

NLA AUDIO PRESERVATION TECHNICAL STANDARDS

1. REPLAY OF ORIGINAL RECORDINGS

- 1.1. The Operator(s) will be required to replay tapes that have been recorded according to a number of different standards. It is expected that all replay equipment will be maintained, cleaned and aligned in accordance with best practise and will meet Library standards as per this specification.
 - 1.1.1. Reel Speeds: 15 ips, 7½ ips, 3¾ ips, 1⁷/₈ ips and 1⁵/₁₆ ips.
 - 1.1.2. Reel Equalisation: NAB and IEC for 7½ ips and 15 ips, IEC (or AES) for all other speeds.
 - 1.1.3. Tracks: ¼ track, ½ track and full track.
 - 1.1.4. With 70µS equalisation at 7½ ips or 35µS at 15 ips. (IEC equalisation).
 - 1.1.5. Frequency response 30Hz to 10kHz ±, -1dB
10kHz to 20kHz +1, -2dB.
 - 1.1.6. Total Harmonic Distortion (THD) better than or equal to 0.5% @ 0vu
 - 1.1.7. Wow and flutter unweighted better than 0.08%.
 - 1.1.8. Total intermodulation distortion better than 0.75%. (SMPTE measurement system).
 - 1.1.9. Cassette (1⁷/₈ ips) equalisation 70µS and 120µS.
 - 1.1.10. DAT 44.1kHz and 48kHz sampling rate.
- 1.2. No component in the replay record path will add to, take away from, or cause unreasonable distortion of the original signal. The reproduction path should equal or exceed the recording capability of 96kHz, 24 bit digital audio (as specified below), notwithstanding the lower technical qualities of much of the original analogue recordings.
- 1.3. The Operator(s) will be expected to adjust the head azimuth on analogue tapes (reel and cassette) to ensure optimum replay characteristics.
- 1.4. The Operator(s) will assess track width and format, where that is unknown.
- 1.5. The Operator(s) will assess replay equalisation characteristics to ensure proper replay where that is unknown, or where it is incorrectly documented.

2. RECORDING OF PRESERVATION DUPLICATES

- 2.1. The Operator(s) will be required to produce the following copies for all DAT, analogue reel and cassette originals:
 - 2.1.1. BWF file
 - 2.1.2. CD-R access copy
 - 2.1.3. XML metadata document

3. RECORDING STANDARDS

3.1. **A/D Converter:** The Operator(s) will convert from analogue to digital using a converter that meets the following specification.

THD+N, 1kHz

- 3.1.1. At a 4dBu input, (-20dB Full Scale (FS)) THD + N will be less than -91dB unweighted, and -93dB A weighted.
- 3.1.2. At a 23dBu input (-1dBFS) input THD + N will be less than -110dB unweighted, and -112dB A weighted.

Frequency Response

- 3.1.3. Where A/D-D/A is at 48kHz, the frequency response will be better than ± 0.025 dB for the ranges 20Hz to 20kHz.
- 3.1.4. Where A/D-D/A is at 96kHz, the frequency response will be better than ± 0.025 dB for the ranges 20Hz to 20kHz and ± 0.4 dB for the ranges 20kHz to 30kHz.

Distortion

- 3.1.5. THD+N, 1kHz with a throughput level of 4dBu will not exceed 0.01% (-93dB A weighted)
- 3.1.6. THD+N, 1kHz with a throughput level of 23dBu will not exceed 0.005% (-112 dB A weighted)

IMD (SMPTE)

- 3.1.7. With a 4dBu throughput IMD will not exceed 0.012%
- 3.1.8. With a 20dBu throughput IMD will not exceed 0.005%

Dynamic Range

- 3.1.9. The converter will have a signal to noise ratio of not less than 117 dBA

Clocking

- 3.1.10. Clock accuracy will be better than ± 50 ppm
- 3.1.11. Clock jitter at the working frequency will be better than 22pSec.

4. SOUND CARD

- 4.1. The sound card will pass the digital signal specified above without adding any audio artifacts in excess of those stated in the A/D specification.
- 4.2. No individual component of noise will exceed -126dB
- 4.3. The sound card will accept and correct digital input with a high level of jitter (up to 35ns) without producing drop outs.
- 4.4. The sound card's own jitter will be less than 1 ns (44,1 kHz)

5. CD DUPLICATES

- 5.1. The CD-R access copy will be recorded on CD-Rs in accordance with the following standards:
 - 5.1.1. Recorded in accordance with the Orange book CD-R standard such that it meets Red book replay standards in all respects.
 - 5.1.2. A BLER better than 30 errors per second, (E11+21+31), and a maximum BERL of 7.
 - 5.1.3. No uncorrectable errors (E32).
 - 5.1.4. The original signal into the A/D converter should not cause an overloaded or distorted peak nor should any compression or limiting be applied, however, the signal out should take advantage of the full bandwidth on the digital CD-R recording.
 - 5.1.5. The CD signal may be derived from the master file using appropriate bit mapping and sample rate conversion.
 - 5.1.6. CD-R's may be written in x4,x8, x12 (which ever is appropriate.)
 - 5.1.7. PQ Start Offset no less than 10 frames.
 - 5.1.8. Index points must be written at one minute spacings for recordings of continuous speech.
 - 5.1.9. CD-Rs must contain at least one end of track mark.

6. LABELLING COPIES

6.1. Labelling BWF files and metadata:

- 6.1.1. The BWF files will be named by the Operator(s) in accordance with the Library's Persistent Identifier Structure system taking the following form:
- 6.1.2. <Collection Id>-<TRC Collection No>-<TRC Series No>-<TRC Item No>-<Sequence No>-<Piece No>-<Fragment No>-<Role Code>.< format extension>
- 6.1.3. This will take the form nla.oh-aaaa-bbbb-cccc-sx-pex-frx-m.wav

6.2. Labelling CDs:

- 6.2.1. All CDs to be labelled on the supplied insert and on the white designated space on the CD with xylene-free felt-tip pens with the following information in black:
- 6.2.2. Material identification
- 6.2.3. Recording date
- 6.2.4. Duration of recorded information
- 6.2.5. Track information (stereo or mono)
- 6.2.6. Numbered in a sequence defined by the Library
- 6.2.7. Write speed

7. HANDLING RECORDING MEDIA

7.1. Original Tapes must be:

- 7.1.1. Played only on properly maintained and adjusted equipment.
- 7.1.2. Played only for the purpose of generating copies.
- 7.1.3. Wound off the tape machine in the play mode and stored on the take up spool, tail out.
- 7.1.4. End fastened. (fastener must be non-bleeding).
- 7.1.5. Boxed when not in use.
- 7.1.6. Held by hub so as not to damage tape by crushing.
- 7.1.7. Tape surface not to be handled.

7.2. CD-Rs must be:

- 7.2.1. Housed away from sunlight in an appropriate dust free environment with suitable humidity and temperature.
- 7.2.2. At all times CD-Rs must be stored either on pod supplied or in jewel case.
- 7.2.3. Handled by the edges or centre hub.
- 7.2.4. The surface must not be handled or touched.
- 7.2.5. The surface must be dust free prior to writing by application of clean compressed gas to write surface.
- 7.2.6. All labelling must be within the white portions printed on the CD-Rs and only with black xylene-free pens.