

Handling of Sound Recordings

Safe handling, like proper storage, is of basic importance for the continued existence of sound recordings. Therefore the first rule in a sound archive must be that original sound carriers should only be handled by qualified, trained staff, for any sort of examination as well as for playback, cleaning, preservation, or re-recording. In preparing to pick up sound carriers, handlers should always be alert and should always expect the unexpected in terms of weight, fragility, integrity of containers, etc. They should take care to avoid uneven loading or stress on carriers as well as the risks of overloading themselves. Among the essentials of handling are cleanliness of clothing and hands; careful avoidance of touching the recorded areas of sound carriers, augmented by the wearing of surgical gloves at least for handling tapes; attention to the type of clothing (avoiding lint and hard edges on fronts and sleeves); avoidance of disseminating substances applied to the body; cleaning of all carriers, at least before playback, by the least threatening means possible; and cleanliness of areas where sound carriers are handled, especially if they are to be removed from their containers. Further precautions include limiting the frequency of playback of any recording before making a safety copy; avoiding the stress of moving original sound carriers outside their normal climatic conditions in the absence of compelling reasons; and making certain always to remove sound carriers from their containers before marking those containers.

I. INTRODUCTION

The primary commandment for the handling of sound recordings relates to recommended policies on duplication, research, and user-access: *Original materials should only be handled by qualified, trained staff.*

The topic of handling sound recordings, like that of storage, is fundamental in considering the subject of sound recordings; for without the continued existence of the sound carriers all other related topics, however important, would be rendered irrelevant. Thus, there is no alternative to the need for the careful study of this subject and for the establishment of sensible policies on handling, even though the comments which result are really calls for common sense.

The purpose of this article is to bring attention to the factors which must be considered regarding the handling of sound carriers (materials containing sound recordings) so that the recordings to be studied can be used and yet preserved in the best possible condition for the longest period of time. There are many different types of sound carriers, many kinds of operations which must be performed on them, and, con-

sequently, many cautions and functions which are imposed upon personnel who need to handle sound recordings. This section sketches the types of materials to be encountered and the operations and functions of archival audio collections. Sections following this introduction group and discuss the factors to be considered.

In 1987 the Associated Audio Archives (AAA) Committee of the Association for Recorded Sound Collections (ARSC) conducted a survey of procedures and practices during its project: *Audio Preservation: A Planning Study*. Results of the survey reconfirmed the need for a simple comprehensive guide to the handling of sound recordings. The 1959 Pickett and Lemcoe booklet (P-L., listed with other references at the end of this chapter) is still a useful resource. Additional and updated information of varying degrees of usefulness can be found in other sources, references to which will be found in the text and a bibliography which follows the chapter.

Work on this chapter began in 1986 with a review of all accessible books and articles offering information on the subject, a review which led to the compilation of a large list of factors related to storage and handling. These were organized into categories and studied by the staff of the Yale Collection of Historical Sound Recordings, Yale University Library, with advice from other members of the ARSC/AAA project group, R. Gay Walker, then Head Librarian of Yale's Preservation Department, and Larry Miller of the Library of Congress. What resulted was consensus on proposed lists of current recommended practices (five of which apply to handling and will be found individually in appropriate sections of this chapter as well as collected in Appendix B), on specific topics requiring further study, and on dangerous practices to be avoided at all costs.

The principal types of materials which have been used as sound carriers are listed below. Laminates, layered combinations of materials, are subject to all the problems of each type of material plus additional physical and chemical stresses which result from the differing reactions of each material to environmental conditions, handling, playback, etc. Finishes used on materials are capable of emissions which can damage other items and must also be considered. In addition, various types of equipment may require handling: current devices, obsolete items which are still in use, and obsolete machines held for such purposes as exhibit.

1. **Paper** (including paperboard) – Used as base material for laminates and in sleeves, boxes, slipcases, etc.: usually acidic, and thus subject to decay (yellowing, browning, loss of strength) and capable of causing damage to adjacent materials.
2. **Waxes** (actually waxy soaps) (AES: 25: 10/11: 713) – Used for cylinders and discs (especially masters): soft, compared to other materials, and thus extremely susceptible to damage by contact with other materials (such as playback styli, fingers, edges of papers or containers, etc.); very fragile, and extremely susceptible to damage by fungi.
3. **Wood** – Used as base material for laminates, as boxes for published recordings, as component packaging for shipping: variably strong and susceptible to deformation, capable of emissions which can damage other materials.
4. **Metal** – Various kinds, usually aluminum (AES: 25: 10/11: 718 ...), used as bases for laminates, boxes, and for reflective layers on CDs; steel for wire; iron and other oxides used as elements in magnetic tape: when thin, soft enough to be subject to denting, bending, and scratching; susceptible to damage from contact with certain other

materials which may be corrosive; when pure, as aluminum in CDs, susceptible to immediate damage by oxidation when exposed to air; other types variably subject to deterioration by oxidation (for example, rusting of iron and steel).

5. **Celluloid** – A compressed solid solution of nitrated cellulose in camphor, used as a component in laminates or by itself in cylinders and discs: extremely flammable, becoming brittle with age, extremely susceptible to damage by moisture, fungi, and contact with other materials; when found as a coating on base-materials such as aluminum or glass, tending to separate over time; subject to deterioration over time even in the most favorable conditions.

6. **Cellulose** (P-L: 15-16) – Used in laminates (as in some of the coated discs called “acetates,” which are usually coated with lacquer: see No. 8, below), as base for magnetic tapes (often labeled “acetate” or “plastic”): containing cell-wall fiber from plants, approximately similar in problems to celluloid (No. 5 above) except easily deformable (breakable) when in thin layers; subject to deterioration (drying, curling, etc.) over time even in the most favorable conditions; when found as a coating on base-materials such as aluminum or glass, tending to separate over time; like celluloid, subject to deterioration over time even in the most favorable conditions.

7. **Vinyl** (AES 25: 10/11: 724-728; P-L: 26 - 28) – Used in discs: petroleum-derived, plastic, relatively soft, susceptible to damage by contact with acidic substances, uneven pressures, hard materials, high temperatures, extreme changes of temperature; with age eventually subject to drying, embrittlement, etc.

8. **Lacquer, Shellac, Bakelite, and other Resins**, natural or synthetic (AES: 25: 10/11: 717, 719; P-L: 24-26) – Used for discs and as top layer in laminates for discs: organic; may be either relatively soft yet brittle or hard and brittle; increasingly brittle with age, susceptible to damage by fungi, acidic substances, contacts with harder materials. When found as a coating on base-materials such as aluminum or glass, tends to separate over time; subject to gradual deterioration even in the most favorable conditions; in relation to vinyl: less susceptible to damage by scratching but much more brittle (easy to shatter on impact); relatively low softening point (usually not much over 100 degrees F.); soluble in alcohol (Bakelite is harder and less soluble than other types).

9. **Polyester** (one brand-name is Mylar) – Petroleum-based, used in thin layers as base material in recording tape or in sheets formed into envelopes or sleeves: relatively strong and long-lived, but more subject to stretching than the types of cellulose compounds it succeeded.

10. **Styrene** (P-L: 26) – Used for discs and containers: a substitute for vinyl in pressed (molded) discs, but more brittle, less smooth, and more subject to the types of damage described for vinyl (above #6); apparently subject to quicker decay than vinyl.

11. **Rubber** (Vulcanite) – Used for discs: relatively soft, yet breakable, organic material subject to damage by hard materials, acidic substances, fungi, etc.

12. **Glass** – Used in optical discs and as base for coated discs: relatively stable but

fragile under twisting or impact; smooth of surface, resulting in separation of coatings containing recorded information.

13. **Plaster of Paris** – Used as base for cylinders and in laminates: fragile, susceptible to damage (crumbling) from moisture, fungi.

The types of operations and functions which normally need to be carried out in a collection of sound recordings include

- receiving
- sanitizing and fumigating
- sorting and organizing
- packaging for storage
- processing, including indexing, cataloging, and labeling
- storage
- preservation, including research, re-recording, special playback
- public service
- reception
- reference
- exhibit
- classes and lectures
- playback, individual and group
- office work

II. POLICY ON

A. Users (researchers)

INSTRUCTION

Not only playback, but ALL handling of sound recordings (sound carriers) should be performed only by qualified, trained staff. For further discussion of policy on playback,

please consult section R.1 below. After providing instruction in care and the need for cleanliness, some institutions may permit researchers to handle separate program notes, booklets, and containers carrying notes and illustrations. Only trained staff, however, should be allowed to make photocopies of such material.

(Current Recommended Practice No. 6: Access to storage areas permitted to staff only; and Current Recommended Practice No. 13: Playback of original materials allowed by qualified staff only.)

All five Current Recommended Practices which refer to handling are listed in Appendix B of this article.

B. Staff

1. New workers

New workers should handle a given type of material only after completion of instruction in safe methods of handling that type of material (see below).

2. Established workers

Even established workers will find it useful to have readily accessible sets of instructions for handling infrequently used materials and to have refresher training in frequently-handled, common media. This relatively simple precaution may help to pre-

vent unintentional damage to items in cases of staff members forgetting unusual procedures, or taking shortcuts in the common ones.

3. Volunteers

Assuming normal abilities and sufficient staff time to make training worthwhile, volunteers may be treated as new workers, but only for relatively stable types of materials.

III. PRE-HANDLING CONSIDERATIONS

From this point to the end of the chapter, all items deal with what qualified, trained staff must know and what new workers must learn, the assumption being that, as stated above, *only* qualified, trained staff are permitted to handle collection materials. (*Current Recommended Practices No. 6 & No. 13; NASA: general reference for tapes: 130, 144 - 146*)

A. Expectations about weight

Knowledge of relationships between appearances and weights of various types of recordings is essential. Workers must stay alert for the unexpected: *constant care and awareness*, especially in areas of unusual or infrequently used items, are needed in order to avoid dangerous surprises, such as encountering (and possibly losing hold of) a heavy lead-base acetate transcription disc in the midst of a group of aluminum-base discs; grasping an aluminum or cardboard disc as tightly as a heavy shellac disc (and thus bending it); gripping a light vinyl record expecting the weight of a shellac pressing (and losing hold). *Constant alertness, always expecting the unexpected, is the best state of mind: in other words, have no expectations about the weight of an item - check each one.*

B. Expectations about fragility

Knowledge of relative fragility, degrees of brittleness, and ease of infliction of various types of damage on different materials is important. Brief summaries of such information appear in the list of types of materials at the beginning of this chapter. *Constant care and awareness* are needed here, also, especially with types of materials not encountered frequently. Treating most known types and especially any unfamiliar types of items as if they were fragile and brittle (thinking of Supraphon, Soviet, or American Decca shellac pressings or of glass-based acetate discs) is a reasonable state of expectation to be maintained.

C. Expectations about type of container

1. Pre-LP commercial and non-commercial discs

a. Original containers.

Pre-LP-era commercial discs were usually provided either singly in paper envelopes (acidic) with center-holes on at least one side and open at the top, or in sets in albums with board covers (acidic) and paper sleeves (acidic) open at the top. A significantly dangerous minority of containers were made with envelopes open at the end opposite the spine; were simply boxes in which discs were laid in paper envelopes; or

were made of paper envelopes attached to a spine or hinge. A significantly safer minority had flaps on the open sides of the envelopes which folded to cover the openings. Empty storage albums were also sold separately. Since nearly all such original containers were made of some form of acidic paper, degradation with age and wear is to be expected. Such containers should be expected to be brittle and crumbling, with tearing especially likely at the weight- or stress-bearing points, such as the centers of the edges of envelopes (points of contact for the edges of the discs). Another point of danger in the paper album is the edge of the envelope towards the spine, at which point decay of adhesive and paper can allow a disc's edge to slip into the part of the spine which flexes with opening. This situation causes the disc's edge to snap when the album is opened. Whereas non-commercial discs were normally supplied with (acidic) paper envelopes, they can be found in most of the same types of containers as commercial discs.

b. Present practice in archives.

In many archives at present the normal storage ideal for pre-LP commercial discs is either an unlined acid-free paper envelope (preferably without center hole), stored so that the open side is at the *top*, or a special multi-layered container of Pickett & Lemcoe's design (P.-L.: 48 - 50), used with flaps either folded or heat-sealed. Limitations in staff and funding, however, have resulted in the survival of many discs on archives' shelves in original containers, particularly album sets. In such cases, the best operating procedure is to require great care in opening or removing discs from all types of containers so as to avoid spilling them, hitting them together, or sliding or scraping them against anything. For examination or removal of discs, album-type containers should always be placed upright (i.e., with the discs vertical, as in storage) on a horizontal surface, and with their envelopes carefully spread. They should never be opened when laid flat or placed in any position which might cause stress or twisting of any disc.

2. LP-era commercial discs (LPs, 45s, usually vinyl or styrene, usually microgroove), as well as non-commercial discs (vinyl, styrene, or lacquer-coated metal).

a. Original containers.

Discs originating in this era were provided in a multitude of types of containers, including those kinds used for pre-LP discs. For 45-rpm discs, the norm came to be paper envelopes (acidic), most standardized (usually with a center-hole to show the label), some specially printed for the individual issue. For single 10-inch and 12-inch discs, the norm was a light card-stock square container (acidic) covered with paper (acidic, frequently laminated with some glossy substance on the front cover), using some sort of glued or taped joints and open on one side (usually on the right side when viewed from the front cover, but occasionally on the top). In countries other than the U.S., the norm was heavy paper (acidic) rather than light card. In the early 1950s, before the widespread use of inner sleeves, covers tended to fit tightly, and some designs even bore internal corner pieces to center the disc inside; later designs allowed space for either square or round-ended inner sleeves. Such inner sleeves were at first made of paper (acidic) or cellophane, with or without center holes. Later, thin polyethylene or similar sheets were sometimes glued to paper envelopes (acidic) or formed into inner sleeves. Sets of discs were housed in the kinds of albums designed for early discs, in separate or hinged multiples of the types of sleeves used for single discs, in slipcases or boxes (usually acidic card; but wood, plastics, and other substances are

found, usually in envelopes). Sometimes empty spaces in boxes were filled with squares of board (acidic) or plastic foam (decays to powder, prints on discs, reacts with paper). Many sets of 45s were stacked in boxes, with or without acidic paper separators. Some discs were housed in acidic envelopes attached to the covers of books. The variety seems infinite. Notes could be nonexistent; printed anywhere on the containers, including on inner sleeves; or printed on acidic separate sheets or booklets of widely varying size. The problems and inherent dangers of such containers include those mentioned above in relation to pre-LP discs (degradation and crumbling, tearing, acidic paper, fungal contamination, etc.); but there are several additional factors. While vinyl is not directly attacked by mold and mildew, the waste products of fungal activity can cause pitting of disc surfaces. The relative softness of most vinyl material allows damage from scratching by paper or any other hard or sharp-edged materials. Some types of inks and plastics can be transferred from sleeves or notes onto disc surfaces by contact, heat, or pressure.

b. Practice in archives

Until the results of much-needed studies lead to the design and manufacture of sleeves proven safe for vinyl, styrene, and other such discs, archives can only follow practices proven by experience. Many discs of this period can still be found stored in their original containers. Some will have been moved to acid-free replacement covers with inner sleeves of a soft composition different from that of the discs, or such inner sleeves will have been fitted to discs in their original containers. Ideally, containers and discs should be handled as recommended above in C.1.b for pre-LP items, with even greater attention paid to the risks of marking, rubbing, and scratching, in view of the softer composition of these plastics.

D. Damaged materials (NASA: for tapes: 134 - 136, 139, 142)

1. Policy

In order to avoid damage to playback equipment and additional harm to the items themselves, damaged recordings should not be handled or played without prior consultation with the senior technical staff member.

2. Identification

All staff members should be asked to keep alert for damaged or grossly contaminated items during work on other projects, retrieval for research, and special inspections. They should follow a system of marking those containers, or listing items discovered to be damaged, as well as segregating severely contaminated materials from the rest of the collection to prevent the spread of the problem.

E. Transportation

1. Purpose

Since *any* handling involves potential risks, *recordings should not be transported anywhere at all without good reason*. When a reason arises for moving recordings, whether inside or outside the archive, care and planning are needed.

2. Within the archive

a. Carts

(1) Design (Fig. 1)

Carts like those used in the ARSC/AAA filming project for the Rigler and Deutsch Index, with the possible modification of having the "V" shelf raised so that the lower shelf has at least 13 inches of clearance under the "V," seem the best design for safe moving of most of the commonly encountered types of recordings. A distant second choice might be the older type of wooden book truck, which has thirteen inches of clearance between shelves, sufficient for all but the largest albums and slipcases, and which has dull finish, permitting items to stand on unfilled shelves without immediate slipping. Bicycle-tire-innertubes can provide minimal protection against items slipping off unprotected front and back edges of shelves. The modern type of steel library book truck, which can be obtained with three shelves with 13-inch clearances, might be adequate for containers of most recordings if available without the normal finish (which is so smooth that no item thinner than about two inches will stand on an unfilled shelf without slipping), and if available with full, even ends rather than handlebars. Most models of such trucks also lack edge protection.

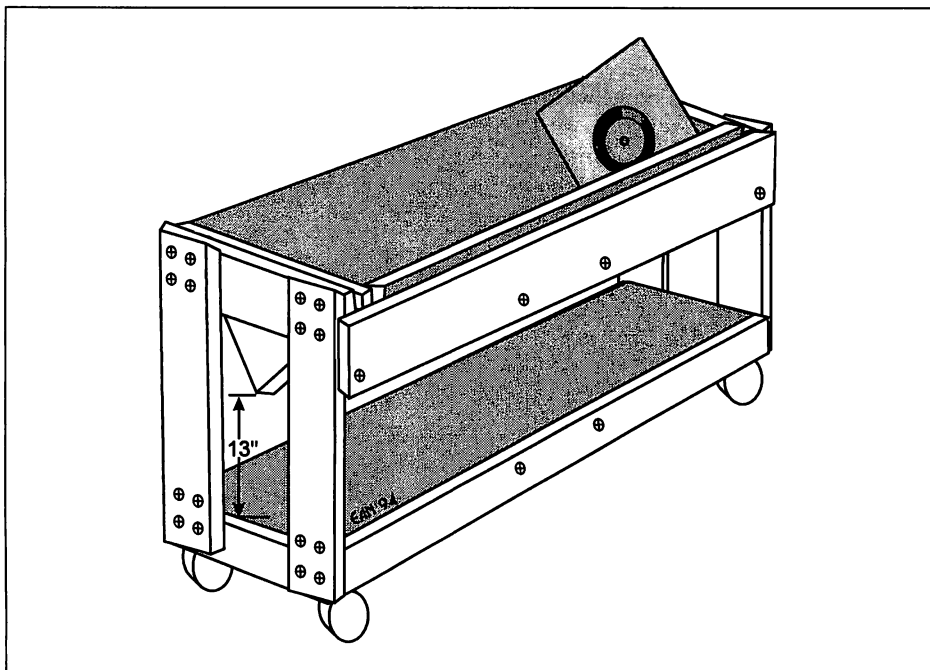


Figure 1: The Rigler-Deutsch Index cart

(2) Loading and unloading

Workers trained in careful handling of sensible numbers of items (in view of fragility, weight, size, open or damaged edges, etc., as well as worker-safety - see III.A - C above) will be capable of moving safely-held groups (size depending upon worker's hand-span) of same-size items, bearing in mind the support of the bunch on the cart and that of the items remaining in the location from which the materials were taken - with reverse procedures in unloading. Staff should be trained to recognize when assis-

tance is needed in loading or unloading. Cleanliness of hands and avoidance of certain items of wearing apparel (such as tie clips, large buttons, or pendants which might scratch or scrape materials) are other important factors.

(3) Procedures for moving loaded carts

Staff moving loads of recordings must (a) check constantly to prevent materials from sliding, slipping off shelves, etc.; (b) watch the route of travel for obstacles (even slight irregularities in flooring or in leveling of elevators can cause disaster); (c) maintain reasonable rates of travel; (d) take extra care on corners, especially in narrow aisles; and (e) seek assistance on ramps or sloping floors; etc.

b. By hand (NASA: for tapes: 144 - 146)

(1) Maximum safe quantity

The same principles apply as in E.2.a.(2) above for loading carts except that instead of support of the items on the cart, workers must consider hand-support in relation to the distance to be moved and conditions both in the space to be covered in the trip and at the destination.

(2) Means of support and holding

The same principles as E.2.a.(2) and E.2.b.(1) above apply, with the addition of extra consideration for protection and support of any possible open edge or other potential problem which might allow the slipping or falling of material. Staff need to take care to support rather than to hold tightly, and need to consider their own physical features, such as hand-span, arm-length, arm-strength, height, etc., in relation to the means of support they use. That is, they should take care to carry only as much as they can safely support.

(3) Decisions about boundaries

This factor refers to the question of the quantity of items considered to be too many to move safely by hand. All the factors in E.2.b.(1) & (2) apply. Rules can be made limiting the number of each type of material for hand-carrying; but these would either be arbitrary or made incredibly complicated by differences in human build. Common sense is the best guide but is, unfortunately, nearly impossible to write out or legislate.

3. Transportation or shipping (outside archive) (NASA: for tapes: 141 - 142)

a. Means of transportation or shipping

(1) Choices of vehicles

In choosing means of moving recordings, which are so easily damaged by all sorts of even minor changes in conditions, those responsible must consider such factors as the number of handlings and transfers; distance of travel; any possible variations in conditions (climatic and other) between origin and destination and en route; the composition of each type of material (in relation to fragility, size, etc.); and the variables relevant to each possible means of transportation, such as shock-protection, methods of climate-control available, supports and shelves, presence of other materials in same vehicle with recordings, etc.

(2) Choices of season

If any flexibility of choice is available, sound recordings should be moved during the season characterized by the climate which is closest to that specified for archival storage. If there is no flexibility, then the staff member responsible for making decisions should try to obtain a means of transport which keeps conditions as close as possible to those recommended for storage for the full duration of the move.

b. Preparation for transportation

Securing protection from or gradual acclimatization (at least 24 hours) to unavoidable, non-normal conditions of any sort is extremely important in order to prevent acceleration of damage. Special packaging may help protect certain materials from particular types of hazards. Attention to the means of packing in relation to containers chosen (see c. below), full labeling, and providing of special instructions on handling, storing, etc., for non-collection-staff personnel (if any will be involved in the moving) are also important.

c. Containers for moving

The principal considerations with regard to selecting appropriate containers for moving are protection from any type of climate variations from normal storage conditions; protection from effects of motion or shocks inevitable in handling and shipping; establishment of maximum weight and capacity for containers for each type of material; and protection from other materials (even containers for other groups of the same materials) which may be shipped at the same time (including the question of whether different types of material, and, if so, what types, should be allowed to be shipped at the same time).

One example might be useful: For shipping standard "shellac" "78-rpm" discs by U.S. Mail or UPS, it is reasonably safe to pack a minimum of 3 or 4 discs to a maximum of about 20 discs, sleeved and tightly taped together as a group, with a junk-disc as well as at least one square of rigid corrugated cardboard placed on each end, in an inner corrugated-cardboard box, also tightly sealed, completely surrounded by at least one inch of padding and then by a tightly-sealed outer box of strong corrugated cardboard construction. The objective is to keep the discs from moving inside the inner box and to keep the inner box from moving inside the outer. In addition to providing several layers of material to absorb shock, this type of packing provides some insulation from climate changes in transit. Such types of package have proven safer than wooden outer containers, probably because they provide some degree of shock-absorption.

F. Inspection

1. Criteria/policy

At minimum, collection materials should be inspected whenever retrieved for reference or processing, or when circumstances demand (for example, problems discovered either internally or upon the arrival of information from another archive that some item or type of item needs to be examined). Any recording showing signs which might indicate damage or severe contamination must not be played for a user without clearance, treatment, or special instructions from the chief technical staff-member. In consideration of preservation as well as efficiency, damaged but potentially playable recordings should be set aside to be re-recorded, with a service copy of the dubbing to be played for the researcher on another occasion. Ideally, staff should conduct regular inspections or at least spot-checks to determine the need for thorough inspections for all types of damage.

2. Damaged materials: Please see III.D above.

3. Slating materials for

a. Repair

Someday there may be simple, safe, and effective remedies for certain common problems encountered in specific carriers, enabling trained staff in archives to repair some types of damage. Unfortunately present knowledge is not yet sufficient to permit any but a few experts to attempt repair work because of the risk of exacerbating existing damage or of creating new irreversible problems. For the present, the best policy is to identify problems (please see above III.D Damaged materials) but not to attempt to remedy them, unless an expert is at hand.

b. Restoration

The best policy to be followed for most archives is to have staff members who are responsible for handling and playback identify problems and refer them to the technical experts.

c. Cleaning

Current Recommended Practice No. 15: Cleaning of all sound recordings, at least before playback, by the least threatening possible method is recommended. Every recording to be played should be inspected for cleanliness before playback and should be cleaned before and after playback by the safest possible means. Grossly contaminated items (showing evidence of active mold or mildew, for example) should be segregated immediately for special attention. If determined to be necessary upon pre-playback inspection, all parts of the playback equipment which will contact sound-carrying parts of the recording should be cleaned before and after playback.

4. Methods

Any space to be used for inspecting sound carriers should, of course, meet all specifications for the storage of these items (see "Storage of Sound Recordings" *ARSC Journal* 1993;24[2]:130-175). In less-than-ideal areas adapted from other purposes for sound archives, managers should choose workspaces with special attention paid to cleanliness and to appropriately strong lighting which emits the least possible amounts of heat and ultraviolet radiation. Please refer to sections III.N and III.O below for discussion of procedures necessary for safe handling for inspection as well as study and playback.

G. Packaging and Re-Packaging

Please consult the article: "Storage of Sound Recordings," (*ARSC Journal*: 1993;24[2]: pp. 130 ff.) for information on packaging.

H. Marking/Labeling

1. Marking on container

A safe general rule for staff requires that sound carriers ALWAYS be removed from their containers before the containers are marked or labeled. Two questions must be considered with regard to any decision to mark directly on existing storage containers: (1) Is it possible to mark the container itself (considerations of color and texture of surface)? and (2) Is the means of marking harmless to the container (both the instrument and the marking medium)?

2. Labels

Neutral paper labels may be applied to neutral paper containers with safe and stable adhesives (paper-conservation experts can provide advice on paper and adhesives). Most sound-carriers, however, do not readily lend themselves to safe and effective labeling. Testing projects are needed to determine what type or types of labels can safely be applied to sound-carriers and their containers.

3. Other marking substances

In many archives paperboard audiotape boxes and paper or board sleeves of disc recordings are marked with ink, fountain-pen, ball-point pen, or soft-tip-marker, in non-printed areas; or sheets of paper (preferably neutral) so marked, or with typewritten information, are inserted into the containers. For tape recordings, tests have determined that neutral marking-slips as well as neutral containers are needed for protection of the materials. Because of concerns about damage, sound-carriers themselves are usually not marked at all. Testing projects are needed to determine what type or types of markers, if any, can safely be used on sound carriers and/or their containers.

4. Procedures for attaching

Adhesive paste made for library conservation studios can be used to apply neutral paper labels to neutral paper sleeves or covers of sound-carriers. Instructions from paper-conservation experts should be followed for application. Only those commercial adhesives which have been tested by conservation experts and deemed safe should be considered.

5. Tagging or marking for security

Please see H.1 - 4 just above. In many collections, items are identified by certain types of marks in ink or by labels or barcodes on containers of sound recordings. Safe, non-removable yet easy-to-apply labels or markings which can be detected by a non-destructive security system are needed. Many library administrations have set goals for such marking to be used as soon as a safe system can be found. The Library of Congress has found or developed ultraviolet marking systems and metal labels for security-tagging of sound recordings.

I. Study, by researchers or staff

1. Inspections

As mentioned above in III.D.2 & III.F.1, any item should be inspected whenever retrieved from storage, either for research use or processing. Adherence to such a policy will assist in detection of problems and in avoidance of increased risk to objects with actual or potential damage.

2. Protection while item is out of container

Obviously any sound carrier is at increased risk of damage when not in its container. The policy of having only qualified staff handle recordings is intended to minimize one part of this risk. Qualified staff should be aware of the particular hazards most threatening to each type of sound carrier, such as dust and dirt for long-playing discs; sources of electromagnetic radiation for audiotapes, etc., and should take the obvious precautions. Once again, common sense is probably the most important factor, but awareness of the design of the working area and care in situating areas for study will help. For playback, the quickest move by the safest route and means from con-

tainer to equipment is obviously in order; for extended examination special containers (such as mylar envelopes) which allow viewing of labels only while protecting carriers from direct contact) may be useful.

3. Information-gathering methods

As already mentioned, qualified staff will have been trained in safe methods; but managers of sound archives must give careful attention to the means afforded researchers in gathering information (other than by ear) directly from sound carriers, strictly enforcing the policy that only qualified staff may handle the actual item. Specific training in dealing with researchers and their needs will certainly be necessary. Experience has shown that requests to handle items for examination are frequent. Staff can rarely be sure of the accuracy of scholars' assertions about their abilities and experience in handling sound carriers; and since one accident can have such severe consequences to a rare or unique original, strict rules and means of tactful but absolute control on a one-to-one basis, with referral to a higher authority as an escape-clause, are essential.

4. Methods usable for photography of item

Another certainty is requests for photocopies of labels, liner notes, covers, and even actual surfaces of sound recordings, often accompanied by such advice as recommending that one use whatever flat-plate photocopy machine is most convenient. Archivists know, however, how damaging the heat, light, and pressure needed for such processes can be. Therefore, each archival collection needs a clear (and effectively disseminated) policy concerning the nature and type of photocopying which researchers may request, assuming such requests are in accordance with applicable copyright law.

5. Procedures for study of covers or notes only

Since many requests for information can be satisfied by the examination of containers, covers, or program notes alone, establishing procedures for study of such items, including temporary, safe storage of the sound carriers themselves while separated from the other materials, is essential. Such temporary storage must meet all the criteria appropriate for permanent storage (sleeves, shelving, handling, etc.).

J. Place-marking for items removed from storage

Staff members of sound archives have developed a number of different methods to mark the places of items temporarily removed from storage. Managers may find it useful to establish procedures for place-marking which are both safe and supportive of surrounding items. Features to consider are full-size support for those surrounding items (to prevent damage from leaning) and compatibility of materials used for flag or supports with those in the place of storage. For single thin items the simplest method may be the best: *not* to mark places in any way, a method which requires the staffer doing re-shelving to examine each item and find its correct place (*Current Recommended Practice No. 10: Support for the principle of no-load [or at least minimum-load-possible], use of dividers on shelves, and use of end-of-shelf full-size supports.*)

K. Removal of items from storage containers (Fig. 2) (P-L: 48 for discs)

Appropriate methods of removing items from a shelf, cabinet, or other container are

naturally governed primarily by awareness and common sense. Local conditions, such as width of aisles and the type of storage box or envelope housing the item, may affect this aspect of handling. Constant awareness of the expected weight and fragility of the item sought and careful attention to items adjacent to it are vital. Since so many types of sound carriers are round and are housed in square envelopes or boxes, managers should train staff to grasp such items by the container's upper or lower exposed corner rather than by the middle, where the grasp is almost certain to exert pressure on the sensitive item inside. Staff should make certain to pull items straight outwards in order to avoid sideways pressure on either the item sought or those adjacent and should pay attention to supporting each item from underneath. Pulling an item out carefully in two stages, with the interval used for checking that no other items are being carried along inadvertently, should be a mandatory precaution. Each staff member will need to develop her or his individual strategies in relation to physique, strength, hand-size, etc. for each type of item in the collection. If audiotapes are stored in conditions different from those of the playback or processing space, they should be retrieved at least twenty-four hours in advance of use so as to have adequate time to stabilize in the workspace environment (Smolian: 43).

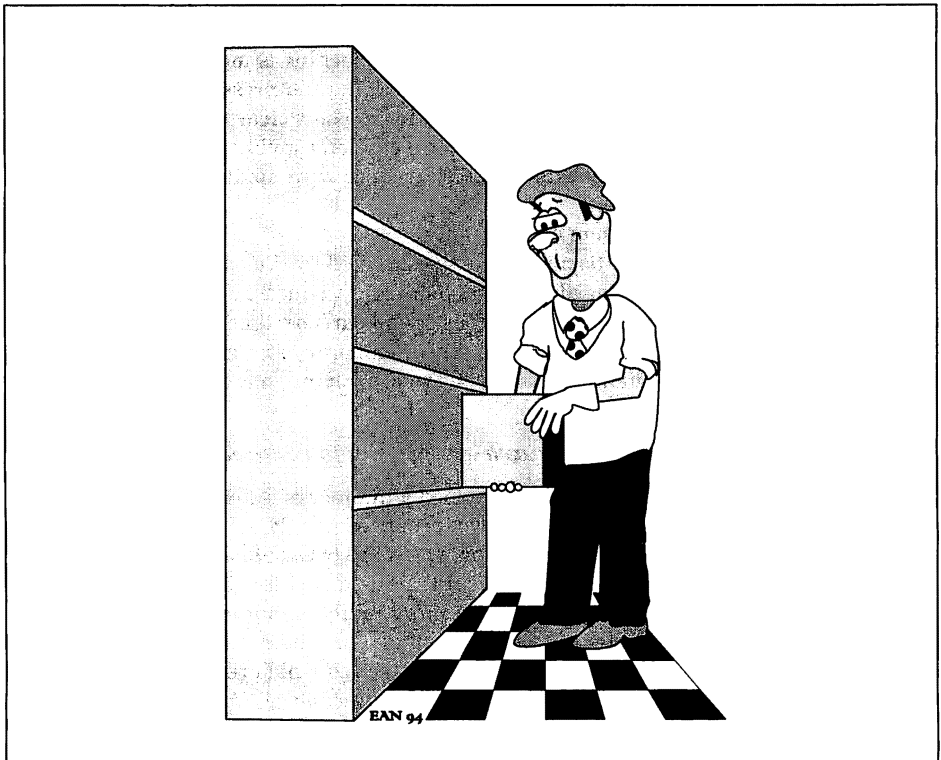


Figure 2: Removal of items from storage / returning items to storage

L. Returning items to storage (Fig. 2)

Safe procedures for returning items to the shelf, cabinet, or other container are essen-

tially the reverse of those for removing them, with special attention to proper positioning of the envelope or box in readiness for placing it in its proper location. Please consult section II.K immediately above for discussion of that topic.

M. Holding items (Fig. 3)

1. Introduction

Safe methods of holding sound carriers may vary considerably from person to person, based on physical characteristics; but such methods all involve the following important features: 1) full awareness of what the person is doing, 2) minimization of stress on the material held, 3) convenience and comfort for the staff member, and 4) avoidance of contaminating the material with any type of foreign substance. Supervisors will need to train thoroughly all staff members and to remain vigilant that staff always use safe methods of handling. Previous discussion in this chapter has indicated reasons for constant awareness and avoidance of exerting stress on collection materials; but in establishing policy, supervisors need to consider a number of factors which are normally taken for granted in relation to avoiding contamination.

2. The effects of foreign matter on items

a. Breath

As anyone who has exhaled in cool, damp air or upon a cold windowpane will remember, involuntary actions can have obvious effects. Many types of fragile sound carriers can easily be damaged by moisture, as well as tobacco smoke and other breath-borne materials well-known to the allergic or those in the vicinity of sneezes and coughs. Thus, reasonable precautions against breathing directly upon sensitive materials are necessary at all times, with consideration of requiring respiratory masks for any staff member for appropriate conditions and materials (Smolian: 38).

b. Hands and fingers (P-L: 48, for discs)

As many people are aware, especially those who have handled photographic films, glass objects, and other such materials, even the most recently washed hands can deposit oily prints upon items with which they come in contact. Skin oils, being composed of organic materials, will support the growth of fungi in addition to causing damage directly to some materials (such as audiotapes - Smolian: 38) and to causing the need for cleaning (which creates the potential for further damage by handling and other means). Therefore, requirements for handling delicate sound recordings should range from a minimum of regular hand-washing to a maximum of total avoidance of direct human contact with materials through the use of new and uncoated surgical gloves thin enough to allow nearly full tactile sense (gloves of woven fabric may deposit lint, and some fabrics may be too smooth to allow grasping without excessive pressure). Ideally, gloves of this type should be required. In their absence a useful and practical general rule for finger-contact with sound carriers is to restrict touch to the absolute minimum required and to permit touching only those portions of the item which carry *no* signal (for example, touching the edges and centers of disc recordings, the edges of films, the ends and cores of cylinders, etc.). Unfortunately, this rule fails for such carriers as tape and wire, any portion of which may contain a signal with no visible indication whatever; so for such materials the rule must be modified: grasping reels or spools by their centers and edges only, without exerting pressure on the sound



Figure 3: Holding items

carriers; and grasping loaded hubs by the hubs and edge of the tape packs. In manipulating tapes and wires contact should be restricted to an absolute minimum of touching only the extreme ends of the item since those parts are less likely than others to carry content (Gibson: 14; Smolian: 38).

c. Clothing

Ideal clothing for those who work with sound recordings would be non-bulky, lint-free, ever clean and free of static electrical charges, soft, smooth, and flexible, uncoated and unimpregnated with any foreign substances (such as fabric softeners), and unencumbered at least above the waist and on the sleeves with any hard or sharp fasteners, decorations, or other objects which might mar or scratch items with which the wearer might come in contact. Combining such features with comfort would be the objective in designing uniforms if they are to be required. Awareness of the importance of cleanliness and reasonable avoidance of lint-shedding as well as the problems of hard fasteners, jewelry (including tie clips, necklaces, and such), writing implements and their holders, etc. may help keep sensible precautions in line with practicality in the choice of appropriate normal clothing. The availability of properly designed smocks for use in special circumstances might also help in maintaining safety.

d. Substances applied to the body

The rule of as much avoidance as possible of all such substances is the best course of action. Although specific studies with sound carriers have yet to be conducted, the compositions of most medicines, lotions, colognes, perfumes, and other such substances are known. Many contain such ingredients as oils and waxes which can contaminate sound recordings or cause them to attract other contaminants. Substances which have odors, pleasant or unpleasant, transmit them by emitting particles of matter into the air, matter whose composition may be unknown because of trade secrecy and whose effect upon sound carriers thus cannot be predicted. Body-powders normally consist of either crushed minerals (such as talc), organic starches, or mixtures of such materials

with perfumes or other ingredients. Perfumes and foods are known to harm audiotapes (Smolian: 31).

N. Items in containers: removal from and insertion into (Fig. 4)

Awareness of such properties as the weight, composition, shape, and topography of the particular object to be handled and of the principles of safe holding (see above III.M.) are the most important factors for supervisors to emphasize in training staff in this portion of their work. When appropriate, as in the case of valuable original containers for which preservation is desirable, the secondary goal of avoiding stress and contamination of the container during withdrawal and insertion of the sound carrier needs attention. The demonstration by experienced people of safe methods for the removal and insertion of recordings from and into their containers, as well as care and common sense, are factors which supervisors should always emphasize in training staff. For example, when handling a disc or cylinder recording, no part of the staff member's hand, the recording's sleeve, or its liner should touch the playing surface; a disc should be held between the fingers and the thumb, with one or more of the fingers in the center and the thumb on the edge. The sleeve should be slightly bowed, and the disc should be slid gently into or out of it (Gibson: 14). Audiotapes should be handled without pressure to the tape itself, cylinders by contact with the insides only, and other materials by analogous means (avoiding contact of fingers with playing areas).

O. Setting materials down

Materials should never remain outside of their proper containers or proper storage areas for longer than absolutely necessary. Nonetheless, each area used for the temporary examination, playback, or other operation to be performed upon items in the collection should have both a set of containers or shelves meeting the same criteria as those for permanent storage and a horizontal counter or desk surface on which it is safe temporarily to place appropriate items for such purposes as information-gathering, processing, or cleaning.

Managers must work for the closest possible approach to safe work-spaces, bearing in mind the problems of each type of item, and then encourage the constant and full awareness of all staff members of the principles of safe handling. In this context the factors to be emphasized include (1) ensuring proper support for each type of item; (2) checking the cleanliness, flatness, hardness, etc., of any surface before using it; (3) avoiding any possible sources of damage in the vicinity, such as ultraviolet light; sharp objects; dirty work surfaces, equipment, or hands; and the presence of items which might fall or lean on objects in the work area; (4) avoiding the presence of strong electromagnetic fields (such as loudspeakers in small enclosures – Smolian: 39); etc. For example, examination of a set of 78-rpm or long-playing disc recordings housed in the original paper or paperboard album with its individual paper pockets hinged and attached at one end involves a number of potential problems: such a container should be set vertically (as in storage) upon a flat surface, each disc checked for safe position in its pocket, and the individual pockets spread apart so as to allow non-stressing, non-scratching removal of the discs, but with care in positioning so that the natural spring-action of the hinges to close the album will not work to undo the support and allow the album to fall.



Figure 4a



Figure 4b



Figure 4c

Figures 4a, 4b, & 4c: Removal of items from containers / insertion of items into containers

P. Protection for materials (when set down)

In ideally-designed archival facilities, protection for materials when temporarily set down would hardly be necessary, since the air and surfaces would be clean, non-contaminating, non-loading, and free of other hazards; and the materials would remain out of their containers for only brief intervals. In the real world of adapted facilities and furniture, limited staff, and interruptions, attention should be given to safety of items which might be left out for longer than a single moment. The easiest solution to this problem is the enforcement of *a rule that items are never to be left out of their containers except during the process of actual use, examination, playback, etc.* If it is absolutely necessary to allow for items to be left out, special attention should be paid to the composition and the cleanliness of workspace surfaces. In addition some sort of safe, non-loading, protective covering material will need to be available at each workspace (polyester envelopes might be considered).

Q. Picking materials up

Procedures for picking materials up involve the same kinds of considerations and care as those for setting them down, with the focus of attention directed towards the items and the problems to be faced in moving them towards and into their containers. Please see above: Sections III.K. Removal of items from storage containers, III.M. Holding items, III.N. Removal and insertion of items from and into containers, and III.O. Setting materials down.

R. Handling for playback

1. Policy

Current Recommended Practice No. 13: playback of original materials should only be done by qualified staff. Such a policy assures the greatest possible degree of safety for fragile and irreplaceable materials. It also allows for communication with researchers in advance and in the course of operations concerning rules and limits regarding playback (such as those that newly discovered damage may prevent or limit playback, that any given tape must be played from start to finish without interruption, that any recording will be played only once per day, etc.). If a researcher needs to listen repeatedly to one or more items, the single playback could be used to make a service copy for subsequent use (*Current Recommended Practice No. 14: limitation of frequency of playback of any item, either per day or before the making of a reference copy*).

The rule of limitation of playback of any recording to once per day is controversial. Obviously, playback of most types of recordings subjects them to wear and thus should be limited. Some people believe that multiple playback, especially with disc recordings made of plastic, increases damage at more than an arithmetical rate of progression; however, no proof of this theory could be found.

2. Moving

The principles discussed above, particularly those in Sections III.M. Holding items, III.N. Removal and insertion of items from and into containers, and III.O. Setting materials down, apply also in relation to playback.

3. Cleaning

Current Recommended Practice No. 15: cleaning of all sound recordings, at least

before playback, by the least threatening possible method. Cleaning sound carriers is really a separate subject from handling but an important one in desperate need of further study (Larry Miller of the Library of Congress has in progress a project on LPs). Since so many damaging methods for discs have been marketed, a few cautionary remarks should be made. Except for carbon-fiber brushes for microgroove vinyl records, dry (or treated but dry-to-the-touch) cloths and brushes or damp (as distinct from wet) methods tend to cause damage either by friction of contaminants against the groove, deposition of contaminants, or both. Concerning fluids, all types of alcohol can dissolve the surfaces of pre-LP discs containing shellac compounds and (on more than minimal contact) leach the plasticizers in LPs; fluids which contain substantial amounts of alcohol should *never* be used on pre-LP discs and should be used in contact with the surfaces of vinyl discs *only* as infrequently and then as briefly as possible (certainly less than one minute). Cleaning of instantaneous recordings (discs, most tapes especially if acetate-base, wires, etc.) and all types of cylinders should only be attempted by experts; non-woven fabric (such as 3M Type 610 tape-cleaning fabric) can be used by experienced operators on audiotape. Fluids of unknown composition should *always* be avoided. One firm (Lagniappe Chemicals Ltd.) has worked with a chemist's advice to develop fluids and methods designed to be safe and effective for cleaning the most commonly encountered types of disc recordings; and one audio restoration firm (Lane Audio and Records) has published a booklet on cleaning recordings.

4. Inspection

For most types of sound carriers, any type of playback will cause some degree of damage by wear to the carrier, the playback unit, or both. Since the archivists' objectives include preservation, the aim in playback is to minimize such damage. Therefore, before playback the staff member on duty must carefully inspect the container and the sound carrier for (1) signs of damage which might threaten the signal, the carrier, or the playback unit; (2) for notes or visible features which indicate conditions of playback required for the recording in question; (3) for cleanliness sufficient for safe playback; and (4) for other special instructions or indications. In addition, the staff member must carefully examine the playback unit for signs of damage, contamination, or need for adjustment or cleaning. The discovery of any factor which might possibly cause damage beyond that which cannot be prevented in normal playback should result in postponement until an appropriate remedy has been determined.

5. Loading a sound carrier for playback

Loading a sound carrier onto or into a playback unit calls for attentive use of the skills referred to in III.R.2. In addition staff members must avoid damaging items by improper contact with parts of playback units which may be capable of damage because of their sharpness or hardness (e.g., tape guides, spindles, styli, edges of supports, etc.) and must be aware of special arrangements involved in such processes as threading tape, wire, or film.

6. Positioning

After loading, many types of playback units require adjustments before proper playback can begin, for example:

a. Centering on turntable for discs

- b. Checking for lead-in on discs
- c. Locating stylus over starting-point for discs or cylinders
- d. Steadying, moving, and lowering arm for discs or cylinders
- e. Positioning tabs, slots, guides, etc., on tape and film machines
- f. Adjusting slack, or eliminating slack, on tapes and films
- g. Checking indicators such as “in motion” or “stopped”
- h. Adjusting compact discs on player-trays
- i. Passing or adjusting to leaders, test-signals, or protective unrecorded portions of tapes to find the beginning of the signal.

7. Playback

Safe and effective performance of adjustments needed during playback requires the full attention of the staff member, as does detection of problems which may require discontinuation of playback. The staff member should also be responsible for observing such rules as limiting the repetition of playback for a given item and logging any required statistics concerning units played.

8. Post-playback necessities

These actions constitute a reversal of those involved in preparation for playback and require careful attention and the observance of the same principles as preparation, in order safely to remove the sound carrier from the playback unit, to inspect it for damage and cleanliness, to clean it if necessary, to return it to its particular container, to return the container to its temporary or permanent place of storage, to inspect the playback unit for adjustment, cleanliness, and damage, and to check audiotapes for evenness of winding (Smolian: 43-44). For audiotapes it is essential to remember that they must be stored in played or end-out-library-wound positions only (fast-forward or fast-rewind should *never* be the last step before storage – Smolian: 44). For aging and deteriorating tapes playback speed should be the *only* speed used (fast forward and fast rewind speed should *never* be used – advice from Eastman School of Music).

S. Packages and containers

1. Preservation

Given the time-span of the history of recorded sound, collection managers can safely assume that nearly every original paper or paperboard package or container for any sound recording and almost every paper sheet or booklet of notes which accompanies a published sound recording is acidic. This fact means, unfortunately, that these materials are doomed to relatively quick decomposition even if stored under ideal conditions. Many sound archivists and researchers feel that it is important to arrange conservation of at least representative examples of original containers, notes, and artwork which accompanied published sound recordings through such means as paper

treatment and encapsulation; but the high cost of such work will probably mean that most such documents will only be preserved in such alternate forms as photocopy or microfilm. Since there exists an increasing amount of literature on the subject of paper preservation, and since many institutions which hold collections of sound recordings also have staff or even departments responsible for paper preservation, no attempt will be made here to summarize that subject except to point out that such principles as cleanliness of hands and gentleness of handling are as useful in dealing with paper materials as with sound carriers.

2. Uneven load

Already discussed in the chapter on storage of sound recordings (*ARSC Journal* 1993;24[2]:130-175) is the problem of the presence of uneven load-pressures inside packages and containers of sound recordings caused by the presence of folded inner sleeves or paper notes, booklets different in size or shape from the sound recordings with which they share containers, fasteners such as staples and clips on sets of pages (which should always be removed), etc. Ideally, any materials that might cause uneven loading should be stored separately from the sound recordings to which they pertain. Since, however, storage conditions suitable for sound recordings are usually suitable for paper materials, and since separate storage creates as well as solves storage and handling problems and increases retrieval time, many sound archives will continue to operate with the normal but threatening condition of combined storage of sound recordings with non-uniform accompanying materials. Staff members who have been trained to deal with this condition can help minimize additional damage by care and common sense in handling such materials.



Figure 5: Electrostatic charges

T. Monitoring

In order to gauge the effects of handling upon sound carriers and their containers, a system of monitoring is useful. Several archives keep various kinds of tallies documenting use, entered by staff members directly on the recordings' containers. Some of these systems track only actual playback, whether for research or preservational copying; others count any use of an item for research purposes, whether examination, playback, or both. A system of tally-marks entered upon the container by the staff member responsible for handling seems both simple and reliable and keeps the information on any particular item in one place. Such tallying systems are operated in addition to the gathering of statistics on research use of collections (such as number of researchers, number of sides played, number of volumes consulted, etc.), this type of logging of use usually being done for such purposes as compiling monthly or yearly statistics.

U. Electrostatic charges (Fig. 5) (P-L: 8 for LPs)

Sound carriers such as 45-rpm, 33 1/3-rpm, and some 78-rpm discs, CDs, audiotapes, films, and certain types of splicing tape are composed of thermoplastic materials which can accumulate and store electrostatic charges. Not only do such charged objects tend to stick to their containers, but they also attract dust and dirt particles. Both the discharge against fixtures on playback units and the friction of particles against carriers cause damage to the carriers as well as undesirable interference with playback, thus necessitating pre-playback, and possibly also post-playback, cleaning (*Current Recommended Practice No. 15*). This phenomenon is not universal, since the addition of certain ingredients in manufacture can inhibit or prevent the accumulation of static charges, but manufacturers' economizing has made it widespread. An important aspect of training for staff in sound archives involves instruction in the following areas 1) handling chargeable materials so as to minimize the buildup of charges, 2) inspecting materials for electrostatic charges (for example, by listening for characteristic crackling sounds when moving an item near another object, such as a sleeve, and by noticing the attraction of body-hairs brought near but not in contact with the object), and 3) discharging items upon which a charge has been built (with such devices as anti-static "guns" or conductive mats or brushes).

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References

- | | |
|---|---|
| <p>Burt LS, Isom WR, and Khanna SK. Record materials. <i>Journal of the Audio Engineering Society</i> 1977;25(10/11):712-728. (abbreviated: AES)</p> <p>Gibson GD. Decay and degradation of disc and cylinder recordings in storage. Paper presented for symposium "Archiving the audio-visual heritage," May, 1987, Berlin: 3-16. (abbreviated Gibson)</p> | <p>Kalil F, ed. <i>Magnetic tape recording for the eighties</i>. NASA Reference Publication 1075. Washington, D.C. 1982 (abbreviated: NASA)</p> <p>Pickett AG, and Lemcoe MM. <i>Preservation and storage of sound recordings</i>. Washington, D.C.: Library of Congress; 1959 (republished 1991), Associated Audio Archives Committee,</p> |
|---|---|

Association for Recorded Sound Collections. (abbreviated: P-L)

Smolian S. Preservation, deterioration, and restoration of recording tape. *ARSC Journal*, 1987;19(2-3):37-53. (abbreviated: Smolian)

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Appendix A: List of Topics Suggested for Study

1. Effects of preservation of containers & notes on storage & handling of recordings
2. Splicing tape
3. Effects on sound-carriers (discs and tapes — sound film has been studied) of contamination by commonly found chemical vapors: for example, paints, resin finishes, housekeeping products such as solvents; adhesives such as those used in plywood, particleboard, etc.; wood and its finishes ...
4. Physical handling of recordings:
 - A. General topic of holding, handling, etc.
 - B. Carts for storage and moving of recordings
 - C. Methods of dealing with loose tape ends for storage
 - D. Racks for temporary storage of recordings at playback or study facilities
5. Labeling and/or marking of sound-carriers and containers for sound-carriers, including security in the sense of labeling, encoding, placing detectors in or on ... materials
6. Damage-repair: Preservation of the structural integrity of the sound-carrier: mechanical and chemical considerations (this topic relates strongly to the technical and engineering aspects of the study), related to all integral parts of the sound-carrier
7. Cleaning methods and materials (Larry Miller of LC has in progress a project on LPs)
8. Moving: means of, conditions for (for example, climate), preparations for, containers for, packing for, quantities per container for, instructions to outside personnel for, etc.
9. Place-marking-and-holding for items when removed from storage
10. Treatments for recordings (additives and coverings such as hardeners, protectants, lubricants) in regard to safety of materials for carriers and signals and in regard to reversibility
11. Limitation of frequency of playback of any item, either per day or before the making of a reference copy is required
12. Security: the whole subject as related to Audio Preservation

Appendix B: Current Recommended Practices

NOTE: Only those items which refer to handling are listed. The full list can be found in the project report: *Audio Preservation: A Planning Study*, published by the Association for Recorded Sound Collections, 1987.

6. Access to storage areas permitted to staff only
10. Support for the principle of *no-load* (or at least minimum-load-possible), use of dividers on shelves, and use of end-of-shelf full-size supports
13. Playback of original materials allowed by qualified staff only
14. Limitation of frequency of playback of any item, either per day or before the making of a reference copy
15. Cleaning of all sound carriers, at least before playback, by the least threatening possible method.