

# Technical Committee Reports

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

Date: 1982 March 3

Time: 1900 hours

Place: Palace Hotel, Montreux, Switzerland

**Present:** Bart Locanthi, Chairman (Pioneer North America), H. Ahrens (Sonopress), K. Altmann (JRT), D. Arditì (IRCAM), M. Arisaka (JVC), W. Aubert (RTBF), M. Batchelor (EMI Studios), B. Bernfeld (Inden), G. Billia (RAI c/o EBU), B. Blüthgen (Polygram), J. Braas (AEG-Telefunken), M. Buehlmann (UNI), T. Doi (Sony), P. Doorn (Polygram), R. Ensminger (3M Co.), H. Ford (Consultant), E. Foster (Diversified Sciences Lab.), T. Griffiths (Decca Research Lab.), G. Hali (EMI), A. Heaslett (Ampex), B. Hertz (Danish Broadcasting), T. Holmes (Philips/Eindhoven), H. Jakubowski (JRT), H. Korrodi (Swiss Broadcasting Corp.), M. Kosaka (Matsushita), M. Kulhan (Supraphon), R. Lagadec (Studer), L. Manno (Consultant), L. Møller (Danish Broadcasting), T. Mori (JVC), J. Nunn (BBC), B. Pisha (Audio Electronics Lab.), M. Polon (UCLA), S. Pramanik (Bang & Olufsen), T. Salava (Tesla-Vust), L. Schmidt (Polygram), J. Serafin (ABC), W. Shelton (BBC Designs), J. Silvera (Swiss Radio), T. Stockham (Soundstream, Inc.), H. Tendeloo (Polygram), E. Torick (CBS Technology Center), G. VanGestel (Philips Research Lab.), K. Voigt (IRT), D. Walstra (Polygram), A. Weisser (TDF), C. Wesdorp (Philips/Eindhoven).

Before the introduction of the attendees, the chairman noted corrections to the minutes of the Digital Audio Technical Committee meeting held in New York on 1981 November 2 (published in *JAES*, vol. 30, no. 4 ([1982 April]).

1 The first item of the agenda was the listing of the members of the Executive Committee of the Digital Audio Technical Committee: G. Billia (EBU), B. Blesser (Consultant), R. Blinn (Capitol Records), B. Blüthgen (Polygram), K. Davies (SMPTE/CBC), T. Doi (Sony), M. Fujimoto (JVC), J. Gibson (SMPTE), T. Griffiths (Decca), A. Heaslett (Ampex), T. Iwashita (PEC), T. Kogure (Matsushita), T. Kohler (N.A. Philips), M. Kosaka (Matsushita), R. Lagadec (Studer), B. Locanthi (Pioneer North America), A. MacPherson (Warner Records), J. G. McKnight (MRL), T. Mizoguchi (NHK), T. Soma (TBS), K. Tanaka (Mitsubishi), E. Torick (CBS Technology Center), T. Stockham (Soundstream), M. Strong (SMPTE), A. Weisser (Telediffusion Francais), T. Yamamoto (Pioneer), R. Youngquist (3M Co.).

The chairman noted that in the few cases in which an

organization has more than one member on this committee, those organizations will have only one vote each. 2 As promised at the previous meeting, working groups to assist in the preparation of draft proposal were established and chairmen were appointed, as follows:

2.1. Sampling Frequency Considerations: chairman, Emil Torick.

2.2 Input/Output (I/O) Interfacing: chairman, Alastair Heaslett.

2.3 Digital Audio System Performance Measurement Techniques: chairman, Roger Lagadec.

Item two on the agenda was a report from Emil Torick on the status of his working group on sampling frequency considerations. He had not assembled a committee yet, but noted that the resolution he made at the previous Digital Audio Technical Committee Meeting of 1981 November 2 (as modified by the group at that time) was reported in many trade publications (see *JAES*, vol. 30, no. 5 [1982 May]). He was in the process of sending this proposal to several people who have been very active in sampling frequency studies for comment, including T. Doi, A. Heaslett, J. Gibson, T. Kogure, and others, and would report on the results at the next AES meeting.

Mr. Torick will use ANSI and IEC procedures as guidance in the preparation of his draft proposal.

Two new items came up which need attention before he can release the draft:

a) Terminology—T. Stockham, as leader of WG5 (IEC) concerning terminology, agreed to provide help and would be *pro tem* chairman until a permanent one could be found.

b) Mr. Torick had received a letter from Chris Siocos, Vice Chairman of Study Group 11, CCIR, and Chairman, Technical Committee, North American National Broadcasting Association, on television broadcasting concerning EBU recommendations to adopt a 32-kHz sampling frequency for systems requiring a 15-kHz audio bandwidth.

Mr. Siocos objected to adopting the 32-kHz sampling frequency because no input had been received from anyone operating in the North American continent.

Mr. Kosaka (Matsushita) noted that 48 kHz was fine as a professional sampling frequency and suggested that the AES should deal with consumer as well as professional digital audio equipment. As secretary of WG18, IEC, he asked the AES Digital Audio Technical Committee to discuss matters concerning consumer applications. He strongly recommended using the same sampling frequency for consumer as well as professional equipment. He noted that the previous AES recommendation appeared to recommend 44.1 kHz as the sampling frequency for consumer applications (other than compact disks). He strongly recommended 48 kHz as the sampling frequency for other consumer applications. He asked the committee to further consider sampling

frequencies for consumer applications. The chairman replied that this matter should be discussed under Item 4 of the agenda (other business).

Mitsubishi/IEG Telefunken handed the chairman their joint proposal indicating that while 50.4 kHz is their preferred sampling frequency, they felt that they will compromise to 48 kHz as a workable and acceptable sampling frequency for professional equipment and 44.1/44.056 kHz for submastering sampling frequencies.

Dr. Doi, reading from the minutes of the previous AES Digital Audio Technical Committee meeting, noted that 48, 44.1 and 32 kHz were accepted professional sampling frequencies.

3 The third item on the agenda was a report from Mr. Heaslett on the results of his working group meeting in Montreux on I/O interfacing.

He has eight principal working group members and five alternate members. They had three proposals for I/O interfacing before them:

- A) Doi/Lagadec (Sony/Studer)
- B) Tanaka (Mitsubishi)
- C) Weisser (EBU)

It was hoped that Lagadec and Weisser would be able to resolve the differences between A) and C) with a single proposal.

The working group agreed on a tentative scope of activity for submittal to the Digital Audio Technical Committee covering:

- a) Format, structure, and protocol;
- b) Interconnect distance;
- c) Interconnect media and hardware;
- d) Sync protocol; and
- e) Line protocol

Two specific work assignments were made:

- 1) M. Jones agreed to prepare a report on connector hardware for single-cable shielded twisted pairs.
- 2) R. Lagadec and A. Weisser agreed to try to consolidate the Studer/Sony and EBU I/O interface proposals into a single one before the Technical Committee meeting that evening.

When Mr. Heaslett finished his report, Messrs. Lagadec and Weisser reported that they had successfully consolidated their two proposals for I/O interfacing into a single one. Dr. Doi indicated that there were some minor differences left, but he saw no difficulty in resolving them. He also agreed to see if he and Dr. Tanaka could similarly resolve the Mitsubishi and Sony/Studer/EBU proposals into a new single proposal.

4 Other Business: Mr. Kosaka requested that the Technical Committee consider consumer digital audio products as well as professional digital audio products.

In the spring of 1981, at the Prague IEC meeting, there were proposals for six or seven sampling frequencies for professional machines and the sampling matter was in a state of chaos. Fortunately, this problem was nearly resolved with the proposed number of sampling frequencies reduced to two at our Technical Committee meeting last November.

Considering the imminence of consumer digital audio products (the compact digital audio disk player this

fall), we do not have much time to clear up pending problems on consumer digital audio products relating to sampling frequency and I/O interfacing considerations. Professional and consumer products will have to interface with each other, and Mr. Kosaka requested that the AES Digital Audio Technical Committee consider both types of products.

Since the first mass-produced consumer digital audio item which will reach the market is the compact disk machine, the chairman asked if anyone could explain the reasons for the selection of 44.1 kHz for this product.

Dr. Doi responded that 44.1 kHz was the minimum sampling frequency for a 20-kHz response, the size of the disk was already fixed at 12 cm, and that a recording time of at least 70 minutes on one side was necessary (Beethoven's 9th Symphony requires over 70 minutes).

H. Tendeloo added that there is considerably more recording time possible on each side of a conventional LP record than is ordinarily used and the compact disk should have at least that potential.

Mr. Kosaka noted that 44.1 kHz was decided upon for the compact-disk sampling frequency before the professional sampling frequency matter was settled. He added that 44.1 kHz might be decided upon for all consumer digital audio products, in which case the consumer would be deprived in the future of having the improved performance possible by the higher sampling frequency of 48 kHz.

Mr. Torick replied that only six months ago the number of contending sampling frequencies was reduced from seven or eight to two. There are now three options:

- 1) Move ahead according to the 1981 November proposal for two sampling frequencies;
- 2) Reduce the scope of the November 2nd document defining 48 kHz as the only professional sampling frequency;
- 3) Adopt a resolution pleading with Sony to reconsider their firm position on 44.1 kHz as the sampling frequency for the compact disk.

Mr. Heaslett recalled the 1977 Digital Audio Technical Committee meeting in Snowbird, Utah, during which a plea was made to the Japanese delegates to:

- 1) Consider the interrelationships of the professional recording industry to the consumer disk and the broadcast industry worldwide;
- 2) Make the consumer disk have a format compatible with professional formats;
- 3) Make the sampling frequency of the consumer disk compatible with that of professional applications.

At the 1977 meeting they had hoped to prevent the dilemma which we are now facing. Heaslett remarked that we possess the options mentioned by Mr. Torick. Mr. Tendeloo said that it is not Sony against the world, but Polygram in consortium with them as well. 48 kHz is a bad decision, he said, because it wastes 10% of recording space compared to 44.1 kHz. He added that too much work has been done for 44.1 kHz and they

were past the point of no return. A one-time conversion from 48 kHz just before disk mastering is bearable by Polygram. He suggested a fourth option was to eliminate 48 kHz and adopt only 44.1 kHz. He reminded us that the Polygram position paper presented to us in New York last November had 48 kHz, 44.1 kHz, and also 32 kHz as professional sampling frequencies.

Mr. Weisser replied that while a single transcoding operation from 48 kHz to 44.1 kHz is not a big problem for the recording companies, it is a quite different problem for broadcasters using the compact disk—they will need a transcoder for each station.

Mr. Blüthgen replied that it looks as if the consumer will have to cope with all three frequencies: 48 kHz, 44.1 kHz and 32 kHz.

The question was then raised about sampling frequencies for consumer digital audio compact cassette recorders.

The chairman noted that there was no agreed-upon standard as yet, but 44.1 kHz and 33.6 kHz were currently being used.

Dr. Lagadec remarked that since 33.6 is close to 32, perhaps 32 kHz should be proposed for the digital audio compact cassette recorder. Mr. Kosaka said that there were many excellent reasons for selecting 48 kHz as the preferred sampling frequency for professional recorders and we should not foreclose for the future the better performance available from the higher sampling frequency to users of consumer products. Furthermore,

the cost of the additional transcoding operations required by professional sampling frequencies will have to be borne by the consumer for all future time. Dr. Lagadec replied that consumer digital audio products should have a minimum number of sampling frequencies, and perhaps future consumer products should use 48 kHz and 32 kHz. Unfortunately, we may be faced with 44.1 kHz for the compact disk.

Mr. Kosaka noted that 44.1 kHz, and not 48 kHz, for the compact disk is a business decision and not a technical one. This in perspective should be a small problem to overcome considering the long-term effects of the confusion and cost forced on consumers worldwide.

The last matter discussed concerned user participation in the AES Digital Audio Technical Committee meetings. Comments from Tendeloo, Griffiths, Blüthgen, Ford, and Stockham indicated that attempts through APRS and SPARS had been fruitless so far, perhaps because the industry is very new and there are not enough people and equipment operating in the professional field yet.

Before the meeting adjourned, the chairman discussed the coming Digital Audio Conference sponsored by the AES in Rye, New York, 1982 June 3 through June 6.

The meeting was adjourned.

BART LOCANTHI  
*Chairman*