

A Proposed University Specialization in Sound Preservation

An approach to, and argument for, designing a university course for sound archivists working in sound preservation is presented. The significance and complexity of work performed in sound preservation are discussed, and a design of a university course syllabus for sound preservation specialization is offered; the focus is on the audio engineering dimension of the sound preservation studies.

Sound archiving as a profession is relatively new. The education and training of sound archivists is in an embryonic stage. The contribution and involvement of recorded sound collectors, audio specialists and educators is necessary to establish principles and proper practices for the advancement of this new discipline.

Sound archivists come from a diverse group of professions and occupations. They range from institutional sound archivists to private record collectors. The area of their work is sound archiving, but they perform tasks that range from policy planning to resleeving discs. At whatever level that the sound archivist works, however, his or her jobs usually include the following stages:

1. acquisition, preceded by a search, and appropriate procurement arrangements, followed by cataloguing;
2. conservation of the original artifact, audio processing, and making copies for preservation and/or access purposes;
3. storage procedures;
4. maintenance of the collection.

The requisite aptitudes, skills and competencies required for successful performance of these stages of sound archiving are enormous. The level of these requirements for any one individual archivist usually depends on the size of the collection, its heritage value and available funds.

Those involved in working in the area of sound archiving come from different backgrounds. Whether a professional in charge of a large public archive or a hobbyist with a small personal collection, few possess any educational training directly and solely related to the field of their work. The aim of this essay is to discuss the requirements and conditions for the education of sound archivists, especially those working in sound preservation (point 2 on the above list of sound

archiving stages), and specifically to suggest topics for inclusion in a basic university or college course designed for this group of sound archivists.

The Role of the Sound Conservator

The sound archivist who works in sound preservation directly with sound records (of all formats) and who uses sound equipment is traditionally and wrongly called a sound technician. The word "technician" implies a vocational, purely technical educational background, and corresponding level of cognitive skills. In practice, in the sound preservation section of the archive this person is assigned to a variety of tasks which require knowledge of many areas related to the humanities and physical sciences. He or she must be skilled in creative thinking and making decisions as well as in operating technical equipment. "Sound technicians" in the sound archive have to combine knowledge of, and interest in, both archiving and sound engineering. A more appropriate name has been suggested for this group of sound archivists: sound conservators. This title better reflects their status and the kind of tasks performed.

Personal Qualities of the Sound Conservator

As institutions move into the area of education of sound conservators, consideration should be given to the selection of students who are appropriately qualified for such education.

Very high demands are put upon the personal aptitudes and gifts of candidates for studies and career in this field. Prerequisites include a demonstration of excellent hearing, which can include positive results in audiometric tests. Only very good hearing guarantees that the person dealing with precious and unique records of history will not alter the original. Professional ethics and good hearing will also prevent alterations towards what could be subjectively described as improvements in sound quality: a trend among some audio producers generally criticized by sound archivists and private collectors. [Galo,1990; Kikuchi,1993]

Highly desirable abilities of the potential sound conservator include patience, meticulousness and manual skills. The sound quality of archival records, judging from the contemporary standards and techniques, is usually unpleasant or even unacceptable. Signal-to-noise ratio is usually very poor, and the noise itself is full of unusual sonic phenomena such as effects of cracks or scratches on discs. Concentrating on and listening to the content (recorded material) is not always an exciting or pleasurable experience. The reasons of holding particular sound recordings in the collection vary, and intellectual or artistic values are only some of these reasons. Moreover, working in sound preservation may mean listening dozens or hundreds of times to an original or fragments of it. This is necessary for many preservation procedures such as, for example, the assessment of the quality and characteristics of the sound, selection of noise reduction equipment and its setting, selection of correctors/filters for the appropriate frequency response (replay equalization), treatment of locked grooves, editing, etc.

Precision is another characteristic of the potential sound conservator. All procedures in the archival environment require a high level of accuracy in all steps of reproduction of the original documents and records. Mistakes in any copying, reconstruction or deciphering are duplicated and later taken as historically accurate. This accuracy and meticulousness, which is necessary to properly preserve the sound artifact, is equally important for the preservation of sound

content and accompanying information.

Manual skills are particularly important in the processes related to conservation and reconstruction. Restoration of an acetate disc, performed under the microscope, or the replacement of oozing splices in the master tape require professional experience combined with a high level of manual precision.

Creativity can be important if the sound archive supports a concept of active access to the collection, which means a commitment to sound production for the market or community.

Education of the Sound Conservator

Most sound archivists today have been educated on the job, but as the significance of the role of the sound conservator increases, the time has come to consider university specialization for this group of professionals. At present, this may consist of only a single course within an allied curriculum such as music or radio/television, but in the future it might include - in a few specialized institutions, at least - a minor or major in sound archiving.

The education of sound archivists specializing in sound conservation is interdisciplinary, and combines knowledge of various disciplines which are traditionally allocated to different faculties or schools. Physics (physics of sound) is of the same significance as history, and chemistry equally important as aesthetics of sound production. Studies in history and discography are the basis of learning about and understanding both the heritage value of the material as well as the processes applied in preservation procedures. Knowledge of selected topics from chemistry is necessary for preservation and maintenance practices.

The Syllabus of a University Sound Preservation Course

Once students have been screened for the requisite qualities, attention can turn to the curriculum *per se*. Obviously, students should first successfully complete prerequisites, including previous studies in music and physics at the introductory or, preferably, higher level. Then they can be introduced to sound archiving, and specifically sound conservation, in specific courses designed to meet their needs.

The course designed for sound conservators, presented here, focusses on audio engineering tasks performed in the preservation section of the sound archive. Contrary to some opinions and assumptions, the design of this course is not an equivalent to what is described as "an introduction to the field of audio", or "basic knowledge of . . .". The aims and objectives of the syllabus for this course are very specific and quite different from the aims of a general education in audio. [Directory,1994]. These aims and objectives are closely linked to sound archiving goals and principles.

The following are topics of a possible course designed for educating sound conservators; in other words for sound engineers working in sound archives. Each major level of the syllabus is followed by some explanatory comments.

- A. Introduction to physics of sound, acoustics and psychoacoustics
 1. Sound and sound spectrum
 2. Acoustics
 3. Auditory perception

The physics of sound and acoustics introduce students to the concept of sound, explain its nature and malleability, and present the major factors and conditions which impact on sound recording or reproduction. A thorough understanding of sound spectrum theory is essential for the judicious and successful use of equipment through various stages of the recording, processing, reconstruction and reproduction of sound. It is impossible, for example, to use noise reduction systems with no knowledge of spectrum theory. Equally important is a basic knowledge of psychoacoustics; it explains the characteristics of auditory perception and provides a foundation for understanding and judging of new trends in sound recording and reproduction, such as low bit-rate codecs or multichannel sound techniques and systems. [Bech,1993]

B. History of sound recording and music

1. History of sound recording
 - a. Sound carriers
 - b. Sound recording and reproducing equipment
 - c. Recording procedures and practices
2. Selected topics from the history and theory of music

A substantial part of studies for audio preservation specialists is devoted to history since sound archivists's interest is directed towards the past rather than the present or future. This is a unique feature of education and training in sound as compared to the curriculum of courses offered to the sound specialists. [Directory, 1994]. General historical topics can be covered in a separate subject on history. There is, however, a range of very specialized issues, crucial in educating specialists for sound archiving, which is included in the course discussed here. Lectures and workshops on the history of sound recording include the exploration of carriers and equipment as well as a variety of technologies labelled as obsolete by the audio industry. To those belong, for example, cylinders, shellac discs, wire recordings; recording and reproducing equipment for their production and playback; the principles of acoustical recording; and the practices of individual sound record producers (companies). Carriers are mentioned first, before equipment, because sound archivists are dealing with old carriers, routinely using contemporary equipment for their reproduction, reconstruction and processing (the contemporary produced equipment will be discussed later). Knowledge of recording techniques used in the past as well as procedures employed by individual companies is fundamental; it will be used, for example, in understanding audio qualities of the acoustically recorded discs, or in setting the playback equalization for different labels produced by companies from the first decades of this century. Other topics on the history of sound recording may include experiences, conclusions and assessments in relation to the life expectancy of different formats and brands, and the reasons for their (formats') degradation, decomposition or damage. [Wise,1993] Reconstruction of musical recordings is easier and much more successful if supported by some knowledge of the theory and history of music. To give some examples: knowledge of musical elements, which are closely related to sound properties, helps in controlling the proper sound level during processing, dubbing and editing. In addition, knowledge of instruments (including voice) as sound sources is very useful in all stages of sound production as well as reproduction; among other things it gives an indication of expected frequency range, source strength, or onset and decay times.

The ability of reading scores proves invaluable in editing of damaged records of musical performances. An acquaintance with the names and careers of famous artists who recorded for famous labels extends the horizons and enhances the enjoyment of dealing with their creations.

C. Ethics and aesthetics in sound preservation

The unique environment of the archive and its goals and objectives are reflected in custodial and non-commercial policies. The attitudes of sound archivists are guided by objectivity, faithfulness and care. Sound conservators have to resist temptations to improve sound quality in any stage of sound processing, focussing instead on a persistent search for the original true quality of the sound. This exploration often requires additional research in such unusual subjects as, for example, dominant pitch (in tuning instruments) in a particular period or place. [Lazar,1989] Ethics and aesthetics also prompt sound conservators to investigate and select the most appropriate techniques used for any single stage or procedure in their work, which sometimes means a conscious rejection of new inventions in both equipment [Galo,1991] and method. [Lazar,1990] The most common case of an unethical decision or action occurs when the original qualities of the sound recording are changed, as a result of playing sound recordings at wrong speeds, or over-filtering in search for the "better" quality of sound.

There are other topics directly related to ethical issues, a knowledge of which prevents dangerous ignorance of legal obligations in the archival environment. Copyright law is one of them, and because it is particularly relevant and increasingly important in the area of sound recording and reproduction [Sweeting,1993], a thorough information on its rules and regulations is essential for the candidate who works in sound preservation.

D. Basic principles of sound recording techniques and technology

1. Equipment, techniques and procedures in sound recording, processing and reproduction.
2. Trends and directions in the development of new audio techniques and technology.

As opposed to the training of audio specialists (for commercial sound production) the emphasis in training sound preservation professionals is put on the reproducing equipment rather than on recording equipment. The knowledge of recording equipment is equally important only for sound recording archivists involved in audio publication.¹ Theory and practice of sound recording and reproduction include unique features of sound preservation work and specific issues in technical design and application, such as, for example, the selection of styli for successful reproduction of vintage records. Sound processors are not as extensively used in sound archiving work as in contemporary commercial studios, particularly in the studios involved in pop music recording. However, noise reduction systems, both analog and digital, and equalizers are routinely used for cleaning and restoration (reconstruction) of the original sound. Complexities of digital noise reduction systems and their significance in audio preservation call for not only a theoretical and practical introduction to their operations, but also months of hands-on experience. Application of noise reduction systems in audio archiving is one of the most important and one of the most difficult stages of sound preserva-

tion work, and it requires a combination of skills, knowledge of the physics of sound, a well developed perception of aesthetics and an ability for making decisions. Keeping up with the development of new techniques and technology is an obligation for sound archivists, as it is for all professionals. New discoveries and new equipment will bring new and different artifacts to deal with. New techniques and new technology will provide better methods and more efficient procedures in sound preservation work.

Discussion

What has been presented in this essay is a proposed major in-depth specialized study in sound preservation to be included in a degree level award. Similarly, courses in discography, history and chemistry could be designed to complement other dimensions of the sound conservators education.

The course outline given in this essay would constitute a minimal syllabus for a university course. Hopefully, appropriate institutions may find this specialized area of study of interest and by offering such a course, and perhaps later a complete curriculum, contribute greatly to the education of sound archivists.

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Endnote

1. Involvement in sound mastering (or remastering) requires the highest level of audio engineering expertise, which goes beyond the usual requirements for sound archivists specializing in sound preservation.

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Corrections and Clarifications

Omitted from Kurt Nauck's "The ARSC Grading Project: Phase One" (*ARSC Journal* 1994; 25[2]:163-177) was the completed Figure illustrating the formula used in calculating the standard deviation for each survey record. The completed Figure should have appeared as follows:

$$\sqrt{\sum_{\text{all } x} (x - E(x))^2 p(x)}$$

Current Bibliography

Current Bibliography, which is compiled by Tim Brooks, does not appear in this issue of the ARSC Journal. It will return with the next issue (Vol. 26, No. 2 / Fall, 1995).