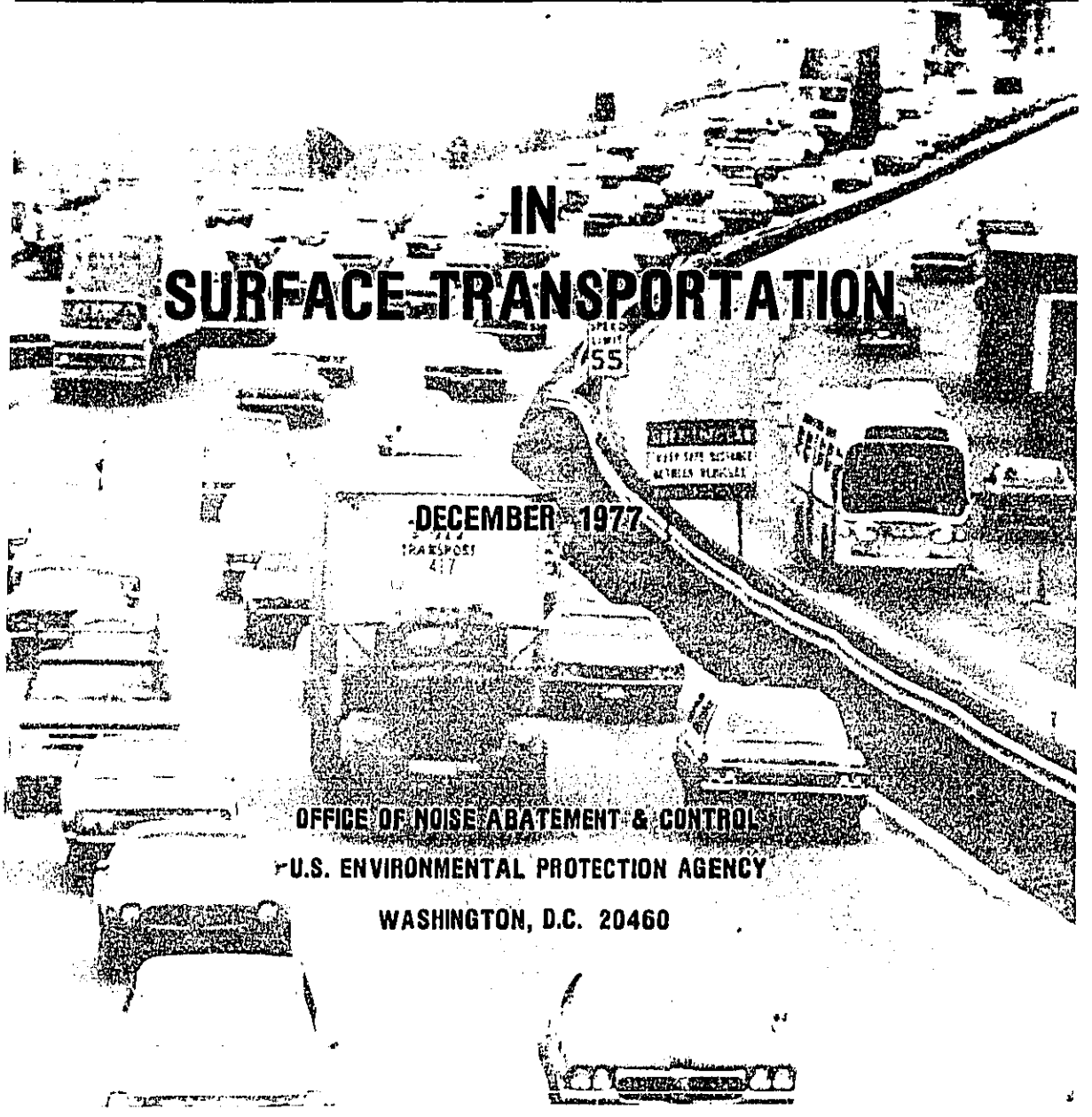
EPA 550/9-78-301

FOREIGN NOISE RESEARCH IN SURFACE TRANSPORTATION



DECEMBER 1977

OFFICE OF NOISE ABATEMENT & CONTROL
U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FOREIGN NOISE RESEARCH

IN

SURFACE TRANSPORTATION

December, 1977

Office of Noise Abatement and Control
U. S. Environmental Protection Agency
Washington, D. C. 20460

PREFACE

Method of Data Collection

The information was collected by means of inquiries to foreign noise contacts, both individuals and organizations. The contacts were queried about their research activities and the names of other individuals or organizations that they were aware of who might be involved in pertinent noise research. These referrals were then contacted to ascertain their research efforts. In addition, inquiries were made at the Ninth International Congress on Acoustics, July 1977, in Madrid, Spain. In total, approximately 1300 requests were made. The foreign researchers were asked to respond with information on their noise abatement research projects that have been completed since January 1976, are in progress, or are planned. They were asked to respond with information about research projects that deal with:

- Aviation noise source control technology
- Surface transportation noise source control technology
- Machinery and construction equipment noise source control technology
- Measurement methodology
- Systems research for noise abatement

The latter two categories include projects not specifically classifiable under aviation, surface transportation, or machinery and construction equipment. "Systems research" includes path modification projects such as noise barriers and operational techniques such as modification of traffic flows.

From these contacts, 368 Surface Transportation Noise Research Projects were identified.

Handling of Data

To retain reporting accuracy, where possible, the original responses were included in the report. In the case of foreign language reports, or data not in our format, the information was translated and/or transcribed to a unified format and is identified as having been so treated. Some researchers described their projects to us in a very limited fashion. Therefore, these projects, when listed in this report, show very fragmentary data elements. We did not try to augment these responses, but simply transcribed them verbatim in an abbreviated format at the end of each topical section.

Any funding data that was not reported in U. S. dollars has been converted and the reports show both the reported foreign currency figures in parentheses and the converted U. S. dollars figures. Below is the table of exchange rates used:

Exchange Rates as of Tuesday, June 21, 1977
(Source: The Wall Street Journal)

Argentina-Peso	=	0.00281 US Dollar
Australia-Dollar	=	1.1100 US Dollar
Belgium-Franc	=	0.027715 US Dollar
Canada-Dollar	=	0.9428 US Dollar
Denmark-Krone	=	0.1649 US Dollar

Finland-Markha	= 0.2450 US Dollar
France-Franc	= 0.2024 US Dollar
Japan-Yen	= 0.003671 US Dollar
Netherlands-Franc	= 0.2024 US Dollar
Northern Ireland-Pound	= 1.7196 US Dollar
Norway-Krone	= 0.1884 US Dollar
Poland-Zloty	= 0.0502 US Dollar
Portugal-Escudo	= 0.02590 US Dollar
Scotland-Pound	= 1.7196 US Dollar
Sweden-Krona	= 0.2253 US Dollar
Switzerland-Franc	= 0.3997 US Dollar
United Kingdom-Pound	= 1.7196 US Dollar
West Germany-Mark	= 0.4240 US Dollar

Completeness and Accuracy of Information

Countries or International Organizations Where Researchers Were Contacted

Argentina
Australia
Austria
Belguim
Bulgaria
Canada
Czechoslovakia
Denmark
Finland
France
East Germany
West Germany
Greece
Hungary
International Civil Aviation Organization
Ireland
International Standards Organization
Israel
Italy
Japan
Luxembourg
North Atlantic Treaty Organization
Netherlands
New Zealand
Norway
Organization for Economic Cooperation and Development
Poland
Portugal
Rumania
South Africa
Spain
Sweden
Switzerland
United Kingdom
United Nations
Yugoslovia
Union of Soviet Socialist Republics

In some of these countries we did not receive large numbers of responses. This does not prove conclusively that little or no research is being carried out in these countries. In some cases, we probably never identified the proper contacts. However, it is more likely that a low response rate is an indication that in these areas research is not widespread, with one exception--the USSR, where it is certain that research is being conducted but no response was forthcoming to our inquiries.

While it is impossible to be sure of the accuracy of the reported data, it is likely to be accurate because the data was mostly provided by the researchers themselves, not second or third hand. There is a wide variation in the amount of information reported per project. This probably reflects the varying amounts of time that researchers had available to respond to our inquiries.

The dollar figures given for the research efforts should not be taken too literally because they paint an oversimplifed picture. The buying power of a fixed amount of dollars can vary from country to country due to flucutating foreign exchange rates. There are also differences between countries in calculating costs of a project, for example, inclusion of overhead rates. The most important factor when considering the funding data is that it is available for only a fraction of the reported projects. This overshadows any other qualifying factors. It is felt that because of these factors, the total funding figures underestimate the total committed resources, but to an unknown degree.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

The principal compiler of this report, Robert English of Informatics Inc., wishes to acknowledge the assistance of Pat Dufour, Miriam Heilman and Carl Modig of Informatics, Harvey Nozick, Roger Heymann and Thomas Quindry of the Office of Noise Abatement and Control, and the hundreds of noise abatement researchers abroad who shared information about their projects.

INTRODUCTION

Purpose of the Report

This is one of three reports which summarize foreign noise abatement research efforts, based on an appraisal carried out by Informatics Inc for the U. S. Environmental Protection Agency, Office of Noise Abatement and Control, as part of their noise research coordination efforts. The U. S. Environmental Protection Agency has reconstituted interagency noise research panels covering three areas: aviation, surface transportation, and machinery and construction equipment. The purpose of the panels is to assemble a total picture of U. S. Federally-sponsored noise abatement research recently completed, in progress, or planned, and provide recommendations for additional research which should be performed to meet the goals embodied in the national noise abatement strategy. The three panel reports are scheduled for release in early 1978.

The three reports on research abroad are to supplement the information provided in the panel reports by providing a broad overview of the international research effort underway in noise abatement and control.

Categorization

For this report, Surface Transportation Noise Abatement Technology Research, the projects were categorized as follows:

- Highway Noise
  - Medium and Heavy Trucks
  - Light Vehicles
  - Buses
  - Highway Planning and Land Management
  - Highway Model Analysis and Prediction
  - Other
- Off-Highway and Recreational Vehicle Noise
  - Motorcycles
  - Motorboats
- Rail Noise
  - Locomotives and Passenger Trains
  - Rapid Rail Transit
  - Innovative Guided Mass Transit
  - Rail Model Analysis and Prediction
  - Other
- Surface Vehicle Components Noise
  - Engine
  - Exhaust Mufflers
  - Power Train
  - Tires
  - Other

Measurement and Enforcement

- Methodology and Standards
- Training

Acoustic Properties

- Propagation
- Barriers
- Architectural Acoustics
- Impact and Vibration
- Other

DISCUSSION OF FOREIGN RESEARCH

MAGNITUDE OF RESEARCH EFFORT

Reported Research by Country

The following number of projects were reported by country:

United Kingdom	93
West Germany	59
Netherlands	44
Switzerland	34
Japan	34
Sweden	27
Canada	20
Denmark	11
Australia	8
France	8
Poland	8
Norway	6
Israel	3
Italy	2
Belgium	2
Northern Ireland	2
Czechoslovakia	1
Hungary	1
Portugal	1

Sponsorship of Research

In almost all countries, most of the research reported is government sponsored. In Socialist countries, the government sponsorship rate is 100%. In Switzerland and the United Kingdom, private sponsorship of the reported research approaches 65%. Belgium, Denmark, Israel, and Northern Ireland also show levels of private sponsorship that are possibly significant.

Type of Research

The type of research was self-identified for less than half of the reported research. Even though there is only partial reporting in this area,

there seems to be fewer developmental than fundamental projects and fewer demonstration than developmental. Czechoslovakia, Japan, Poland, United Kingdom, and West Germany appear to be doing most of the demonstration work. Each of these countries have two or more projects that are at least partially demonstration in nature.

Types* of Research by Country

	Fundamental	Development	Demonstration	Measurement & Methodology	Unclassified	
Australia	5		1	4	1	
Belgium	1			1		
Canada	3	3	1	6	12	
Czechoslovakia			2			
Denmark	1	1	1	1	8	
France	1	1	1		6	
Hungary	3	1		3		
Israel	3	1		2		
Japan	24	21	24	8	2	
Netherlands					44	
Norway	1			1	5	
Poland	3	4	2	2	2	
Portugal	1			1		
Sweden	2	4		1	23	
Switzerland	10	6	1	3	24	
United Kingdom	18	5	3	9	73	
West Germany	8	3	2	2	49	
TOTALS	84	50	38	44	249	465

*As self-reported by investigators, who had the opportunity to classify their projects using one or more of the categories listed in the table.

The table sums to more than the total number of projects because some projects were classified as more than one type.

Funding Information

Funding tables are provided on pages 23-29. They show funding by country for each major category for the period 1976-1977 and funding by country for each sub-category for the same period.

ANALYSIS OF RESEARCH

HIGHWAY NOISE

Medium and Heavy Trucks

Many countries have started "quiet truck" projects, with the purpose of designing new production models quieter than existing ones. Some of the design goals are:

Japan	86 dBA @25 ft. (approximately 81 dBA @50 ft.)
United Kingdom	80-82 dBA @25 ft. (approximately 75-77 dBA @50 ft.)
Switzerland	2.5 dBA less than present Swiss regulation [of 87 dBA @25 ft., i.e., goal is 84.5 dBA @25 ft., or approximately 79 dBA at 50 ft.]
Netherlands	10 dBA reduction from present models

Much of this research has been motivated by legislative limits scheduled to go into effect in the next few years.

Another subject under study is noise inside truck cabs (two studies).

Light Vehicles

The emphasis in this research is not noise emissions to the outside environment but rather the noise environment inside the passenger compartment. Some approaches include redesign of the compartment frame to reduce vibration and better engine mounts to reduce structure-borne noise transmitted from the engine block.

Buses

Of note is the Dutch interest in German retrofit of existing buses for noise abatement purposes.

Highway Planning and Land Management

Many types of projects have been included in this category: solutions to urban traffic noise other than barriers, which are not effective in the urban environment (Canada); research supporting new regulatory guidelines, including explanatory documentation for designers (Czechoslovakia); criteria for human sensitivity to traffic noise (Netherlands); and economic analysis (Norway). In addition to planning of new highways, rerouting of existing traffic is being studied (Norway).

Highway Model Analysis and Prediction

Researchers in many countries are working on the prediction and modeling of traffic noise. Most of their models are based on steady-stream traffic conditions. A few are now starting to deal with restricted traffic flow. Work is being carried out in the United Kingdom, Sweden, Japan, West Germany, and Switzerland to develop computerized prediction models. Research in Sweden is trying to develop computer programs to draw contour maps of road traffic noise and a Joint Nordic Prediction Model for highway planning with a precision of ±3 dBA. There is an effort in Switzerland to develop a computerized model of noise propagation that will be commerically available to any interested party. Work in the United Kingdom predicts a 4 dBA reduction* in traffic noise in interrupted flow areas due to traffic management practices. A lot of highly theoretical predictive work is being carried out in Japan and is being applied in highway noise prediction. It includes digital simulations and statistical treatment of data on traffic noise in Hiroshima City. They find that their experimental results agree well with their theories.

* No reference noise level provided in research project report.

Highway Noise: Other

One area of interest in this category is noise from the road surface. Assessments of the noise from grooved pavement, coarse text road surfaces, and different types of paving are being conducted. The effects of interrupted traffic flow on noise emissions is being studied in a variety of places. West German researchers are considering the effects of traffic light phases and the types of intersections on noise and are looking at the basic parameters of traffic flow. The Netherlands is considering such system approaches as separate bus and tram lanes, bicycle * routes, and limited vehicle access to residential streets. British researchers have gathered data on noise emissions of traffic at intersections and intend to set up design criteria for new intersections based on the data. Interkeller AG/SA of Switzerland is carrying out a large number of research projects. They cover a variety of subjects including acoustic comfort, noise radiation from motor vehicles, and fast Fourier simulation techniques.

OFF-HIGHWAY AND RECREATIONAL VEHICLE NOISE

Motorcycles

Only two research projects were uncovered in this area. The Netherlands is involved in very basic data gathering efforts on the noise of mopeds. Japanese research is more advanced and looks at the different characteristics of motorcycle noise due to acceleration.

* Project described them as cycle routes. It is assumed they mean bicycle routes because of the widespread use of bicycles in the Netherlands for commuting.

Motorboats

Very little research was reported in this area. Some work is being done in Sweden on noise and vibration and its transmission in the motorboat hull. Acoustic enclosures for outboard motors are being developed in the United Kingdom.

RAIL NOISE

Locomotives and Passenger Trains

Most research on the topic is in the measurement and assessment area. Research is ongoing in the Netherlands to identify the noise emissions of different types of railroad vehicles and components under operating conditions. A Canadian project is attemping to design a car retarder system that reduces or eliminates the emitted squeal.

Rapid Rail Transit

Noise abatement of the wheel and axle and wheel/rail interaction is being attempted in several countries. Japanese efforts have produced a damped wheel with 1-3 dBA reduction and a "soundproofed" wheel with a 3-5 dBA reduction*. Shape, thickness, height, and absorptive lining effects of sound barrier walls along rapid transit rail systems are being investigated.

* No reference noise level provided by research project description for the untreated wheel.

Innovative Guided Mass Transit

Japanese efforts have reduced the vibration transmission to nearby buildings by placing the track on a pile insulated from the subway tunnel structure. Other research efforts deal with wheel/rail contact noise, curve noise, and bridge noise. The Netherlands is trying to develop noise zones around their tramways.

Rail Model Analysis and Prediction

Basic research efforts in Norway, Sweden, Switzerland, United Kingdom, and West Germany are being conducted to develop calculation models and other methods for predicting noise from general railroad traffic, switch-yards, and fast electric trains. These predictions will be used as a basis for setting limits on noise and suggesting ways to meet these limits.

Rail Noise: Other

Research is being conducted on passive noise abatement methods such as noise barriers (embankments or walls of various types), sound insulating windows, and placing the tracks underground or in cuttings. The Netherlands is performing basic investigations to set up noise zones around railroads. The causes of shunting and switching noise (motors, impact, braking, communication, etc.) are being investigated. A Swedish project investigated the difference in noise levels from two railway transformer stations and obtained a 10 dBA reduction* by the use of ventilation system dampers and outdoor absorbent screens.

* No reference noise level provided by the research project description.

SURFACE VEHICLE COMPONENT NOISE

Engines

The Institute of Sound and Vibration Research in Southampton, United Kingdom, is doing extensive work in the field of engine noise. Their work includes modeling of turbocharged engine noise, damping of engine covers with rubber inserts, evaluation of polymers as damping material, developing a minimal cooling system and associated noise reduction features, development of a prototype quiet truck engine, modeling of engine structures for low noise, and studying the effect of oil films on engine impact noise. Optical holography techniques are being used in Australia to measure the response of engine cylinder walls to vibration. Engine vibration in general is being studied in many areas of the world. This includes studies of vibration in the engine block, vibration due to piston slap, and development of mathematical models of engine and transmission vibration. One such model in development by Perkins Engines Ltd. of the United Kingdom will aid in quiet engine designs. The target is a 10 dBA reduction. Use of the predictive techniques has resulted in a 7 dBA reduction in an experimental quiet engine*. The research seems to be approximately equally split between internal combustion and diesel engines. Most of the research in this category falls into the fundamental and development categories.

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* No refererence noise level provided by the research project description.

Exhaust Mufflers

As in engine noise, the Institute of Sound and Vibration Research in Southampton, United Kingdom, is doing considerable research on exhaust mufflers. Research is being done in the prediction and modeling of exhaust systems and noise for both internal combustion and diesel engines. The United Kingdom is developing a Quiet Heavy Vehicle exhaust system to go along with its Quiet Heavy Vehicle. Most of the work in this area is fundamental and developmental.

Power Train

Only three research projects were uncovered in this category. All were from the United Kingdom and covered vibrations and noise in the crankshaft, gearbox, and transmission. Some work is intended to check the ability of a theoretical model to predict the associated noise.

Tires

Research on tire noise seems to be predominantly fundamental. There is a widespread attempt to ascertain the causes of tire noises and the characteristics of the tires and road that promote noise. The IFM-Bureau of Acoustics in Sweden is doing a considerable amount of research on tire noise. In the United Kingdom, there is an effort to identify the quietest commercially available tires for use on the Quiet Heavy Vehicle. They have determined that radial tires are 2-3 dBA quieter than mono-ply tires*. Difference in noise levels between wet and dry roads is also being considered.

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* No reference noise levels provided in research project description.

Surface Vehicle Components: Other

Researchers in Sweden are attemping to develop a screen to go on a car in order to reduce tire noise. Preliminary reductions of 3 dBA are expected at 7.5 m.* Other efforts are looking at the body as a noise transmission element to the passenger compartment and at reducing intrinsic vehicle noises such as rattling, squeaking, and shifting of structural components.

MEASUREMENT AND ENFORCEMENT

Methodology and Standards

Almost every country responding to the survey is involved in measurement methodology and standards in some way. A major area of research is the development of basic measurement methods for traffic and rail noise. This research includes development of instrumentaton including a miniature sound level meter, assessment of the accuracy of various sound level meter measurements, statistical simulations of random street noise, and development of computer programs to assist in measurement of noise levels. Interkeller AG/SA in Switzerland and Heinrich Gillet AG in West Germany are very active in instrumentation and measurement research as it relates to automobile noise. A West German research project is developing a measurement method for noise levels of new ships upon delivery (tugboats, freighters, and low rated passenger ships). The actual measurement of noise levels is another major area of effort. This includes measurement of time distributions of noise levels, truck cab interior noise levels, noise levels in urban and rural areas, levels at intersections, and noise levels of railroad rolling stock and around rail stations. These noise

* No reference noise levels provided in the research project description.

measurement research activities are being carried out in most cases as a basis for the establishment of emission and immission limits to be developed for traffic and rail noise.

Training

Two Canadian research projects are concerned with training. They deal with the development of training courses for the use of the land use developer, planner, architect, or engineer. They allow determination of the noise impacts due to highway traffic, and site design and site layout to achieve recommended sound levels.

ACOUSTIC PROPERTIES

Propagation

Research in this area is predominantly fundamental and dealing with measurement methodology. Many researchers are investigating the basic mechanisms of noise propagation under various conditions. The mechanisms of propagation over water, over large asphalt surfaces, under the influence of wind and varying meteorological conditions, in urban and suburban areas, in streets of varying conditions, and over different road coverings are all being studied. Also under study are ways to determine the acoustic impedance of the ground and the effects on noise propagation of tunnel openings and nearby wooded areas. Methods for the prediction of noise propagation and models of its transmission are being developed.

Barriers

In addition to fundamental research in this category, a considerable amount of developmental and demonstration work is being done. One project in the Netherlands intends to survey the existing worldwide barrier technology. A Swiss project is developing a computer model to predict the effects of barriers and optimize their location. Their results show good agreement with measured noise levels. They intend to make it commercially available to any interested parties. Research is progressing on the development of various types of barriers - wood screens, both reflective and absorptive; earthen barriers; rows of buildings; and belts of vegetation. Many areas are exploring the use of vegetative screens, even to the levels of which types of trees or bushes are best in "acoustic quality." Another area of major effort is the evaluation of the effectiveness of existing noise barriers.

Architectural Acoustics

Much work is being done on the use of absorptive material in and around buildings to reduce noise levels. A Canadian project studying the noise levels on high rise balconies due to traffic noise (70 - 80 dBA) found a 5 dBA reduction by absortively treating the balcony ceilings alone. Other research efforts address the use of different window constructions for noise abatement. The interior arrangement of rooms in buildings to avoid traffic noise is being considered as a noise abatement method in the Netherlands.

Impact and Vibration

Several countries are involved in the assessment and prevention of vibration propagation into buildings. This can be caused by either traffic, subway systems, or railroads. Efforts in Japan have resulted in vibration reduction in nearby buildings by supporting rapid rail system tracks on piles insulated from the tunnel structure. West German efforts have reduced vibration transmission by spring suspended rails. Other research is concerned with the plaster adherence effects of heavy traffic vibrations, structural noise in buildings built directly over traffic arteries, and noise and vibration near road speed control humps.

Acoustic Properties: Other

The three projects in this category come from Interkeller AG/SA in Switzerland and deal with functions and physical laws of material for insulation, absorption, or damping and with studies of standing waves in auto passenger compartments.

SUMMARY

Of the types of sources considered, highway noise abatement appears to be getting by far the most attention. There are 368 research projects reported and 109 of these are classified as Highway Noise projects (Table, Page 23). In addition, a large number of projects from the Surface Vehicle Components, Measurement and Enforcement, and Acoustic Properties categories deal with highway noise. Rail Noise abatement follows second in level of research effort and Off-Highway and Recreational Vehicle Noise research is a distant third.

Considering the research by category, Highway Noise again has the highest level of effort, 109 projects. Surface Vehicle Components, Acoustic Properties, and Measurement and Enforcement (74, 74, and 66 respectively) fall next in order of precedence with approximately the same level of effort for all three. Rail Noise with 39 projects came next and Off-Highway and Recreational Vehicles is again seen as having the lowest amount of research effort with only 6 projects reported.

Several projects stand out as significant efforts, as showing significant results, or as having no U.S. research counterpart; and therefore deserve a second mentioning. One project at the Cranfield Institute of Technology in the United Kingdom is attacking the problem of automobile interior noise by redesigning the passenger compartment frame to reduce vibration. At the Imperial College of Science and Technology of London University, United Kingdom, a L_{10} predictive model for urban traffic noise is being developed. Their preliminary results show that reduction of 4 dBA or more can be achieved by management practices of interrupted flow traffic. Teito Rapid Transit Authority of Japan has tested several types of soundproof wheels. Their results show a 3-5 dBA reduction with a resilient "soundproofed" wheel and a 1-3 dBA reduction with a damped "soundproofed" wheel. The Public Health and Environmental Hygiene Department of the Netherlands intends to survey the results of barrier studies worldwide and investigate the applicability of their results to traffic noise. A project carried out by the Ministry of Transportation and Communications of Canada has found that noise levels on highrise balconies (70-80 dBA) near expressways are 10 dBA higher than on the ground floor. The use of sound absorption

material on balcony ceilings alone reduces noise levels by 5 dBA. In addition, the Transport and Road Research Laboratory is conducting a study concerning possible insulation against noise and vibration near road speed control humps.

Finally, the IFM-Bureau of Acoustics in Sweden is attemping to develop a screen to be placed on road traffic vehicles in order to reduce tire noise. Their preliminary results show a reduction of 3 dBA at 7.5 m.

FUNDING CHARTS

SUMMARY
SURFACE VEHICLE NOISE R&D
FUNDING IN THOUSANDS
1976-1977
COUNTRY

* Some funding for other years included because projects extended longer than 1976-1977.

Converted to thousands of U.S. Dollars.

CATEGORY	Australia	Belgium	Canada	Denmark	France	Japan	Netherlands	Norway	Poland	Portugal	Sweden	Switzerland	United Kingdom	West Germany	TOTALS	Projects with Funding Reported
Highway Noise	82*		21	33	43*	1,094	40		87*	20*	236*	1,236*	1,285*	228*	4,405*	35 of 109
Off Highway and Recreational Vehicle Noise																0 of 6
Rail Noise				15		527*					65*	40*	9*	1,509*	2,165*	17 of 39
Surface Vehicle Components Noise	57*					110					528*		242*	1,648*	2,585*	19 of 74
Measurement and Enforcement	1		268*	8		165		89	27		18*		86*	3,031*	3,693*	18 of 66
Acoustic Properties	12*	229	554*	139*		262*			36		86*		108*	627*	2,053*	34 of 74
TOTALS	152*	229	843*	195*	43*	2,158*	40	89	150*	20*	933*	1,276*	1,730*	7,043*	14,901*	123 of 368

HIGHWAY NOISE R&D FUNDING IN THOUSANDS
1976-1977
COUNTRY

* Some funding for other years included becau
projects extended longer than 1976-1977.

Converted to thousands of U.S. Dollars.

CATEGORY	Australia	Canada	Denmark	France	Japan	Netherlands	Poland	Portugal	Sweden	Switzerland	United Kingdom	West Germany	TOTALS	Projects with Funding Data
Medium and Heavy Trucks					462	40				1,199*	1,247*		2,948*	4 of 10
Light Vehicles					184		25*				38*		247*	3 of 8
Buses														0 of 4
Highway Planning and Land Management			33	43*			62		73			59*	270*	7 of 22
Highway Model Analysis and Prediction	82*	17			364			20*	155*	28*		13*	679*	14 of 40
Other		4			84				8*	9		156*	261*	7 of 25
TOTALS	82*	21	33	43*	1,094	40	87*	20*	236*	1,236*	1,285*	228*	4,405*	35 of 109

OFF-HIGHWAY AND RECREATIONAL VEHICLE
NOISE R&D FUNDING IN THOUSANDS
1976-1977

* Some funding for other years included because projects extended longer than 1976-1977.

Converted to thousands of U.S. Dollars

CATEGORY		Projects with Funding Reported
Motorcycles		0 of 2
Motorboats		0 of 4
TOTALS	NO FUNDING REPORTED	0 of 6

RAIL NOISE R&D FUNDING IN THOUSANDS
1976-1977
COUNTRY

* Some funding for other years included because projects extended longer than 1976-1977.

Converted to thousands of U.S. Dollar

CATEGORY	Denmark	Japan	Sweden	Switzerland	United Kingdom	West Germany	TOTALS	Projects with Funding Reported
Locomotives and Passenger Trains						3	3	1 of 4
Rapid Rail Transit		417*			9*	1,506*	1,932*	11 of 14
Innovative Guided Mass Transit		110*					110*	1 of 5
Rail Model Analysis and Prediction				40*			40*	1 of 5
Rail Noise Other	15		65*				80*	3 of 11
TOTALS	15	527*	65*	40*	9*	1,509*	2,165*	17 of 39

SURFACE VEHICLE COMPONENTS NOISE
R&D FUNDING IN THOUSANDS
1976-1977
COUNTRY

* Some funding for other years included because projects extended longer than 1976-1977.

Converted to thousands of U.S. Dollars.

CATEGORY	Australia	Japan	Sweden	United Kingdom	West Germany	TOTALS	Projects with Funding Reported
Engines	57	110		79*	1,156*	1,402*	8 of 35
Exhaust Mufflers					428	428	2 of 11
Power Train							0 of 3
Tires			363*	163*	64*	590*	7 of 16
Other			165*			165*	2 of 8
TOTALS	57	110	528*	242*	1,648 *	2,585*	19 of 74

MEASUREMENT AND ENFORCEMENT
R&D FUNDING IN THOUSANDS
1976-1977
COUNTRY

* Some funding for other years included because projects extended longer than 1976-1977.

Converted to thousands of U.S. Dollars.

CATEGORY	Australia	Canada	Denmark	Japan	Norway	Poland	Sweden	United Kingdom	West Germany	TOTALS	Projects with Funding Data
Methodology and Standards	1	211*	8	165	89	27	18*	86*	3,031*	3,636*	17 of 64
Training		57								57	1 of 2
TOTALS	1	268*	8	165	89	27	18*	86*	3,031*	3,693*	18 of 66

ACOUSTIC PROPERTIES NOISE R&D
FUNDING IN THOUSANDS
1976-1977
COUNTRY

* Some funding for other years included because projects extended longer than 1976-1977.

Converted to thousands of U.S. Dollars

CATEGORY	Australia	Belgium	Canada	Denmark	Japan	Poland	Sweden	United Kingdom	West Germany	TOTALS	Projects with Funding Data
Propagation	9*	229	511*				70*	101*	178*	1,098*	11 of 19
Barriers	3*		36	139*			6*		110*	294*	9 of 24
Architectural Acoustics			7*			36	10	3	195*	251*	7 of 13
Impact & Vibration					262*			4	144*	410*	7 of 15
Other											0 of 3
TOTALS	12*	229	554*	139*	262*	36	86*	108*	627*	2,053*	34 of 74

HIGHWAY NOISE

MEDIUM AND HEAVY TRUCKS

See Also Pages

253

257

320

Medium and Heavy Trucks
Denmark

Project Title: Possibility of and Objectives for a Limitation of Noise Emissions from Motor Vehicles.

Performing Organization Name & Address:
National Agency of Environmental Protection
Kampmannsgade 1
1604 Kobenhaven, Denmark

Sponsoring Organization Name & Address:

Principal Investigator(s):
National Agency of Environmental Protection

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, o Production)
___ Measurement Methodology

Start Date: summer 1978

Completion Date:
Estimated spring 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	(100,000 D.kr.) $16,490

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Possibility of and Objectives for a Limitation of Noise Emissions from Motor Vehicles: The project includes measurement of a representative selection of new motor vehicles at the time of their registration (in cooperation with the State Car Inspection)and measurement of the same types of vehicles of varying ages. The aim of the study is to determine the noise emission from existing motor vehicles (especially from lorries, buses, and mopeds) at the time of registration and after a couple of years' usage, in order to be able to evaluate the effect of more stringent limits to the noise emission from motor vehicles.

Project Title:

Research and Development of Low Noise Large Trucks and Buses

Performing Organization Name & Address:
1. Isuzu Motors Ltd, Kawaski Plant
2. Nisson Diesel Motor Co., Ltd. Ueo Plant
3. Hino Motors Ltd.
4. Mitsubishi Motors, Ltd.

Sponsoring Organization Name & Address:

Principal Investigator(s):
1. Y. Nashimoto
2. K. Hachitani
3. H. Sekiguchi
4. T. Hirano

Type of Research Program:
X Fundamental
X Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1974

Completion Date: Estimated _____ Actual 1976

Funding:

Year	Amount
1976 (actual):	(¥125,826,000) $461,900
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The above listed four companies joined in a research effort to develop low noise large sized trucks and buses below an accelerating driving noise of 86 dB(A) under a three year project starting April 1974. In March 1977, an experimental model was completed and recently the model was publicly introduced to the news media.

Translated and transcribed from the original Japanese.

Project Title: Truck noise reduction, Encapsulation of machinery
Propagation of noise from industrial plants over long distances

Performing Organization Name & Address:
M + P, akoestische adviseurs
Tiengemeten 1-3
Amstelveen
The Netherlands

Sponsoring Organization Name & Address:
Ministry of Public Health and
Environmental Hygiene
Leidschendam

Principal Investigator(s):

A. von Meier; Dipl.-Ing., Ph.D

Type of Research Program:

X Fundamental
X Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: begin 1976

Completion Date:
Estimated end 1977
Actual _____

Funding:

Year	Amount
1976 (actual)	
1977 (budget)	
1978 (forecast):	
	$40190

Or Total Funding Amount: (appr. fl. 100.000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Truck Noise:

Literature survey. Present state of the art.
Development of a quiet truck with 10 dB less noise.

Propagation of noise over long distances:

Development of an easy to handle procedure for calculating the noise level at distances $\geq$ 200 m from the source. Parameters: source strength, wind- and temperature conditions, ground effects, screening, scattering.

Encapsulation:

Survey on state of the art. Preparation of an instruction manual for use by industry.

Reports to be published appr. end 1977.

Project Title:
Noise Abatement on Heavy Commercial Vehicles

Performing Organization Name & Address:

ADOLPH SAURER Ltd.
9320 Arbon
Switzerland

Sponsoring Organization Name & Address:

ADOLPH SAURER LTD.
9320 Arbon
Switzerland

Principal Investigator(s):

Research + Development
Truck Division

Type of Research Program:

x Fundamental
x Development (Component or System)
x Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: June 1974

Completion Date:
Estimated ____
Actual October 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$1 199 100 (SFr. 3 000 000)

COMMENTS: No external financial assistance

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The objective of the research project was to reduce the noise emitted by Saurer commercial vehicles, in view of the new, more stringent regulations governing noise limitation, which came into effect on 1.1.1977.

Initially, basic investigations were carried out to analyse the noise sources on the vehicle. The focal point of the work was then directed to the main source of noise: the diesel engine. The radiation of noise from the engine through various components was explicitly characterised in its dependency on various influencing parameters. In the subsequent selection of noise reducing measures, great value was placed on the fact that they should be as effective and economic as possible, not affect the operation of the engine and at the same time be manufacturable under mass production conditions.

Finally a collection of measures was compiled comprising modifications to heavy noise producing engine components and on the exhaust and cooling systems.

The noise levels achieved on the Saurer 77 Range of heavy commercial vehicles lie, on average, 2·5 dB(A) under the values valid in Switzerland since 1.1.1977, using the measuring method as laid down in ISO R362 (88 dB (A)).

Summerauer, I.: Saurer on the Road to quiet Vehicles
Automobil Revue 5, 1977

Project Title:

Quiet Heavy Vehicle Project

Performing Organization Name & Address:

Transport and Road Research Laboratory
Old Wokingham Road
Crowthorne Berks
United Kingdom

Sponsoring Organization Name & Address:

Department of Transport
Department of Environment
Marsham Street
London, United Kingdom

Principal Investigator(s):

J. W. Tyler

Type of Research Program:

___ Fundamental
___ Development (Component or System)
x Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1971

Completion Date: Estimated 1978 / Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$1246710 (£725,000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

OBJECTIVE:

To demonstrate that quiet versions of heavy diesel engined commercial vehicles can be built having similar performance to conventional vehicles and to evaluate the increased manufacturing costs. A 32 ton 220 bhp tractor unit has been modified to produce 80 dB(A) (at 7.5 metres) using re-designed cooling and exhaust systems and a standard engine. A 40 ton 350 bhp tractor unit has reached 82 dB(A) in research form with re-designed exhaust and cooling systems and a quieted engine. During the development phase of the project this vehicle is expected to reach the target of 80dB(A).

Cab noise in both vehicles has been reduced to 75-78dB(A).

Project Title:
Noise Restrictions on Service Equipment

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / **Completion Date:** Estimated _____ Actual _____	**Funding:** Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project is designed to amass the information needed to formulate implementation based on article 2 of the Noise Abatement Bill, concerning noise nuisance caused by service equipment such as rubbish lorries (= garbage trucks), cattle lorries and oil tank lorries.

The project will make use of data obtained from previous research and, if applicable, specifications used abroad in setting noise restrictions and E.E.C. regulations.

Each type or category of service equipment investigated should be tested under representative running conditions, at normal noise levels, using approved methods of noise measurement and observing any other relevant aspects for the regulations to be established, and for the noise restrictions to be enacted in the continued operations check.

Transcribed from the original.

Medium and Heavy Trucks
Netherlands

Project Title:
Investigation of the Possibility of Obtaining Quieter Lorries

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976	**Completion Date:** Estimated _____ Actual _____
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	**Funding:** Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

In various countries, an analogous development to the city buses has taken place with regards to developing quieter motor lorries.

Although there are different problems involved with these vehicles than encountered with buses, there are still indications that relatively simple adaptions, including isolation of the motor and improvement of the silencers can lead to considerable noise abatement.

This project is intended to find out the degree to which it is possible to effect these adaptations to Dutch lorries on a large scale, using the knowledge and experience gained in the implementation of earlier projects.

Transcribed from the original.

Switzerland. Optimisation of Truck and Bus Soundproofing. Interkeller AG/SA, 8052 Zurich, Switzerland. F. Friundi.

United Kingdom. Origins of Noise Inside Vehicle Cabs. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. R. D. H. Perry, T. Priede.

United Kingdom. Commercial vehicle exterior noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Dixon, D. Anderton.

HIGHWAY NOISE

LIGHT VEHICLES

See Also Pages:

58

257

264

289

290

Light Vehicles
Japan

Project Title:

Vehicle Noise Reduction of the Passenger Car and the Light Truck.

Performing Organization Name & Address:

Research Department, Passenger Car Development Center, Mitsubishi Motors Corporation
1-Hashimecho, Okazakicity, Japan

Sponsoring Organization Name & Address:

Mitsubishi Motors Corporation
33-8 Shiba 5-Chome, Minato-ku
Tokyo 108, Japan

Principal Investigator(s):

Chiaki Moritani
Manager, Research Dept.

Type of Research Program:

x Fundamental
x Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1975.4

Completion Date:
Estimated 1979
Actual ____

Funding:

Year	Amount	
1976 (actual):	(¥20,000,000)	$73,420
1977 (budget):	(¥30,000,000)	$110,130
1978 (forecast):	(¥30,000,000)	$110,130

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

"Vehicle Noise of the Passenger Car,"
Mitsubishi Juko Giho
Vol. 14, No. 1
1977-1

Complaints about road traffic noise are becoming louder recently with the increase of traffic volume. In order to ease them, it is necessary to take comprehensive countermeasures including the reduction of the noise of the individual cars, the improvement of road structure and the improvement of traffic management.

In this paper the authors make clear the contribution ratios of various noise sources to the vehicle noise of the passenger car and describe a method to estimate and calculate the vehicle noise of the passenger car from noise level of various noise sources and the specifications of the car.

They have given the empirical formula for simulating the passby noise level of a passenger car, using the data (exhaust noise level & engine noise level) obtained in the tests on the chassis dynamometer in anechoic chamber and the data (tire & body noise level) measured through free run of the test course.

This formula is practically useful for the estimation of the contribution of exhaust and engine noise level for the pass by test.

Comparison of estimated with measured results for the thirteen vehicles shows good agreement. (Fig. 3 in the original report)

Further, they experimentally investigate the characteristics of the exhaust noise, fan noise and engine noise, the main noise sources, and introduce examples of countermeasures obtained by the investigation.

Transcribed from the original.

Project Title: Implementation of the method of automotive vehicle external noisiness control for application to the inspection for permit to be operated in road traffic.

Performing Organization Name & Address:

Instytut Transportu Samochodowego
/Road Transport Institute/
40, Stalingradzka St.
03-301 Warsaw, Poland

Sponsoring Organization Name & Address:

1/Ministry of Transport, Warsaw
4, Chalubinskiego St.
2/National Motor Transport Enterprize
Warsaw 17, Grojecka St., Poland

Principal Investigator(s):

Dr. eng. Jerzy Miazga

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
_X_ Measurement Methodology

Start Date: Mar. 15, 1975

Completion Date:
Estimated June 30, 1976
Actual Dec. 20, 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(500,000 zl) $25,100

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A simplied method of automotive vehicle noisiness control was developed as well as the equipment for measurements. The equipment makes possible the evaluation of noise level in dBA and the acoustic pressure in dB for two frequency bands. The method may be applied to the automotive vehicle inspection for permit to be operated in road traffic. The criteria of accepted noise levels for different makes and types of vehicles were developed. These values, taken as maximum, make possible with the AS-2 apparatus the elimination of too noisy vehicles which would endanger the environment.
The results of work were published in conference paper: B. Burza, J. Miazga "Estimation of noisiness of motor vehicles admitted to traffic with the aid of the measuring device AS-2" for Noise Control Conference, Warsaw, 13-15 October 1976.

Transcribed from the original.

Project Title:
Reduction of Car Noise by Passenger Compartment Design

Performing Organization Name & Address:

Cranfield Institute of Technology
School of Automotive Studies
Cranfield, Bedford England MK43 OAL

Sponsoring Organization Name & Address:

Science Research Council
PO Box 18
SWINDON SN1 5BW

Principal Investigator(s):

Dr S K Jha

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: July 1976

Completion Date: Estimated ____ Actual July 1979

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$37,831 (£ 22,000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

OBJECTIVE:

Investigate the possibility of reducing the structural modal density of a car body structure by means of passenger compartment redesign, and study its effect on interior noise.

METHODOLOGY:

Vibrational analysis of a two dimensional frame representing the central cross-section of a car body has been made by using finite element technique. Good correlation between theory and experiment has been found. Work is progressing towards determining the modal density for various conceivable passenger compartment shape. Once an optimum shape has been found, work would continue to predict the sound pressure level inside the car produced by various vibrational modes of the body structure, and compared with equivalent normal production model car.

Light Vehicles
United Kingdom

Project Title:
Transmission of Engine Forces Through Engine Mounts and Their Relation to Interior Noise of a Car

Performing Organization Name & Address:

Cranfield Institute of Technology
School of Automotive Studies
Cranfield
Bedford MK 43 OAL
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

S. K. Jha

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The investigation consists of an experimental determination of the dynamic characteristic of engine mountings by obtaining mobility and transmissibility responses of the mountings. The experimentally obtained values are then used in theoretical evaluation of force transmitted by the engine into a rigid structure. Work is in progress to incorporate the effect of flexibility of the subframe in the evaluation of force transmission, and estimate the degree of correlation between the internal noise of a car and the magnitude of the forces transmitted.

Transcribed from the original.

Project Title:
Vehicle Noise and Vibration Analysis

Performing Organization Name & Address:

Ford Motor Company Ltd.
Research and Engineering Center
Laindon, Basildon, Essex
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

R. Guppy
G. Simmonds

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
1972	Estimated _____ Actual 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To economically reduce the noise environment of car passengers. Noise isolation and source reduction methods are used. Feasible noise attenuation systems are evaluated to reduce engine, exhaust and road noise. Noise source investigation has lead to detail design changes in major engine components, driveline and exhaust systems. Test facilities used include road test, chassis dynamometer, laboratory, component tests and rig tests.

Switzerland. The Sound Radiation of Body Panels in the Interior of a Car at Low Frequency and the Possible Methods. Interkeller AG/SA, 8052 Zurich, Switzerland. W. Stahel.

Switzerland. An Attempt at Comprehensive Presentation of Automobile Acoustic Questions. Interkeller AG/SA, 8052 Zurich Switzerland, R. H. Van Ligten.

Switzerland. Considerations on Preventive Noise Control in Passenger Car Design. Interkeller AG/SA, 8052 Zurich, Switzerland. P. H. Gillard.

HIGHWAY NOISE

BUSES

See Also Pages:

33

34

40

257

Buses
Netherlands

Project Title: Investigation of the Possibilities of Obtaining Quieter Buses for Public Transport

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Transport and Public Works Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The buses presently in use for public transport are generally very noisy and have often been the subject of many complaints in the city of annoyance or noise nuisance. In several West European countries city buses have been developed with noise levels 10 decibels below the present maximum permissible. Of particular interest is research conducted in Germany, whereby noise-abating accessories were installed in a relatively simple manner on the city buses of the city of Hamburg, which reduced the noise levels of these buses to below the noise level of the average passenger car.

This project is intended to implement a similar operation on the standard Dutch city bus, including consideration of the possibility of adapting existing rolling stock as well as the possibility of building the new silencers into buses yet to be built. If the project is successful, a second stage would involve the silencer adaptation of the standard local buses as well.

Transcribed from the original.

Buses
United Kingdom

Project Title:
Research on the Reduction of Noise Emission from Diesel Engined Buses

Performing Organization Name & Address:

British Leyland Ltd.
Leyland, Preston
Lancashire, United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A private industry research conducted by Leyland which hopes to begin production of a single-decker emitting 77/78 dBA at the end of 1976. They are also working on a quiet double-decker, and about 400 Metro-Scania and Bristol Series III double-deckers already in service and thought to be capable of 80dBA.

Transcribed from the original.

United Kingdom. Lead-Acid Battery Driven Vehicles. Lucas Industries, Lucas CAV Ltd., P. O. Box 36, Warple Way, Acton, London W3 7SS, United Kingdom. The Chloride bus is known to emit no more than 77dBA.

United Kingdom. Experimental Battery Driven Buses. Department of Industry, London, United Kingdom.

HIGHWAY NOISE

HIGHWAY PLANNING AND LAND MANAGEMENT

See Also Pages:

86

177

274

280

293

294

315

328

330

331

333

360

Project Title: Study on Possible Improvement of the Noise Conditions in Existing Urban Areas.

Performing Organization Name & Address:

National Agency of Environmental Protection, Acoustics Laboratory
Kampmannsgade 1, 1o04 Kobenhaven
Denmark

Sponsoring Organization Name & Address:

Principal Investigator(s):

National Agency of Environmental Protection

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, Production)
___ Mensurement Methodology

Start Date:
aut. 1977

Completion Date:
Estimated summer 1978
Actual _____

Funding:

Year	Amount	
1976 (actual):	100.000 D.kr.)	$16,490
1977 (budget):	100.000 D.kr.)	$16,490
1978 (forecast)	200.000 D.kr.)	$32,980

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Study on Possible Improvement of the Noise Conditions in Existing Urban Areas:

In continuation of the project which was carried out in 1976/77 and which covered and area at Århus, a study shall be performed in a major built-up urban area. The town of Odense will be a suitable object for this study.

Highway Planning and Land Management
France

Project Title:
A Search for Elements of Decision Making by the State Relative to Reduction of Nuisance due to Traffic Noise.

Performing Organization Name & Address:
Institute of Transport Research, Center for the Evaluation of Research on Nuisances
109, Avenue Salvador Allende
69672 Bron Cedex France

Sponsoring Organization Name & Address:
Ministry of Life Quality
D.P.P.N.

Principal Investigator(s):
J. Lambert

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1/77

Completion Date:
Estimated 6/78
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: (210,000 Fr) $42,504

COMMENTS:

The subject of the study is an analysis of the means for reducing and suppressing nuisance due to noise from automobile traffic in the vicinity of urban highways.

Each means of control (reduction at the source, screening, acoustic insulation, election of urbanization type) must be analyzed from the standpoints of its cost (implementation and maintenance), efficiency (minimization of exposure to noise, implantation into urban landscape), and realization time.

Evaluation of some means must be based on a study of several actual sites.

A program of action is to be proposed, taking into account the objective and particularly, preference of the neighborhood residents.

30, Sept. 1977 Intermediate Report
30, June 1978 Final Report

Translated and transcribed from the original French.

Highway Planning and Land Management
Poland

Project Title: Project FA-34 The investigations of noise annoyance caused by Łazienkowska express route and elaboration of directions on acoustic prevention against traffic noise.

Performing Organization Name and Address:
Building Research Institute /ITB/ Dep.of Acoustics, ul.Ksawerów 21, 02-656 Warszawa, Poland

Sponsoring Organization Name and Address:
Direction of Highway Routes Construction in Warsaw
Warszawa, ul.Gdańska, Poland

Principal Investigator /s/:
Maria Stawicka-Wałkowska, D.Sc.
prof. Jerzy Sadowski, Ph, D

Type of Research Program:
- [x] Fundamental
- [x] Development /Component or System/
- [ ] Demonstration /Experimental, Prototype, or Production/
- [ ] Measurement Methodology

Start Date: August 1974
Completion Date: Estimated ____ Actual: July 1977

Funding:

Year		Amount	
1976	/actual/:	(469.506 zł.)	$23,569
1977	/budget/:	(98.045 zł.)	4,922
1978	/forecast/:		

Total Funding Amount: (567.551 zł.) - - - - - - - - - - - - $28,491 - - - -

COMMENTS:

Project Sumary: /Briefly describe the goals, approach, expected or actual results, report /s/ generated and the date /s/ of publication./

The Project deals with measurements of sound level spreading over façades of buildings adjoining express-routes.
A main goal was to define the real state of traffic noise annoyance for real conditions, at buildings situated in different urban arrangements /close or free development, one - or both sided building, high or low/ close to express routes.

The Project based on investigations held on in vicinity of the new express route in Warsaw called Łazienkowska.

The analysis of measurements carried on chosen cross-sections, allowed to draw conclusions in relation to typical sound level spreading at buildings adjoining main noise source /taking in to account that the noise source is placed in excavation, at the ground level and as an elevated road.

The conclusions deal with the choosing of most favourable location of buildings that are exposed to traffic noise and with directions of noise control.

The Project contains fundamental materials for projecting of new highways and their housing that have to be proper from the urban-acoustic point of view.

Report generated: Polish - French Seminar - June 76, Warsaw
76 Noise Controle - Conference - October 76, Warsaw
Main conclusions and directions are being at the present moment prepared for publishing.

Highway Planning and Land Management
Poland

Project Title: Project 17.06.02.2 "Complex developments of urban structures and building constructions with respect to acoustic protection; example: residential area "Białołęka Dworska" / near Warsaw /

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Building Research Institute /ITB/ Dep.of Acoustics, ul.Ksawerów 21, 02-656 Warszawa, Poland	Centre of Investigation and Building Design in Warsaw /COBPBO/,ul.Wierzbowa Warszawa, Poland

Principal Investigator(s):
Barbara Szudrowicz,D.Sc.
profJerzy Sadowski,Ph.D.

Type of Research Program:
___ Fundamental
_x_ Development (Component or System)
_x_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
Sept.76	Estimated Sept.79 Actual _____

Funding:

Year	Amount
1976 (actual):	(231,024 zł) $11597
1977 (budget):	(430,865 ") $21629
1978 (forecast):	78 $129 28
72	(450,545 ") 79 $9693
Total Funding Amount:	(1.112,434 zł.) $55844

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The housing estate "Białołęka Dworska" is being designed as a model estate with respect to environmental protection. Acoustic protection /urban and building/ is one of the elements of complex treatments of the problems.

Phase I: acoustic study of the territory and elaboration of acoustic guideline for urban developments in relation to highway systems will be performed by March 31, 77.

Phase II: that phase of investigations will include acoustic development of all parts of the estate in relation to highways and designing and situation plan of the buildings in the way conform to noise control requirements.

Phase III: that phase will include the study and assessment of the result obtained both with respect to acoustic climate and other factors of environmental protection.

Sweden. Consequences of Speed Standard and Intersection Design for Secondary Links in Town Road Networks. Lunds University of Technology, Dept. of Traffic Planning & Engineering, Box 725 S-22 007, Lund 7, Sweden. Sponsor: Lund University of Technology, Box 725, S-220-07, Lund 7, Sweden. J. Colliander; S. Lundberg; M. Reutherborg. Oct. 1976. Jan. 1978. $40,000. The aim is to study effects of various combinations of speed standard and intersection design for secondary links in urban road networks on residents, road users, etc.; such as noise, safety, costs, transport mode distribution.

Sweden. Noise Protection Plans for Local Districts. Statens Naturvaardsverk, National Swedish Environment Protection Board, Fack, S-117120, Solna, Sweden. Sigvard Tim. 1976. 1977. $33,000, (150,000 Sw Cr). The aim is to work out guidelines to be used by local authorities for noise protection planning.

West Germany. Noise Protection in Planning for Reorganization. Chair for Traffic and City Planning, Muenchen 2, Arcisstr. 21, West Germany. Dr.-Ing. Karl Glueck. Jan. 1, 1974. June 30, 1976. $58,936, (139,000 DM). Checking the practical use of a city planning survey of noise levels when reorganizing the urban area.

Project Title:

Land Use Planning and the Design of New Housing Developments Against Arterial Traffic Noise.

Performing Organization Name & Address:
Ontario Ministry of the Environment
Noise Pollution Control Section
135 St. Clair Avenue West
Toronto, Ontario M4Y 1 P5
Canada

Sponsoring Organization Name & Address:

Principal Investigator(s):

H. Gidomy
J. Cheng

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This paper examines in a quantitative fashion the implication of some new land use planning concepts with respect to noise when designing new residential developments adjacent to arterial or major roadways. Comparisons based on actual noise measurements on several existing residential developments are made between two distinct design concepts.

The use of conventional noise control measures such as berms, walls and berm/wall combinations has gained wide acceptance over the last few years. However, their applicability to urban situations in which new residential developments are located next to busy roads is strictly limited by a number of factors. Alternative solutions are offered in this paper to enable planners and designers of new residential subdivisions in designing a more acceptable sound environment indoors and outdoors. The alternative solutions to the conventional barriers appear to offer improved acoustics, economics and aesthetics.

Transcribed from the original.

Project Title:
Ontario Environmental Noise Control Program

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Ontario Ministry of the Environment 135 St. Clair Avenue West Toronto, Ontario M4V 1 P5 Canada	
Principal Investigator(s): John Manuel	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This paper presents an overview of the Province of Ontario environmental noise control program. The legislation; the progress of municipalities in adopting and implementing noise by-laws; the control of operational noise of vehicles; training courses in environmental acoustics technology; land use and site planning techniques are included in the topics to be discussed.

Transcribed from the original.

Highway Planning and Land Management
Canada

Project Title: A Planning Policy for Freeway Noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Ontario Ministry of the Environment 135 St Clair Avenue West Toronto, Ontario M4V 1P5 Canada	
Principal Investigator(s): J. Manuel	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The Ontario government has taken significant steps towards implementation of a provincial noise control policy covering lands in the proximity to freeways. The government has also announced a program for noise attenuation along stretches of certain existing freeways passing through established residential areas where priorities and feasibility is demonstrated. Additionally, the responsibility for noise control in new subdivisions has been placed on the developer. The implications of this policy with respect to noise control is discussed in the paper.

Transcribed from the original.

Highway Planning & Land Management
Czechoslovakia

Project Title: Proposal of Regulations for the Design of Settlements from the View-point of Excessive Transportation Noise Protection

Performing Organization Name & Address:

Research Institute for Building and Architecture,
Prague 1, Letenska 3,
Czechoslovakia

Sponsoring Organization Name & Address:

Ministry of Construction,
Prague 2,
Na poricnim pravu 1,
Czechoslovakia

Principal Investigator(s):

Ing. Thor, CSc.,

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_x_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual ~~1976~~

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The proposal of Regulations concerning the physical planning documentation from the view-point of transportation noise protection has to serve as a provisional methodical instruction for designing residential settlements as regards the protection of inhabitants against excessive transportation noise. After their verification (approximately within two years) these Regulations will become a part of complex measures to the decree of the Czech Ministry of Health regarding the heath protection of the population against disadvantageous effects of noise and vibrations.

oject Title:

Planning Petrol Station inside Dwelling Districts.

rforming Organization Name & Address:

The Dept. of Appl. Acoustics.
Israel Inst. of Technology
Haifa, Technion City, Israel

Sponsoring Organization Name & Address:

The Neft-Institute
Tel Aviv

-incipal Investigator(s):

Schaudinischky, L.H.
Keller, J.

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date:	Completion Date:
1976	Estimated ____ Actual 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

roject Summary: (Briefly describe the oals, approach, expected or actual results, eport(s) generated and the date(s) of ublication.)

In developing countries very often the necessity arises, to erect "petrol station" in dwelling districts. The aim of the study was to determine, by means of objective measurements, if and in which degree, the noise situation, at day and at night, will become worse inside nearby dwellings, compared with the conditions before the petrol station has been built. For this purpose, a two track recording of 24 hrs. of an average day has been made.

Track I got the output of microphone I, situated at some distance ($\approx$ 10m) from the station, on the street, while Track II received the output of micr. II inside the station. In addition, the traffic flow and its composition (private cars, buses, transporters, motorcycles) has been recorded by observers. The measuring results have been evaluated with the aid of a computer, giving L_{og}; L_{10}; L_{50}; L_{90} and L_{99}.

The report will be published at the end of this year.

Highway Planning and Land Management
Netherlands

Project Title:
Investigation of Noise-Sensitivity of Various Receivers

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Public Health and Environmental Protection
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In order to establish the noise zones along roads which are necessary to prevent noise nuisance, a number of elementary planning conditions should be set up, which concerns to be permitted within these zones must comply with. This project will investigate human noise-sensitivity in various situations, expressed in maximum permissible noise loads for each type of concern or activity; these rules will then be incorporated into the elementary planning conditions.

Some attention will also be devoted to the noise-sensitivity of nature-protected areas.

Transcribed from the original.

Project Title:
Working Out the Zoning System Along Motor Roads

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Public Health and Environmental Protection
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The Bill on Noise Abatement contains a regulation on the establishment of noise zones along the roads inside of which maximum permissible traffic noise levels are applicable. Acoustic research conducted inside these zones should make it evident in which manner noise levels can be kept below these maximum permissible levels, and the government measures needed to accomplish this.

This project will give indications as to how, on the basis of existing knowledge and experience, the zoning can be worked out in detail. The results of other research projects will be incorporated into the recommendations of this project.

Transcribed from the original.

Highway Planning and Land Management
Norway

Project Title:
An Analysis of Different Noise Abatement Strategies

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Institute of Transport Economics Royal Norwegian Council for Scientific and Industrial Research P.O.Box 6110 Etterstad N-Oslo 6, Norway	
Principal Investigator(s): Multi-disciplinary team of engineers and an economist	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 Completion Date: Estimated 1979/1980 Actual _____	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

The overall aim of the project is to make an assessment of the effects of different relevant traffic noise abatement strategies on a national basis. The analysis will investigate the effects with respect to noise reduction, (number of people exposed etc.), the socio-economic consequences and the economic responsibility aspects. The project will when completed propose more flexible noise standards and noise reduction measures based not only on measures on the emission /immision side, but using traffic management techniques and different land use methods.

The project will to a large extent be based upon data obtained from the traffic noise mapping (1976) executed in connection with The Norwegian Road Plan (NVP II). First phase expected to be completed by end 1977.

Last year a study was completed which made an assessment of the existing traffic noise climate in 50 urban areas in Norway. The analysis was based upon data from an extensive traffic noise mapping exercise carried out in 1976. The project included a survey of the number of dwellings exposed to different noise levels and the costs involved if certain noise standards should be satisfied. The Institute has besides carried out a few investigations of the effects different traffic management measures have on the noise climate for residents in urban areas. Four case studies have been completed and considerable improvements can be attained (reduced number of exposed residents) if traffic management measures were introduced separatly or in combination with other insulation measures as part of a more comprehensive noise abatement policy. The application of traffic management measures will besides give other environmental benefits (less pollution, reduced external noise etc.) as well as improved traffic safety.

The Institute continues in 1977 the mapping and analysis of the traffic noise climate outside urban areas in order to attain a more complete national noise climate picture. This will form the basis for the priority assessment of different noise abatement measures in relation to 105 Mill. N.Kr. ($ 1,978,200) already allocated for this purpose.

The Institute is now embarking upon a more extensive study of the noise reducing effects of other traffic management measures. For example: lorry-routes in urban areas, prohibition of traffic movements in special noise sensitive areas at night or for certain categories of traffic, traffic restrictions etc. We started this project in the summer at 1977 and aim to complete a number of case-studies by the end of 1978.

Project Title:

Pilot project of measures against road traffic noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Environmental and Public Health Administration of Stockholm, Sweden	
Principal Investigator(s): A working group with representatives from the authorities concerned	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated ? Actual	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The project aims to study all aspects involved with noise abatement from legal and economical to technical and measurements of noise reduction obtained with the measures. A few sectors of roads and streets are treated completely according to this plans.
The results will form a base for further steps of this kind within the town.

Highway Planning and Land Management
Sweden

Project Title: Municipal Traffic Noise Abatement Programs-a Survey of Program and Planning

Performing Organization Name & Address:

Swedish Council for
Building Research
Stockholm, Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Mar 1975

Completion Date:
Estimated ____
Actual Feb 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The object of this study is to define the need for municipal traffic noise abatement programs, to investigate research and development requirements in various subsections of the project and, thirdly, to draw up a working program for the compilation of practical hints and aids for use in municipal noise abatement.

Trascribed from the original.

Project Title: Emission Cadastre for Motor Vehicles in Switzerland (Partial Cadastre Noise)

Performing Organization Name & Address:

Dr. Pelli & Co. Beratung in Mathematik und Physik BMP
Hofwiesenstr. 18 Postfach
8042 Zurich, Switzerland

Sponsoring Organization Name & Address:

Eidg. Amt fuer Umweltschutz
3003 Bern, Switzerland

Principal Investigator(s):

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Sept. '76

Completion Date: Estimated 1977 Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The result of the study should serve to clarify how many persons and how large areas in Switzerland are subjected to a certain stress caused by street traffic noise. The cadastre should help federal and local officials to introduce an orderly prevention program according to priorities. Finally, the results should be a basis for subsequent estimations and prevention costs.

NOTE: Cadastre = official register of the ownership, extent, and value of real property, used as a basis of taxation.

Translated and transcribed from the original German.

Highway Planning and Land Management
United Kingdom

Project Title:
Applied Research at the Industrial Town of Darlington

Performing Organization Name & Address:

Department of Environment
Noise Advisory Council
London, United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Sept. 1976

Completion Date:
Estimated ~~Sept 1978~~
Actual ___

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The experiment is designed to show the benefits to be had from a concerted application of known noise abatement techniques, as well as noise abatement zones. It is likely to include such measures as traffic management schemes and public information programs aimed at encouraging noise-makers to behave more responsibly.

Transcribed from the original

Sweden. Reporting of Traffic Noise in Landscape Using a Color Jet Plotter. Faculty of Technology, University of Lund, Dept. of Building Acoustics, Fack S-220 07 Lund 7, Sweden. Sponsor: Swedish Council for Building Research. Jan. 1975. March 1976. An application of "Development of a Method for Calculating Traffic Noise". The color jet plotter plots graph lines in the terrain and colors according to the different sound levels which occur.

West Germany. Introduction of Town-Zones with Restricted Traffic. Sponsor: Federal Ministry of the Interior, Bonn, West Germany. 1977. 1979.

West Germany. Noise Protection in City Planning. Institute for Rural Settlement Planning, Stuttgart Univ., Stuttgart, Keplerstr. 11, West Germany. Dipl. Ing. Detlev Simons.

HIGHWAY NOISE

HIGHWAY MODEL ANALYSIS AND

PREDICTION

See Also Pages:

66
133
138
251
259
282
285
298
299
306
309
315
319
321
322
323
325
340
342

Highway Model Analysis and Prediction
Australia

Project Title:
Community and Domestic Noise Environment

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
W.A. Institute of Technology, Hayman Road, BENTLEY, WESTERN AUSTRALIA 6102	
Principal Investigator(s): I.H. Bailey	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) _X_ Measurement Methodology
Start Date: March 1977 / Completion Date: Ongoing Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): $200) $222 1978 (forecast)($500) $555 Or Total Funding Amount:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

COMMENTS: I am trying to organize finance for a sophisticated noise analysis system. At present I have to rely on currently held equipment.

AIMS AND OBJECTIVES

1. To verify that existing traffic noise predictive methods are valid in Perth.
2. To evaluate the distribution of noise levels in the community.
3. To measure the extent of noise penetration into the domestic environment and to study the effect of factors such as the sound transmission loss of typical dwellings, construction techniques, people's life styles and weather conditions.

APPROACH

1. The use of standard techniques to evaluate road traffic noise as a function of traffic speed, composition, rate of flow and distance from the road.
2. The measurement of noise levels outside and inside homes due to traffic on nearby roads, studying the effects of factors such as open and closed windows and the penetration of noise into front and rear rooms. .

PROGRESS

Recordings of noise on a number of sites have been made and analysis is proceeding.

Project Title:

Traffic Noise Prediction Model Study

Performing Organization Name & Address:

JOINT (MAIN ROADS DEPARTMENT, BRISBANE
(UNIVERSITY OF QUEENSLAND, BRISBANE

Australia

Sponsoring Organization Name & Address:
MAIN ROADS DEPARTMENT, BRISBANE

AUSTRALIAN ROAD RESEARCH BOARD
P.O. BOX 156
BAG 4 NUNAWADING VICTORIA

Principal Investigator(s):

G. HOLLINGWORTH

A.L. BROWN

Type of Research Program:

___ Fundamental
___ Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
-/3/76	Estimated ___ Actual -/8/77

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$15,550 - $19,980 ($10,000 (US) Allocn.)

COMMENTS: Funding has been mainly concerned with L. Brown's salary. G. Hollingworth's salary is carried as an overhead.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The U.K. Department of the Environment has published a method of calculating road traffic noise levels (L10) from a knowledge of traffic parameters and roadway geometry. To test this prediction method, L10 noise levels were calculated for 17 sites near the South East Freeway, Brisbane, where 24 hour noise level measurements had been made. Road traffic volumes used in the calculations were those measured simultaneously with the noise levels. Predicted and measured noise levels are compared for each half hour of the day at the 17 sites. Measurement sites included locations at cut, fill and at-grade cross-sections of the freeway, often with sites of very complex acoustical geometry. Distances of sites from the freeway ranged from 20 metres to 100 metres. General agreement between the predicted and measured values were observed under all site conditions, and the method can be recommended for adoption where prediction of L10 noise levels are required, at least for the range of traffic and geometry conditions covered in this study.

Paper: "Prediction of NOISE LEVELS (L10) near a FREEWAY" by above authors to be presented at 9th ARRB Conference (Brisbane), 21-25 August, 1978

Project Title:
Motor Vehicle and Traffic Noise - Measurement, Analysis, Prediction.

Performing Organization Name & Address:
School of Architecture,
University of New South Wales,
P.O. Box 1,
KENSINGTON. N.S.W. 2033
AUSTRALIA

Sponsoring Organization Name & Address:
Australian Research Grants Committee,
Department Science,
P.O. Box 449,
WODEN. A.C.T. 2606
AUSTRALIA

Principal Investigator(s):
Assoc. Prof A. Lawrence,
Mrs. M.A. Burgess.

Type of Research Program:

- X Fundamental
- ___ Development (Component or System)
- ___ Demonstration (Experimental, Prototype, or Production)
- X Measurement Methodology

Start Date: 1974

Completion Date: Estimated 1977 Actual ____

Funding:

Year	Amount
1976 (actual):	($ 9,923) $11,015
1977 (budget):	($18,510) $20,546
1978 (forecast):	($14,354) $15,933

Or Total Funding Amount:

COMMENTS: Grant terminated at end of 1976.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

1. The original aims of the project

The original aim of this project was to determine the contributions to the noise emitted by traffic streams made by individual vehicles in typical Australian urban situations. It was hoped that this information would enable the appropriate test methods and the permissible maximum noise emission levels for vehicles to be established on a logical basis. In effect, these levels should be such that when these vehicles form part of a typical urban traffic stream, the noise of the stream does not exceed acceptable community noise levels (e.g. as recommended in Australian Standard 1055 "Noise Assessment in Residential Areas").

2. Progress in achievement of original aims

Measurements of traffic noise have been made at over 40 separate sites in the Sydney Area. The Techniques for recording the Traffic composition and noise levels have continually been refined with experience and as new equipment has become available. Basically, the sound from a traffic stream is recorded on two or more channels simultaneously. The microphones are located at various distances from the traffic flow so that the effects of distance and shielding by barriers or buildings may be measured. A simultaneous detailed count of all the vehicles passing in each direction is made, the vehicles being classified as:- heavy (more than two axles); medium (two axles, dual tyres on the rear axle); light (two axle commercial vehicles, single, tyres); cars; buses; motor-cycles. In addition a synchronised voice commentary is recorded on a separate channel, with the aim of identifying as many individual vehicles as possible. The individual noise peaks on a level recorder chart can be related to particular vehicles described in the voice commentary. These clearly identified peaks are then analysed (using the Real Time Analyser) to accumulate data for traffic stream noise synthesis. The analysis of peaks from the different recording positions is also used to determine the frequency-dependent attenuation resulting from distance and shielding.

For the development of methods of test for noise emission of individual vehicles it may be necessary to devise more than one test to represent the noise emitted in normal traffic.

Highway Model Analysis and Prediction
Canada

Project Title:
Traffic Noise

Performing Organization Name & Address:

Mechanical Engineering Dept.
University of Manitoba
Winnipeg R3T 2N2
Canada

Sponsoring Organization Name & Address:

National Research Council of Canada/
Center for Transportation Studies

Principal Investigator(s):

N. Popplewell &

K. W. Yeaw

Type of Research Program:

_x_ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
_x_ Measurement Methodology

Start Date:
Oct. 1975

Completion Date:
Estimated Jan. 1, 1978
Actual _____

Funding:

Year		Amount
1976 (actual):	($9,000)	$8,485
1977 (budget):	($9,000)	$8,485
1978 (forecast):	($9,000)	$8,485

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A method of predicting L_{eq} for traffic noise in urban situations has been developed. The effects of building shielding has been assessed using a geometrical acoustics approach. Agreement between theory and field measurements is good[2]. Measurement methodology for urban traffic noise is being assessed presently.

1. K. W. Yeaw et al, Method of predicting L_{eq}.
Journal of Sound & Vibration 53, 103 (1977)

2. K. W. Yeaw et al, Shielding of Noise from statistically stationary traffic flows by simple obstacles.
Submitted to Journal of Sound & Vibration for publication.
Also given at the 9th International Acoustics Conference, Madrid, Spain, July 1977.

Transcribed from the original.

Project Title: The Evaulation of Road Traffic Noise in Relation to Noise Power Levels of Motor Vehicles

Performing Organization Name & Address:

Traffic Safety and Nuisance Research Institute
Ministry of Transport
6-38-1 Shinkawa
Mitaka, Tokyo 181
Japan

Sponsoring Organization Name & Address:

Principal Investigator(s):

Traffic Noise Pollution Section
T. Ando

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: April 1976

Completion Date: Estimated March 1979
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount	
1976 (actual):	(¥8,600,000)	$31,570
1977 (budget):	(¥17,018,000)	$62,473
1978 (forecast):	(¥17,246,000)	$63,310

Or Total Funding Amount:

COMMENTS:

In order to improve the practical results of noise control, flow of traffic on general roads was observed and the noise was measured. In parallel to this study, the sound output was measured and studied to determine a simulation technique for traffic noise.

Publication:
Environmental Research in Japan 1978. Sept. 1979.
Report of Traffic Safety and Nuisance Research Institute. March 1980.

Translated and transcribed from the original Japanese.

Project Title:

Calculation Model of Road Traffic Noise

Performing Organization Name & Address:

Traffic Environment Section,
Road Division,
Public Works Research Institute
4-12-52, ANAGAWA, chibashi, shibaken, JAPAN

Sponsoring Organization Name & Address:

Ministry of Construction
1-3 KASUMIGASEKI 2, chiyodaku, Tokyo
JAPAN

Principal Investigator(s):

Kozo KANEYASU
Hiroshi NONAKA

Type of Research Program:

X Fundamental
X Development (Component or System)
___ Demonstration (Experimental, Prototype, Production)
___ Measurement Methodology

Start Date:
1st April 1975

Completion Date:
Estimated 31 March 1980
Actual _____

Funding:

Year	Amount
1976 (actual):	US$ 120,000
1977 (budget):	US$ 150,000
1978 (forecast):	US$ 150,000
Or Total Funding Amount:	US$ 750,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To establish a calculation model of noise levels from road traffic by studying the following subjects:

(1) Social survey for evaluation of road traffic noise
(2) Study of calculation models in the urbarn areas
(3) Survey of effects and durability of noise barriers

Reports

K.KANEYASU : Noise attenuation by acoustic shielding, Annual Report of Roads, JAPAN ROAD ASSOCIATION, 1973, pp.88-96.
K.KANEYASU : Vehicle noise and tire noise, Annual Report of Roads, JRA, 1974, pp.78-85.

Highway Model Analysis and Prediction
Portugal

Project Title:

Urban Noise Models

Performing Organization Name & Address:

Laboratorio National De Engenharia Civil
Av. Brasil – Lisbon 5
Portugal

Sponsoring Organization Name & Address:

Several

Principal Investigator(s):

Dr. P. Martins Da Silva

Type of Research Program:

x Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
x Measurement Methodology

Start Date: Jan., 1976

Completion Date:
Estimated June, 1978
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: $20,000

COMMENTS:

Preparation of physical and mathematical models for the provision of the characteristics of air and road traffic noise. The mathematical model regarding air traffic has been concluded. As to the road traffic model it only contemplates traffic flow with no interruptions and no obstacles (buildings or barriers) along the rides. A model is being prepared which will include the presence of light signals and take into account the existence of obstacles to propagation.

Physical models for the study of road traffic noise propagation using electric sparks as sound sources are being utilized.

A report was presented to Internoise 77 (in Zurich) and a preliminary report (in Portuguese). It is expected that the final report will be ready by March 1978.

Transcribed from the original.

Highway Model Analysis and Prediction
Sweden

Project Title:
Impact. Environmental Effects from Urban Traffic

Performing Organization Name & Address:

Nordisk Planeringskonsult AB
Moelndalsvaegen 85 II
S-412-85
Goeteborg, Sweden

Sponsoring Organization Name & Address:

Nordisk Planeringskonsult AB
Moelndalsvaegen 85 II
S-412-85
Goeteborg, Sweden

Principal Investigator(s):

B. Persson
K. Kristiansson

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1974

Completion Date:
Estimated 1977
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$62000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The purposes of this project are: Determination of environmental impact from urban traffic in terms of air pollution, noise, and energy consumption. Design of a computer program that computes air pollutant levels and noise levels in the street environment. Evaluation of traffic planning with respect to the environment. Comparison of various planning alternatives.

PUBLICATION

The NPK System. "Impact - Calculation of the Environmental Impact of Road Traffic," Report 1975 Nordisk Planeringskonsult AB

Transcribed from the original.

Highway Model Analysis and Prediction
Sweden

Project Title: Prediction and Visualization of Road Traffic Noise with Computer, CRT Screen and Electronic Plotter

Performing Organization Name & Address:

Chalmers University of Technology
Division of Highway Engineering
Fack S-402-20
Goeteborg 5, Sweden

Sponsoring Organization Name & Address:

Chalmers Technical University
Fack S-402-20
Goeteborg 5, Sweden

Principal Investigator(s):

G. Lanner

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Oct. 1971

Completion Date: Estimated 1977
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$25000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A computer program for the calculation and automatic drawing of contour maps of road traffic noise has been developed. Road, terrain and buildings are coded from existing maps and stored on discs. Equivalent and maximum sound levels are calculated for a predicted traffic level and visualized by sound level contours drawn by a plotter. The noise generated by a single car driving along the road is calculated and visualized as a sequence of pictures on a CRT screen. The acoustical consequences of changes in the road alignment or the environment can be studied easily. Programs are now revised to reduce computer time.

Transcribed from the original

Highway Model Analysis and Prediction
Sweden

Project Title:

Prediction model for noise levels of road traffic

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
The National Board of Physical Planning and Building Fack S-104 22 Stockholm Sweden	Nordic Ministrial Council (Nordiska Ministerrådet) Postboks 1477 Vika Oslo 1 Norge
Principal Investigator(s): Gösta Blücher	Type of Research Program: ___ Fundamental __X__ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: March 1976	Completion Date: Estimated Sept 77 Actual _____
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	Funding: Year / Amount 1976 (actual): (200 000 SwCr) $45060 1977 (budget): (100 000 SwCr) $22530 1978 (forecast): Or Total Funding Amount: COMMENTS:

- o The project will end up with a joint nordic prediction model.
- o The model will be used out of data known in a planning situation.
- o The model will be of nomogram type with necessary formulas for datorisation.
- o The result of calculation will be given as eqvivalent level in dB(A) with a precision of ± 3 dB(A).
- o The model will have following parameters
  - Number of vehicles
  - Proportion of heavy vehicles
  - Speed limit
  - Distance from road of receiver
  - Height above or below ground of roadway
  - Position and height of screens
  - Height of receiver
  - Screen width
  - Type of ground between road and receiver

Project Title:
Road Traffic Noise Measurement and Prediction in Restricted Flow Conditions

Performing Organization Name & Address:

Department of Civil Engineering
Bradford University
Bradford, W. Yorks, United Kingdom

Sponsoring Organization Name & Address:

Science Research Council
State House
High Hollborn
London

Principal Investigator(s):

Dr. D. C. Hothersall
Dr. R. J. Salter
Mr. R. R. K. Jones

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
x Measurement Methodology

Start Date: 10/75

Completion Date:
Estimated 10/78
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(£9280) $15958

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Measurement at sites where restricted traffic flow occurs have been compared with levels predicted by the recommended methods and discrepencies found.

Computer simulation programs of traffic flows at various types of road configuration producing restricted flows are being developed. By use of these programs, the noise level at an adjacent site may be calculated.

Experimental work to obtain single vehicle noise levels as a function of vehicle acceleration and velocity for inclusion in the simulation programs is well advanced.

As a result of this work it is hoped to improve the traffic noise prediction procedure in areas of restricted flow and to obtain a better understanding of the operative parameters in these conditions.

REFERENCES

1) "Observed and Predicted Traffic Noise Levels Around Road Junctions in the U.K.," D. C. Hothersall, R. R. K. Jones, Proc. Australian Road Research Board, 8th Conference, Perth, W. Australia, Session 33, p. 31.
2) "Computer Simulation of Road Traffic Noise," R. R. K. Jones, D. C. Hothersall, Proc. 9th International Congress on Acoustics, Madrid (1977), p. 54.

Transcribed from the original.

Highway Model Analysis and Prediction
United Kingdom

Project Title:
Noise and Traffic Management

Performing Organization Name & Address:
London University
Imperial College of Science and Technology
Dept. of Civil Engineering (Transport)
Prince Court Road, London SW7
United Kingdom

Sponsoring Organization Name & Address:
Transport and Road Research Laboratory

Principal Investigator(s):
D. H. Crompton
D. A. Gilbert
L. George
L. Moore, S. Simpson

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Oct. 1972

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount: (h 14,000)	$ 24,074

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Noise levels from urban traffic of a given volume can vary according to the layout, traffic composition and other traffic characteristics including level of bunching, speed, etc.. Traffic management measures can also influence these traffic characteristics and thus indirectly influence noise levels. The object is to devise predictive models relating these characteristics (with interrupted flow conditions) to L10 noise levels to determine optimum ways, for a given traffic volume, of reducing L10 levels. Preliminary results show that reductions of about 4 dBA and more can be achieved by traffic management measures. Data from field surveys in a wide range of situations have been collected and a preliminary predictive L10 model has been developed, whose standard error is about ± 5dBA. Improving this equation for general use seems to require stratifying sites in term of traffic, layout and management characteristics and analysing data in greater detail. In particular, vehicle speeds, traffic compositions and levels of service are being closely examined.

Publication:

"Noise and traffic management"
D. H. Crompton and D. Gilbert
Report to Department of Environment, 1971

"Noise and traffic management"
D. Gilbert
1973

"Noise from road traffic (interrupted flow) - two models for prediction of L_{10} levels
D. Gilbert
January 1973

Transcribed from the original.

Highway Model Analysis and Prediction
United Kingdom

Project Title:
Traffic noise in the City of Bath and the Effect of the Proposed East/West Relief Road on the Anticipated Noise Climate.

Performing Organization Name & Address:

Bath University
School of Architecture and Building Engineering
Claverton Down, Bath BA2 7AY
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

W. Powell

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Aug 1972

Completion Date:
Estimated ___
Actual Aug 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount: (Under £ 5,000)	$ 8598

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To predict traffic noise levels and establish realistic criteria of acceptable noise using physical measurements of the noise together with subjective surveys. Computer simulation and model work may be used. A picture of the noise climate will be built up by noting traffic flow and recording and analysing samples of noise taken over an 18-hour weekday, 6am to 12pm, at selected points in the City of Bath; the predicted effect of the East/West relief road will be applied and compared with the present situation. The results of the survey will enable an investigation of the effectiveness of model and computer techniques to take place and will provide valuable information for such people as town planners, enabling them to predict the effect their actions will have on future noise patterns.

Transcribed from the original.

Project Title:
Prediction of Noise From Freely Flowing Traffic

Performing Organization Name & Address:

London Univ., Queen Mary College
Dept of Civil Engineering
Mile End Road, London E1 4NS
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

D. G. Powell
R. Navaratnam

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Oct 1975

Completion Date:
Estimated Oct 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount: (b 2,000)	$ 3439

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To appraise critically, compare and possibly improve existing methods for the prediction of noise from freely flowing road traffic. Methods will be developed for the prediction of noise levels from traffic in unsteady flow and in areas subjected to noise from more than one stream. Fieldwork will include collecting data to validate prediction methods and to examine the variability of measured traffic noise parameters such as L_{10} values.

Transcribed from the original.

Project Title:

The performance of traffic noise prediction models in urban situations.

Performing Organization Name & Address:

Greater London Council,
County Hall,
London, SE1 7PB

Sponsoring Organization Name & Address:

Greater London Council

Principal Investigator(s):

R.G. Banks

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_X_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1976

Completion Date:
Estimated _____
Actual October 1976

Funding:

Year	Amount
1976 (actual):	0.5 man years
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In the field of environmental noise , much of the work of the G.L.C. is concerned with the noise from non freely flowing traffic, and for planning purposes a model was required to predict noise levels in these circumstances. A literature survey was performed to determine the extent of existing work in this field. The results, (published in G.L.C. report DG/SB/ESG/R.27) showed the existance of several models for predicting noise from freely flowing traffic but very few designed specifically for non free flow traffic. The performance of 7 of these models (both free and non-free types) were tested at a number of sites in London, chosen to give typical non-free flow characteristics. The results (published in G.L.C. report ESG/EN/R.43) showed that 4 of the 7 models predicted L_{10} with a mean error of less than 2dB(A) and a standard deviation of 2.1 or 2.2 dB(A).

Highway Model Analysis and Prediction
West Germany

Project Title: City Development in Brunsbuettel, Present and Future Noise Stresses

Performing Organization Name & Address:
Institute for Sound and Vibration Technology
Hamburg 70, Fehmarnstr. 12
West Germany

Sponsoring Organization Name & Address:

Principal Investigator(s):
Ing. Grad. Guenther Wilmsen

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Dec 1,1974

Completion Date:
Estimated _____
Actual June 31, 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: (30,000 DM)$12,720

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Measurements to determine present noise stresses with preparation of a noise map; computation to ascertain future noise impact, on street traffic and industry.

Translated and transcribed from the original German.

Highway Model Analysis and Prediction
West Germany

Project Title:

Traffic Noise Prognosis in City Streets

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Muller Corp. Technical Consultants on Acoustics Planegg, Robert-Koch-Str.11 West Germany	Federal Transportation Ministry
Principal Investigator(s): Dipl.-Ing. Horst Wittmann	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: (125,000 DM) $ 51,000 COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Execution of a large number of noise level measurements in city streets under varied traffic conditions and traffic situations. The aim is to check on the applicability of the prediction methods used up to now in respect to traffic noises, which are based on measurements of free flowing traffic traveling faster than 60 km/h. Possibly, development of better prediction techniques in regard to urban traffic patterns.

Translated and transcribed from the origianl German.

Highway Model Analysis and Prediction
France

Project Title:

Description and Prediction of Noise from Urban Traffic

Performing Organization Name & Address:

Institute of Transport Research
Center for the Evaluation of Research on Nuisances
109, Avenue Salvador Allende
69272 Bron Cedex France

Sponsoring Organization Name & Address:

S.E.T.R.A.
C.E.T.U.R.

Principal Investigator(s):

B. Favre

Type of Research Program:

___ Fundamental
_X_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1977

Completion Date: Estimated ____ Actual Dec. 31, 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Presently, only empirical approximate formulas are used for predicting noise from automobile urban traffic, because of deficiency of the recently developed prediction techniques.

In the first phase of research, therefore, the elements are to be assembled, which are necessary for better understanding of noise emission and propagation in a city, particularly at intersections. This will be done by integrating simulation data of the C.E.R.N.

Definition of essential parameters and classification by type of possible situations and noise levels as a function of the site, situation, and traffic control are to follow the synthesis. Selection of the parameters is to be made in connection with the previous studies on noise from a pulsed traffic.

First, prediction tools (formulas and a mathematical model, if possible) are to be proposed and validated by measurements.

Translated and transcribed from the original French.

Project Title: A Statistical Prediction of Arbitrary Random Noise and Vibration Distribution in a Higher Level Region and a Simplified Evaluation Procedure of a Higher La Sound Level.

Performing Organization Name & Address:
Department of Electrical Engineering,
Faculty of Engineering, Hiroshima University,
3-8-2 Senda-machi Hiroshima City 730
Japan and Kure Technical College, 2-2-11,
Aga-Minami, Kure 737 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Seijiro Hiromitsu
and
Nobuyoshi Yoshino

Type of Research Program:

- X Fundamental
- X Development (Component or System)
- X Demonstration (Experimental, Prototype, or Production)
- ___ Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978.
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work is based on regular expenses of the national school of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This paper provides the statistical treatment of random noise or vibration with the digital level fluctuation, which is suitable to an estimation of level distribution within a higher fluctuation range. On the basis of the above theory, the simplified evaluation procedure of the higher La sound level is proposed by an introduction of the conditional distribution function. Namely, when a random noise or vibration Z with the digital level of an arbitrary distribution type can be considered as a sum of two different random processes, X and U, with the digital level, a unified statistical treatment for the probability distribution using a backward difference type with respect to the resultant random fluctuation, Z(=X+U), is exactly found.

Furthermore, we have expreimentally confirmed the validity of the present theory, not only by means of digital simulation, but also two kinds of experimentally observed street noise data given by Dr.Morita and us.

Highway Model Analysis and Prediction
Japan

Project Title: A Statistical Theory Generalized by an Equivalent Model for Non-Stationary Random Noise Process and Its Digital Simulation.

Performing Organization Name & Address:
Department of Electrical Engineering, Faculty of Engineering, Hiroshima University, 3-8-2, Senda-machi, Hiroshima City 730 Japan and Kure Technical College, 2-2-11, Aga-Minami, Kure 737 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Seijiro Hiromitsu
and
Tsuyoshi Okita

Type of Research Program:
- X Fundamental
- X Development (Component or System)
- X Demonstration (Experimental, Prototype, or Production)
- ___ Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work is based on regular expenses of the national school of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The random city noise which we encounter in daily life appears as a resultant of diversified fluctuations of circumstances containing more complicated social causes rather than pure physical ones. One of the typical examples is seen in road traffic noise, whose temporal changes show always non-stationary property.

Generally, a stationary random noise process of arbitrary distribution type exhibits a non-stationary property with the slowly temporal change of system parameters and/or input characteristics. Whatever the cause of this non-stationary property might be, it could be generally explained by mean value fluctuations(*d.c.*component), and by fluctuations around a mean value(*a.c.* component). The latter cause cannot be precisely investigated, in only the category of variance fluctuation. In this paper, we took a generalized viewpoint of study on an arbitrary non-stationary random noise process(such as road traffic noise) formed by diversified causes of non-stationarity. An equivalent statistical noise model was proposed by simulating the process as a resultant of a random noise with fluctuating mean value and an output response of a time varying amplifier to stationary random input with zero mean value. More precisely, an internal mechanism of non-stationary random noise process may often be investigated by introducing a statistical noise model $Z(t) = \alpha(t)X(t) + \beta(t)$, where the temporal fluctuations of mean value $\beta(t)$, the equivalent gain factor $\alpha(t)$ and the stationary random input noise $X(t)$ may exhibit great arbitrariness on their probability distribution forms, and be mutually correlated with one another.

Next, a universal expansion expression of probability distribution for this resultant non-stationary random noise process was explicitly derived by taking the stationary term into the first term. In view of the arbitrariness of the fluctuating patterns of $\alpha(t)$ and $\beta(t)$ causing non-stationary property, and the complexity of the mathematical expression involved, the validity of theoretical expression is experimentally by the method of digital simulation. Furthermore, it is noticeable that the unified theory introduced in this paper is obtained by very simplified calculus, and the engineering significance is more intuitively acceptable.

This study was published in the Proceedings of the 25th Japan National Congress for Applied Mechanics(Vol.25, 1977).

Project Title: A New Method of Estimating Representative Statistics of Random Noise by On-Line Treatment (Theory and Experiment).

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University, 3-8-2, Senda-Machi, Hiroshima 730 Japan and Kure Technical College, 2-2-11, Aga-Minami, Kure 737 Japan.

Sponsoring Organization Name & Address:
none.

Principal Investigator(s):
Mitsuo Ohta,
Sizuma Yamaguchi,
Seijiro Hiromitsu and
Kazutatsu Hatakeyama.

Type of Research Program:

X Fundamental
X Development (~~Component or~~ System)
X Demonstration (Experimental, ~~Prototype, or Production~~)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated ___
Actual March, 1976.

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work was based on regular expenses of the national schools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This research provides a new method of estimating the representative statistics of environmental random noise, such as the L_α sound level(α = 5, 50, 95,...), which are directly combined with the level probability distribution form of noise.

The actual noise data usually show the diversified fluctuation patterns of level probability distribution form and also show the non-stationary behaviour in the passege of time. First, we introduced a universal framework of level probability distribution of statistical non-orthogonal expression, which has an arbitrary probability distribution as the first term and many parameters as the coefficients in the series expansion. The estimation method for the L_α sound level was given as a recurrence algorithm, which was based on the reccurence modification of expansion coefficients of the above series expression. Thus, this method gives an on-line processing of observed noise data, which is suitable for the utilization of a digital computer.

The estimation procedure presented were experimentally demonstrated by applications to actual road traffic noise data observed in Hiroshima City.

This work was published in the Journal of the Acoustical Society of Japan, Vol. 32, No. 3, pp. 161-164(1976)(in Japanese).

Project Title: A Statistical Fundamental Theory Suitable to the Observed Level Distribution of Noise and Vibration with Digital Level and its Experiment

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University, 3-8-2, Senda-machi, Hiroshima, 730 Japan, and Faculty of Engineering, Hiroshima Denki Institute of Technology; 595, Nakano, Senogawa-cho, Hiroshima, 739-03 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo OHTA,
Masafumi NISHIMURA and
Hirofumi IWASHIGE.

Type of Research Program:
- X Fundamental
- ___ Development (Component ~~or System~~)
- X Demonstration (Experimental, ~~Prototype, Production~~)
- X Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978.
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS: This work is based on regular expenses of the national schools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In this paper, we theoretically consider the statistical treatment of random noise or vibration level distribution suitable to the actual situation and where the real experimental data are treated in a form of digital level and finite number.

When a random noise or vibration with a digital level Z of arbitrary distribution type can be considered to be the sum of two different random processes X and U with digital level as a result of the natural internal structure of the fluctuation or the analytically artificial classification of the fluctuation, a unified statistical treatment for the probability distribution of the resultant random fluctuation Z(=X+U) is introduced exactly in a new form of expansion terms.

We have experimentally confirmed the validity of our theory not only by means of digital simulation but also from results of road traffic noise data in Hiroshima City.

This study was published in the Journal of the Acoustical Society of Japan (Vol.32, No.9, 1976) in Japanese.

Highway Model Analysis and Prediction
Japan

Project Title: An Estimation Theory of Level Distribution over a Long Time Interval on the Basis of Level Distribution over a Short Time Interval in a Urban Noise Measurement and Its Experiment

Performing Organization Name & Address:
1. Faculty of Engineering, Hiroshima University, 3-8-2, Senda-machi, Hiroshima 730, Japan.
2. Hiroshima Denki Institute of Technology, Senogawa-cho, Hiroshima 739-03, Japan.

Sponsoring Organization Name & Address:

none

Principal Investigator(s):
Mitsuo Ohta (1),
Masafumi Nishimura (2) and
Tsuyoshi Okita (1).

Type of Research Program:

_X_ Fundamental
___ Development (Component or System)
_X_ Demonstration (Experimental, ~~Prototype; or Production~~)
_X_ Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In this paper, concerning the actual road traffic noise with many different types of level distributions, a new trial of statistica treatment to estimate the noise level distribution in a long term interval on the basis of an information of noise level statistics (with high degree of experimental reliability) in a short time interval is firstly considered from the theoretical view-point. That is, the above estimation technique is mainly founded on the use of the newly established probability expression in the form of statistical expansion series. The expression has an arbitrary number of nonstationary parameters to be universally available for arbitrary nonstationary forms of the traffic noise fluctuation over a long period of time. More explicitly, in this unified expression, the stationary term is taken in the first term and many nonstationary factors are reflected successively in the second and higher order expansion terms.

Two explicit expressions of level distributions over a long time interval on the basis of level distribution over a short time interval are derived. This is a special application of the above general theory. In the derivation, two fundamental and typical view-points of modeling an actual random time series are pointed out. One is to regard the time series as multiplicable, and the other is to regard it as additive.

Finally, the validity of the above estimation theory is experimentally confirmed by applying it to data of actually measured road traffic noise. The experimental result is in good agreement with the theory.

This work was published in the Journal of the Society of Instrument and Control Engineers (Vol.12, No.3, 1976) in Japanese.

Highway Model Analysis and Prediction
Japan

Project Title: A Generallized Expression on the Multivariate Joint Probability Distribution of State Variables for a Stochastic System with Quantitized Level and its Application to City Noise Measurement

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University, 4-8-2, Senda-machi, Hiroshima 730, Japan.
Hiroshima Denki Institute of Technology, Nakano, Senogawa-cho, Hiroshima 739-03, Japan.
Arima Labor Hygiene Consultant.

Sponsoring Organization Name & Address:

none

Principal Investigator(s):
Mitsuo Ohta (1),
Masafumi Nishimura (2) and
Toshiharu Arima (3)

Type of Research Program:

- X Fundamental
- Development (Component or System)
- X Demonstration (Experimental, ~~Prototype; or Production~~)
- X Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978
Actual

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

It is a wellknown fact that whole information on the statistical property for state variables of a stochastic control system can be derived by finding first the multivariate joint probability density function of their variables. From this point of view, we have reported in the previous paper the unified explicit expression of the joint probability density function for state variables. However, nowadays it is very often to measure the actual random data (e.g., the road traffic noise measured by a sound level meter) in a form of digital level at descrete time. Furthermore, for these digital level data the use of digital computer is essential in the various statistical evaluations and in the extraction information. In this paper, we firstly give the theoretical consideration on the joint probability function and its joint factorial moments suitable to the actual situation that the real experimental data are taken in a form of digital level and finite number.

Comparing with the corresponding theories in the case of continuous level distribution, the above theoretical result is characterized by some specific features: (1) This result has a form of difference type instead of differential type in its expression. Therefore, the experimental frequency distribution $P_n(x)$ can be directly used with keeping its crude numerical form. (2) When the difference operation is actually done in the practical application, the infinite series type expansion expression is exactly truncated with finite number of terms. (3) As a special case of letting the level width tend to 0, the above theory includes the wellknown expressions in the continuous level form.

Finally, we have experimentally confirmed the validity of our theory not only by means of digital simulation but also by two kinds of experimentally obtained road traffic noise data in Hiroshima City.

This study was published in the Journal of the Society of Instrument and Control Engineers (Vol.13, No.3, 1977) in Japanese.

Highway Model Analysis and Prediction
Japan

Project Title: Poly-Frequency Spectral Analysis for the Road Traffic Noise Based on the Filtered Poisson Process Model(Theory and Simulation Experiment).

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University, 3-8-2, Senda-Machi, Hiroshima 730 Japan, and Kure Technical College, 2-2-11, Agu-Minami, Kure 737 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Sizuma Yamaguchi and
Seijiro Hiromitsu.

Type of Research Program:
_X_ Fundamental
_X_ Development (~~Component-or~~ System)
_X_ Demonstration (Experimental, ~~Prototype, or Production~~)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978.
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work is based on regular expenses of the national schools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

There may be necessarily two engineering features of environmental road traffic noise: the level probability distribution in the single-variate form and correlation characteristics in the multi-variate form. For the practical purpose of the environmental noise control, both characteristics must be considered within a realistic model for road traffic noise.

The estimation with respect to level statistics of road traffic noise from freely flowing complex road traffic consisting of various types of vehicles on a multi-lane road, can be based on the statistical Laguerre expansion series expression. Many parameters and assumed statistics of road traffic noise are reflected in each coefficient of series expansion, which can be calculated by use of cumulant fomulas of noise intensity. Also, using these formulas presented, the equivalent vehicle number and equivalent acoustic power can be decided using nomographs that make the statistical treatment of complex road traffic noise become much more simple, in the specific sense of equivalence such important noise standard indices as NPL(the noise pollution level), κ_1(L_{eq} sound level) and higher order cumulants.

The estimation of correlation properties and poly-spectral functions was carried out by introducing the filtered Poisson process model for the formation of temporal noise intensity wave. Auto-correlation and higher order correlation and poly-spectral functions are exactly derived for a basic road traffic model consisting of two different types of vehicles on a single-lane road. Those formulas can be employed for the evaluation of noise, the design of noise shielding barriers, the detection of voices in noisy fields, the identification of actual noise fields surrounding the road, etc.

The results of the theory developed here are confirmed by comparison with the simulated data of road traffic noise for heterogeneously intermixed road traffic and uniform environmental features.

This work was reported in the IFAC(International Federation of Automatic Control) Symposium on Environmental Systems, Planning, Design and Control, which appeared in its Preprints, page 477-484(Aug., 1977).

Highway Model Analysis and Prediction
Japan

Project Title: A Unified Statistical Treatment for the Multivariate Joint Probability Expression of General Random Processes in the Form of Finite Expansion Terms.

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University, 3-8-2, Senda-Machi, Hiroshima 730 Japan, and Kure Technical College, 2-2-11, Aga-Minami, Kure 737 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Shizuma Yamaguchi and
Seijiro Hiromitsu.

Type of Research Program:
_X_ Fundamental
_X_ Development (Component or System)
_X_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated November, 1977.
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work is based on regular expenses of the national schools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In the previous study, we have proposed the unified explicit expression of the multivariat probability distribution expression for arbitrary random processes. This probability expression has been derived in the general form of statistical infinite series expansion expression by generalizing several well-known results: the probability expression of a nonstationary random process with mean value fluctuation, the multivariate statistical Hermite or Laguerre series expansion type expression and another probability expression using multi-dimensional Hermite polynomials due to Kuznetsov et at. Those probability expressions have been also experimentally demonstrated to be accessible to arbitrarily complicated random phenomena such as random traffic noise and random vibration. This fact means that they play a fundamental role in the statistical treatment of random phenomena because of their generality with mathematical justification. The truth is, however, that, in practical applications, the exact evaluation to the truncation error of series expression is always important, since a statistical expansion expression will be inevitably employed in the form of a finite number of expansion terms. From the above viewpoint, when a multivariate random noise or vibration processes of arbitrary distribution type can be considered to be respectively the sum of two different random processes as a result of the natural internal mechanism of the fluctuation or the analytically artificial classification of the fluctuation, a unified statistical treatment for the joint probability distribution or joint moments of the resultant random fluctuation is introduced exactly in the form of finite expansion terms.

Furthermore, we have experimentally confirmed the validity of the present theory not only by means of digital simulation but also by experimentally observed road traffic noise data in Hiroshima City. The exporimental results clearly show the good agreement with the theory.

Project Title: A Unified Study on the Multivariate Joint Probability Expression and Its Linear Transitional Property for the State Variables of Stochastic Environmental System.

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University, 3-8-2, Senda-Machi, Hiroshima 730 Japan, and Kure Technical College, 2-2-11, Aga-Minami, Kure 737 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):

Mitsuo Ohta,
Sizuma Yamaguchi and
Seijiro Hiromitsu.

Type of Research Program:

- x Fundamental
- x Development (~~Construction~~ System)
- x Demonstration (Experimental, ~~Prototype~~ Production)
- ___ Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work is based on regular expenses of the national shcools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Most of random phenomena in the noise environmental system exhibit conspicuous non-Gaussian distribution and nonstationary properties. On the other hand, whether the stochastic noise environmental system is stationary or nonstationary, every information on the statistical properties of the system can be derived by finding the multivariate joint probability density function of state variables describing the system.

From this point of view, firstly, the unified explicit expression of the joint probability density function for the state variables of the nonstationary system is found in the general form of statistical orthogonal and nonorthogonal expansion series. It is derived by generalizing our previous result on the joint probability density function in a form of two kinds of multivariate statistical Hermite series expansion due to M. Ohta and P. I. Kuznetsov, et. al. Next, by using the above theoretical result, the new explicit expressions of multivariate joint probability density and multivariate joint moment functions for the output response are exactly derived without any simplification of the problem and any approximation of the analysis, in the case when a general nonstationary random signal with arbitrary probability distribution form and correlation functions as passed through an arbitrary stationary linear system with finite order. An effect of random input and system characteristics is concretely reflected in the expansion coefficients.

Finally, the validity of our theory for the multivariate statistical treatment of environmental noise system is experimentally confirmed by use of actually observed data of the nonstationary random traffic noise and a digital simulation technique.

This work is to be published in the Transactions of Electronics and Communication Engineers of Japan, probably by the end of 1977, in Japanese.

Highway Model Analysis and Prediction
Japan

Project Title: A Statistical Analysis of Nonstationary Random Noise in View of Temporal Change of Cumulants and Its Application to Dynamical Prediction of L_A

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University,
3-8-2, Senda-Machi, Hiroshima 730 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Shizuma Yamaguchi and
Toshiharu Arima.

Type of Research Program:

X Fundamental
X Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date:

Completion Date:
Estimated
Actual Apr. 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work is based on regular expenses of the national schools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In this work, firstly, a unified theory of the statistical treatment of the probability distribution function is introduced in the case where a general random noise of arbitrary distribution type exhibits the nonstationary property with arbitrary temporal change of various cumulants by generalizing previous studies of nonstationary property with fluctuation of mean value and/or variance. As the result, the purpose of finding an effect of nonstationality due to temporal change of cumulants on the output probability distribution, the explicit expressions of cumulative distribution function and probability density function in the general form of statistical expansion series taking the stationary term into the first term are derived. The nonstationary effect caused by the change of various cumulants is concretely reflected in each expansion coefficient of the second and higher terms in the above expansion expression. The validity of the above theoretical result is also supported experimentally by the nonstationary random traffic noise observed in Hiroshima City.

Next, a new approach toward the dynamical prediction problem of L_A is considered by use of the above universal expression of probability density function for arbitrary nonstationary random noise level. The usefulness of our theoretical prediction method is confirmed experimentally by applying to an actual nonstationary random traffic noise level.

This work was published in the Journal of the Acoustical Society of Japan (Vol.33, No.4. April.,1977) in Japanese.

Highway Model Analysis & Production
Japan

Project Title: A Unified Study on the Prediction Problem of Road Traffic Noise with Various Types of Vehicles and Multi-Lanes on a Road of Arbitrary Length(Theory and Simulation Experiment)

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University, 3-8-2, Senda-Machi, Hiroshima 730 Japan and and Kure Technical College, 2-2-11, Aga-Minami, Kure 737 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Sizuma Yamguchi and
Seijiro Hiromitsu.

Type of Research Program:
X Fundamental
X Development (~~Component or~~ System)
X Demonstration (Experimental, ~~Prototype or Production~~)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual Sept., 1976.

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS: This work was based on regular expenses of the national schools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In this research, firstly, a new trial to solve the prediction problem in terms of the lower and higher order cumulants of noise intensity and the level probability distribution in the general form of statistical Laguerre expansion series is theoretically considered in connection with the internal structure of road traffic noise.

More concretely, the above road traffic noise is considered in cases of the arbitrariness of the number of lanes of road and types of vehicles, the ratio of intermixture of vehicle types, the average number and the acoustic power distribution of vehicles running with proper mean velocity on the respective lane of road, the length of straight interval of road and the distance from the observation point.

Next, the equivalence problems are discussed that is to replace the multiple lanes of road and the various types of vehicles with a specific lane and a specific type of vehicle. Some examples of nomographs for calculating the equivalent vehicle number for a specific sense of equivalence.

The validity of the present prediction theory is also supported by use of digital simulation technique.

This work was published in the Journal of the Acoustical Society of Japan, Vol. 32, No. 7, pp. 403-412(1976)[in Japanese).

Highway Model Analysis and Prediction
Netherlands

Project Title: Research on Life-size and If Possible Scale-Model Buildings Concerning Their Acoustic Orientation to Nearby Roads and to Each Other

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Transport and Public Works
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In making predictions of noise levels in spaces between buildings near motor roads, there is always the difficulty that echoes from buildings and sound waves curving over and around building create complex fields of sound.

Research is needed in a number of life-size situations and, for the sake of convenience, research on scale models may also be conducted.

The data obtained from this research may be compiled into a computer programme in order to make prognosis of noise levels. The data may also be used for urban development planning to prevent noise nuisance. In addition to the evaluaton of the research methods used, a number of common parcel layout or land allotment forms will be assessed acoustically.

Transcribed from the original.

Highway Model Analysis and Prediction
Netherlands

Project Title:
Investigation of Sound Transfer at Greater Distances

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Public Health and Environmental Protection
Ministry of Transport and Public Works
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The methods developed by TNO of predicting road traffic noise are reasonably reliable up to a distance of some 200 metres from the road; after that distance, the ground tends to absorb a certain amount of the sound waves, heavily influencing the results of the prognosis. The purpose of this project, based on existing knowledge (reference works, actual research and measurements) and on new investigations, is to develop a model for calculating sound transfer at greater distances, as influenced by factors such as the nature of the soil, density of plant growth, and weather conditions. This model will be used to design the noise zones to be established around highways and industrial estates.

Transcribed from the original.

Highway Model Analysis and Prediction
Poland

Project Title:

Performing Organization Name § Address:	Sponsoring Organization Name § Address:
INSTYTUT OCHRONY SRODOWISKA SAMODZIELNA PRACOWNIA OCHRONY PRZED HALASEM. 02-078 WARSZAWA, UL. KRZYWICKIEGO 9 Poland	MINISTERSTWO ADMINISTRACJI, GOSPODARKI TERENOWEJ I OCHRONY SRODOWISKA. 02-056 WARSZAWA, UL. FILTROWA 57.
Principal Investigator /s/: RADOSLAW KUCHARSKI, M. Sc.	Type of Research Program: x Fundamental x Development /Component or System/ x Demonstration /Experimental, Prototype, Production/ x Measurement Methodology
Start Date: Completion Date: Estimated _____ Actual _____	Funding: Year Amount 1976 /actual/: 1977 /budget/: 1978 /forecast/: Or Total Funding Amount: COMMENTS:
Project Summary: /Briefly describe the goals, approach, expected or actual results, report /s/ generated and the date/s/ of publication./	

Our activity connected with researches and their coordination in the field of out - door /environmental/ noise has brought the following results:

- 1976, Giving shape to the methods concerning the researches of the noise in the area of urban - industry aglomerations for purpose of standarization estimating the acoustical climat on the area of our country.
- 1977, Estimated methods of noise level prediction/the noise generated by the road traffic, the railway, the air operations, the industry/.

Besides we plan to prepare:

- 1978, The methods of designing the antinoise protections.
- 1980, The guide lines for decreasement the noise emitted by the trams in the system wheel - rail.

Project Title:

Computer Model for Noise Propagation

Performing Organization Name & Address:

Herr PH Dr. E. J. Rathe
Wettstein Str 71
3332 Rusaikon (CH)
Switzerland

Sponsoring Organization Name & Address:

Eidg. Amt für umweltschutz
3003 Bern
Switzerland

Principal Investigator(s):

Prof. Dr. E. J. Rathe

Type of Research Program:

-X- Fundamental
-X- Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: March 1976

Completion Date: Estimated 1978 / Actual ____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The computation method to be developed should be suitable for setting up noise immission prognoses for complex installations including the most essential parameters, such as type of source, nature of the soil, terrain topography, superstructures and if possible meterological conditions. Moreover, the computation methods should serve to estimate the effectiveness of planning-technical noise abatement measures.

Translated and transcribed from the original German.

Project Title:

Computer model of noise immission due to traffic noise

Performing Organization Name & Address:

Dr. E.J. Rathe
Swiss Federal Institute of Technology
Wettsteinstrasse 71
CH-8332 Russikon, Switzerland

Sponsoring Organization Name & Address:

Principal Investigator(s):

E.J. Rathe

Type of Research Program:

x Fundamental
X Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1974

Completion Date: Estimated 1980
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

GOAL: Treatment of traffic situations involving the simultaneous impact of different kinds of traffic

APPROACH:

Computer modelling with the direct simulation of each traffic element, and the statistical evaluation of the noise emission for observers at any given location. All kinds of road vehicles and railway trains can be included separately, or in combinations as needed.

RESULTS:

The model provides the link between specified noise emission characteristics of vehicles (as determined by test runs, or in certification procedures) and the noise immission produced by complex traffic. The dispersion of vehicle types and driving conditions, as well as fluctuations of traffic density can be included. Results are available in the usual form of statistical levels, such as LEQ, L1, L10, L50 etc.

PLANS:

Development of a commercial version to allow the use of the programs directly by any interested party.

Project Title: External Noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
BUILDING RESEARCH ESTABLISHMENT GARSTON, WATFORD WD2 7JR HERTFORDSHIRE, ENGLAND	
Principal Investigator(s): DR F J Langdon DR W A Utley MR D E Sexton	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.) Building Research Establishment Research Programme 1976-77.	

To determine the relationships between human reactions and noise from road traffic, industry, railways, aircraft and construction either in isolation or combined. Study how such relationships may be used in urban planning. Improve and develop methods for estimating noise levels from road traffic, industry, railways and construction sites; determine performance of remedial measures for noise control. Specify procedures for measuring or estimating noise exposure to assist in implementation of legislation for noise control.

Carry out studies of subjective reactions of people in dwellings and the effects upon sleep of mixed noise exposures arising from road traffic and railways. Relate reactions of teaching staff in schools to external noise from road traffic and relate these to noise exposures. Examine the range of sound insulation values provided by facades of school buildings. Give guidance on the setting up of Noise Abatement Zones and develop further guidance on the prediction and control of noise from industrial premises. Study noise emission from construction sites to determine better prediction methods. Set up new test facility to compare alternative methods for measuring noise output of construction plant for inclusion in EEC Directives. Investigate various methods of measuring L_{eq}. Investigate methods of measuring and predicting noise from railways.

Project Title:
Computer Simulation of Traffic Noise and Noise Prediction

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Transport and Road Research Laboratory Old Wockingham Road Crawthorne, Berkshire RG11 6AU United Kingdom	Department of the Environment
Principal Investigator(s): D. G. Harland P. M. Nelson	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Jan 1971 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

An algorithm for adding time varying distributions of noise has been invented and is being used as the basis of a traffic noise model which is at least an order more efficient than the Monte Carlo simulations reported by other workers. The model is being developed to predict urban traffic transport modes.

Publication:

"The combination of noise from separate time varying sources"
P. M. Nelson
Applied Acoustics, No 6, 1-21, 1973

"A computer model for determining the temporal distribution of noise from road traffic"
P. M. Nelson
TRRL LR 611, 1973

"Estimates of the reduction of traffic noise following the introduction of quieter vehicles"
P. M. Nelson and J. Fanstone,
TRRL LR 624, 1974

"A computer model of traffic noise to solve planning problems"
P. M. Nelson
Conf. Paper, Symposium on roads and the environment, OECD, 1974

"Predicting road traffic noise in the rural environment; a study of the A66 road improvement scheme in the Lake District"
P. M. Nelson and N. Godfrey,
TRRL LR 642m 1874

Transcribed from the original

Netherlands. Research on Acoustic Qualities of Artificial Structures. Sponsor: Ministry of Transport and Public Works, Amsterdam, Netherlands. 1976. With the help of scale models and life size sound situations, this research is intended to devise an empirical method of predicting the sound fields around complex artificial structures for which no reliable noise level prognosis is yet possible because of the many complicated reverberation patterns.

Norway. Simplified Method for Predicting Traffic Noise. Laboratory of Acoustics, Norwegian Institute of Technology, Trondheim, Norway. Sponsor: Joint Nordic Countries Project. 1977.

Sweden. Nordic Calculation Model for Road Traffic Noise. Ingemanssons Acoustics, Box 53037, S-40014 Goteborg, Sweden. Sponsor: Nordic Board of Ministers, Drottning Maudsgate 11, Oslo 2, Norway. S. Benjegaard. Feb. 1976. Oct. 1977. Development of a method for the calculation of road traffic noise, common to the Nordic countries.

United Kingdom. Analytic Studies on Traffic Noise Evaluation and Prediction. Imperial College and New Castle Polytechnic, New Castle-Upon-Tyne, United Kingdom. Sponsor: Transport and Road Research Laboratory.

HIGHWAY NOISE

OTHER

See Also Page :

356

Project Title:

Noise from Grooved Pavement

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Acoustics Office, R & D Division Ministry of Transportation & Communications 1201 Wilson Avenue Downsview, Ontario M3M 1J8 - Canada	same as performing organization
Principal Investigator(s): D. N. May M. M. Osman A. F. Maio J. Desormeaux G. Giles	Type of Research Program: ___ Fundamental _X_ Development (Component or System) ___ Demonstration (Experimental, Prototype, Production) ___ Measurement Methodology
Start Date: June 15, 1976 Completion Date: Estimated March 15, 1977 Actual still incomplete	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: $4054 ($4300.)
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

Goal was to assess the noise from concrete pavement when it has been transverse-grooved to improve its skid-resistance, and to find type of grooving which results in minimal noise increase. Approach used is to take equivalent sound level measurements (A-weighted and narrow band) as well as instantaneous measurements from real-time analyser of noise from grooved and ordinary pavements for (a) traffic in general, (b) individual vehicle pass-by, (c) individual vehicle near-tire, (d) individual vehicle interior. Results have demonstrated that noise increase found when grooving is cut by a tyne machine is much reduced when it is cut with a diamond machine.

"A note on traffic noise from grooved highway pavement", D. N. May, R & D Division, Ontario Ministry of Transportation & Communications, internal report, January 76.

"Traffic noise on diamond-grooved pavement, Hwy. 401, Toronto 1976", A. F. Maio, R & D Division, Ontario Ministry of Transportation & Communications, Report 76-TIL-23, October 1976.

"Vehicle interior sound levels on various pavement surfaces", J. Desormeaux and D. N. May, R&D Division, Ontario Ministry of Transportation and Communications, Report 77-AC-05, July 1977.

"Exterior sound levels of individual vehicles on five types of concrete pavement", D. N. May and M. M. Osman, R&D Division, Ontario Ministry of Transportation & Communications, Report 77-AC-06, August 1977.

Project Title:

Study on Prevention of Noise and Vibration on the Roads in Cities and Towns

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Noise Section Research Institute for Environmental Protection Tokyo Metropolitan Government 7-2, Yurakucho, Chiyoda-ku, Tokyo	Tokyo Metropolitan Government 1-5-3 Marunouchi Chiyoda-ku, Tokyo
Principal Investigator(s): T. Mochizuki S. Nagahashi M. Kobayashi	Type of Research Program: ___ Fundamental ___ Development (Component or System) _x_ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 4/76 / Completion Date: Estimated 3/79, Actual ____	Funding: Year — Amount 1976 (actual): (¥11400000) — $41849 1977 (budget): (¥11600000) — $42584 1978 (forecast): ? Or Total Funding Amount:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

1. Tests on the environmental effect of noise and vibration on the roads.

Ten young men were stationed as monitors at each of 6 houses along Belt Way 7 (main highway) (10 x 6 = 60 total men), and their sensitivity to the road noise and vibration was tested.

i) Correlation between the measured results of the noise and vibration levels and to what degree the subjects were affected was investigated.

ii) Investigation was made into expressing the combined effect of noise and vibration using an index number.

2. An analysis was made on the driving patterns of vehicles on the highways according to the types of vehicles (large trucks, passenger cars, buses, etc.), and an assessment of generation of noise in a typical driving pattern on a test course was conducted, and from these results the following will be accomplished.

i) A comparison of the generation of noise from each driving pattern.

ii) An assessment of the driving patterns which best reduce the noise.

Translated and transcribed from the original Japanese.

Highway Noise Other
Switzerland

Project Title: Cost Estimation for Noise Abatement Measures for Main Road Traffic Arteries

Performing Organization Name & Address:
Herrn P. Winkelmann
Landoltstr. 85
3007 Bern, Switzerland

Sponsoring Organization Name & Address:
Federal Environmental Office
Eidg Amt fuer Umweltschutz
3003 Bern, Switzerland

Principal Investigator(s):

Herrn P. Winkelmann

Type of Research Program:

x Fundamental
x Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Nov 1976

Completion Date:
Estimated Nov 1977
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(sFr. 23,000) $9,193

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Design of methodology for estimating the cost of passive noise abatement measures on main highways and application of methodology,

Determination of problematic highway segments: over 60, 65, 70, or 75 dB(A) (via use of a special consulting bureau).

Determination of abatement cost per segment:
- Cost per window design for noise installation
- Approximate number of windows per segment

Preliminary results indicate expenses of 1.5 million Swissfrancs per problem kilometer. On the basis of a detailed survey of the noise situation in Cantor Zurich, a preliminary estimate of costs for all Switzerland can be made.

Translated and transcribed from the original German.

Highway Noise Other
West Germany

Project Title: Traffic Noise at Built-Up Street Intersections

Performing Organization Name & Address:
Federal Institute for Highway Construction
Koeln, Bruehler Strasse 1
West Germany

Sponsoring Organization Name & Address:
Federal Highway Ministry

Principal Investigator(s):
Dr. Siegfried Ullrich

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1975

Completion Date:
Estimated
Actual Dec. 31, 1978

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(100,000 DM) $42,400

COMMENTS:

Dependence of various noise parameters in vicinity of street intersection on the type of intersection, the red-green phases in the adjustment of the traffic lights; propagation of the noise among the structures by the side of the streets - Development of computation methods.

Translated and transcribed from the original German.

Highway Noise Other
West Germany

Project Title:
Effect of Noise Abatement Measures on the Ease, Fluidity and Safety of Traffic Flow

Performing Organization Name & Address:
Federal Institute for Highway Construction
Koeln, Bruehler-Strasse 1
West Germany

Sponsoring Organization Name & Address:
Federal Highway Ministry

Principal Investigator(s):
Dipl. -Phys. Guenter Reinhold

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(100 000 DM) $42,400

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Classification of noise abatement measures in respect to their effectiveness; determination of the dependence of the parameters determining traffic flow on the type of noise abatement measures, their height (noise-screening walls) and their distance to the road. Measured values: speed of vehicles, distance between vehicles and to the side of the road.

Translated and transcribed from the original German.

Sweden. Analysis of Vehicle Noise from Coarse Texture Pavements. National Swedish Road and Traffic Research Institute, Road Research Division, Fack S-58101 Linkoeping, Sweden. Sponsor: National Swedish Road Administration, Fack, S-102 20, Stockholm, Sweden. O. Andersson. Jan. 1973. July 1976. $8,200. The aim is to assess the noise level increase due to coarse surface texture pavements, e.g. surface dressings.

West Germany. Noise Abatement in Streets Collection of Examples. Chair for Traffic and City Planning, Munich Technical University, Muenchen 2, Arcisstr. 21, West Germany. Sponsor: Federal Transportation Minister. Dr.- Ingl. Karl Glueck. June 1, 1975. Sept. 30, 1976. (84,000 DM) $35,616. Elaboration of general examples out of special applications.

West Germany. Noise Protection on Streets (Example Collection). Technical University of Munich, Arcisstrasse 21, D-8000 Munich 2, West Germany. Sponsor: Ministry of Labor, Postfach 100, D-5300 Bonn-Bad Godesberg, West Germany. Dr.- Ing. Gluck, Dipl.- Ing. Hiekel. Type: Demonstration. 1975. 1977. (84,000 DM) $35,616. Selection, preparation and representation of examples of noise abatement on streets. The example collection is to appear as an appendix to the guideline "Noise Protection on Streets" of the Federal Minister for Traffic.

Highway Noise Other
Czechoslovakia

Project Title: Proposal of Regulations for the Physical Planning Documentation from the View-Point of Surface Transportation Noise Protection

Performing Organization Name & Address:
Research Institute for Building and Architecture,
Prague 1, Letenska 3,
Czechoslavakia

Sponsoring Organization Name & Address:
Ministry of Construction,
Prague 2,
Na poricnim pravu 1,
Czechoslovakia

Principal Investigator(s):

Ing. THOR, CSc.,

Start Date: 1976

Completion Date:
Estimated _____
Actual 1976

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_x_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The Regulations for project organizations concerning the physical planning documentation (i. e. physical plans and projects) from the view-point of the protection of excessive surface transportation noise including noise caused by railroads

- involve the calculation of noise intensity (L_{Aeq}),
- determine the town planning measures and their efficiency to limit the traffic noise effects,
- determine the noise protecting technical equipment and aids connected with the construction (noise barriers, noise protecting bafflers, green areas, noise protecting precautions on buildings etc.),
- determine the method of "frontal orientation of unoccupied rooms towards the noise source",
- involve a practical example of transportation noise protecting measures including the considerations of economic consequences.

The annex to these Regulations involves the requirement on the soil fund in connection with the noise protecting measures.

The mentioned Regulations are intended for project, investorial, approving and other organizations similarly like for specialists from national committes, who in their work must deal with the surface transportation noise problems and environmental noise protection.

Highway Noise Other
Netherlands

Project Title:

The Effect of Traffic Regulation in the Cities

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Public Health and Environmental Protection
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The Bill on Noise Abatement also includes measures to be taken to reduce, as much as possible, the noise nuisance caused by road traffic. These measures include the regulation of the traffic flow in the city, such as limiting vehicle access to residential streets, barring cars from bus and tram lanes, opening cycle routes, etc. These measures will also be considered partly to improve traffic safety in existing situations (for example, rationalization of old city centres). This project will also devise traffic-regulating measures which can be applied in new suburbs.

Transcribed from the original.

Highway Noise Other
Netherlands

Project Title:
Determining Empirically the Influence of Road Surface on Noise Emissions

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Transport and Public Works
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

One of the sources of traffic noise is the interaction of tyres and road surface; especially when vehicles are driven at high speeds over bad road surfaces, higher noise emissions can be confirmed.

This project is intended to further investigate the influence of the road surface, not only with regards to the type of paving, but also its specific texture.

Transcribed from the original.

Highway Noise Other
Netherlands

Project Title:
Determining in Actual Practice the Influence of Speed, Stop Lights, Junctions and Sharp Curves on Noise Emissions

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Transport and Public Works
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project is also intended to supply supplementary data to that obtained from the TNO research on noise emissions on motor roads, whereby special attention will be given to city streets.

The results can be used to refine the methods of prognosis and to serve as a basis for traffic control measures to be taken to reduce traffic noise.

Transcribed from the original.

Highway Noise Other
Switzerland

Project Title: Study of the role of vehicular noise emissions on noise emmissions (exposure) for typical traffic conditions.

Performing Organization Name & Address:
Herrn PS Dr. E. J. Rathe
Wettsteinstr. 71
3332 Russikon (CH)
Switzerland

Sponsoring Organization Name & Address:
Eidg. Amt für Umweltschutz, 3003 Bern
im Einvernehmen mit der
Eidg. Polizeiabteilung, 3003 Bern
Switzerland

Principal Investigator(s):

Prof. Dr. E. J. Rathe

Type of Research Program:

X Fundamental
X Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: May 1976

Completion Date:
Estimated ____
Actual 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The result of the work should contribute to answering the questions how and to what extent the noise exposure proceeding from traffic on the streets is dependent on the emission boundary values prescribed with the vehicle type testing.

In this sense, the study serves to test the effectiveness of the measures provided by the legislature up to 1982 for reducing the noise emission of motor vehicles.

Translated and transcribed from the original German.

Highway Noise Other
United Kingdom

Project Title:
Assessment, Measurement and Prediction

Performing Organization Name & Address:

Dept. of Environment
Dept. of Transportation
London, United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
1977

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Urban road traffic noise.
Road construction noise.
Vibration.
Road and rail traffic noise.
Noise from individual and mixed external noise sources.
Construction site noise.

Transcribed from the original.

Highway Noise Other
West Germany

Project Title:
The Economics of Noise

Performing Organization Name & Address:
Universitat Köln
Institut fur Verkehrswissenschaft
Albertus-Magnus-Platz
d D 5000 Köln 41
West Germany

Sponsoring Organization Name & Address:
Deutsche Forschungsgemeinschaft
D 5300 Bonn-Bad Godesberg

Principal Investigator(s):

Kentner, Wolfgang

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
1976

Completion Date:
Estimated 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The economics of noise, especially road traffic and airport noise.
The kind, effects, benefits, and costs of means for reducing the noise level.
The possibilities of economic noise assessment.
Cost-benefit analysis.
The financing of noise abatement strategies.
The economic aspects of noise abatement policies for the Federal Republic of Germany.

Transcribed from the original.

Highway Noise Other
West Germany

Project Title:
Preventive Noise Abatement Measures by the City of Hildesheim

Performing Organization Name & Address:
Institute for Testing and Research in Construction Technology
Hildesheim, Hohnsen 2
West Germany

Sponsoring Organization Name & Address:

Principal Investigator(s):
Dip. Ing. Gerhard Scheich

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
May 1, 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

a) Recording of existing noise levels on heavily traveled streets.

b) Estimation of anticipated noise levels after completion of extensive reconstruction and repaving of streets.

c) Elaboration of proposals for preventive noise abatement measures.

Translated and transcribed from the original German.

Switzerland. Countermeasures Applicable in Practice to Reduce Exterior Noise of Motor Vehicles. Interkeller AG/SA, 8052 Zurich, Switzerland. Y. Lebresene.

Switzerland. Characterization of the Noise Radiated by Two Commercial Vehicles in a Built-up Area Before and After. Interkeller AG/SA, 8052 Zurich, Switzerland. R. Padoan, M. Jacteur Monrozier.

Switzerland. Acoustic Comfort of and Noise Pollution by Motor Vehicles. Interkeller AG/SA, 8052 Zurich, Switzerland. R. J. Van Lighten.

Switzerland. External Noise in Road Vehicles. Interkeller AG/SA, 8052 Zurich, Switzerland. A. Chappuis.

Switzerland. Exterior Noise - Example of Treatments Applied in Practice and Results of an Experimental Investigation. Interkeller AG/SA, 8052 Zurich, Switzerland. A. Chappuis.

Switzerland. Characterization of Acoustic Comfort in Motor Vehicles. Interkeller AG/SA, 8052 Zurich, Switzerland. H. W. Spring.

Switzerland. Road Simulation Using the Fast Fourier Technique. Interkeller AG/SA, 8052 Zurich, Switzerland. F. Burhop, B. Wiesner.

United Kingdom. Traffic Noise at Roundabouts and Intersections. Wales University Institute of Science and Technology, Dept. of Civil Engr. & Bldg. Technology, King Edward VII Avenue, Cathays Park, Cardiff CF1 3NU, United Kingdom. Sponsor: Science Research Council. Dr. J. G. Hunt, Dr. P. E. Lewis, A. James. Oct. 1972. Mar. 1976. To analyse noise caused by traffic at roundabouts and intersections and the formulation of design criteria.

United Kingdom. Noise Generated by Non-Free Flowing Road Traffic. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. D. Sparkes, J. B. Large. Publication: C. Sparkes 1977 M.Sc. Dissertation, ISVR, University of Southampton, Investigation of vehicle noise at controlled intersections.

OFF HIGHWAY AND RECREATIONAL VEHICLE NOISE:

MOTORCYCLES

See Also Page:

33

Project Title:
Investigative Study of the Driving Noise of the Motorcycle

Performing Organization Name & Address:

Japan Automobile Manufacturers Association, Inc.
Motorcycle Noise Control Committee

Sponsoring Organization Name & Address:

Principal Investigator(s):

M. Nakamura
T. Aoyama
J. Abe
Y. Sato
Y. Kobayashi
Y. Yokoyama

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1975

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Surveys of motorcycle traffic volume on city streets in several areas were carried out. A study of the starting acceleration behavior of motorcycles was performed comparing them with automobiles. The survey found an average share of 3.6% of total traffic volume for motorcycles as compared with a 24% share of the registered vehicles. If passenger cars travel 1 unit from start in a unit of time, Class IV motorcycles travel 1.36, Class III motorcycles 1.30, Class II motorcycles 1.05, Class I motorcycles 0.95, heavy duty trucks 0.63, light duty trucks 0.81 and min-trucks 0.83. Average first gear shift timing after motorcycle starts was 2.8 seconds. Driving noise for different types of motorcycles at different speeds were measured. Peak noise levels of motorcycle acceleration were compared to steady speed driving noise levels. For Class IV and III peak acceleration levels equalled steady driving levels of 55 km/h, for Class II 45 km/h, and for Class I 35 km/h.

Report
"Motorcycle Noise Studies, Part II", March 1977, Motorcycle Noise Control Committee of the Japan Automobile Manufacturers Association, Inc.

Transcribed from the original.

Motorcycles
Netherlands

Project Title:
Investigation of Noise Emissions of Motorcycles and Mopeds

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): - Or Total Funding Amount: - COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The amount of noise produced by cars and lorries is being investigated in another project; the noise production of motorcycles and mopeds was excluded from consideration because of the minor role which the noise of motorbikes played in the cacaphony of traffic noise. This was due to the relatively small number of motorbikes on the road.

But now that this number is rapidly rising, it has become necessary to include measurements of motorbike noise in the calculation of traffic noise levels. This is particularly true of mopeds in the residential streets where cars have often been barred, but the air is still rent by moped noise.

The purpose of this project is to supply the data needed on this situation.

Transcribed from the original.

OFF HIGHWAY AND RECREATIONAL VEHICLE NOISE:

MOTORBOATS

Project Title:
Noise Restrictions on Boats and Ships

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This project is designed to amass the information needed to formulate implementation based on article 2 of the Noise Abatement Bill, concerning noise nuisance caused by motorized boats and ships, and outboard motors, and by sound signalling. The project will make use of data obtained from previous research and, if applicable, specifications used abroad in setting noise restrictions, and E.E.C. regulations or other international arrangements.

Each type or category of motorized boat or ship investigated should be tested under representative running conditions, at normal noise levels, using approved methods of noise measurement and observing any other relevant aspects for the regulations to be established, and for the noise restrictions to be exacted in the continued operations check.

Transcribed from the original.

Sweden. Airborne and Structurally-Borne Noise in Pleasure Craft. Volvo Penta, AB Volvo Penta, S-405 08 Goeteborg, Sweden. 1974. 1977. A study of exciting forces and their transmission in the hull. Optimization of bedding and vibration insulation for engine, propeller, and propeller transmission.

United Kingdom. Noise Control Modifications for the Yamaha Outboard Motor Enclosure. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. G. Koopman, J Lea.

United Kingdom. Ship and Marine Technology. Department of Industry, London, United Kingdom. 1977. Acoustic design of ships. Propeller excited vibration.

RAIL NOISE

LOCOMOTIVES AND PASSENGER TRAINS

See Also Page:

355

Project Title:
Conclusive data on existing sound immission from train noises

Performing Organization Name & Address:
Institute for Sound and Vibration Technology
Hamburg 70
Fehmarnstr. 12
West Germany

Sponsoring Organization Name & Address:
Free Hausa City of Hamburg

Principal Investigator(s):
Manfred Kessler

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
June 1, 1976

Completion Date:
Estimated _____
Actual July 31, 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(6,000 DM) $2,544

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Before the construction of the planned " p & r" installation at the Elbganstrasse RR station, execution of acoustic measurements to gather conclusive data.

Translated and transcribed from the original German.

Project Title:
Noise Control of Railroad Car Retarder Systems

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
University of Alberta Edmonton, Alberta Dept. of Mechanical Engineering Canada	Canadian National Railways Western Region 22nd Floor CN Tower, Edmonton

Principal Investigator(s):

Gary Faulkner

Andrew Mioduchowski

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_x_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
Summer 1975	Estimated Fall 1977 Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The squeal emitted from car retarder system is often intense. These squeals are of a high frequency (2000-1000 Hz). An attempt is being made to design vibration absorbers which will reduce or eliminate the vibration causing the squeal.

Transcribed from the original.

Locomotives and Passenger Trains
Netherlands

Project Title:
Study of the Emission by Rail Vehicles

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Transport and Public Works Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This project is intended to provide a greater understanding of the noise emissions of the different types of railroad vehicles presently used in the Netherlands.

When the relation between noise emissions and noise registration procedures has been clearly established, reliable prognoses can be set up on noise loads around railroad, tram and underground tracks.

First of all, trains, locomotives and freight cars will be investigated. The next step is to determine the separate influences on noise levels of motors, brake systems, wheel to rail contact, and artificial structures such as bridges, tunnels and fly over crossings.

The last phase of this project will investigate the necessity and the possibilities and the consequences of changing the rolling stock in use or the tracks, or both.

Transcribed from the original.

Project Title:
Factors Affecting Railway Noise Levels in Residential Areas

Performing Organization Name & Address:
Institute of Sound & Vibration Research
Southampton
SO9 5NH
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

J. G. Walker

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In order to be able to estimate noise levels in residential areas it is important to understand the mode of propagation of railway noise in open ground conditions. Experiments were conducted to investigate the effect of train type and speed as well as distance from the track on measured noise levels. The presence of cuttings and embankments as well as the houses themselves also affect the noise levels. Data are presented which show the effect on all these parameters and a simple procedure is outlined that allows the maximum noise level at any position in a residential area to be estimated.

Transcribed from the original.

RAIL NOISE

RAPID RAIL TRANSIT

See Also Page:

172

Project Title:
Study on the Prevention of Noise and Vibration Relating to High Speed Transport Facilities

Performing Organization Name & Address:
Noise Section
Research Institute for Environmental Protection
Tokyo Metropolitan Government
7-2 Yurakucho
Chiyoda-Ku, Tokyo, Japan

Sponsoring Organization Name & Address:
Tokyo Metropolitan Government
1-5-3, Marunouchi
Chiyoda-Ku
Tokyo

Principal Investigator(s):

S. Nakamara
Y. Uehara

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_x_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 4/77

Completion Date:
Estimated 3/79
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	(¥3700000) $2,569
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The following study will be conducted aiming at the prevention of noise and vibration by the Tohoku and Joetsu super-express railways, constructional plans for which are now in progress:

1. Generation of noise and vibration and characteristics of the propagation of noise and vibration will be analyzed according to rail structures and running conditions, using data from the super-express railways presently in operation and results of the actual measurement of the noise and vibration within a model test section, and the stage of the distribution of the noise and sound will be assessed.

2. Investigation into a method to reduce the noise.

3. Testing with simulated models, the effect of noise distribution due to rail structures and the lay of the land will be studied.

4. By combining projects, 1, 2 and 3, forecast the effect of super-express railways on the local environment, and assess the problems to be met.

Translated and transcribed from the original.

Project Title:

Study of Railroad Noise Reduction by Noise-Proof Wheels

Performing Organization Name & Address:
Teito Rapid Transit Authority ... 3-19-6, Higashi Ueno, Taito-ku, Tokyo
Sumitomo Metal Industries, Ltd. ...15-5 Kitahama, Higashi-ku, Osaka

Sponsoring Organization Name & Address:
Transportation Ministry of Japan
2-1-3 Kasumigaseki, Chiyoda-ku, Tokyo

Principal Investigator(s):
Mr. Kei Satoda.... Teito Rapid Transit Authority
Mr. Mitsuo Suzuki....Sumitomo Metal Industries, Ltd.

Type of Research Program:
___ Fundamental
_x_ Development (Component or System)
_x_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: April 1975

Completion Date:
Estimated Mar. 1976
Actual Mar. 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$220260 (Yen 60,000,000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In recent years the noise pollution of railroad vehicles has become an important social problem to be solved urgently. With the test and research subsidy allocated by the Transportation Ministry of Japan, Teito Rapid Transit Authority and Sumitomo Metal Industries, Ltd. have investigated the vibration and noise characteristics of several types of sound-proof wheels and carried out the field test with test vehicles, in which inside and outside noises of the vehicles were measured. The results shows that the resilient sound-proof wheel can reduce noise measured under the car body floor from 3 to 5 decibels and the damping sound-proof one can also reduce from 1 to 3 decibels.

Project Title:

Noise Reduction of Shinkansen Railways

Performing Organization Name & Address:

Sponsoring Organization Name & Address:

Japanese National Railways

1-6-5 Marunouchi Chiyoda-ku
Tokyo JAPAN

Principal Investigator(s):

T.Nimura, M.Ebata, S.Kono, T.Takahashi,
T.Sone, F.Saito and M.Kumagai.

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_X_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: April, 1974

Completion Date:
Estimated March 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	(¥ 2,000,000) $7342
1977 (budget):	undecided but will be continued.
1978 (forecast):	undecided but will be continued.

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The aim of this project is to reduce the Shinkansen noise so that it may satisfy the Environmental Quality Standards for Shinkansen Noise. The results and the approaches can also be applied to the noise reduction for ordinary railways.
The train noise is radiated from various portions, but their contributions to total noise are not clarified. In this study, the noise shares of various portions have been estimated and the guideline on noise reduction and the countermeasures for each source are studied on the basis of the estimation. As one of the countermeasures, sound insulation wall has been investigated in detail including noise radiation due to wall vibration.
The results obtained are as follows;
1) The noise radiation due to vibration of wall makes little contribution to overall train noise, if the wall has the thickness of 20 cm or more and 3 m hight.
2) For inverse-L type noise insulation wall the noise coming out of the gap between the edge of the wall and car body can be reduced several dB by means of sound absorbing panel installed vertically at the edge of the wall.
3) When the noise insulation wall are constructed by the light material except concrete, the vibration of the wall is much greater than one of the concrete wall in the low frequency range, so that vibration isolation must be taken into consideration.
The results obtained in this study have been reported one after another in INTER-NOISE since 1974.

Project Title:
Tyne and Wear Metro-Noise Control

Performing Organization Name & Address:

Rupert Taylor & Partners Ltd.
113 Westbourne Grove
London W2 4UP United Kingdom

Sponsoring Organization Name & Address:

Metro-Cammell Ltd. Birmingham
Tyne and Wear P.T.E., Tyne and Wear
Westinghouse Brake & Signal Co. Ltd.
Chippenham

Principal Investigator(s):

Rupert Taylor

Type of Research Program:

___ Fundamental
_X_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
1973	Estimated 1978 Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$8598 (£5000)

COMMENTS: Work carried out in a consultancy capacity

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Design and development of quiet rapid transit vehicles including ancillary equipment and civil engineering aspects of tunnel design.

Stage 1) Noise survey of European Rapid Transit Systems
2) Development of Prototype vehicle and development of noise reduction modification to ancillary equipment.
3) Acoustical testing of prototype and measurement of tunnel acoustical properties

Transcribed from the original.

Project Title: Active Noise Abatement Measures at High Velocity in Wheel-Rail Technology

Performing Organization Name & Address:

Environmental Systems, Inc.
Muenchen 81, Gnesener Strasse 4-6
West Germany

Sponsoring Organization Name & Address:

Federal Minister for Research and Technology

Principal Investigator(s):

Dr. Ing. Karl-Heinz Jendges

Start Date: July 1, 1975

Completion Date: Estimated _____ Actual June 30, 1978

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(630,000 DM) $267,120

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The aim of this project is a basic study of the possibilities for active noise abatement procedures at high velocity in wheel-rail technology. The most promising ideas, out of a list of suggestions on noise abatement, are evaluated in regard to effectiveness, and their structural feasibility is checked. Recommendations on further preventive measures are submitted. The results of this research project form the basis for the experiments to be conducted in a second phase with the selected ideas up to speeds of 250 km/h.

Translated and transcribed from the original German.

Project Title: Active Noise Abatement Measures at High Velocity by Wheel/Rail Technology

Performing Organization Name & Address:

Federal Railroads - Central Office
Munich, West Germany

Sponsoring Organization Name & Address:

Federal Ministry for Research and Technology

Principal Investigator(s):

Dipl. -Ing. Rainer Kiefmann

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1976

Completion Date:
Estimated Dec. 31, 1978
Actual ___ _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(423,000 DM) $179,352

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In the framework of this research project, the possibilities for active noise abatement are to be thoroughly studied in wheel/rail technology at high velocities. The fundamental research is to build on the preliminary work already accomplished. The most promising ideas from a list of anti-noise suggestions are to be evaluated in regard to probable effectiveness. The practicability is to be examined and recommendations are to be submitted for future preventive measures.

Translated and transcribed from the original German.

Project Title: Passive Noise Abatement Measures for High Speed Systems by Means of Wheel/Rail Technology

Performing Organization Name & Address:

Federal Railroads
Central Office, Munich
Munich 2, Arnulfstr. 19
West Germany

Sponsoring Organization Name & Address:

Federal Minister for Research and Technology

Principal Investigator(s):

Dip., -Ing. Rainer Kiefmann

Start Date: Jan. 1, 1976

Completion Date: Estimated Dec. 31, 1979
Actual ___

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(2,500,000 DM) $1,060,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In the framework of this research project, the insights gained from an already completed project regarding the effectiveness of passive noise abatement measures for high velocity wheel/rail traffic systems are to be broadly examined and compelted in particular, sound screens on drive vehicles and wagons are to be studied as well as noise shields in front of the wheels, damping elements on the tracks, variations of the sound screening wall; and the levels of efficacity are to be determined.

Translated and transcribed from the original German.

Japan. Research on sound-barrier walls for the Shinkansen. Japanese National Railways, 6-5 Marunouchi 1-Chome, Tokyo, Japan. Type: Development. 1977. 1980. $7,342 (2 million yen). Research on the noise generating mechanism and check-up on the effects of sound-barrier walls of various shapes with model carbody and speaker sound waves employed.

Japan. Research on noise generated by concrete structure on the Shinkansen. Japanese National Railways, 6-5 Marunouchi 1-Chone, Tokyo, Japan. Type: Demonstration. 1977. 1980. $91,775, (25 million yen). Study on the designing of concrete structure (viaduct for track elevation) with the view to minimizing the noise therefrom.

Japan. Research on noise originated in connection with power collection on the Shinkansen. Japanese National Railways, 6-5 Marunouchi 1-Chome, Tokyo, Japan. Type: Fundamental, Development. 1977. 1980. $44,052, (12 million yen). Contribution of the sparking, the shuffling sound and the swishing sound to the noise generated in connection with power collecting and analysis of the generating mechanism.

Japan. Overall testing to abate the Shinkansen noise. Japanese National Railways, 6-5 Marunouchi 1 Chome, Tokyo, Japan. Type: Demonstration. 1978. 1980. $293,680, (80 million yen). The trolley wire, rolling stock, track and structures that have been tested separately are gathered together and their combined effect in noise abatement is being tested.

Japan. Experiments to abate and analyze wheel noise using testing installations. Japanese National Railways, 6-5 Marunouchi 1-Chome, Tokyo, Japan. Type: Fundamental, Development. 1977. 1978. $44,052, (12 million yen). Using wheel axle running testing installation and bogie running testing installation, experiments are conducted to find out the way to attenuate noise generated by various kinds of wheel load, bogie, etc.

United Kingdom. Cost Effective Noise Control Methodology for Urban Rapid Transit Systems. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. E. G. Terry, J. B. Large.

West Germany. Express Line Hamburg-Harburg Track Section Hammerbrockstrasse in Hamburg. Institute for Sound and Vibration and Technology, Hamburg 70, Fehmarnstr. 12, West Germany. Ing. Grad. Guenther Wilmsen. Measurements for an analysis of the existing noise levels in Hammerbrookstrasse. Experiments on express trains. Testing of reinforced concrete express bridges. Final measurements to determine noise impact of express train traffic through Hammerbrookstrasse.

RAIL NOISE

INNOVATIVE GUIDED MASS TRANSIT

Project Title:
A Vibration Reducing Measure Adopted where a Tunnel Runs Close to a Theater

Performing Organization Name & Address:
The Institute of Industrial Science
The University of Tokyo
22-1, Roppongi 7 Chome, Minato-ku
Tokyo, Japan

Sponsoring Organization Name & Address:
Teito Rapid Transit Authority
10-6, Higashi Ueno 3-Chome
Taito-ku
Tokyo, Japan

Principal Investigator(s):
Prof. Choshiro Tamura (Tokyo Univ.)
Mr. Akio Oikawa (T.R.T.A.)

Type of Research Program:
- x Fundamental
- x Development (Component or System)
- x Demonstration (Experimental, Prototype, or Production)
- ___ Measurement Methodology

Start Date: Oct. 1974

Completion Date: Estimated ___ Actual March 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(30,000,000 Yen) $110,120

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

When undertaking construction of the subway Yurakucho Line, we had to construct a new underground station only about 1.5 meter away from a theater. And, it was extremely important to cut out the wave vibration propagating from the tunnel to the theatre. We successfully achieved the aim by supporting the track on a pile insulated from the tunnel structure; the pile worked to scatter the vibration into the soil below the tunnel.

On putting the line into revenue service, we made a series of measurements on the solid-borne sound and made an analysis of the way the vibration propagated from the track to the pile, soil, back to the tunnel and then on to the wall and slab of the theater building.

Project Title:
Study of the Noise Emission of Different Types of Trolleys, Subways, and the like

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Transport and Public Works
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project is oriented to public transport in urban conditions. Measurements will be made according to the methods established in a previous project.

In the second phase, the separate sources of noise will be investigated, such as wheel to rail contact, bridges and tunnels, rounding a curve, etc. Thereupon an investigation of possibilities for noise abatement will take place.

Transcribed from the original.

Project Title:

Research on Noise Zoning Along Tramways

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This project involves the parameters of the noise zones to be established around tramways. In the cities, tramways are often combined with the city streets, but in the suburbs and outside the cities trams often have a separate route. This project is mostly concerned with these tram routes.

The second phase will investigate noise-abatement measures, in conjunction if possible with research already conducted by the public transport companies.

Transcribed from the original.

West Germany. Studies for the Reduction of Internal and External Noises Generated by Rail Transportation Systems in City Traffic - Preliminary Study: Noise. Research Association for Underground Traffic Installations, Dusseldorf 30, Mozartstr. 7, West Germany. Sponsor: Federal Ministry for Research and Technology. April 1, 1975. Nov. 30, 1976.

West Germany. Research Regarding Abatement of External and Internal Noise in Rail Transportation Systems in City Traffic. Institute for Ground Transportation, Berlin 12, Strasse Des 17 Juni 135, West Germany. Dip.- Ing. Paul Wimbe. Dec. 31, 1975. Feb. 28, 1976. Sorting, assembling and analyzing of the literature on the following main points: rolling noises, curve noises, percussion noises; causes and effects: infrastructure, superstructure, track, wheel, wheel housing, logic.

RAIL NOISE

RAIL MODEL ANALYSIS AND PREDICTION

See Also Pages:

151

272

273

284

361

Project Title: Development and Compilation of Acoustic Principles for Assessing the Noise Exposure due to Railroad Switchyards

Performing Organization Name & Address:
Eidg. Material, und Versuchanstalt
EMPA, Abteilung Akustik
8600 Duebendorf (CH)
Switzerland

Sponsoring Organization Name & Address:
Federal Environmental Office
3003 Bern In cooperation with:
The Federal Transport Office
3003 Bern Switzerland

Principal Investigator(s):

Herrn Professor A. Lauber
Herrn F. Kopp

Type of Research Program:

_x_ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
_x_ Measurement Methodology

Start Date: 1975

Completion Date:
Estimated _____
Actual 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: (sFr 100,000)$39,970

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The work should enable the prediction of noise emissions and immissions to be expected from planned (new) switchyards, the assessment of all types of noise abatement measures.

Translated and transcribed from the original German.

Project Title: Noise Immissions in Fulda Township Along Existing Railroad Tracks and Along the New Stretch Being Built

Performing Organization Name & Address:

"IGI" Engineer, Geological Institute
Niedermeyer
Westheim, West Germany

Sponsoring Organization Name & Address:

German Federal Railroads
Frankfurt, West Germany

Principal Investigator(s):

Dip. -Ing. Niedermeyer

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(30,000 DM) $12,720

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Measurement of present noise immissions in Fulda township. Noise immissions by sounds of passing railroad trains. Measurement of noise immissions. Prediction of sound immissions up to the year 1990. Preventive measures against noise. Effect of noise screen walls along the new construction stretch in the vicinity of inhabited areas to be protected. Proposals for noise abatement.

Translated and transcribed from the original German.

Project Title:

Mapping of noise from railroad traffic and planning of measures against this noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Environmental and Public Health Administration of Stockholm, Sweden	
Principal Investigator(s): - " -	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, o. Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated 1978, Actual ___	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

The project contains the following headlines:

1. Construction of a calculation model for predicting noise from railroad traffic.
2. Try to find limits for railroad noise.
3. Suggest meaures to fulfill the requirements.
4. Calculate the costs within Stockholm for meaures against railroad noise.

A working group within the town of Stockholm has been set up for this project. Representatives from the National Environmental Protection Board and the State Railroad Authorities are associated with the group.

Norway. Methods for Prognosing Noise From Railways. Laboratory of Acoustics, Norwegian Institute of Technology, Trondheim. Norway. 1980.

United Kingdom. Noise Prediction Method for Fast Electric Trains. Building Research Establishment, Aylesbur, Buckinghamshire, United Kingdom.

RAIL NOISE

OTHER

See Also Page:
284

Project Title: Noise Nuisances Along Railroads.

Performing Organization Name & Address:

National Agency of Environmental Protection
The Danish State Railways
Kampmanusgade 1
1604 Kobenhaven, Denmark

Sponsoring Organization Name & Address:

Principal Investigator(s):

National Agency of Environmental Protection

The Danish State Railways

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated aut. 1978
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount	
1976 (actual):	(70.000 D.kr.)	$11,543
1977 (budget):	(20.000 D.kr.)	3,298
1978 (forecast):	(100.000 D.kr.)	16,490

Or Total Funding Amount:

COMMENTS:

Noise Nuisances Along Railroads: The Danish State Railways and the National Agency of Environmental Protection will cooperate in preparing guidelines for the calculation and evaluation of noise from railroad traffic.

Rail Noise Other
Sweden

Project Title:
Comparison of Noise from Two Railway Transformer Station of Different Size. Noise Abatement Measures.

Performing Organization Name & Address:

IFM Akustikbyran AB
Warfvinges vag 26
S-112 51 Stockholm, Sweden

Sponsoring Organization Name & Address:

The Swedish State Railways

Principal Investigator(s):

Goran Westerberg

Type of Research Program:

___ Fundamental
_x_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Febr 1976

Completion Date:
Estimated ____
Actual May 1977

Funding:

Year	Amount
1976 (actual):	(45.000 Sw Crs) $10,139
1977 (budget):	(20.000 Sw Crs) $ 4,506
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The railway transformer stations generate electrical power of 16 2/3 Hz for the railway system. The increased use of short distance trains with good acceleration has caused the need of enlarged transformer stations. In one case the larger station has caused more environmental noise than the former smaller station. Complaints have reached both the local health authorities and the Swedish State Railways.

The task was
1) to investigate the increase in environmental noise level because of the enlargement of the station
2) to suggest noise abatement measures to restore the noise level situation before the enlargement with some reserve for further enlargements.

The task was solved by
1) measurements at the enlarged station,
2) measurements at another station of the same type and size as the former non-enlarged station,
3) comparisons of environmental noise levels
4) suggestions of different combinations of noise abatement steps.

Different sound sources as transformers and cooling fans were regarded as well as the operating time for each source. The enlarged station produced 9 MVA out of 30, the smaller 3 out of 9 on an average. The raise in environmental sound level was found to be within the interval 4-6 dB(A) both in maximum, minimum and equivalent sound level. The proposed noise abatement measures contained the use of ventilation out-and inlet dampers and outdoor absorbing screens in different combinations for a 10 dB(A) reduction.

Rail Noise Other
Sweden

Project Title:

Survey of noise from railbound traffic in Stockholm

Performing Organization Name & Address:
Miljo- ooch Halsovardsforvaltningen
Fack
104 62 STOCKHOLM 17
Sweden
(local health authorities)

Sponsoring Organization Name & Address:
Miljo- och Halsovardsförvaltningen
Fack
104 62 STOCKHOLM 17

Principal Investigator(s):

O-ing Sten Wahlstrom

Type of Research Program:

___ Fundamental
_x_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Oct.8, 1976

Completion Date:
Estimated Dec. 31, 1978
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$50,000

COMMENTS:

For some years there have been in Sweden guiding rules for physical planning, considering road traffic noise (Urban planning and noise from road traffic. The national board of urban planning, report nr. 22, 1972).

These guiding rules are used by the Stockholm City administration for the present even for noise from railbound traffic. Examples of noise reducing steps that have been taken in Stockholm are noise barriers (embankments and walls made of wood, steel or concrete) and exchanging of windows.

Transcribed from the original.

Rail Noise Other
West Germany

Project Title:
Tunnel with Only Slight Cover (Subway or "U" Train, Water Mains, etc.)

Performing Organization Name & Address:
Special Research Area 77
"Rock Mechanics", Karlsruhe U.
Karlsruhe Richard-Willstaetter-Alle
West Germany

Sponsoring Organization Name & Address:
German Research Society
Federal Transportation Ministry

Principal Investigator(s):
Dip. Ing. Gerhard Sauer

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1971

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: (500,000 DM) $212,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Exploration of factors affecting cost-effective development of underground installations with only slight cover. Techniques are needed to achieve economically rewarding excavation and operation of underground structures aimed at reducing noise and traffic problems as well as exhaust gas pollution in centers of population concentration.

Translated and transcribed from the original German.

Rail Noise Other
Netherlands

Project Title:
Study of the Noise Emission During Shunting and Switching

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Transport and Public Works Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The purpose of this project is to reveal which occurrences cause noise nuisance during shunting, such as diesel motors, impact of cars, braking, communication, etc. In the second stage of research, means of abating this noise will be investigated. An investigation will also be made of how acoustic screening can be installed around shunting yards in order to protect nearby noise-sensitive receivers. This could be anything from sound-absorbing screens to sound barriers to trees to architectural adaptations. Many ideas on acoustic screening can be taken from the I.C.G. research programme on Road Traffic Noise.

Transcribed from the original.

Rail Noise Other
Netherland

Project Title:
Research on Zoning Along Railroads

Performing Organization Name & Address:	Sponsoring Organization Name & Address: Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This project is intended to provide an understanding of the parameters essential to determine noise zones around railroads. This research is closely related to the projects on zoning along or around motor roads, airports, industrial estates, etc.

The standards developed in other projects must be made applicable to measuring noise levels at given distances from the railroad tracks. Points of interest are the methods of prognosis, data needed, inspection measurements, equipment and registration.

The second phase will review all of the possible measures for abating noise to the permissible levels (such as acoustic screening and barriers).

Transcribed from the original.

Rail Noise Other
Netherlands

Project Title: An Inventory of Noise-Sensitive Receivers Within the Noise Zones to be Established

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health & Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): - Or Total Funding Amount: - COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This research should provide some information of the noise-sensitive receivers or concerns inside the zones around the railroad tracks. This includes considerations both of the existing situation and of the developments envisioned in the development plan.

This information can be useful in making estimates of costs, setting up rationalization schemes and making decisions on possible new developments in the field of rail transport.

Transcribed from the original.

Rail Noise Other
Netherlands

Project Title: Investigation of the Financial Consequences of Policy Decisions on Noise Abatement Along Railroads

Performing Organization Name & Address:

Sponsoring Organization Name & Address:

Ministry of Public Health and Environmental Protection
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project is primarily concerned with the consequences of the noise zoning and the programmes of rationalization which this will entail. The results of this project will affect the stringency of the zoning and the rate of rationalization. This project should try to give some idea of the financial consequences of noise abatement measures. Finally, this project should indicate the basis on which a system on noise nuisance levies could be based.

Transcribed from the original.

Rail Noise Other
Netherlands

Project Title:
Research on Noise Abatement Requisites to be Imposed on the Purchase of New Rolling Stock

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Transport and Public Works
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project, using the results of other projects in this research programme, will draw up minimum noise abatement requisites to apply to new or renewed trains, freight cars, trams or undergrounds. In the second phase, new forms of rail transport will be looked into, such as the turbotrain, aerotrain, transrapid, transurban, etc. If test results are already available on these vehicles, they should be evaluated. This research project is not only concerned with developments in rail transport in Europe, but in America and Japan as well.

Transcribed from the original.

United Kingdom. Measurement and Analysis of Train Induced Ground Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. H. P. Verhas, J. B. Large, J. G. Walker. Publication: H.P. Verhas 1977 M.Sc. Dissertation, ISVR, University of Southampton. Measurement and analysis of train induced ground vibration.

United Kingdom. The Effect of Cuttings on Railway Noise Propagation. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. C. Glaretas, J. G. Walker, J. B. Large. Publication: C. Glaretas 1977 M.Sc. Dissertation, ISVR, University of Southampton. The effects of cuttings on railway noise propagation.

SURFACE VEHICLE COMPONENTS

ENGINES

See Also Pages:

36
37
43
46
47
241
302
344

Engines
Australia

Project Title:
Optical holography for the study of sound radiation from vibrating surfaces

Performing Organization Name & Address:
Dept. of Mechanical Engineering
University of Adelaide
Adelaide, South Australia
AUSTRALIA 5001

Sponsoring Organization Name & Address:
Department of Science
Australian Research Grants Committee
P.O. Box 449, Woden, A.C.T. 2606
AUSTRALIA

Principal Investigator(s):
David Alan Bies
Colin H. Hansen
Renzo Tonin

Type of Research Program:
X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Jan 1976

Completion Date:
Estimated Dec 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	$ 7,000
1977 (budget):	$50,000
1978 (forecast):	$19,000

Or Total Funding Amount:

COMMENTS: estimation in U.S. dollars.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

We have developed techniques for the interpretation of time averaged optical holograms to describe in detail the modal response of vibrating surfaces. Thus besides simple plates, we are presently investigating the modal motion of cylinders. In the latter case we are investigating the coupling between modes due to small irregularities in the cylinder walls. Additionally we are developing a process for locating sound sources on a vibrating surface using a combination of optical holography and pressure scanning.

Project Title:

The comittee of the engine noise control,RC-SC 43,

Performing Organization Name & Address:

The Japan Society of Mechanical Engineers.

4-9-2,Yoyogi,Shibuya-ku,Tokyo, 151,Japan

Sponsoring Organization Name & Address:

33 participants of the automobile industries. And Japan Autorace Organization.

Principal Investigator(s):

Chairman : Prof. Kiichi Fukuda
Manager : Prof. Shoichi Furuhama

And 12 professors.

Type of Research Program:

X Fundamental
X Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date: September 1976

Completion Date: Estimated August,1978 Actual _____

Funding:

Year	Amount
1976 (actual):	$ 55,000
1977 (budget):	$ 55,000
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

1) The research in noise control due to the vibration of the engine block by piston slap, crank shaft vibration and others.

2) The research in noise control due to the combustion in diesel engine and gasoline engine.

3) The research in noise control due to the cooling fan, and the inlet and exhaust gas flow.

4) The research of noise controling by the muffler and enclosing of the engine.

Project Title:

Engine Induced Noise in Cars

Performing Organization Name & Address:

Cranfield Institute of Technology
School of Automotive Studies
Cranfield, Bedford MK43 OAL

Sponsoring Organization Name & Address:

Science Research Council
PO Box 18
SWINDON SN1 5BW

Principal Investigator(s):

Dr S K Jha

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: June 1976

Completion Date: Estimated Sept 1979
Actual _____

Funding:

Year	Amount
1976 (actual)	$12169 est.
1977 (budget)	$26388 est
1978 (forecast)	$26388 est.
	$79101

Or Total Funding Amount: (£ 46,000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

OBJECTIVES:

Obtain a quantitative measure of the noise in a vehicle induced by engine excitation alone, evaluate the forces and torques generated and transmtited by the engine and establish the mechanism of transmission of such forces to the body.

METHODOLOGY

A mathematical model for the dynamics of the engine and transmission assembly will be constructed and the forces transmitted by the assembly into the vehicle structure will be evaluated. A mobility matrix assembly method will be used for this purpose. The transmitted forces through the engine mounts will be measured and compared with the theoretical prediction.

Correlation between the engine generated and transmitted force spectra and noise spectrum inside the car will be made and thus relative importance of various transmission paths will be established.

Project Title:

Diesel Combustion Noise

Performing Organization Name & Address:

Noise Control Group
Research Department
Lucas CAV Ltd
P O Box 36, Warple Way, Acton
LONDON W3 7SS

Sponsoring Organization Name & Address:

LUCAS CAV

Principal Investigator(s):

M F Russell
A J Herbert
G Balfour

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: April 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: 3 men continuously

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

OBJECTIVES

1. To define, and quantify the effects of, the factors which control the noise originating from the combustion process in diesel engines.

2. To quantify the effect of various noise-reducing modifications on noise, emissions economy and smoke.

First Report issued as SAE paper 770257 presented at International Automotive Engineering Congress and Exposition Detroit Feb/March 1977

Project Title:
Prediction and Control of Diesel Engine Noise

Performing Organization Name & Address:

Noise Research
Perkins Engines Ltd.
Eastfield
Peterborough
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

R. Southall
R. A. Pettitt
D. L. Mennell

Type of Research Program:

_x_ Fundamental
_x_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1973

Completion Date:
Estimated 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	3 Technical Staff & 3 Fitters
1977 (budget):	3 Technical Staff & 3 Fitters
1978 (forecast):	3 Technical Staff & 3 Fitters

Or Total Funding Amount:

COMMENTS: Three semi anechoic test chambers available

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The objective of the project is to develop a theoretical engine noise prediction model for use at the design stage and to evolve noise reduction methods. These techniques have been tried out on the design of a special quiet engine with a target noise reduction of 10 dBA.

The predictive approach is split into 2 major sections. The vibration of the engine surface is calculated using the Finite Element Method and then surface vibration is linked to radiated noise by use of a plate idealisation and the statistical energy method.

Initial results have shown good correlation of measured and predicted vibration up to 1 KHz. Variations above this frequency are presently being corrected by refinement of the force input calculations. The predictions of radiated noise from engine surface vibration have been shown to be very accurate. The technique has proved so successful that it is now incorporated in a regularly applied method of identifying major noise sources using measured vibration data.

The use of these new techniques has currently resulted in a noise reduction of 7 dBA being achieved with the experimental quiet engine. Work is continuing to improve the prediction techniques and to develop more effective noise reducing methods.

PUBLISHED PAPERS

1. "A Method of Determining the Effect of Design Changes on Diesel Engine Noise"
   M. G. Hawkins & J. M. O'Keeffe CIMAC 1975
2. "Analysis and Prediction of Engine Structure Vibration"
   M. G. Hawkins & R. Southall SAE 750832 August 1975
3. "The Application of Idealisation and Response Analysis to Diesel Engine Noise Assessment"
   P. J. Yorke SAE 750836, Aug. 1975.
4. "Diesel Engine Noise - Basic Studies Lead to Practical Reductions"
   J. Coulson & R. Southall SAE 760550 June 1976
5. "A Review of Engine Noise Control at Perkins Engines"
   R. Southall November/December issue of Noise Control

Engines
West Germany

Project Title:
New possibilities for development of quieter cooling systems for ICE devices especially motor vehicles.

Performing Organization Name & Address:
Anstalt für Verbrennungsmotoren
Prof. Dr. Dr. h.c. H. List (AVL)
A-8020 Graz, Kleiststrasse 48
West Germany

Sponsoring Organization Name & Address:
Forschungsvereinigung Verbrennungskraftmaschinen
Postfach 109, Lyonerstrasse 18
D-6 Frankfurt/Main-Niederrad 1
West Germany

Principal Investigator(s):
Dipl.-Ing. G.E. Thien
Dipl.-Ing. H.A. Fachbach
Dipl.-Ing. R.v. Hofe

Type of Research Program:
___ Fundamental
_x_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: April 1976

Completion Date: Estimated Mar 1980; Actual _____

Funding:

Year		Amount
1976 (actual):	$	58,000
1977 (budget):	$	81,300
1978 (forecast):	$	106,000

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The cooling-blower system, in addition to engine noise, intake and exhaust noise, forms one of the most essential parts of the total noise of present day vehicles. Since it could recently be shown how engine noise could be reduced and since efforts are being made to develop methods for the economic reduction of exhaust noise, there is an urgent necessity to find ways to reduce the noise caused by the cooling-blower system. The essential purpose of the research task is to come up with basic physical-technical data which concern the noise reduction of the total radiator-blower complex, whereby the special technical and economic requirements and the boundary conditions of aggregates driving the combustion engines are to be taken into account. The results of works are known which are concerned with the noise of blowers under favorable inflow and outflow conditions. Up until today, however, no even approximately sufficient data exist for the solution of the problem how a certain amount of heat can be conducted through a cooling-ventilation system without exceeding a certain sound level with minimum space requirement and the smallest possible expenditure of energy.

Transcribed and translated from the original German.

Engines
West Germany

Project Title: Development of New Techniques for the Design of Low-Noise Cooling-Ventilating Systems for Internal Combustion Engines, Particularly in Motor Vehicles

Performing Organization Name & Address:

Research Association for Internal Combustion Engines
Frankfurt, Lyoner Strasse 18
West Germany

Sponsoring Organization Name & Address:

Working Group of Industrial Research Associations

Principal Investigator(s):

Dipl. -Ing. Gerhard Thien

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1976

Completion Date: Estimated ____ Actual Dec. 31, 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(380,000 DM) $161,120

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Establishment of fundamental physical-technological data regarding noise abatement in cooling ventilating systems; description of the qualitative and quantitative effects of variable parameters affecting individual components as well as the total system, both in regard to their interaction and the functioning of the entire system.

Translated and transcribed from the original German.

Project Title: Research on Recently Developed Low-Noise Engines Regarding Correction Between Noise and the Parameters Affecting the Casing

Performing Organization Name & Address:

Research Association for Internal Combustion Engines
Frankfurt, Lyoner Strasse 18
West Germany

Sponsoring Organization Name & Address:

Working Group of Industrial Research Associations

Principal Investigator(s):

Dipl. -Ing. Gerhard Thien

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1975

Completion Date:
Estimated
Actual Dec. 31, 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(272,000 DM) $115,328

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Development of basic information on the noise generation in engines of a novel design ("skeleton" motors with body-noise-insulating outer casing). Experimentation with water and air cooled models of the new low-noise engine construction.

Translated and transcribed from the original German.

Project Title:
Reduction of Engine Noises in Motor Vehicles

Performing Organization Name & Address:
Porsche Corp.
Stuttgart, Porschestr. 42
West Germany

Sponsoring Organization Name & Address:
Federal Minister for Research and Technology

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Jan. 1, 1974

Completion Date:
Estimated _____
Actual August 31, 1976

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: (566,000 DM) $239,984

COMMENTS:

Translated and transcribed from the original German.

Project Title: Diesel Engines for Subcompact Cars with High Fuel Economy and Low Emission Level

Performing Organization Name & Address:

Research Divisions
Volkswagenwerk AG
Postfach
3180 Wolfsburg/W. Germany

Sponsoring Organization Name & Address:

Bundesminister für Forschung und Technologie
(Secretary of Research and Technology)
Postfach 12 03 70
5300 Bonn 12/W. Germany

Principal Investigator(s):

Mr. P. Hofbauer

Type of Research Program:

x Fundamental
x Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 10/01/75

Completion Date:
Estimated 09/30/78
Actual ___

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$ 500 000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Goals: - Disadvantages of the Diesel engine compared to the spark engines should be reduced and if possible eliminated
- high fuel economy
- low regulated emissions ($HC/CO/NO_x$)
- low unregulated emissions such as noize, odor, particulates

Approach: - Theoretical and hardware study
- Capsulated Diesel Engine

"We are running a program to improve Diesel engines applicable for subcompact cars. One major point of this program is noise reduction."
--excerpt from cover letter

Engines
Sweden

Project Title:

"Stirling Engine Development"

Performing Organization Name & Address:

Kommanditbolaget
United Stirling (Sweden) AB&Co.
Fack
201 10 Malmo 1, Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Our company is primarily dealing with Stirling engine development. Those engines are inherently quiet machines. Our noise abatement activities are because of this mainly devoted to auxiliary equipment like blower, radiator fan, compressor etc.

For demonstration of a low noise Stirling vehicle we are presently installing a 75 kW V4 engine in an 8 ton distribution truck. Predicted noise level is 76 dB(A), ISO R362, corresponding to 70 dB(A) SAE J 366a. Noise measurements will be made late 1977.

Transcribed from the original.

Engines
United Kingdom

Project Title: Combustion Modelling in Turbocharged Engines and Correlation with Noise

Performing Organization Name & Address:

University of Southampton
Institute of Sound and Vibration Research
Southampton SO9 5NH, United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

G. J. Hawksley
D. Anderton

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Publications:

G.J. Hawksley
1976 University of Southampton,
ISVR Memorandum No. 559
A computer programme for predicting the performance of a turbocharged diesel engine.

G.J. Hawksley
1976 University of Southampton,
ISVR Memorandum No. 563.
Turbocharging the high speed diesel engine.

Engines
United Kingdom

Project Title: Study of the Mechanically-induced Noise and Vibration in Diesel Engines Using Simulation Techniques

Performing Organization Name & Address:

Department of Transport Technology
Loughborough University
Leics. LE11 3tU United Kingdom

Sponsoring Organization Name & Address:

Perkins Engine Co. - Peterborough
and University of Technology, Loughborough, UK

Principal Investigator(s):

Dr. S. D. Haddad

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Aug. 1977

Completion Date: Estimated 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: M.Sc. research

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Considerable progress has been achieved in the understanding of the parameters which determine the noise radiated by automotive engines. The main sources of noise in engines are combustion, piston slap, bearing impacts, timing gear rattle, valve gear impacts and accessories. Combustion excitation can be reduced by turbocharging but at the same time piston slap excitation is usually increased. Therefore, it is important to study each single source in isolation using realistic simulation techniques to establish the controlling factors which facilitate an overall optimization of engine noise reduction. Experimental, digital and analogue simulation techniques have been developed (while at ISVR since 1970) to simulate the piston slap source. The experimental simulation rig, in particular, should help designers to study engine vibration and noise response at an early stage even before assembling and running the engine in a final format. Also, this technique has shown that the rate of rise of piston sideways force (K) is related to engine block vibration (V_R) as $V_R \propto \log (K)$.

Refinement and further work on piston slap is to continue with a view to adapting the simulation rig technique to simulate the other mechanically-induced noise sources in diesel engines.

References: S.D. Haddad "Study of diesel engine noise and vibration sources using simulation techniques" 16th FISITA International Congress in Japan (Paper 3-4) May 1976.

Transcribed from the original.

Project Title:

Minimum Mechanical Noise Levels in Diesel Engines

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Department of Transport Technology Loughbourgh University Leics. LE 11 3TU, United Kingdom	C. A. V. (Lucas) Ltd.
Principal Investigator(s): Dr. S. D. Haddad	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 31 July 1976 Completion Date: Estimated 31 July 1978 Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The project includes a survey of known methods of controlling mechanical noise with investigations to establish the minimum practical noise levels. This is to provide a realistic target for mechanical noise control measures in automotive diesel engines.

References: 1) S. D. Haddad, T. Priede and H. L. Pullen
"Relation Between Combustion and Mechanically-induced Noise in Automotive Diesel Engines" 15th FISITA International Congress held in Paris 13-17th May, 1974 (Paper A-3-4).

2) Wellworthy Ltd. - related internal reports on piston movement and engine noise - Haddad acting as collaborator and consultant. (1971 - 1975)

Publications
First Report submitted: No. SH/77/1 July 1977

Transcribed from the original.

Engines
United Kingdom

Project Title: Optimisation of Design Parameters for Quieter Diesel Engines

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
University of Southampton Institute of Sound and Vibration Research Southampton SO9 5NH, United Kingdom	
Principal Investigator(s): C.M.P. Chan D. Anderton E.C. Grover N. Lalor T. Priede	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / **Completion Date:** Estimated _____ Actual _____	**Funding:** Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

Publications:

T. Priede and R.D.H. Perry
1976 International Congress of the Environment
Paris.
Vehicle noise and control.

C.M.P. Chan, D. Anderton and T. Priede
1976 University of Southampton, ISVR
Memorandum No. 562
S.R.C. Final Report: Low noise engine design data for authomotive industry.

Transcribed from the original

Project Title:
Mechanical Noise Investigation

Performing Organization Name & Address:
Ricardo & Co. Engineers (1927) Ltd.
Bridge Works,
Shoreham-by-Sea,
Sussex BN4 5FG. ENGLAND.

Sponsoring Organization Name & Address:
Ricardo & Co. Engineers (1927) Ltd.
Bridge Works,
Shoreham-by-Sea,
Sussex BN4 5FG. ENGLAND.

Principal Investigator(s):
B.J. Challen
K.A. Atkins

Type of Research Program:
X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: May 1977

Completion Date: Estimated June 1977
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The object of this programme is to investigate the sources of mechanical noise in a prototype high speed IDI diesel engine by means of motoring the engine and successively removing mechanical components.between tests. This project is being undertaken as an internal research programme.

Switzerland. Noise Radiation from Truck Diesel Engines. Interkeller AG/SA, 8052 Zurich, Switzerland. I. Summerauer.

United Kingdom. Piston Engine Exhaust Noise Source Characterization. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. P.O.A.L. Davies, M. Bhattacharaya.

United Kingdom. I. C. Engine Exhaust Noise Source Modelling. University of Southampton, Institute of Sound and Vibration Research, Southampton, SO9 5NH, United Kingdom. P. O. A. L. Davies, M. Bhattacharya.

United Kingdom. Damping of Lightweight Engine Covers Using Rubber Inserts. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor.

United Kingdom. Injection Equipment Noise and Pump Mounting System. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. L. Pullen, T. Priede.

United Kingdom. Mechanical Noise of Petrol Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Baker, E. C. Grover.

United Kingdom. The Evaluation of Polymers for Suitability for Damping in Automotive Engineering Applications. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. R. F. Halliday, E. C. Grover.

United Kingdom. Study of Minimal Cooling Systems and Associated Noise Reduction Design Features. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. W. P. Mansfield, T. Priede.

United Kingdom. Prototype Quiet Engines for Low Noise Lorry Project. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. E. C. Grover, R. D. H. Perry, R. F. Holliday, G. Brazeley.

United Kingdom. Optimisation of Engine structures for Low Noise by Modelling Techniques. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. M. Petyt, N. Lalor, D. Crocker, E. Gardiner, N. Erotokritos. Publication: C.M.P. Chan, J. Dixon and D. Anderton 1977 University of Southampton, ISVR Memorandum No. 565. A comparison of the noise and vibration characteristics of the Rover 2¼ litre diesel in 3 and 5 bearing form.

United Kingdom. Low Noise Engine Design. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. E. C. Grover, G. Bazeley, P. Prust, T. Priede. Publication: T. Priede and R.D.H. Perry 1976 International Congress of the Environment, Paris. Vehicle noise and control.

United Kingdom. Piston Slap Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor, J. Dixon, T. Priede.

United Kingdom. Effect of Oil Film on Impact Noise in Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. K. Ewida, N. Lalor.

United Kingdom. Optimisation of Oil Lubrication Characteristics to Reduce Impact Noise in the Bearings of Internal Combustion Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Baker, E. C. Grover.

United Kingdom. Structural Damping on A Running Engine. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. K. Abideen, N. Lalor.

United Kingdom. Axial Vibrations of Engine and Transmission. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor.

United Kingdom. Experimental Techniques to Determine Minor Modifications of Engine Structures for Reduced Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor, D. Anderton, J. Baker, J. Dixon, G.W. Gardiner, C.M.P. Chan, N. Erotokritos. Publication: C.M.P. Chan, J. Dixon and D. Anderton 1977 University of Southampton, ISVR Memorandum No. 565 A comparison of the noise and vibration characteristics of the Rover 2¼ litre diesel in 3 and 5 bearing form.

United Kingdom. I. C. Engine Inlet Noise Sources. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United KIngdom. P. O. A. L. Davies.

West Germany. Development of Noise Attenuating Engine Enclosures. Heinrich Gillet KG, 6732 Edenhoben, Postfach 100, West Germany.

SURFACE VEHICLE COMPONENTS

EXHAUST MUFFLERS

See Also Pages:

37
43
47
188
192

Project Title:
Exhaust Systems; Effect of Typical Failures on Emitted Noise

Performing Organization Name & Address:

Motor Industry Research Assoc.
Watling Street
Linchley nr Nuneaton
Warwickshire, United Kingdom

Sponsoring Organization Name & Address:

Department of the Enviroment Vehicle Engineering Division

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
Feb 1975	Estimated _____ Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(£ 827) $ 1422

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To demonstrate the effect of common failures of vehicle exhaust systems on the noise emitted by the vehicle under specified test conditions.

Transcribed from the original

Project Title: Theoretical and experimental Study of Single and Multiple Chamber Muffler Design on Muffling of Exhaust Noise.

Performing Organization Name & Address:
Anstalt fur Verbrennungsmotoren
Prof. Dr. Dr. h.c. H. List (AVL)
A-8020 Graz, Kleiststrasse 48
West Germany

Sponsoring Organization Name & Address:
Forschungsvereinigung Verbrennungskraftsmaschinen
Postfach 109, Lyonerstrasse 18
D-6 Frankfurt/Main-Niederrad 1
West Germany

Principal Investigator(s):
Dipl.-Ing. G. E. Thien
Dr. K. P. Mayer
Dipl.-Ing. B. Nowotny

Type of Research Program:

___ Fundamental
_X_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1976

Completion Date:
Estimated Dec. 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	$118,000
1977 (budget):	$ 93,000
1978 (forecast):	$105,000

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The calculation methods used up to today, based on purely acoustical, that is to say linear equations for gas throughput and the damping mechanism of exhaust gas noise dampers for noises with internal combustion provide no sufficient agreement between calculation and measuring results. The design of mufflers is thus done in a largely empirical manner. With the use of pertinent information, we were successful in producing acoustically highly effective mufflers with a sufficiently small flow resistance, admittedly without the guarantee that these mufflers represent optimum solutions with regard to weight, constructional volume and cost.

In the course of the research project, with the use of modern computation methods and test techniques, ways and possibilities are to be sought for predicting and pre-calculating the effect of noise-damping mechanisms in the exhaust systems of internal combustion engines with sufficient accuracy. The path to a solution is built on the most recent development of finite difference methods for the calculation of the spontaneous formation of pressure waves in compressible media, which were set up for solving the problems of gas dynamics in the USA.

Translated and transcribed from the original German.

Project Title:
Theoretical and Experimental Study of Single- and Multi- Chamber Filter for Exhaust Gas Noise Abatement

Performing Organization Name & Address:
Research Association for Internal Combustion Engines
Frankfurt, Lyoner Strasse 18
West Germany

Sponsoring Organization Name & Address:
Working Group of Industrial Research Associations

Principal Investigator(s):
Dipl. -Ing. Gerhard Thien

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Jan. 1, 1976

Completion Date:
Estimated _____
Actual Dec. 31, 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(500,000 DM) $212,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Development of a computation method for the design of exhaust gas sound mufflers for internal combustion engines. Utilization of a new computation method-- similar to that of the "finit-element-method"--which makes it possible to calculate cross section variations. Execution of supplementary tests to determine coefficients for damping and flow lasser and to verify the accuracy of the computation formulas.

Translated and transcribed from the original German.

Project Title: Noise Reduction in Alternative Intake and Discharge Systems.

Performing Organization Name & Address:	**Sponsoring Organization Name & Address:**
Alfa Romeo S.p.A	
Principal Investigator(s):	Type of Research Program: ___ Fundamental X Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976	**Completion Date:** Estimated 1977; Actual 1978
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.) This is a research program for the improvement of the acoustical behavior of intake and exhaust systems. The article states the following points:	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

1) Additional bases for elementary acoustical theory (one dimensional and with no average discharge) in the physical models of various types of mufflers (reflection, absorption, etc.).
2) Experimental calculation and measurement, with proper equipment, of transmission loss of the chamber.
3) Refinement of mathematical models eventually leading to a theory of no average discharge with more dimensions.
4) A program of calculation for the study of acoustical systems formed by the combination of various mufflers.
5) Optimization of configurations of similar acoustical systems. Theoretical and experimental analysis in relation to the spectral conditions of the excitement.
6) Definition of prototypes to be proven on the car.

Translated and transcribed from the original Italian.

Project Title:
Noise-shielding properties of exhaust systems

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Public Health and Environmental Hygiene Dept. Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, Production) ___ Measurement Methodology
Start Date: Est. 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This research project has the purpose of acquiring basic data with regard to the taking of the executive decision on the basis of article 10 of the noise nuisance bill regarding the noise-shielding properties of certain exhaust systems with the purpose of making trade in so-called sport exhausts impossible. The manipulation aspects will also be involved in the study.

Translated and transcribed from the original Dutch.

Project Title:
Prediction of noise from silencer configurations.

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Department of Mech. and Industrial Eng., The Queen's University of Belfast, Ashby Institute, Stranmillis Road, Belfast, N.Ireland BT9 5AH	Volvo A.B., Sweden

Principal Investigator(s):

Professor G. P. Blair

Type of Research Program:

- X Fundamental
- X Development (Component or System)
- ___ Demonstration (Experimental, Prototype, or Production)
- ___ Measurement Methodology

Start Date:	Completion Date:
1/1/76	Estimated ___ Actual 30/12/77

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	Confidential
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This research work again followed the lines of our fundamental studies which have been published under SAE papers Nos.720155, 730160 and 740713, and in this case these programs were constructed for the specific purpose of analysing the noise output from any conceived pressure input characteristic with respect to time arriving at any one of three types of silencer configuration and predicting the noise produced thereby in space at a predetermined microphone position. The levels of attenuation could be assessed for any new silencer design and the back-pressure on the engine and in the silencer box could be predicted either dynamically or as a mean pressure level.

Project Title:
Design of Diesel Engine Silencers

Performing Organization Name & Address:
Dept. of Mech. and Industrial Eng.,
The Queen's University of Belfast,
Ashby Institute,
Stranmillis Road, Belfast, N. Ireland, BT9 5AH

Sponsoring Organization Name & Address:
Confidential

Principal Investigator(s):
Professor G. P. Blair

Type of Research Program:
___ Fundamental
_X_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1/8/76

Completion Date:
Estimated 1/8/77
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	Confidential
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This work is aimed at the design and development of silencers for diesel engines from 1 - 8 cylinders of the turbo-charged two-cycle and four-cycle type with outputs ranging from 100 - 1000 h.p. This project follows the basic development lines illustrated in SAE papers Nos. 720155, 730160 and 740713. The results show good broad-band attenuation in the three basic requirement levels of non-critical, industrial, urban, residential and critical residential area utilisation. The reports generated are confidential and will not be published.

Project Title:
Silencer Development. Quiet Heavy Vehicle.

Performing Organization Name & Address:

Southampton University
Institute of Sound and Vibration Research
Highfield, Southampton SO9 5NH
United Kingdom

Sponsoring Organization Name & Address:

Transport and Road
Research Laboratory

Principal Investigator(s):

P.O.A.L. Davies
W. Adams

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
April 1973	Estimated _____ Actual Apr 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To produce optimised silencer design layouts for two specified heavy diesel truck engines to meet Motor Industries Research Association's specifications. To investigate new fundamental methods for improving silencer performance.

Publication:

P.O.A.L. Davies and W.J. Adams 1976
University of Southampton, ISVR Contract
Report No. 76/12. Quiet Heavy Vehicle
Project: The design of exhaust silencers.

Transcribed from the original.

France. Noise From Exhaust Outlet of a Vehicle. Bertin et Cie, B. P. No. 3, F-78370 Plaisir, France. 1977.

United Kingdom. Tailpipe Noise Sources. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. C. L. Morfey. A geometric acoustics model has been constructed for sound transmission through a variable area duct with flow, and radiation out through the exhaust.

United Kingdom. The Design of High Performance Exhaust Silencers. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. P. O. A. L. Davies.

SURFACE VEHICLE COMPONENTS

POWER TRAIN

Project Title:
Crankshaft Vibrations

Performing Organization Name & Address:
Cranfield Institute of Technology
School of Automotive Studies
Cranfield
Bedford MK 43 OAL
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):
D. Hodgetts

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To carry out further experiments on various multi-cylinder engines. To check the ability of the theoretical model to predict the frequencies, amplitudes and model shapes for the whirling modes of vibration. Associated with this work are two doctorate studies of the hydrodynamic constraints that a journal bearing imposes on the shaft.

Transcribed from the original.

Power Train
Abbreviated Listings

United Kingdom. Effect of Crank-Mechanism and Gearbox on In-Line Engine Modes and Natural Frequencies. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor.

United Kingdom. Transmission and Gearbox Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Baker, R.D.H. Perry.

SURFACE VEHICLE COMPONENTS

TIRES

See Also Page:

43

Project Title:

Development of quieter tires and road surfaces

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
IFM Akustikbyrån AB Warfvinges väg 26 S-112 15 Stockholm, Sweden	National Swedish Board for Technical Development
Principal Investigator(s): Nils-Åke Nilsson	Type of Research Program: _x_ Fundamental _x_ Development (Component or System) ___ Demonstration (Experimental, Prototype, Production) _x_ Measurement Methodology
Start Date: 1 Nov 1976*	Completion Date: Estimated 1 Nov 1977 Actual _____
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	Funding: Year — Amount 1976 (actual): $ 73,000 1977 (budget): $ 63,000 1978 (forecast): $ 78,000 Or Total Funding Amount: COMMENTS:

Report:	Author:	Report No.
Generating mechanisms for external tire noise	N Å Nilsson	TR 3.709.14 (English)
Parametric influences of external tire noise	N Å Nilsson	TR 3.709.15 (English)
Tire noise and tire vibration bibliography	N Å Nilsson	TR 3.709.05 (English)
Laboratory measurements of external tire noise Discussions at BASt	N Å Nilsson U Sandberg	TR 4.283.01 (English)
Report from travels for the purpose of study in the United States of America	N Å Nilsson	TR 4.283.03 (Swedish)
Radiation of airborne sound due to contact-patch excited vibrations	N Å Nilsson S Söderqvist	TM 3.709.05 (English)
Measurement of vibrations of in-service tires Pre-study at Gislaved Tire and Rubber Company	O Bennerhult N Å Nilsson	TR 4.283.04 (English)

* Due to delay in scheduling this project the project couldn't start July 1st but Nov. 1st. The financial years are therefore running 1 Nov. to 31 Oct.

Project Title: Developing a method for characterizing tires with respect to external tire noise.

Performing Organization Name & Address:
IFM Akustikbyran AB
Warfvinges vag 26
S-112 51 Stockholm Sweden

Sponsoring Organization Name & Address:
National Swedish Board for Technical Development

Principal Investigator(s):
Nils-Ake Nilsson
Ove Bennerhult

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	$20,000
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The characterization of tires with respect to tire noise is essential when measuring noise from the contact mechanism when a tire is rolling over a road surface. It is necessary to control parameters as rubber hardness, tread pattern and other fundamental characteristics of a tire with respect to external noise.

During the project methods for doing this will be worked out and tested to real measurements of external tire noise to see how different tire parameters correlate to external tire noise.

Project Title:
Road Surface Characterization with Respect to Type of Noise.

Performing Organization Name & Address:
National Swedish Road and Traffic Research Institute, Road User and Vehicle Research Dept.
Fack
S-58101 Linkoeping, Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):
U. Sandbery

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Oct. 1976

Completion Date:
Estimated June 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$150,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Methods will be developed for characterization of road surface properties influencing vehicle noise and the methods will be used for estimation of these properties. The purpose is to make it possible to define a road surface with respect to its influence on tyre noise. The investigations include theoretical studies and constructional work concerning test equipment and characterization methods as well as experiments, tests and measurements in situ. It is intended to develop a measuring equipment for registration of road surface profiles (macrotexture). Comparison will be made between tyre noise generated on the surfaces for three types of passenger tyres and the physical properties of the surfaces measured by the developed methods.

Transcribed from the original.

Project Title:
Tyre Noise-Influence of Tyre and Road Surface

Performing Organization Name & Address:

IFM-Bureau of Acoustics Co.
Warevinges Valg 26
S-112 51
Stockholm, Sweden

Sponsoring Organization Name & Address:

Swedish Board for Technical Development
Liljeholmsvaegen 32
S-900 72
Stockholm, Sweden

Principal Investigator(s):

G. Godefelb

N.A.A. Nilsson

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Oct.1974

Completion Date:
Estimated _____
Actual June 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: $50,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The influence of different parameters on the tyre-road surface system is studied. A series of tests will be performed which in the long run should lead to type-road to tyre-road surface structures that cause lower noise emissions.

Transcribed from the original.

Tires
Sweden

Project Title: Characterization of Pavements with Relevance to "Tire-Noise-Generation" Measurement of Water-Pavement/Water-Tire Interfacial Energy

Performing Organization Name & Address:

Swedish Institute for Surface Chemistry
Box 5607
S-11486
Stockholm, Sweden

Sponsoring Organization Name & Address:

National Swedish Road and Traffic
Research Institute
Fack
S-58101
Linkoeping, Sweden

Principal Investigator(s):

L. Kaell

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: June, 1977

Completion Date:
Estimated _____
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$1,000

COMMENTS:

One of the factors that influences tire noise generation is the presence of water on the pavement. This project aims at a preliminary evaluation of the role of interfacial energies between water-pavement and water-tire for this noise generation. The methods used will be contact angle measurements.

Transcribed from the original.

Project Title:
Rolling Noise of Tires

Performing Organization Name & Address:
Ingenieurschule HTL
Automobilabteilung
Quellgasse 3
CH-2500 Biel 3

Sponsoring Organization Name & Address:
- Eidg. Polizeiabteilung
  Ch-3003 Bern
- Eidg. Amt für Umweltschutz
  CH-3003 Bern

Principal Investigator(s):

Type of Research Program:

__X__ Fundamental
____ Development (Component or System)
____ Demonstration (Experimental, Prototype, or Production)
__X__ Measurement Methodology

Start Date: Spring

Completion Date:
Estimated ____
Actual Summer 1976

Funding:

Year	Amount
1976 (actual):	(Fr. 16000.) $6395
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Purpose: Can a method be developed with the aid of a suitable rolling test stand to measure the rolling noise of tires?

- Study of the correlation quality of measuring results between road and rolling test stand.

Results:

- A measuring method equivalent to the street should be developed for the rolling test stand.
- Differences of the different tested tires exist with regard to noise values and frequencies; the differences of the studied tires however are smaller than the influence of the different street linings.

Translated and transcribed from the original German.

Project Title:

Low frequency noise generated by rolling tyre/road interaction.

Performing Organization Name & Address:

Dept. of Mechanical Engineering
University of Birmingham,
South West Campus, P.O. Box 363,
Birmingham B15 2TT.

Sponsoring Organization Name & Address:

Science Research Council, London
British Leyland Ltd., Birmingham
Ford Motor Co. Ltd., Basildon

Principal Investigator(s):

Dr. B. Mills
Dr. J. W. Dunn

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1974

Completion Date:
Estimated 1979
Actual _____

Funding:

Year	Amount	
1976 (actual):	(£14,000)	$24074
1977 (budget):	(£19,000)	$32672
1978 (forecast):	(£25,000)	$42990

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To measure the 3-dimensional point mobilities of the wheel hub of a vehicle without wheels and tyres and to combine them with compatible parameters of the rolling tyre and to examine the influence that the rolling tyre/vehicle interaction has on the vibration characteristics of the vehicle and the noise generated inside the structure. To achieve these aims attention has been strongly focussed on the problem of relating the vibration pattern of the structure to the measured noise level inside it. Also included is an attempt to predict sound pressure levels using simple radiation theory and measured panel velocity data. This latter aspect of the project has led to techniques by which the dynamic performance of a structure can be quantified with respect to excitation at any road or drive-line input station. Dynamic performance parameters have been established for a range of current and prototype vehicle structures.

Project Title:

Laboratory Investigations of Vehicle/Rolling Tyre Interaction and Its Relation to Low Frequency Generated Noise.

Performing Organization Name & Address:
Birmingham University
Dept. of Mechanical Engineering
P. O. Box 363
Birmingham, B15 2TT
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council

Principal Investigator(s):

B. Mills
J. W. Dunn

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Nov 1973

Completion Date:
Estimated ____
Actual Mar 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: (£ 31,800) $ 54,683

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

To measure the 3-dimensional point mobility of the wheel hubs of a vehicle without wheels and tyres and to combine them with compatible parameters of the rolling tyre, in order to establish a broad band vibration analysis of a complete vehicle, and to examine the influence that this 3-dimensional vehicle/tyre interaction has on the vibration and noise generation inside vehicle structures.

Transcribed from the original.

Project Title:

Origins of Tyre Noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Transport and Road Research Laboratory Old Wokingham Road Crowthorne, Berks, United Kingdom	Department of Transport Department of Environment Marsham Street London, United Kingdom
Principal Investigator(s): MCP Underwood G. Winney J. Vaughan	Type of Research Program: __x__ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1971 / Completion Date: Estimated 1978, Actual ____	Funding: 1976 (actual): (£20K) $34,392 1977 (budget): (£10K) $17,196 1978 (forecast): (£ 5K) $ 8,598 Or Total Funding Amount: COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

1) To study the causes of tire noise and model the transfer of energy from road surface input to radiation of noise from tire and road.

2) To identify the quietest commercially available tires for use on the Quiet Heavy Vehicle.

3) To determine by practical tests, the effects of varying the various parameters affecting tire noise, e.g. mass of tread belt, tread pattern, wall thickness, casing material, etc. Results on radial construction tires show that this type can be 2-3dB(A) quieter than mono-ply.

Transcribed from the original.

Project Title:

Study of Feasible Reductions in Noise from Rolling Tires

Performing Organization Name & Address:

Federal Highway Institute
Postfach 51 05 30
Bruehlerstr. 1
5 Koeln 51 West Germany

Sponsoring Organization Name & Address:

Federal Transport Ministry
Postfach 100
53 Bonn-Bad Godesberg 1
West Germany

Principal Investigator(s):

Dr. S. Ullrich

Type of Research Program:

_X_ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 4/1977

Completion Date: Estimated 6/79
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$63,600 (DM 150,000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The origin of tire noise. Tire noise on normal roads and on a special rotating drum test stand. Relationship between tire noise and road pavement (surface). Effects of tire material and tread design. Classification of tires now on the market with regard to their noise emission.

Translated and transcribed from the original German.

Tires
West Germany

Project Title:

Noise Generated by Travel on Wet Surfaces

Performing Organization Name & Address:	**Sponsoring Organization Name & Address:**
Institute for Acoustical Technology Tech. Univ. Berlin Berlin 10, Einsteinufer 27 West Germany	German Research Society
Principal Investigator(s): Prof. Dr. Manfred Heckl	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / **Completion Date:** Estimated _____ Actual _____	**Funding:** Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: (63,000 DM) $26,712
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

The noises generated by rolling depend in part on whether the surface is wet or not. For example, tires on wet streets. On the basis of simple tests, it is to be ascertained to what extent this type of noise generation depends on travel velocity and the surface tension of the fluids involved.

Translated and transcribed from the original German.

Tires
Canada

Project Title:

Effects of Road Surfaces on Two Common Types of Tire

Performing Organization Name & Address:

Ontario Minstry of the Environment
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5
Canada

Sponsoring Organization Name & Address:

Principal Investigator(s):

Geoff Murphy

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Sound level measurements taken close to the rear wheel of a window type van when fitted with (a) snow tires; (b) rib tires; and driven over 5 different road surfaces ranging from smooth asphalt to rough plastic grooved concrete indicate an overall "A" weighted level increase of approximately 10 dBA for Rib Tires and 5 dBA for Snow Tires. Other stationary monitoring tests conducted before and after diamond cut grooving was introduced into concrete sections of Hwy. 401 show an average increase to the hourly L_{eq} of 1.7 dBA at a point 75 feet from the edge of the modified pavement and 0.9 dBA at 138 feet from the same point.

Transcribed from the original.

Tires
Sweden

Project Title:
Tire Noise Measuring Methods

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
National Board for Technical Development Stockholm, Sweden	
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Mar 1974 / Completion Date: Estimated ____ Actual Mar 1976	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): - Or Total Funding Amount: - COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Parameter studies and screening. The aim is to obtain reproducible measurements of tire noise, to study the influence of different parameters on the sound generation mechanism of tire and road surface, and to develop vehicle screens to prevent the diffusion of the noise.

Transcribed from the original

Tires
Switzerland

Project Title:

Study of Rolling Noise from Automobile Tires

Performing Organization Name & Address:
Kantonales Technikum Biel (KTB)
Automobiltechnische Abteilung, 2500 Biel
Eidg. Material- und Versuchsanstalt
EMPA, Abteilung Akustik
8600 Dubendorf, Switzerland

Sponsoring Organization Name & Address:
Eidg, Amt fUr Umweltschutz, 3003 Bern
im Einvernehmen mit der:
Eidg. Polizeiabteilung, 3003 Bern
Switzerland

Principal Investigator(s):

1. Herrn P. Wittwer, Dozent
2. Herrn Dr. R. Hofmann

Type of Research Program:

X
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
__X Measurement Methodology

Start Date:
Aug. 1976

Completion Date:
Estimated _____
Actual ___ Summer 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The results of the study should be useful in clarifying whether with the aid of a suitable rolling test stand a method can be developed for measuring the rolling noise of tires.

Even if a type testing method for passenger cars does not appear to have first priority for noise combatting, the introduction of boundary values must still be discussed with truck tires. To be sure not in the sense of a comprehensive type testing, but rather to eliminate the few tires which cause an audible howling tone on superhighways.

However, the efforts should go in the direction of low-noise street coverings parallel to all tire tests.

Translated and transcribed from the original German.

Tires
United Kingdom

Project Title:
Improving the Prediction of the Effects of Road Surface on Traffic Noise

Performing Organization Name & Address:

Transport and Road Research
Laboratory
Crowthorne
Berkshire, United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Transcribed from the original.

Tires
West Germany

Project Title:

Generation of Noise by Rolling Motor Vehicle Tires

Performing Organization Name & Address:

Institute for Mechanics
Technical Inst. Darmstadt
Darmstadt, Hochschulstr. 1
West Germany

Sponsoring Organization Name & Address:

Principal Investigator(s):

Prof. Dr. Peter Hagedorn

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1976

Completion Date: Estimated _____ Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Experimental and theoretical studies on the genesis of tire noises. Measurements at the test bed and on the street. Possibly, suggestions on how to reduce these noises.

Translated and transcribed from the original German.

SURFACE VEHICLE COMPONENTS

OTHER

Surface Vehicle Components Other
Sweden

Project Title:

Limitation of the Sound Level of Vehicle Engine Cooling Systems

Performing Organization Name & Address:

Chalmers University of Technology
Department of Internal Combustion Engineering
Fack
S-40220 Goeteborg 5, Sweden

Sponsoring Organization Name & Address:

National Swedish Board for Technical Development
Fack
S-10072
Stockholm 43, Sweden

Principal Investigator(s):

L. Collin

A. Pettersson

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: July 1975

Completion Date: Estimated July 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$110,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The aim of the project is to minimize the noise emission level of cooling systems for vehicle engines.

Transcribed from the original.

Project Title:
Tyre Noise Screening

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
IFM - Bureau of Acoustics Co. Warevinges Vaeg 26 5-112 51 STockholm Sweden	Swedish Borad for Technical Development Liljeholmsvaegen 32 S-100 72 Stockholm, Sweden

Principal Investigator(s):

G. Gadefelt
P. Voigt

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
Oct. 1974	Estimated _____ Actual June 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: $55,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project aims at developing screens to be attached to road traffic vehicles that prevent tyre noise environment. A number of different types of screens are made and attached to vehicles. Measurement of tyre noise levels from freely moving vehicles are made at a distance of 7.5 M. The tests are performed on dry and wet road surfaces and at varying speeds. The noise reducing effect of different screen alternatives and their properties in practical use are studied. The result from a preliminary test suggests that reductions in tyre noise level of about 3 dB(A) in practical use can be expected.

Transcribed from the original.

Surface Vehicle Components Other
United Kingdom

Project Title:

Noise From DPA Pumps

Performing Organization Name & Address:

Noise Control Group
Research Department
Lucas-CAV Ltd
P O Box 36, Warple Way, Acton,
London W3 7SS

Sponsoring Organization Name & Address:

Lucas C.A.V.

Principal Investigator(s):

M F Russell
A J Herbert
S W Nicol

Type of Research Program:

_x_ Fundamental
_X_ Development (Component or System)
_X_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1974

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: 1 man continuously

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

OBJECTIVES

1. To develop a complete understanding of the noise generating process in the DPA diesel fuel injection pump

2. To examine all ways of controlling noise from this pump

3. To demonstrate practical means of noise control for this pump

First report issued as SAE paper "Identification and Modelling of Rotary Diesel Fuel Injection Pump Noise Process" presented at Milwaukee in Sept 1975 (SAE publication SP 397)

Project Title:

Noise Stresses Caused by Commercial Vehicles.

Performing Organization Name & Address:

Chair and Institute for Motor Vehicle Technology,
Hannover Techn. Univ.
Hannover, Nienburger Strasse 1, WG

Sponsoring Organization Name & Address:

German Research Society

Principal Investigator(s):

Dipl.-Ing. Siegfried Jaekel

Start Date: Apr 1,1973

Completion Date: Estimated _____ Actual _____

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(200,000 DM) $ 84,800

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This research project is to contribute to a reduction of noise-induced stresses caused by commercial vehicles. The noisiness of the engines is well-known and is not the object of this study. Rather, there often are--in addition to the intrinsic vehicle sound--pulsating or pulse-like adjunct noises (e.g. rattling, squeaking, etc. caused by shifting of structural components and of super structures) which stand out--often by their very intensity--because of the irritation and annoyance which they cause.

Translated and transcribed from the original German.

Surface Vehicle Components Other
Italy

Project Title: A Digital Analysis Method for Determining the Contribution of Various Transmission Methods of Noise Into the Passenger Compartment of a Car.

Performing Organization Name & Address:	**Sponsoring Organization Name & Address:**
Alfa Romeo S.p.A.	
Principal Investigator(s):	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) X Measurement Methodology
Start Date: 1977 / **Completion Date:** Estimated 1978, Actual ____	**Funding:** Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The search for an experimental method of determining transfer functions among various inputs and outputs of a system without separate recurring excitement from the various inputs. The transfer functions, along with other input and output characteristics permit the deduction of the contribution of each input and output. The deeper problems concern principally:

1) The possibility of individualizing the inputs.
2) The possibility of having (eventually artificially) inputs that aren't terribly correlated with a sufficient precision upon determination of the transfer functions.
3) Eventual precision studies on relief and influence of its results.

Translated and transcribed from the original Italian.

France. Noise Reduction by Covering the Motor and Mechanical Parts. Bertin et Cie, B.P. No. 3, F-78370 Plaisir, France. 1977.

Switzerland. The Body as Transmission Element Between the Sources and the Passenger Compartment. Interkeller AG/SA, 8052 Zurich, Switzerland. P. Gillard.

Switzerland. The Transmission to the Vehicle Body through the Engine Mounts and the Measurement of their Dynamic Characteristics. Interkeller AG/SA, 8052 Zurich, Switzerland. B. Braune, F. Sommer.

MEASUREMENT AND ENFORCEMENT
METHODOLOGY AND STANDARDS

See Also Pages:

33
38
43
44
59
79
80
81
82
83
89
94
110
113
115
169
180
181
184
208
235
237
245

Methodology and Standards
Australia

Project Title:
Noise Source Identification on Automotive Engines

Performing Organization Name & Address:
Dept. Mech. Engineering,
Monash University
Clayton
Vic. Australia 3168

Sponsoring Organization Name & Address:
Monash University

Principal Investigator(s):
Dr. Robin J. Alfredson

Type of Research Program:
x Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
x Measurement Methodology

Start Date: 10/76

Completion Date:
Estimated 12/77
Actual ____

Funding:

Year	Amount
1976 (actual):	
1977 (budget): ($1000)	$1110
1978 (forecast): ($1000)	$1110

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A digital intensity device has been developed which measures directly acoustic intensity. It is based on a high speed analogue to digital converter coupled directly to a digital computer. The ADC receives signals from two microphones via a dual precision amplifier.

The device is being used in the near field of an automotive engine in order to identify regions of high acoustic intensity and hence regions radiating high levels of acoustic power. Tests to date have been very promising. The first report will be at the NOISE-CON 77 to be held in Virginia NSA in October, 1977.

Transcribed from the original.

Project Title:

Community Noise Measuring Instruments

Performing Organization Name & Address:

National Research Council of Canada
Division of Physics
Acoustics Section
Ottawa, Canada K1A 0R6

Sponsoring Organization Name & Address:

Principal Investigator(s):

G. S. K. Wong

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year		Amount
1976 (actual):	($50,000)	$47,140
1977 (budget):	($50,000)	$47,140
1978 (forecast):	($50,000)	$47,140

Or Total Funding Amount:

COMMENTS:

Miniature Sound Level Meter
In July 1976, Canadian Patents and Development Ltd. selected Richard Brancker Research Ltd. of Ottawa as licensee for this instrument. Manufacture is expected to commence in February 1977. The instrument is capable of measuring A-weighted levels as low as 40 dB and has a dynamic range of 80 dB plus a crest factor of 14 dB. A low-power-consumption detector based on implicit computation provides true-rms values of the input signal. The display is a column of LED's driven by a special circuit.

Instruments for Measuring Community Noise Indices
Two economically attractive noise-level monitoring instruments are under development. The first instrument is for the measurement of equivalent sound level (L_{eq}); and the second instrument is basically a portable (L_x) data logging system for the assessment of the percentage "X" of the time that a certain level of noise "L" is exceeded. Values of L and L_x are of importance as community noise indices. An analogue input circuit with self-contained auto-ranging, which is suitable for these and other applications, has been designed and constructed. According to preliminary tests, the dynamic range of the system is at least 95 dB plus a crest factor of 14 dB and the resolution is better than 0.1 dB.

Transcribed from the original.

Project Title:

Exterior Vehicle Noise and Health Impairment Effects on People

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Sound and Vibration Laboratory Faculty of Engineering Science The University of Western Ontario London, Ontario, Canada, N6A 5B9	Federal Ministry of Transport (Canada) Ottawa, Ontario Canada
Principal Investigator(s): Dr. J.S. Bradley Prof. J.E.K. Foreman Mr. Brian Jonah	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) _X_ Measurement Methodology
Start Date: May 1974 Completion Date: Estimated / Actual May 31, 1977	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: ($126,000) $118,793 COMMENTS: Phase I (May 1974-75) -($28,000) $26,398 Phase II (May 1975-77) -($98,000) $92,395
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The Laboratory has just completed a study for the Canadian Ministry of Transport on external vehicle noise and its subsequent health impairment effects on people. The purpose of the study was to more definitely establish criteria for acceptable future external vehicle noise levels in Canada, as a further development of the Canada Motor Vehicle Safety Standards. The question of acceptable noise levels is of concern to vehicle manufacturers as well as being extremely important to the well-being of large portions of our population. The project consequently involved an extensive study of the complex interaction of nearly randomly varying traffic noise levels, and the many forms of adverse human reactions to these noises.

The first phase of the project from May 1, 1974 to April 30, 1975 was carried out by Dr. J.S. Bradley of the Laboratory. This part of the work consisted of a very extensive study and analysis of the present state of research knowledge in the areas of vehicle noise, road traffic noise and the effects of noise on man. A thorough literature survey was performed, and a 2000 entry computer-sorted bibliography was compiled. Visits were made to prominent research groups in Europe as well as North America to better assess recent developments in the field. This phase resulted in Publication TP154 CR 7602, "Exterior Vehicle Noise and Its Effects - A Survey of Research on Exterior Vehicle Noise, Traffic Noise, and the Effects of Noise on People", Transport Canada, Road Safety, Ottawa, Ontario, March 1975.

The second phase of the work was completed on May 31, 1977. It consisted of an inter-disciplinary experimental research project, with the goal of relating physical measurements of traffic noise to human response measurements (co-coordinators: Dr. J.S. Bradley and Mr. Brian Jonah). A great deal of effort was made to ensure that both the noise measurements and the human response measurements were as accurate as possible, so that subsequent analysis of the two was not unduly limited by experimental procedures.

Human response measurements were obtained by an interviewer-administered questionnaire. This part of the work was supervised by Mr. Jonah, with the assistance of Dr. R. Norman and Dr. R. Gardner of the Department of Psychology at the University. A quite detailed questionnaire was developed and tested. Much use has been made of previous research to determine the most fruitful areas to investigate and to ensure that the questionnaire represented a definite improvement over previous studies. The questionnaire was evaluated and pretested in a pilot study. Questionnaire responses were coded and eventually stored on computer mag tape with the corresponding noise data. Subsequently, a variety of statistical analyses were performed with this computer data.

The complete computer-based noise measuring system that has been developed is thought to be more sophisticated than those that currently exist for the purpose of measuring traffic noise or general environmental noise. Six recently developed digitally recorded noise monitors were used as field recording units. They record a noise level once per second for a full 24 hours on a digital cassette (or approximately 100,000 samples per 24 hours) and include wind and other information. The recorded field data was transferred to computer magnetic tape via a translator and interface built by the UWO Computing Centre. The data was then manipulated in almost any conceivable manner within the capabilities of the University's large Cyber 73 computer system.

The project was carried out as much as possible as a controlled experiment. This involved selecting sites to provide desired values of chosen variables. In this way the effects of housing type, road type (freeway, regular), community size, socio-economic status, and noise level have been investigated. In addition, a large number of other individual variables have also been investigated. The field work employed a number of students from various Faculties within the University as field workers. A final report has been prepared for the Ministry of Transport, information on which can be obtained by writing to Mr. Eric R. Welbourne, Chief, Vehicle Systems, Road and Motor Vehicle Traffic Safety, Department of Transport, Ottawa, Ontario, K1A 0N5.

Project Title:
Study to Obtain Noise Exposure Data for Truck Drivers

Performing Organization Name & Address:
The Industrial Research Institute,
The University of Windsor,
Windsor, Ontario. N9B 3P4
CANADA

Principal Investigator(s):

Dr. Z.F. Reif
Prof. A.R. Howell

Start Date: June 1, 1976

Completion Date:
Estimated
Actual July, 1977

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Sponsoring Organization Name & Address:
Road and Motor Vehicle Traffic Safety Branch, Transport Canada,
Floor 27C, Transport Canada Building,
Ottawa, Ontario. K1A ON5, CANADA

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
-X- Measurement Methodology

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: $23,835

COMMENTS:

On-road measurements of truck cab interior noise levels in a variety of vehicle types and operations are being compared with measurements made on the same vehicles under each of three sample standardized procedures. The objectives of the project are to determine the value of the standardized procedures as predictors of the interior noise level under actual operating conditions and to compare typical driver noise exposures with accepted standards for industrial environments.

Project Title:
Calculation of Noise Immission on the Basis of Emission Measurements

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
National Agency of Environmental Protection Kampmannsgade 1 1604 Kobenhaven, Denmark	
Principal Investigator(s): National Agency of Environmental Protection	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1977 **Completion Date:** Estimated Summer 1978 Actual _____	**Funding:** Year — Amount 1976 (actual): 1977 (budget): (50,000 D.Kr.) $8,245 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

Calculation of Noise Immission on the Basis of Emission Measurements:

In a number of cases, noise is difficult to measure because of the presence of other noise sources. A study shall be made on the possibility of calculating the immission load on the basis of emission measurements.

Transcribed from the original.

Project Title:

Research on testing method and exterior noise of vehicle

Performing Organization Name & Address:

Noise Research Group, Fourth Research Division
Japan Automobile Research Institute, Inc.
Yatabe, Tsukuba-gun, Ibaraki-ken
300-21, Japan

Sponsoring Organization Name & Address:

Principal Investigator(s):

Dr. S. Iwamoto
4th Res. Div. of JARI

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date: April 1976

Completion Date:
Estimated March 1980
Actual _____

Funding:

Year	Amount	
1976 (actual):	(20,000,000 Yen)	$73,420
1977 (budget):	(25,000,000 Yen)	$91,775
1978 (forecast):	(25,000,000 Yen)	$91,775

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A factor analysis was conducted relating the errors in measured values and observed values, operational characteristics of drivers, visual reading of observers with the presently practiced various international and national testing methods including the ISO R362 accelerating noise testing method.

Our institute is equipped with a large soundproof room where indoor testing of large size vehicles is possible. It is possible to perform various studies ranging from basic studies dealing with, for example, combustion noise, machine noise and exhaust gas emission noise of an engine, to applicational and developmental studies such as measures to lower noise by utilizing noise-insulating and absorbing materials.

Presently, a developmental study on new testing methods such as a multi-mode noise testing method which is assumed to draw future attention, is being prepared to take place in this large sized sound-proof room.

Publication

Technical Report, 1976, Japan Automobile Manufacturers' Association

Translated and trascribed from the original Japanese.

Project Title:

Road traffic noise in urban areas

Performing Organization Name & Address:

Oslo City Health Department
St. Olavs plass 5
Oslo 1, NORWAY

Sponsoring Organization Name & Address:

Norges almenvitenskapelige forskning: råd, Munthesgate 29, Oslo 2

Principal Investigator(s):

Cand.real Kjell Gjævenes
overing. Sigurd Solberg
cand. sociol. Eystein Arntzen

Type of Research Program:

_x_ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
_x_ Measurement Methodology

Start Date: Jan. 1, 1976

Completion Date:
Estimated July 1, 1979
Actual _____

Funding:

Year	Amount	
1976 (actual):	(N.kr 290.000)	$54,636
1977 (budget):	(N.kr 180.000)	$33,912
1978 (forecast):	(N.kr 230.000)	$43,332

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Goals: - Map the influence of different time - distributions (mainly on 24-h and week base) of traffic noise on peoples noise reaction.
- Obtain a more well-definod basis for the choise of different traffic restrictions and other undertakings against noise, and contribute to the development of suitable noise indices.
- Study the representativity of short-time measurements of traffic noise for different time distributions.

Approach: Social surveys (500 respondents) and long-time measurement in areas with different time-distributions of road traffic: I) steady traffic all week II) steady traffic during daytime-periode on workdays III) predominantly rush-time traffic on work-days

Final report: July 1, 1979

Methodology and Standards
Poland

Project Title: An acoustic evaluation of automotive vehicles from the point of view of the noise and vibrations influence on driver's work

Performing Organization Name & Address:

Instytut Transportu Samochodowego
Road Transport Institute
40, Stalingradzka St.
03-301 Warsaw, Poland

Sponsoring Organization Name & Address:

1/Ministry of Transport, Warsaw
4, Chalubinskiego Street
2/National Motor Transport Enterprize
Warsaw, 17, Grojecka St., Poland

Principal Investigator(s):

Dr. eng. Jerzy Miazga

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Oct. 16, 1976

Completion Date:
Estimated Oct. 30, 1978
Actual _____

Funding:

Year	Amount	
1976 (actual):	(125,336 zl)	$ 6,292
1977 (budget):	(410,712 zl)	20,618
1978 (forecast):	(480,952 zl)	24,144
Or Total Funding Amount:	(1,017,000 zl)	$51,054

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The main research objective is to analyze the acoustic conditions inside trucks and buses operated at National Motor Transport Enterprize and to establish criteria for noise influence on driver's work. The study contains investigations carried out in road conditions and the simulation of road and acoustic conditions at the laboratory. The completion of work is planned at the end of 1978. It is expected to know how and when to carry on the periodic inspections of the vehicles from the point of view of safety. Additionally, we hope to collect some data concerning the influence of noise on the psychophysiological effectiveness of driver and the results will be utilized for setting up proper standards. Nothing has been published yet.

Transcribed from the original.

Methodology and Standards
Sweden

Project Title:
Traffic Noise in Urban Areas

Performing Organization Name & Address:

Ingewansson Acoustics
Box 52037
S-400 14
Goeteborg 53, Sweden

Sponsoring Organization Name & Address:

Swedish Council for Building Research
Fack
S-102 30 Stockholm, Sweden

Principal Investigator(s):

S. Benjegaard
S. Ljunggren

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1972

Completion Date:
Estimated ____
Actual May 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$18,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The effects of different noise production affecting and propagation affecting parameters on the traffic noise situation in urban areas were studied. These studies formed a basis for the calculation of a measurement method adopted to urban areas. The method can be used for measurement of noise load in trafficked streets, along house fronts, and inside streets.

Transcribed from the original.

Project Title:
Factors Affecting Traffic Noise in Congested Urban Situations

Performing Organization Name & Address:

Newcastle-Upon-Tyne-Polytechnic
Dept. of Physics and Physical Electronics
Newcastle-Upon-Tyne NE1 7RU
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council

Principal Investigator(s):

B. Oakes
I. S. Diggory

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: June 1974

Completion Date:
Estimated ____
Actual May 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount: (£ 25,000 - £50,000)	
	$ 42,990 - $85,980

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Noise level measurements will be conducted in built-up urban areas, in the vicinity of junctions and intersections. Short-term and 18-hour measurements will be carried out using 4 channels of the Digitronix Nomal system purchased for this purpose, from which values of L10 L50 L90 Leg etc, will be determined. Classified traffic flow analyses will be conducted simultaneously with the noise surveys together with various parameters, vehicle delay, queueing times, etc, which will give an indication of the degree of congestion. Junction configurations of increasing complexity will be considered, and the prediction methods modified and extended to include the complicating factors. The ultimate aim is the development of a satisfactory model to account for the field data, and to allow for the prediction of noise levels generalised in urban environments under a variety of conditions.

Transcribed from the original.

Methodology and Standards
United Kingdom

Project Title:

Traffic Noise Levels Associated with Suburban Road Junctions

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Newcastle-Upon-Tyne-Polytechnic Dept. of Physics and Physical Electronics Newcastle-Upon-Tyne NE1 7RU United Kingdom	Transport and Road Research Laboratory
Principal Investigator(s): B. Oakes J. D. Llewellyn J. S. Wraith	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Apr 1975 Completion Date: Estimated 1978 Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: (£ 5,000 - £ 10,000) $ 8,598 = $ 17,196
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

A study will be made of noise levels at several suburban roundabout junctions to attempt to apply the results of other studies to junctions having similar configurations. A survey will also be made of the noise levels in the vicinity of one other type of suburban traffic junction controlled by traffic lights. Traffic noise levels will be supplemented and correlated with traffic flow and composition measurements, and attempts will be made to produce a model which would enable noise levels at similar junctions to be predicted. Noise level measurements will be conducted using a second level meter and portable tape recorder, followed by the usual statistical distribution analysis, yielding the L_{10}, L_{50}, and L_{90} indices.

Transcribed from the original.

Project Title:
Maximum Emission Levels for Power Vehicles

Performing Organization Name & Address:

Research Institute for Noises and Vibrations
Aachen, Franzstr. 83
West Germany

Sponsoring Organization Name & Address:

Federal Ministry of the Interior

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Oct. 1, 1975

Completion Date:
Estimated ____
Actual Dec. 31, 1978

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(6,444,000 DM) $2,712,256

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Reduction of traffic noises, particularly those of street, rail and ship transportation by
a) establishing objective emission limits at prescribed time intervals under official regulations;
b) establishing maximum immission levels for built-up areas combined with the setting of noise abatement requirements for construction projects in order to protect inhabitants from traffic noise;
c) promoting development and testing of low-noise means of transportation.

Translated and transcribed from the original German.

Project Title: New Measurement Technique for Determining Noise Emission of Ships and Boats on Inland Water Ways

Performing Organization Name & Address:
Testing Center for Inland Marine Engineering
Duisburg, Kloecknerstr. 77
West Germany

Sponsoring Organization Name & Address:

Principal Investigator(s):
Dr. Ing. Erich Schaele

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: June 1, 1975

Completion Date:
Estimated _____
Actual May 31, 1976

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(74,000 DM) $31,376

COMMENTS:

Aim: to supplement existing measurement procedure under DIN 45 640 with an amended version so that noise emissions can be measured immediately on board during delivery of ship.

Variant: 6 to 8 measurement sites are arranged on a half cylinder designed along the ships axis within the noise domain in such a manner that clear individual data can be obtained. These provide a mean value computed in accordance with prescribed computations, which mean value would be measured at 25 m distance as delivery value.

Application: new method usable only on tugboats, freighters and low rated passenger ships; not to be used on highly rated passenger ships nor on motorboats of any sort.

Translated and transcribed from the original German.

United Kingdom. Acoustic Analysis Using Finite Elements. Trent Polytechnic, Dept. of Mech. and Prod. Engr., Barton Sheet, Nottingham, United Kingdom. J H Swannell, Trent Polytechnic, S T W Keiller, Trent Polytechnic, R D Henshell, Nottingham University. Sept. 1975. Sept. 1978. (under £5,000) $8,598. To analyse the distribution and intensity of noise in vehicle cabs, using finite elements. Verification by experimental procedures, using B and K noise measuring equipment.

West Germany. Development of Measurement and Analysis Techniques for Infrasonic Research. Institute for Technical Acoustics, Technical Institute, Aachen, Klausenerstr 13-19, West Germany. Sponsor: German Research Society. Prof. Dr. Kuttruf. Aug. 1, 1973. Dec. 31, 1976. (150,000.00 DM) $63,600.

West Germany. Noise Map of Duisburg. Institute for Hygiene, Dusseldorf University, Dusseldorf, Gurlittstr 53, West Germany. Sponsor: Duisburg City. Dr. Eng. Edmund Buchta. Jan. 1, 1975. April 1, 1977. (280,000.00 DM) $118,720. Noise recording by areas for the total city territory during day time (6:00 am - 10:00 pm) and night time (10:00 pm - 6:00 am) in the form of contour lines of equal continuous sound level.

West Germany. Exterior Urban Noise Test Method. Heinrich Gillet KG, Postfach 100, D-6732 Edenkoben / W. Germany. Guenther Frietzsche. Type: Measurement Methodology 1975/1976. 1977. 1976: (30.000 -DM) $12720. 1977: (20.000 -DM) $8480. 1978: (10.000 -DM) $4240. Total: (60.000 -DM) $25440. Comments: Internal Gillet Research. Replace ISO driving test R 362 by new methods with better correlation to city noise levels.

West Germany. Computations on Noise Propagation in Related Structural Shapes and Sites. Technical Monitoring Association, Koeln, Konstantin-Wille-Str. 1, West Germany. Sponsor: Minister of the Interior, Duesseldorf, West Germany. Dipl. - Phys. W. Gloeckner. Mar. 1, 1975. Oct 31, 1976. (150,000 DM) $63.600. Caluclation and graphic representation of contour lines connecting points of equal noise level in relation to street patterns, structural shapes and construction sites.

Project Title:

Development of representative passenger car noise emission test procedure

Performing Organization Name & Address:
Committee of Common Market Automobile Constructors (CCMC)
Square de Meeus 18
B-1040 Brussels, Belgium

Sponsoring Organization Name & Address:

Principal Investigator(s):

Engineering Staff of Member Companies of CCMC

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date: On-going

Completion Date:
Estimated 1978
Actual ____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: Data not available

The development of noise test procedures for passenger cars, with both manual and automatic transmissions which rate the cars in a manner representative of their contribution to the noise environment.

Approach: An urban driving programme was carried out using 23 different passenger cars, running on 6 different routes in 4 large European cities, with over 200 hours running time.

The resultant data have been subjected to extensive computer development and analysis to determine statistically representative engine operating conditions, to be reproduced in test procedures.

Publication: CCMC Report N/17/77, February 1977,
"Proposals for a New Test Procedure for the Measurement of Exterior Noise of Passenger Cars"

This report included procedural proposals for manual gearbox cars; work is continuing on cars with automatic transmissions.

In the future, similar studies for commercial vehicles are envisaged.

Project Title:
Methodology to Assess Environmental Noise Impact

Performing Organization Name & Address:

Ontario Ministry of the Environment
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5
Canada

Sponsoring Organization Name & Address:

Principal Investigator(s):

A. K. Dixit

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A general methodology is proposed to assess and reduce environmental noise impact for two common situations. The first situation is that of existing residents exposed to future noise sources, and the second of future residents exposed to already existing noise sources. Considerations of technical feasibility, aesthetics, economic cost and acceptability by residents are discussed in the selection of noise control measures to reduce future noise impact. The application of methodology is then demonstrated for three individual examples of planning a large community, a light rapid transit route and an arterial road.

Transcribed from the original.

Methodology and Standards
Canada

Project Title: Use of Transportation Noise As a Standard for the Assessment of Other Noise Soruces in Urban Areas in Ontario

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Ontario Ministry of the Environment 135 St. Clair Avenue West Toronto, Ontario M4V 1P5 Canada	
Principal Investigator(s): Tim Kelsall	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): - Or Total Funding Amount: - COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

In May, 1976 the Ontario Model Municipal Noise Control By-law introduced a new standard for judging the acceptability of a noise source in an urban area in Ontario, by comparing it with the transportation noise in the area. This paper will outline the reasons behind this choice of transportation noise as a standard and review standards used in other jurisdictions showing that implicitly they also use transportation noise as a standard. Finally, the reproducibility of this standard from day to day and the experience gained by the Ministry of the Environment in it's use will be summarized.

Transcribed from the original.

Methodology and Standards
Denmark

Project Title:

General Accuracy of Sound Level Meter Measurements

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Brüel & Kjær, 23 Linde alle DK-2850 Nærum. Denmark.	
Principal Investigator(s): Peter Hedegaard	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) _X_ Measurement Methodology
Start Date: March 1977 / Completion Date: Estimated ___ Actual June 1977	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

From the tolerance levels given in IEC standards for sound level meters it can be seen that at medium high and high frequencies very large deviations may occur between results obtained from different sound level meters fulfilling the same standard. This is partly due to the wide tolerances on frequency response and directional sensitivity characteristics and partly due to the use of different microphone features such as flat 0° incidence free-field response or flat random incidence frequency response. The poorly defined impulse response requirements for "Fast" and "Slow" detector/indicator modes may also result in appreciable deviations in the results when measuring impulsive noise.

Increased noise legislation and the high cost of noise control will lead to a demand for a sound level meter capable of greater accuracy.

Theoretical deviations between measurements with different microphone sizes and configurations are compared to the deviations found in practical measuring situations. The deviations in measuring results due to different detector/indicator systems are also discussed.

Date of publication 1977/78. Brüel & Kjær Technical Review.

Methodology and Standards
France

Project Title:

Conversational Calculation of Noise Level of Road Traffic

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Institute of Transport Research Center for the Evaluation of Research on Nuisances 109, Avenue Salvador Allende 69272 Bron Cedex, France	CERN - SETRA
Principal Investigator(s): Guy Pierrele	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): - Or Total Funding Amount: - COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The purpose of this research-request is to adapt the methods developed by CERN for calculation of noise level to conversational procedures.

Restructuring of the mechanism and identification of complex calculation procedures must accompany conversion to conversational tool to improve performance of the unit.

Translated and transcribed from the original French.

Project Title:
Study of procedures for measurement and evaluation of environmental noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
National Institute of Hygiene Gyali ut 2-6 H-1966 Budapest, Hungary	The same

Principal Investigator(s):	Type of Research Program:
Laszlo CZABALAY	___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) _x_ Measurement Methodology

Start Date:	Completion Date:
1976	Estimated 1980 Actual 1980

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS: Is not ascertainable

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The use of the "impulse" time constant for the measurement of noises with strong, less and non impulsive characteristics was studied. The"impulse" time constant was proposed for the unified evaluation of all kinds of fluctuating noises.

The propagation of traffic noise was studied and a method of predicting road traffic noise in dwelling areas has been developed. This work will be extended to railway and aircraft noise.

Work on correlation of various traffic noise parameters is planned on the basis of road traffic noise measurements at 700 sites.

Publications:

Czabalay, L., Hirka, F.: A környezeti zaj mérésének és értékelésének egyes kérdései /Some problems of the measurement and the evaluation of ambient noise/
Gépgyártástechnológia, 17. 173-176. 1977.

Hirka, F., Czabalay, L.: Számitási eljárás a közlekedési zaj becslésére /Computation method for estimating traffic noise/
Járművek, Mezőgazdasági Gépek, 24. 231-234. 1977.

Project Title: A Unified Expression for the Transition of the Multivariate Joint Probability of State Variables in an Arbitrary Environmental Stochastic System and Its Digital Simulation.

Performing Organization Name & Address:
Faculty of Engineering, Hiroshima University,
3-8-2, Senda-Machi, Hiroshima 730 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Shizuma Yamaguchi and
Kazutatsu Hatakeyama.

Type of Research Program:

X Fundamental
X Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated April, 1978.
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS: This work is based on regular expenses of the national schools of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The random signals (e.g., street noise, machine or structure vibration) appearing often in the actual engineering fields exhibits various kinds of probability distribution apart from a usual Gaussian distribution owing to diversified causes of the fluctuation. According to the fact that the arbitrary statistics of the environmental random phenomena including mean value, covariance and higher order correlations are derived from an information of the multivariate joint probability function associated with the individual phenemenon under consideration, it must be essentially an important problem from the analytical viewpoint of the general environmental system to propose the generalized statistical treatment for the output probability distribution of nonlinear and/or nonstationary system of arbitrary-type with random output signal. When a general expansion of the multivariate joint probability function of such a resultant fluctuation is sought in the unified form (not influenced too much on the whole but concretely reflected in its internal parameters by the individual fluctuation pattern), it is better to choose a statistical expansion series expression whose expansion coefficients reflect the first and the higher order statistical concepts (explaining the output of nonlinear and/or nonstationary system with arbitrary random input signal). From the standpoint of convergence property of the expansion expression to be used, how to choose the cumulative distribution function as the first term of the expansion expression is of vital importance, since this term describes the principal part of the environmental random phenomena. From these essential considerations, in this work, when an arbitrarily distributed random signal is passed through a nonlinear and/or nonstationary system of arbitrary type with finite memory, a new attempt to the unified statistical treatment for the multivariate joint probability density and cumulative distribution functions of its output fluctuation of the system is proposed in the universal form of expansion series expression, without any assumption to the internal structure of the system and the distribution type of the fluctuation.

Methodology and Standards
Netherlands

Project Title:

Noise requirements for service equipment.

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Public Health and Environmental Hygiene Dept. Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Est. 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

In this study, data will be obtained that are required for the making of executive decisions on the basis of article 2 of the noise nuisance bill with respect to noise production by service equipment such as trash trucks, cattle cars, and oil trucks. In conducting the study, use will be made of data obtained from earlier studies and, if applicable, data used abroad for establishing noise requirements and EC guidelines. The study will concern types or categories of service equipment under typical conditions of use, the pertinent noise levels, the measuring methods used, and other possible aspects for the establishment of specifications and the requirements imposed for operating controls.

Translated and transcribed from the original Dutch.

Methodology and Standards
Netherlands

Project Title: Establishing a Standard Method of Measurement of the Noise Emissions of Rail Vehicles and the Influence of these Emissions on Artificial Structures Placed Along the Tracks.

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Transport & Public Works Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

Various methods of measurement are used in different countries to determine the noise emission of rail vehicles. In the first phase of this research project, an inventory will be made of these methods, with an evaluation if necessary. Regulations on methods of measuring will have to be drawn up on measuring noise in such a way that it is possible to obtain uniform and comparable results.

The method of measurement must serve to control noise specificiations of new rail vehicles, to test present rolling stock and to measure the effects of noise abatement at the source. The term "rail vehicles" is used collectively to mean train units, locomotives, freight cars, trams and underground trains. Separate methods of measurement will be determined for each of these categories in this project.

Methodology and Standards
Netherlands

Project Title:

Research on Noise Levels Around the Stations

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____. Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): - Or Total Funding Amount: - COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

Because the function of stations requires them to be built as close to residential areas as possible even though a number of activities in and around these stations can be of annoyance to those living close by, this research is necessary to find out which noise abatement measures can be taken to limit noise nuisance as much as possible.

For this purpose, measurements will be made all around a number of larger and smaller stations. This should give some idea of the actual sources of the noise nuisance, such as the public address sytem, braking, pulling out, signal horns, switch points, etc. The results of this research project should be a set of guidelines for designing new stations or for remodelling existing stations for purposes of noise abatement.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title: Determining the Financial Consequences of Policy Standards and Measures on Abatement of Traffic Noise

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Public Health and Environmental Protection
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

There are financial consequences connected with the enforcement of a noise abatement policy which can bear some relation to policy standards which must be chosen in a given situation.

This project intends to give a rough idea of the financial consequences of various policy standards and resulting enforcement of policy in "new situations" (new or altered highways, or else new buildings near a highway), as well as "existing situations" and "transitional situations" which will include programmes of rationalization. Aspects of financing such measures will also be covered in this project.

A distinction will be made between highways outside the city and streets and highways in the city.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title: Investigation of Noise Emissions of Various Categories of Motor Vehicles

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Transport and Public Works
Ministry of Public Health and Environmental Hygiene
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project is designed to obtain accurate information on noise emissions of various categories of motor vehicles in order to devise a reliable traffic noise prognosis. Special attention will be devoted to those categories of motor vehicles which cause a relatively large proportion of the total road traffic noise, in order that they may be made quieter or else be excluded from road traffic.

Registration of noise levels of a moving row of vehicles will include information on their speed and local conditions such as type of pavement and degree of moisture of the road, both for city streets and for motorways.

The implementation of this project will include, where possible, aspects of research projects on height and slope, road surfacing, speed, stop lights, junctions and curves.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title: Research into the Influence of Height and Slope of the Road on Noise Emissions

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Transport and Public Works Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976	Completion Date: Estimated _____ Actual _____
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

This project is intended to amass additional information to supplement research by the TNO (Institute of Applied Physics) on noise production on the roads, by means of measurement of noise levels in a number of representative situations.

Special attention will be devoted to combinations of raised roads and the effects of roadside noise deflection.

Transcribed from the original.

Project Title:
A System of Assessing Traffic Noise Nuisance

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The purpose of this project is to devise an official system of assessing noise nuisance caused by road traffic, on the basis of which environmentally acceptable noise norms and maximum permissible traffic noise loads may be set.

This research will be conducted on the basis of the knowledge and experience of the TNO in advising on the acoustic aspects of road-building and construction plans, as well as their knowledge of systems of assessing noise nuisance abroad.

The system of assessment should be so attuned to standard policy measures in such a way that it is comprehensible to those with no background in acoustic theory. Emphasis will be given to evaluating the actual living situation from a resident's point of view.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title:

Developing Methods of Measuring Traffic Noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Transport and Public Works Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The purpose of this research project is to develop a standard method of measuring and ascertaining noise caused by road traffic. Of importance are the placement of microphones, choice of distance and duration of the measurement, moment of measurement, influence of weather conditions, and the specifications of the measuring instruments and their use. The method of measurement will be described in a brochure which will serve as a guide for government agencies and others to effect a monitor of noise loads near roads with motor traffic for the purpose of determining officially recognized values.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title: Substantiating Maximum Noise Levels for Noise-Sensitive Objects and Buildings Other Than Dwellings

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated ____ Actual ____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The Bill on Noise Abatement gives maximum permissible noise levels for traffic noise and for industrial noise near dwellings. The bill also contains the possibility of establishing maximum permissible noise levels for concerns other than dwellings, i.e. schools, hospitals, homes for the elderly, nursing homes and clinics and other such human concerns.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title: Establishing a Standard Method of Registration of Noise Levels Resulting from Railroad Traffic.

Performing Organization Name & Address:

Sponsoring Organization Name & Address:

Ministry of Public Health and Environmental Protection
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A number of methods of measurement are already known. After making an inventory and evaluation of these, regulations will be drawn up giving details on apparatus used for measurement, conditions for measurement, number of sites and number of measurements to be used, peak and duration of noise levels, period of measurement, processing data obtained and registration of results. These regulations will also distinguish between train, tram and underground traffic, collectively referred to as rail traffic.

The results of this research project will be used in describing the present situation, such as in relation to urban planning and local building plans and zoning, or in order to make government decisions on measures to be taken to abate noise, or to measure the effect of the measures taken.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title: Research In Order to Develop a Representative Standard Noise Level Test and Possibly Procedures for Spot-Checking for the Amount of Noise Produced by Motor Vehicles

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976	**Completion Date:** Estimated _____ Actual _____
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	**Funding:** Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

This project is primarily intended to obtain data which the Dutch delegation in various international organizations (E.E.C., ISO, ECE) can utilize in developing a better standard noise-level testing than the one which is currently accepted internationally. The currently used method of testing, accepted on the basis of the ISO recommendaton R 362 (1964) is too lenient on several categories of passenger cars and motorcycles which now cause a considerable part of city traffic noise, partly due to the manner in which they are used. For this reason the currently used method of testing noise levels of traffic noise are no longer suited for measuring noise emissions of several categories of motor vehicles in city traffic. Special electro-mechanical instruments were developed for this research, which will be used to test alternative noise-level and spot check methods to determine maximum noise emissions of motor vehicles, for which purpose measurements will be made of a large number of representative vehicles of the present day assortment.

The results thus obtained will also serve as a basis for methods of measurement to be developed for enforcement of maximum noise levels on the road.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title:
Developing a Method of Assessing Relatively Quiet Areas

Performing Organization Name & Address:	Sponsoring Organization Name & Address: Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

For the purpose of setting maximum permissible noise levels of traffic and other noise, it is necessary to have some idea of the situation, acoustically speaking, in that area so that physical planning can be attuned to local noise conditions.

Even if there are no noise-making elements immediately present, interference may be caused by the combined effect of a number of distant sources of noise, often unknown to the public.

The purpose of the project is to devise a procedure for making a relatively simple, statistical description of acoustic conditions. One part of this procedure will include a method of sound measurement for detailed research in quiet areas.

The emphasis of this research is on those areas which still enjoy a relatively low noise level. Once the methods of measurement have been determined, a large-scale inventory of noise levels there will be made.

The results of this research can be used to set up the investigation of quiet areas as called for in the Noise Abatement Bill.

Transcribed from the original.

Methodology and Standards
Netherlands

Project Title:
Noise requirements for vehicles.

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Public Health and Environmental Hygiene Dept. Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Est. 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): - Or Total Funding Amount: - COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

In this study, data will be obtained that are required for the making of executive decisions on the basis of article 2 of the noise nuisance bill with respect to noise production by vehicles with motors, outboard motors, and sound signalling. In conducting the study, use will be made of data obtained from earlier studies and, if applicable, data used abroad for establishing noise requirements and EC guidelines. The study will concern types or categories of vehicles under typical conditions of use, the pertinent noise levels, the measuring methods used, and other possible aspects for the establishment of specifications and the requirements imposed for operating controls.

Translated and transcribed from the original Dutch.

Project Title:
Environmental Hazards of Railway Generated Noise in the North East of England

Performing Organization Name & Address:
Civic Trust for the North East
34/35 Saddler Street
Durham, United Kingdom

Sponsoring Organization Name & Address:
Civic Trust for the North East

Principal Investigator(s):
N. Whittaker

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Dec 1973

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Programme of noise measurement studies of railway generated noise, both from track and machinery over a series of sites, urban and rural.

The sites cover dwellings and developments close to the main lines concerned and are related to other incidental noises levels, static and moving machinery, overhead aircraff, etc. Particular emphasis is placed on the dispersal of railway generated noise; the amplifying effects of bridges and viaducts, the dampening of cuttings, etc. The eventual report will be a submission to those authorities concerned; the Department of the Enviroment, the Local Authorities, the British Rail Board, etc.

Transcribed from the original.

Project Title:

Traffic Noise

Performing Organization Name & Address:

Transport and Road Research Laboratory
Old Wockingham Road
Crawthorne, Berkshire RG11 6AU
United Kingdom

Sponsoring Organization Name & Address:

Department of the Environment

Principal Investigator(s):

D. G. Harland
P. M. Nelson

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1970

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A data logging system recording "A" weighted sound levels from eight microphone inputs has been assembled. The data read out and system operation are controlled by a mini-computer. This gives real time analysis, on site, of various noise indices. The system is used to measure the distribution of traffic noise in urban areas, behind noise barriers and in the vicinity of road junctions. Studies of the loudness response to vehicle noise and the effects of traffic noise on speech interference are in progress.

Publications:

"A data logging system for the measurement of road traffic noise",
M. Cheeseman and P.M. Nelson,
TRRL Report LR 479, 1972

"A laboratory study of nuisance due to traffic noise in a speech environment",
B. Sullivan and J. G. Charles
Southampton University, Report No 1542, 1973

"Predicting road traffic noise in the rural environment: a study of the A66 road improvement scheme in the Lake District",
P. M. Nelson and N. Godfrey,
TRRL LR 642, 1974

"A mini-computer system for environmental noise analysis",
M. Cheeseman,
TRRL SR 46 UC, 1974

Transcribed from the original.

Project Title: Use of digital voltmeter with sound level meter

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Hull College of Higher Education, Queen's Gardens, Hull, England.	
Principal Investigator(s): L.W. Bean	Type of Research Program: ___ Fundamental _X_ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Jan. 1976 Completion Date: Estimated June 1977 Actual _____	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS: No formal funding

The goals are to develop the necessary computer programs for handling measurements made on the output of a sound level meter with a digital voltmeter and to compare the results obtained with those using other equipment.
Results obtained so far indicate that measurements made this way agree with those using other techniques.
It is hoped to publish a paper shortly.

Project Title:

Comparison of different methods of rating noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Hull College of Higher Education, Queen's Gardens, Hull, England.	
Principal Investigator(s): L.W. Bean	Type of Research Program: ___ Fundamental X Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: June 1976 Completion Date: Estimated Dec. 1977 Actual _____	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS: No formal funding

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The goals are to investigate the correlation between different methods of rating noise, e.g. A weighting and NC curves, for different noises and to establish relations between them.
Results obtained so far show that there is good correlation between certain quantities, e.g. Stevens' loudness level and perceived noise level, and that one quantity may be calculated from another with reasonable accuracy.

Methodology and Standards
West Germany

Project Title:

Testing of sound level meters

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Laboratorium für Schallnormale der Physikalisch-Technischen Bundesanstalt, Bundesallee 100, 3300 Braunschweig Federal Republic of Germany	Bundesminister für Wirtschaft (Federal Minister of Economics)
Principal Investigator(s): Dr. K. Brinkmann	Type of Research Program: X Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) X Measurement Methodology
Start Date: -- Completion Date: Estimated ____ Actual ____	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

Development of measuring methods for testing of sound level meters, integrating sound level meters, and noise dose meters.

Type approval tests for verification of sound level meters.

Reference: Annual Reports of Physikalisch-Technische Bundesanstalt

Australia. Study of a Precise and Reproducible Method Making it Possible to Measure Vehicle Noise. National Acoustic Labs, S. Hickson Road, Millers Point, Sydney, NSW, Australia. J. Rose, L. Kenna.

Norway. Basis for Restricted Noise Emission Limits for Cars. Laboratory of Acoustics, Norwegian Institute of Technology, Trondheim, Norway. 1978.

Norway. Method for Measurement of Road Traffic Emmission. Laboratory of Acoustics, Norwegian Inst. of Technology, Tondheim, Norway. Sponsor: Joint Nordic Countries Project. 1977, 1978.

Switzerland. The Application of Random Signal Processing in Automobile Acoustics. Interkeller AG/SA, 8052 Zurich, Switzerland. P. H. Dilkes, K. Huembelin, R.H. van Ligter. Paper published at Inter Noise 77.

Switzerland. A Sound Intensity Meter and its Applications in Car Acoustics. Interkeller AG/SA, 8052 Zurich, Switzerland. H.P. Lambrich, W.A. Stahel. Paper published at Inter Noise 77.

Switzerland. Development of an Instrument for the Measurement of Sound Intensity and its Application in Car Acoustics. Interkeller AG/SA, 8052 Zurich, Switzerland. W. Stahel, H.P. Lambrich.

Switzerland. Advantages and Disadvantages of Analogue and Digital Measurement and Analysis Methods in Car Acoustic Studies. Interkeller AG/SA, 8052 Zurich, Switzerland. K.A. Humbelin.

Switzerland. The Determination of Dominant Signal Transmission Paths in Automobile Acoustics Using Digital Signal Analysis. Interkeller AG/SA, 8052 Zurich, Switzerland. K. Humbelin, R.H. Van Lighten, P. Dilkes.

Switzerland. The Utilization of the Intensity Meter for the Investigation of the Sound Radiation of Surfaces. Interkeller AG/SA, 8052 Zurich, Switzerland. F. Friundi.

Switzerland. The "Ingolstadt Method" for the Testing of Sound Insulating Materials and Systems for Motor Vehicles. Interkeller AG/SA, 8052 Zurich, Switzerland. D. Rosenberg, (Audi-NSU).

United Kingdom. Unified Noise Criterion for Environmental Noise in a Rural Area. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. K.F. Levett, J.B. Large, C.G. Rice.

United Kingdom. Indoor-Outdoor Noise Measurements. University of Southampton, Institute of Sound and Vibration Research, Suthampton SO9 5NH, United Kingdom. I.Ward, J.B. Large, C.G. Rice.

United Kingdom. Evaluation of Traffic Noise. R. Travers Morgan & Partners (pooled efforts). Sponsor: Building Research Establishment, National Physical Laboratory, Transport and Road Research Laboratory. Aim of

this pooled research effort is to revise the Department of the Environment method for the evaluation of traffic noise.

United Kingdom. Vehicle Noise Rating. Dept. of Industry, London, United Kingdom. 1977.

West Germany. Noise Control Measurement Method for Passenger Cars According to S49 St VZO. Heinrich Gillet KG, 6732 Edenkoben, Postfach 100, West Germany.

West Germany. Criteria of a Simplified Noise Measurement Method. Heinrick Gillet KG, 6732 Edenkoben, Postfach 100, West Germany.

West Germany. Noise Measurements on Passenger Cars Under Different Operating Conditions. Heinrich Gillet KG, 6732 Edenkoben, Postfach 100, West Germany.

West Germany. Development of Uniform Measurement and Evaluation Techniques. Institute for Construction Machinery, Aachen, Templergraben 55, West Germany. Dr. Ing. Hubert Frenking. Jan. 1, 1973. June 30, 1976. Evolving uniform procedures with due regard to national and international norms and regulations; criteria for measurement and evaluation.

West Germany. Noise Map of Stuttgart. Geographical Institute of Stuttgart University, Stuttgart 1, Silcherstr. 9, West Germany. Prof. Dr. Cristoph Borcherdt. May 1, 1976. Oct. 31, 1976. Determination of noise loads in Stuttgart on the basis of traffic count and cartographic representation (Noise Map).

West Germany. Analysis of the Determination of the Mean Frequency of Traffic Noises as a Function of their Intensity Level. Institute for Acoustical Technology, Aachen, Klausenerstr. 17-19, West Germany. Sponsor: German Research Society. Dr. Ing. Paul Scherer.

West Germany. Several Research Projects on Road Traffic Noise. Federal Institute for Road Affairs (BAST), Bruhler Strasse, 5 Cologne, West Germany. Measurement, prediction, statistical analysis, propagation, traffic flow influence, building influence, barriers.

MEASUREMENT AND ENFORCEMENT

TRAINING

See Also Page:

63

Training
Canada

Project Title:
Acoustics Technology in Land Use Planning - Volumes I Thru III

Performing Organization Name & Address:

NOISE POLLUTION CONTROL SECTION
135 St. Clair Ave. West
Toronto, Ontario M4V 1P5
Canada

Sponsoring Organization Name & Address:

ONTARIO MINISTRY OF THE ENVIRONMENT
135 St. Clair Ave. West
Toronto, Ontario M4V 1P5
Canada

Principal Investigator(s):

J. Manuel
H. Gidamy
C. Krajewski
S. Eaton
J. Hemingway
A. Dixit

Type of Research Program:

___ Fundamental
_X_ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
_X_ Measurement Methodology

Start Date: Dec. 1976

Completion Date:
Estimated Vols. I&II-July/77
Actual Vol. III-Jan. '78

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	($60,000) $56,568

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Volume I - Analysis of Noise Impacts, this Volume has been written as an acoustics primer for the use of the land use developer, planner, architect and engineer in determining the noise impacts on a new subdivision due to highway traffic and railway traffic. Prediction techniques are used extensively and are fully exaplained in the text.

Volume II - Road Traffic Noise Tables, this Volume deals with specific site design and optimum site layout to achieve recommended sound level limits both indoors and outdoors. Detailed Tables are included which predict the decibel excess above design limits for given road traffic conditions. Other Tables are developed to aid in design of a subdivision taking account of housing density, use of barriers and barrier buildings.

Volume III - Aircraft Noise, is under preparation.

Training
Canada

Project Title:

Training Course on Land Use Planning with Respect to Environmental Noise

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Ontario Ministry of the Environment 135 St. Clair Avenue West Toronto, Ontario M4V 1P5 Canada	
Principal Investigator(s): S. H. Eaton	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

Included in the responsibilities of the Ontario Ministry of the Environment are the development and presentations of training and certification programs for personnel engaged in the protection and improvement of the outdoor environment. In the course of commenting upon the proposed uses of land, the Abatement and Land Assessment Unit of the Noise Pollution Control Section works in close cooperation with professional consultants, developers and other governmental organizations. Based upon the Unit's experience the Ministry has added to its training programs a course entitled "Acoustic Technology in Land Use Planning".

This paper discusses the needs and nature of the demand for the course. The philosophy, and features of the course are outlined.

Trainees are shown how the Unit derives its assessment of noise impact upon a site due to Transportation sources. Techniques for reducing the impact by planning and architectural design are stressed, and the design of the noise attenuation features are described.

Some trainee reactions to the course are presented.

Transcribed from the original.

ACOUSTIC PROPERTIES

PROPAGATION

See Also Pages:

35
36
48
85
109
122
127
128
142
151
153
163
184
189
225
226
227
228
229
231
232
233
234
245
263
276
357

Project Title: Noise Propagation in Urban Areas

Performing Organization Name & Address:

Dept. of Architectural Science
University of Sydney
Sydney NSW 2006
Australia

Sponsoring Organization Name & Address:

1. Australian Road Research Board
   500 Burwood Highway, Vermont, Victoria 3133
2. N.S.W. State Pollution Control Commission
   Central Square, Sydney 2000, NSW
   Australia

Principal Investigator(s):

F. R. Fricke
R. Bullen

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: July 1976

Completion Date: Estimated Dec. 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	($8000) $8880

COMMENTS: $8000 is allocation up to July 1978.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The aim of the work is to produce a method for predicting noise levels in cities. This is being done by investigating the mechanisms by which sound is attenuated in urban and suburban areas.

So far, theoretical treatments of sound propagation down a street and around a corner in urban areas have been developed which accurately predict measured levels. A theoretical prediction of sound levels amongst buildings in a suburban area has also been developed which is in good agreement with measured data, obtained by other workers, using traffic noise as the source. The theories show the importance of diffusion; absorption and the interaction of diffusion and absorption, on the attenuation of sound.

Further work is to be carried out on the effect of vegetation on urban noise levels and its perception.

Publications:

A. Bullen & F. Fricke "Sound Propgation in a Street", J. Sound & Vibration, 46,33-42, 1976
R. Bullen & F. Fricke "Sound Propgation at a Street Intersection:, J. Sound & Vibration (Accepted for publication)

Transcribed from the original.

Propagation
Belgium

Project Title:
Measurement of Traffic Noise in Large Cities and Inquiry about the Annoyance

Performing Organization Name & Address:

Laboratorium Voor Akoestiek en Warmtegeleiding
Celestijnenlaan, 200 D
3030 Heverlee
Belgium

Sponsoring Organization Name & Address:

Ministry of Health and Household
Environmental Section
Vesaliuskwartier
Rijksadministratief Centrum
1010 Brussels, Belgium

Principal Investigator(s):

Prof. Dr. H. Myncke
Dr. A. Cops

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1, 1974

Completion Date:
Estimated Dec. 31, 1976
Actual Dec. 31, 1976

Funding:

Year	Amount
1976 (actual):	111,000 US $
1977 (budget):	118,000 US $
1978 (forecast):	128,000 US $

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Study of the different physical parameters which influence the noise level in large citites: intensity of traffic, width and height of streets, road covering, etc. Forty measurement points were chosen in Antwerp and twenty in Brussels. The sound level was continuously registrated and statistically analyzed. At the same time a large inquiry was made by a psychologist on the annoyance. The correlation between physical measurements and annoyance was determined.

Publications:

- Final report, 12 parts, 1000 pages (in dutch), June 1977
- Summary and conclusions, 50 pages (in dutch), September 1977
- H. Myncke, A. Cops, P. Steenackers - Traffic noise measurements in Antwerp and Brussels - Part I: Physical Measurements - 9° I.C.A., Madrid, July 1977 (in English)
- H. Myncke, A. Cops, R. Gambart - Traffic noise measurements in Antwerp and Brussels - Part II: Enquiry concerning annoyance - 9° I.C.A. - Madrid, July 1977 (in English)

Propagation
Canada

Project Title:

Noise Attenuation Study

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
University of Calgary Acoustics Group Calgary ALTA T2N 1N4 Canada	Alberta Transportation
Principal Investigator(s): H. W. Jones P. J. Vermeuler D. Stredulensky B. E. Dunn	Type of Research Program: x Fundamental x Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) x Measurement Methodology
Start Date: June, 1975 Completion Date: Estimated Jan., 1977 Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): $39598 Or Total Funding Amount: ($42,000) COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

1. Jointly with Bolt, Beranek and Newman, produce a literature review of road traffic noise and its control.

2. Design apparatus for and make measurement of noise attenuation (in various configurations) at right angles to highways.

3. Establish accurate methods for modeling the transmission of highway noise.

4. Make a minor contribution to design guide on assessment of highway noise.

Transcribed from the original.

Project Title:

Sound Propagation Outdoors

Performing Organization Name & Address:
National Research Council of Canada
Division of Physics
Acoustics Section
Ottawa, Canada K1A 0R6

Sponsoring Organization Name & Address:

Principal Investigator(s):
J. E. Piercy
J. F. W. Embleton
R. Donato
N. Olson
G. A. Daigle

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount	
1976 (actual):	($250,000)	$235,700
1977 (budget):	($250,000)	$235,700
1978 (forecast):	($250,000)	$235,700

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The purpose of this project is to gain a better understanding of the mechanisms of outdoor sound propagation. (This is basic to the control of motor vehicle and aircraft noise in residential areas.) The current picture indicates an acoustic shadow region near the ground, whose extent depends on the magnitude of the surface impedance. This shadow is always penetrated at low frequencies by a ground wave, and at higher frequencies by any one (or combination) of several mechanisms. Different mechanisms are predominant under different meteorological and topographical conditions, and at different horizontal ranges. The present state of knowledge in this field is summarized in a review paper and book chapter recently prepared for publication.
Topics considered include:

1) Theory of propagation over an impedance boundary
2) Measurement of ground impedance
3) Motor vehicle test site studies
4) Theory of multiple ray paths
5) Absorption of sound in the atmosphere
6) Effect of atmospheric turbulence

Transcribed from the original.

Project Title: Special Conditions of Noise Propagation, for instance over Water.

Performing Organization Name & Address:
National Agency for Environmental Protection
Kompomdusgode 1
1604 Kobenhaven, Denmark

Sponsoring Organization Name & Address:

Principal Investigator(s):
National Agency of Environmental Protection

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, Production)
___ Measurement Methodology

Start Date: 1978

Completion Date: Estimated 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	(50.000.D.kr.) $8,245

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Special Conditions of Noise Propagation, for instance over Water:

On the basis of measurements a number of rough rules of calculation shall be established for the propagation of noise over special configurations of the ground, for instance water surfaces and major asphalt surfaces, and the propagation of noise under the influence of the wind. The aim is to obtain a more exact evaluation of measuring results compared with calculation results.

Propagation
Sweden

Project Title:

The Influence of Meteorological conditions on L_{eq}

Performing Organization Name & Address:
Statens provningsanstalt
(The Swedish National Authority for Testing, Inspection and Metrology)
S-501 15 Boras, Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

Dr. Hans G. Jonasson
Dr. Sven Israelsson (Upsala University)

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
June 30, 1976

Completion Date:
Estimated June 30, 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$70,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The final goal is to make guidelines for outdoor measurements of L_{eq}. These guidelines will include restrictions on the meteorological conditions during the measurements.

The tests are carried out at the meteorological station of Upsala University. A stationary 4 stroke engine is used as a sound source and during all tests wind velocity and temperature gradients are continuously recorded. Besides the noise from a nearby highway is measured several times a week throughout the year.

A report will probably be published in September 1978.

Project Title:
Noise Propagation in Complex Environments

Performing Organization Name & Address:
Department of Civil Engineering
Bradford University
Bradford
W. Yorks
United Kingdom

Sponsoring Organization Name & Address:
Science Research Council
State House
High Holborn
London
United Kingdom

Principal Investigator(s):

Dr. D. C. Hothersall

Type of Research Program:

x Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
x Measurement Methodology

Start Date:	Completion Date:
10/77	Estimated ___ Actual 10/80

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(£ 14950) $25,708

COMMENTS:

It is proposed to investigate the propagation of noise (particularly transportation noise) over various ground surfaces and in complex environmental situations by analytical and simulation methods. This investigation will increase the accuracy of the prediction methods for noise propagation and would enable methods of alleviating noise nuisance by building design to be proposed.

Transcribed from the original

Project Title:
Improvement of methods of prediction of air-to-ground and ground-to-ground propagation of sound over real ground surfaces

Performing Organization Name & Address:
Institute of Sound and Vibration Research,
The University,
Southampton,
SO9 5NH, England.

Sponsoring Organization Name & Address:
Presently I.S.V.R. in-house, with research studentships provided, respectively, by the Canadian National Research Council and O.N.E.R.A. (Paris, France).

Principal Investigator(s):
Professor P.E. Doak (Supervisor)
S. Bolton (Ph.D. student, 1976-)
C. Crance (M.Sc. student, 1977-)

Type of Research Program:
X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date: 1.1.1976

Completion Date:
Estimated 30.12.1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(£20,000 (est.)) $34,392

COMMENTS: Estimated Total Funding Amount includes 3 yrs. National Res. Council (Canada) Fellowship; 2 yrs. O.N.E.R.A. M.Sc. Student support and £5,000 I.S.V.R. in-house cost-sharing.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The project is the first in a longer term series aimed at improving prediction methods for sound out-of-doors. Eventually, atmospheric, building and ground contouring effects are to be included. Present studies are concentrated on getting "ground impedance" effects right, including effects of its variation with position as well as from day to day. The literature of existing fundamental and practical methods has been thoroughly reviewed, in the context of all effects (not just that of "ground impedance"). Computation programs based on existing exact theories are being developed. Methods of accurate local measurement of ground impedance are being investigated. Working collaboration with investigators at the C.N.R.S. Laboratoire d'Acoustique et Vibration, Marseilles, France, has been established. Development work is expected at a later date, and U.K. authorities will then be requested to assist with funding.

Project Title: Sound Propagation Over the Ground Surface
(Measurement of the Impedance of the Ground Surface)

Performing Organization Name & Address:

The Open University
Walton Hall
MK 7 6AA Milton Keynes
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council
State House, High Holborn
WCIR 4TA, London
United Kingdom

Principal Investigator(s):

K. Attenborough
N. W. Heap
D. Dean

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 10/73

Completion Date:
Estimated 10/77
Actual _____

Funding:

Year	Amount
1976 (actual):	(£2500) $4299
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

1. To investigate the influence of the relative displacement of absorbent and non-absorbent ground surfaces upon the far field pressure distribution due to a point sound source.

2. To investigate methods of determining the acoustic impendence of the ground surface.

3. To investigate relationship between physical parameters of ground (permeability, water content, etc.) and acoustic properties. A scale model of the ground surface will be created and measurements carried out in an anechoic chamber, resulting empirical model to be corrected for climatic refraction and total result use for prediction of sound field for near grazing incidence, i.e., traffic noise aircraft flyover noise. Systematic measurements of surface impedance in situ will be related to measurements of physical parameters.

Citations

"Sound Attenuation Over Ground Cover", Shock and Vibration Digest, V. 7 pp. 73-83, 1975.

"Relationship Between Acoustic Impedance and Permeability," Report No. 1 on Contract B/RG/7263/7, (Unpublished).

"Normal Surface Impedance of the Ground," in Press.

Transcribed from the original.

Project Title:

Propagation of Traffic Noise Over Vacant Land: Dependency on Sound Absorption of the Surface, Elevation Above Surface and Siting of the Highway

Performing Organization Name & Address:
Federal Highway Office
Bundesanstalt Fuer Strassenwesen
Post Fach 51 05 30
Bruchlerstr. 1,5 Koeln 51
West Germany

Sponsoring Organization Name & Address:
Bundesminister Fuer Verkehr
Post Fach 100
53 Bonn-Bad Godesberg 1

Principal Investigator(s):

Dr. S. Ullrich

Type of Research Program:

__x__ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: April, 1976

Completion Date:
Estimated Dec., 1978
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(DM 85,000) $36,040

COMMENTS:

Computation base for the sound propagation (road traffic noise) in unbuilt or moderately built areas. Roads in cuttings, in grade, or elevated on earth berm. Effect of vegetation between the road and receiver.

Report:

"On the Propagation of Average Noise Level from Level Road in an Unbuilt Flat Ground", 6/1977.

Translated and transcribed from the original German.

Project Title:

Noise Damping by Wooded Areas

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Institute for the Study of Forestry Yields, Freiburg Univ. Freiburg, Bertoldstr. 17 West Germany	
Principal Investigator(s): Dipl.-Forstw. Schoelzke	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Aug 1, 1972 Completion Date: Estimated Dec 31, 1977 Actual _____	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: (170,000 DM) $ 72,080
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

Propagation of sound in forest stands of oaks/beech trees/spruce/and pines is studied in various age groups; the spread of white noise is measured along several lines through the stand, also the spread of noise filtered through octave bands.

Aim: Is noise protection possible from wooded areas? What is the order of magnitude of this protection? Are there differences between types of trees?

Translated and transcribed from the original German.

West Germany. Traffic Noises in Tunnels and at Tunnel Access - Effect of Absorbent Facing. Federal Institute for Highway Design, Cologne, Bruehler Strasse 1, West Germany. Sponsor: Federal Highway Ministry. Dr. Siegfried Ulbrich. Jan. 1, 1974. Dec. 31, 1978. (100,000 DM) $42,400. Determination of noise levels in tunnels - noise progagation at tunnel openings - effect that absorbent facing on tunnel walls and ceilings has on the progagation at the openings.

West Germany. Noise Progagation in Built-Up or Cultivated Areas. Institute for Acoustical Technology, Aachen Klausenerstr. 13-19, West Germany. Prof. Dr. Kuttruff. Jan. 1, 1973.Dec. 31, 1976. (150,000 DM) $63,600. Noise progagation in inhabited areas; noise screening by woods.

Propagation
Japan

Project Title: A New Trial to Estimate the Noise Propagation Characteristics of a Traffic Noise Syntem and Its Application.

Performing Organization Name & Address:
Department of Electrical Engineering,
Faculty of Engineering, Hiroshima University,
3-8-2, Senda-machi, Hiroshima City,
730 Japan.

Sponsoring Organization Name & Address:
None.

Principal Investigator(s):
Mitsuo Ohta,
Tsuyoshi Okita
and
Kazutatsu Hatakeyama.

Type of Research Program:
_X_ Fundamental
_X_ Development (Component or System)
_X_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated March, 1978.
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS: This work is based on regular expenses of the national school of Japan.

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The large-scale use of motor vehicles in the Twentieth Century as general surface transportation has given rise to several environmental problems, most troublesome of which is the road-traffic noise.

Generally speaking, a level-fluctuation of road-traffic noise is brought on by various causes. It is obvious that the ultimate causes are due to a variety in noise sources, i.e., uncertain behavior of individual cars, and to some effect of the noise-propagation characteristics affected by reflections and/or absorptions owing to surrounding buildings and their topographical locations.

By dividing the road into a suitable number of blocks, and paying close attention to the mean value of the noise intensity in each block, the mean value can be proportional to the number of cars in the block. This averaged relationship is generally true, based upon an adequate number of passing cars. In this paper, at first, this proportional relationship is shown to be a logical result based upon the additive property of energy quantity or noise intensity generated by the road traffic. We recoginize so-called proportional parameters, which relate the number of passing cars to the sound intensity received, as noise-propagation characteristics in a wider sense, which are indexes characterized by reflections and/or absorptions owing to surrounding buildings and their topographical locations.

In this paper, on the basis of the additive property of sound energy, some unified method has been proposed to estimate the inherent characteristics of noise-propagation in each block in the form of a synthetical evaluation with the number of cars for each car-type, including a consideration of the entire back-ground noise. This procedure can be done without depending on the surrounding and topographical locations.

We have confirmed the validity of our theoretical results, not only by means of digital simulation, but also by road-traffic noise-data experimentally observed near Hiroshima City. The experimonal results clearly show a good agreement with the values recently reported by other official groups.

This work was published in the preprints of the International Federation of Automatic Control, Environmental Systems, Planning, Design and Control, in August 3, 1977.

Project Title: Propagation of Sound at Grazing Incidence Outdoors

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Institute of Sound and Vibration Research, The University, Southampton, SO9 5NH, England.	None.
Principal Investigator(s): J. Stuart Bolton	Type of Research Program: _X_ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) _X_ Measurement Methodology
Start Date: May 1976 Completion Date: Estimated December 1978 Actual _____	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS: This is a Ph.D. project. The principal investigator is personally funded by a National Research Council (Canada) Postgraduate Scholarshi

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project is designed to investigate the effects of allowing the earth's surface to have a finite acoustical impedance, on the propagation of environmental noise over moderate distance (< 2 km).

The relative benefits of describing the surface by specifying a complex density and speed of sound independently rather than using a normal impedance are being considered.

The observable differences in the features of sound propagation over a multilayered surface as compared to a single (semi-infinite) layer surface are being predicted to establish whether typical ground surfaces must be considered to be multilayered. The effect of surface impedance discontinuities along the propagation path is also being investigated.

Subsidiary to the main project, techniques of measuring the acoustical parameters of typical ground surfaces are being developed.

United Kingdom. Outdoor Sound Propagation in the Presence of a Surface of Finite Impedance. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. P.E. Doak, S. Bolton.

United Kingdom. Measurement of Ground Impedance. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. P. E. Doak, C. Crance.

United Kingdom. Propagation and Attenuation of Sound Out-Of-Doors. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. P. E. Doak, S. Bolton.

West Germany. Noise Abatement in Streets. Institute for Highway Research, Karlsruhe University, Karlsruhe, West Germany. Prof. Dr. Wilhelm Lentzbach. Oct. 31, 1975. Feb. 28, 1976. Analysis of the literature on street noise abatement. Measurements of street noises and their analysis. On the basis of present day regulations and guidelines, a study was made of noise propagation in streets and of its impact on built-up areas.

ACOUSTIC PROPERTIES

BARRIERS

See Also Pages:

62
84
115
125
158
163
170
176
179
180
242
307
308
353
357

Project Title: Field Measurement of Road Traffic Noise Shielding provided by Buildings and Building Elements.

Performing Organization Name & Address:
School of Architecture,
University of New South Wales,
P.O. Box 1,
KENSINGTON. N.S.W. 2033
AUSTRALIA.

Sponsoring Organization Name & Address:
State Pollution Control Commission,
G.P.O. Box 4036,
SYDNEY. N.S.W. 2001
AUSTRALIA

Principal Investigator(s):
Assoc. Prof A. Lawrence,
Mrs. M.A. Burgess.

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date: July 1977

Completion Date:
Estimated July 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	($3,000) $1,330

COMMENTS: Only for Part-Time Staff

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

1. Aims of Project

The investigators have been measuring traffic noise in the Sydney urban area over the last few years and have used a multi-channel technique to measure the real traffic noise attenuation provided by rows of buildings and by the facades of buildings with open and shut windows. The purpose of this proposed investigation is to continue these measurements, so that a realistic shielding prediction method may be devised. (From measurements made already, the actual shielding provided by a row of buildings is much greater than that predicted using conventional barrier theory - this has important economic implications).

2. Method

Calibrated recordings of traffic noise measured simultaneously at up to four microphone locations, are analysed in the laboratory to determine L_5, L_{10}, L_{50}, L_{90}, L_{95} and L_{eq}. These levels are related to a detailed count of traffic flow rate and composition, taken over 10 minute sampling periods. In addition, a voice commentary is used to describe as many vehicles as possible; these are later identified on paper charts and subjected to one-third octave band analysis using a real-time analyser and computer graphic print-out. Thus the attenuation between microphone locations is obtained for each one-third octave band as well as in dB(A).

3. Practical applications

Guidelines for assessing background noise at various distances from new and existing roads (with implications for allowable noise emissions from industrial and other sources). General application in assessing the environmental impact of new developments having a traffic component. Guidelines for authorities planning land-use zoning near major roads.

Project Title:

Transportation Noise Scale Model Facility

Performing Organization Name & Address:
Acoustics Office, R & D Division
Ministry of Transportation & Communications
1201 Wilson Avenue
DOWNSVIEW, Ontario M3M 1J8 - Canada

Sponsoring Organization Name & Address:

Same as performing organization

Principal Investigator(s):

M. M. Osman
D. N. May

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
x Measurement Methodology

Start Date: December 12, 1975

Completion Date:
Estimated Sept. 12, 1976
Actual June 1, 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
	$35543
Or Total Funding Amount:	($37,700)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The goal was to develop a scale model facility to simulate outdoor noise problems. The noise source is a spark having a useful noise in the frequency range 4-140 kHz, and the receiver is a 1/8" microphone. A choice of three scaling factors is available: 1/16, 1/32 and 1/64. Measurements are carried out with and without certain features of the model (e.g. noise barriers) and attenuation is measured. Preliminary experiments on barrier attenuation show good agreement with prediction.

Two reports are completed, one covering instrumentation use and the other on the choice and validation of the materials used in scale modelling.

"Noise scale model instrumentation - Instrumentation manual", M. Osman, R & D Division, Ontario Ministry of Transportation & Communications, Report 77-AC-3, January 1977.

"Materials choice and validation for scale modelling", M. Osman, R & D Division, Ontario Ministry of Transportation & Communications, Report 77-AC-4, May 1977.

Project Title:

Screening effect of earth barrier

Performing Organization Name & Address:
The Acoustical Laboratory
The Danish Academy of Technical Sciences
DK-2800 Lyngby, Build. 352, Denmark

Sponsoring Organization Name & Address:
Miljøstyrelsen
Kampmannsgade 1
DK-1604 København V
Denmark

Principal Investigator(s):
Jørgen Kragh

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1975

Completion Date:
Estimated April 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$65,960 (D.kr. 400.000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Noise measurements have been carried out in 6 microphone positions 7-200 m from motorway kerb., and in various heights above ground.
One measurement site is open level ground. Another site involves a 7 m high earth barrier close to the road.
On 70-100 days over a period of appr. 1 year noise levels (L_{eq},dBA) were recorded under varying meteorological conditions.
Data processing estimated to be completed early in 1978 involving an analysis of possible connections between wind speed and direction and noise level reduction with distance from road.

Comparison between data from screened and unscreened measurement site will give information of screening effect of the earth barrier, and on variation of screening due to changes in meteorological (and other) conditions.

Barriers
Denmark

Project Title:

Plus Støjværn

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
ZAC-CONSULT, Gladsaxe Møllevej 23, DK-2860 Søborg, Denmark	Vejen Træindustri A/S, DK-6600 Vejen, Denmark.
Principal Investigator(s): John Zachariassen	**Type of Research Program:** ___ Fundamental _X_ Development (Component or System) _X_ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1975 / **Completion Date:** Estimated ____ Actual 1977	**Funding:** Year (actual): Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: around U.S.D. 70.000 COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Development of a system of noise abatement screens for outdoor use. The system is based on standard components made primarily from pressure-creosoted wood.

The system includes reflecting panels and absorbing panels. A reflecting screen may at any time be converted into an absorbing screen through the use of standard components.

The development is near completion. Pilot production is in progress.

Barriers
Denmark

Project Title:

Noise Reduction Capacity of Plantation Belts.

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
National Agency of Environmental Protection Acoustic Laboratory Kompmonusgade 1 1604 Kobenhaven, Denmark	
Principal Investigator(s): National Agency of Environmental Protection	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, Production) ___ Measurement Methodology
Start Date: 1977 Completion Date: Estimated spring 1979 Actual _____	Funding: Year — Amount 1976 (actual): 1977 (budget): (20.000 D.kr)$3,298 1978 (forecast): (100.000 D.kr)$16,490 Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

Noise Reduction Capacity of Plantation Belts: The knowledge of the capacity of plantation belts to retain noise both in Denmark and at the international level is far from sufficient. Plantation belts are already widely used as a noise-reducing measure, mainly along major roads, and it is therefore considered very important to improve the knowledge of this measure.

Barriers
Sweden

Project Title:
Screening of Noise From Heavy Vehicles

Performing Organization Name & Address:

IFM-Akustikbyran AB
Box 30021
400 43 Goeteborg, Sweden

Sponsoring Organization Name & Address:

Statens naturvardsverk
Fack
171 20 Solna, Sweden

Principal Investigator(s):

Esse Kamph

Start Date:
July 1, 1977

Completion Date:
Estimated June 30, 1978
Actual _____

Type of Research Program:

- x Fundamental
- ___ Development (Component or System)
- ___ Demonstration (Experimental, Prototype, or Production)
- ___ Measurement Methodology

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount: (25,000 skr) $5632

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Studies of the literature on the measuring carried out on various contributing noise sources in heavy road vehicles. The study of the location of the contributing noise sources in some common types of heavy vehicles. The estimation of the effects of screening with regard to screens placed close to the roads in typical populated areas, according to current estimation methods, and also with regard to the various locations of the contributing noise sources in heavy vehicles. Determining the need to modify current methods with regard to the estimation of screening effects.

Translated and transcribed from the original Swedish.

Project Title: Noise Barriers

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Transport and Road Research Laboratory Old Wockingham Road, Crowthorne, Berkshire RG11 6AU United Kingdom	Department of the Enviroment
Principal Investigator(s): L. M. Watkins D. G. Harland	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1969 Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: (£ 40,000)$68,784
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

To assess effects of road side noise barriers, to develop a prototype barrier for use on urban motorways.
A wooden barrier has been erected alongside the M1 near Luton and the Building Research Station has measured the effects of the barrier. A prototype has been erected alongside the M4 at Heston and a subjective survey has been made to assess the effects of M4 traffic noise. A further survey was made about six months after completion of the barrier. The weight of the barrier is to be increased and further measurements made to assess the effect. Measurements are also made behind a wooden barrier alongside the M6 in Birmingham to assess the performance of a two mile and three mile barrier and the effect, if any, of multiple reflection between barriers.

Publication:

Performance of a motorway noise barrier at Heston
Scholes, Mackie, Vulkan and Harland
Applied Acoustics, Vol 7, No 1, 1-13, 1974

Transcribed from the original

Project Title: Free Field and Model Studies on the Influence of Type of Road Cuttings, Earth Berms, etc., on Effectiveness of Reduction of Road Traffic Noise

Performing Organization Name & Address:
Federal Highway Institute
Postfach 51 05 30
Bruehlerstr. 1
5 Koeln 51, West Germany

Sponsoring Organization Name & Address:
Federal Transport Ministry
Postfach 100
53 Bonn-Bad Godesberg 1
West Germany

Principal Investigator(s):
Dr. S. Ullrich

Type of Research Program:
x Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 4/76

Completion Date:
Estimated 12/78
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast)	
Or Total Funding Amount:	$42,400 (DM 100,000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Collection of data on reduction of road traffic noise emissions by use of various profile structures of cuttings, embankments, and long barriers. Development of simple methods for calculation of estimated protective effects against traffic noise. Model and field measurements.

Reports

"Model Test on Propagation of Road Traffic Noise in the Vicinity of a Road in a Cutting," Nov. 1976.

"Curves of Equal Reductions of Average Noise Level Achieved by Constructing a Road in a Cutting," Feb. 1977.

Translated and transcribed from the original German.

Project Title: Influence of Noise Protective Devices on the Ease of Flow, Fluidity and Security of Road Traffic Flow.

Performing Organization Name & Address:
Federal Highway Institute
Postfach 51 05 30
Bruehlstr. 1
5 Koeln 51 West Germany

Sponsoring Organization Name & Address:
Federal Transport Ministry
Postfach 100
53 Bonn-Bad Godesberg 1
West Germany

Principal Investigator(s):

G. Reinhold

Type of Research Program:

x Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 4/76

Completion Date:
Estimated 12/78
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$42,400 (DM 100,000)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Classification of noise protection measures with regard to their effectiveness.

Investigation of the relationship of specific parameters of flow of traffic as a function of the type of noise protection measure, its height (noise protection screens), and its distance from the road.

Translated and transcribed from the original German.

Barriers
West Germany

Project Title:
Assembling and Evaluating Data Needed for the Drafting of VDI - Guideline 2720

Performing Organization Name & Address:
Battelle Institute E.V.
Frankfurt 90, AM Roemerhof 35
West Germany

Sponsoring Organization Name & Address:
Federal Ministry for Labor and Social Problems

Principal Investigator(s):
Dr. Ulrich Kurze

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Nov. 1, 1975

Completion Date:
Estimated ____
Actual March 31, 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(59,000 DM) $25,016

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Analysis of the literature on noise protection by shielding in open and enclosed spaces.

Translated and transcribed from the original German.

Project Title:
Field Evaluation of Existing Noise Barriers Using Electronically Simulated Transportation Noise Signals.

Performing Organization Name & Address:

Ontario Ministry of the Environment
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5
Canada

Sponsoring Organization Name & Address:

Principal Investigator(s):

Christian A. Krajewski

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

A number of existing barrier sites were selected for investigation of their effectiveness in reducing traffic generated noise under varying atmospheric conditions.

A sound reinforcement system and electronic compensating filters were used to duplicate distinct transportation noise sources to provide a uniform, repeatable source characteristic clearly above the ambient level.

Sound levels at receiver locations in "no barrier" conditions were checked theoretically by using a simplified Weyl and van der Pohl equation.

A portable electronic "weather station" was designed to provide continuous, digital information on meteorological conditions, synchronized with sound recordings during the field investigations.

Transcribed from the original.

Project Title:

Acoustic Barriers

Performing Organization Name & Address:

Institute of Transport Research
Center for the Evaluation of Research on Nuisances
109 Avenue Salvador Allende
69672 Bron Cedex, France

Sponsoring Organization Name & Address:

S.E.T.R.A. - C.E.T.U.R.

Principal Investigator(s):

B. Favre

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated 12/12/77
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

a) Visually transparent automobile barrier. The 1975 study of the visually transparent acoustic barrier is to be completed. The geometric and acoustic characteristics of optimum transparency and acoustic attenuation are to be established. Industrial studies are to be followed.

b) Synthesis of foreign procedures. The 1972 documentation and synthesis are to be updated in view of the abundance of more recent French and foreign studies.

c) Directivity of traffic noise source. Directivity of noise from traffic on an urban highway along a cross-sectional profile is to be measured in a selected site because of possible directivity effect on screen efficiency.

Translated and transcribed from the original French.

Project Title:

Calculation of Barrier Efficiency

Performing Organization Name & Address:

Laboratoire de Meconique et d'Acoustique
31, Chemin Joseph Aiguier
13274 Marseille Cedex 2
France

Sponsoring Organization Name & Address:

Principal Investigator(s):

Andre Dumas

Type of Research Program:

X Fundamental
___ Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In the first study, we contemplated a thin planar barrier with the reflector placed on the equally reflecting ground. The purpose is to find out how this three-dimensional problem may be reduced to the analogous two-dimensional problem. Supposedly, the length of the barrier in infinite and the linear acoustic source is parallel to the barrier. Two methods of calculation are used and compared. A classic method of the MAEKAWA model and a more vigorous method, where diffracted field is represented by a double-layer potential, if the barrier is reflecting.
Numerical data thus obtained are compared between them and with the measurements made with a model.
It is concluded that hypothetical substitution of a two dimensional model for the actual problem is reasonable and barrier attenuation calculated by the method of layer potentials appears to be the minimum limit.

Publications

Calculation of a barrier efficiency: comparison between a classic method of approximation and numerical solution to the integral equation of the problem. International Round Table of the C.N.R.S. The Marseille Laboratory of Mechanics and Acoustics (1975).
Methods of forecasting noise attenuation by a barrier - International Anti-pollution Days - Grenoble (October 1975) - Two dimensional simulation of a barrier problem, Methods of efficiency calculation - The 9th ICA - Madrid (1977) - Study of diffraction by a thin barrier on the ground - Acustica (to be published), v. 39, no. 3, 1978.

Project Title:
About the "acoustic quality" of israeliemce plants as screening belts

Performing Organization Name & Address:

The Dept. of Applied Acoustics and the
Israel Inst. of Wood-Research.
Technion I.I.I.
Haifa, Israel

Sponsoring Organization Name & Address:

Principal Investigator(s):
Schaudinischky, L.H.
Keller, J.

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date:	Completion Date:
End 1975	Estimated ____ Actual 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

In many countries of the world, space for town and settlements is becoming a problem of ever-increasing importance. This situation is closely connected with the enormous growth of traffic roads, along which the building of houses and settlements is extremely difficult because of noise, dust, fumes and particles, which are the direct result of the heavy traffic. On the other hand, this neighbourhood could shorten waste time needed by the greater part of inhabitants to come to their places of occupation. A nearly ideal solution for this problem could be the separation of the highways from the settlements by green belts, consisting of acoustically effective, quick growing and resistive trees, having a low consumption of water. Such green belts would also be useful as parks and counteract the irresponsible destruction of wood, in order to create the land for our highways.

A special instrumentation set-up has been constructed for the objective testing of the "screening effect" of single trees. Furthermore, certain physical properties have been determined, which would allow the approximative calculation of the "acoustic quality" of a tree, according to a new mathematical model.

Barriers
Netherlands

Project Title:
Taking inventory of noise transmission limiting measures and establishing rules for calculating them.

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Public Health and Environmental Hygiene Dept.
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
Est. 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

One of the possibilities of reducing the noise load from institutions on the environment is the installation of defices which limit noise transmission, such as screens, walls, and trees. The study intends to investigate the applicability of the results of such studies in the field of traffic noise, among others, and to take inventory of the results of specific industrial noise studies here and abroad. If necessary, supplementary studies will be made of the effect of certain measures. In order to issue specifications within the framework of the drafted noise nuisance legislation, rules for calculation of the effect of the measures should be established.

Translated and transcribed from the original Dutch.

Project Title: Research of the Effect and Applicability of Acoustical Insulation by Means of Roadside Planting

Performing Organization Name & Address:

Sponsoring Organization Name & Address:
Ministry of Transport and Public Works
Amsterdam, Netherlands

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: 1976

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The effectiveness of trees and shrubs as an acoustical screen is often greatly overrated, as witnessed by the narrow strip which is generally left along motorways (in this country), in contrast to the broad verges which research abroad on acoustics has proven to be necessary in order to perceptibly improve the noise situation.

In the Netherlands, very little has been done to date to resolve this problem; it is now necessary to select by experimentation some native flora with good noise-deflecting qualities which, in addition should not be dependent on the seasons.

This project includes both the study of several experimental verges along busy highways during varous seasons, and the planting and research of various kinds of plant growth.

Transcribed from the original.

Barriers
Netherlands

Project Title:
Investigation of the Possibilities of Noise Deflection Along the Roadside

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Transport and Public Works Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

Although there is already a great deal of theory available on the effect of acoustic screens, there is a pronounced need for experimental verification by measuring noise levels behind screens of different heighth, length and shapes. More experimental research should also be done into the acoustical effect of plant growth near the top of the screen and the influence of the wind on the effectiveness of the screen. The findings of this research can then be incorporated into prognosis models of noise nuisance around the road, which models will also be based on data from an earlier project.

Results of similar research abroad will be used as much as possible in the implementation of this project.

This project will also include a study of the effects of acoustical screen structures on the landscape and environment , the cost of such screening available for the Netherlands, and maintenance and installation costs involved.

Transcribed from the original.

Project Title:

Computer model of traffic noise propagation

Performing Organization Name & Address:

Dr. E.J. Ratne
Swiss Federal Institute of Technology
Wettsteinstrasse 71
CH-8332 Russikon, Switzerland

Sponsoring Organization Name & Address:

Principal Investigator(s):

E. J. Ratne

Type of Research Program:

- [x] Fundamental
- [x] Development (Component or System)
- [ ] Demonstration (Experimental, Prototype, or Production)
- [ ] Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

GOAL: Treatment of propagation problems in complex topographical surroundings

APPROACH:

Computer modelling with automatic selection of the relevant terrain cuts. Output prepared for planning purposes to allow easy evaluation of the effect of barriers and the optimization of their location and /or dimensions.

RESULTS:

The program is being tested in actual cases, the results are in good agreement with measurements. Since the spectra in 1/3-octave bands for the sources, as well as even complicated directivity patterns can be taken into account, the model is now applicable to road, railway and airborne traffic simulations.

PLANS:

Development of a commercial version of the programs to allow their use directly by any interested party.

France. External Noise from 504 Berlin-Screen. Bertin et Cie, B. P. No. 3, F-78370 Plaisir, France. 1977.

Poland. Designing Acoustic Shields on Existing Routes or Newly Designed. Warsaw Sanitary, Epidemiological Station, Building Research Institute, Department of Acoustics, Warsaw, Poland. Sponsor: Warsaw Bureau for Development. Example: Bridge, Route J. Poniatowski.

Poland. Analysis of the Run of the Torunska Express Way in Relation to Noise Annoyonce for Residents of the Adjacent Areas. Building Research Institute, Warsaw, Poland. Sponsor: Management of Highway Construction, Warsaw, Poland. This project was worked out with an aim of providing the designers the material on how to locate protections along the way and giving them the illustration of noise level distribution on the areas adjacent to the Express Way.

Sweden. Lanscaping of Traffic Routes for Reduction of Noise. Swedish Council for Building Research, Stockholm, Sweden. Mar. 1975. Feb. 1976.

United Kingdom. Road-Side Noise Barrier Experiment. Transport and Road Research Laboratory, Berckshire, Building Research Establishment Buckinghamshire, United Kingdom. A 3m road-side barrier along M6 motorway in Birmingham.

United Kingdom. Noise Barrier Screening. Transport and Road Research Laboratory, Crowthorne, Berkshire RG11 6 AU. A 5m high barrier screening project to study the sound reduction at distances greater than 100m behind such a barrier.

ACOUSTIC PROPERTIES

ARCHITECTURAL ACOUSTICS

See Also Pages:

62
79
108
113
125
179
352
353
358
362

Architectural Acoustics
Canada

Project Title:

Traffic Noise and High-Rise Balconies

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Acoustics Office, R & D Division Ministry of Transportation & Communications 1201 Wilson Avenue DOWNSVIEW, Ontario M3M 1J8 - Canada	same as performing organization
Principal Investigator(s): D. N. May	Type of Research Program: x Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, o Production) ___ Measurement Methodology
Start Date: Oct. 3/75 Completion Date: Estimated Jan. 3/76, Actual April 3, 1977	Funding: Year — Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: $7071 ($7500)
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	COMMENTS:

Project goal was to evaluate noise levels on high-rise balconies near expressways and to investigate noise control using sound absorptive material. Approach used was to measure energy equivalent sound levels on a number of balconies and at roadside, and to retrofit a balcony with varying coverages of absorptive material. Sound levels above the 8th floor of high-rises 200 ft. or so from expressways were 10 dB(A) higher than on ground floor. Daytime equivalent sound levels were 70 to 80 dB(A) on balconies, depending on size of expressway. The use of sound absorptive material showed substantial noise reductions, 5 dB(A) from treating the balcony ceiling alone.

Report: "Traffic noise and high-rise balconies", D. N. May, Research & Development Division, Ontario Ministry of Transportation & Communications, Report 77-AC-2, April 1977.

Architectural Acoustics
Denmark

Project Title:
The Noise Reduction Capacity of Heat-Insulating Constructions.

Performing Organization Name & Address:
National Agency of Environmental Protection
Kampmanusgade 1
1604 Kobenkaven, Denmark

Sponsoring Organization Name & Address:

Principal Investigator(s):

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:
1977

Completion Date:
Estimated summer 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast): (100.000 D.kr.)	$ 16,490

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The Noise Reduction Capacity of Heat-Insulating Constructions:

Preparation of guidelines in the form of a catalogue of constructions, in which construction types - primarily window constructions - may be evaluated for, for instance: heat-insulation, noise-insulation, ventilation, construction, inflammability, economy.

Transcribed from the original.

Project Title: No.17.06.02.1 "Study on acoustic climate development in buildings, in Poland, by means of urban developments and elaboration of a detailed program for the years 1977-80.

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Building Research Institute/ITB/ Department of Acoustics, ul. Ksawerow 21, 02-656 Warsaw, Poland	Centre of Investigation and Building Design COBPBO ul. Wierzbowa 9 Warsaw, Poland
Principal Investigator(s): Prof. Jerzy Sadowski	Type of Research Program: ___ Fundamental _X_ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: Jan. '76 Completion Date: Sept. 30, 77/1st ph/ Sept. 79/end/	Funding: Year Amount 1976 (actual): (713,457 zl) $35,816 1977 (budget): x 1978 (forecast): and 1979 x Or Total Funding Amount: COMMENTS: x=will be determined in the phase
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This project is a study on research development in urban acoustics, carried out in Poland and in a number of the countries, well advanced in that type of activities. Particularly interesting aspects of the project are the possibilities of using the urban developments for protection of housing estates against the ambient noise/traffic and industrial in particular/.
PHASE I: The study will be ended up by summarizing the progress of the previous research, identification of the problems to be solved by means of investigations that are being performed in Poland, adaptation of other countries devleopments into Poland, list of research projects to be undertaken in the years 78-80 identifying the goals of the projects.
PHASE II: will include and refer to performance of the tasks and research estimated for 78-80 by the Building Research Institute and research centres collaborating with the BRI. The investigations to be performed in the years 78-80 cover as well the problems connected with building interiors /arrangement of rooms/ and with mass of a building, taking into account "acoustic localization" of buildings designed in such a way so as to isolate or screen the ambient noise. Apart from the BRI the following other research centres will take part in the investigations: Institute of Fundamental Technology Problems at the Polish Academy of Science /IPPT, PAN/, Research Institute for Environmental Development in Warsaw and others.

Transcribed from the original.

Project Title:
Traffic Noise Spectra

Performing Organization Name & Address:
Chalmers University of Technology
Department of Building Acoustics
Facks
S-402 20 Goeteborg, Sweden

Sponsoring Organization Name & Address:
Building Standards Institution
Drottning Kristinas Vaeg 73
S-114 28 Stockholm
Sweden

Principal Investigator(s):
G. Koarfalk

Type of Research Program:
___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: July 1976

Completion Date:
Estimated ____
Actual April 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$10,000

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Generalized traffic noise spectra were evaluated for different noise situations. 140 measured spectra from different situations were collected. Their mean and standard deviation in one-third octave bands from 50 Hz-500 Hz were evaluated in different classes: 1. undamped spectra (cities, close to roads), 2. spectra with ground effects 3. screened spectra. The spectra were also evaluated with respect to sound isolation of facades. The accuracy of the spectra is found to be astonishingly good. At dominating frequencies the standard deviations typically are between 1 and 2 dB. The result is intended to be used for the classification of facades according to their sound isolating properties.

Transcribed from the original.

Project Title:

A Wave Model for the Response of Framed Structures to Noise and Vibration

Performing Organization Name & Address:

Civil Engineering Department
University of Leeds,
England.

Sponsoring Organization Name & Address:

University of Leeds Post1976

Principal Investigator(s):

L. A. Walker
M. J. Greenwood

Type of Research Program:

X Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: parts (a) & (b) in text Autumn 1977 | Completion Date: Estimated Autumn 1979 Actual _____

Funding:

Year	Amount	
1976 (actual):	(£ 500)	$ 860
1977 (budget):	(£1000)	$1,720
1978 (forecast):	(£1000)	$1,720

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Within the field of noise abatement in buildings a study has been made of vibrational energy transfer in framed structures.

The approach has differed from earlier versions in that two wave types, that is, flexural and dilatational are simultaneously allowed for in the model, since the earlier studies for single joints have shown that errors may arise where only one wave type, e.g. flexural, is assumed for the model. The experimental models, using small section hollow steel members, have given good agreement with theory for both a plane and a simple space frame, where the first was used as a proving exercise for the second.

Future work would aim to include (a) the effects of infilling panels; (b) the efficiency of active damping methods, studied in an earlier project. These would expect to reduce low frequency vibration and acoustic flanking transmissions of a kind caused by traffic and machinery, for which passive damping methods are known to be inadequate.

This project is continuing.

Project Title:

Underground Vibrations in Buildings

Performing Organization Name & Address:

Institute for Soil and Rock-Mechanics
Karlsruhe U.
Karlsruhe, Richard-Willstaetter-Allee
West Germany

Sponsoring Organization Name & Address:

Principal Investigator(s):

Prof. Dr.-Ing. Gerd Gudehus

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Sept. 1, 1975

Completion Date:
Estimated _____
Actual Sept. 31, 1977

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(175,000 DM) $74,200

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The screening effect of rigid, wall-like insertions (protective wall) is studied, as well as that of rows of drill holes, on the underground propagation of tremors. This is done both near to and far from the tremor source (machine bed plate, traffic tremors).

The study is carried out (computations) by the finite element method on a level model. In addition, measurements of the screening effect at the scale model are executed in an experimental sand box.

Translated and transcribed from the original German.

Project Title:

Sound Level Reduction in the Case of Typical Building Forms and Positions

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
Technical University of Munich Arcisstrasse 21 D-8000 Munich 2 West Germany	Innenminister des Landes Nordrhein-Westfalen Haroldstrasse 6 D-4000 Dusseldorf 7 West Germany

Principal Investigator(s):
Dr. Gluck
Prof. Machtetemes
Dipl.- Ing Bondmann
Dipl-Volkswirt Brackmann
Dipl-Ing Luckert, Perschke

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_X_ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:	Completion Date:
1974	Estimated ____ Actual 1977

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(284,000 DM) $120,416

COMMENTS:

Setting up an example catalogue in which the sound level reduction with typical building forms and positions is represented in the form of isophones. 209 examples. Publication: Literature series of the Institute for Rural and City Development Research of the District Nordrhein-Westphalia.

Translated and transcribed from the original German.

Project Title:
New Aspects for Planning Heavy Diesel Engine Repair Halls.

Performing Organization Name & Address:
Dept. of Appl. Acoustics
Technion I.I.I.
Haifa, Israel

Sponsoring Organization Name & Address:
I.D.F.

Principal Investigator(s):
L.H. Schaudinischky

Type of Research Program:
X Fundamental
X Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Jan. 1977

Completion Date:
Estimated _____
Actual _____
In progress

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

The positive influence of breaks in continuous noisy work on the hearing of workmen has been proved by appropriate investigation results. A survey of the noise situation in big repair halls, where numerous groups of workers are engaged in overhauling and testing of heavy diesel-engines in its various phases, clearly show up, that several groups are performing mounting and demounting, both relatively silent works, while a few other groups, sometimes one only, has reached the run-up phase, during which high noise levels are created. The nearly free propagation of sound-waves inside such halls and the numerous reflection by hard surfaces does not allow an acceptable reduction of the noise levels in those groups, which otherwise could profit from silent intervals.

The aim of the study is to base the planning of such working halls on the conception of single and individual test and repair cells, with good sound-protection against each other, while the run-up of overhauled engines is controlled inside a special control room, acoustically well insulated from the repair cells arranged along the two long walls of the C.R.

Architectural Acoustics
Netherlands

Project Title: Public Experience of Acoustic Insulation in or Around the Dwelling

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The installation of acoustic insulation in situations suffering serious noise nuisance, such as acoustic screens or wall coatings, can have unfavourable side-effects to the point where inhabitants do not experience the new situation as an improvement. These problems include impairment of the view, maintenance problems, and the"bunker effect" of heavily insulated dwellings. The estimation of inhabitants for various forms of acoustic insulation should be taken into consideration in making decisions on similar measures to be implemented in other situations.

Public opinion will be gauged by means of inquiries, the results of which also serve to improve our knowledge of the relation between the loudness of traffic noise and the degree of annoyance or noise nuisance which is experienced because of it.

Implementation of this project will also include inquiries in noisy places near busy motorways among the inhabitants of buildings to be acoustically insulated, both before and some time after this has taken place.

Transcribed from the original.

Architectural Acoustics
Netherlands

Project Title:
Interior Layout of Buildings so as to Avoid Noise from Outside

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Housing and Physical Planning Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

In situations in which the noise load from one side of the dwelling will be greater than that from the other side, one of the means of achieving an optimal situation with regards to limiting traffic noise nuisance is to plan the interior layout so that living space is as far removed as possible from the source of noise. This idea has hardly been brought into practice in planning housing.

The project intends to compile a report treating of the optimal layout of a dwelling, based on the existing knowledge. This report should be of practical value to architects and building authorities.

On the basis of consultation of available literature, attention will be devoted to the noise-sensitivity of various sorts of living space and other factors which would influence the layout of a dwelling.

Transcribed from the original.

Architectural Acoustics
Netherlands

Project Title:
Inventory of knowledge Pertaining to Acoustic Insulation of Buildings

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 Completion Date: Estimated ____ Actual ____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

The purpose of this project is to compile a practical list of applicable acoustic insulation of buildings which can serve as a guideline for architectural and building authorities.

As there is already a great deal of knowledge available concerning the possibilities and effects of acoustic insulation, it seems that an inventory of existing data which has been published and distributed but which is not yet widely operational.

Based on extensive research of available information, a step-by-step division into classes of acoustical insulation will be made, indicating the best form of acoustic insulation in each situation, taking into account side effects such as ventilation and thermic aspects, humidity, and the cost of purchase and maintenance.

Transcribed from the original.

United Kingdom. Insulation of Windows in the Vicinity of Road Rumble Strips. Transport and Road Research Laboratory, Crowthorne, Berkshire RG11 6AU United Kingdom.

West Germany. Supplementary Noise Abatement in Existing Buildings Against Traffic Noise. Sponsor: Federal Ministry of the Interior, Bonn, West Germany. Prof. Grossele, Stuttgart, West Germany. 1976. 1978.

ACOUSTIC PROPERTIES

IMPACT AND VIBRATION

See Also Pages:

130
151
153
163
184
191
341
342

Project Title:
Vibrations and Low-Frequency Noise.

Performing Organization Name & Address:
National Agency of Environmental Protection
Acoustic Laboratory
Kampamausgade 1
1604 Kobenhaven, Denmark

Sponsoring Organization Name & Address:

Principal Investigator(s):

National Agency of Environmental Protection, Acoustic Laboratory

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, Production)
___ Measurement Methodology

Start Date:
spring 1978

Completion Date:
Estimated spring 1979
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	(100.000 D.kr) $16,490

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Vibrations and Low-Frequency Noise: This study includes an examination of guidelines which are used in other countries, concerning the evaluation and measurement of low-frequency noise; moreover, the establishment of methods of measurement of and limits to vibration and low-frequency noise. The results shall form the basis of 2 guidelines from the National Agency of Environmental Protection.

Project Title:

A Study of the Tunnel Vibration Propagating to a Nearby Building

Performing Organization Name & Address:
Institute of Industrial Science
The University of Tokyo

Sponsoring Organization Name & Address:
Teito Rapid Transit Authority
19-6, Higashi Ueno 3-Chome
Taito-ku, Tokyo, Japan

Principal Investigator(s):

Prof. Kiyoteru Ishii

Type of Research Program:

X Fundamental
__ Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
__ Measurement Methodology

Start Date:
June, 1977

Completion Date:
Estimated June, 1978
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	(5,000,000 Yen) $18355
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

We have made an analysis of the tunnel vibration propagated to a new building nearby by taking the measurement of the vibration at different stages of the building construction; before and after the completion of the basement, before and after each floor has been concreted, etc.

Project Title:

Impacts and Controls of Environmental Noise and Vibration

Performing Organization Name & Address:
Faculty of Engineering
Kobe University
Kobe, Japan

Sponsoring Organization Name & Address:
Ministry of Education
Tokyo, Japan

Principal Investigator(s):
Maekawa, Zyun-iti
Hattori, Hiroshi
Kawai, Ryoji
Gyoten, Yoshihisa
Sakurai, Shunsuke

Start Date: 1970

Completion Date:
Estimated 1985
Actual

Type of Research Program:

X Fundamental
__ Development (Component or System)
__ Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Funding:

Year	Amount	
1976 (actual):	(20,000,000 Yen)	$73,420
1977 (budget):	(1,500,000 Yen)	$ 5,500
1978 (forecast):	0	
		$175180
Or Total Funding Amount:	(47,720,000 Yen)	

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

This project consists of the following groups.

1) Studies on the Aural Reflex

The aural reflex are studied using Impedancemeter in normal ears, facial palsied patients and other pathological conditions.

2) Environmental Noise Control

Estimation of noise reduction by barriers of any shape will be developed. Sound field simulated by a digital computer will be used to psychological measurement of annoyance.

3) Nuisance control at the sources of noise and vibration

Vibrations due to impact, rotation, and reciprocation of machine parts will be analized and the methods of preventing generation of noise and vibration will be developed.

4) Vibration control of buildings

Micro tremor of buildings will be observed at various points in order to find the optimum building construction, for vibration control.

5) Vibration control of ground

Ground Vibration caused by travelling vehicle and blasting operation will be revealed by field measurements and model studies in laboratory. On the basis of the experimental data, design criterion for ground vibration control will be discussed.

Project Title:
Study on the Prevention of Super-Low Frequency Noise

Performing Organization Name & Address:
Tokyo Metropolitan Government
Research Institute for Environmental Protection
Noise Section
7-2 Yurakucho, Chiyoda-ku
Tokyo, Japan

Sponsoring Organization Name & Address:
Tokyo Metropolitan Government
1-5-3 Marunouchi
Chiyoda-ku
Tokyo, Japan

Principal Investigator(s):

Shunji Miyanoto
Shinichi Sueoka

Type of Research Program:

___ Fundamental
___ Development (Component or System)
_x_ Demonstration (Experimental, Prototype, or Production)
_x_ Measurement Methodology

Start Date:
Apr. 1976

Completion Date:
Estimated March 1980
Actual _____

Funding:

Year	Amount	
1976 (actual):	(¥ 10,600,000)	$38,913
1977 (budget):	(¥ 4,160,000)	$15,271
1978 (forecast):	?	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

1. Measure and analyze the low-frequency noise in relation to mechanism of generation, characteristics of generation and transmission, and characteristics of frequency.

2. Investigate standardization of measuring instruments and methods, and also examine methods to lower the measurable range of the instruments.

3. Study on the effects of noise on the human body (threshold value and sensitivity-level contour, etc.)

Translated and transcribed from the original Japanese.

Impact and Vibration
Japan

Project Title:

A Vibration Reducing Measure Adopted Where A Tunnel Runs Close To A Theater

Performing Organization Name & Address:

The Institute of Industrial Science
The University of Tokyo
22-1, Roppongi 7 Chome, Minato-ku,
Tokyo, Japan

Sponsoring Organization Name & Address:

Teito Rapid Transit Authority
19-6, Higashi Ueno 3-Chome
Taito-ku, Tokyo, Japan

Principal Investigator(s):

Prof. Choshiro Tamura (Tokyo Univ.)
Mr. Akio Oikawa (T.R.T.A.)

Type of Research Program:

- X Fundamental
- X Development (Component or System)
- X Demonstration (Experimental, Prototype, or Production)
- ___ Measurement Methodology

Start Date: Oct. 1974

Completion Date: Estimated ____ Actual Mar. 1976

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	$110,130 (30,000,000 Yen)

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

When undertaking construction of the subway Yurakucho Line, we had to construct a new underground station only about 1.5 meters away from a theater. And it was extremely important to cut out this wave motion propagating from the tunnel to the theatre for the purpose of keeping the atmosphere in the theater quiet and protected from the vibration due to the subway train. We successfully achieved the aim by supporting the track on a pile insulated from the tunnel structure; the pile worked to scatter the vibration into the soil below the tunnel.

On putting the line into revenue service, we made a series of measurements on the solid borne sound and made an analysis of the way how the vibration propagated from the track to the pile, soil, back to the tunnel and then on to the wall and slab of the theater building.

Project Title:
Low Frequency Noise & Vibration from Road Traffic

Performing Organization Name & Address:
GREATER LONDON COUNCIL
SCIENTIFIC BRANCH
THE COUNTY HALL
LONDON SE1 7PB GREAT BRITAIN

Jointly with

TRANSPORT & ROAD RESEARCH LABORATORY
(ENVIRONMENT DIVISION)
OLD WOKINGHAM ROAD
CROWTHORNE, BERKS RG11 6AU GREAT BRITAIN

Principal Investigator(s):
ROBERT HILL (GLC)
DAVID MARTIN (TRRL)

Type of Research Program:
___ Fundamental
___ Development (Component or System)
X Demonstration (Experimental, Prototype, or Production)
X Measurement Methodology

Start Date:
Jan 1977

Completion Date:
Estimated Jan 1978(stage I)
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	1.5 man years (Stage I)
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

The present project is intended to be the first stage of a long term project to investigate the nature and extent of traffic induced vibrations in an urban situation (London). Initially the work has been to develop an instrumentation system for measurement and analysis of vibration and low frequency noise levels in buildings. This will be followed by a series of measurements in occupied buildings where there have been complaints of vibration caused by road traffic. In subsequent stages of the work it is hoped that a social survey will be carried out and that this will be supported by a further series of measurements at interview sites.

The aims of the project are to determine the extent to which ground-borne vibration & air-borne low frequency sound contribute to reported 'vibration' in buildings and to determine the extent to which these vibration levels cause annoyance. It is hoped that the results will provide useful guidance to planners and building designers on how to minimize these effects in buildings

Project Title: Propagation of Subway Vibration Into the Soil and Measures for Screening Them Off

Performing Organization Name & Address:

Construction Department of Federal Institute for Materials Testing
Berlin 45, Unter Den Eichen 87
West Germany

Sponsoring Organization Name & Address:

Principal Investigator(s):

Dr. Dolling

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date: Feb. 1, 1973

Completion Date:
Estimated ~~Dec. 31, 1977~~
Actual _____

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	
Or Total Funding Amount:	(240,000 DM) $101,760

COMMENTS:

Subway vibrations often affect near-by buildings and installations. In one concrete case in Berlin, the screening effect of a spring-suspended rail through construction is to be checked. The aim here is to investigate theoretically and experimentally the fundamental relationships between vibration propagation in tunnels and the surrounding soil.

Translated and transcribed from the original German.

United Kingdom. Acceptability of Building Vibration. Human Factors Research Unit, Institute of Sound & Vibration Research, University of Southampton, Southampton SO9 5NH, United Kingdom. Sponsor: Science Research Council, Swendon, Wiltshire. Dr. D.J. Griffin, Mr. P. Napp. Type: Fundamental, Measurement Methodology. Sept. 1976. Sept. 1977. 1977: (£2000) $3,439. Preliminary investigation of methods of quantifying the vibration experienced in buildings and the complaints that arise. No publications yet produced.

West Germany. Structural Noise Generation in Buildings Physically Connected with Express Highways and Road Tunnels. Muller Corp. Technical Consultants on Acoustics, Planegg, Robert-Koch-Str.11, West Germany. Sponsor: Federal Transportation Ministry. Dipl. -Phys. Gerardo Volberg. $42,400, (100,000DM). Assembling of experiences and measurement data on the intensity of structural noises induced in buildings by nearby traffic. Using this information as foundation for guidelines on required noise abatement procedures in constructions for human use which bridge over traffic arteries.

West Germany. Effect of Tremors on Plaster Adherence. Otto Graf Inst., Stuttgart 80, Pfaffenwaldering 4, West Germany. Dr.-Ing. Ruprecht Zimberlmann, Jan. 1, 1975. Dec. 31, 1976. $42,400, (100,000DM). Under the effect of heavy traffic or as a result of a so-called "jet boom", extraordinarily strong tremors can be communicated to buildings. This project aims at finding out to what extent this can affect plaster adherence.

Project Title:
Problems with Low Frequency Environmental Noise

Performing Organization Name & Address:

Ontario Ministry of the Environment
135 St. Clair Avenue West
Toronto, ontario M4V 1P5
Canada

Sponsoring Organization Name & Address:

Principal Investigator(s):

S. H. Eaton

Type of Research Program:

___ Fundamental
___ Development (Component or System)
___ Demonstration (Experimental, Prototype, or Production)
___ Measurement Methodology

Start Date:

Completion Date:
Estimated _____
Actual _____

Funding:

Year	Amount
1976 (actual):	
1977 (budget):	
1978 (forecast):	

Or Total Funding Amount:

COMMENTS:

Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)

Complaints about low frequency noise often present practical difficulties in measurement, rating or assessment, and control; and yet the disturbance can be real, severe and widespread in the community. Typical offenders include locomotives, trucks, air compressors and combustion processes.

The limitations and uses of common noise measurement and analysis systems are reviewed, and difficulties expressed with rating the disturbance are illustrated with reference to some "real-life" complaint and control investigations.

Transcribed from the original.

Project Title:
Vibrations Resulting from Road Traffic

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Amsterdam, Netherlands
Principal Investigator(s):	Type of Research Program: ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / Completion Date: Estimated _____ Actual _____	Funding: Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This project is intended to provide a better insight into the cause and effect relations between vehicles, road and underground vibrations which can reach nearby buildings through the ground and cause them to vibrate.

In most cases, these are vibrations affecting buildings very close to the road, which are caused by the rumbling of heavy traffic (lorries and busses).

The project should also provide insight into the manner in which vibrations arise, how they are communicated, how they affect buildings and inhabitants, and possibilities of preventing this vibration nuisance.

Project research should include a survey of all (international) knowledge available on the subject, and in a later stage should give guidelines for effective prevention of the problems caused by road traffic vibrations.

Transcribed from the original.

Impact and Vibration
Netherlands

Project Title: Investigation of Vibrations Resulting from Rail Traffic

Performing Organization Name & Address:	Sponsoring Organization Name & Address:
	Ministry of Public Health and Environmental Protection Ministry of Transport and Public Works Amsterdam, Netherlands
Principal Investigator(s):	**Type of Research Program:** ___ Fundamental ___ Development (Component or System) ___ Demonstration (Experimental, Prototype, or Production) ___ Measurement Methodology
Start Date: 1976 / **Completion Date:** Estimated _____ Actual _____	**Funding:** Year / Amount 1976 (actual): 1977 (budget): 1978 (forecast): Or Total Funding Amount: COMMENTS:
Project Summary: (Briefly describe the goals, approach, expected or actual results, report(s) generated and the date(s) of publication.)	

This project will conduct research into the manner in which vibrations caused by rail vehicles can reach nearby buildings by means of the rails and the ground. Particular attention will be devoted to vibrations caused by heavy rolling stock such as locomotives and laden freight cars, and the manner in which these vibrations can reach nearby buildings through the construction of the railroad tracks.

The project will largely make use of data already available from research in the Netherlands and abroad, both in respect to methods of measuring and on the causes of vibrations. Secondly, the project will investigate means of noise abatement and of effective prevention of vibrations.

Transcribed from the original.

United Kingdom. Insulation Against Noise and Vibration Near Speed Control Humps. Transport and Road Research Laboratory, Crowthorne, Berkshire RG11 6AU United Kingdom.

United Kingdom. Insulation of Windows Against Low Frequency Sound. Building Research Establishment, Aylesbur, Buckinghamshire HP17 9PX, United Kingdom.

ACOUSTIC PROPERTIES

OTHER

See Also Pages:

45
63
68
87
124
282
287

Switzerland. Functions and Physical Laws of Sound Insulation and Acoustic Absorption Materials. Interkeller AG/SA, 8052 Zuirch, Switzerland. B. Braure.

Switzerland. Theorectical and Experimental Study of Standing Waves in an Automobile Passenger Compartment. Interkeller AG/SA, 8052 Zurich, Switzerland. J. Garnier (Renault).

Switzerland. Functions and Physical Laws of Vibration Insulating and Structural Vibration Damping Materials. Interkeller AG/SA, 8052 Zurich, Switzerland. J. Roos.

COUNTRY INDEX OF RESEARCH PROJECTS

WEST GERMANY (Continued) Page