.thomann.de/gb/steinberg\\_ur44c\\_red.htm](https://www.thomann.de/gb/steinberg_ur44c_red.htm)

Mid-range audio interface with 6 line-inputs (analogue inputs only).

### **RME Fireface UCX II**

[https://www.thomann.de/gb/rme\\_fireface\\_ucx\\_ii.htm](https://www.thomann.de/gb/rme_fireface_ucx_ii.htm)

High-end desktop audio interface (analogue and digital inputs).

### **PrismSound Titan**

<https://beta.prismsound.com/products/titan/>

High-end professional mastering interface (analogue and digital inputs).

## Preservation Software

### **FSUM Frontend**

<https://fsumfe.sourceforge.net/>

Simple-to-use Graphical User Interface for checksumming software FSUM. Generates and verifies checksums for all file types, to ensure no loss of data when copying or moving files between locations, or as a health-check for files held on preservation storage.

### **MediaInfo**

<https://mediaarea.net/en/MediaInfo>

Free software for analysing media files and reporting on their formats and technical characteristics.

### **Bulk Rename Utility**

<https://www.bulkrenameutility.co.uk/>

A free file-renaming utility for Windows.