

Pamela J. Smith  
 April 22, 2005  
 Plan for the Preservation Department Audio Lab

### Extent of Audio Materials

The Elmer Holmes Bobst Library has the opportunity to distinguish itself as a leader in audio preservation and access by addressing practices for physical care and treatment and implementing library-wide systems that support the longevity of its audio holdings for academic use. The overall purpose of the Audio Preservation Lab is to increase longevity of the Library's archival audio materials through preventive care, preservation, training and research.

Audio materials are the dominant format in all three special collections at Bobst: The Fales Library and Special Collections, The Tamiment Library and Robert F. Wagner Labor Archives and New York University Archives. Formats range from the earliest analog medium (wire) to the current digital medium (DAT). The majority of Bobst's archival collection includes obsolete 1/4" reel-to-reel tape (45%) and cassette tape (52%), comprising 97% or about 23,000 items. A large portion of this material is held by the renowned center for research on Labor and the Left at the Tamiment Library and Wager Labor Archives.

The following chart reflects these statistics:

Archive	Wire	LPs	45s	1/4"	1/2"	1"	Cassette	Micro	Audio CD	DAT
Fales		199	50	496	89	2	1,508	69	334	84
Tamiment/ Wagner	87	No count		6,895			10,630	6	2	
University Archives		13		3,610			610		4	2
Total	87	212	50	11,001	89	2	12,748	75	340	86
<b>% of format in total audio holdings</b>	Less than 1%	1%	Less than 1%	45%	Less than 1%	Less than 1%	52%	Less than 1%	2%	Less than 1%

### Need for the Audio Lab

Although the large amount of endangered audio material is daunting, an Audio Lab within the Preservation Department at Bobst Library has the opportunity to serve as a needed space for convergence to tackle a large portion of the Library's audio holdings. Taking a proactive approach, this space will facilitate preservation services for all special collections at Bobst. A specialized lab is needed to care for the integrity and needs of fragile audio material, to provide support for staff training and research, and to serve as a role model for other large, academic research libraries by establishing high standards and protocols of library and archival practice.

### Conservation and Preservation of Audio Materials

Different actions are necessary depending on age, condition and format of audio recordings. Unlike paper materials, media must be assessed and inventoried at the time of accession, or deteriorated and at-risk materials will not be identified. In particular, the oxides in magnetic tape suffer from inherent deterioration, with a short life span estimating fifteen to twenty years. High temperature and humidity exacerbates deterioration. Preservation becomes more expensive and complicated as formats and playback equipment go out of production, making preservation more expensive and complex. Time is of the essence to assess and develop strategies for preservation. The Audio Lab will serve as a site for inspection, description and re-organization for all special collections as Bobst staff distinguish between material that must be moved to proper off-site storage and what should remain in-house. The Audio Lab will function as a collaborative space to share tools, expertise and preservation strategies.

Proper housing and cool, dry storage are the most important conservation actions in extending the life of audio materials. It is fortunate that Bobst Library plans to move particular archival collections to environment-controlled off-site storage facility. Before audio materials are moved off-site, they must be entered into Bobst's Media Database to capture intellectual and physical information in terms of condition. It is essential to gather at a minimum format, date range and basic condition when materials are processed at the item level, using standard glossaries and vocabularies. Audio collections must be sorted for relative value (i.e. separating commercially available material from "out-of-print," rare or unique material), determining which items fall within each department's collection policy. Deaccessioning may be in order. Labeling and housing must be appropriate and consistent. Material in good condition will be played during the identification and cataloging process. The information gained will be used for priority setting, funding proposals and for management of preservation projects. Obsolescence ratings for media formats and playback equipment may also be helpful at this stage.

Audio in poor condition, or formats for which playback equipment is endangered or no longer manufactured, must be re-mastered to a contemporary format. This is particularly relevant to Bobst's archival collections of 1/4" reel-to-reel audio tapes, as playback equipment is no longer being manufactured. Technological advances and lower costs now make it possible to convert analog tape to digital files for preservation. Based on condition of the materials, the Lab will enable some materials to be inspected, cleaned and re-mastered on 1/4" tape and digitized on-site, while others will be sent to vendors. The Audio Lab is needed to provide playback equipment for assessing the condition and content of materials before and after preservation action. Also, preservation specialists can use the playback equipment to assess the quality of items re-mastered by vendors.

The research value of Bobst's resources is enhanced by its special collections. Yet the Library must balance demands of access for scholarly research with the protection and preservation of master materials. The Audio Lab will facilitate the necessary production of access copies in the form of digital audio files on compact discs.

#### Staff Training, Research and Curricular Support

The Audio Lab will serve as a training space for Library staff and interns. Through demonstrations and hands-on work, appropriate care and handling, and inspection procedures will be learned, thus extending the life cycle of audio materials. In addition, the Moving Image Archiving and Preservation (MIAP) Program, offered through the Cinema Studies Department of the Tisch School of the Arts, trains graduate students in audio preservation. The Audio Lab will

provide a needed teaching space for professional development of a new generation of audio preservationists.

### Develop Standards in Library and Archival Practice

Standards and protocols for audio preservation are still being developed, especially during the current transitional period of the analog world becoming purely digital. Many questions remain in the academic library community to improve access to and preservation of historically and culturally significant recorded sound collections. Through the Audio Lab, the Library has an opportunity to create best practices for care, handling, cleaning, re-mastering and storage of recorded sound materials that are urgently needed. Best practices and protocols in the form of written policies and procedures can be shared with Bobst staff and extended to the greater research library community as guidelines.

Increasingly, digital surrogates are made of audio materials and must be managed along with versions on analog or digital tape. The Audio Lab is needed to ensure a proactive approach to issues such as optimum workflow, standards for digitization, digital storage, the integration of metadata with other Library information systems, and digital access. The Audio Lab will facilitate needed research in the burgeoning field of analog-to-digital preservation, as well as digital-to-digital preservation.

### **Scope of Audio Lab Activities**

The basic workflow of the Audio Lab will include inspection, rehousing, cataloging, treating accordingly, and transferring sound recordings to 1/4" open reel and digitally capturing by creating a high-resolution .wav file. Each format will present different problems and will require somewhat different workflows. For example, 1/4" reel-to-reel audiotape is an older format and playback equipment is no longer being manufactured. Over time, tape may break down when the adhesive that binds the oxide to the plastic base absorbs moisture, and can cause mistracking, head clogs, oxide loss, and alternate sticking and slipping of the tape as it goes across the heads. It will be necessary to encourage research strategies and further prioritize activities so that staff has time to develop workflows for a single format or a single process thoroughly. It will be necessary to provide a special area for inspection and playback of audio materials, as well as for some treatment methods (such as desiccation of sticky tapes). Some areas of the Media Preservation Lab overlap between film, video and audio functions. These include spaces for re-housing, packaging and shipping, and storage of supplies. The most successful plan will share resources and space between the Media Preservation Lab and the Conservation Lab.

The scope and the equipment and supplies lists assume that the Preservation Department will begin with playback and record equipment for 1/4" reel-to-reel, cassette, Digital Audio Tape (DAT) and optical compact disc. Computer hardware and software should also be arranged to accommodate digital source files.

#### Preventive care

- Visual inspection of audio materials to determine condition and to document physical condition. Includes such areas as visual inspection for physical damage or mold.

- Minor cleaning and other physical care. Examples are removing dust and debris on item or container, removal of tape or other attachments, taping down of ends and restoring even wind.
- For newer tapes, selective rewinding (to prevent wind problems) or playback (to further assess condition) may be required.
- Re-housing with the goal of storage in inert polypropylene cases or acid-free inert paper cases with proper labeling, corresponding to the database record for the item.

#### Preservation and Access projects

- Selected audio formats will be re-mastered in the Audio Lab, to create preservation masters and access copies. In the short term, priorities will be to preserve the bulk of archival material held at Bobst by re-mastering from 1/4" reel-to-reel and audio cassette. Destination formats will be new 1/4" open reel stock and broadcast wave files (96kHz/24-bit) for preservation masters and lower quality wave files (44kHz/16-bit) on audio compact disc for access. Both analog and digital preservation masters will be stored in Bobst's off-site storage facility. See below for more details on long-term storage.
- For tapes that the Lab cannot handle internally, inspection and identification will aid in developing accurate lab estimates, and in overall project management. For example, two tapes of the same program may be compared to determine which is of the highest quality, or if they represent different versions. Thus tapes can be prioritized for off-site service.
- Access copies of selected tapes will be created, to prevent playback of original materials, out of print materials or preservation masters.

#### Documentation projects

- Workers will enter data using the Media Database, recording condition and actions through networked computer terminals. Ideally, documentation for the original item will be recorded directly as work is being done during inspection and treatment.
- A new record should be completed for each new derivative object in the Media Database as thoroughly as the record made for each original object. This includes data and metadata, in addition to minimal cataloging of the title and author, among other information, the copy creation date, who duplicated it, the original format, creation hardware, software, operating system, bit depth and sampling rate. Originals, preservation masters, and access copies should be intellectually attached and controlled using the Media Database.
- It is crucial that the Audio Preservation Lab establish metadata standards to thoroughly describe and document the creation of new preservation masters, and the best protocol of attaching metadata. Particularly relevant metadata includes information in terms of identification and future migration. Staff should record the inspection and playback reports, noting any defects, as well as actions taken in making new masters and derivatives (including any changes being made). 96kHz/24-bit broadcast wave files allow for metadata to be encoded with the file, and an Extensible Markup Language (XML) file for each .wav file can also be created that retains all technical metadata. Following the lead of the Digital Library Initiative, the Audio Lab should consider the Metadata Encoding and Transmission Standard (METS) as a standard for encoding descriptive, administrative and structural metadata within a digital library environment. METS uses the XML language.

### Education and Support

- The Audio Lab will provide a space for training in care and handling of audio materials.
- The Audio Lab will provide playback for identification purposes (of cassette formats in good condition). Rare items may not be identified on a tape or box label—it is quite common for labeling on audiovisual materials to conflict with the actual content. Also, not all items in a collection will be valuable or fall within a department’s collection policies. The Lab will support staff’s need for accurate description and will assist in determining relative value of audio materials.
- With the capability of playing back and recording both analog and digital preservation masters, Audio Lab staff can compare the gain and loss of digitizing analog material. This research should prove to be very useful for not only Bobst, but also for the larger library and archive community as new standards for digital conversion are being developed. A full analysis should occur as to the benefits, disadvantages and costs of creating both analog and/or digital preservation masters.
- Continued collaborations with MIAP will support a new generation of audio preservationists. Sessions from classes such as *Introduction to Moving Image Archiving and Preservation* and *Collection Management* will be held in the space, and students could use the space to practice care and handling skills, as well as work on particular audio assignments and projects. MIAP students will be trained and work in the Audio Lab as work-study interns.

### Research and Standards Development

- Procedures for evaluation, cleaning and re-mastering of audio materials will be developed through the Library’s activities in the Audio Lab. The procedures will benefit not only the Library, but also the larger library and archival communities. Controversy regarding baking and cleaning treatments for audio could be explored and tested, perhaps by student researchers. In addition, the combined use of the Lab by Preservation and Digital Libraries will allow for convergence of ideas and approaches; this work will contribute to research into what is currently becoming more and more practical: the feasibility of digital preservation of and access to recorded sound.

### Workstations

- The Audio Lab will share workstations for inspection, acid detection and repair, using the rewind tables that can be adjusted for audio. Rehousing may also take place in this area, or in the Re-housing Room shared with the Conservation lab. Separate work spaces are needed for the audio playback and record equipment, and for the Apple dual processor G5 desktop workstation to create digital audio masters for preservation and access.

### Equipment and Supply List

Costs listed are from estimates provided by Molly Wheeler, who set up an in-house audio preservation program at the Harry Ransom Humanities Research Center at the University of Texas, Austin, as well as from online research. Below is the list of equipment and supplies needed for analog to analog playback and remastering of 1/4” open reel, audio cassette, DAT and CD, followed by a list of additional equipment for the creation and storage of .wav files from analog to digital and digital to digital playback and remastering. Total costs estimate at \$21,050-\$22,050.

#	Item	Purpose	Cost/Notes
2	1/4" open reel audio decks- Otari MX5050BIII	one for source and one for mastering	\$1600-2400
1	audio cassette deck- Tascam 122MKIII.	source deck	\$1,000-\$1,200
	Marantz CDR510 Dual CD Recorder/Playback Deck	source deck	\$1,000
1	Sony PCMR500 DAT Recorder/Player	source deck	\$1,300
2	Genlec 1031A speakers	monitors	\$3,800
1	Mackie 16 track mixer	signal routers; if the source needs it	\$800
1	Rane PE 17 5-band parametric equalizer	for analog audio processing	\$350
1	DBX 1046 Quad Compressor/Limiter		\$750
1	Fix Cassette Workbench	transferring cassettes to new shells	\$35
48	Empty Cassette Tape Shells	transferring cassettes to new shells	\$20
2	1/8" Cassette Splicing Tape	cassette splicing	\$20
1	Cassette Splicing Block	cassette splicing	\$34
2	1/4" 8-Track Splicing Block	1/4" splicing	\$70
4	1/4" Splicing Tape for Reel and 8-Track	1/4" splicing	\$45
4	Clear 1/4" Tape Leader	1/4" splicing	\$72
100	Splicing Blades	splicing	\$6
91	Inert Polypropylene 1/4" Audiotape Containers (large)	long-term storage	\$162
56	Inert Polypropylene 1/4" Audiotape Containers (small)	long-term storage	\$111
		<b>Total</b>	<b>\$11,175-\$12,175</b>

Additional costs for working digital to digital:

Number	Item	Purpose	Cost/Notes
1	Mackie HDR 24/96	for audio capture for .wav files	\$4,000
1	LaCie RAID Biggest F800 1TB	storage of .wav files	\$1,499
1	Marantz 340 CD Recorder or equivalent	for making CDs	\$700
1	RME ADI-8DD 16 Channel 24-Bit Digital Format Converter	converting between digital files	\$1,000
1	Graham-Patten ADC-24 A-to-D audio converter	for out to speakers	\$275
1	Apple dual processor G5 desktop workstation (with 20" Cinema Monitor)	running digital audio workstation software	\$1,899
1	Pro Tools V. 6.7 software	digital audio processing software	\$300
100	Mitsui Gold CD-R compact discs (700MB ea.)	archival storage of .wav files	\$150

100	Verbatim CD-R compact discs (700MB ea.)	access storage of .wav files	\$52
		<b>Total</b>	<b>\$9,875</b>

### **Storage**

The Preservation Department will share the initial costs for long-term storage equipment and divide the costs for maintenance. As Bobst prepares to move unique, archival material to an environment-controlled storage facility, the Preservation Department can assist Library staff in assessing what material should stay on-site and what should be stored off-site. Further discussion should take place as to the role the Preservation Department should have during this stage.

Analog preservation masters on 1/4” reel-to-reel will be stored off-site in inert polypropylene containers. Per the Digital Library’s current standards, digital preservation masters will be backed up on multiple servers maintained by the campus’ Information Technology Services (ITS) and stored on magnetic disks, one stored on-site and one stored off-site. Using a Macintosh G5 workstation, the Preservation Lab will provide software support to make the high resolution preservation .wav masters and XML metadata files. With redundancy being one preservation strategy, back-up also includes storing data on-site on RAID hard drives and “archival” Mitsui Gold CD-R’s. For access to both analog and digital material, .wav files will be stored and available on-site on low-cost Verbatim CD-R’s.

### **Staffing**

At least one full-time person is needed to initiate and manage conservation and preservation projects from the three special collections at Bobst—Fales Library and Special Collections, Tamiment Library and Robert F. Wagner Labor Archives and New York University Archives. As audio preservation projects come to the Preservation Department, the Audio Lab specialist will institute new systems for handling, describing, treating and preserving. Ideally another part-time to full-time staffperson would be on-hand to assist in the supervision of work and research done in the Audio Lab, as well as assist in the training of staff and students.

### **Additional considerations**

As Bobst’s Media Preservation Lab works with digital materials, it is necessary to consider the research, references and resources of NYU’s Digital Library initiative. The Digital Library has thought extensively on issues of acquisition, selection, organizing, storage, description, preservation, quality assurance and access of works in digital form, and the Media Preservation Lab could benefit greatly in a collaborative partnership. In particular, the Digital Library could serve as a role model in workflow. It is necessary to establish cohesive procedures and roles for Bobst staff and Preservation specialists as objects move from a collection through inspection, treatment and storage, and tracking the object at each stage using a computer inventory control.