

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.  
 1791 Tullie Circle, N.E./Atlanta, GA 30329  
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TC/TG/TRG MINUTES COVER SHEET

(Minutes of all TC/TG/TRG Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

**NOTE: THESE DRAFT MINUTES HAVE NOT BEEN APPROVED AND ARE NOT THE OFFICIAL APPROVED RECORD UNTIL APPROVED BY THIS TECHNICAL COMMITTEE.**

TC/TG/TRG NO.: TC 2.6

DATE: 11 May 2004

TC/TG/TRG TITLE: Sound and Vibration

DATE OF MEETING: 25 & 26 January 2004

LOCATION: Anaheim, California, USA

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Courtney Burroughs	2003	Norm Broner	2003	Charles Arnold
Ted Carnes	2001	Geoff Leventhall	2003	Richard Barlia
Mark Fly	2002	Eric Rosenberg	2001	Jason Bobruk
Rob Lilkendey	2003			Erica Bowden
Jerry Lilly	2001	CORRESPONDING		Duane Brown
Patrick Marks, Vice Chair	2002	Robert Ajemian	2002	Costas Christofi
Sally McInerney	2001	Peter Baade	1991	Bob Essner
Matt Murello	2002	Richard Batherman	1983	Mike Franklin
Tom Paige, Secretary	2002	Steven Black	2002	Leon Kloostra
Karl Peterman, Chair	2003	Russ Cooper	2001	Greg Meeuwssen
Doug Reynolds	2000	John Dunlap	1999	Paul Meisel
Bill Rockwood	2000	Ron Eligator	1999	Patrick Murphy
Kenneth Roy	2003	Bill Fearon	2000	Cornelis Overweg
Mark Schaffer	2001	Mike Froelich	1998	Steven Ryherd
Robert Simmons	2002	Barrie Graham	1991	Michael SantaMaria
Jason Swan	2003	Art Hallstrom	1991	Robert Schmitt
Lily Wang	2002	Basel Jurdy	1996	John Sofra
		Reggie Keith	1999	Dutch Uselton
CORRESPONDING MEMBERS		Howard Kingsbury	1999	Kenric Van Wyk
Warren Blazier	1999	Richard Kolano	2002	Zhiping Wang
Curt Eichelberger	2002	Thomas Kung	2000	Steve Wise
Charles Francis	1999	Neil Moiseev	2003	
Dick Godfrey	2002	Matt Nelson	2002	
Brian Guenther	2003	John Paulauskis	2003	
William Kowald	2002	Paul Saxon	1996	
Pat Lama	1996	Jia Shaobo	2000	
Patrick Oliver	2003	William Stewart	2000	
Kim Osborne	1999	Karen Thrasher	2003	
Rich Peppin	2001	Terry Tyson	2003	
Robert Schmidt	1995	William Waeldner	1990	
		Stephen Woessner	2003	

**DISTRIBUTION:**  
All members of TC;  
TAC section head: Fredrick A. Lorch  
All liaisons: K. William Dean, Charles G. Arnold, Paul W. Cabot, Ronald E. Jarnagin, Nadar R Jay Jayaraman, David F. Lewis, Stanley A. Mumma, Claire B. Ramspeck, William W. Seaton, Michael R. Vaughn

**MEETING MINUTES FOR  
ASHRAE TECHNICAL COMMITTEE 2.6 – SOUND AND VIBRATION  
25 & 26 JANUARY 2004  
ANAHEIM, CA**

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## Attendance List:

Not all attendees are listed here, and some information is incomplete. In attendance at various sessions:

<u>Name</u>	<u>Affiliation</u>	<u>E-Mail Address</u>
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Courtney Burroughs	ARL/Penn State University	cbb2@psu.edu
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Pat Lama	Mason Industries	info@mason-ind.com
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Michael SantaMaria	McKay Conant Brock Inc.	msantamaria@mcbinc.com
Charles Arnold	HDR	carnold@hdrinc.com

## Meeting Minutes: Main Meeting of TC2.6 - Sound and Vibration 2:15 pm 1/26/2004

By Tom Paige, TC Secretary

1. Karl Peterman, committee chair, called the meeting to order at 2:15 pm.
2. All present, including members and guests, introduced themselves.
3. Minutes from the last meeting (Kansas City, June 2003) were posted on the Internet at the TC 2.6 Home Page. One correction was reported for these minutes. In Item 6, CHAIR'S REPORT it was Ken Roy who is on the TC 2.1 RP-1128 monitoring committee, not Lily Wang. The roster of official voting members was reviewed and then a vote was taken to approve the minutes as corrected. The vote was unanimous approval.
4. MEMBERSHIP – Charles Francis reviewed the current state of the committee membership. Bill Rockwood and Doug Reynolds will move from voting to corresponding members after the Nashville meeting. Sally McNerny announced that she would be stepping down as a voting member after Nashville and will become a corresponding member. The 2004-2005 roll-over roster will have 15 voting members and 2 international members. It is desirable to maintain a balance between consulting, academic and manufacturing representatives. Karl Peterman reviewed the duties of the various classes of membership. Voting members must first be corresponding members for at least a year. The committee is currently seeking more members from the academic and manufacturing sectors. Emanuel Mouratidis, Steve Wise and Randy Zimmerman were upgraded to corresponding members for the 2004-2005 roster. New member applications were received from Mike Franklin, Zhiping Wang and Costas Christofi.
5. SECRETARY'S REPORT – Tom Paige asked the subcommittee chairs to supply their respective minutes within 5 to 10 working days for inclusion in the main meeting minutes. From now on, all meeting minutes and agendas will be posted on the TC 2.6 Web site and everyone will receive an e-mail notice of the posting, including a hyperlink to the proper page.
6. CHAIR'S REPORT – Karl attended the Section 2 chairs' meeting. ASHRAE got some feedback that the handbooks generally are not as reliable as they used to be. We need to spend some effort to keep the handbooks more up to date. ASHRAE will be providing websites to all TCs. Karl asked for feedback on the Yahoo Groups mailing list server TC 2.6 is currently using. Karl indicated that ASHRAE is planning to make downloadable copies of program presentations available. These would be copied during the speakers' lounge review. TC 2.6's concern was that there was no review by the TC members. Jason Swan added that it would take about 2 weeks to post the presentations so there was time to notify ASHRAE if changes were required. The presentations would be posted for 1 year. At this point, David Underwood, the chair of the 2005 Fundamentals Handbook subcommittee, asked to say a few words. Manuscripts will be voted on for the fundamentals handbook on March 22, 2004. David is also our fundamentals handbook liaison. August 2, 2004 is the deadline for submissions for the CD handbook. Next year members will receive both the printed handbook and a searchable CD. A 4-volume CD handbook with electronic enhancement files will also be available starting next year. Karl added that the handbook committee wants a common thread among chapters, with the same project being used as an example in all chapters. ASHRAE headquarters will serve as the first example.
7. OPERATIONS – Patrick Marks gave the Operations subcommittee report. The Bylaws, Honors and Awards, and Long-Term Planning subcommittees had not met and there was nothing to report. Several liaison reports were presented: TC 2.1 – Ken Roy gave an update on Lily Wang's building temperature and noise trade-off research project (RP-1128). TC 2.7 – Robert Simmons gave an update on SPC 171P, Standard Method of Test of Seismic Restraints. TC 5.1 – Mark Fly reported on two new research projects, the first regarding system effects on vaneaxial fans and the second regarding system effects on DWDI centrifugal airfoil and BI fans. TC 5.2 – Ted Carnes reported that the SPC-70 standard on inlets and outlets (GRDs) should be ready soon, and work is being done on SPC-130. Ted is addressing the acoustical aspects. VISCMA – Robert Simmons reported that 3 good books are being published geared toward installation and field-inspection of seismic restraints. Also, there are articles that can be downloaded from the VISCMA website regarding the pitfalls of internal isolation, and understanding the IBC Code. AMCA – Tom Paige reported that the certified ratings program for duct silencers was launched by AMCA on November 15, 2003. The corresponding document, AMCA Publication 1011-03, was also revised at that time. Silencer testing under the program is being conducted at Intertek in Cortland, NY.
8. STANDARDS – Rich Peppin reported his appointment as ASHRAE representative to ASA Committee S12 (American National Committee on Noise). He thanked TC 2.4 for helping make this possible. He will make sure TC 2.6 members have insight and input into all S12 standards and related ISO/ANSI standards that are developed or reviewed. ARI – Rich voted negative on behalf of ASHRAE on ARI 260 (reference sound source) based on input from TC 2.6 members, in particular one strong negative vote. ANSI – Rich reported that the ANSI sound power standards are in a state of limbo. Specifically, the ANSI S12.51 series, which are Nationally Adopted International Standards, are probably being dropped. There were several questions and a discussion regarding the ISO 374 series, and ANSI S12.30 series of standards. The chair recommended a Standards subcommittee meeting (45 minutes) to be scheduled for further discussion at the next meeting.
9. RESEARCH – 879-RP: Jerry Lilly reported that he received a copy of the final report from Norm Broner. Some changes will be requested and the Project Monitoring Subcommittee will vote on the report. This will take about a month. After the PMS accepts the report it will be sent to all TC 2.6 voting members for an e-mail vote. A paper on Norm's work must be presented, but not

necessarily by Norm himself. This could also be a poster session paper. 1026-RP: The final report for the plenum research project has been approved, and two papers on this work will be presented in Nashville. 1128-RP: The research project by the University of Nebraska was mentioned earlier by Ken Roy. 1216-TRP: Mark Fly spoke on this research project earlier (Inlet effects on DWDI fans). 1218-RP: Bill Rockwood reported on the numerical methods kick-off meeting. The contractor, Dr. Andy Seybert gave a demo of the capabilities of the boundary element method for acoustical calculations, and presented the guidelines for modeling. The first phase is the modeling of 5 unlined plenums, then one plenum with 1" and 4" lining, and next the effect of non-rigid walls. Three elbow configurations will also be modeled, and a duct terminating into a room (plenum). The data output will be spreadsheets. The Project Monitoring Subcommittee consists of Bill, Sally McInerny, Pat Marks and Warren Blazier. The subcommittee will need 2 hours at the Nashville meeting. 1314-WS: Mark Schaffer reported that the research project on end reflection will be funded. It will go out for proposals in March and contractor recommendation in Nashville. Mark also reported that the work study on elbow attenuation would not yet have been reviewed. 1219-TRP: The research project to quantify duct rumble also got approved for funding. Some action is required before Nashville. Ken Osborn volunteered to reword the work statement to make it clearer. Mark reported that, at the Research subcommittee meeting held that morning, the voting results for highest priorities of RTARs were: Tonality (Tom Paige), Silencer System Effects (to be drafted by Pat Marks) and the Attenuation of Lined Ducts Longer and Shorter than 10 Feet. Mark Schaffer added that RTARs must now show the quantitative benefits of the proposed work (number of people helped, number of \$ saved, or number of dB reduced). Also, there is a new form for the PMS to fill out, the ASHRAE Research Project Analysis. At the end of a project, the PMS must write a report on the value of the research. (See subcommittee minutes below for additional details.)

10. **SOUND CRITERIA** – Ted Carnes reported that the subcommittee had a semi-closed session on Sunday. Guests were invited to attend but not participate actively. Seven of the nine subcommittee members attended. Their objective is to divide the criteria method into 3 categories: design, commissioning and trouble-shooting. The group wants to use one criteria rating, probably RC. The tangency method doesn't meet our needs. Some designers are using HVAC background noise for sound masking but this is not reliable. Ted commented that the research work Doug Reynolds is doing will be helpful in evaluating criteria methods. Ted requested a 1-hour slot at the Nashville meeting. (See Criteria minutes below for additional details.)
11. **VIBRATION ISOLATION** – Jerry Lilly reported that results of previous measurements of high frequency performance of rubber pads were reviewed at the subcommittee meeting, and data for new testing with spring isolators was presented.
12. **SOUND MEASUREMENTS IN ROOMS** – Jerry Lilly reported on the progress made to date. There will be two classes of measurements: survey and engineering. More measurement locations are required for the latter. The procedure will be made into a standard format. Ken Roy will do some tests at Armstrong.
13. **MISCELLANEOUS** – Karl Peterman reported that ASHRAE has asked for research ideas on homeland security.
14. **PUBLICATIONS** – Fundamentals Handbook – Courtney Burroughs reported that all comments received had been considered and only a few needed discussion at the Publications subcommittee meeting that morning. As a result, some minor changes will be made, and the final draft will be ready by mid March 2004. Some of the figures are also being revised. The Publications subcommittee had voted unanimously to accept the chapter with 2 identified revisions: one to the noise criteria table and the other to the interpolation method between NC rating curves (eg NC-43). Jason Swan made a motion, seconded by Pat Marks, to accept the Fundamentals chapter with the 2 revisions. The vote was unanimous with 15 affirmative and no negative votes. Courtney Burroughs was congratulated for a job well done. We now need someone to volunteer to chair the 2007 Applications, Chapter 47, Handbook subcommittee. Other Publications: Practical Guide to Noise and Vibration Control – Mark Schaffer reported that he received comments on his first draft and he will be making the revisions by March 1, 2004. Karl added that Mark's book is one of the best selling ASHRAE publications. TC 2.6 has to approve Mark's book before it goes out. Karl announced that we need to check relevant articles in publications that were not approved by our committee.
15. **SOFTWARE** – Brian Guenther reported that ASHRAE has approved the Acoustical Analysis Software project and a Project Monitoring Subcommittee has been formed. The scope was reviewed at the subcommittee meeting that morning. A vote was taken to approve the scope. There were 14 votes in favor and 1 negative vote. Doug Reynolds requested that the scope be distributed to all members. Brian requested a 1-hour slot at the next meeting. (See subcommittee minutes below for additional details.)
16. **PROGRAMS** – Jason Swan reported that the results of the first "shoot-out" were in. Agreement in the low-frequency bands was quite close. In this example the return-air path was blocked. The test results will be posted on the TC 2.6 website. Jason is working on Shoot-Out #2 which will have an open return-air path. Jody Dunlap of ASHRAE publications has requested information on the shoot-out. A seminar on portable classroom acoustics, chaired by Lily Wang was scheduled for Wednesday. For the upcoming meeting in Nashville, a symposium on plenums and their fans, chaired by Mark Fly was planned, and also a seminar on heat pumps, chaired by Sally McInerny. A seminar on grilles, registers and diffusers is also in the works. A "hot topic" session on tonality, by Jerry Lilly is also planned for Nashville. For the Orlando meeting in January 2005, Steve Wise will chair a symposium on low frequency noise. The papers must be reviewed by August 6, 2004. (See subcommittee minutes below for additional details.)
17. **NEW BUSINESS** – Courtney Burroughs announced a call for papers for the 2004 Noise-Con conference in Baltimore.

18. FUTURE MEETINGS – Next main TC meeting will be in Nashville, Tennessee, 27 June 2004.
19. ADJOURNMENT – The meeting was adjourned at 4:15 PM.

## **Subcommittee and Working Group Meetings:**

### **RESEARCH SUBCOMMITTEE MINUTES (Submitted by Mark Schaffer)**

**ASHRAE TC 2.6 Research Subcommittee Meeting  
Sunday January 25, 2004, 3:30 to 4:30 PM  
Anaheim, CA - Hilton Hotel, El Capitan B Meeting Room**

These meeting minutes were written on April 29, 2004 and include additional information gathered as of this date.

#### **ONGOING RESEARCH – RP's, TRP's and ASHRAE-Funded WS's**

879-RP: Low Frequency Criteria - Jerry Lilly reported that he received a copy of the final report from Norm Broner. Some changes will be requested and the Project Monitoring Subcommittee will vote on the report. This will take about a month. After the PMS accepts the report it will be sent to all TC 2.6 voting members for an e-mail vote. A paper on Norm's work must be presented, but not necessarily by Norm himself. This could also be poster session paper.

1026-RP: Plenum Attenuation - The final report for the plenum research project has been approved, and two papers on this work will be presented in Nashville.

1128-RP: Combined Effects of Temperature and Noise - The research project was awarded to the University of Nebraska-Lincoln.

1216-TRP: Inlet effects on DWDI fans – Mark Fly reported that ASHRAE has not awarded this project to a contractor because of a dispute from one of the bidders.

1218-RP: Numerical Methods - Bill Rockwood reported on the numerical methods kick-off meeting. The contractor, Dr. Andy Seybert at the University of Kentucky, gave a demonstration of the capabilities of the boundary element method for acoustical calculations, and presented the guidelines for modeling. The first phase is the modeling of 5 unlined plenums, then one plenum with 1" and 4" lining, and next the effect of non-rigid walls. Three elbow configurations will also be modeled, and a duct terminating into a room (plenum). The data output will be spreadsheets. The Project Monitoring Subcommittee consists of Bill Rockwood, Sally McInerny, Pat Marks and Warren Blazier. The subcommittee will need 2 hours at the Nashville meeting.

1219-TRP: Duct Rumble due to Fan/Elbow Interaction – Neither of the 2 original proposals was accepted by the PES, and ASHRAE re-issued the RFP in March. If proposals are received in May they will be sent to our PES for review and the recommendation of a successful bidder at the Nashville meeting.

1314-WS: End Reflection - Mark Schaffer reported that the research project will be funded and will go out for proposals in March. Proposals will be received in May, and our PES will be expected to review the proposals and recommend a successful contractor at the Nashville meeting.

#### **FUTURE RESEARCH - RTARs**

The TC voted to prioritize our research interests in the following order:

- Tonality (14 votes) – Tom Paige will write this RTAR
- Silencer System Effects (14 votes) – Pat Marks will write this RTAR.
- Attenuation of Lined Ducts Longer and Shorter than 10 Feet (10 votes) – Jerry Lilly will write this RTAR.
- Duct silencer testing using E477 versus E90 (6 votes)
- Duct silencer design guidelines (3 votes)

- Sound fluctuations (3 votes)
- Vibration isolator performance at high frequencies (3 votes)
- Criteria – topic unidentified (0 votes)

Mark Schaffer added that RTARs must now show the quantitative benefits of the proposed work (number of people helped, number of \$ saved, or number of dB reduced). Also, there is a new form for the PMS to fill out, the ASHRAE Research Project Analysis. At the end of a project, the PMS must write a report on the value of the research.

## **SOUND CRITERIA SUBCOMMITTEE MINUTES (Submitted by Ted Carnes)**

### **Indoor Sound Criteria Subcommittee Meeting Highlights**

#### **2004 Winter Meeting January 25<sup>th</sup> in Anaheim, CA**

The meeting was more open as compared to the closed meeting in Kansas City.

26 signed the attendance sheet.

There are three general uses of Indoor Room Criteria. These are generally Design, Commissioning, and Troubleshooting aspects.

For this meeting we concentrated on the Design aspects. Then at the next two meetings we will concentrate on Commissioning (Nashville meeting) and finally Troubleshooting and Diagnostics (Orlando meeting).

Ted Carnes provided a short presentation on –  
Acoustic Design and Construction Process Narrative  
Establish Acoustic Criteria  
Sound Criteria Usage – Design, Commissioning, and Diagnostics and Troubleshooting

### **Open Discussion**

Open discussion was held on use of sound criteria for Design. Some highlights are as follows:

Most sub-committee members and others would like to be able to use a single criteria method for design, commissioning, and troubleshooting and diagnostics but no one was sure on which one.

A number of sub-committee members felt that while sound quality needed to be considered, that a tangent type determined criteria would work for design.

A RC curve that is not necessarily Neutral could still be acceptable.

Do not rely upon HVAC sound for speech privacy masking.

### **Related Research**

Erica Bowden provided update on University of Nebraska Omaha research project on effect of HVAC type sound on worker performance in a mock-up setting. The test room has been completed and initial testing will occur in the spring semester. Results should relate to sound criteria.

Doug Reynolds provided update on University of Nevada Las Vegas (UNLV) research project on worker environmental effects including sound in 30 office buildings. The initial phase of the testing will begin in the spring. Some ASHRAE TC 2.6 members will be asked to assist with project. Results will be related to what sound criteria best describes the office work environment.

RP-879 test results with respect to sound criteria may not provide any really new information but could provide some confirmation on use of room criteria.

Everyone was invited to attend meeting in Nashville.

## **SOFTWARE SUBCOMMITTEE MINUTES (Submitted by Brian Guenther)**

TC2.6 Subcommittee: Acoustical Analysis Software

Minutes from Meeting on January 26, 2004, 10:15am - 10:45am

Bob Hanna, president of Hands Down Software (HDS), presented an overview of his company, a brief history of the software project and a review of the agreed upon scope. (See scope below). New issues raised included:

1. Should the algorithms be in database format, not hard-coded, to enable ease of future changes?
2. Uncertainty disclaimers need to be added. (Bob will need our specific direction on this)
3. Limits and error checks need to be established. (Bob will need our specific direction on this)
4. It would be nice for the software to be structured for 1/3 octave band data. This can be a future modification, but Bob needs to consider this in his program structure now. We will use full octave data for the first release.

HDS will begin work on the project immediately after the Anaheim meeting and provide regular updates to the PMS. The PMS consists of Brian Guenther (chair), Jason Swan, Matt Murello, Mark Fly, Jerry Lilly, Mark Schaffer, and Bill Rockwood.

The PMS will meet next at Nashville in June 2004.

Respectfully submitted,

Brian Guenther

**Scope as at August 8, 2003**

### **ASHRAE Software Phase I: Indoor Sound Prediction Software for HVAC Systems**

**Target User:** For use by HVAC designers at system design stage.

**Purpose:** Predict sound in occupied spaces generated by indoor HVAC systems. Compare to sound criteria.

**Benefit:** Enable user-friendly acoustical system prediction/analysis. Easy to change/modify as HVAC system design changes. Easy “what-if” scenarios.

**Scope:** Multi-path system analysis to be done in order from source to occupied space. System analysis includes the following components:

1. Sound sources
  - a. Fans (input data from mfrs)
  - b. AHUs (input data from mfrs)
  - c. VAV boxes (input data from mfrs)

- d. Fan coil units
- 2. Duct System Elements - attenuation
  - a. Return air opening in MER wall
  - b. Plenum
    - i. New algorithms from ASHRAE TRP 1026
    - ii. Concrete, bare metal and 1-4" lining
  - c. Straight duct – rect & round
    - i. Lined
      - 1. internally 1" or 2"
      - 2. externally
    - ii. Unlined
    - iii. Flex
  - d. Elbow duct fittings – rect & round
    - i. Radiused or mitered; w/ and without turning vanes
      - 1. Lined 1" or 2"
      - 2. Unlined
  - e. Duct breakout c/w ceiling plenum IL/TL
  - f. Silencers (input data from mfrs)
  - g. Branching
  - h. End reflection
  - i. Room Effect (point source and distributed array)
- 3. Duct System Elements – airflow generated noise
  - a. Plenum
  - b. Straight duct – rect & round
    - i. Lined
    - ii. Unlined
    - iii. Flex
  - c. Elbow duct fittings – rect & round
    - i. Lined
    - ii. Unlined
  - d. Silencers (input data from mfrs)
  - e. Take-offs, transitions, and other duct fittings
  - f. Terminal devices (input data from mfrs)
- 4. Compare predicted level(s) to sound criteria (NC, RC Mark II, NCB, dBA)
  - a. Graphical output
  - b. Look up table of criteria guidelines for space types
- 5. Functionality
  - a. Ability to calculate return, supply and breakout paths simultaneously
  - b. Data presented in eight octave bands from 63Hz to 8kHz
  - c. Show calculation results as-you-go
  - d. Option to export to spreadsheet
  - e. Graphical output including system layout diagram
  - f. Ability to store library of components (e.g. fans, AHUs, VAV boxes, silencers, etc.)
  - g. Ability to save, modify and copy systems
  - h. Ability to save unlimited systems within project file
- 6. Include look up table of design guidelines such as mechanical room location, maximum velocities for duct, fittings, etc.
- 7. Reporting
  - a. On screen and printer output
  - b. Include project info, tagging, given inputs, selected components, attenuation/sound power of component, resultant sound power immediately following component
  - c. Graphical plotting of results vs. criterion

**Not part of phase I scope:**

- Outdoor acoustical analysis
- Chillers, cooling towers, air-cooled condensers, pumps
- Architectural paths/treatments including floating and non-floating floors/ceilings, MER walls, windows and other barriers
- Vibration isolation

**PROGRAMS SUBCOMMITTEE MINUTES (Submitted by Jason Swan)**

**ASHRAE Winter Meeting, Anaheim, California – Programs Subcommittee Meeting**

Sunday, 25 January 2004, 10:00 AM

**I This Meeting – Anaheim, California, 24 to 28 January 2004**

Programs

1. Seminar: A New Classroom Acoustics Standard ... But What About Portable Classrooms? (Lily Wang)  
Wednesday, 28 January 2004, 8:00 AM, Room 212A/B  
David Lubman, David Lubman & Associates  
Thomas J. Phillips & Peggy L. Jenkins, California Air Resources Board  
Patrick Marks, Intertek  
Mark Schaffer, Schaffer Acoustics  
Darren Jorgensen, JE Compliance Services (Unable To Attend)
2. "Shoot-Out" #1 – Results and Discussion, 11:00 AM, Sunday 25 January 2004  
Results to be compiled and loaded on website.

**II Next Annual Meeting – Nashville, Tennessee, 26 to 30 June 2004**

Seminar Paperwork Due 13 February 2004

Programs Slated:

1. Seminar: Acoustical Characteristics / Application Methods for Water to Air Heat Pumps (Sally McInerny)
2. Symposium: Plenums and Their Fans (Mark Fly)  
*2 papers planned from TC research project (Emanuel Mouratidis, Karl Peterman)*  
*1 paper from Governair (Kim Osborne)*
3. Internal Current Issue: Pure Tones in HVAC (Jerry Lilly) **needs 45 minutes**

Programs subcommittee:

- Discussion of second Shoot-Out exercise (**needs 1 hour**)
- Plan for upcoming year and a half (**needs 1 hour**)

**III Next Winter Meeting – Orlando, Florida, 5 to 9 February 2005**

Symposium Papers Due 2 April 2004

Seminar Paperwork Due 6 August 2004

Slated (establish priority)

1. Symposium: Low Frequency Noise Effects on People (Steve Wise)  
Presentation of Vipac research (Norm Broner)  
Presentation of University of Nebraska research (Erica)  
Presentation from Leventhall  
Presentation of Swedish research (Kersten)
2. Seminar: Noise from Grilles, Registers, & Diffusers (Mark Schaffer)
3. Seminar: Pure Tones in HVAC (Jerry Lilly)

**V. Upcoming Meetings**

- Annual Meeting '05 – Denver, Colorado, 25 to 29 June 2005 (Papers due 24-Sep-04, Paperwork due 18-Feb-05)
- Winter Meeting '06 – Chicago, Illinois, 21-25 January 2006
- Annual Meeting '06 – Quebec City, Canada, 24-28 June 2006

**VI. STATUS OF PROGRAM TOPICS "IN THE HOPPER"**

[Equipment Series] Small Fan Coils  
Noise Fluctuations (Jerry Lilly)  
Commercial Refrigeration (Pat Marks)  
Ultra-Quiet HVAC and Plumbing (Tom Paige / Rob Lilkendey)  
Under-floor Air Systems (Doug Reynolds)  
Sound Quality (Lily Wang)  
"Forgotten" Equipment: Noise from Boilers, Transformers, etc. (Pat Marks)  
Frequency Characteristics of Compressors (Bill Rockwood)