

# Inter-Noise 89

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Jiri Tichy, Graduate Program in  
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State University, University  
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## GENERAL

### THE 20 YEAR PLAN FOR POLISH NOISE CONTROL.

Zbigniew Engel and Jerzy  
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### VDOT NOISE ABATEMENT POLICY: A JOINT VENTURE IN HIGHWAY NOISE CONTROL.

A.C. Anday, Virginia  
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## EMISSION: NOISE SOURCES

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### NOISE GENERATION BY GAS FLOW IN A PIPE WITH AN

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Matsunori Nara, DND Co.,  
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### NOISE CONTROL AND THERMAL MANAGEMENT IN HIGH DENSITY ELECTRONIC PACKAGING BY THE USE OF AIR MOVER SPEED CONTROLS.

William M. Veazey and Warren  
R. Kundert, Control Resources,  
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### SOME WAYS OF UTILIZING A FAN DATABASE.

Egons K. Dunens, Control Data  
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### SUBSONIC AXIAL FLOW FAN NOISE AND INFLOW VELOCITY DISTURBANCE.

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### NOISE CONTROL OF THE ENGINE COOLING FAN.

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M. Terao and H. Sekine,  
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### NOISE REDUCTION EFFORTS ON VANEAXIAL COOLING FANS USED IN AIRCRAFT.

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### THE DESIGN AND DEVELOPMENT OF A LOW NOISE DC MOTOR DRIVEN CENTRIFUGAL FAN.

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Kh. Eghtesadi, Pitney Bowes Corp, Norwalk, CT, USA.

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**FLUIDBORNE NOISE OPTIMISATION OF AN EXTERNAL GEAR PUMP.**  
F. Busatti and G. Miccoli, CEMOTER, National Research Council, Cassana, Italy.

**LOW FREQUENCY ACOUSTIC EMISSIONS FROM LARGE HORIZONTAL AXIS WIND TURBINES.**  
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**NOISE CONTROL FOR CYCLONE DUST COLLECTOR SYSTEMS.**  
Albert G. Duble, Acoustical Engineer, Newberg, OR, USA.

**THE QUIET TYPEWRITER.**  
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**ANALYSIS OF DOT-MATRIX PRINTER NOISE.**  
Ryosuke Ugo and Jun Fujimoto, NEC Corporation, Kawasaki, Japan.

**NOISE REDUCTION OF A DOT MATRIX PRINTER.**  
Yoji Okazaki and Yumio Nitta, Toshiba R&D Center, Kawasaki, Japan.

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D.N. May and M.A. Simpson, Douglas Aircraft Company, Long Beach, CA, USA.

**EVALUATION OF INTERIOR NOISE PREDICTION PROCEDURES FOR UDF-POWERED COMMERCIAL AIRCRAFT BASED ON EXPERIMENTAL MODAL ANALYSIS.**  
Steven E. Marshall, Boeing Commercial Airplanes, Seattle, WA, USA.

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**AIRCRAFT CABIN ENCLOSURE.**  
Herbert L. Kuntz, Robert J. Gatineau and Roland A. Prydz Lockheed Aeronautical Systems Company, Burbank, CA, USA.

**QUANTIFYING THE SOUND POWER GENERATED BY A HELICOPTER MAIN TRANSMISSION ON A REGENERATIVE TEST STAND.**  
Wm. Mark Hardesty and Benjamin F. Hudson, McDonnell Douglas Helicopter Co., Mesa, AZ, USA.

**ADVANCED TURBOPROP AIRCRAFT FLYOVER NOISE ANNOYANCE.**  
David A. McCurdy, NASA Langley Res. Ctr. Hampton, VA, USA.

**EXTERIOR NOISE OF THE MCDONNELL DOUGLAS UHB DEMONSTRATOR.**  
D.N. May and J. P. Meade, Douglas Aircraft CO., Long Beach, CA, USA.

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Richard P. Woodward, Irvin J. Loeffler, Richard J. Ranaudo, NASA Lewis Research Center, Cleveland, OH, USA.

**CONTROLLING UDF (R) ENGINE NOISE.**  
B.A. Janardan and P.R. Gliebe acoustic systems technology, GE Aircraft engines, Cincinnati, OH, USA.

**UNSYMMETRICAL BLADE-SPACING: PROPELLER NOISE REDUCTION WITHOUT PERFORMANCE PENALTY.**  
Werner Dobrzynski, German Aerospace Research Establishment (DLR), Braunschweig, FRG.

**ROCKET NOISE - REVISITED.**  
S.A. McInerney, California State Univ., Long Beach, CA, USA.

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Bernard Troclet, Aerospatiale, Les Mureaux, France.

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V. TANDARA, Technische Beratung, Berlin, Federal Republic of Germany.

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## PHYSICAL PHENOMENA

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ENROUTE NOISE TEST PRELIMINARY RESULTS.

William L. Willshire, Jr., NASA Langley Research Center, Hampton, VA, USA and Donald P. Garber, Planning Res. Corp., Hampton, VA, USA.

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M.M. Boone, Delft Univ. of Technology, Delft, the Netherlands and E.A. Vermaas, DGMR, The Hague, the Netherlands.

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D.J. Oldham and M.A. Rowell, Univ. of Sheffield, Sheffield, united Kingdom.

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Leonard L. Koss and Uri Siovitz, Monash Univ., Clayton, Australia.

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K. Yamamoto, K. Taya and M. Yamashita, Kobayasi Inst. of Phys. Res. Tokyo, Japan and K. Tanaka, Japan public Highway Corp., Tokyo, Japan.

INFLUENCES OF COVERING MATERIALS ON THE NOISE REDUCING EFFICIENCY OF A BARRIER WITH ABSORBING EDGE.

Kyoji Fujiwara, Kyushu Institute of Design, Fukuoka, Japan.

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R. Meneses and J.L. Bento Coelho, Inst. Sup. Technico, Lisbon, Portugal.

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Henry E. Bass, Walton McBride, John Noble and Richard Raspet, Physical Acoustics Research Group, Univ., MS, USA

NOISE AND THE BLUE ROUTE.

Harvey S. Knauer, Pennsylvania dpt. of transportation, St. Davids, PA, USA.

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Yves H. Berthelot, Georgia Institute of Technology, Atlanta, GA, USA.

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J. Dickey and G. Maidanik, David Taylor Res. Ctr., Annapolis, MD, USA, and J. Ertel, U.S. Naval Academy, Annapolis, MD, USA.

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Michael P. Mereness, Metropolitan Waste Control Comm., St. Paul, MN, USA, and Loren Pitts, Transco Prod., Inc., Chicago, IL, USA.

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J. Hood, Env. Noise Control, Waltham, MA, USA, and S.A. Kidwell, Commonwealth Edison Co., Chicago, IL, USA.

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**PREDICTION, MINIMIZATION AND CONTROL OF BLAST-INDUCED GROUND VIBRATIONS.**

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Colin G. Gordon and C. Hal Amick, Acentech Incorporated, Canoga Park, CA, USA.

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Wang Xiaogang, Taiyuan Univ. of Technology, Taiyan, China and C.H. Ku, Xian Jiaotong Univ., Xian, China.

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VIBRATION CRITERIA FOR HUMAN PERCEPTION AND DAMAGE TO RESIDENTIAL BUILDINGS DURING CONSTRUCTION OPERATIONS.

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AIRCRAFT NOISE INDUCED BUILDING VIBRATION AND EFFECTS ON HUMAN RESPONSE.

Clemans A. Powell and Kevin R. Shepard, NASA Langley Research Center, Hampton, VA, USA.

VIBRATIONS AND AIRBLAST IMPACTS ON STRUCTURES FROM MUNITIONS DISPOSAL BASTS.

David E. Siskind, Bureau of Mines, Minneapolis, MN, USA.

VIBRATION CONSIDERATIONS IN ZONING.

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A.J. Brammer and J. E. Piercy, National Research Council, Canada.

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Setsuo Maeda, Osaka, Japan.

IMMISSION: PHYSICAL ASPECTS OF ENVIRONMENTAL NOISE

NOISE PREDICTION AND CONTROL IN MICROELECTRONIC CLEAN ROOMS.

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NOISE CONTROL FOR THE ORANGE COUNTY PERFORMING ARTS CENTER.

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Muneshige Nagatomo, Tohoku Univ., Sendai, Japan Shoichi Kajima, kajima Corp., Tokyo, Japan and Masanori Tano, Kajima Inst. of Construction Tech., Tokyo, Japan.

SOUND INSULATION OF SINGLE WALLS.

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Knut S. Nordby, NORCO, Tucson, AZ, USA.

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B.M. Gibbs, Liverpool Univ., Liverpool, UK, and Y.A. Balilah, King Abdulaziz Univ., Jeddah, Saudi Arabia.

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Anders Agren and Carin Johansson, Lulea Univ. of Technology, Lulea, Sweden.

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PLUMBING NOISE IN BUILDINGS.

Earl Mullins, Paoletti/Lewitz/

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NOISE CONTROL AT THREE HAZARDOUS TOXIC WASTE CLEANUP AND INCINERATION SITES IN ILLINOIS, USA.

Greg Zak, Illinois Environmental Protection Agency, Springfield, IL, USA.

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Vincent Mestre, Mestre Greve Associates, Newport Beach, CA, USA.

A REVIEW OF AIRCRAFT NOISE CONTROL MEASURES AT THE BURBANK AIRPORT.

Dwight E. Bishop, Acoustical Analysis Associates, Inc., Canoga Park, CA, USA.

STAPLETON INTNL. AIRPORT: A CONTRAST IN NOISE ABATEMENT TECHNIQUES, PREFERENTIAL RUNWAY USE SYSTEM AND AIRCRAFT NOISE LIMITATION PROGRAM.

Steven R. Alverson, Stapleton International Airport, Denver, CO, USA.

FIFTEEN YEARS OF NOISE CONTROL AT LOGAN INTERNATIONAL AIRPORT.

Larry Coleman, Massport, Boston, MA, USA and Kenneth McK. Eldred, KEE Engineering, Concord, MA, USA.

JOHN WAYNE AIRPORT: AN EXAMPLE OF NOISE CONTROL, THE METHODS AND THE RESULTS.

Vicent Mestre, Mestre Greve Associates, Newport Beach, CA, USA and Karen L. Robertson John Wayne Airport, Costa Mesa, CA, USA.

LOW LEVELS OF AIRCRAFT NOISE FROM EXPANDED EAST COAST PLAN OPERATIONS.

James R. Muldoon, Port Authority of NY & NJ, New York, USA, and Robert Miller, Harris Miller Miller Hanson, inc., Lexington, MA, USA.

RESIDENTIAL SOUNDPROOFING AND PROPERTY ACQUISITIONS: TWO APPROACHES TO COMPATIBILITY PLANNING NEAR ATLANTA'S AIRPORT.

Joe A. Carroll, Airport Noise Abatement Program, Hartsfield Atlanta International Airport, Atlanta, GA, USA.

NOISE INDUCED VIBRATION OF DWELLING CONSTRUCTION AROUND THE AIRPORT.  
Y. Tokita, Aircraft Nuisance Prevention Association Center, Tokyo, Japan and H. Ogawa, Kobayasi Inst. of Physical Res. Tokyo, Japan.

THE EFFECT OF AIR TRAFFIC INCREASE AND PHASING OUT OF STAGE 2 AIRCRAFT ON THE NOISE EXPOSURE AROUND AIRPORTS.  
U. Isermann, K. Matschat and E.-A. Muller, Inst. fur Stromungsforschung, Göttingen, FRG and V. Nitsche, Flughafen Dusseldorf, FRG.

AIRPORT NOISE CONTROL: NEW ZEALAND'S RADICAL NEW APPROACH - THE "AIRNOISE BOUNDARY" PRINCIPLE.  
Philip Dickinson, Department of Health, Wellington, New Zealand

RESEARCH GOALS FOR IDENTIFICATION AND SUBSTANTIATION OF A RATIONAL AIRCRAFT NOISE DESCRIPTOR SYSTEM RELEVANT TO HUMAN ANNOYANCE BY AIRCRAFT NOISE.  
Maurice A. Garbell, M.A.G. Associates, San Francisco, CA, USA.

THE EFFECT ON AVIATION NOISE OF THE SINGLE EUROPEAN MARKET.  
J.B. Large and Michael E. House, The Univ., Southampton, United Kingdom.

THE RELATIONSHIP BETWEEN TRAFFIC NOISE AND FLOW VOLUME IN THE URBAN AREA.  
P.S. Cheung, Taichung, Taiwan.

PROPAGATION OF TRAFFIC NOISE FROM TRUNK ROADS IN URBAN AREA.  
Masaki Hasebe and Kozo Kaneyasu, Hokkaido Univ., Sapporo, Japan.

VEHICLE NOISE EMISSION CHANGES DURING THE PERIOD 1974-1988.  
Ulf Sandberg, Swedish Road and Traffic Research Inst., Linköping, Sweden.

AN ANALYSIS OF TRAFFIC NOISE

PROPAGATION AROUND MAIN ROADS IN TOKYO.  
Takeshi Ishiyama, Kazumasa Tateishi and Tosshiro Arai, Japan Automobile Research Inst., Ibaraki, Japan.

A COMPUTER MODEL (UBSUB) TO APPRAISE ROAD TRANSPORT OPERATIONS, LAND USE PLANNING, ENVIRONMENTAL NOISE POLLUTION AND SOCIAL IMPACT.  
Kadhim S. Jraiw, Hawthorne, Australia.

MEASUREMENT OF ENVIRONMENTAL NOISE.  
Hans G. Jonasson, Statens Provinganstalt Boras, Sweden.

COMMUNITY RESPONSE TO COGENERATION PLANT NOISE: CASE HISTORY.  
Mahabir S. Atwal, Jose S. Ortega, Hooshang Khosrovani, Paul S. Veneklasen & Assoc., Santa Monica, CA, USA.

ONGOING MONITORING PROGRAM FOR COMMUNITY NOISE CONTROL AT A MANUFACTURING FACILITY.  
William E. Biker, BBN Systems and Technologies, Cambridge, MA, USA, and Edwards J. Arnold, Nuclear Metals, Inc., Concord, MA, USA.

NOISE CONTROL CODE FOR CONSTRUCTION SITES IN SINGAPORE.  
Tang Sing Hai, Univ. of Singapore, Singapore.

SOUND CONTROL AT BRITISH OPEN AIR POP CONCERTS.  
J.E.T. Griffiths, Travers Morgan East Grinstead, United Kingdom.

OPEN AIR CONCERT NOISE CONTROL IN NEW ZEALAND.  
Philip Dickinson, Department of Health, Wellington, New Zealand and Nevil Hegley, Hegley acoust. Consultants, Auckland, New Zealand.

HOW LOUD IS TOO LOUD? AN OVERVIEW OF TOURING SOUND REINFORCEMENT SYSTEMS USED IN THE CONCERT INDUSTRY, AND LIKELY FUTURE DEVELOPMENTS.  
David W. Scheirman, Julian, CA, USA.

MONITORING CONCERT SOUND

LEVELS IN THE COMMUNITY THE LOCAL OFFICIALS EXPERIENCE AND VIEWPOINT.  
Ellwyn G. Brickson, HCA/Environmental Health Santa Ana, CA, USA.

CONTROLLING CONCERT SOUND LEVEL EMISSIONS - THE DESIGN AND DEVELOPMENT OF IN-HOUSE SOUND LEVEL MANAGEMENT SYSTEMS.  
Richard G. Cann, Grozier Technical Systems, Inc. Brookline, MA, USA.

RESIDENTIAL NEIGHBORS AND OUTDOOR CONCERT FACILITIES; ARE THEY COMPATIBLE? A CASE STUDY OF THE GREAT WOODS CENTER FOR THE PERFORMING ARTS.  
William J. Cavanaugh, Cavanaugh-Tocci Assoc., Sudburg, MA, USA and Bruce Montgomery, Great Woods Ctr, for the Performing Arts, Mansfield, MA, USA

PRIORITY SETTING FOR ENGINEERING NOISE CONTROLS IN INDUSTRY.  
M.M. Osman And N. Maybee, Ontario Hydro, Toronto, Canada.

NOISE CONTROL BY PLANNING IN A NEW VEHICLE BODY PLANT.  
Juhani Kuronen, Heikki Laitinen, Lappeenranta Regional Inst. of Occupational Health, Lappeenranta, Finland.

IMMISSION: EFFECTS OF NOISE

PROGRAM FOR HEARING CONSERVATION AND NOISE ABATEMENT.  
Ellen Andolf-Steinwall, Stig Vinberg, Christer Hansson and Gita Zimmer, Swedish Foundation for Occupational Health & Safety, Gothenburg, Sweden.

EVALUATION OF FAN NOISE LOUDNESS USING A-WEIGHTED SOUND LEVEL AND ZWICKER'S MODEL.  
S.E. Smith, AT&T Technology Systems, D.A. Quinlan and J.S. Jeng, AT&T Bell Laboratories, and M.G. Prasad, Stevens Inst. of Technology, USA.

NEW MEASUREMENTS OF EQUAL-LOUDNESS LEVEL CONTOURS.  
K. Betke and V. Mellert, Univ. of Oldenburg, Oldenburg, Fed. Rep. of Germany.

**ON THE PSYCHOLOGICAL EVALUATION OF AMPLITUDE-MODULATED SOUNDS.**

Sonoko Kuwano and Seiichiro Namba, Osaka Univ., Osaka, Japan and Takeo Hashimoto, Seikei Univ., Tokyo, Japan.

**IMPLEMENTATION AND USE OF ISO 532B - MEASURING LOUDNESS LEVELS OF BUSINESS MACHINES.**

James R. Wilson, Xerox Corporation, Fremont, CA, USA.

**ON THE DEPENDENCE OF UNBIASED ANNOYANCE ON LOUDNESS.**

Eberhard Zwicker, Technical Univ. of Munich, Munich, Federal Republic of Germany.

**AVERAGE LOUDNESS OF ROAD TRAFFIC NOISE.**

Hugo Fastl, Technical Univ. of Munich, Munich, Federal Republic of Germany.

**LOUDNESS EVALUATION OF IMPULSIVE NOISE.**

Toshio Sone, Yasunori Ogura and Yoiti Suzuki, Tohoku Univ., Sendai, Japan.

**LOUDNESS OF TWO-TONE-NOISE COMPLEXES.**

Rhona Hellman, Northeastern Univ., Boston, MA, USA and Eberhard Zwicker, Technical Univ. of Munich, Munich, FRG.

**NOISINESS OF REPEATED IMPULSIVE SOUNDS : EFFECTS OF BACKGROUND-TO-PEAK LEVEL AND DURATION.**

Takashi Yano and Asato Kobayashi, Kumamoto Univ., Kumamoto, Japan and Kiyoto Izumi, Muroran Inst. of technology, Muroran, Japan.

**AUTOMOBILE NOISE CHARACTERIZATION AND MICROPHONE PLACEMENT STUDY.**

Chandru Butani and James Scheidemann, AT&T, Union, NJ, USA.

**RATTLING OF DOORS GENERATED BY LOW FREQUENCY SOUND IN DWELLINGS.**

H. Ochiai and M. Yamashita, Kobayasi Inst. of Physical Research, Tokyo, Japan.

**LOW FREQUENCY NOISE AND VIBRATION FROM SONIC BOOMS.**

Louis C. Sutherland, Wyle laboratories, El Segundo, CA, USA.

**A-WEIGHTING - IT DOES NOT WORK INDOORS FOR HELICOPTER OR LARGE GUN NOISE; NOISE WITH LOW FREQUENCIES AND LARGE AMPLITUDES.**

Paul D. Schomer, And Brian D. Hoover, Construction Engineering Research Laboratory, Champaign, IL, USA.

**QUANATIFYING SUBJECTIVE RESPONSES TO DISCRETE TONES IN NOISE FROM COMPUTER AND BUSINESS EQUIPMENT.**

G.R. Bienvenue, M.J. Corkery and S. Miscedra, State Univ. College, New Palz, NY, USA and M. A. Nobile, IBM Corp., Poughkeepsie, NY, USA.

**COMMUNITY REACTION TO NOISE FROM POWER STATIONS.**

R.F.S. Job and A.J. Hede, Univ. of Sydney, Sydney, Australia.

**METHODS AND PRINCIPLES TO REDUCE THE NUISANCE OF ROAD TRAFFIC NOISE BASED ON NOISE BARRIERS.**

Ingerlise Amundsen and Anne Underthun Marstein, Public Roads Administration, Oslo, Norway.

**CRITERIA FOR AIRCRAFT NOISE EXPOSURES IN CLASSROOMS.**

Jim Buntin, Brown-Buntin Associates, inc., Fair Oaks, CA, USA.

**NOISE PROPAGATION ARISING FROM INADEQUACIES IN CURTAIN WALLING OF BUILDINGS.**

M.S. Leong, U. of Technology Malaysia, Kuala Lumpur, Malaysia.

**URBAN PLANNING OF INDUSTRIAL AND COMMERCIAL SITES INSIDE AIRCRAFT NOISE INFLECTED AREAS OF AIRPORTS.**

Lothar Prang, Stadtebau-Infrastruktur, Kaarst, Federal Republic of Germany.

**THE ROLE OF NON-ACOUSTIC VARIABLES ON ANOYANCE JUDGMENTS.**

Sanford Fidell, Laura Silvati and Linda Secrist, BBN Systems and Technology, Inc., Canoga Park, CA, 91304.

**THE COMBINED EFFECT OF ROAD TRAFFIC AND AIRCRAFT NOISE ON PEOPLE.**

Anita Lawrence, U. New South Wales, Australia, and A. Putra,

Inst. Teknology Bandung, Bandung, Indonesia.

**THE DEVELOPMENT OF ADVANCED LAUNCH SYSTEM NOISE CRITERIA FOR FUTURE SPACE PORT SITE SELECTIONS.**

Marlund E. Hale, Engineering-Science, inc Pasadena, CA, USA

**MEASUREMENT AND PREDICTION OF HIGHWAY NOISE WITH REGARD TO THE ITALIAN SITUATION : ANALYSIS OF A REAL CASE.**

G. Elia and G. Cerrato, Modulo Uno S.R.L., Torino, Italy and W. Bowlby, Vanderbilt univ., Nashville, TN, USA.

**AIRCRAFT NOISE ANNOYANCE.**

Truls Gjestland, ELAB-RUNIT, Norwegian Inst. of technology, Trondheim, Norway.

**AIRPORT NOISE IMPACT ANALYSIS PROBLEMS.**

Sam R. Lane, Costa Mesa, CA, USA.

**CORRELATION BETWEEN SUBJECTIVE AND OBJECTIVE ANALYSIS OF NOISE.**

Onsy Abdel Alim, Alexandria Univ., Alexandria, Egypt.

**A COMPARISON OF DIFFERENT METHODS OF COMPUTING THE STATISTICAL INDICES.**

J.M. Holding, Sheffield Polytechnic, Sheffield, united Kingdom.

**ANALYSIS.**

**PC-BASED INTEGRATED ACQUISITION AND DATA PROCESSING SYSTEM.**

Jean-Marc Rouffet and Patrick Luquet, Societe Otdb, Villeurbanne, France.

**NEW ACOUSTICAL PRINCIPLE FOR OUTDOOR MICROPHONES.**

Erling Frederiksen and Ole Schultz, Bruel & Kjaer, naerum, Denmark.

**TEMPORARY/PORTABLE AIRCRAFT-NOISE MONITORING INSTRUMENTATION SYSTEMS :**

**PRACTICAL CONSIDERATIONS.** Rob Greene, Orange, CA, USA.

**CONTROL OF A SOUND LEVEL METER USING A SINGLE CHIP MICROCOMPUTER.**

K. Mayes, Cirrus Research, Ltd. Hunmanby, united Kingdom.

**THE USE OF MULTISPECTRUM IN DETERMINING AIRPORT NOISE SOURCES.**

Robert L. Bronsdon, Bruel & kjaer instruments, inc., Marlborough, MA, USA.

**NOISE EXPOSURE METERS FOR THE INTERNATIONAL MARKET.**

Robert Krug, Cirrus research, inc., Wauwatosa, WI, USA.

**A NEW DESIGN FOR A SOUND INTENSITY MEASUREMENT SYSTEM.**

Tao Zhongda, Institute of Acoustics, Beijing, China and A.D. Wallis, Cirrus Research, Ltd., Hunmanby, United Kingdom.

**USING SHORT LEQ IN THE MEASUREMENT AND RATING OF IMPULSIVE NOISE.**

A.D. Wallis, Cirrus research, Ltd., Hunmanby, UK, and B. F. Berry, National Physical laboratory, Teddington, UK.

**MEASURING LOW-FREQUENCY VIBRATION WITH A SHEAR TYPE ACCELEROMETER.**

Anthony P. Nash, Charles M. Salter assoc., San Francisco, CO, USA.

**AN INDEX TO CHARACTERIZE THE PRESSURE-INTENSITY FIELD OF AN ACOUSTIC SOURCE WITH INTERFERENCE.**

W.S. Kim and M.G. Prasad, Stevens Institute of Technology, Hoboken, New Jersey, USA.

**MEASURING THE THREE-DIMENSIONAL ACOUSTIC INTENSITY VECTOR WITH A FOUR-MICROPHONE PROBE.**

L.M.C. Santos, C. C. Rodrigues and J. L. Bento Coelho, CAPS - Institute superior tecnico, Lisbon, Portugal.

**ACOUSTIC INTENSITY MEASUREMENT WITH A PORTABLE PERSONAL COMPUTER.**

Adam Rozwadowski, 01 dB, Villeurbanne, France, and Henri Pepin, CETIM, Senlis, France.

**SOUND INTENSITY/POWER AS A NOISE CONTROL DIAGNOSTIC TOOL.**

Mark A. Lang, Douglas Aircraft Co., Long beach, CA, USA.

**IS OUR CONFIDENCE IN SCANNED INTENSITY MEASUREMENTS**

**JUSTIFIED?**

O.K.O. Pettersson and M.J. Newman, Acoustics Research Center, Trondheim, Norway.

**GUIDELINES FOR THE SELECTION AND PERFORMANCE EVALUATION OF PROBES AND INSTRUMENTS TO MEASURE SOUND INTENSITY.**

G. Krishappa, National Research Council of Canada, Ottawa, Canada.

**TEMPORAL VARIABILITY OF INTENSITY MEASUREMENTS.**

S. Gade, Bruel & Kjaer, Naerum, Denmark.

**BIAS ERROR PRODUCED BY STRONG NOISE IN SOUND INTENSITY MEASUREMENTS.**

M. Recuero, M. Vagureo and C. Gil, univ. School of Engineering, Madrid, Spain.

**APPLICATION OF SOUND INTENSITY SYSTEMS FOR ENVIRONMENTAL NOISE CONTROL.**

Ramani Ramakrishnan, Ministry of the Environment for Ontario, Toronto, Canada.

**SOUND INTENSITY METHOD FOR MEASUREMENT OF NOISE FROM AIR MOVING DEVICES.**

(Special Technical Group Workshop) Steven M. Tarket, Hewlett Packard, Ft. Collins, Co, USA.

**CHANGES OF SOUND POWER OF REFERENCE SOUND SOURCES INFLUENCED BY BOUNDARY CONDITION MEASURED BY THE SOUND INTENSITY TECHNIQUE.**

Hideki Tachibana and Hiroo Yano, univ. of Tokyo, Tokyo, Japan

**THE USE OF SOUND FIELD INDICATORS FOR THE MEASUREMENT OF THE SOUND INTENSITY DETERMINED SOUND POWER.**

Gerhard Hubner, Siemens, Berlin, Fed. Rep. of Germany.

**COMPARISON OF SOUND POWER MEASUREMENT TECHNIQUES FOR MINING DRILLS : SOUND INTENSITY VS ISO 3741.**

Robert R. Stein and Roy C. Bartholomae, U.S. Bureau of Mines, Pittsburgh, PA, USA.

**A NEW METHOD OF MEASURING SOUND POWER LEVEL USING SOUND INTENSITY MEASUREMENT.**

Xu Dian and Zheng Yun, the Second Automobile Works, Shiyao, China.

**SOUND POWER FROM SOUND INTENSITY; RESULTS OF THE ANSI ROUND ROBIN.**

U.S. Shirahatti and M.J. Crocker, Auburn univ., AL and R.J. Peppin, Sxantek, Inc, Rockville, MD, USA.

**SOUND POWER DETERMINATION FROM SOUND INTENSITY : ANSI AND ISO DATA QUALITY INDICATORS.**

U.S. Shirahatti and Malcolm J. Crocker, Auburn univ., AL, USA.

**QUALIFYING INTENSITY MEASUREMENTS FOR SOUND POWER DETERMINATION.**

J. Pope, Bruel & kjaer Instruments, Inc. Marlborough, MA, USA.

**COMPARISON BETWEEN PHASE GRADIENT METHOD AND TRANSFER FUNCTION FOR CHARACTERIZATION OF MATERIALS IN FREE FIELD.**

A. Curti, S. Pauzin and D. Biron, O.N.E.R.T.A., Toulouse, France.

**IMPEDANCE TUBE MEASUREMENT - A COMPARATIVE STUDY OF CURRENT PRACTICES**

W.T. Chu, National Research Council of Canada, Ottawa, Canada.

**ABSORPTION MEASUREMENTS BY POROUS FLEXIBLE MATERIALS.**

Uno Ingard, Mass. Inst. Of Technology, Cambridge, MA, USA, Francis Kirschner, Michael Poldino and John Koch, The Soundcoat Co., Deer Park, NY, USA.

**ABSORPTION MEASUREMENTS OF POROUS SHEET RESONATOR ABSORBER.**

John Koch and Michael Poldino, the Soundcoat Co., Deer Park, NY, USA.

**MEASUREMENT OF THE SPHERICAL WAVE ABSORPTION COEFFICIENT AT OBLIQUE INCIDENCE USING THE TWO-MICROPHONE TRANSFER FUNCTION METHOD.**

Matthew A. Nobile, IBM Acoustics laboratory, Poughkeepsie, NY, USA.



**SOUND ABSORPTION MEASUREMENT FOR ACOUSTICAL MATERIALS - ITS HISTORY AND HEADACHES.**  
Richard K. Cook, Rockville, MD, USA.

**MEASUREMENT OF NORMAL INCIDENCE ABSORPTION COEFFICIENT USING SOUND INTENSITY.**  
J.A. Burks and E.R. Spencer, U.S. Bureau of Mines, Pittsburgh, PA, USA.

**PREDICTION OF THE STATISTICAL ABSORPTION COEFFICIENT FOR MINERAL WOOL MATERIALS.**  
A. Cops, W. Lauriks and L. van Briel, Catholic Univ. of Leuven, Heverlee-Leuven, Belgium.

**MEASUREMENT OF ABSORPTION COEFFICIENTS AT OBLIQUE INCIDENCE USING SPATIAL FOURIER TRANSFORM.**  
Masayuki Tamura, National Institute for Environmental Studies, Ibaraki, Japan.

**TOWARDS AN IN-SITU METHOD FOR THE MEASUREMENT OF ACOUSTIC IMPEDANCE AND ABSORPTION COEFFICIENT OF ACOUSTIC MATERIALS.**  
Yvan Champoux and Jean F. Allard, Univ. of Sherbrooke, Sherbrooke, Quebec, Canada.

**ACOUSTIC IMPEDANCE MEASUREMENT BY THE PULSE METHOD.**  
H. Shibayama Shibaura Inst. of Tech., Tokyo, Japan, E. Ikeshita, Ikeshita Arch. Des., Tokyo, Japan and K. Kido, Tohoku Univ., Sendai, Japan.

**IN-SITU TECHNIQUE FOR THE MEASUREMENT OF SURFACE IMPEDANCE AT NORMAL AND OBLIQUE INCIDENCE.**  
J.F. Allard, Faculte des Sciences du Mans, Le Mans, France, A. Cops and W. Lauriks, Catholic Univ. of Leuven, Heverlee-Leuven, Belgium.

**IMPEDANCE TUBE MEASUREMENTS : A ROUND ROBIN COMPARISON.**  
Richard J. Peppin, Scantek, inc., Rockville, MD, USA, and James Haines, Manville Sales Corp., Denver, CO, USA.

**CHARACTERISTICS OF A NEW HEMI-ANEOCHOIC ROOM FOR**

**NOISE EMISSION MEASUREMENTS AT IBM BRAZIL.**  
P. Moreira, IBM Brazil, Campinas, Brazil, W. Hoffman, M. Nabuco and J. Azevedo, INMETRO, Laboratorio de ruidos, Xerem - D. Caxias - RJ, Brasil.

**REVERBERATION SOUND FIELD QUALIFICATION BY THE TWO MICROPHONE TECHNIQUE.**  
Samir N.Y. Gerges, Lab. de vibracoes e acustica, UFSC, Florianopolis, Brasil, and J.P. Cespedes, Univ., de Chile, Santiago, Chile.

**A SIMPLER WAY TO BUILD THE ANSI FAN NOISE TEST PLENUM : THE INCE CBE CONSTRUCTION GUIDELINES.**  
Stephen J. Boyle, Data General Corporation, Westboro, MA, USA.

**A SIGNAL PROCESSING TECHNIQUE TO IDENTIFY THE NUMBER OF INCOHERENT SOURCES IN A SYSTEM.**  
D.A. Ufford and R.J. Bernhard, Purdue Univ., West Lafayette, Indiana, USA.

**SEPARATION OF STRUCTURE-BORNE & AIRBORNE NOISE FROM FANS BY COHERENT POWER ANALYSIS.**  
Larry E. Wittig and Hsiao-an Hsieh, digital equipment corp., Maynard, MA, USA.

**UNATTENDED MONITORING AND SOURCE IDENTIFICATION OF AIRCRAFT NOISE.**  
Ichiro Yamada and Juichi Igarachi, Kobayasi Hayashi, Rion Co., Tokyo, Japan.

**ACOUSTICS OF MACHINE STRUCTURES - RESULTS CONCERNING NOISE REDUCTION AND DIAGNOSTICS.**  
Detlef Hamann, Univ. of Technology, Dresden, GDR, and Werner Schirmer, Central Institute of Occupational Safety, Dresden, GDR.

**DIAGNOSIS OF TRANSFORMER COIL LOOSENESS BY VIBRATION MEASUREMENTS.**  
F.S. McKendree, Westinghouse R&D Center, Pittsburgh, PA, USA and S.I. Roth, Aluminum Company of America, Pittsburgh, PA, USA.

**THE ROLE OF PRODUCTION**

**NOISE QUALITY CONTROL MONITORING AT HARLEY-DAVIDSON, INC., MOTORCYCLE DIVISION.**  
Alexander J. Bozmoski, Harley-Division, inc., Muskego, WI, USA.

**IDENTIFICATION OF NOISE SOURCES OF AN AUTOMOBILE ALTERNATOR BY RPM DEPENDENT NOISE AND VIBRATION SPECTRUM ANALYSIS.**  
Sang Joon Suh, Jintai Chung and Hee Joon Eun, Korea Satandards research inst., Taejon, Korea.

**MACHINERY DIAGNOSIS : A PROCEDURE BASED ON SPECTRAL ANALYSIS.**  
P. Ruiz, Techniphone S.A., Le Puy Ste Reparade, France.

**MACHINERY NOISE DIAGNOSIS BY EAR-RELATED PARAMETERS.**  
H. Remmers, Spectradata, GmbH, Oldenburg Federal Republic of Germany, K. Betke and V. Mellert, U. of Oldenburg, Oldenburg, FRG.

**ENERGY FLOW METHOD IN QUALITY CONTROL.**  
Per V. Bruel and Michael Brock, Bruel and Kjaer, Naerum, Denmark.

**ESTIMATION METHOD OF UNUSUAL SOUND SOURCE IN MACHINERY.**  
Keiichi Katayama, Shigeki Morii, Naoyuki Nagai, and Mamoru Tsuboi, Mitsubishi Heavy industries, Hiroshima, Japan.

**AN AUTOMATED SOUND MEASUREMENT SYSTEM TO EVALUATE WELD QUALITY.**  
William D. Gallagher, Engineering specialties corp., st. Louis, MO, USA.

**VIBRATION MONITORING OF RECIPROCATING PUMPS.**  
T. Berther and P. Davies, Purdue Univ. west Lafayette, IN, USA.

**FAULT DETECTION AND IDENTIFICATION IN MOTOR/ GEARBOX COMBINATIONS.**  
Richard H. Lyon, R.H. Lyon corp. Belmont, MA, USA.

**IDENTIFIATION OF SOURCES OF VIBRATION FOR CLOSELY GROUPED MACHINES : THE USE OF MULTIPLE INPUT TECHNIQUES.**

P.R. Wagstaff and J. C. Henrio, Univ. of Compiègne, Compiègne, France and P. Esparcieux, D.C.A.N.-CERDAN, Toulon, France

PREDICTING NOISE RADIATION FROM MACHINERY - EXAMPLES OF COUPLING LOSS FACTORS FOR PRACTICAL STRUCTURES. G. Stimpson and R.S. Ming, ISVR, The Univ., Southampton, United Kingdom.

COMPARISON OF EXPERIMENTAL AND ANALYTICAL ESTIMATIONS FOR THE MODAL DENSITY OF A RING-STIFFENED CYLINDER. Paul M. Serati and Steven E. Marshall, Boeing Commercial Airplanes, Settle, WA, USA.

A DATA ACQUISITION AND PROCESSING SYSTEM TO DETERMINE SEA PARAMETERS FOR CAR BODIES. S.J. Walsh and N. Lalor, Inst. of Sound and Vibration Research, Southampton, UK.

A PRACTICAL APPLICATION EXAMPLE OF THE MODIFIED CEPSTRUM TECHNIQUE. Mei Q. Wu and Malcolm J. Crocker, Auburn Univ., AL, USA.

COMPARISON OF THE FAST FIELD PROGRAM AND PARABOLIC EQUATION AS APPLIED TO THE ATMOSPHERE. Michael J. White, Construction Eng. Res. Lab. Champaign, IL, USA and Richard Raspet, U. of Mississippi, Univ., MS, USA.

NUMERICAL SIMULATION OF STRUCTURAL DYNAMIC AND ACOUSTIC PROBLEMS WITH A NEW FAST ALGORITHM. Karl-Heinz Elmer, Univ. Hannover, Hannover, Federal Republic of Germany.

PROPAGATION OF A VIBRATION IN A LAYER OF GROUND. D. Habault, CNRS, Marseille, France.

ANALYSIS OF NOISE RADIATED BY A SOURCE WITHIN A PARTIAL ENCLOSURE USING THE BOUNDARY ELEMENT METHOD. A.F. Seybert, Univ. of Kentucky, KY, USA.

NOISE STUDY BY USING A CAD SYSTEM. Areg Gharabegian, Engine-

ering-Science, inc., Pasadena, CA, USA.

A METHODOLOGY FOR USING A CONSTANT SPEED MODEL TO PREDICT TRAFFIC NOISE IN CHANGING SPEED SITUATIONS. William Bowlby and Roger L. Wayson, Vanderbilt Univ., Nashville, TN, USA.

CAD AND GIS APPLICATIONS IN HIGHWAY NOISE MODELING. Matthew C. Artz, Engineering-Science, inc., Pasadena, CA, USA

A MODEL TO CALCULATE RAILWAY NOISE. Judith Lang, Versuchsanstalt für Wärmeund shalltechnik am TGM, Vienna, Austria.

USE OF FAA'S NATIONWIDE AIRPORT NOISE IMPACT MODEL. Steven R. Albersheim, FAA, Washisgton, DC, USA, and Kenneth McK. Eldred, KEE and Assoc., Concord, MA, USA.

ACOUSTIC NOISE SYNTHESIS AND ITS APPLICATION TO THE DESIGN OF A DUCT SYSTEM. M.G. Prasad, Stevens Int. of Technology Hoboken, NJ, USA and T.V. Ananthapadmanabha. AT&T Bell lab., Murray Hill, NJ, USA.

LOW FREQUENCY NOISE PREDICTION OF INTERNAL ACOUSTIC ENVIRONMENT OF A LAUNCH VEHICLE AT LIFT-OFF. G. Borello, Centre national d'Etudes Spatiales, Evry, France.

MODELING PROCEDURES FOR THE APPLICATION OF THE SELECTIVE TWO-MICROPHONE ACOUSTIC INTENSITY METHOD. Martin W. Trethewey and Yu-Hong Lin, Penn state Univ., Univ. Park, PA, USA.

PRESENTING ENVIRONMENTAL NOISE DATA USING RECORDED NOISE EXAMPLES. David Dubbink, Ontario, CA, USA.

SOUND SOURCE IDENTIFICATION AND SOUND LEVEL PREDICTION IN A DANISH POWER PLANT. E. Luzzato, EDF, Clamart, France and O. Hermansen, Elsamprojekt, Fredericia, Denmark.

WINDNOISE IN CARS - CRITERIA

AND MEASUREMENTS. Bo Wadmark, Volvo Car Corp., Gothenburg, Sweden.

A CONCEPT FOR DEFINITION OF SUBJECTIVE NOISE CHARACTER-AS A BASIS FOR MORE EFFICIENT VEHICLE NOISE REDUCTION STRATEGIES. F.K. Brandl, H. Schiffbanker and G.E. Thein, AVL LIST Ges.m.b.h, Graz, Austria.

## REQUIREMENTS

INDUSTRY GOAL : ONE WORLD-WIDE STANDARD. Lyle F. Luttrell, Control Data corp. Arden Hills, MN, USA.

DAY-NIGHT AVERAGE SOUND LEVEL (DNL) AND SOUND EXPOSURE LEVEL (SEL) AS EFFICIENT DESCRIPTORS FOR NOISE COMPATIBILITY PLANNING. Robert W. Young, Consultant in Acoustis, San Diego, CA, USA.

DEVELOPMENT OF LEGISLATION ON PREVENTION OF HEARING DAMAGE IN GREAT BRITAIN. K. Kyriakides and A. Dove, Health and Safety Executive, United Kingdom.

RECENT REVISIONS TO THE CALIFORNIA NOISE INSULATION STANDARDS. Russell B. DuPree, California dept. of Health Services, Berkeley, CA 94704.

EUROPEAN COMMUNITY AEROPLANE NOISE LEGISLATION - THE NEXT STAGE. A.J.P. Rowland, Commission of the European Communities, Brussels, Belgium.

WILL YOUR MACHINE BE TOO NOISY IN 1992? THE LIKELY IMPACT OF THE EC DIRECTIVES. J.H.F. Greenwood, Health and Safety Executi, Bootle, United Kingdom.

PLANNING AND NOISE MITIGATION. Alexander Segal, San Diego, CA, USA.