NOTICE

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This is the first issue of the planned quarterly publications concerning noise pollution. The quarterly issues will be combined at the end of each year into a single volume. This method of publication makes it possible for subscribers to remain currently aware of noise pollution information and at the same time, satisfy the needs of those requiring less urgently timed information through use of the yearly publication.

The eight sections of the basic Noise Pollution Resource Compendium have been merged and/or reduced to five sections in this issue in order to more efficiently categorize the current references.

This quarterly issue features complete abstracts instead of data processed bibliographic citations. The changed format is considered more desirable from a user's point of view. The new format and subject organization will be maintained in the upcoming quarterlies and the annual supplement.

The contents of this quarterly publication are arranged under subject headings which are judged major areas of noise pollution activity. An index at the end of each subject group simplifies cross reference of interrelated articles. This publication is paginated by the accession number of the first abstract contained on the appearing page. The legend of the accession number follows the organization of the basic Noise Pollution Resources Compendium.

NP 73 - 1A - 001

Accession number within category number listings consecutively

Subsection designation

Section designation

Year of search and publication

Noise Pollution
1. NOISE SOURCES
1.A GENERAL
NP73-1A-001

72-STG-0578
Dooms, Ir. L. (Ed.)  National Center for Scientific and Technical Documentation, Dept. of Environmental Research, Brussels, Belg.

Belgian environmental research index.
Research index only, SS

AIR POLLUTION ; WATER QUALITY ; NOISE CONTROL ; SOLID WASTES ; PESTICIDES ; BELGIUM ; research index.
Research by Belgian investigators on water, air and noise pollution, solid waste and pesticides is documented. Legislation and treatment are also included.

NP73-1A-002

69253. CARLESTAM, GOSTA. (Linnegatan 81, Stockholm 0, Swed.)
Environmental Health Lab Kemalan AFB Calif.
TECHNICAL REPORT BIBLIOGRAPHY.
Final rept., cole P. HOffouse. Aug 72. 137p

Description: (Air pollution, Air Force research), (Water pollution, Air Force research), (Industrial medicine, Air Force research), (Radiation hazards, Air Force research), Chemical analysis, Electromagnetic, Ionizat. Environment, California.

Identifier: Electromagnetic radiation hazards, Noise pollution, McChanner Air Force Base.
A bibliography of all unclassified technical reports prepared by USAF Environmental Health Laboratory to date is presented. It contains a listing by subject matter and a listing of all reports by year with report number and abstract. This report covers the area of environmental topics such as air, water, noise, and radiation pollution.

NP73-1A-003


Presents a brief systems look at what seems to be a very unsystematic research coverage of the field in the past decade. There has been extensive discussion of domestic noise during this period, though with notable omissions. There has been research on interference with education, and some on hospitals. Quite a number of activities of importance have hardly had comment, let alone research. Discusses some of the problems for the designer in dealing with the present situation and puts forward ideas which seem to him likely to put design on a better basis.—J. Abst., ed.
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Typical industrial plants located in urban, suburban, and rural communities were surveyed and their noise sources were identified. The plants were glass manufacturing, oil refining, power generating, automobile assembly, and can manufacturing. The noise of communities adjacent to these plants was recorded for five minute sampling periods during two days and nights of normal operation and during weekends. Only the external assembly and glass manufacturing plants are principal sources of community noise. Elsewhere noise from surface transportation on highways and traffic near the plants either predominated or contributed equally with industrial plants. The impact of industrial plant noise on the work and the community environment, and attitudes towards noise legislation are discussed. Noise control programs for industrial plants are described, and the noise abatement technology is discussed.

Design and experimental data on the sound power of the inlet noise were compared for the compressors of several stationary gas turbine plants. It appears that in spite of the different occasions of the first stages of several full-scale compressors, the parameter S (the dimensionless similarity criterion) changes insignificantly.

This paper describes the interaction between the viscous regions of successive blade rows in an axial-flow turbine. It is shown that wake-stator interactions produce regular spatial variations in the unsteady velocity field, and therefore have a significant influence on the generation and propagation of internal noise. The discussion is supported by noise measurements and flow observations at low speed in a single-stage axial-flow compressor.


The behaviour of some important aspects of fan noise is both highly complex and paradoxical. By using a qualitative theory based on the work of Kaji and Okazaki, however, it is possible to predict the behaviour in the forward end of the tone noise from the aerodynamic interaction of the fan rotor and stator. In this paper the theory is developed and extensive results from a five stage cooling air turbine fan (designed for separate operation) are used to justify and illustrate the theory.
NP73-1B-005

2988. HARRISON, R. (Imp. Chem. Ind. Ltd., Spondon Stn., Stock- by, Derby, Engl., UK.) and H. J. STUXH. A possible cause linked with air-fed heads. ANN OCCUP HYG 10(4): 453-458, May 30(Nov., 1972).--Sound pressure levels in a typical air-fed head and for underground of 2 human volunteers before and after cleaning the air line were measured. A simple method of reducing the noise to the near-earphone level was sought and tested.--J. E. P.

NP73-1B-006

S1672. GONCHARENKO, V. P. Analiz chuma komprjorov, primenяykh v stekol'noi promyshlennosti, puti onkuda liya. [Analysis of the noise produced by compressors used in glass industry and means of its reduction.] GIG TR PROF ZABOL 13(8): 27-29, 1971.--The noise of air suction into the compressor was measured at 3 points--inside the filter chamber and at 250 and 2000 mm distance from it. The noise created by different types of compressors was measured primarily to compare the existing level of the sound pressure and noise spectrum with requirements of the sanitary standard. Results showed that the noise in the air suction chamber reached the maximum at 1000, 2000 and 4000 Hz frequencies, exceeding 100-104 db at summary level of Lsum = 112.5 db. At 250 mm distance from the chamber the noise reached its maximum at the same frequencies with a level of 100-104 db at Lsum = 107.3 db, but at 2000 mm distance from chambers of the air suction chamber the level was 89-97 db at Lsum = 103.5 db. Spectral components of compressor noise were at a wide range of high and low frequency, and exceeded the admissible values in all 4 types of compressors. Reduction of noise was accomplished by applying a plastic muffler, a combined damper of noise pulsations, and especially by reconstruction of valves.--M. D. S.

NP73-1B-007

[Characteristics of noise in mechanical wood processing shops at cellulose-paper plants] Marininoko NY, GIG Sanks 25:116-7, Oct 78 (Eng)
NP73-1B-008

73-2TE-0009
Van Stenenburgen, B.

Compressors are 'Ommen', silencing methods are necessary to fix & rates.
See Citation No. 73-2TE-00049 pp. 158-166. 1971.
In English; Eng., Fr., Ger. sums., illus., refs. (Some in Du.), from AS & T.

The Netherlands gas compressor station, Omnen, has operated for 3/4 yr with 4 compressor units of 15,000 hp each, driven by gas turbines. The station is situated in a rural environment which made it necessary to fix the permissible noise levels of the rather low noise rating value of 30 outside the nearby houses. Noise production of the main gas turbines is studied and the silencing measures are made from the necessary excess attenuation. Particulars about the composition and dimensions of the silencing equipment are given. Graphs with measuring results from some noise sources are shown.

NP73-1B-009

72-6TE-0181
Kratsch, Ger.
Druckluft, Lern und Umschutz. Wuppertal, Ger.
In German; Eng., Fr., Ger. sums., 21 figs., no refs., from Sum.

NOISE SOURCES : NOISE REDUCTION : COMPRESSED AIR : environmental protection.
The problems of defining noise sources besides those caused by compressors and pneumatic hammers are discussed, as well as measures for noise reduction. The use of compresses air for environmental protection e.g. with the air-bubble method or in deep sea drilling is also considered.

NP73-1B-010

72-6TE-0100
Arvidsson, Ola
Berglund, Kanneth
Berlin, Math
(both) Statens Institut foer Folkhalsan,
Stockholm, Sweden
Lunds Universitet, Institutionen foer Hygien, Sweden
Wahlstrom, Sten
Aaberg, Sven
(both) Kungliga Tekniska Hoegskolan,
Institutionen foer Byggnadskustik,
Stockholm, Sweden

Byggbueller som samhallsproblemat, Del 2.
In Swedish; no abs., numerous figs., data tables, no refs., SS.

Tables are presented of building site noise measurements, generated by earth moving and construction equipment. Data for each machine is presented with a photograph, description and measurement results.

NP73-1B-011

72-6TE-0168
Lamonica, Joseph A.
USBM, Pittsburgh Technical Support Center, PA
Noise levels in cleaning plants.
No abs., 5 figs., 5 tables, no refs., from Intro & Test.

NOISE LEVELS : MINING INDUSTRY : cleaning plant noise.
In anticipation of noise regulations for coal mine surface facilities, the U.S. Bureau of Mines conducted a noise survey at 3 cleaning plants in an attempt to identify possible problem areas. Those occupations where the individual's exposure exceeded the limits of the proposed noise sources were identified. The manner in which sound energy is distributed over the audible range of frequencies was described.

NP73-1B-012

72-6TE-0197
Lamonica, Joseph A.
Research entitled theoretical studies of fan noise generation by a transonic compressor blade row.
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1.C HOME, OFFICE AND NON-INDUSTRIAL
The new attitude toward sound and acoustics in the architectural environment is considered. Acoustic properties as such, man as producer and consumer of sounds, as well as the perception of and sensitivity to acoustics were examined in detail, and the new hypotheses and proposals were clarified by examples and discussions of position. Observations relating to the architectural interior as a form of the environment inhabited by man are considered. In order to ensure him sonic comfort, man is initially considered as the object (construction of a new system of location and orientation of the spatial coordinates at eye and ear level), then as the subject (in terms of his faculties of spatial perception and the responses elicited by sound signals), finally, man-to-man relations. Measures of planning, technical production, and sound insulation in the created environment are described. These considerations show sound to be a component of the environment, and some aspects and criteria of a technical sonic nature that promote comfort and achievement are therefore taken into account.

NP73-1C-002

Household noise problems; P.K. BADE (Carrier Corp, Syracuse, NY); J Acoust Soc Amer 80, pt 1 Nov 1971 p 1393-9; Communications to the Editor make a plea for uniform criteria on household equipment, for information on proper application and installation and for realistic criteria on acceptable sound levels. Recent standards are cited for the Air-Conditioning and Refrigeration Institute. Data are given for noise of a refrigerator, air conditioner and dishwasher in a typical kitchen.

NP73-1C-003

HOME, OFFICE AND NONINDUSTRIAL
(See Also)

1A004  3B034  3B055  3D017  3D032  4B006  5C013
3A007  3B052
1. D URBAN
A study was conducted to assess the impact of aircraft noise on the surrounding area of an airport. The focus was on developing an evaluation tool to analyze changes in noise due to airport operation changes. Two approaches were tested: developing extensive and detailed data on land use around airports, and creating a computer-based system to analyze noise contours. The system was intended to provide a method for evaluating aircraft noise impacts and assisting in making informed decisions about airport development. The study was supported by HUD and was conducted by the Regional Airport Systems Study.

Author

Pavel K. Dygert, Judy A. Unger, and Fred L. Collins

1972
NP73-1D-003

NP73-1D-004

NP73-1D-005

NP73-1D-006

NP73-1D-007
A noise survey was conducted to determine whether background noise conditions exist within the environment of a typical automobile, motorcycle, or military vehicle. The levels of noise were measured in various environments, including public places, homes, and cars. The results were then compared to recommended noise levels for different types of vehicles.

The data collected shows that the noise levels in public places are generally lower than those in homes or cars. This is due to the fact that public places are typically less congested and have fewer sources of noise. In homes, the noise levels are higher due to the presence of household appliances and other sources of noise. In cars, the noise levels are also higher due to the presence of engines and other mechanical components.

The survey also revealed that background noise levels are lower in urban areas compared to rural areas. This is probably due to the fact that urban areas are typically more congested and have fewer sources of noise.

The results of the survey are important for the development of noise reduction strategies. By understanding the noise conditions in different environments, it is possible to implement effective noise reduction measures, such as the use of quieter vehicles or the implementation of noise barriers in urban areas.


20
Diesel engine noise control in the 1970s.


No abs., illus., refs., from Text & SS.


Diesel engines are noisier than gasoline engines, but because of their greater fuel economy, they remain in widespread use. Sources of diesel engine noise, the relation between combustion induced and piston slap noise, characteristics of combustion controlled noise, effect of timing gears and accessories, noise and engine design parameters, and consideration of the principles of noise control are discussed. Diesel engine noise can be reduced even taking into account future trends for higher power outputs. However, research efforts must investigate high pressure charging techniques for automotive use in conjunction with studies of exhaust emissions; quiet structure design is just as important since only by both techniques can the required demands be met.

Noise and the truck driver.

See Citation No. 73-1TE-00006 p. 127 (1972).

Abs. only, from AA.


Truck drivers may be exposed to high noise levels while driving. The source and character of the noise, the noise reduction achieved, and the noise reduction techniques utilized by one Industrial Hygiene Department are reviewed. The most effective combination of noise reduction techniques achieved a level of 85 dbA under all driving conditions (with closed windows and air vents).

Noises generated by trains of the Chicago Transportation Authority were studied and analyzed relative to occupational health hazard and speech interference. Tape recordings of noise occurring inside of train cars were obtained under various operating conditions. Frequency of occurrence and cumulative distributions of sound intensities were developed through instrumental analysis of the tape recordings. Analyses were measured in terms of overall sound pressure level, dbA, and sound intensity in each of the octave bands. In some cases, daily noise exposures exceeded the limits recommended by the American Conference of Governmental Industrial Hygienists and specified in the Walsh-Healy Act. Years of daily exposure to these noises had adverse effects on the hearing acuity of a portion of the train crew. Speech interference is extensive on these trains. Some portion of the passengers probably develop a small amount of temporary hearing shift in a single trip, yet it is unlikely that any will develop noise induced permanent threshold shifts from this source.
NP73-1D-023
72-STE-0163
Anon.
Urban traffic noise: Strategy for an improved environment.
Organisation for Economic Co-Operation and Development, Consultative
Group on Transportation Research. Organisation for Economic Co-
In English; no refs. 17 figs., 3 tables, data table, appendix, 46 refs. (2
in Fr., 5 in Gard., 5 in Sorn.). From Test & SS.
GOVERNMENT REGULATIONS: NOISE SOURCES: traffic noise:
Europa: Canada: urban noise.
Sources and characteristics of urban traffic noises are given and
their effects on humans are listed. Control of urban traffic noise is
discussed with reference to modifications in vehicular design, traffic
operations and urban architecture. Current administrative and legislative
measures in various member countries are reviewed. The Consultative
Group on Transportation Research of Organisation for Economic Co-
Operation and Development makes several recommendations for the role
of government relative to vehicle noise, traffic noise and urban environment.
Economics of noise abatement, research and development, and international cooperation.

NP73-1D-024
72-STE-0144
Payne, R.C.
Propagation of traffic noise in typical urban situations.
Teddington, Eng. National Physical Laboratory. Acoustics Report No. 54,
Sum. 40 figs., 26 tables, index, no refs., from AS.
NOISE MEASUREMENT: ENGLAND: traffic noise propagation.
Field measurements were carried out to investigate the propagation
of traffic noise for 10 different road and housing configurations. The
shielding produced by a substantial brickwall parallel to a main road, and
the effect of an aperture in such a barrier, was measured and results
compared with data for open grassland. Shielding by rows of houses
flanking a main road and noise propagation along side-roads branching
off main roads was investigated in detail, and empirical curves are
presented for predicting levels of L10 (the noise level in dB(A) exceeded
for 10% of time) in such situations.

NP73-1D-025
72-5GD-0866
Appleyard, Donald (both) Univ. of California, Dept. of City
Lintell, Mark
Environmental quality of city streets: The residents' viewpoint.
National Research Council, Highway Research Board. Highway Research
Abs. 6 figs., 21 refs., from AA.
Presented at Committee on Social, Economic and Environmental Factors
of Transportation Annual Meeting. 50th.
NOISE SOURCES: HIGHWAYS: AUTOMOTIVE POLLUTANTS: SAN
FRANCISCO: residences: traffic.
The San Francisco Planning Department did a small study of the
quality of the environmental along some of the city's main traffic streets
to find out what effect traffic has on the street as a living environment.
Viewpoints of those people who live on the city's streets are presented.
The criteria categories examined were traffic hazard; stress, noise, and
pollution; privacy and home territory, neighboring and visiting, and
identity and interest.

NP73-1D-26
72-STE-0171
Bhattacharyya, B.
Indian Inst. of Technology, Kharagpur
An analysis of the problem of noise in the urban areas.
See Citation No. 72-6TE-0170 p. 25. [1972?].
Abs. only, from AA.
NOISE SOURCES: NOISE CONTROL: INDIA: effects: urban areas:
abstract only.
An analysis of the sources, effects and control methods of urban
noise in India is presented.

NP73-1D-028
72-STE-0174
Nambik, K.
Agarwal, A.L.
Ramanathan, N.L.
Relase pollution in Ahmedabad.
See Citation No. 72-6TE-0170 p. 28. [1972?].
Abs. only, from AA.
NOISE SOURCES: NOISE CONTROL: INDIA: Ahmedabad: traffic
noise: abstract only.
Results of a survey of the noise environment in the city of
Ahmedabad, India, indicate that traffic noise is the major noise source.
Several measures are recommended to alleviate the problem and a
"noise map" of the city is included.

NP73-1D-029
72-5GD-0793
Sturman, Gerald M.
Persons, Brinckerhoff, Quade & Douglas, Inc., New York, NY
Effects of highways on urban environments.
Abs. 2 figs., 3 refs., from AA.
HIGHWAYS: AUTOMOTIVE POLLUTANTS: NOISE GENERATION:
Impacts on an urban highway on the communities through which it
passes are studied. Air pollution, noise pollution, access disruption, loss
of job opportunities, and loss of housing are analyzed.
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I. E. AERONAUTICS
ENGLISH AND GERMAN CO-BIBLIOGRAPHY

Unifying theories of coreodynamic noise generation are critically reviewed with special emphasis on conceptually adequate and physically accurate with special reference to supersonic jet noise. This review the basic work of Stokos, Kirchoff and Rayleigh on fluctuating motions in fluids is retained and developed to provide a firm basis for the critique. The advantages and disadvantages of waveguide theory such as Lighthill's are thoroughly discussed in Section 11.3. A contribution is made towards removing the criticism made by Lighthill's isotropic acoustic tensor theory. New developments such as those by Crow, Laylof and Dack are emphasized. On the basis of the evidence provided by the critical review, a new unified theory for jet noise has been derived. Author (GRA)

PRELIMINARY NOISE TESTS OF THE ENGIN-E-OVER-THE-WING CONCEPT. 2: 10 DEG. - 30 DEG. FLAP POSITION
(NASA-TM-X-68104; E-7038) Avail: NTIS HC $4.00 CSCL 10B

Preliminary acoustic tests of the engine-over-the-wing concept as a method for reducing the aerodynamic noise created by conventional and short takeoff aircraft are discussed. Tests were conducted with a small wing section model having two flaps which can be set for either the landing or takeoff position. Data was acquired with the flaps set at 10 degrees and 20 degrees for takeoff and 30 and 50 degrees for landing. The engine exhaust was simulated by an air jet from a convergent nozzle. For field noise data are presented for nominal pressure ratios of 1.25, 1.4 and 1.7 for both the inboard and sideline modes. Author

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Modification of characteristics especially in inhabited areas around airports and, with the advent of supersonic air ejectors, the noise discharge rates on the city streets due to an aircraft is developed in terms of images formed. Attention is given to antinoise legislation and administrative measures which indicate the paths of propagation and the contribution to the received sound. A criterion for reurbanization in a city street due to an aircraft is developed in terms of images formed. Charts indicating the amplification or shielding of noise from low flying aircraft are presented. (Author)


Aeronautical acoustic problems involve noise in aircraft interiors, stresses in the structures, external noise near aircraft, especially in inhabited areas around airports, and with the advent of the supersonic aircraft, the problem of the 'sonic boom'. The general characteristics of aerodynamic noise are discussed, as well as the evaluation of the noise generation in a turbulent fluid, and its solution. First applications of the equation to various aircraft are studied. Attention is given toantinoise legislation and regulations, recent studies, and future prospects.


Experimental study of the effects of primary and secondary air discharge rates on the pumping performance and noise generation of a supersonic air ejector. The noise spectra obtained from the tests appear to be in fair agreement with the results found by other investigators.


A noise source located in local and city environments is generated for low- and high-speed engines, such as the Rolls-Royce T53-E and high-speed engines, such as the Rolls-Royce NP73-1E-011. It is seen that the change from low to high bypass ratios has resulted in a marked noise reduction by substitution of subsonic core and broadband noise (aerodynamics of fan, compressor, and turbine) for the low frequency rise of the jet. The generation mechanisms of jet, compressor, fan, and turbining noise are analyzed. A study of jet noise reveals a new source, termed impinging noise, which is an internal source attributable to reduction of fan design with supersonic linings. It is shown that internal airflow quality can be a significant factor for the impinging fan related impingement noise. Turbine noise investigation also requires careful quantification to reveal the source.

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NP73-1E-014

NP73-1E-015

NP73-1E-016

NP73-1E-017

NP73-1E-018

NP73-1E-019

NP73-1E-020

NP73-1E-021
NP73-1E-022


These effects are mainly connected with the thermal radiation, the noise, and the exhaust gas production of the engines. The effects of thermal radiation have no harmful characteristics. However, the acoustic emissions produce highly disturbing and sometimes even harmful noise effects. Certain components of the exhaust gas also have disturbing or deleterious effects. The physical mechanisms involved in the origin of the phenomena which produce these environmental effects are examined. Quantitative predictions of general validity concerning the individual effects are discussed, and the relation of these effects with the design parameters of the propulsion system is investigated. A number of suggestions for reducing the harmful environmental effects are made on the basis of the preceding analysis.

NP73-1E-023


Description of a new method for evaluating the environmental annoyance of time-varying aviation noise on the basis of statistical data for instantaneous changes in the sound level of noise intensity. The procedure is illustrated with statistical data collected by measurements near the runway and on the approach of an airport.

NP73-1E-024


An experimental investigation has been conducted on the sound level produced by a two-bladed, four-foot diameter model propeller capable of boundary layer control. The propeller had a spinner comprising 705 of the total propeller radius. A porous screen on both surfaces of the symmetric section radial control removed of the boundary layer. Two-foot measurements were made in an acoustic chamber of 3 square feet and 3 square feet with the noise levels being measured both with and without boundary layer control. Agreement with theory was good (within 2 dB) showing a sixth power of the blade velocity relationship and a classical acoustic radiation pattern for the overall.
NP73-1E-027

AD-492 239  PC35A/MP89/99
Environmental Health Lab Evaluation AFB Cold
PORES EXPOSURE AT AIRCRAFT MAINTENANCE POSITIONS.
Final rept., Robert A. Capell, Oct 70, 21p (Rept no. EHL-70-798-70).

Description: (Airplane engine noise, Maintenance personnel, (Maintenance personnel, Exposure), Sound, Military facilities, Head, Palm, Hearing, Pressure, Statistical data, Jet fighters, California.

A noise survey was conducted at McClellan AFB, California to investigate the noise environment of maintenance personnel exposed to the P111, F105, and F165 A/C during in-air run-up operations. This report describes conditions which were encountered to affect the noise environment in the noise field. (Author)

NP73-1E-028

AD-492 239  PC35A/MP89/99
Environmental Health Lab Evaluation AFB Cold
PORES ENVIRONMENTS ON CONTROL
PORES.
Final rept., Robert A. Capell, Jan 71, 26p (Rept no. EHL-71-7251).

Identifiers: *Noise pollution, P-105 aircraft, U-4 aircraft, P-111 aircraft, F-105 aircraft.

Noise surveys were made of the control towers of two Air Force Bases. Measurements of the indoor and outdoor sound pressure levels during aircraft taxiing and other operations were recorded. These data are presented so that an evaluation of the community environment can be made by using certain operational data from each base. An evaluation of the noise exposure provided by each tower is also made. (Author)

NP73-1E-029

AD-602 041  PC55.45/MP89.95
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PERFORATED WALL HOSE IN THE ABCD-
16-FT. AND 4-FT. TRANSONIC TUNA.
Final rept., O.P. Credit, Oct 71, 22p AEDC-TR-71-236
Contract F04609-72-C-0063.
Prepared in cooperation with ARO, Inc., Tal.
ubac, Tex. Rept. no. ARO-PWT-TR-71-161.
Distributions Limitations now Removed.


The report presents the results of recent studies of noise in wind tunnels. Noise levels in the free stream and at the test section wall were measured in two tunnel as a function of Mach number, Reynolds number, wall angle, and wall porosity. In one tunnel free-stream noise characteristics were also evaluated with solid (taped) test section walls. Test results revealed that the perforated test section wall reduces discrete frequency, high energy noise. A critical Mach number range was noted. (Author)
Laboratory noise radiated by an airplane fuselage subjected to turbulent boundary layer excitation and evaluation of noise reduction techniques (workshop); W. V. BHAT (Boeing Co., Seattle, Washington), J. P. NELSON; Sound Vibr v 18 n 8 Oct 22 1971 p 615-64; The community noise radiated by an airplane fuselage structure caused by a turbulent boundary layer pressure field has been measured at two flight Mach numbers. For a single fuselage panel the radiated power is approximately 50 and 70 db relative to $10^{-9}$ watt at Mach 0.85 and 0.65 respectively. Damping tape and rubber wedge broadband, applied to the structure, reduces the noise radiation and they are more effective at Mach 0.65 than at Mach 0.85. The flight test data are in poor agreement with variable wind tunnel measurements, indicating the need for improvements in cooling flows. 11 ref.

Community noise levels of the DC-10 aircraft; A. L. MEYER; Anglo-American Astronaut Conf, 12th, July 7-9 1971, Gatlinburg and Spire Int, 1971, Pp a 73-79, 1 p; Noise level data for the DC-10 are presented and community noise levels of the aircraft are discussed. 1 ref.

Turbofan trends for short haul; L. G. DAVISON (Rockwell-Healy), L. O. DAWSON; ASME Pap 79-ST-40 for esoteric Eng 38-39 1972, 11 p; After a general discussion of the noise problem the relation between conventional and STOL options are broadly reviewed and their requirements are compared. Some of the associated technical difficulties are considered including variable pitch, reheat, propulsion and the environment, (noise and pollutants). 9 ref.

Hovercraft are a relatively new and unique form of transport, capable of traversing terrains which previously were almost impassable at speed by surface transport. This high-speed capability was gained partially at the cost of ride comfort, but unlike some vehicle developments, as power and speed have increased, the noise and vibration within the hovercraft have steadily decreased with each new craft. The sources of noise and vibration are discussed, together with their possible methods of reduction in order to improve crew and passenger comfort.

Tu-104 jet: subjective judgment of annoyance. Take-off noise characteristics of the Tu-104 jet airliner in the far sound field was investigated. The local flight noise spectrum varies in accordance with the Doppler effect. A characteristic is given for the influence of noise persistence, number of flyovers, and population density on the subjective judgment of the noise annoyance factor. A method is described for calculating the persistence correction to the perceptible noise level.

Physical properties, causes, and effects of the sonic boom are discussed. Factors affecting the boom are analyzed, including aircraft shape and weight, meteorological conditions, and height at which the aircraft is flying. Maneuvering and acceleration can cause a 4- or 6-fold increase in boom intensity due to focussing. The worst booms come during initial acceleration to supersonic speed because all factors tend toward the largest pressure pulses: the airplane is relatively low and at maximum weight and high incidence.
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2. NOISE DETECTION AND MEASUREMENT
2.A GENERAL

Standard values of atmospheric attenuation determined from SAE ARP 866 are used in correcting aircraft noise measurements from test day to reference day conditions but errors are often introduced when there is a large difference between test and reference conditions. This paper describes a systematic investigation into atmospheric attenuation by simultaneous measurement of meteorological data and aircraft noise under more than twenty different conditions of temperature and humidity. Measured attenuation values are presented which show better agreement with SAE ARP 866 predictions when conditions representing the whole noise path are used rather than surface conditions. Continuing analysis will provide a direct comparison with SAE ARP 866 and consider the problems of predicting attenuation where only limited meteorological data is available.

(Author)
ACOUSTIC MEASUREMENTS: BIOINDICATORS: human biological indicators: noise damage. Human responsiveness to various sound stimuli is discussed, and stress is placed on potential indicative features of noise in the environment. Physical indicators, such as the Phon, Sone, and Noy scales, and perceived noise level, are quite reliable, and the technology is sufficient for providing highly refined sound analysis. Physiological, auditory, and vestibular indicators, such as hearing threshold shifts, cochlear cell damage, and interruption of cochlear and vestibular blood supply, can also be used to define the mechanisms of noise damage. Other indicators of environmental noise include those involving education, safety, psychology, social science, politics, and economics.

ACOUSTIC MEASUREMENTS: NOISE SOURCES: SOUND WAVES. An introduction to acoustics as a form of wave motion is presented. Making physical measurements of sound in rooms and buildings are examined.
2A GENERAL (See Also)

1D019  1D024  1E034  3B047  3D025  5A014  5C007
2.B INSTRUMENTS
The audio dosimeter—a system for measuring personal noise exposure.
See Citation No. 73-1TE-00006 p. 127. [1972].
Abs. only, from AA.


An accurate measurement on the 'A' scale of the sound energy reaching the ear of the employee during his work days is necessary; his exposure should be limited to prescribed values. Methods of obtaining this measurement utilizing sound level meters, plus time and motion studies, are reviewed and limitations are defined. A new method to obtain this measurement is described. In a single operation, an instrument continuously measures the sound at the ear of the employee for all values between 90 and 115 dB A, simultaneously measures time, and integrates the result. Exposure over 115 dB A other than impulsive or impact noise is also indicated. Results of 14 mo of field experience are presented and advantages over previous methods are discussed.

NP73-2B-002

73-1TE-00010
Basch, M.W. General Radio Co., Engineering Dept., Concord, MA
A wearable pocket noise dosimeter.
See Citation No. 73-1TE-00006 p. 128. [1972].
Abs. only, from AA.

ACOUSTIC MEASUREMENTS: MEASURING INSTRUMENTS: ENGINEERING: abstract only: dosimeters.

A noise dosimeter that meets the ANSI Type II Sound-Level Meter Standard and accumulates the OSHA percentage directly is discussed. The frequency response for noise dosimeters should be measured with 1/3-octave bands of random noise in a reverberant room since this is more repeatable and a better approximation for a device that will ultimately measure noise. These frequency response measurements will show the effects of the proximity of the wearer. The dosimeter is composed of 2 parts: a small pocket unit that accumulates and stores the digital data representing the OSHA percentage and an indicator unit that provides a digital readout on a light emitting diode display. The pocket unit includes a small ceramic microphone, a true rms detector with more than 15 db crest factor capacity, and an extremely low-power MOS digital counter to store the OSHA percentage. It weighs 7 oz and runs for over 300 hr on an ordinary 9 V transistor battery.

NP73-2B-003

[Low-cost classification measuring instrument for the exact determination of equivalent permanent noise level] Linbig, W.
2 Gesamte Hyg 18:318-31, May 72 (Gor)

NP73-2B-004

Gig Sault 37:81-92, Feb 72 (Rus)
INSTRUMENTS
(See Also)
2C008  3D052  5C013  5C022
2.C TECHNIQUES
This paper is concerned with the problem of computing the noise duration correction for the effective duration time when the noise duration time approaches a noise floor. The present method for computing the noise duration correction leads to extremely large negative values as the effective duration time approaches zero. A modification is suggested to avoid this anomaly.

NP73-2C-010

Experimental atmospheric absorption values from aircraft flyover noise signals; D.S. Bishop (Bell Aerospatial and Dynamics, Inc., Van Nuys, Calif.), NASA Contract Rep CR-1761 May 1973, 72 p. A detailed analysis of the noise recorded as the ground during a series of 30 aircraft flyovers by two aircraft (a four-engine turboprop transport and a four-engine turbojet transport) during a single day of field measurements has been conducted. Noise levels recorded at five positions on the ground at the side of the flight path were acquired from the field tests. Differences in one-third octave band noise levels obtained at different ground positions for the same angle of radiation from the aircraft were utilized to obtain data of absorption values. 880497

NP73-2C-011

A personal acoustic dosimeter was developed to monitor an individual's exposure to noise. The dosimeter is only 15 in³ and is carried in an individual's pocket. The batteries provide for 24-h operation and the unit features instantaneous readout of the percentage of maximum permissible exposure, true rms detection, and a continuous weighting scale. The results obtained in field testing and performance criteria for such devices are discussed. An on-the-job multifunctional electronic dosimeter was developed to permit the wearer to hear low level signals while covering the mutter but protect him from levels in excess of 80 dBA is also described.

NOISE SOURCES: MOTOR VEHICLES: ROAD PRESSURE LEVELS

A method for measuring sound-pressure levels at one location in a given area with calculated levels based on statistical data for vehicle speeds, traffic density, the muffler, and the muffler's noise attenuation within a city. The spreading of urban noise is determined by a variational distance with a typical value of 0.15 m. The theoretical noise-based sound-pressure levels at one location in an area can be compared with calculated levels based on statistical data for vehicle speeds, traffic density, and muffler attenuation coefficients. The difference can be calculated with a checking factor of 18% which may be an absolute value proportionally independent of frequency.


Digital data reduction methods for aircraft engine noise characteristics are discussed. It is noted that the approach used is superior to the opinions and electronic analysis because of reduced analysis time, lower cost, and improved information exchange resulting from the analytical techniques. Standardization that is possible analysis of a noise spectrum is used to illustrate the method.
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2. D FACILITIES
Magnitudes estimated by each of 21 observers were obtained for a variety of noise sources under three methods of auditory presentation: loudspeaker presentations in an anechoic chamber, loudspeaker presentations in a normal sound-attenuated room, and otophone presentations. Comparability of ratings obtained in these environments were evaluated with respect to predictability of ratings from physical measures, reliability of ratings, and to the scale values obtained in various other methods. Acoustic environments was found to have little effect upon physical predictability mechanisms and ratings of perceived emissions were little affected by the acoustic configuration in which they were obtained. The need for further study of general auditory interactions between subjective response of sound and power and the methods of magnitude estimation and physical estimation is indicated by the finding that in some cases the estimators, though instructed otherwise, apparently judged the magnitude rather than the absolute magnitude of sound-source action.
2D FACILITIES
(See Also)

2B002  5B001
3. NOISE ABATEMENT AND CONTROL
NP73-3A-001


(Research DOT-PAF-71-119. Task 3)

L-3609. FAA-AB-72-10-3

Date: 1972. NC 02.00.

Various methods of reducing noise in general FAA air traffic control and navigational facilities that occur at the measurement facility noise criterion can be described. Noise control procedures for each facility under consideration are described as well as the results for reducing specific noise reduction methods.

NP73-3A-002

NP73-3A-002

EPA. National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THE NASA-QM UTILIZATION


WASA-THS-72011, B-7607. Draft: NASA NC 02.00. 0232. 21A.

Obtain to develop an origin noise reduction technology suitable for use in an airport and an urban environment and leading to a quieter and more efficient flight. Two industry sized engines were developed and tested. The engines were designed with the following quiet features: (1) High bypass ratio engines; (2) Large engine diameter; (3) Low engine noise; (4) Low engine design noise; (5) Optimum noise from water to water level. The authors show that if these features are applied to future engines, significant reductions in aircraft noise levels will be achieved.

NP73-3A-003

NP73-3A-003


PHASE PROGRAMS OF PROFESSIONAL/INDUSTRIAL ORGANIZATIONS, UNIVERSITIES AND COLLEGES.


Information, providing to noise programs being sponsored or carried out, either directly or indirectly, by professional, industrial, and voluntary associations (c) are provided. Information is also given on private utility research and educational and research programs. A bibliography of pertinent publications relating to noise is included.
NP73-3A-004

Aircraft noise control and propagation studies have been conducted in connection with the generation of jet aircraft noise by three major applications of commercial aircraft. The EPA noise program is discussed first. Activities with regard to the use of data, graphs, and tables in combination with CD and plug results will be outlined. Combinations of noise suppression and thrust loss are made, and it is shown how these data support the controllability of an EFV with the community. The conventional solution to noise problems is reviewed in the light of current and projected noise regulations. Recent test experience is reviewed and an estimate is made of the apparent jet noise floor which can be economically controlled. The jet noise problem for future STOL or short-haul aircraft is discussed, and the apparent lack of agreement on noise data in the low-velocity, low to medium range is indicated. The implications of jet noise due to this improvement on an EFV are determined. (Author)

NP73-3A-005

The role of development and test on the concept of vehicle design for propulsion is discussed. The concept of the four types of tests are examined as a demonstration of the relative feasibility of a fully coupled flight test driven by an Airframe and propulsion and the role of each in the development of vehicle applications. Practical experience is given to the development and conceptual tests on different aircraft designs testing the vehicle pitch margin. A comprehensive test rig with the basic pitch motion and motion between tests and an Airframe and propulsion pitch margin test are used in the tests. The advantages of the STOL propulsion concept are discussed.

NP73-3A-006

A recent report in the field of aircraft engine technology (Progress report on engine data technology at the University of Manchester) is provided. L. G. Napier and E. D. B. E. E. (Manchester, England) Aeronautical Research Council. 18, Apr. 1974, p. 835-829. 30 refs. in Dutch.
NP73-3A-007

3A-007

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NP73-3A-008

3A-008

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NP73-3A-009

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3A-009

Description: In discussing the problem of denvered noise reduction, two papers are presented dealing with some basic principles of mixture; the composition and function of the auditory system, physiological, physical and psychological effects of noise exposure, and legal implications for noise reduction. (Author)

NP73-3A-010

3A-010

3A-010


Staff members of the Bureau of Mines, United States Department of the Interior, conducted a series of tests to determine the most efficient of reducing noise generated by the detenting cord that is utilized for blasting in quarry blasting. Ten different types of detonating cord were tested and evaluated for their acoustical qualities. The results of the investigation showed that noise levels produced by low cost lead core detonating cord were lower than those produced by high core lead core detonating cord covered with six inches of extrachloriated material. (Author)

The present brief review on the problem and practice of the Environmental Protection Agency.
The need to limit plant noise to meet increasingly stringent regulations and standards should be considered during the plant design stage to avoid costly modifications. Design procedures utilizing a computer program were developed by Humphreys & Glasgow Ltd. The program calculates the maximum tolerable sound pressure level for each individual piece of equipment so that the total assembly will meet both community and plant noise level limits, and also provides data for preparing detailed specifications for each piece of equipment. The second part of the program shows the effect of the detailed engineering on the noise levels of the plant.

A brief history of Western Electric's mandatory hearing conservation and engineering noise abatement program is given. To augment the in-plant long-range efforts to reduce noise at its sources, the Western Electric procurement specification for the purchase of new machinery is detailed. The mandatory hearing conservation program is outlined.

Aircraft noise and the airlines. Phases of noise: at the source—motor vehicles—the answer lies in mufflers, and oil and gas burners.

The U.S. airlines' deep concern over aircraft noise and the abatement thereof is described. The 3 basic approaches are set forth: reducing noise at the source, operational procedures, and control of noise en route in the airport vicinity. Emphasis is placed on the need for much larger government funding for aircraft noise research and development.

Concern over noise emissions has increased significantly. The noise emission problem is related to other pollution efforts, and alternative abatement strategies are defined. Major technical and economic parameters are discussed, based on the present state-of-the-art. A balanced approach to noise abatement is suggested.

How community noise considerations affect the development of new commercial transport aircraft is examined. The general noise level goals of the manufacturer are discussed and information is provided to show that, contrary to popular opinion, the noise levels of succeeding generations of jet transports are generally lower than those of their predecessors. Some of the evaluation procedures available for minimizing community noise are examined, along with some of the constraints (aircraft manufacturer faces in the design process). Future trends in community noise levels are assessed.
Future of gasoline engines.


Abs. only, AA.

Also in: Society of Automotive Engineers. New York. Section Papers No. 720615.

ECONOMICS:

Also in: Engineering, 80(7): 75-76, July 1972.

Also in: Sums., illus., for a Quieter City, Inc., New York, NY.

Also in: Environmental Engineering and Science Conference. Second Annual. The present gasoline engine is examined against the requirements for an automotive powerplant such as performance, economy, operational factor and availability considerations. New factors of noise and pollution are shown to modify the basic requirements. The effect of these factors on future gasoline engines is discussed.

NOISE REDUCTION: INDUSTRIAL NOISES: FEDERAL REGULATIONS.

Industry must take the initiative to design for quiet without waiting for legislation and proof of a large market. The motivation is preservation of the human environment. Some voluntary moves have already been made in the U.S. Manufacturers have voluntarily made silented environment portable air compressors, a quieter garbage truck, a soundproofed metal garbage can, a silent calculating machine. Legislation will now be needed to protect these progressive manufacturers from their noisy competitors. Industry must choose to sit back and wait, or it can voluntarily expand displays of leadership mentioned above. To educate industry to its responsibility to man and his environment is a major goal of Citizens for a Quieter City. The ultimate noise abatement goal must be a partnership of government, citizen, and industry.

NOISE REDUCTION: GERMAN DEMOCRATIC REPUBLIC.

The organization of essential elements of noise control in the German Democratic Republic is described, and it is shown in what way noise control will become effective. Some basic principles are stated, how they are realized and put into practice by efficacious incorporation into the mainstream, and leading activity in factories, complexes, of facory plants, and industrial branches as well as by incorporation into the governmental and social supervision is explained.

NOISE REDUCTION: AIR POLLUTION.


Sums., illus. for various papers, SS:


Environmental pollution is discussed, including: air quality control; water quality; noise abatement; solid waste disposal; and waste water treatment. In addition to technology, legal and economic aspects of environmental pollution are considered.

WASTE SYSTEMS: NOISE REDUCTION: GERMAN DEMOCRATIC REPUBLIC.

The organization of essential elements of noise control in the German Democratic Republic is described, and it is shown in what way noise control will become effective. Some basic principles are stated, how they are realized and put into practice by efficacious incorporation into the mainstream, and leading activity in factories, complexes, of factory plants, and industrial branches as well as by incorporation into the governmental and social supervision is explained.

NOISE REDUCTION: AIR POLLUTION.


Sums., illus. for various papers, SS:


Environmental pollution is discussed, including: air quality control; water quality; noise abatement; solid waste disposal; and waste water treatment. In addition to technology, legal and economic aspects of environmental pollution are considered.

WASTE SYSTEMS: NOISE REDUCTION: GERMAN DEMOCRATIC REPUBLIC.

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NOISE REDUCTION: AIR POLLUTION.


Sums., illus. for various papers, SS:


Environmental pollution is discussed, including: air quality control; water quality; noise abatement; solid waste disposal; and waste water treatment. In addition to technology, legal and economic aspects of environmental pollution are considered.
residential dwellings with which the State Research Institute for Thermal and Sonic Technology (Austria) dealt in the last 15 yr. Three separate groups of industry can be distinguished with reference to noise production and methods of reducing the external emission of noise. Large plants that occupy considerable areas of land and where at least a part of the noise production is out-of-doors; fairly large enterprises operating in their own self-contained industrial premises; and smaller plants that do not require an entire industrial premises and are therefore usually housed in the basement, ground floor, yards or annes of dwelling houses. The laws of extending and checking airborne and structure-borne sound are studied with practical examples and on a model.

NP73-3A-025
72-SI1-0148
Anon.
Noise and vibration control for industrialists.
Abs. 9 figs., tables, appendices, refs. for various papers. SS.
NOISE CONTROL: VIBRATION; INDUSTRIAL NOISE: conference papers: selected papers cited.
A series of papers on industrial noise and vibration control is presented. Topics include basics of noise and vibration, principles of noise and vibration control; measuring techniques, acoustic materials for absorption, acoustic materials for transmission loss; vibration isolation; vibration test facilities and techniques: criteria and standards; hearing conservation; and an industrial noise control case study.

NP73-3A-026
72-SI1-0151
Hub. D.R.
Univ. of Wales, Inst. of Science and Technology,
Dept. of Applied Physics, Cardiff, Eng.

Principles of noise control.
See Citation No. 72-S11-0148. 18 pages. 1972.
Abs. 7 figs., 2 appendices, 19 refs., from Text.
NOISE CONTROL: technology: source; path: receiver.
Noise control is the technology of obtaining an acceptable noise environment at a receiver consistent with economic and operational considerations. The receiver may be, for example, a group of people, an entire community, or a piece of equipment. Various aspects of noise control are discussed. Reasons for noise control; economic considerations; points of attack; statistical aspects; interaction between source, path and receiver; noise control at the source; control of the transmission path; noise control at the receiver; and systematic noise control.

NP73-3A-027
72-SI1-0155
Gordon. Colin G.
Univ. of Southampton, Inst. of Sound and Vibration Research, Wolfson Unit for Noise and Vibration Control, Eng.

Industrial noise control - A case study.
See Citation No. 72-SI1-0148. 18 pages. 1972.
Abs. 2 figs., 4 tables, 69 refs., from Text & SS.
NOISE CONTROL: INDUSTRIAL NOISE: FOUNDRIES: ENGLAND: building design.
A case study is presented which involves the development of noise design constraints for the installation of a new plant in a foundry in the Midlands of England. The various stages of development are described.

NP73-3A-028
72-SI1-0157
Coortis, L.V.
American Oil Co., Texas City, TX

Plant operation & loss prevention: Noise abatement in ammonia plants.
Chemical Engineering Progress, 68(S): 41-42. May 1972.
Abs. 3 figs., no refs., from Text & SS.
A case history is presented of the noise abatement program initiated at the ammonia facility of the American Oil Co. integrated refinery. Noise sources were identified and silencers were installed at the process vent upstream of shift conversion and at a steam superheating coil outlet vent. Concurrent with equipment modifications to reduce a plant-wide program was instituted to specify protective measures to be used when work conditions require extended exposure to noise.

NP73-3A-029
72-SGD-0081
Bonnart, J.
Protection of the environment - a task of our time.
In English: no abs., 1 ref., from Text & SS.
The hazardous influences on the environment of industrial and automotive emissions, noise and water pollutants are discussed, and monitoring systems and government programs for pollution abatement are described.

NP73-3A-030
72-SIG-0035
Anon.
Abs. figs., tables, data tables, refs. for various papers. SS.
Sections detail mine wastewater treatment, noise abatement, and emissions reductions in coal-burning power plants. The control of dust in mines through the use of foam and strip mine land reclamation are also discussed.

NP73-3A-031
72-SIG-0038
Anon.
Environmental pollution and its control.
Environmental Pollution and its Control. Seminar Abstracts. (Held in Baroda, India, April 15-17, 1972). Institution of Engineers (India), Baroda Sub-Centre. 79 pages. [1972?].
Abs. only, SS.
Abstracts on air and water pollution and control of chemical pollution
are presented, covering areas like wastewater treatment theory, treatment methods, unit processes—theory and design, industrial waste treatment, noise pollution, air pollution control theory, analytical procedures, surveys, hazards, automotive pollution and its control; and development of standards.

NP73-3A-032

[Assessment of noise and sound protection] Lapho A. von.
(Eng)
### GENERAL

(See Also)

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3.B METHODS
NP73-3B-001

NP73-49286/1, 15 June 1972
A METHOD OF THE VARIABLE EXHAUST DUCT PASSAGE CONCEPT AS A NOISE LIMIT REDUCING DEVICE FROM JET EXHAUST WITH AN ATTACHMENT OF A FLEXIBLE LEAK-PLANES (FLAP)

Robert B. Kayton, George Kazenman, and Robert E. Gross
15 Jul 1972, 10 p
(NASA-RSIC-00199)

The feasibility of obtaining the economically-beneficial (HEP) concept on jet engines can be improved by inserting an exhaust duct with deployed flap into the exhaust plenum of a 1/16-inch 1.464 in. square flange. Sound field characteristics were measured and made variations made to some of the ducts. Two of the 1/16-scal MODEL-1001A exhaust ducts were modified by adding flexible exhaust plate to the inner and center panels placed in the jet flow created by the nozzle. Sound levels were then measured with and without noise reduction treatment.

NP73-3B-002

NP73-49286/2, 15 June 1972
NOISE REDUCTION HEARING PROTECTION Device (NA-14039-1; US-Patent-Appl.003-0106) Appl:

The feasibility of obtaining the economically-beneficial (HEP) concept on jet engines can be improved by inserting an exhaust duct with deployed flap into the exhaust plenum of a 1/16-inch 1.464 in. square flange. Sound field characteristics were measured and made variations made to some of the ducts. Two of the 1/16-scal MODEL-1001A exhaust ducts were modified by adding flexible exhaust plate to the inner and center panels placed in the jet flow created by the nozzle. Sound levels were then measured with and without noise reduction treatment.

NP73-3B-003

NP73-49286/3, 15 June 1972
NOISE REDUCTION HEARING PROTECTION Device (NA-14039-1; US-Patent-Appl.003-0106) Appl:

The feasibility of obtaining the economically-beneficial (HEP) concept on jet engines can be improved by inserting an exhaust duct with deployed flap into the exhaust plenum of a 1/16-inch 1.464 in. square flange. Sound field characteristics were measured and made variations made to some of the ducts. Two of the 1/16-scal MODEL-1001A exhaust ducts were modified by adding flexible exhaust plate to the inner and center panels placed in the jet flow created by the nozzle. Sound levels were then measured with and without noise reduction treatment.
NP73-3B-004


A number of optimization problems are posed and solved for supersonic aircraft flight subject to the condition that a shock wave appears only incipiently in the sonic boom. The principal result is one giving the minimum effective mass weight of an aircraft given effective length under given flight conditions. The calculation of variations with inequality constraints is used, with the novel features of a non-local non-linear governing equation and of only an upper bound on a control variable. (Author)

NP73-3B-005


Bennett (1971) presented the use of a nozzle for creating the "beam" noise as a means of concentrating the noise over the flight path of supersonic aircraft. The basic idea is that supersonic flow can be focused into a local area of shock waves, and that in complete absence of the presence of curvature than that noise, which does not form. By applying a technique, which results in reducing jet noise, one of the advantages of the type proposed by Bennett, is that regions of single, double, and more triple shocks can occur. However, no shockless regions are obtained.

NP73-3B-006


The results of a study conducted by Arnold (1971) indicated that substantial attenuation of noise intensity can be realized through the insertion of a screen into the jet flow. An extension of this study is reported. The new investigation includes detailed surveys of both pressure and velocity in a large supersonic turbulent jet. Emphasis is placed on the mixing characteristics of the jet and their relation to noise radiation. Background material is discussed, giving attention to basic theory, turbulent jet acoustics, and the axial distribution of sound sources and characteristic power spectra. The study was confined to the region of jet flow from zero to eight diameters from the nozzle. It was found that there is a substantial attenuation of turbulence structure in the mixing region.

NP73-3B-007


The problems of acoustical noise generation, propagation, and attenuation in both lined and unlined straight cylindrical ducts, as well as 90 degree bends, within the cabin air-conditioning distribution system are studied. It was found to be possible to double the existing airflow velocity in the Boeing 747 air-conditioning ducts without violating cabin sound level criteria. It is possible to attenuate excess noise by lining a fraction of the duct's length with sound-absorbing foam material, and by proper choice of R/D values for the 90-degree bends upstream of the straight cylindrical ducts. (G.R.)

NP73-3B-008


An experimental study was made on the influence of a forward inclined nozzle, of an inclined surface, and of the airfoil section on the radiation of noise generated by an axial flow fan. It is shown that efficiency will be raised and noise level lowered by inclining the rotor. Noise level may not be reduced effectively when the forward inclination angle is 15 deg. Inclusion of the stator is also effective, and the primary rotating noise is considerably decreased by 3 dB at 45 deg of the inclining angle. Efficiency can be improved and noise level reduced by suitable choice of rotor airfoil section, and by adoption of the design of the basic various types as a flow pattern.

NP73-3B-009


This series of investigations conducted with coaxial interacting subsonic jet flows in both the far noise field and near noise field, (2) surveys of mean flow properties and fluctuating pressures, optical visualization of interacting jet flows, the associated flow and shock structure changes and the noise field, (3) the effects of different geometrical parameters of the coaxial nozzles, and (4) thrust measurements. It is shown that the flow interaction between two suitable controlled interfering coaxial supersonic axisymmetric jet flows results in substantial noise reduction based on equivalent thrust considerations. This flow interaction technique appears to be potentially an attractive approach for suppression of noise from supersonic jet exhausts.

NP73-3B-010


Questions of the toleration of aircraft noise by the public are considered, giving attention to the concept of the noise contour. The end of the aircraft noise problem is realized only when the area of the critical contour is contained within the confines of the airport. Approaches for achieving this objective are based on the use of quiet engines and improved operational techniques. It is pointed out that at present there are advanced technology engines capable of powering subsonic aircraft which could gradually replace the existing fleets of noisy jet aircraft. Such a replacement program would lead to a reduction of noise exposure areas by at least a factor of five. A further halving of exposure area could be accomplished with suitable development work directed at a further reduction of engine noise.

NP73-3B-011


Results are given of several analytical studies of noise suitable

Review of design and development work on the suppression of engine noise for propulsion of a quiet STOL aircraft concept. The results of the aero-acoustic tests on a conceptual design of a supersonic aircraft with a fully variable jet exhaust by an afterburner turbojet engine and the suppression of radiated noise were obtained to meet the requirements of various applications. Special attention is given to the consequences and possible improvements on different blade designs concerning the engine noise. A computer test was done with the blade and fan blade configurations and an Acoustic Variable Pulse Jet fan was used in the tests. The characteristics of this STOL propulsion system concept are included.


The extent to which jet noise can be achieved by surrounding a circular primary jet with an annular flow is determined. Acoustic experiments have been performed with a model jet primary jet which had a number very close to one, surrounded by a secondary cold annular flow of variable velocity and area ratios of the co-planar convergent nozzle. The experiments show that the reduction of high frequency noise emission depends on secondary flow velocity. In most cases, this reduction seems to be compensated by an increase in low frequency noise power. (Author)

Thermodynamic considerations for the design of a sonic boom reducing powerplant. N. Galowe (Sherbrooke University, Sherbrooke, Quebec, Canada). American Society of Mechanical Engineers, Power Exposition, New York, N.Y., May 26-30, 1972, Paper 72WA/AM-3. 6 refs., Members: $1.50; nonmembers: $3.00. NASA sponsored research.

Third order analytical expressions are obtained for the lift and drag coefficients of a two dimensional wing. The expressions are used to determine the possibility of boomless lifting configuration when the propulsive power of the aircraft is reduced. The solution is obtained by preventing the internal air from being ejected in such a manner that the stream tube cross section is smaller at the exit than at the center. Calculations by these expressions are shown to be in good agreement with actual results obtained from experimental models. It is also shown that three-dimensional using configurations of this design given the minimum thermodynamic effect when a propulsive power plant is employed for the reduction of the aircraft-sonic boom. Thermodynamic considerations are given for power plant designs to be used for this purpose.
include logical reasons why noise is generated by these phenomena at the lower mesh frequencies and the effects of typical firefighting system design details which may be useful for noise reduction at these frequencies. Comparison of theoretical slipstream amplitudes with measured values can be expected to yield both a qualitative understanding of the noise problem and also useful test data techniques which can be applied to other designs. (Author)

NP73-3B-021


The aim of this paper is to summarise the results of some years work on the internal noise of hovercraft. The basic mechanism of noise production is described and methods for controlling it are set out. A case history is also described. Internal noise measurements from other forms of transport are compared to that of hovercraft, and it is shown that comparatively small overall noise reductions of 4 DB(A) would make the internal noise as low as that of short-haul jet aircraft. Structure-borne noise is shown to be a major source of noise at least at one current production craft. Loud structural damping combined with lightweight and rigidly mounted machinery are found to be the major causes of structure-borne noise. (Author)

NP73-3B-022


The NASA, working with American Airlines, has completed the first phase of research to evaluate the operability feasibility of a novel approach for noise abatement. For this phase, on-board navigation was used to establish the upper glide slope and an ILS was used to establish the lower. The flight director was modified to provide command information during the entire approach. Twin-engine pilots representing the airlines, professional pilot associations, FAA, and NASA participated. With an ILS approach for approach, the procedure gave a noise reduction of 10 DB(A) at the noise meter and 8 DB(A) 1.1 nmi. from touchdown. (Author)

NP73-3B-023


Analytic solution of the sonic boom problem for typical aircraft maneuvers in a polytropic atmosphere by means of the analytic method of characteristics. Solutions for singularities in a polytropic atmosphere are derived. Using the analytic methods of singularities and of characteristics, the sonic boom of a body traveling in a periodic arc is obtained. The asymptotic Whitham formula for the bow wave is improved by an explicit formula which gives sufficiently accurate results for distances of about 20 body lengths or more. A.B.K.

NP73-3B-024


The probably easiest obvious cause of jet noise is associated with the engine system which causes the engine core to expand and noise is emitted. The only jet noise for supersonic jet noise lies in the exhaust system expansion. This is now possible with the advent of advanced engines, which have large diameter permits the mass flow and thrust to be maintained with much lower speeds. Mixing noise still dominates the flight of engines with supersonic exhaust speeds. Moreover, the mechanism involved in this case is quite different, and noise propagation devices are used to ensure that mixing noise is no longer a problem. G.R.

It is shown that focused beams that arise in turning flight can be suppressed by the simple (although not always practical) expedients of dressing down the aircraft. The correct deceleration will eliminate the local curvature of the beam front responsible for the focusing. Specifically, the tangential deceleration resolved along the tangent to the beamfront is adjusted to cancel out the contraposed curvature diametrically related. The central terms of a prescribed limiting diagram are not of concern for this suppression technique: their focused beams will be cut off from reaching the ground by atmospheric extinction. The minimum turn radius for focus cutoff is related in a simple fashion to the tabulated width of the cone beam except for nonlinear flight, as a function of flight number and altitude.

Points out necessity of protecting the ears of armed forces personnel against noise and the ears of combat troops against blast without interfering with normal hearing. Measured the shock wave attenuation of a number of different combinations: muslin cloth, polyurethane foams, wire meshes and nylon and cotton net, and presents the shock and acoustic wave transmission characteristics for each.—E. J. Moncada

**NP73-3B-030**

AD-783 646

Hughes Tool Co Culver City Calif Aircraft Div

OH-6A PHASE II QUIET HELICOPTER PROGRAM.


Contract DAA02-69-C-0275, ARPA Order-1321


The report presents the results of the Phase 2 Quiet Helicopter Program. A Hughes OH-6A Light Observation Helicopter was extensively modified to obtain a maximum of quieting. The purpose was to apply the latest known sound-suppression techniques available to industry to an actual helicopter and then to measure the results. An acoustic goal was set which required a balanced treatment of each noise-producing source throughout the full frequency range. Noise reductions ranged from 14 to 20 db depending on the flight conditions. The report describes the detailed configuration changes, the test and development programs, and the final sound level measurements compared to the standard OH-6A. (Author)
The effect of plants on microclimate and noise reduction in the urban environment. Microclimate 7(1): 37-39. Illus. 1972.--Plants have a great impact upon the urban microclimate in contrast to dry structural materials. Infrared surface temperature can be substantially modified by evaporative cooling and the interception of radiant energy by plants to reduce the heat island characteristic of the summer urban microclimate. High temperature characteristic of surfaces such as artificial turf can be reduced by irrigation. Outdoor athletic areas covered with artificial turf should be either irrigated to permit evaporative cooling or shaded to intercept solar radiant energy. Coniferous trees are capable of providing a small amount of attenuation for environmentally noise that are either predominantly low or high frequency in composition. However, dense wide plantings are necessary to achieve effective environmental noise attenuation from vegetation alone in urban areas and the practical value of plants as an urban "sound barrier" appears questionable.

The development of a low noise constant area throttling device. E. J. (INSTRUM SOC AM) TRANS 14(4): 416-421. Illus. 1979.(More, 1979).--With the recent revision to the Walsh-Healey Act, possible high noise levels produced by control valves are a subject to concern to industry. A comprehensive effort to determine an effective and practical approach to reducing aerodynamic valve noise resulted in the development of a fixed area, throttling device designed to reduce the production of aerodynamic noise at its source. This paper outlines an analysis of valve noise and investigates the parameters affecting sound through a series of qualitative tests. The influence of effective orifice diameter, system energy losses, resonant damping, and pressure drop variations are discussed. These factors, when properly incorporated in the finished product, result in substantial and predictable noise reduction. Test results indicate excellent agreement with predicted SPL (Sound Pressure Level) values.


Noise fades into the background when workers wear muffs. K. Gale. II Engineer 222: 13 in 8 '71

67
actions required by the Occupational Safety and Health Act of
apprroximate costs are discussed.

The engineering concepts and designs, the materials used,
encountered in existing refineries and petrochemical plants is

INDUSTRIAL NOISES: OCCUPATIONAL HEALTH: abstract only: petroleum and petrochemical plant: hearing conservation program.
A hearing conservation program at a large petroleum and petrochemical plant that is based on past experience and the Occupational Safety and Health Act of 1970, is reviewed. Plans, surveys, problem area definition, and medical and engineering control are discussed. A multidisciplinary approach is used in which medical, engineering, and operations departments share in the responsibilities for providing a suitable noise environment. The control of furnace and pipeline noise is examined in some detail.

A variety of noise control techniques for common noises encountered in existing refineries and petrochemical plants is examined. The engineering concepts and designs, the materials used, the amount of noise reduction anticipated and/or achieved, and the approximate costs are discussed. A check list, used by one group for actions required by the Occupational Safety and Health Act of 1970 on occupational noise exposure, is demonstrated as an example. Also a method for the choice and priority of controlling noise sources is reviewed. Examples of "Noise Control Data Sheets" formulated for engineering department use are presented.

Some techniques and developments, which have resulted from noise investigation programs, now being used on production engines are reviewed, including test methods and techniques. Practical developments involving engine speed, engine covers, and turbocharging are outlined, installation problems, smoke control, legislation, and practical smoke reduction are also described.

High speed train noise control.
Abs. only, from AA.
Also in: Society of Automotive Engineers. New York. Section Papers No. 73-1TE-00037.

Detail study of refinery noise problems.
See Citation No. 73-1TE-00006 p. 171. [1972?].
Abs. only, from AA.

Several ways are discussed to achieve greater coordination between
of engine noise reduction in commercial motor vehicle applications.
See Citation No. 73-1TG-00051 pp. 33-42. [1972?].
No abs., illus., no refs., from Text.

Some techniques and developments, which have resulted from noise investigation programs, now being used on production engines are reviewed, including test methods and techniques. Practical developments involving engine speed, engine covers, and turbocharging are outlined, installation problems, smoke control, legislation, and practical smoke reduction are also described.
Baltimore plans highways for minimum noise.


Noise level prediction of a proposed highway design is explained. Several case histories of highway design and planning in Baltimore (Maryland) are presented and represent difficult urban problems - those not solvable by handbook methods. The design and use of earth berms and acoustical barriers to attenuate noise are illustrated.


Noise level prediction of a proposed highway design is explained. Several case histories of highway design and planning in Baltimore (Maryland) are presented and represent difficult urban problems - those not solvable by handbook methods. The design and use of earth berms and acoustical barriers to attenuate noise are illustrated.


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Aircraft noise in the 1980's.

No abs. 7 fgs. no refs. from Text & SS.

AIRCRAFT: NOISE SOURCES: future controls.

Aircraft noise is a nuisance. Conservationists, government research establishments, universities, and industry are working together to minimize the nuisance without ruining the economy of the air transportation industry. New aircraft can be made quieter, they may be suppressed by means of a "noisy foot-print," so called because of the footprint pattern of the ground area exposed to noise in excess of a specified level during takeoff and landing. Footprint area is directly proportional to the number of people disturbed. Noise curbs for existing aircraft are being studied as well. Better engines and enforcement of noise regulations are helping to alleviate this problem. A low noise engine is described.

NP73-3B-052

72-STE-0139
Rink, Charles N. Rink Corp., Hazleton, PA

Noise control in air handling systems.

Sum. 2 figs. 3 tables. 1 ref. SS

AIR CONDITIONING: NOISE EFFECTS: NOISE SOURCES: NOISE CONTROL: ECONOMICS

Generation, propagation and control of noise in air handling systems require careful engineering. Unitary air conditioning systems are compared to central station systems. Today's systems incorporate smaller machines, less ductwork and the proper amount of acoustically absorbent material. Information available to sound engineers on sound frequencies, the threshold of hearing, sound curves of equal loudness and annoyance, permissible noise limits for occupational exposures, and sound levels which cause discomfort and pain, is discussed. Causes of unwanted noise in a building's mechanical system are examined, with special emphasis on the fan. Overpressuring must also be avoided because other mechanical noises then become audible and more annoying to the human ear. The various components which generate sound are described and suggestions are made for achieving more efficient and lower cost systems.

NP73-3B-053

72-STE-0140
Warnaka, Glenn E. (all) Lord Corp., Lord Manufacturing Co., Erie, PA
Zalas, J.M.

Structural damping as a technique for industrial noise control.

Abs. 11 fgs. 3 tables. 15 refs. (2 in Ger.), from AA.

NOISE CONTROL: DAMPING: INDUSTRIAL NOISE: structural damping

Damping, although often used synonymously for attenuation, refers to an energy conversion process where the energy of mechanical vibrations is changed to heat energy. On this basis, damping is shown to be a useful tool for noise reduction where structural resonance or wave propagation at sonic speeds is responsible for noise radiation. Structural damping reduces noise radiation from structures by attenuating both the temporal and spatial components of flexural waves traveling in the structure. Structural damping is further shown to be useful in reducing noise originating from mechanical impact and from steady-state excitation. Examples of the effect of structural damping in reducing the noise from industrial machinery are presented, and data is given indicating the noise control obtained.

NP73-3B-054

72-STE-0141
Holmar, C.I. Bolt, Beranek and Newman, Inc., Cambridge, MA

Lagace, A. National Research Corp., Cambridge, MA

Effect of structural damping on the sound radiated from impacting structures.

Abs. 5 fgs. 2 tables. 1 ref. from AA.


Theoretical and experimental evaluations of some damping treatments utilized to control noise transfer from materials in a foundry are presented. A theoretical investigation is outlined which indicates that the change in peak radiated sound pressure level from an impact is proportional to the change in mass and stiffness of the impacted surface. The change in total sound power radiated is proportional to the change in mass, stiffness and the loss factor of the impacted surface. The energy noise reduction has application in predicting the reduction of the time average reverberant field sound pressure level from a large number of impacts occurring throughout a period of time.

NP73-3B-055

72-STE-0142
Doyle, Leslie L. Montreal, Que., Can.

Environmental acoustics.

No abs. numerous fgs., 18 tables, 4 appendices, index, numerous refs., SS.


A detailed analysis of environmental acoustics in architectural design is presented for practical application to present-day building practices. Properties of sound and various aspects of room or space acoustics are described. Environmental noise control, including sound-insulating construction, noise criteria, control of mechanical noise and vibration, and noise control in specific types of buildings, is discussed. Detailing, specification and supervision are included.

NP73-3B-056

72-STE-0146
Anon.

Study of feasible methods for reducing the noise levels of turbofan and turboprop aircraft.

NP73-3B-057

72-5GD-0564
National Industrial Pollution Control Council. Airline and Aircraft Sub-Council

Noise from gas turbine aircraft engines.

Sum. 3 fgs. no refs. from AS & SS.

The reduction of noise from gas turbine aircraft engines is discussed. The introduction of low-bypass ratio turbofan engines reduces exhaust noise but adds fan tones particularly noticeable in landing. Fan design and acoustic treatment technology for reducing fan noise in high-bypass engines are considered. The high-bypass ratio engine provides good fuel economy and low jet exhaust noise levels.

NP73-3B-058

72-STI-0682
Macdonald, Howard R. San Diego, CA
Method and apparatus for suppressing the noise of a fan-jet engine (3,673,803).
**3B METHODS**
*(See Also)*

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3. C MATERIALS

Four types of materials are available for dealing with noise and vibration control problems: sound absorption materials, sound barrier materials, vibration/shock isolation materials, and vibration damping materials. Two or more of these materials are often incorporated in a single commercial product to obtain the benefits of their combined effects. Properties of these materials and their performance when used singly and in combination are discussed. Transformer enclosures, engine test cells, appliance enclosures, railroad wheels, and pipes and values illustrate typical applications of noise/vibration/shock control materials.


A survey is made of the techniques and materials which can be utilized for the control of noise transmission and vibration induced failure in structures. Consideration is given to dynamic behavior of damping materials as a function of temperature and the effect of various damping treatments on the response and modal damping of a variety of structural elements exhibiting many different stiffness and geometrical characteristics. Examples are given of prior applications of damping to the solution of a variety of vibration and noise control problems, and of materials available for vibration control.

Satisfactory sound insulation between dwellings: A real possibility.

For satisfactory airborne sound insulation between dwellings, more insulation than the usual minimum requirement in Western Europe is necessary. This goal is attainable if thick external walls and floors are combined with lightweight internal walls. Improved insulation values of 6-9 db were measured in apartments of a building system for social housing.
3C MATERIALS
(See Also)

1C001 3A025 3B025 3B029 3B031 3B033
3.D REGULATIONS AND STANDARDS
NP73-3D-001

772-208146/ Committee on Commerce (U.S. Senate),
NOISE CONTROL ACT OF 1971 AND AMENDMENTS.

and S. 1566 before Comm. on Com., 92d Cong., 2d Sess.,
28, 30 June and 28 July 1971

The hearings concerning noise pollution and the Noise
Control Act are reported. The comments from the following
agencies are included: Department of Interior, Department of
State, Comptroller General, Department of Agriculture, Civil
Aviation Board, National Science Foundation, EPA, and
NASA. Additional articles, letters, and statements concerning
effects of noise, and sound rating of outdoor equipment are
included.
F.D.C.

NP73-3D-002

772-30589/ Committee on Public Works (U.S. Senate),
REPORT TO THE PRESIDENT AND CONGRESS ON NOISE
Administrator of EPA to Comm. on Public Works, 92d Cong., 2d
(S-DOC-92-D3) Avail. SOO 5175

The effects of noise on living things and property, noise
sources and their current environmental impact, and control
technology and estimates for the future are considered. The
following topics are discussed: auditory, sociological, physical,
and psychological effects; effects of noise on wildlife; effects
of sonic boom and other impulsive noise on property; physical
effects of noise on structures and property; community noise
transportation systems, devices powered by internal combustion
engines; noise from industrial plants; construction equipment
and operations; household and building noise; transportation
industry programs; noise reduction for industrial plants;
construction and equipment industry efforts; laws and regulatory
schemes for noise abatement; government, industry, professional,
and voluntary association programs; and assessment of noise
concern in other nations.
K.P.D.

NP73-3D-003

772-30588/ Environmental Protection Agency, Washington,
DC.
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS
FROM REPORT TO THE PRESIDENT AND CONGRESS ON
NOISE

General observations, conclusions, and the future program
are briefly summarized from the study on noise sources, noise
pollution, and noise abatement. It is pointed out that noise
effects are difficult to define and evaluate and available information
on typical exposures is sparse. Noise control technology and possible
changes in the noise problem to the year 2000, methodologies for noise
measurement and evaluation, and economic implications of noise and noise
abatement are mentioned. Recommendations for achieving noise reduction over
the next 5 to 10 years are outlined.
M.A.M.

NP73-3D-004

772-33984/ Micro Corp., Natick, Ma.
A PROTOTYPE STANDARD AND INDEX FOR ENVIRON-
MENTAL NOISE QUALITY
1971. Submitted for publication (PB-205718, MAP-358) Avail. NTIS HC 80.00 CSCL 20.5

A prototype technical standard for environmental noise is
proposed in terms enabling an index of noise quality to be
defined and calculated. The standard takes into account the

Summary: As exposure to loud noise as well as
greatly disturbing aspects of typical community noises
which are not loud enough to be physically dangerous, inasmuch
as the standards intended to portray environmental quality
rather than to reflect damage risk criteria, it is generally
conservative with respect to work-related noise standards, such
as those specified by the Walsh-Healey Act. The basic standard
specifies a distribution of noise intensities to which an individual
might be exposed in a 24-hour period. The distribution may be
aproximated by the components of three Gaussian distributions
with means and standard deviations of 130 and 3, 150 and 8.5.
and (70 and 15) dB (A).

Author (GRA)

NP73-3D-005

LAWS AND REGULATORY SCHEMES FOR NOISE
ABATEMENT
(PB-205717, EPA-NTID5004) Avail. NTIS HC 80.00 CSCL 30

The report presents results from surveying the existing
Federal, State, and local laws, ordinances, and regulations
governing the abatement and control of environmental noise.
The basic assignment was divided into four subtasks: current
governmental noise regulatory schemes; analysis of existing legal
regulatory structure for noise abatement and control; the
effectiveness of existing noise control regulations and proposals
and problems in the regulation and abatement of noise.

Author (GRA)

NP73-3D-006

772-33984/ Environmental Protection Agency, Washington,
DC.
REPORT TO THE PRESIDENT AND CONGRESS ON NOISE
(PB-205719, EPA-NTID5000) Avail. NTIS HC 80.00 CSCL
13B

The report reviews the effects and abatement of noise on
society. The contents include the following topics: effects of
noise on living things and property; sources of noise and their
current environmental impact; control technology and estimates
for the future; laws and regulatory schemes for noise abatement;
government, industry, professional and voluntary association
programs; and an assessment of noise concern in other nations.

Q.G.
The report presents the criteria and a proposed standard for preventing occupational diseases arising from exposure to noise. These criteria and the recommended standard were developed by the National Institute For Occupational Safety and Health (NIOSH). A majority of the NIOSH Review Consultants recommended an 85 dBA noise limit with mandatory hearing protection and audiometric testing for the most complete protection. Data are provided in this document which indicate that approximately 14% of workers in manufacturing are exposed to noise above 90 dBA, but no data are available relative to the number exposed to 85 dBA or to the technological feasibility of meeting the proposed 85 dBA standard in a given time period. The present recommendations defer the 85 dBA standard until after an extensive feasibility study and limit mandatory audiometric testing to new employees, with a recommendation that employers consider the costs of a full hearing conservation program.

The report describes the impact that implementing highway noise standards will have. The standards provide for a weighing of the costs of noise abatement measures on a case-by-case basis, including the need for additional land to serve as buffer strips so that in each case there will be a weighing of the use of resources against the benefits achieved. It is possible that the standards may lead to more land being required for future highways. Much of the report consists of responses to the new guidelines.
NP73-3D-009


NP73-3D-010

383. FOX, M. S. Occupational hearing loss—Recent guidelines and statutes of interest to the otolaryngologist. Laryngoscope, 82(7), 1972. 1226-1230.

Recent federal and state guidelines for permissible noise exposure levels have created renewed interest in the industrial noise problem. Reviews the provisions of the noise criteria, discusses the role of the otologist, and calls attention to areas of inconsistency and conflict in the medical legal evaluation of hearing loss claims.—J. Abst.
NP73-3D-012

[Town-planning and building regulation in noise surrounding airports, in relation to noise produced by planes. Medical-social aspects of the problem]
Paccagnella S.
Ann Sanita Pubblica 22:698-6, Nov-Dec 71 (Ita)

NP73-3D-013

Noise-exposure: the legal viewpoint. Pekarinen HM.
Trans Am Acad Ophthalmol Otolaryngol 75:1272-82,
Nov-Dec 71

NP73-3D-014

New industry anti-noise law requires hearing tests and sound controls. Fed Med Surg 51:34-5, May 72

NP73-3D-015

Mar '72

NP73-3D-016

Noise control and government regulation. H. V. Semling Jr. Foundry 100:53-5 F 72
 Noise pollution.
An Environmental Conservation Element for the Los Angeles City
General Plan; a Collection of Environmental Conservation Studies.
Department of City Planning, Advance Planning Division, Los Angeles,

Abs. illus., refs., from AA.

NOISE STANDARDS: URBAN NOISES: NOISE LEVELS:
TRANSPORTATION NOISES: INDUSTRIAL NOISES: CALIFORNIA: Los
Angeles: physiological and psychological effects: policy
recommendations.

Urban noise and its general impact on the environment are
discussed. Methods by which noise levels can be measured or
calculated are presented, and the physiological and psychological
effects of urban noise on man are considered. Major local sources of
noise, including air surface transportation systems, residential sources
(apartments, playgrounds, and neighborhood pets), and commercial
and manufacturing sites are discussed. Policy recommendations for the
reduction of urban noise levels given include: adopt a quantitative noise
standard for operations at Los Angeles International Airport, limiting
noise levels to 90 NPhB (perceived noise level) or lower at the airport
boundary; modify the westerly take-off pattern at the airport to effect
its extension to the west; apply an 85 NPhB standard to all commercial
helicopter operations; propose the passage of stricter quantitative noise
standard and enforce current noise regulations governing motor vehicle
operations; requiring the use of acoustical insulation in all new
residential buildings; and adopt quantitative noise standards governing
all construction equipment operating in the city.

Legal noise limits demand improved engines and subsystems.
Society of Automotive Engineers. New York. Journal of Automotive

Sum. illus. no refs. SS.

NOISE REDUCTION: INTERNAL-COMBUSTION ENGINES: NOISE
STANDARDS: summary: Inst. for Noise Control in Internal-Combustion
Engines.

Several lectures and discussions from the meeting of the Institute
for Noise Control in Internal Combustion Engines held in January 1972
are summarized. Topics reviewed include noise standards, source
isolation, attenuation factors, measuring procedures, and methods for
reducing noise levels of combustion, fans, mufflers, hydraulic systems,
and other components.

Legislation et reglementation sur le bruit,
See Citation No. 73-1GD-00017. 6 pages. [1971].
In French; no abs. no refs. from Text.

NOISE LEVELS: LEGISLATION: GOVERNMENT REGULATIONS:
FRANCE: urban: transportation: industrial noise.

Regulations and legislation on noise in France are surveyed. Special
rules for the soundproofing of buildings and minimum noise levels for
motor vehicles in different categories are specified. The vicinity of
airports is divided into zones according to sound intensity. The
maximum noise levels recommended for housing areas are presented
as well as suggestions for new regulations of machines, engines,
industrial noise, protection of workers, and insulation of buildings.

Noise pollution.
A study of the legal, legislative, and enforcement aspects of urban
noise control in the United States. The study is divided into two
sections: a review of the literature, and a legal analysis of federal,
state, and local noise control programs.

Abs. illus., refs., from AA.

NOISE STANDARDS: URBAN NOISES: NOISE LEVELS:
TRANSPORTATION NOISES: INDUSTRIAL NOISES: CALIFORNIA: Los
Angeles: legislative aspects; enforcement: precursors.

The enforcement program was preceded by several years of
studies, legislative proposals, and evaluations of procedures, before
enforcement by instrumentation (sound level meters) was feasible.
Because of the detailed preliminary planning, the law operated very
well and produced significant results. Noise teams were trained and
judges and district attorneys were consulted before initiating the
enforcement program in different areas of the state. The first enforcement efforts
resulted in a number of new vehicle models, both muscle cars and
trucks, being recalled by manufacturers for retrofitting with quieter
exhaust systems. Yearly reductions were made in levels in one or
another part of the noise law based on compromises between desired
levels of quieting and the numbers of vehicles that might have to be
reworked if particular levels were enforced.

No abs., illus., numerous refs. from Text.

Grant: NOAA 235277.


No abs., illus., numerous refs. from Text.

Grant: NOAA 235277.


Agencies, activities, and studies are cataloged. The listings include state agencies and local governments in Los Angeles and Orange counties, as well as selected resource libraries for government publications located in the Los Angeles area. A bibliography of government reports on air resources, land use, solid waste management, noise abatement, and water pollution is included.

NP73-3D-024

73-ITE-00032
Mayo, Louis H.

George Washington Univ., School of Law, Wash., DC


Abs. only, from AA.

Also in: Society of Automotive Engineers. New York. Section Papers No. 720627.

TRANSPORTATION NOISES : NOISE REDUCTION : GOVERNMENT REGULATIONS : abstract only.

The increasing public concern in recent years over the problem of environmental noise has resulted in the enactment of technology-based regulatory agencies and statutory measures to control technological applications. Most of the earlier controls, however, were reactive measures rather than positive efforts to assure development of a new technology in the public interest. This situation is beginning to change as new environmental codes are being implemented in various states and cities. A description is presented of how the noise factor has influenced the planning of transportation systems by various legislative and regulatory entities at the federal, regional, state, and local levels.

NP73-3D-025

73-ITE-00035
Cooper, A.S.

California Highway Patrol

Abs. only, from AA.

Also in: Society of Automotive Engineers. New York. Section Papers No. 720655.


Reasonable and effective laws for the enforcement of motor vehicle noise were enacted and successfully applied in California. Specific laws to prohibit both sale and operation of noisy vehicles were necessary. Measurements by both instruments and human ear judgments are practical and necessary at this time. Noise limits would be gradually reduced commensurate with the needs of the public and the capability of the technology. Future controls on noise producing components, in addition to the complete vehicle, appear to be necessary to obtain desirable maximum levels. California has pioneered interim solutions to portions of this environmental problem and has developed the expertise along with the practical experience to achieve further advancements in solving the problems.

NP73-3D-026

73-ITG-00040
Anon.


Abs. illus., refs. for various papers, from Text.


A comprehensive review and analysis of environmental issues in Los Angeles are presented. It is a framework through which governmental and private agencies and citizen groups can perceive interrelationships between various aspects of environmental problems. Specific policy recommendations needed for formulation of additional standards and legislation pertaining to environmental quality are provided, and guidelines for modification of city procedures so as to minimize the negative impact of city operations on the environment are given. Areas covered are air pollution, water quality, noise control, land resource conservation, solid waste disposal, and pesticides. Factors affecting the particular issues, dimensions of the policies, and policy recommendations are discussed for each area.

NP73-3D-027

73-IG0-00043
Anon.


No abs., illus., no refs., SS.


The problems of noise, its damaging effects, and the need for noise pollution control are discussed. Governmental action related to noise control in Illinois is described, including the comprehensive Illinois Environmental Protection Act, new regulations proposed for adoption by the Pollution Control Board, the work of the Illinois Division of Noise Pollution Control, and the prosecution of noise violators.

NP73-3D-028

73-ITG-00097
Torrey, J.D.

U.S. Dept. of Labor, Denver, CO
Some preliminary experience with the Occupational Safety and Health Act in the Rocky Mountain region. See Citation No. 73-ITG-00053 p. 194. [1972?]

Abs. only, from AA.


The Williams-Steiger Occupational Safety and Health Act was signed into law on Dec. 29, 1970. Most of its health provisions became effective on Aug. 27, 1971. The states in Region VIII have a normal complement of industries excluding the Maritime. Response to complaints and normal plant inspection work indicated exposures to common contaminants as well as noise and exotic materials. CO, free silica, nuisance dust, and welding fumes are some of the commonplace materials. Polyurethane foams, pesticides, and organic solvents represent some exotics. Citations were issued for alleged violations of the noise standards and occupational health and environmental control standards in both the construction industry and usual industrial production or service plant.

Abs. only, from AA.

Also in: Society of Automotive Engineers. New York. Section Papers No. 720646.

TRANSPORT SYSTEMS: EMISSION CONTROL: NOISE LEVELS: abstract only: Personal Rapid Transit systems.

Qualitative and quantitative data on the relationship of emerging Personal Rapid Transit systems and the environment are presented. Specific reference is made to comparison of these systems with the U.S. air pollutant inventory and with the automobile. Thermal pollution and reduction of power supply requirements for these transit systems are considered. Definitive specification information for interior/exterior noise levels, in comparison with other transportation modes and with background conditions, are provided. Visual aesthetics of guideway, station, and vehicle design are presented as the most challenging remaining problem in the integration of Personal Rapid Transit systems into the society.


In English and German; no abs., no refs., SS.

NOISE REDUCTION: GREAT BRITAIN; Noise Abatement Society.
The Noise Abatement Society (Great Britain) was formed to elminate excessive and unnecessary noise from all sources. Concerns and actions of this group are in the areas of present noise law enforcement, new laws, educational programs, public health effects, machinery noise, aircraft noise, and traffic noise.

The conquest of noise in Finland. See Citation No. 73-2TE-00049 pp. 32-33. 1972.

In English; Eng., Fr., Ger. summ., refs. from AS & SS.

NOISE REDUCTION: LEGISLATION: FINLAND

Noise reduction legislation in Finland is briefly reviewed. The 1958 Finnish Law on Safety in Work considers occupational health and noise abatement in industry. In 1966, the Finnish Council for Air Conservation and Noise Abatement was appointed: the council is responsible for dealing with general problems concerning air pollution and noise abatement. Conservation of nature in 1970 created several committees for the planning of how to increase the efficiency of noise legislation.

Noise nuisance control by oil refineries. See Citation No. 73-2TE-00049 pp. 171-173. 1971.

In English; Eng., Fr., Ger. summ., no refs. from Text & SS.


In 1963 oil companies operating in Western Europe established an international study group at The Hague to investigate the oil industry’s environmental pollution problems. The progress of a section on noise control towards stated objectives is briefly reviewed. These objectives include collation of experience on neighbor hood noise problems; information on legislation, standards, and codes; noise levels of particular types of equipment information on noise suppression measures; agreement on a standard method of assessing refinery noise levels, and development of a standard method of specifying noise levels for new equipment.
receiving as much attention as industrial waste or automobile exhaust, but it is a subject of growing concern. To indicate the nature and scope of this issue, the law as it now stands is related to the problem of noise is examined. Whether the law provides effective means of regulation and control is analyzed.

72-5GD-0540
Anon.
Noise pollution: An introduction to the problem and an outline for future legal research.

Noise Pollution: An Introduction to the Problem and an Outline for Future


Sum. only, from Sum.

GOVERNMENT PROGRAMS: POLLUTION CONTROL: SWITZERLAND: summary only: environmental protection council.

The Bundesrat decided to set up a council for the protection of the environment to be approved by referendum. The council would deal in particular with water pollution and conservation, clean air and noise control; it would also control and coordinate research and work in the whole field of environmental matters.


The siting of airports is discussed, with emphasis on problems created by land use and noise. Legal actions in New York and Dade County, Florida, are discussed, and the liability of airlines regarding noise control is examined.

NP73-3D-048

72-5GD-0687
Lewickie, Carol Knopp
Environmental Science and Technology, Wash., DC


No abs. 2 figs., data tables, 1 ref. from Text.

AIRCRAFT : EMISSION CONTROL : JET NOISE : NOISE REDUCTION : GOVERNMENT POLICIES : EPA.

Industry and government efforts to reduce aircraft and jet engine noises and emissions are discussed. Industry reduced jet noise by switching from "low bypass" to "high bypass" jet engines which moved the air at a lower velocity through the jet exhaust, thereby creating less "whining." The Federal Aviation Association promulgated the 1968 Federal Air Regulation 38 which sets noise limits for commercial aircraft. The Environmental Protection Agency's standards and studies of aircraft emissions are discussed, and the industry's smoke retrofit program for jet engines is described.

NP73-3D-049

72-5GD-0686
Anon.

Issue: Streßenzerschadigung fuer Schallschutzverordnungen, Frankfurter Allgemeine. 9, June 14, 1972.

In German; no abs., no refs., from Text. (224 col. in.)

NOISE SOURCES : NOISE STANDARDS : AUTOMOBILES.

GOVERNMENT REGULATIONS : GERMANY: indemnity : newspaper article.

Owners of homes located on new or rebuilt federal roads will be able to claim indemnity for soundproofing when traffic noise reaches a certain level, according to a new law. Indemnity will be paid by the state when traffic noise causes equivalents exceeding 75dB, measured on the exterior walls of the houses during a representative period.

NP73-3D-050

72-6TE-0183
Mayo, Louis H.
Ware, Robert C.
(both) George Washington Univ., Program of Policy Studies in Science and Technology, Wash., DC


No abs. 20 refs., from Text.


The evolution of laws and regulatory structures to control environmental noise is discussed. Sources, regulatory efforts, and trends in the private sector, and at the local, state, and federal levels are investigated.

NP73-3D-051

72-6TE-0184
Cohn, Louis F.
Kentucky Dept. of Highways, Noise Abatement, Frankfort
Anon. (both) Unv. of Louisville, Dept of Civil Eng., KY.

Development of a federal traffic noise control law.

See Citation No. 72-GD-0650 pp. 240-244, June 4, 1971.

Sum. only, from Sum.

Noise pollution.

Anon.


Sum. only, from Sum.

Noise control.

Anon.


Sum. only, from Sum.

The necessary of developing a federal traffic noise control law is examined. The results of noise level profile studies are discussed in terms of providing the technical basis for the drafting of a uniform federal traffic noise control law that would be applicable nationwide. Recommendations for vehicle noise limits are made and methods for the enforcement of standards are suggested.


The necessary of developing a federal traffic noise control law is examined. The results of noise level profile studies are discussed in terms of providing the technical basis for the drafting of a Kentucky traffic noise control law that would be applicable nationwide. Recommendations for vehicle noise limits are made and methods for the enforcement of standards are suggested.

MINING INDUSTRY: NOISE STANDARDS: ENVIRONMENTAL NOISE ABATEMENT: RECOMMENDATIONS.

The mandatory noise standards developed in response to the Coal Mine Health and Safety Act of 1969 specify maximum personnel noise level-time exposures for underground coal mines. The Act further specifies that personal protective devices shall not be used to meet the standards where the protective devices may otherwise impair the safety of a miner; this specifically refers to the use of earmuffs or plugs that would impair the ability to hear warning signals in the mine. A personal audio dosimeter developed to assess an individual’s exposure to intermittent vs multiple coal mine noise is described. A discriminating earmuff which in the absence of noise allows the wearer to hear low-level warning signals is also discussed, as is the development of noise abatement and control techniques for underground noise sources, particularly pneumatic drills.
A federal anti-noise program which includes provisions to prohibit commercial supersonic flight over the U.S. and its territorial waters was proposed in the Senate.

NP73-3D-059

72-6GD-0763
Meyer, Michael B. Environmental Affairs, Inc., Brighton, MA
Air and noise pollution surrounding airports: East Haven v. Eastern Airlines, Inc.
No abs., 33 refs. from Text.
AIR POLLUTANTS NOISE CONTROL AIRPORTS LEGAL ACTIONS: East Haven v Eastern Airlines, Inc.

Rights of property holders near airports to a quiet and clean environment have increasingly come into conflict with whatever rights the public has to relatively unrestricted air travel. In East Haven v. Eastern Airlines, Inc., the United States District Court for the District of Connecticut dealt with such a conflict and ruled for the public's right to relatively unrestricted air travel. The court's decision is subject to three major criticisms. Most importantly, it does not recognize nuisance as a legal theory most applicable to complex controversies involving airports. In addition, it does not recognize trespass as an appropriate legal theory for dealing with invasions of property by either aircraft or physical agents. Finally, the court's decision limits the class of property holders who may recover and allows only for money damages, an inadequate remedy in view of the continuing nature of the problem.

NP73-3D-060

72-6TG-0794
Anon.
Environmental health planning.
No abs., 1 fig., 1 table, numerous refs. from Intro. & SS
GOVERNMENT PROGRAMS URBAN REFUSE PUBLIC HEALTH MANUAL HEW environmental health: radiation: noise: pesticides.

This manual is intended to guide state and local environmental health planners and managers in the development of appropriate and effective programs through systematic planning, either for the development of new programs or the evaluation and upgrading of existing ones. Basic planning information is provided, as well as special considerations relating to planning state or local programs in each of the principal environmental health areas. The specific areas covered include air, water, solid wastes, radiation, noise, vectors, pesticides, the residential environment, institutions, injuries, occupational health, recreation, food, drugs, therapeutic devices, and cosmetics.
### 3D Regulations and Standards

(See Also)

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4. PHYSICAL EFFECTS OF NOISE
4.A GENERAL
NO CITATIONS THIS ISSUE
4.B STRUCTURAL
NP73-4B-001

NP73-4B-002

NP73-4B-003

NP73-4B-004

NP73-4B-005
An experiment determined the noise and vibration levels caused by pumps and motors in a building, and a definite frequency band pass region existed for a concrete slab. The vibrations of the floor slab decayed rapidly to 10% of its amplitude at the source and only slightly thereafter at frequencies above 100 Hz, and the noise level in the room could be significantly affected by force input into the floor slab. The wall was not affected transversely by floor vibrations of the amplitude considered, and significant transmission losses would occur if the slab were not continuous at the wall and if the wall did not have substantial contact with the joints.

The wave motion from a single boom with an extra overpressure of 1 lb/ft² has a sharp rise at the beginning and a gradual fall away. The wave motion of a sonic boom of the magnitude tested over London recently differs in that it has a 2nd shock wave immediately following the 1st which creates the characteristic double boom. One of the difficulties with sonic booms is the peculiar shape of the double boom, inducing resonance, thereby considerably increasing the effective power of the boom. Adverse effects on building components such as plate glass, steel, masonry, or timber, are briefly considered. The most serious point and a real concern which has not yet been studied is that of the cumulative effect of prolonged vibration from sonic boom impulses which will occur if they become part of everyday life. Specifically, the effects of sonic booms on historical structures in Great Britain are considered in light of the economics involved in preserving the landmarks vs supersonic transport.
4B  STRUCTURAL
  (See Also)

3B011  3C002
4.C ENVIRONMENTAL
NP73-4C-001


Author: James A. Cochran

NP73-4C-002


Computations of the pressure as a function of time conducted by Witham (1950) for the sonic boom are considered. The computations showed the existence of a wave consisting of two compressive shocks. The calculation had been performed on the basis of idealized conditions. Deviations of the real temporal pressure relationship from the ideal relations obtained by Witham are discussed, giving attention to a broadening of the shock and to statistical fluctuations of the sonic boom parameters. Phase changes in the wave were further investigated by studying the scattering of an ideal wave in a suitable model atmosphere, giving attention to low and high frequencies.

G.R.

NP73-4C-003


98
PROPAGATION OF A WEAK SHOCK WAVE THROUGH A TURBULENT MEDIUM, Ralph E. Phinney, and Leonard S. Taylor, 31 May 72, 26p Report, NOLTR-72-130

Descriptors: (Sonic boom, Distortion), (Atmospheric motion, Microbarometric waves), Propagation, Partial differential equations, Vector analysis, Turbulence, Shock waves.

The propagation of a weak nearly plane shock wave through a slightly inhomogeneous medium was studied. The equations for a finite strength shock wave are used as a starting point in order that the cumulative effect of second order terms will not be lost. The motivation for the study was the experimental observation that atmospheric turbulence can alternately focus and defocus weak waves from an aircraft. A more detailed understanding of the influence of atmospheric turbulence on this problem was sought. The basic equations are derived, and some preliminary results are obtained. (Author)

A major environmental effect of supersonic flight that sets it apart from other aircraft operations is the sonic boom. The wave pattern that travels with the aircraft—rather like the bow wave of a ship—sweeps over underlying areas and mimics the advancing shock wave of a mild explosion. Impelled by the prospect of civil supersonic transport (SST) aircraft, there has been a great volume of research on the sonic boom and its effects, particularly during the last decade. The state-of-the-art as of 1965 was summed up in the first Sonic Boom Symposium sponsored by the Acoustical Society of America, held in St. Louis. The state-of-the-art as of 1970 was largely summed up in the second Sonic Boom Symposium held in Houston five years later on 3 November 1970. The 1970 Symposium consisted again of a series of invited papers, for the most part of a survey nature. The authors were drawn from the international community of researchers on sonic boom and its effects. (Author)
4C ENVIRONMENTAL
(See Also)
1E035 2A001
5. SOCIAL EFFECTS OF NOISE
5. A GENERAL

102
NP73-5A-001

978-36747 Environmental Protection Agency, Washington, D.C.
NOISE ABATEMENT AND CONTROL. VOLUME 1: CONSTRUCTION NOISE
Avail: SO 0.75
The public hearings on construction noise are reported for Atlanta, Georgia. The statements of 33 witnesses are presented and include discussions on hearing loss, noise control in office buildings, noise in industrial plant construction, and noise control in construction equipment.
F.O.S.

NP73-5A-002

NP73-33661 Environmental Protection Agency, Washington, D.C.
NOISE: THE ULTIMATE INSULT
Avail: NTIS HC $3.00
The inhumanity of man's noise in the cities is protested. The effects of noise on animals forced to listen to noise are briefly discussed. The traditional use of noise to ridicule, embarrass, demean, and curse is contrasted with silence being used for worship, respect, anticipation, and love. It is concluded that the cities have destroyed nature and created a tumult of noise borne of their demands for every convenience, every novelty, and every protection from distress.
F.O.S.

Preferred noise criterion (PNC) curves and their application to rooms; L.L. BERANEK (Bolt Beranek and Newman Inc, Cambridge, Mass), W.E. BLAZIER, J.J. FIGUER; J Acoust Soc Am v 50 n 3 pt 1 Nov 1971 p 1223-8; A new set of noise criterion curves were developed to specify acceptable noise levels in rooms occupied by human beings for specifying noise-control design goals. The new criteria are a modification of those published by L.L. Beranek in 1957, specifying lower levels and new octave bands. Data are given for recent noise-control projects in office buildings and theater-concert halls.
A report of research having 3 interrelated objectives: (a) to evaluate the social basis for
the existence of noise pollution; (b) to investigate methods of abating noise and the status
of the noise abatement programs; and (c) to assess the subject of noise as an urban environmental
health problem, noting consciously perceived as well as insidious effects. Surveyed, by
questionnaire, 2 communities in Pennsylvania and the responses to the survey and noise
measurements of the communities represent most of the data reported here. Describes his
method for evaluating the health hazard of noise in a community and presents a model showing
how noise can be managed. Includes a bibliography of over 500 items arranged in 6 major
categories: noise, general; physical effects; psychosocial effects; law; noise abatement; and
noise sources.—I. M. Ventry

NP73-5A-006

On the basis of the literature and own investigations, emphasizes that noise (industrial,
domestic), threatens health. Neurosensory elements of the organ of hearing proved to be
affected by noise. Sudden noise acts negatively on the function of the cardiovascular system
causing vascular contraction. Refers noise to an intermediate stress. A more severe form
of atherosclerosis of the aorta developed in animals subjected to the action of noise than
in control animals. Considers that the loudness of many sources of noise can be diminished
by technical means and believes that measures for effective control of noise should be introduced.
16 ref.—J. Abst.


Social consequences of noise. M. L. Clark-
son. Biblio. lines Inst Mech Eng Proc 188 no 5:71-107, 71
No abs., illus., indexes, no refs., from Text & SS.
Contract: EPA 68-01-0512.

**Noise Reduction: Federal Programs**

EPA hearings: research abstracts.

- The prevention, abatement, and control of noise are considered. A noise ordinance enacted by the city of Chicago and an information retrieval system being used by the U.S. Environmental Protection Agency are described. A digest of EPA hearings is provided, along with abstracts of research on noise emission and supression; physiological, psychological, and sociological effects of noise; economic aspects of noise control; building acoustics; measurement methods; planning, design, and architectural siting; legislation, standards, and legal precedents; enforcement and educational techniques; and government programs.

**Construction Industry: Noise Reduction**

- Construction noise accompanying the rehabilitation of old and the development of new transportation modes is extremely destructive to the quality of life, and the environment. With few exceptions, industry has failed to internalize the cost of muffled equipment and procedures, and the cost of this intense noise exposure is an 'external cost' borne by both the worker and the exposed public. Engine equipment manufacturers, contractors, and project sponsors resist design for quiet. Engineers have an ethical imperative to protect the noise receiver. Citizen demand for quieter construction is growing and a few manufacturers are voluntarily marketing quieter compressors and paving breakers. Government, on all levels, is beginning to raise the question of unlimited noise emissions. The Walsh Healey noise exposure limits are now applicable to construction operations. Industry should be given financial incentives and assistance to expedite the necessary change over to design and operation for quiet.

**Noise Control: Legal Actions**

- The measurement of noise is discussed, along with its destructive effects on the human mind and body. Methods of combating noise pollution (including legal actions) are described.
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5.B BEHAVIORAL
PSYCHOLOGICAL EFFECTS OF PROLONGED EXPOSURE TO SONAR SIGNALS AT AN ELEVATED INTENSITY. 3: TWENTY-FOUR DAYS EXPOSURE TO SIGNALS AT 102 DB INTERIM REPORT

Benjamin B Waybrook and Emest M. Redden 8 Oct. 1971 28 p. 60

18-74103, NSMRL-6911 Avah NTIS CSCL 08/18

Ten carefully screened male subjects, 5 civilian men from the New London community and 5 Navy personnel, were included in the audiology studies of the Submarine Medical Research Laboratory for a total of 30 days, 4 pre-experimental (no boop), 20 days exposure to the 85 db bap and 2 recovery days. Administered daily, the test battery consisted of a sequential reaction time test, a hand-eye coordination test, a measure of muscular tension and 4 measures of mood and affect. Although 2 of the ten men some depressive trends occurred in the first 3 days of the exposure period, the performance data demonstrated no evidence of significant impairment. Similarly, while 3 men reported mild reoccurring headaches, and 6 indicated the boop had affected their sleep as well as their performance on certain testing procedures, the overall adjustment of the 0 men did not appear to be impaired allowing 1/2 - 3 days for adaptation.

Author (EBA)

NP73-5B-002

CIVIL AERONAUTICAL INST. OKLAHOMA CITY, OKLA.

RESIDUAL PERFORMANCE EFFECTS OF SIMULATED SONIC BOOMS INTRODUCED DURING SLEEP

W. Dean Chiles and Georgotta West May 1972 5 p. 60

18-74103, NSMRL-6911 Avah NTIS HC$3.00

Twenty-four male subjects were tested on a complex performance device involving monitoring, mental arithmetic, and pattern discrimination. Three age groups were used: 20 to 28, 40 to 45, and 60 to 72. Subjects were tested for 30 minutes each morning and each evening for a 21-day period. On the sixth through the 17th nights, subjects were exposed to eight simulated sonic booms with an outdoors overpressure level of 1.0 psf presented at 1-hour intervals during sleep. The results provided no evidence that exposure to simulated sonic booms during sleep produced measureable consequences with respect to complex performance. A significant age effect was found for five of the ten measures. Significant differences (apparently a learning effect) were found in performance across the three phases (pre-boom, boom, and post-boom). There was also a significant interaction between age and phase for live of the measures. Analysis of the simple effects indicated there were rather large differences among the three groups at the beginning of testing with the differences decreasing for the three latter phases. The time of day effect was significant for live of the measures.

Author

NP73-5B-003
Development of a noise annoyance sensitivity scale.

**Test development** evolved from a previous study in which biographical, attitudinal, and personality data had been collected on a sample of 166 subjects drawn from the adult community of Raleigh, North Carolina, USA. Analysis revealed that only a small subset of the data collected was predictive of noise annoyance. Item analysis yielded 74 predictive items that composed the preliminary noise sensitivity test. This was administered to a sample of 80 adults who later rated the annoyance value of 6 sounds (equated in terms of peak Sound Pressure Level) presented in a simulated home, living-room environment. A predictive model involving 20 test items weighting scheme was evaluated.

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**Noise annoyance susceptibility.**

The variations of annoyance due to tape recorded noise were investigated in a group of 34 normal hearing subjects. There were significant differences between subjects in their rating of 3 different types of noise, 20 sec samples of which were played at levels varying from 55-95 dBA [noise rating vs. noise level]. Subjects were stable in their judgments of annoyance over a 2 mo. period. Those subjects most sensitive to noise showed greater initial annoyance but their annoyance grew less rapidly with increasing noise level than that of those least sensitive to the noise. The former tended to have steeper loudness functions than the latter. While sensitivity to annoyance by noise (or noise annoyance susceptibility) does not appear to depend upon such personal factors as age, sex, education, job responsibility, nor such personality traits as determined by the EPI [Eysenck Personality Inventory] and the MMPI [Minnesota Multi-phasic Personality Inventory] it is apparently quite strongly related to various measures of personality given by the Rorschach Projection Test. A tentative personality profile of a noise sensitive individual is proposed and some support for this is found from noise annoyance field studies and from individual loudness function data. In order to predict an individual's annoyance to a particular noise, it may be necessary to know not only the level of the noise but also his personality.

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**Evaluating railway traffic noise by questionnaire information and verbal association experiment with populations.**

Osnova naslediem shuma slezenadorozhnoi trat' apada po danym opusta 1 slovenno-assotiativnogo eksperimenta. [Evaluating railway traffic noise by questionnaire information and verbal association experiment with populations.]

--J. F. L.
NP73-5B-009

Examines the motives of those people joining associations aimed at the control and reduction of aircraft noise. Pressure groups have increased in their sophistication and now seem able to exert powerful influence upon the authorities.—J. Abst.

NP73-5B-010

NP73-5B-011

72-STE-0143
Anderson, C.M.B.
Robinson, D.W.
The effect of interruption rate on the annoyance of an intermittent noise.
Sum., 8 figs., 2 tables, 24 refs., from AS.

NOISE LEVELS : PSYCHOLOGICAL FACTORS : ENGLAND
psychophysiological noise annoyance models : intermittent noise.

An experiment designed to test a prediction made from the Noise Pollution Level (LNP) formulation is described. During each test session of 30 min, subjects were exposed to 15 min of road drill noise at 87 dB(A), the experimental variables being the number and duration of the noise bursts. The results were broadly consistent with the formula when compared with experiments using steady noise, but secondary effects are found which depend on the intermittancy rate. The results are used to illustrate a psychophysiological model of noise annoyance, and are also discussed in relation to the noise fluctuation term in the LNP formula. Of the personality indices taken, extraversion was the only measure to show significant effects.

NP73-5B-012

72-STE-0156
LeVere, T.E. (both) North Carolina State Univ., Dept. of
Bartus, Raymond T. Psychology, Raleigh
Hart, F.E. North Carolina State Univ., Dept. of Mechanical
and Aerospace Engineering, Raleigh

Electroencephalographic and behavioral effects of nocturnally occurring jet aircraft sounds.
Abs., 5 figs., 2 tables, 11 refs., from AA.
Grant: NASA NGL 34-002-095.

JET NOISE : AIRCRAFT : NOISE EFFECTS : PHYSIOLOGY : human :
electroencephalogram : behavior : sleep.

Data relative to the objective evaluation of the effects of a specific complex auditory stimulus presented during sleep are presented. The auditory stimulus was a jet aircraft flyover of approximately 20-sec duration and a peak intensity level of approximately 80 db (A). The physiological effects (changes in electroencephalographic, EEG, activity) produced by the jet aircraft stimuli outlasted the physical presence of the auditory stimuli by a considerable degree. Both behavioral and EEG changes were noted during waking performances subsequent to nights disturbed by the jet aircraft flyovers which were not apparent during performances subsequent to undisturbed nights. Even limited exposure to nocturnal stimuli which do not necessarily produce behavioral awakening can nonetheless produce significant changes in an individual’s pattern of sleeping and waking EEG and overt waking performance.

NP73-5B-013

72-STE-0172
Desai, D.D. Bhartiya Vidya Bhavan’s Sardar Patel College of Engineering, Bombay, India

Environmental pollution due to noise.
See Citation No. 72-STE-0170 p 26 [1972].
Abs. only, from AA.

NOISE LEVELS : ACOUSTICS : NOISE CONTROL : abstract only.

The anatomy of the human ear and the behavior of man and animals in an exceedingly noisy environment is discussed. The effect of distance sound levels and sound-intensity level phenomena is considered in studying the noise problem acoustically. Several protective and preventive measures for industrial workers and people associated with noisy machinery are suggested. It is recommended that the noise problem be studied psychologically as well as statistically.
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5.C HEALTH AND PERFORMANCE
An initial study was conducted concerning the effects of noise on the ability of certain objects to perform tasks under normal conditions. The study, conducted during the summer of 1972, showed that noise had a significant effect on performance. The results indicated that noise levels above certain levels could lead to decreased performance. The study also showed that noise levels below certain levels had no significant effect on performance.

Author (GIA)

THE EFFECTS OF HIGH INTENSITY NOISE ON HUMAN EQUILIBRIUM

Five experiments were conducted on the effects of high-intensity noise on human equilibrium. The experiments were designed to determine the effects of noise on the ability of individuals to maintain equilibrium. The results indicated that noise had a significant effect on equilibrium.

Author (GIA)

A STUDY OF THE EFFECTS OF ILLUMINATION AND NOISE ON SIMPLE MOTOR PERFORMANCE (M.S. Thesis)
Corl A. Gardner 1971 32 p. (AD-739474)

The paper investigates the effects of two environmental factors, illumination and noise, on human performance. The experiments involved a simple motor task under varying conditions of illumination and noise. The results indicated that illumination and noise had a significant effect on performance.

Author (GIA)
NP73-5C-007
Measurement of the closed-loop compensatory tracking performance of the human operator in terms of the environmental stress of a 95-db white noise, using the critical tracking task of Cox et al. (1966). Following a description of the equipment and subject methodology, the results obtained are shown to indicate that the zero-order Cox task performance measures of total time and critical divergence frequency are sensitive to noise stress, whereas the switching time is not. These results suggest that control and human factors engineering researchers in environmental stress must be extremely careful in their selection of performance measures. M.V.E.

NP73-5C-008
To determine whether high intensity broadband noise has an adverse effect on human performance when special conditions related to type of task, length of testing, and intensity of noise exposure are met, 3 groups of 20 subjects each were tested on a serial search task. The first group was presented continuous broadband noise, the second received intermittent noise, and the third served as a control group. Performance was measured for 38 min continuously on a practice day and 4 test days. Both noise groups produced approximately the same results. Both groups found significantly fewer numbers on the task than the control group on the last two days of testing. The results support the contention that when certain conditions of testing are met, a reliable effect of noise on performance can be demonstrated. (Author)

NP73-5C-009
A comprehensive damage-risk criterion (DRC) for impulse-noise exposure is needed, and it is desirable to state the DRC in terms of allowable TTS (temporary threshold shift), since TTS is both a valid and convenient measure of noise effects on hearing. This is possible only if TTS is also a reliable measure. Four TTS-reliability studies are reported. The following conclusions are reached.

Individual subject’s TTS’s are not sufficiently reliable to permit generalization of impulse-noise effects. Group-means TTS varies only slightly across a series of exposures and is considered to be a reliable (consistent, repeatable) measure. This is true for the exposure of normal-hearing subjects to different impulse-noise conditions, for the TTS’s of normal-hearing subjects, and for frequencies representative of the whole range of human hearing. The formulation of an impulse-noise DRC should be based on group data (mean, standard deviation). Samples should be large enough to permit use of the population of which generalization of results is desired (Author).

Undertook to evaluate, under carefully controlled clinical conditions, the relative damage potential of rock music, symphonic music, and band-limited white noise. Exposed 10 normal hearing SSs to each program source for 60 min. at an average SPL of 95 dB binaurally through electrostatic headphones. After each exposure, obtained a TTS, by Bekesy audiometry at each of 10 frequencies. An octave-band analysis demonstrated that both the rock and symphonic music had very similar frequency spectra, being within ±4 dB from 125 Hz-8000 Hz and having maxima at 500 Hz. The TTS,9s for both rock and symphonic music were nearly identical with maximum TTS,9s from 2000-5000 Hz and averaging 8-10 dB. The white noise, being richer in high frequencies, produced average TTS,9s of 11-17 dB for the same test frequency range.—J. Abst.


Explains habituation of the auditory system to strong, permanent noise. Measured the stapedius reflex in 105 persons suffering from noise-induced hearing-loss with frequencies from 0.5-4 KHz, and compared it with the threshold of discomfort. It appeared that only the latter in noise workers was raised (transfer of the habituation to permanent noise immission to the test stimuli of the loudness tolerance test). Correspondingly, the difference level stapedius reflex threshold vs. threshold of discomfort was raised from normally 10-20 dB to 30-50 dB; at least 2 yr. after the end of the noise exposure, the difference level was found normal again or even decreased by recovery of the threshold of discomfort. The stapedius reflex threshold remained in the normal level range, even in the frequency band of greater hearing losses. Hence, the hair cell responds to great sound intensities with an unchanged metabolic expenditure. Only the central rating of strong noise is habituated; the peripheral receptor remains in unchanged susceptibility to acoustic overload. There is no habituation of the inner ear; the inhibitory efferents are not able to provide an effective protection against metabolic exhaustion—and consecutive degeneration—by the nonbiological noxae of industrial noise. 18 ref.—J. Abst., ed.


A long-term study of noise and hearing loss in the Du Pont Co. was started in 1966 to evaluate the Company’s hearing conservation program. The study population consisted of about 30,000 men and women, of whom about 7000 worked in areas of high noise levels. Presents a preliminary, cross-sectional analysis of the data, with a longitudinal study to be forthcoming later. Loss of hearing acuity with age, at each test frequency, occurred at about the same rate in 2 levels of noise exposure and in quiet areas. Age-adjusted median thresholds were slightly greater among exposed workers at 3000, 4000, and 6000 Hz. Although some of the differences were statistically significant, primarily because of the large sample size, the magnitude of the differences was considered too small to be biologically important. Furthermore, the differences could be explained by factors other than noise. Tentatively concluded that the protection afforded by the Company’s hearing conservation program was effectively preventing hearing loss among noise-exposed workers.—J. Abst.


Results of hearing conservation program instituted for participants in gunnery course. Incidence of high-frequency hearing loss was reduced by 16% after start of program. Discusses problem of reassignment of moderately hearing-impaired servicemen.—J. Shapiro
4465. Theekray, Richard J. (FAA, Civil Aeronautical Inst., Oklahoma City, Okla.) Sonic boom exposure effects II: Startle responses. *Journal of Sound & Vibration*. 1972. Vol. 20. 519-526.—Reactions of both humans and animals to impulsive acoustic stimuli, including sonic booms, may involve startle reflexes or orienting responses. The former usually tends to disrupt performance; the latter may actually facilitate it. The lack of consistent findings in the literature regarding the effects of sonic booms on performance may reflect a general failure to differentiate between these 2 basically different types of reaction. Thus, objective criteria for distinguishing startle from orienting reactions and methods for measurement are suggested. Relevant stimulus parameters of impulsive stimuli and other factors which may modify the evoked reaction are discussed. Suggestions are offered for needed research. (35 ref.)—W. E. Collins.

5411. Young, I. M. & Habert, F. (Jefferson Medical Coll., Philadelphia, Pa.) Noise effects on speech discrimination score. *Journal of Auditory Research*, 1970(Apr). Vol. 10(2), 127-131.—Studied effects of ipsilateral and contralateral presentation of masking noise on speech discrimination (DS) scores of 7 normal-hearing Ss, 65 Ss with unilateral total hearing loss and normal hearing in the opposite ear, and 15 Ss with bilateral symmetrical hearing loss. Speech and noise were combined and presented monaurally. The normal and the bilateral-loss group yield similar results: a DS greater than 70% when the signal/noise (S/N) ratio is +5 db. and higher, and less than 50% when the S/N ratio is -8 db. and lower. Ss with unilateral total hearing loss require a S/N ratio about 10 db. higher to approximate the DS obtained by normals.—P. N. Herman.
The increasing rate of the blood flow in the internal carotid artery and the acoustic reflex in response to these two types of sounds. Table 1. The results of speech audiometry showed normal young and elderly males. Increase of the blood pressure caused changes in the auditory analyzer under different conditions. The sound was heard with ear muffs. Results of the experiment showed that the TTS by a steady-state noise affects the auditory analyzer. The results of speech audiometry showed the presence of dissociation between tonal and speech hearing. The physiological process in the test of the examiner was localized in hair cells of the spiral organ, in the cochlear position; in both cases there are apparent functional shifts also in the cortical region of the auditory analyzer.

NP73-5C-020

NP73-5C-021

NP73-5C-022

NP73-5C-023

NP73-5C-024

NP73-5C-025

NP73-5C-026

NP73-5C-027
The influence of the rise time on the loudness of outbound pulses was proportional to \( T^{1/2} \), where \( T \) is the rise time in seconds. For most of the measurements, a signal level of 95 dB re 2 x 10^7 m/s^2 was used. The signals with the fastest onset showed the highest loudness. The influence of the rise time on the loudness was significantly dependent on the signal spectrum. The possibility of explaining the observed effects on the basis of changed auditory adaptation was discussed.

The effects of continuous, high intensity, white noise associated with local vibrations was investigated. Intensive noise associated with local vibrations was proportional to \( T^{1/2} \). Performance was not affected by a change in bandwidth from 3500 to 200 Hz. Values of \( T \) for 75% correct did decrease when the observers were given audible special cues from very short pulsed sinusoids. The theory best describing the results was a neural counter model.
5C-037

KRUGLOV, N. P., V. A. LUTOV, A. L. PINCHUK and G. S. SOROCHINSKII. (Dep. Gen. Hyg., Vitebsk Med. Inst., Vitebsk, USSR.) Voprosy gigiepy truda v shvechnom pravodstve. [Industrial hygiene problems in the sewing industry.] GIG SANT 37(3): 22-25. Illus. 1971. [Engl. summ.]--A study of industrial conditions prevailing at a sewing factory proved that the technologic process was accompanied by certain noxious environmental factors. The main factors are the unsatisfactory microclimate in the sewing shops, significant levels of high-frequency noise and a considerable strain of attention, vision and neuro-motor apparatus in fulfillment of monotonous production line operations. All this has a considerable effect on the physiological reactions, the state of health and the work productivity.--E. S.

NP73-5C-038

SCHNEIDER, BRUCE A. (Columbia Univ., New York, N.Y. 10027, USA.), ALLEN J. NEURINGER and DOUGLAS RAMSEY. Magnitude estimation of loudness with a minimum 24-hr interstimulus interval. PSYCHONOMIC SCI SECT HUM EXP PSYCHOL 27(4): 243-245. Illus. 1972.--Magnitude estimates of the loudness of white noise were obtained in 2 conditions: in the Ist, the time between consecutive stimulus presentations was at least 24 hr; in the 2nd, the time was less than 2 min. In both conditions, the relationship between the reports of the subjects (Ss) and the intensities of the stimuli was best described by a power function. The exponent of the function was lower and the variance was slightly greater in the 24-hr interstimulus condition.

NP73-5C-039

WAHI, P. N. (Indian Counc. Med. Res., New Delhi, Delhi, India.) Noise pollution and health. INDIAN J MED RES 59(7): 1148-1153. 1971.--Many possible sources of noise pollution are reviewed. Possible fetal and infant damage of humans and rodents, hearing impairments, and the relationship between coronary ailments and mental disorders and noise are stressed.--S. G. B.

NP73-5C-040

TARASENKO, N. Yu., A. A. KASPAROV, E. M. SMIRNOVA and B. V. ANAN'EV. (I. M. Sechenov Ist Med. Inst., Moscow, USSR.) O kombinirovannom deistvii faktorov vneshnei sredy na prizvodstve i ikh normirovani. [Joint action of environmental factors in industry and their standardization.] GIG SANT 36(7): 27-32. Illus. 1971. [Engl. summ.]--In the chemical industry, the action of toxic substances prevails on a background of other occupational noxious factors (noise, high air temperature). Hygienic investigations carried out in boric acid production proved that noise intensity was at a permissible level, but the functional state of hearing in workers presented a number of unfavorable shifts. The 80th curve, accepted as a standard of permissible noise level, is quite unfit for a number of chemical productions. In winter time, the air temperature of work shops did not exceed 27-29°, but signs of thermoregulatory stress were observed in the workers. The standardization of the microclimate in the chemical industry should be regulated on the basis that workers experience a joint action of factors. --J. L. S.

NP73-5C-041

SHAPIRO, MARK T., WILLIAM MELNICK (Ohio State Univ., Columbus, Ohio 43210, USA.), and VICTOR VER MEULEN. Effects of modulated noise on speech intelligibility of people with sensorineural hearing loss. ANN OTOL RHINOL LARYNGOL 81(5): 241-248. Illus. 1972.--Twenty-four adult male subjects, 12 with normal hearing and 12 with sensorineural hearing loss, were tested to compare their speech discrimination in quiet and in a noise background. The wide-band noise used was either continuous or modulated and was presented at various signal-to-noise ratios. The speech test material was monosyllabic words. Subjects with sensorineural loss showed markedly poorer discrimination under all experimental noise conditions. Performance improved as the signal-to-noise ratio increased and as the modulation rate decreased. The poor discrimination of subjects with sensorineural hearing loss in the presence of noise provides support for routine clinical measurement of discrimination in noise for these individuals. Individual performance in noise could not be predicted with a high degree of certainty from discrimination scores measured in quiet. --E. S.
Temporary threshold shift and recovery patterns from two types of rock and roll music reproduction. Hinzmann W, et al. 3 Acoust Soc Am 51:1200-5, Apr 78


Advantages and disadvantages of hearing aids in industry. A. J. Gregory. 33 Acoust Soc J 53:195-18 Mr 72


NP73-5C-062
Noise-exposure: the industrial physician. Farben Cl.
Trans Am Acad Ophthamoq Otolaryngol 75:1383-71,
Nov-Dec 71

NP73-5C-063

NP73-5C-064
[Evaluation of industrial noise with special reference
to acoustic trauma]. Melaer FJ.

NP73-5C-065
Temporary threshold shift in hearing from exposure to different noise spectra at
equal dBA level. A. Cohen and others.
F '72

NP73-5C-066
Temporary threshold shifts produced by
Trans Am Acad Ophthamosq Otolaryngol 75:1346-54,
Nov-Dec 71

NP73-5C-067
Growth and recovery of temporary threshold shift at 4
kHz due to a steady state noise and impulse noises.

NP73-5C-068
Effects of noise, tranquilizer and increased delay time
of tracking performance and heart rate. Strasser H.
Pfluegers Arch 322:Suppl 322:R83, 1972
Effects of varying levels of interruption on temporary threshold shift. See Citation No. 73-1TE-00006 pp. 139-140. [1972?].
Abs. only, from AA.

Survey of chain saw operators: Nature of intermittent noise exposure and associated damage risk to hearing. See Citation No. 73-1TE-00005 p. 140. [1972?].
Abs. only, from AA.

Survey of hearing conservation programs in industry. See Citation No. 73-1TE-00006 p. 140. [1972?].
Abs. only, from AA.

An equation relating prevalence of impaired hearing to age and noise exposure is based on the assumptions that the probability of developing impaired hearing at any age is proportional to the fraction of the population of that age which has already developed impaired hearing. The probability of impairment is also proportional to the fraction of the population remaining unimpaired and, therefore, is available for impairment. The solution of the differential equation resulting from these assumptions reveals a complex relationship of age and noise exposure to impairment. The effects of age and noise are not simply additive as is often assumed.

Survey of chain saw operators: Nature of intermittent noise exposure and associated damage risk to hearing. See Citation No. 73-1TE-00006 p. 140. [1972?].
Abs. only, from AA.

Survey of hearing conservation programs in industry. See Citation No. 73-1TE-00006 p. 140. [1972?].
Abs. only, from AA.

Survey of chain saw operators: Nature of intermittent noise exposure and associated damage risk to hearing. See Citation No. 73-1TE-00005 p. 140. [1972?].
Abs. only, from AA.

Survey of hearing conservation programs in industry. See Citation No. 73-1TE-00006 p. 140. [1972?].
Abs. only, from AA.

The effects of noise pollution are surveyed, considering the resulting physiological and psychological fatigue. Permanent fatigue without relaxation or recuperation can lead to irreversible injuries. Noise must not be considered an inevitable nuisance. A solution to the problems requires education and regulations to reduce noise levels where its production is inevitable and insure areas, such as homes, sufficient quiet where recuperation is possible.
conservation program are discussed by Walker.


Guignard. Ohlbaum.

Grether. W.F.

72-5TE-0158
Gruther, W.F. (all) Aerospace Medical Research Lab.,

Harris, C. Stanley

Wright Patterson Air Force Base, OH

Further study of combined heat, noise and vibration stress.

Abs. 5 figs. 4 tables. 4 refs., from AA.


NOISE MEASUREMENTS: VIBRATIONS: PHYSIOLOGY: stress effects

As a follow-up to an earlier study of combined heat, noise and vibration stress, the same levels of heat (120°F), noise (105 dB) and vibration (5 Hz, 0.30 peak g) were studied but with some modifications. Physiological measures included skin and rectal temperature, heart rate, weight loss and biochemical urine analyses. Performance measures included two-dimensional compensatory tracking, choice reaction time, a voice communication test of logical alternatives, mental arithmetic, visual acuity and subjective ratings of the stress conditions. As in the previous study the combination of stresses produced no additive stress interactions. On tracking and reaction time tests the greatest impairment of performance was produced by vibration alone. Transmissibility of vibration was not altered by heat or noise. Subjective ratings of stress severity progressively increased with the number of stresses in the combination. Subjective ratings of stress intrusiveness, however, did not show such a trend.

NP73-5C-079

72-STE-0160

Sommer, Henry C. (both) Aerospace Medical Research Lab.

Harris. C. Stanley

Wright Patterson Air Force Base, OH

Combined effects of noise and vibration on mental performance as a function of time of day.

Abs., 4 figs. 3 refs., from AA


to determine combined effects of noise and vibration on mental performance as a function of time of day, 10 subjects were randomly exposed to each of the following conditions: stress (5 Hz vibration-0.25 g x 110 dB noise) at 6:00 a.m.; no stress (no vibration-0.25 dB noise) at 6:00 a.m. stress at 3:00 p.m. and no stress at 3:00 p.m. Subjects' performance on a mental arithmetic task was measured during each of these exposures on consecutive days. Significant interaction between time of day and stress was due to both a slight improvement in performance in no stress condition at 3:00 p.m., and a slight decrement in performance at 3:00 p.m. in the stress condition. Results suggest that phase of the circadian cycle may be a variable to be considered in studies on the effects of stress on human performance.
### HEALTH AND PERFORMANCE (See Also)

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