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## A COMMENT AND FURTHER RECOMMENDATIONS ON “INTERNATIONAL RERECORDING STANDARDS”

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### AUTHOR'S NOTE:

It is extremely fortunate that the Association for Recorded Sound Collections is devoting time and space to this area of the sound preservation problem.<sup>1</sup> However, very little has been published that places stringent definitions on the various needs for rerecording and the respective techniques to be used in each case.

The influx of commercial rerecordings shows great variability at best. Manipulations to an unprecedented degree are encountered as the result of digital cure-all, and the basis for this is a lack of knowledge of both early recording technology and present-day replay technology. The basic requirement for the kind of rerecording that aims to make early recordings available to other researchers must be that any manipulation of the signal must be conscious and must be able to be undone.

My 1981 comment on the printed version in the *Phonographic Bulletin* of William D. Storm's 1979 Salzburg presentation was written at a time when I thought I disagreed with Storm.<sup>2</sup> However, I now believe that both viewpoints are valid and may co-exist.

It cannot be stressed enough that rerecording is not a goal in itself in archival terms, it is only a means. The real goals in the use of sound recordings are preservation, distribution and restoration. These concepts are arranged in order of urgency, as will be seen in the following comments, and they have one thing in common: they are closely linked with technical processes, as opposed to various kinds of evaluation which may draw on completely un-technical techniques.

Preservation is resorted to when the artifact, the original, is too valuable or fragile to be used directly in repeated attempts at utilization. Distribution is used when several archives are to help in utilizing the recording. Restoration is the activity directed to re-establishing either the original sound in the recording studio at the time of recording or the original sound available to the one-time listener (audio history). It will be clearly seen that Storm has treated only the restoration concept.

As a point of departure I would like to take the rhetorical question “From an archival viewpoint, we must ask to whom do we owe allegiance--to audio history or to the recording artists?”<sup>3</sup> My firm answer to that is “to neither,” and in the same

breath I will stress "we owe allegiance primarily to the artifact, the object *per se*!"

The above simple clarification will allow us to see a number of what may appear as inconsistencies in the paper by Storm, but which are in reality only premature attempts at employing the technology at hand. For instance, there is no point in applying de-emphasis in the first rerecording step<sup>4</sup> since that may be applied at a later point in time in a further "re-rerecording" when perhaps even better knowledge of the manufacturers' practices have become known.

The first condition for promoting international rerecording standards<sup>5</sup> should be the recognition that the signal, not the sound, is the most important thing to save.

There seems to be a similar lack of stringency in the proposal for standards for the preservation of audio history. Remember, we want to replicate the actual sounds heard by people of the various eras. First of all, it seems to be rather socially biased to specify "... original equipment that gives optimum reproduction ...."<sup>6</sup> Indeed, there ought to be various qualities of equipment available, depending on whether the social setting is in a downtown bar, in the Music Room of the Vandeschnitzels, or by the river at a summer picnic with portable phonograph. Similarly, we must require that an original phono cartridge of the era be used with electrical recordings<sup>7</sup> in those cases where that was required, as opposed to the still wide-spread use of acoustic playback. Otherwise the illusion will go away.

There is no contradiction and no guesswork whatsoever when dealing with audio history.<sup>8</sup> The original equipment of the era will tell exactly what "these records were once supposed to sound like," and this is certainly, by definition, "audio history," provided the original equipment is in correct working order. It cannot be denied that the recordings may carry more information that may make contemporary replay more lifelike than "intended" or originally obtainable, but by definition that is going outside the stated purpose of this type of rerecording.

Rather than trying to argue against what are basically good engineering suggestions, I would like to define a framework in which they are meaningful. It should be pointed out that exactly the same considerations are being discussed in the International Association of Sound Archives Technical Committee.

It becomes necessary to strive for several types of rerecording, one of which should be recommended for inter-archival exchange (distribution) or for perusal in lieu of the valuable original (preservation).

The intention must be to provide the researcher with a secondary source which is equal (or at least equivalent) to the original source in as many respects as possible. Indeed, a physical replica might be preferred, or at least imagined for the sake of the argument. If we take one side of an old disc recording, we might obtain a replica by making a negative impression in a suitable polymer, one that will release the original after impression and which does not contribute any graininess of its own, and then make a further positive from that. Or one might do what was certainly performed in the early days of acoustic recording: grow a metal negative from the disc recording for use as a stamper in a fine-grain compound. However, we shall use a different approach, that of electrical rerecording disc-to-disc.

Suppose that we want a replica, a disc record having exactly the same undulations of the groove as the original. Obviously, we shall have to provide synchronous movement of the reproducing stylus in the original groove and of the cutting stylus on the copy lacquer (acetate). We may even want to have independent signals, left and right, which requires a stereo pick-up and stereo cutter, although obtaining identical groove profiles will be a problem. We also shall have to provide synchronous

rotation of the two turntables. However, the actual speed used in this process is immaterial. Now, what replay characteristic, or de-emphasis, should we use for the pick-up? The correct answer is "the inverse of that of the cutterhead we are using in this transfer process." It may come as a surprise that we are independent of the pre-emphasis used on the original recording, but this is logical since we know exactly for what we need the signal from the pick-up. Our only requirement shall be that the movements are identical.

In practice we would not go to the extreme of preparing this kind of a replica. We would go to an intermediate medium. Now, of course, we shall be at a loss with respect to which replay characteristic to use, since we do not know to what it should correspond. In effect, the problem becomes one of signal-to-noise ratio, and of documentation of the replay characteristic used. A standard would define one particular characteristic for the transfer function from the tip of the stylus to the preamplifier output. What is important is to have the possibility, even from a secondary source, of determining stylus displacement or velocity at a given point in time of the original recording. A standard would, in effect, prescribe the overall response of pick-up-with-preamplifier, and calibration would have to ensure that differences in the pick-ups available to archives were compensated for by the preamplifiers. Therefore, standards only constitute one way of obtaining traceable results. Individual information would do just as well.

Another parameter which now needs definition is the replay speed of the original; there is no synchronization as in the replica case. Again standards might be applied, but then one must have the certainty that the performance of each link is up to that standard. Indeed, the whole endeavor has as its goal that two secondary sources, two rerecordings, created at different times and possibly from identical original sources extant at two archives should be equivalent in all respects.

Given the above, and now adding my own experience to philosophy, I would prefer individual calibration to standards. In fact, I would envisage "mechanical" calibrating signals as inputs to the rerecording apparatus, to be recorded onto the secondary medium at the beginning and/or the end of the sound recording so transferred. Calibration, or, information as to the transfer function which constitutes the total replay characteristic, is obtained in the following manner. A record with grooves of the same overall dimensions as the original but having sharp, randomly distributed pulses, is played with the same stylus, pick-up and preamplifier. Analyzing the spectral distribution of the signal at the output of the preamplifier will give the required information. Similarly, the output from the secondary source would take into account the quite probable non-uniform characteristic of both the rerecording and the replay tape recorders used. Provided that a suitable sweep time were provided, a calibrated frequency sweep record could also be used. However, this introduces still another characteristic to account for: the recording characteristic of the frequency sweep record. I have avoided this problem by using a grainy coarse-groove record with a non-modulated groove.<sup>9</sup> Such records are quite scarce, and in the event that the ideas outlined in this paragraph were introduced as a standard procedure in archival exchange, one would have to press such records in grainy material.

I already have a solution to the speed calibrating problem in the shape of another calibrating record which was described by me in the *Phonographic Bulletin*.<sup>10</sup> The basic idea calls for recording a signal onto the secondary medium which indicates the speed of the reproducing turntable of the original. I have given the outer

band of the speed calibrating record a signal, the frequency of which is 10 times the rpm. When the record is revolved at 78.0 rpm, the frequency is 780 Hz. As in the case of the replica, the actual speed of rerecording becomes immaterial, provided the user of the secondary source has access to a variable speed tape machine and a frequency counter. Indeed, the correct speed of reproduction is often a point under discussion, and the user may by research determine a certain speed as "correct" by varying the speed of the secondary source, and then measuring the frequency of the calibrating signal to give the "correct" speed of the original source expressed in rpm. This procedure would work on any generation tape copy.

To sum up my considerations concerning preservation and distribution rerecording, I would prefer half-speed, or possibly 33 1/3 rpm because it is readily available, stereo rerecording with transfer function and speed calibrating signals preceding and following each selection. It may be noted that using this method would allow one to make a "replica" of the original, even from a rerecorded secondary source, provided the signal-to-noise ratio of the rerecording process is sufficient.

One should consider the kind of rerecording described above as the most basic and academic. But the introduction of standard calibration signals, rather than standards with their associated tolerances requiring expensive calibrating equipment, will not put undue burdens on the archives.

I have already given above some thoughts on the concept of audio history. It is extremely important to provide this kind of rerecording for the benefit of those archives who do not possess early replay equipment. Also, it is useful in film production for creating the correct atmosphere. One argument in favor of even more widespread use of this kind of rerecording is that the recordings definitely were made to sound pleasing on certain contemporary equipment. However, then we would have to oblige the Victor Talking Machine Co. in reproducing their records at 78 rpm although they were recorded at 76 rpm. It will not be possible to obtain the same effect by changing the speed of the secondary sound carrier, since the transfer function of the reproducing diaphragm and horn will then have acted on the wrong frequencies compared to that which Victor prescribed.

However, it would indeed be possible to obtain a reasonable approximation to the historic sound from a rerecording made according to the archival case above, by suitable electro-mechanical driving means for an acoustic reproducing system. But the converse definitely would not be true. Even though a transfer function calibration signal might be recorded through the microphone in the listening room, the reverberation would destroy the one-to-one relationship.

I think that I have sufficiently described why no place exists in inter-archival exchange for rerecordings mainly directed towards restoration. Their range of usefulness is simply too limited. I firmly believe that restoration of sound, whether it be "audio history" or "artist unmasking," is of prime importance when evaluation of a recording is to be performed. Indeed, I have contributed suitable techniques myself.<sup>11</sup> However, evaluation is not a main archival function, nor is equipment, including calibrated loudspeakers and listening rooms, readily available at each and every archive. On the other hand, mass-produced calibration records to be used in a prescribed manner would be within the reach of virtually all archives, who may then make use of a much wider range of equipment, most likely already available in-house. A further advantage accrues from the procedure outlined above, in that future contributions to the technological history of sound recording will not make archival rerecordings of today obsolete. Restoration will be made in a next "re-rerecording" step.

### CONCLUSIONS

I feel that the concepts of one kind of rerecording for "audio history" and one kind for "artist's sound" are both valid, provided it is realized that the first cannot supply raw material for the latter, and provided the first is made coherent by using a number of relevant pick-ups/soundboxes to re-create diverse listening situations.

I firmly believe that the proper raw material for the two kinds of rerecording is any rerecording made under known conditions, but I do not subscribe to the necessity of calibration of equipment to certain standards. Rather, I would suggest the provision of standard calibration signals to be recorded along with the rerecording itself, in order to obtain at any later date, at any later generation copy of the rerecording, the total influence of the whole range of equipment and sound carriers that have been put between the original and the copy under evaluation. The above conclusions are a natural consequence of a unified view of the responsibilities of an archive.

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### NOTES

<sup>1</sup> This paper is a comment on William D. Storm, "A Proposal for the Establishment of International Rerecording Standards," *ARSC Journal* 15, no. 2-3 (1983): 26-37.

<sup>2</sup> George Brock-Nannestad, "Letter to the Editor," *Phonographic Bulletin*, no. 30 (July 1981): 45-47, commenting on William Storm, "Reply," *Phonographic Bulletin*, no. 30 (July 1981): 49.

<sup>3</sup> Storm, "A Proposal," 29, para. 4.

<sup>4</sup> Storm, "A Proposal," 28, para. 5.

<sup>5</sup> Storm, "A Proposal," 29, para. 2.

<sup>6</sup> Storm, "A Proposal," 30, para. 6.

<sup>7</sup> Storm, "A Proposal," 31, para. 2.

<sup>8</sup> Storm, "A Proposal," 32, para. 2.

<sup>9</sup> Brock-Nannestad, "Horn Resonances in the Acoustico-Mechanical Recording Process, and the Measurement and Elimination in the Replay Situation," *Phonographic Bulletin*, no. 32 (March 1984): 39-43.

<sup>10</sup> Brock-Nannestad, "An Aid to Calibrated Rerecordings," *Phonographic Bulletin*, no. 32 (March 1982): 53.

<sup>11</sup> Brock-Nannestad, "Horn Resonances," 39-43. 