First Nations Media Australia Archiving Resources

Some common types of AUDIO archival media, their storage requirements and preservation risks

Format	Risk level ¹	Page
¼" Open Reel	High risk of loss	2
Compact Cassette	High risk of loss	3
Continuous Loop Cartridge (Cart)	High risk of loss	5
8 Track	High risk of loss	6
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Digital Audio Tape	High risk of loss	8
Digital Compact Cassette	High risk of loss	9
Compact disc (CD)	Moderate risk of loss	10
MiniDisc (MD)	High risk of loss	11
DVDs	See Video formats	



¹ The level of risk is a general assessment only. Situations of poor storage conditions, tape or recording surface damage, lack of access to players all change the risk assessment for individual media or a range of media. The risk level given here is an estimate based on good storage, the quality of the tape's or recording medium's physical condition and the market availability of players.

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¼" Open Reel 1935-1980s

Magnetic tape (acetate, paper, polyester, or PVC) on a hub or reel Each item should have its own PAT compliant enclosure to protect it from dust, handling damage, and changes in environmental conditions. Store the items in Inert plastic containers to protect from dust, pests and airborne contaminants. An enclosure must be truly clean in order to protect the fragile tape surface. Dust and dirt abrasions can affect sound quality and even render the tape unplayable. Mouldy, damaged, and dirty containers must be replaced.



wouldy, damaged, and dirty contai					
Description	Description Deterioration & Risk S		Storage	Handling & Care	Playback
	Level	Environment	orientation		Equipment
¼" open reel audio is the	¼" open reel audio is	Temperature	Store all magnetic	Never touch the surface	Reel-to-reel audio
earliest type of magnetic tape-	susceptible to risks		tape vertically on	of a magnetic tape	playback equipment
based recorded sound format.	associated with age,	Ideal 4.5-12	end, inside its	recording. Handle by	and media are
The tape is composed of	hardware, and	degrees Celsius	case. Stacking any	the hub instead. Do not	becoming scarce,
magnetic particles, binder, and	equipment obsolescence.		tape format	pull on the tape or	although there are a
a base of either acetate, paper,	Like other types of	Humidity	horizontallyor	squeeze the reel	few manufacturers
polyester, or PVC. The quarter-	magnetic media, it is	30-50% relative	even allowing it	flanges. This places	that are still filling the
inch size, which was the	prone to risks such as	humidity	to lean for too	stress on the tape,	needs of professional
standard width of open reel	mould, binder		longcan	potentially causing	audio studios. In
tape until the 1950s, is the most	deterioration, physical	Wood cabinets	compromise a	distortion and damage.	order to play back a
common open reel tape width.	damage, signal drop-outs,	should be	tape pack and	Never leave media in a	tape properly, you
Cellulose acetate was the most	and, in the case of	avoided.	cause warping. Its	playback machine;	must know the tape
common tape base during the	acetate-based tapes, base	Enamelled steel,	container should	always return to storage	track configuration
1940s and 1950s. Acetate bases	deterioration. ¼" tape	stainless steel, or	provide hub	enclosure when not in	and recording speed.
can be differentiated from	may be thinner and more	anodized	support for the	use Acid-free archival	In addition to the
polyester bases by conducting a	fragile than other kinds of	aluminium are	reel in order to	hold-down tape should	proper playback head
quick light test. Hold the reel up	tape, and it is more	preferred.	preserve the pack	also be used to secure	configuration,
to a light source - if light "pipes"	susceptible to stretching		and prevent	loose ends of the open	playback equipment
through, the base is most likely	and breaking during		distortion. Use	reel tape.	must have a tape
acetate. Reel size can vary,	playback.		unslotted reels if	Whenever feasible,	transport able to
measuring from 2 or 3 inches to	Due to media and		possible	replace original	support the tape's
10.5 inches in diameter (14-inch	hardware obsolescence,			cardboard containers as	full width in order to
diameters are also possible),	this format should be			they are typically non-	read all the tracks
with 5, 7, and 10.5 inches also	considered at high			archival (i.e. acidic) and	encoded on it.
common.	preservation risk.			have little or no hub	
				support.	

Compact cassette 1963 – 1990s

Polyester magnetic tape enclosed in a plastic cassette.

Each item should have its own PAT compliant enclosure to protect it from dust, handling damage, and changes in environmental conditions. Store the items in Inert plastic containers to protect from dust, pests and airborne contaminants. An enclosure must be truly clean in order to protect the fragile tape surface. Dust and dirt abrasions can affect sound quality and even render the tape unplayable. Mouldy damaged and dirty containers must be replaced



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Description	Deterioration & Risk	Storage	Storage orientation	Handling & Care	Playback
	Level	Environment			Equipment
Compact cassette is a	Magnetic tape is	Temperature	The best orientation for	Engage the record	Noise reduction
magnetic tape-based	susceptible to physical,		a cassette is vertical on	protection mechanism if	technologies were
recorded sound	biological, and chemical	Ideal 4.5-12	its end, like books on a	it has not already been	developed in order to
format. The tape is	risks like stretching,	degrees Celsius	shelf. Have dividing	done. Cassette boxes	reduce the noise or
composed of magnetic	breaking, drop-outs,		supports every 100mm-	should have projections	tape hiss commonly
particles or pigment,	improper wind, mould,	Acceptable	150mm. Piling tapes	to lock the hubs and	found on thinner
binder, and a	binder deterioration, and	18-24 degrees	one upon the other	prevent movement. Do	tapes recorded at
polyester base.	unintended recording.	Celsius	tends to stress the	not attempt to open a	slow speeds. Noise
Cassettes are	Compact cassettes with		cassettes at bottom;	tape cassette/cartridge	reduction
composed of 1/2 inch	tape lengths of longer than	Humidity	and over time, this can	this is likely to cause	technologies most
plastic pigment-	90 minutes are especially	35-45% relative	cause the plastic	greater damage unless	commonly found on
coated recording tape	prone to print-through,	humidity	housing to warp and	you know what you are	compact cassettes
wound around two	stretching, and breaking as		even crack. Allowing	doing. Never touch the	are Dolby (B, C, and
internal reels and	the tape is thinner than	Wood cabinets	cassettes to lean for too	magnetic tape surface.	S) and dbx (Type II). If
housed in a plastic	shorter length tapes.	should be	long in poor storage	Keep magnetic media	a tape has been
enclosure. Ferric oxide	Frequent playback wears	avoided.	environments can lead	away from stray	recorded using noise
is the most common	on the media and degrades	Enamelled steel,	to distortion.	electromagnetic fields	reduction, the
pigment; other	the sound quality over	stainless steel, or		and avoid devices with a	playback equipment
pigments include	time. This medium is	anodized		motor or transformer,	must have
chromium dioxide,	especially susceptible to	aluminium are		both of which generate	corresponding noise
metal particle, and	damage from playback as it	preferred.		an alternating magnetic	reduction capabilities
metal evaporated	may jam in the playback			field. Never leave media	in order to accurately
tape. Cassette	deck and be "eaten," which			in a playback machine;	play back the tape
dimensions are	can cause crimping and			always return to storage	content.
approximately 4" ×	breaking during playback.			enclosure when not in	
2½" × ½". The track	Internal cassette elements			use.	

configuration is often	like pads and rollers are		
four-track stereo,	susceptible to damage.		
where tracks 1 and 2	Cassette housings can be		
compose "Side A" and	repaired and replaced in		
tracks 3 and 4	the event of damage.		
compose "Side B."	Due to media and		
	hardware obsolescence,		
	this format should be		
	considered at high		
	preservation risk.		

Continuous Loop Cartridge (Cart) 1959-late 1990s Polyester magnetic tape enclosed in a plastic cassette

Each item should have its own PAT compliant enclosure to protect it from dust, handling damage, and changes in environmental conditions. Store the items in Inert plastic containers to protect from dust, pests and airborne contaminants. An enclosure must be truly clean in order to protect the fragile tape surface. Dust and dirt abrasions can affect sound quality and even render the tape unplayable. Mouldy, damaged, and dirty containers must be replaced.



Mouldy, damaged, and dirty contai					
Description	Deterioration &	Storage	Storage	Handling & Care	Playback Equipment
	Risk Level	Environment	orientation		
Continuous loop cartridge (cart)	Magnetic tape is	Temperature	The best orientation	Engage the record	As carts have been
is a magnetic tape-based	susceptible to		for a cassette is	protection mechanism if	largely replaced by
recorded sound format, and it is	physical, biological,	Ideal 4.5-12	vertical on its end.,	it has not already been	digital technology, the
the 4-track precursor to the 8-	and chemical risks	degrees	like books on a shelf.	done. Do not attempt to	media and its related
track cartridge. The tape is	like stretching,	Celsius	Piling tapes one	open a tape	playback equipment are
composed of magnetic particles	breaking, drop-outs,		upon the other tends	cassette/cartridgethis	largely obsolete.
or pigment, binder, and a base.	mould, and binder	Acceptable	to stress the	is likely to cause greater	Although most carts
Carts are composed of ¼ inch	deterioration.	18-24 degrees	cassettes at bottom;	damage unless you	resemble a commercial
plastic oxide-coated recording	Additionally, carts	Celsius	and over time, this	know what you are	8-track cartridge, they
tape wound around a single	are subject to		can cause the plastic	doing. Furthermore,	cannot be played back
internal reel and housed in a	binding and tension	Humidity	housing to warp and	never touch the	on an 8-track machine.
plastic enclosure. Although	problems due to	35-45% relative	even crack. Allowing	magnetic tape surface.	
carts appear similar to an 8-	binder lubrication	humidity	cassettes to lean for	Keep magnetic media	
track, they are distinctly	and wind issues.		too long in poor	away from stray	
different and are identifiable by	Due to media and		storage	electromagnetic fields	
a fairly large hole in the lower	hardware		environments can	and avoid devices with a	
left backside of the cartridge.	obsolescence, this		lead to distortion.	motor or transformer,	
Cartridge dimensions are	format should be		Wood cabinets	both of which generate	
generally 133mm × 101mm ×	considered at high		should be avoided.	an alternating magnetic	
23mm (NAB A type) but can be	preservation risk.		Enamelled steel,	field. Never leave media	
found in both smaller and larger			stainless steel, or	in a playback machine;	
sizes (NAB type B and C)			anodized aluminium	always return to storage	
depending upon end use and			are preferred.	enclosure when not in	
tape length.				use	

8-Track 1964 – early 1980s (also known as Stereo 8) Polyester magnetic tape enclosed in a plastic cassette.

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Description	Deterioration & Risk	Storage	Storage orientation	Handling & Care	Playback Equipment
	Level	Environment			
The 8-track cartridge	As with other	Temperature	The best orientation for	Engage the record protection	8-track tapes require
(or Stereo 8) is a	magnetic media, 8-		a cassette is vertical on	mechanism if it has not	format-specific
magnetic tape-based	tracks are susceptible	Ideal 4.5-12	its end, like books on a	already been done. Cartridge	equipment for playback.
recorded sound	to physical, biological,	degrees	shelf. Have dividing	cases should have projections	The audio is recorded
format that was used	and chemical risks like	Celsius	supports every 100mm-	to lock the hubs. Do not	and played back in two-
exclusively for	stretching, breaking,		150mm. Piling tapes one	attempt to open a tape	channel stereo with a
commercially	drop-outs, improper	Acceptable	upon the other tends to	cassette/cartridgethis is	tape track configuration
releases. As a result,	wind, mould, and	18-24 degrees	stress the cassettes at	likely to cause greater	of eight tracks, each in
its content is likely not	binder deterioration.	Celsius	bottom; and over time,	damage unless you know	its own channel going in
unique. The tape is	The format is also		this can cause the	what you are doing. Never	the same direction,
composed of	especially susceptible	Humidity	plastic housing to warp	touch the magnetic tape	making 4 sides. Since the
magnetic particles or	to tape binding due to	35-45% relative	and even crack.	surface. Keep magnetic	tracks are so thin and
pigment, binder, and	lubrication loss and	humidity	Allowing cassettes to	media away from stray	close together and
a polyester base.	jamming in the		lean for too long in poor	electromagnetic fields and	because the playback
Ferric oxide is the	playback machine.		storage environments	avoid devices with a motor or	heads move between
most common	Due to media and		can lead to distortion.	transformer, both of which	the pairs of tracks, the
pigment; other	hardware		Wood cabinets should	generate an alternating	heads often become
pigments include	obsolescence, this		be avoided. Enamelled	magnetic field. Never leave	misaligned. When this
chromium dioxide,	format should be		steel, stainless steel, or	media in a playback machine;	misalignment occurs,
metal particle, and	considered as a high		anodized aluminium are	always return to storage	echoes of adjacent
metal evaporated	preservation risk.		preferred.	enclosure when not in use.	tracks may be heard
tape. Cartridge					during playback.
dimensions are					
generally 5¼" × 4" ×					
%" with a tape width					
of ¼".					

MICROCASSETTE 1969–early 1990s

Polyester magnetic tape enclosed in a plastic cassette.

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HIGH RISK OF LOSS

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Description	Deterioration & Risk	Storage	Storage orientation	Handling & Care	Playback Equipment
	Level	Environment			
Microcassette is a	Since the tape is extremely	Temperature	The best orientation	Engage the record	Microcassettes require
magnetic tape-	thin, microcassettes are		for a cassette is	protection mechanism if it	format-specific
based recorded	especially prone to breakage	Ideal 4.5-12	vertical on its end, like	has not already been	equipment for playback.
sound format. The	and stretching. As with other	degrees Celsius	books on a shelf. Have	done. The cassette case	
tape is composed	magnetic media,		dividing supports	should have projections	
of magnetic	microcassettes are	Acceptable	every 100mm-150mm.	to lock the hubs. Do not	
particles or	susceptible to physical,	18-24 degrees	Piling tapes one upon	attempt to open a tape	
pigment, binder,	biological, and chemical risks	Celsius	the other tends to	cassette/cartridgethis is	
and a polyester	like stretching, breaking,		stress the cassettes at	likely to cause greater	
base. Ferric oxide is	drop-outs, improper wind,	Humidity	bottom; and over	damage unless you know	
the most common	mould, binder deterioration,	35-45% relative	time, this can cause	what you are doing. Never	
pigment; other	and unintended recording.	humidity	the plastic housing to	touch the magnetic tape	
pigments include	Frequent playback wears on		warp and even crack.	surface. Keep magnetic	
chromium dioxide,	the media and degrades the		Allowing cassettes to	media away from stray	
metal particle, and	sound quality with each		lean for too long in	electromagnetic fields	
metal evaporated	playback over time. This		poor storage	and avoid devices with a	
tape. Cassette	medium is especially		environments can lead	motor or transformer,	
dimensions are	susceptible to damage from		to distortion. Wood	both of which generate an	
approximately 1 🔏 "	playback as it may jam in the		cabinets should be	alternating magnetic field.	
×1¼" with a tape	playback deck and be		avoided. Enamelled	Never leave media in a	
width of	"eaten," which can cause		steel, stainless steel,	playback machine; always	
approximately 1/8.	crimping and breaking		or anodized aluminium	return to storage	
	during playback.		are preferred.	enclosure when not in	
	This format would be			use.	
	considered high risk of				
	loss.				

DIGITAL AUDIO TAPE (DAT) 1987 – mid 2000s

Polyester magnetic tape enclosed in a plastic cassette.

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Mouldy, damaged, and dir					
Description	Deterioration &	Storage	Storage orientation	Handling & Care	Playback Equipment
	Risk Level	Environment			
Digital Audio Tape	The lifespan of the	Temperature	The best orientation for	Engage the record protection	DATs must be played
(DAT) is a digital	cassette is		a cassette is vertical on	mechanism if it has not	back on format-specific
magnetic tape-based	dependent upon	Ideal 4.5-12	its end, like books on a	already been done. Do not	equipment
recorded sound format.	numerous factors:	degrees	shelf. Have dividing	attempt to open a tape	
The tape is composed of	the quality of the	Celsius	supports every 100mm-	cassette/cartridgethis is	
magnetic particles or	original tape, the		150mm. Piling tapes one	likely to cause greater	
pigment, binder, and a	type and condition	Acceptable	upon the other tends to	damage unless you know	
polyester base. Ferric	of the machine on	18-24 degrees	stress the cassettes at	what you are doing. Never	
oxide is the most	which it is played,	Celsius	bottom; and over time,	touch the magnetic tape	
common pigment;	the amount of care		this can cause the	surface. Keep magnetic	
others include	the tapes are given,	Humidity	plastic housing to warp	media away from stray	
chromium dioxide,	how often they are	35-45% relative	and even crack.	electromagnetic fields and	
metal particle, and	played, and how	humidity	Allowing cassettes to	avoid devices with a motor	
metal evaporated tape.	they are packaged.		lean for too long in poor	or transformer, both of	
The dimensions of the	DAT has known		storage environments	which generate an	
shell are 73mm × 54mm	playback problems		can lead to distortion.	alternating magnetic field.	
× 10.5mm with a tape	that are typically		Wood cabinets should	Never leave media in a	
width of 4mm.	related to		be avoided. Enamelled	playback machine; always	
	mechanical		steel, stainless steel, or	return to storage enclosure	
	alignment. DAT is		anodized aluminium are	when not in use.	
	not an archival		preferred.		
	format.				
	This format would				
	be considered high				
	risk.				

DIGITAL COMPACT CASSETTE (DCC) 1992 – late 1990S Polyester magnetic tape enclosed in a plastic cassette.

Each item should have its own PAT compliant enclosure to protect it from dust, handling damage, and changes in environmental conditions. Store the items in Inert plastic containers to protect from dust, pests and airborne contaminants. An enclosure must be truly clean in order to protect the fragile tape surface. Dust and dirt abrasions can affect sound quality and even render the tape unplayable. Mouldy, damaged, and dirty containers must be replaced.



Description	Deterioration & Risk Level	Storage Environment	Storage orientation	Handling & Care	Playback Equipment
Digital Compact Cassette (DCC) is a magnetic tape-based moving image format. The tape is composed of magnetic particles (chromium dioxide- or cobalt- doped ferric-oxide), a binder, and a polyester base. DCC uses PASC (Precision Adaptive Sub-band Coding) compression in order to store the amount of information required for CD-quality sound on an audiotape. The cassette cartridge and tape width is the same as an analog compact cassette (approximately 4" × 2½" × ½" with a ½" tape). The cassettes look similar to analog audio cassettes except they only have access holes for the transport hubs on one side. Also, the tape path is shielded by a		-	The best orientation for a cassette is vertical on its end., like books on a shelf. Piling tapes one upon the other tends to stress the cassettes at bottom; and over time, this can cause the plastic housing to warp and even crack. Allowing cassettes to lean for too long in poor storage environments can lead to distortion. Wood cabinets should be avoided. Enamelled steel, stainless steel, or anodized aluminium are	Engage the record protection mechanism if it has not already been done. Do not attempt to open a tape cassette/cartridgethis is likely to cause greater damage unless you know what you are doing. Furthermore, never touch the magnetic tape surface. Keep magnetic media away from stray electromagnetic fields and avoid devices with a motor or transformer, both of which generate an alternating magnetic field. Never leave media in a playback machine;	
metal slider similar to those found on a 3.5 inch floppy disc.			preferred.	always return to storage enclosure when not in use.	

COMPACT DISC (CD) 1982 – present Polycarbonate plastic disc substrate coated with a thin, reflective "data layer" composed of metal (commercial CDs) or dyes (recordable, rewritable CDs) Inert plastic containers with a non-damaging centre hub are recommended. Original packaging for optical media can be less than desirable as the hubs may be too large or require excessive pressure to be applied in order to remove the

disc



MODERATE RISK OF LOSS

•		Storage Environment	Storage orientation	Handling & Care	Playback Equipment
Compact Disc (CD) is a digital M	Nost CD damage is	Temperature	Like other types of	Avoid touching the	CDs must be played
optical disc format that can in	ncurred through poor		discs, optical media	surface of the	back on format-
hold a variety of digital sto	torage and handling.	Ideal 7-12	should be stored	information side—what	specific equipment.
material, including recorded Su	urface scratches,	degrees Celsius	vertically on end,	may be thought of as	Over time the
sound and moving image. go	ouges, and smudges		inside a case.	the underside of the	availability of CD
Data capacity, however, ca	an inhibit playback of	Acceptable		disc; handle through the	players is decreasing.
prevents the storage of th	he disc. If the seal	13-20 degrees		core hub and at the	
extremely large movie files. er	ncasing the aluminium	Celsius		edge. Never leave	
CDs are the same re	ecording surface is			media in a playback	
dimensions as DVDs: 120mm so	omehow	Humidity		machine; always return	
diameter and 1.2mm thick. co	ompromised, the	30-50% relative		to storage enclosure	
Content is only stored on all	luminium layer can	humidity		when not in use.	
one side of the disc. The ox	xidize, resulting in data				
amount of content on the los	oss. Data on CDs,	Wood cabinets			
disc depends on how the es	specially non-	should be			
content is compressed; if the re	eplicated,	avoided.			
data is heavily compressed, re	ecordable/rewritable	Enamelled steel,			
more data will fit on the disc. CI	Ds, is subject to loss	stainless steel, or			
Some discs are recordable ov	ver time.	anodised			
(CD-/+R), and some discs can		aluminium are			
be written, erased, and Th	his format would be	preferred.			
recorded multiple times (CD- co	onsidered moderate				
RW). ris	isk.				

MiniDisc 1992 – around 2013

Magneto-optical disc (ferromagnetic material under plastic layer) enclosed in a plastic cartridge with a sliding door

Inert plastic containers are recommended.



Description	Deterioration & Risk Level	Storage Environment	Storage orientation	Handling & Care	Playback Equipment
MiniDisc is a digital recorded sound format. It uses similar encoding technology as CD, although the disc is enclosed in a cartridge measuring approximately 7cm square. There are two distinct types of MiniDisc: Pre-recorded, which is very similar to CD in operation and manufacture, and Recordable MDs, which can be recorded repeatedly and employ magneto-optical technology.	Information encoded on MiniDiscs is stored in a compressed format. As MiniDiscs are recorded, the data stream is compressed. Audio quality begins to degrade when subsequent copies are made and the disc undergoes multiple re- compression. Thus, any copies—even digital copies—even digital copies—made from MiniDiscs are not true clones. They will be more compressed than the master disc and have lower audio quality. This format would be considered high risk.	Temperature Ideal 7-12 degrees Celsius Acceptable 13-20 degrees Celsius Humidity 30-50% relative humidity Wood cabinets should be avoided. Enamelled steel, stainless steel, or anodised aluminium are preferred.	Like other types of discs, optical media should be stored vertically on end, inside a case.	Avoid touching the surface of the information side—what may be thought of as the underside of the disc; handle through the core hub and at the edge. Never leave media in a playback machine; always return to storage enclosure when not in use.	MiniDiscs must be played back on format-specific equipment. Over time the availability of MiniDisc players is decreasing.