

# Technical Committee Reports

## MINUTES OF THE MEETING OF THE DIGITAL AUDIO TECHNICAL COMMITTEE

*Date: 1983 October 7*

*Time: 1900 hours*

*Place: New York Hilton, New York City*

*Present:* Bart Locanthy (Pioneer North America)  
*Chairman,* H. Arisaka (JVC), D. Bennett (CBC), R. Blinn (Capitol/EMI), B. Blüthgen (Polygram), T. Doi (Sony), R. Finger (CBS), H. Ford (H. F. Engineering), H. B. Hadden (Broadcast News, Ltd.), A. Heaslett (Ampex Corp.), C. Henocq (ITC/3M), K. Ishida (Matsushita), M. Jones (Neve), M. Kato (Matsushita), T. Kogure (Matsushita), A. Kurahashi (Matsushita), P. Ladegaard (Brüel & Kjaer), L. Manno (Eng. Consit.), J. Nunn (BBC), B. Pisha (Audio Elect. Lab.), D. Ranaganada (*Stereo Review*), T. Shelton (BBC Designs), T. Stockham (Soundstream), K. Tanaka (Mitsubishi), H.

Tendeloo (Polygram), E. Torick (CBS Technology Center), S. Traiman (RIAA), B. Waggoner (Grass Valley Group), Alain Weisser (TDF/EBU), T. Yazawa (Sony), R. Youngquist (3M).

**1** After introduction of the attendees, the chairman reported on the status of the AES recommended practice: *Preferred Sampling Frequencies for Professional Digital Audio Application*. The first item in the report concerned the voting by the executive committee of the Digital Audio Technical Committee. There were two abstentions and one negative vote, which the chairman attempted to resolve, and being unsuccessful forwarded the AES recommended practice to S4 and to the AES Technical Council. At the time of the meeting the document in S4 was out for voting and, concurrently, with the AES Technical Council and ANSI.

**2** The next item on the agenda was a report from Alastair Heaslett regarding the status of activities in his working group on digital input/output (I/O) interface. Alastair reported that after some additional editorial work, the document can be passed on to the AES Technical Committee on Digital Audio, probably by the end of 1983, and certainly before the 75th Convention in Paris. He said there is a small problem concerning electrical parameters, and a subgroup was appointed specifically to generate the final input on this subject. Tim Shelton is the volunteer subchairman, and Alain Weisser, Martin Jones, Roger Lagadec, Toshi Doi, and Kuni Tanaka are assisting in the task.

The final item on the agenda of the I/O interface working group concerned system synchronization. Tim Shelton presented a document to the working group on system synchronization. Mr. Heaslett felt that this topic should be taken up at the technical committee level and said he would make such a recommendation.

Mr. Heaslett's final comment was that he would circulate his edited I/O interface document among the working group members and wait for a period of one month to receive other comments on it before completing the final document which would then be submitted to the technical committee.

**3** Item three on the agenda was a report from Roger Lagadec concerning measurement techniques for digital audio. Dr. Lagadec reminded us that at the meeting in Eindhoven five subworking groups were initiated. The first subworking group relates to large-signal behavior of conversion systems, both analog to digital (A/D) and digital to analog (D/A). The second subworking group was on small-signal behavior; the third was on intermodulation effects; the fourth was on phase measurement, and the fifth had to deal with the issues of channel-to-channel coherence.

The first subworking group prepared two reports: 1) general guidelines for measuring A/D and D/A conversion systems, and 2) a proposal for the definition of levels in digital audio within the framework of 24-

bit digital-to-analog systems.

The second subworking group also participated in the preparation of the two aforementioned reports.

The report of the third subworking group on intermodulation was in the form of two individual contributions from two members. The report from the fourth subworking group was in the form of a report by its chairman on how to measure phase in digital audio conversion systems.

The chairman of the fifth group submitted a report saying that in his view, and the view of his organization, there was no point in having a group investigate the issues of channel-to-channel coherence because the issue had been dealt with in depth at the BBC. His report was supplemented by references to technical literature. It was the opinion of the working group as a whole that there was no point in pursuing the issue further. Technical points having to do with special areas, such as clock purity, could be handled by the fourth subworking group which is now considering phase measurement techniques.

In total, three documents were submitted (in addition to the above-mentioned report on the nonexistence of the issue of channel-to-channel coherence). One contained general guidelines for measuring digital audio conversion systems. This was discussed extensively and a number of amendments to it were proposed. Another was on the possible proposal for defining the levels of digital audio signals, and the third was a paper on phase measurement techniques to be presented at the 74th Convention.

With reference to the tasks of the subworking groups, the group on large-signal behavior of conversion systems will present a report at the meeting in Paris, and this report should offer some amendments and discussions to be submitted to a vote approximately a year from now. It is hoped that the subworking group on small-signal behavior will reach the same goal, although this is a much more difficult issue. The hope has also been expressed that the third working group on intermodulation effects, whose members are from the United States exclusively, will reach the ambitious goal of presenting a report that can be amended and submitted to a vote one year from now.

Also, a suggestion was made that liaison with the corresponding working groups within the IEEE should be undertaken.

**4** The next item on the agenda was new business, and Chairman Locanthy presented his views regarding a letter received from Mr. Tanaka relative to the minutes of the previous technical committee meeting. The chairman had indicated in the notes of the previous technical committee meeting that the principal reason for the lack of a consensus in Mr. Heaslett's working group on I/O interfacing was caused by a weakness in the protocol, which was evidenced by possible errors when using a test cable length of 200 meters, and he had stated that the group had previously settled on a cable of that length. Elsewhere, the maximum cable

length was indicated as being 150 meters. A lack of a precise definition of cable length has led to confusion.

Suggestions were recently heard that the maximum cable length of 100 meters should be considered as being possible without equalization, so perhaps we are getting farther away from the gray area. Therefore, there is reasonable consensus on the document at this time. With some degree of luck, as voiced by Mr. Heaslett, we should see a copy of a proposed I/O interface document in early 1984.

The second item under new business was also presented by Chairman Locanthy. He indicated that he was still disturbed by the attempts of some record companies to pursue an engineering means of handling anti-piracy matters. The chairman's personal opinion was that if governments would back up any reasonable laws against piracy, and would make the penalties great enough, piracy could be discouraged.

One private report made to the chairman was that someone had encountered a Compact Disc from which it was nearly impossible to make a cassette tape copy that, on playback, would not produce objectionable and strange sounds. Clearly, this could happen if strong high-frequency signals near the upper limit of the CD were recorded on the disk. These signals would cause saturation and result in intermodulation products which would fold back into the low-frequency portion of the spectrum. The chairman's opinion was that the presence of additional high-frequency spurious signals recorded with program material on the CD would reduce the overall dynamic range. Furthermore, some people with good high-frequency hearing would also hear these undesirable signals coming directly off the CD itself.

The third item under new business concerned the lack of clear labeling on CDs to indicate the nature of the original master recording. The chairman found that the term "digitally mastered" often meant that the original recording was made on analog tape and mastered digitally to be transferred to the CD. The analog tape in some cases was rather old, and also very noisy. In England there are very strong laws governing how things are labeled, and it was the observation of the chairman that most English CDs clearly indicated whether or not the original recording was digital.

Concerning this point, Steve Traiman of the RIAA said that they are trying to get their members to indicate specifically if the record was made from an analog master or a digital master tape.

Han Tendeloo indicated that in order to clarify the nature of the original recording, Polygram was going to drop the term "digital mastering," and was going to label their disks "digital recording," to indicate that the master was initially a digital recording. They intend to do more to show the history of the recording, i.e., whether it is truly a digital recording or whether the mixdown was done to a digital tape.

David Ranada of *Stereo Review* raised the question of nomenclature and said there is confusion when reading foreign magazines on digital audio matters. There is also a lot of confusion in looking at the U.S. literature.

He also voiced concern about the labeling of controls on CD players, and has volunteered to coordinate the issuing of a dictionary of terms for digital audio and/or guidelines for language to describe various aspects of CD players, pressing operations, and manufacture, to reduce the present ambiguities.

Mr. Clegg also seconded Mr. Ranada's comments about nomenclature. He said that, although he is very familiar with the operation of CD players, in a store that sold approximately six different brands he experienced some difficulty in determining which buttons to press to obtain some functions, and the store salesman was unable to provide any assistance. So, it is very clear that there is a lack of congruity in terminology on the equipment itself, as well as on the disk, and perhaps even in the recording studio some terminology problems exist. Therefore, we have a technical communication problem to solve.

Mr. Heaslett commented that the labeling of disks and hardware are probably matters not strictly within the purview of the AES, and perhaps these matters might better be addressed by the Institute of High Fidelity. Also, those in the consumer standards field should become involved.

David Ranada volunteered *Stereo Review* to publish any set of terms agreed upon by the vendors of CD systems. However, he has not seen any documents, nor have any been offered to the press, on terms used in CD mastering and player manufacturing, although some terms have been defined in various AES papers.

The chairman noted that the AES Digital Audio Technical Committee had started quite some time ago to define digital audio terminology, and Tom Stockham was going to head up a committee for this purpose. When queried on this point, Dr. Stockham replied that a working group on digital audio terminology was started about three years ago, and he did volunteer to chair it, but he became inundated with other projects and could not continue. From the points of view of the members of the Digital Audio Technical Committee, the terminology problem seemed to resolve itself and members were able to communicate fairly well. The problem now seems to be that digital technology has reached a new community—a much broader one—and they need to know what the terms mean.

Dr. Stockham said that he would be happy to pass on to Mr. Ranada the data which he had accumulated on digital audio terminology. Mr. Tendeloo said that many terms have been on the table for some time at Polygram and they have been standardized within the company. He said that he would be happy to supply information concerning the terminology available within Polygram to Mr. Ranada. Toshi Doi said that many technical terms describing the CD were issued jointly by Philips and Sony to their licensees, and it is his feeling that if the licensees used these specifications and terms there would be less confusion. Dr. Doi also expressed the opinion that in a short time there will be updated specifications concerning CD master tapes.

The chairman asked Dr. Doi if the labels on the CDs

now coincide with the information distributed to the licensees by Philips and Sony. Dr. Doi replied that the labeling problem may not be covered by this information. He said he would investigate the matter and report his findings to the committee.

Dr. Lagadec said that it is imperative to get our terminology straight. He noted that two items in the press concerning the concept of error correction seemed to indicate a lot of confusion. In both cases the authors seemed to believe that digital audio was not acceptable because error correction took place. In all of our understanding of error correction, when the errors are detected and corrected, the corrected information is an exact replica of the original input data and is, therefore, perfect. Therefore, Dr. Lagadec said he is awed when members of the press comment on the undesirability of error correction. The committee agreed that we have a responsibility to make it very clear to people in the press that we record data with redundancy. We expect all recording media to have errors of some kind or other, and the purpose of error correction is to detect errors in the system so that the output data is indeed an exact replica of the original input data. The usual analog recording media (tapes, disks, etc.) do produce errors of one kind or other—distortion, dropouts, clicks and pops—and analog systems do not correct these errors. Digital audio systems can eliminate these kinds of problems. Furthermore, both tape and disk systems with analog audio have minute variations in speed during the recording and playback process so we are subject to wow and flutter, which is absent in the CD system.

Hugh Ford commented that having listened to Dr. Lagadec's complaints about the publicity and the misinformation in the press, he wanted to make a plea on behalf of the press that they be given more information on CD-related matters. Mr. Ford said that if one attends these conventions, some information is assimilated. However, most people do not attend these conventions and therefore have only sketchy data. Practically nothing is forthcoming from manufacturers and he finds it extremely difficult to get information on the system. It also appears that some of the producers of the CDs have been using incorrect subcode titling, etc. Mr. Locanhi appointed David Ranada as chairman of a working group on terminology, and there were offers of assistance from Tom Stockham, Han Tendeloo, and Hugh Ford.

Dr. Lagadec mentioned that there will be a standard format for the transmission of digital audio data in the shape of an "AES/EBU format." One item has been left undecided in this format; how the user's data will be put to proper use. He also said that he and Mr. McNally, of the BBC Research Staff, prepared a paper which was presented at this AES convention (AES preprint 2003). This paper concerns a proposal for the possible use of user's data in a formatted way. Dr. Lagadec proposed that a working group be formed within the Technical Committee on Digital Audio to investigate digital labels for tracking user's data through transmission and recording systems. This work would

be aimed at a large number of applications, both in the recording and the broadcasting industries. The existing paper on labels by McNally and Lagadec would certainly be a possible input to this working group, but would by no means be considered as limiting the scope of the group.

The chairman noted that a motion is before the committee to set up a working group for handling "labels." John Nunn of the BBC replied that he would largely support the formation of a working group to investigate the use of labels, and that within the BBC they are looking at the use of labels for another application. Mr. Nunn said that he could not commit himself at this meeting to being chairman of such a committee, but that if Mr. Locanhi would write him a letter requesting him to do the work, and include some terms of reference for the activities of that group, he would have a speedy answer to the written request. Mr. Locanhi agreed to do that.

The chairman then asked if there was any more new business. Alastair Heaslett noted that in his report on the digital I/O interface working group, one element emerged that indicated a potential need for another working group on the subject of system synchronization. Dr. Lagadec seconded the motion for having a working group on this subject. Furthermore, Dr. Lagadec conveyed his interest in volunteering to participate in such a working group, but not to chair it. The chairman asked for a volunteer for the chair. Tim Shelton said that his problem was similar to that of John Nunn: it is easy to find people to join a working group, but not easy to find someone who has the time and resources to chair such a group. Tim said that he would consider the chair depending on the time schedule of the deliberations of this working group. Mr. Heaslett replied that based on previous experience he estimated it to be three years' work, with some reasonable information being produced in about a year. It would be unreasonable to expect anyone to produce cogent results in less than a year. Tim indicated that under those conditions he would accept the chair.

Mr. Locanhi pointed out that since there was now a working group chairman and one team member—Dr. Lagadec—volunteers from the group would be appreciated. Bruce Waggoner of the Grass Valley Group and Martin Jones of Neve volunteered their services. Björn Blüthgen agreed to be involved, as did Alain Weisser and Dr. Doi. Dr. Doi said that he is interested in being active in both new working groups.

5 The chairman then called for any unfinished business. Since there was none, a motion was made for adjournment. It was seconded, and the meeting was adjourned at 8:20 p.m.

The next meeting of the Digital Audio Technical Committee will be held in connection with the 75th Convention, Paris, on 1984 March 26.

BART LOCANTHI  
Chairman  
Digital Audio Technical Committee