

# **Analog Sound Formats and Guides**

# Sound Formats - Open Reel Audio

## 1/4" Open Reel (1935-1980s):

- Base Material - Acetate, paper, polyester, or PVC magnetic tape;
- Tape width: ¼"
- Reel diameter: 2", 3", 5", 7", 10.5"

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Prone to risks like mold, binder deterioration, physical damage, signal drop-outs, and, in the case of acetate-based tapes, base deterioration.
- Tapes are also prone to blocking or pinning, which occurs when layers of tape adhere to adjacent layers.
- Issues for many polyester-based tapes are print-through, sticky shed syndrome (binder hydrolysis), and soft binder syndrome.
- Vinegar syndrome is a concern for many acetate-based tapes.



# Sound Formats - Open Reel Audio

## 2" Open Reel (Late 1950s - 1980s)

- Base Material - Polyester or acetate magnetic tape;
- Tape width: 2"
- Reel diameter: 3", 5", 7", 10.5", 14"

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Prone to risks like mold, binder deterioration, physical damage, signal drop-outs, and, in the case of acetate-based tapes, base deterioration.
- Tapes are also prone to blocking or pinning, which occurs when layers of tape adhere to adjacent layers.
- Issues for many polyester-based tapes are print-through, sticky shed syndrome (binder hydrolysis), and soft binder syndrome.
- Vinegar syndrome is a concern for many acetate-based tapes.



# Sound Formats - Open Reel Audio

## 1" Open Reel (Early 1950s - 1980s)

- Base Material - Polyester or acetate magnetic tape;
- Tape width: 1"
- Reel diameter: 3", 5", 7", 10.5", 14"

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Prone to risks like mold, binder deterioration, physical damage, signal drop-outs, and, in the case of acetate-based tapes, base deterioration.
- Tapes are also prone to blocking or pinning, which occurs when layers of tape adhere to adjacent layers.
- Issues for many polyester-based tapes are print-through, sticky shed syndrome (binder hydrolysis), and soft binder syndrome.
- Vinegar syndrome is a concern for many acetate-based tapes.



# Sound Formats - Open Reel Audio

## 1/2" Open Reel (1950s - 1980s)

- Base Material - Polyester or acetate magnetic tape;
- Tape width: 1/2"
- Reel diameter: 3", 5", 7", 10.5"

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Prone to risks like mold, binder deterioration, physical damage, signal drop-outs, and, in the case of acetate-based tapes, base deterioration.
- Tapes are also prone to blocking or pinning, which occurs when layers of tape adhere to adjacent layers.
- Issues for many polyester-based tapes are print-through, sticky shed syndrome (binder hydrolysis), and soft binder syndrome.
- Vinegar syndrome is a concern for many acetate-based tapes.



# Sound Formats - Cassette / Cartridge-Based

## Continuous Loop Cartridges (Cart) (1959 - 1990s)

- Base Material – Polyester magnetic tape;
- Tape width: ¼" (6.4mm)
- Cassette: 133mm × 101mm × 23mm

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Physical, biological, and chemical risks like stretching, breaking, drop-outs, mold, and binder deterioration
- Binding and tension problems due to binder lubrication and wind issues.



# Sound Formats - Cassette / Cartridge-Based

## Compact Cassette (1963 - 1990s)

- Base Material – Polyester magnetic tape;
- Tape width:  $\frac{1}{8}$ " (3.81mm)
- Cassette: 4" × 2½" × ½"

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Environmental conditions--especially heat, dust, and humidity--may also affect cassettes
- Susceptible to physical, biological, and chemical risks like stretching, breaking, drop-outs, improper wind, mold, binder deterioration, and unintended recording





# Sound Formats - Cassette / Cartridge-Based

## 8-Track (1964 - early 1980s)

- Base Material – Polyester magnetic tape;
- Tape width: ¼"
- Cassette: 5¼" × 4" × ⅘"

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Environmental conditions--especially heat, dust, and humidity--may also affect cassettes
- Susceptible to physical, biological, and chemical risks like stretching, breaking, drop-outs, improper winding, mold, binder deterioration





# Sound Formats - Cassette / Cartridge-Based

## Microcassette (1969 - present)

- Base Material – Polyester magnetic tape;
- Tape width: approximately  $\frac{1}{8}$ "
- Cassette:  $1 \frac{7}{8}$ "  $\times$   $1 \frac{1}{4}$ "

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Environmental conditions--especially heat and humidity;
- Life-span 2-10 years



# Sound Formats - Cassette / Cartridge-Based

## Digital Audio Tape (DAT) (1987 - mid 2000s)

- Base Material – Polyester magnetic tape;
- Tape width: 4mm
- Cassette: 73mm × 54mm × 10.5mm

## Risks

- Susceptible to risks associated with age, hardware, and equipment obsolescence.
- Environmental conditions, dust, heat and humidity;
- DAT has known playback problems that are typically related to mechanical alignment



# Sound Formats – Phonograph Record

## Shellac Disc (1897 - late 1950s)

- Base Material – Shellac-based disc
- Size: 7"; 10"; 12"; 16" (diameter)

## Risks

- Susceptible to warpage, breakage, groove wear, and surface contamination.
- Tend to become brittle with age and are susceptible to damage by mold and acidic substances.
- When cleaning, DO NOT use fluids that contain alcohol as it can dissolve the shellac.
- Original sleeves are not recommended for long-term storage and should be assumed to be acidic



# Sound Formats – Phonograph Record

## Aluminum Disc (Late 1920s - 1940s)

- Base Material – Uncoated aluminum disc
- Size: 10"; 12"; 16" (diameter)

## Risks

- Susceptible to warpage, breakage, groove wear, and surface contamination.
- During playback, special care must be taken to preserve the signal etched into the relatively soft aluminum.
- High humidity and temperatures can adversely affect these discs by creating prime conditions for corrosion and fungal growth.
- Discs can be damaged by attendant materials like acidic cardboard (exterior) sleeves and non-archival plastic or paper (interior) sleeves.



# Sound Formats – Phonograph Record

## Lacquer Disc (Late 1920s - 1970s)

- Base Material – Aluminum, steel, glass, or fiberboard disc laminated with lacquer (cellulose nitrate or acetate cellulose)
- Size: 7"; 8"; 10"; 12"; 13"; 16" (diameter)

## Risks

- Susceptible to warpage, breakage, groove wear, and surface contamination.
- The nitrocellulose laminate can swell and possibly delaminate when exposed to high humidity or water.
- May suffer from plasticizer loss, which causes the disc coating to become brittle and can lead to delamination.
- All lacquer discs are fragile, but glass cores are especially so and can easily break if not handled gently.



# Sound Formats – Phonograph Record

## Vinyl Disc (Late 1940s - present)

- Base Material – Polyvinyl chloride (vinyl) or polystyrene disc
- Size: 7"; 10"; 12" (diameter)

## Risks

- Susceptible to warpage, breakage, groove wear, and surface contamination.
- Prone to scratches and abrasion due to its relatively soft material.
- Can be damaged by attendant materials like acidic cardboard (exterior) sleeves and non-archival plastic or paper (interior) sleeves.



# Sound Formats - Cylinder

## Wax Cylinder (late 1880s - c. 1915)

- Base Material – Molded wax cylinder
- Size: 2¼" (diameter) × 4–4¼" (length)

## Risks

- Susceptible to risks associated with warpage, breakage, groove wear, and surface contamination;
- Brown wax cylinders are typically the softest among cylinder records
- Materials within the wax cylinder harden with age, causing the wax to become brittle;
- Cylinders of different diameters cannot be played on the same machine; and, attempting to do so will damage the cylinder.





# Sound Formats - Cylinder

## Plastic Cylinder (1900s - 1929)

- Base Material – Molded cellulose nitrate cylinder
- Size: 2¼" (diameter) × 4–4¼" (length)

## Risks

- Susceptible to risks associated with warpage, breakage, groove wear, and surface contamination;
- Celluloid-based cylinders are prone to brittleness, and their cores (whether plaster or cardboard) are extremely fragile
- Cylinders of different diameters cannot be played on the same machine; and, attempting to do so will damage the cylinder.

