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# FOREIGN NOISE RESEARCH

## IN SURFACE TRANSPORTATION

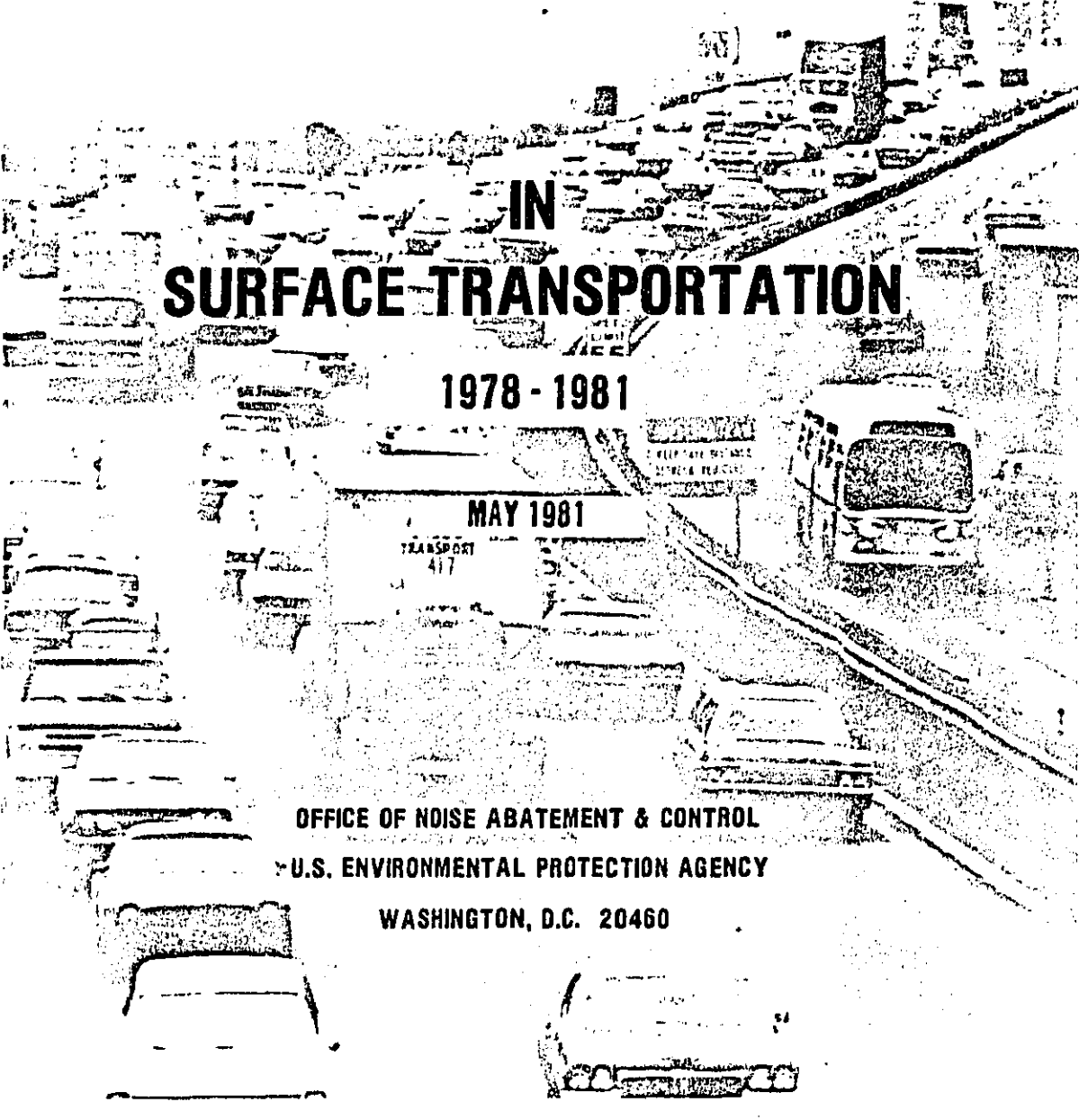
1978 - 1981

MAY 1981

TRANSPORT  
417

OFFICE OF NOISE ABATEMENT & CONTROL  
U.S. ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460



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IN  
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Washington, D.C. 20460

## PREFACE

### Method of Data Collection

Information on foreign research projects in surface transportation noise abatement and control was collected from both individuals and organizations. These contacts were queried: (a) on the research they either were conducting or funding and (b) for names and addresses of other surface transportation noise researchers. In addition, inquiries were made at the INTERNOISE 80 international conference of noise abatement engineers. In total, some 700 researchers were contacted. The foreign researchers were asked to respond with information on their noise abatement projects that have been completed since December 1977, are in progress, or are being planned. They were asked to respond with information about projects dealing with:

- o Highway vehicle noise control (trucks, buses, cars, etc.)
- o Vehicle component noise control (engines, exhaust mufflers, cooling systems, power train, tires, etc.)
- o Roadway surface materials, tire/road interaction
- o Path control (barriers, insulation, highway planning and land management)
- o Highway noise analysis (prediction models, propagation theory, etc.)
- o Rail noise (guided mass transit, light rail, elevated structures, wheel/rail interaction)
- o Off road and recreational vehicle noise
- o Measurement, monitoring and enforcement research

From these inquiries, 294 surface transportation noise research projects were identified.

#### Handling of Data

To retain reporting accuracy, each researcher was sent a blank project description form to complete. The forms that were returned typed, and that could be reproduced clearly have been included unaltered. Any project description which was handwritten, written in a language other than English, or was in a condition that would not reproduce clearly either was transcribed, or was translated and then transcribed. If a project description was transcribed or translated and transcribed, a line was typed at the bottom of the page noting what was done.

Several research projects were described in a very limited fashion. These project descriptions appear at the back of each category as abbreviated listings.

Any funding data that was not reported in U.S. dollars has been converted. The project descriptions show both the reported foreign currency figures in parentheses and the corresponding U.S. dollar amounts. The exchange rates used for these conversions appear in Table I.

Table I: Exchange Rates as of Friday, February 27, 1981 (Source: The Wall Street Journal)

Australia-Dollar	= 1.1549 US Dollar
Austria-Schilling	= 0.0663 US Dollar
Belgium-Franc (commercial rate)	= 0.0287 US Dollar
Britain-Pound	= 2.2020 US Dollar
Canada-Dollar	= 0.8317 US Dollar
Denmark-Krona	= 0.1503 US Dollar
Finland-Markka	= 0.2444 US Dollar
France-Franc	= 0.1993 US Dollar
Greece-Drachma	= 0.0194 US Dollar
India-Rupee	= 0.1205 US Dollar
Ireland-Pound	= 1.7150 US Dollar
Israel-Shekel	= 0.1194 US Dollar
Italy-Lira	= 0.0009 US Dollar
Japan-Yen	= 0.0047 US Dollar
Netherlands-Guilder	= 0.4239 US Dollar
Norway-Krone	= 0.1837 US Dollar
Poland-Zloty	= 0.0769 US Dollar*
Portugal-Escudo	= 0.0174 US Dollar
South Africa-Rand	= 1.2790 US Dollar
Sweden-Krona	= 0.2159 US Dollar
Switzerland-Franc	= 0.5102 US Dollar
Turkey - Lira	= 0.0108 US Dollar**
West Germany-Mark	= 0.4695 US Dollar

Thoroughness and Accuracy of Information

Countries Where Researchers Were Contacted

Argentina	Hungary	Switzerland
Australia	India	Thailand
Austria	Israel	Turkey
Belgium	Italy	United Kingdom
Brazil	Japan	Union of Soviet
Bulgaria	Korea	Socialist
Canada	The Netherlands	Republics
Czechoslovakia	North Ireland	West Germany
Denmark	Norway	Yugoslavia
East Germany	Poland	
Egypt	Portugal	
Finland	Romania	
France	Sweden	

\* Obtained from the Polish embassy in Washington, D.C.

\*\* Obtained from the Turkish embassy in Washington, D.C.

The response rate from each of these countries and organizations varied. While researchers in some countries and organizations returned several project descriptions, researchers in other countries and organizations returned very few or no project descriptions at all. A low rate of response does not prove conclusively that little or no research is being conducted. In some cases, the proper researcher or agency may not have received the letter of inquiry. However, a low response rate more probably indicates that research is not widespread. An exception is the Soviet Union, where much research is being conducted and reported in professional journals, yet from which no completed project descriptions were returned.

While fewer inquiries were sent for this survey than for the previous one,\* the coverage was probably at least as comprehensive because of the availability of better address lists. The second survey data collection effort made full use of the experience gained during the compilation of the first survey. All contributing researchers to the 1977 report were given the opportunity to describe their current research. Inquiries also were sent to researchers with a known interest in international exchange efforts and for whom accurate addresses already had been obtained.

Accuracy of the reported data is impossible to ascertain. However, because the data was provided almost entirely by the researchers, reasonable accuracy is likely. There is a wide variation in the amount of reported

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\* Foreign Noise Research in Surface Transportation, EPA 550/9-78-301. Office of Noise Abatement and Control/U.S. Environmental Protection Agency, Washington, D.C., December 1977

information per project which probably reflects the varying amounts of time that researchers had available to respond to the inquiry.

The dollar figures given for the research projects should not be used to estimate the level of effort expended. The purchasing power of a fixed amount of dollars varies both from country to country and from time to time because of fluctuations in the monetary exchange rates. There also are differences between countries in calculating costs of a project, such as variations in labor and overhead rates.

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## INTRODUCTION

### Purpose of the Report

This is an update to a December 1977 Office of Noise Abatement and Control/U.S. Environmental Protection Agency report, Foreign Noise Research in Surface Transportation. It is intended to provide a broad overview of the international research effort under way in the field of surface transportation noise abatement and control.

### Categorization

The projects are categorized in a similar manner to the previous report. Any differences reflect changes in the subject areas of the project descriptions. Specifically, one subcategory, Hovercraft, was added, and one subcategory, Training, was deleted.

#### Highway Noise

Medium and Heavy Trucks

Highway Planning and Land Management

Highway Model Analysis and Prediction

Other

#### Off Highway and Recreational Vehicle Noise

Motorcycles

Motorboats

Hovercraft

Rail Noise

Locomotives and Passenger Trains

Innovative Guided Mass Transit

Rail Model Analysis and Prediction

Other

Surface Vehicle Components Noise

Engine

Exhaust Mufflers

Power Train

Tires

Other

Methodology and Standards

Acoustic Properties

Propagation

Barriers

Architectural Acoustics

Impact Vibration

Other

## DISCUSSION OF FOREIGN RESEARCH

### 1. MAGNITUDE OF RESEARCH EFFORT

#### Reported Research by Country

The following number of projects were reported by country or international organization.

United Kingdom	76
West Germany	74
Sweden	30
Japan	21
Canada	16
Austria	13
Netherlands	10
France	9
Australia	8
Norway	7
Switzerland	6
Denmark	5
Belgium	4
Poland	4
Israel	2
Italy	2
Bulgaria	1
Commission of Communities (CEC)	1
Common Market (EEC)	1
Greece	1
Hungary	1
Northern Ireland	1
Turkey	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 percent. In the United Kingdom and in Japan, the sponsorship is largely private, 65 percent and 89 percent respectively. France, Italy,

and Greece also show levels of private sponsorship that are possibly significant, however because of the low number of project descriptions received from these countries, actual statistical analysis would yield unreliable conclusions. Of the non-Socialist countries, West Germany, Sweden, and Canada receive the most government sponsorship with 95 percent, 86 percent, and 81 percent respectively.

#### Area of Research

The area of research was identified by the researcher in a manner consistent with our format for approximately 25 percent of the project descriptions. Categorization of topic areas was difficult, for many of the projects would fit into more than one category. For example, the French project "Reduction of the noise emitted by the diesel engine and the tire" could be categorized within either the "engine" or the "tire" subcategory within the general category "Surface Vehicle Components Noise." In such cases, the main thrust of the research dictated placement in a particular subcategory/category. A reference page before each subcategory refers the user to page numbers of any project descriptions not actually described in that subcategory, but which contain information relevant to that subcategory. Using the French project as an example again, this project was listed in the subcategory "engine," and was referred to also on the "additional information" sheet before the "tire" subcategory.

#### Funding Information

Funding tables are provided on pages 31-39. They show funding by country for each major category/subcategory for the period 1978-1981.

## 2. ANALYSIS OF RESEARCH

### HIGHWAY NOISE

#### Medium and Heavy Trucks

Several countries are researching this topic, but no one country is conducting several projects on any particular noise source. Norway and West Germany are conducting research to provide background data for noise emission legislation. Noise reduction for heavy trucks is being conducted in Sweden, the United Kingdom, and West Germany. The United Kingdom study modified two heavy diesel engine commercial vehicles to demonstrate that quiet versions can be built that will be similar in both performance and cost to conventional vehicles. A forty ton vehicle (made by Foden) powered by a Rolls Royce Eagle diesel engine was developed to the preproduction stage. This vehicle, measured according to ISO R362, achieved 80 dB\* at 7.5 meters and 72 dB in the cab.\*\* The West German study also used ISO R362 to measure their low noise truck design. Their report describes a reduction of 8-10 dB on a truck with an air-cooled diesel engine (130 hp) and a 7.5 ton maximum weight.\*\* Unfortunately, direct comparison of the results achieved by the British and the West Germans is impossible because the two countries report their findings

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\* Unless otherwise specified, all references in this report are to A-weighted decibels.

\*\* Corresponding conventional vehicle noise measurements that could be used for comparison are not reported on the project description.

in different formats. Another West German project presently under way is using either the same truck that was mentioned previously or is using a very similar vehicle. (The previously-mentioned truck was an air-cooled, diesel-engined vehicle of 130 hp, with a maximum weight of 7.5 tons.) In this project, the Federal Post Office will test 50 of these fully shielded vehicles in practical use to determine maintenance problems of the quieted vehicles.

#### Light Vehicles

A West German project being undertaken by Volkswagen, Inc. has reduced the drive noise of an automobile (without the rolling noise component) by approximately 8 dB.\* The automobile was modified by encapsulation. The function of the vehicle is not greatly impaired by this modification.

#### Buses:

Little research was reported in this field. Measurements made by the Institute of Applied Physics TNO-TR in the Netherlands gave a good idea of the proportion of total noise produced by various sources under various conditions. Another Dutch study investigated the possibility of making public transit buses quieter by encapsulation.\*\*

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\* The measurement methodology utilized was ISO R362. The corresponding conventional vehicle noise measurements that could be used for comparison are not given in the project description

\*\* Though unspecified, we assume the Dutch study will encapsulate the motor and possibly the gear box.



### Highway Planning and Land Management

Both Sweden and West Germany are investigating the problem caused by noise from the street and how this problem can be reduced. Sweden is investigating specially designed buildings which will provide a quieter living/working environment for the inhabitants by attenuating traffic and other urban noises. Research within this subcategory is continuing in West Germany with a literature search. A French study has produced a short paper describing the basic information relevant to the decisions that need to be made by public authorities responsible for the reduction of traffic noise in areas bordering urban express ways.

### Highway Analysis and Prediction

Researchers in several countries are working on the prediction and analysis of traffic noise. One of the areas of interest is the evaluation of previously developed traffic noise prediction models. The Australian Road Research Board is conducting such an evaluation on several methods being used in other countries. The Board is searching for a model to adopt for the conditions of Australia. As of their writing, they have evaluated the United Kingdom, Department of Environment method, and expect shortly to evaluate other European methods as well as those methods used in the United States. In Austria, a research effort has developed a high accuracy model for computing traffic estimates for environmental impact studies. The test results were reported as very satisfactory. Belgium has created a guideline for prediction of traffic noise. This guideline is intended for use by nonspecialists such as the local authorities.

Cost-benefit analysis of the long term transportation noise abatement procedure is beginning. In France, this analysis is not zeroing in on any particular aspect of transportation noise abatement, but instead the research team is examining first the entire field of surface transportation noise abatement. Japan, Norway, Sweden, Switzerland, the United Kingdom, and West Germany are developing traffic noise prediction models, some of which will be based on computer analysis.

Highway Noise: Other

A large amount of highway noise-related research is in progress around the world in a number of specialized areas; some are very tailored to the locality. France has estimated the traffic noise in the year 2000 that will be experienced in French cities. Turkey has conducted a study of the noise effects in and around Istanbul. Other studies which are less local in scope are a Swedish study on the adaptation of men during sleep to traffic noise, and a Belgium study of noise produced during car and motorcycle races. Three countries, Canada, Japan, and Sweden, reported research concerning the noise experienced in the working environment by the professional driver. The effect of noise on the comfort and safety of the driver will be determined. Interest in the cost-benefit analysis of sound proofing automobiles, conducting international literature surveys on highway noise, analyzing the noise emitted from highway tunnels, and general measurement schemes of various types to measure urban traffic noise has been reported.

## OFF HIGHWAY AND RECREATIONAL VEHICLE NOISE

### Motorcycles

Only West German projects were reported. These projects have become increasingly more specialized since 1978. In that year, a project was begun to develop two low-noise, small engines for motorcycle (80 cm<sup>3</sup> and 100 cm<sup>3</sup>). These engines have a lower rotational speed in order to reduce the characteristic, annoying high frequency noise. Later projects centered on reducing the consumer's desire and ability to alter (manipulate) the noise reduction devices on motorcycles. The most recent study is an investigation of source-specific measurements of motorcycle emissions, and which operating states are suitable for these measurements.

### Motorboats

Very little research was reported in this area. In Sweden, the structureborne sounds and vibrations emitted at the engine mounts through the propeller shaft bearings and from the propeller blades through the water are being investigated with holographic models. Different construction techniques that will reduce structureborne vibration and noise through the hull are being investigated. In the United Kingdom, the reduction of noise from marine auxiliary engines is being examined.

### Hovercraft

In the United Kingdom, the environmental effects and the propeller noise of hovercraft are being investigated.

## RAIL NOISE

### Locomotives and Passenger Trains

Much of the research on this topic is centered on the design and testing of a low noise wheel. (Whether this is a drive wheel or not is unspecified.) Such research is under way in both Japan and West Germany. Additional work is being conducted in West Germany on the identification of the sources of railway noise.

### Innovative Guided Mass Transit

The West Germans have studied the possibilities of reducing noise resulting from wheel-rail interaction by constructing low (0.35 and 0.8 meters, approximately 1 and 2.6 feet) sound protection walls. These walls were constructed a small distance from the rail. This project concerned the legal and the operational requirements for sound reduction on the railroads. Measurements and tests on the German railroad as well as trolley and streetcar tracks were included.

### Rail Model Analysis and Prediction

At least six countries in Europe are developing prediction models for railroad noise. Also the Commission of the European Communities created two calculation models, one for  $L_{max}$  of one train pass-by, and another for  $L_{eq}$  of the hourly railway traffic. These two models are designed to be used by local authorities with little training.

Two other countries, Bulgaria and Switzerland, also are developing or have developed prediction models for pass-by train noise. Both of these models include such parameters as the length of the train, the velocity of the train, and the distance of the observer from the tracks. The Bulgarian model assumed that the train was a line source. The Swiss model, however, is based on the assumption that the wheel radiates as a dipole source. The Netherlands has proposed to begin using  $L_d$  (rail) as a provisional measurement unit for noise near dwellings. This unit is defined as the equivalent noise level weighted for day, evening, and night periods. Norway is establishing a prediction model for railroad noise. This model will be used until the overall Scandinavian model becomes available sometime in 1983. West Germany is continuing its long-term (1977-1984) investigation of structureborne noise from different sources. Canada has developed mathematical models to predict  $L_{eq}$  (24) contours around railway hump yards.

#### Rail Noise: Other

France, Sweden, and the United Kingdom are conducting research of annoyance reactions to and interference caused by train noise. The French have studied the interference effects of train noise with sleep. The Swedes and the British have conducted studies to determine respectively the level at which annoyance reactions sharply increase, and which noise source is more annoying -- airplane or train. Airplane noise was found to be more annoying, but the difference in the annoyance reaction to train and plane noise varied from test to test. The British also have determined that the 24 hour  $L_{eq}$  noise index appears to be the most practical

choice of an index for representing rail noise. Another British study team is determining the cause of different annoyance reactions to diesel, third-rail electric, and overhead electric trains. The acoustical characteristics of any detected differences will be examined.

#### SURFACE VEHICLE COMPONENTS NOISE

##### Engine

Much work is being done to quiet motor vehicle engines, particularly diesel engines. Austria and the United Kingdom have programs to develop a low noise diesel engine for light vehicles. The resulting British engine produces 50kW (67 hp) at 4,200 rpm and weighs 167 kg. The maximum noise level measured at one meter is 98 dB\* which was considered reasonable for this weight/power ratio. Further reduction was possible, but the project was terminated upon exhaustion of the funds. Other countries are working to reduce diesel engine noise not by redesigning entire engines, but either by reducing the noise of various engine components, or by encapsulation. Work to reduce the noise emission of the cooling and ventilation systems is being performed in Austria, Northern Ireland,\*\* Sweden, the United Kingdom, and West Germany. A new piston design that would reduce the noise produced by piston-slap in diesel engines is under way in the United Kingdom. Reduction of the noise caused by piston-slap

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\* Measurement methodology not specified.

\*\* Though a portion of the United Kingdom, Northern Ireland is listed separately to reflect its individual research efforts.

in gas engines is also under way in the United Kingdom. Various forms of encapsulation and isolation of the linking members is under way in Austria (optimum design of linking members on a diesel engine), the United Kingdom (close shielding a diesel engine and gearbox, and damping lightweight engine covers with rubber inserts), and in West Germany (reduction of passenger car engine noise by either engine-jacketing encapsulation or the undercarriage shell type of encapsulation). Several studies of noise radiating surfaces on engines are being conducted in France (identify the noise radiating surface of a diesel engine, and the United Kingdom (a study of the radiation efficiencies of diesel engine components, and the correlation of engine surface vibrations and noise). The effect of fuel composition on the noise emitted by the engine is being studied in the United Kingdom. Also under way in that country are studies to reduce the noise of combustion in gas engines, and in diesel engines (two projects under way). More experimental than theoretical studies are under way around the world in this subcategory. A greater ratio of experimental to theoretical studies can indicate growth and maturity in a research area.

#### Exhaust Mufflers

Unlike the trend of research in engine noise, research in exhaust muffler noise seems to be approximately equally divided between experimental and theoretical studies. Such studies have been undertaken in both Austria and West Germany. These projects do not refer to which type of engine (diesel or gas) the mufflers are being designed. Work in the United Kingdom seems to be largely theoretical, or predictive. A study is under

way at the Institute of Sound and Vibration to provide prediction models of perforated liner performance in flow ducts at excitation levels in a range of 70-150 dB.\* At the Motor Industry Research Association, also located in the United Kingdom, design work was completed recently on a reduced backpressure (about 50 percent of the original equipment) muffler that would not detract from the external noise requirement of EEC Directive 77/212/EEC.\*\* Prototype mufflers were produced which substantially\*\*\* met the requirements. This muffler resulted in improvements of better than 3 percent in maximum power, and more than 3.5 percent in specific fuel consumption at maximum power. In West Germany, most of the reported research is sponsored by the Federal Environmental Office. Under their sponsorship criteria are being established to evaluate the acoustical quality of exhaust systems of passenger cars. The criteria are estimated to be completed by the beginning of May, 1981.

#### Power Train

Only the United Kingdom and West Germany reported research projects in this subcategory. In the United Kingdom, a theoretical and experimental study of engine and drive train vibrations is under way. Two studies also are under way on the mechanical noises from transmissions and gearboxes. These two studies are being performed at the Institute of Sound and Vibration

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\* Measurement methodology is unspecified.

\*\* "Permissible Sound Level and the Exhaust System of Motor Vehicles."  
Amended 3/8/77

\*\*\* Unspecified term used in the project description.



Research. In West Germany, research is under way on the influence of rotational speed limitation and automatic transmissions on the noise emissions in passenger cars. Four different passenger car types, each in three versions were tested (hand gear shift, automatic transmission, and rotational speed limited transmission).

#### Tire Noise

There is a considerable amount of widespread research being undertaken to study the effect of pavement characteristics on the noise emitted at the tire/road surface interface. Work in both theoretical and experimental areas is under way. Also, a literature review on this topic has been compiled in Austria. This review covers 109 publications in German and English. Recent investigations contained in the review indicate that roadways with articulated anti-skid properties and low tire/pavement noise levels could be laid. In West Germany, researchers are investigating the noise generating mechanisms at the tire/road interface on wet and dry roads. Only one country, West Germany reported work on developing a low noise tire. However, several countries are studying tire rolling noise both on the road and on rolling drums. The noise emission of truck tires is being investigated in West Germany.

#### Surface Vehicle Components Noise: Other

Studies are under way in Sweden and the United Kingdom to determine the noise generated inside of various vehicles. In Sweden, research teams are centering their attention on buses, and seek to determine the

desirable noise and infrasound environment with respect to the health, performance, and comfort of the driver. In the United Kingdom, the researchers are developing means to predict the low frequency noise in heavy and light vehicles. Another study in the United Kingdom is studying the structural characteristics of vehicle body sheet metal structures that vibrate and produce noise as the vehicle is driven. For this study, modeling will be used. A research program in West Germany is investigating the noise of heavy truck brakes.

#### METHODOLOGY AND STANDARDS

Widespread research and development is under way on acoustical measuring techniques and measuring equipment. In West Germany, the Technical Monitoring Association is developing a measuring instrument for noise emission checks on vehicles in flowing traffic. The National Research Council of Canada conducted research and development on acoustical instruments and measuring techniques for calibrations. A miniature\* sound level meter and a precision acoustical measuring amplifier (with an error of  $\pm 0.1$  dB over 120 dynamic range) were developed. Work is under way by a committee of the Common Market to determine the best long-term measuring procedure for passenger cars. In the United Kingdom, a low cost alternative was developed to the special instruments that compute and display the value of quantities such as  $L_{10}$ ,  $L_{eq}$  and so forth. The alternative makes use of an inexpensive digital voltmeter (a Digital Avometer type DA 114) and feeds the results

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\* An unspecified term used in the project description.

into a computer. This method was tested, and found to be as reliable as the conventional techniques.

#### ACOUSTIC PROPERTIES

Many of the research project teams studying propagation are investigating the effect of vegetation on urban noise control. An Australian study team showed that scattering, not absorption, was the main factor in the attenuation of sound by vegetation. However, a West Germany study team came to a different conclusion. In that project, conducted by the Institute for the Study of Forestry at Freiburg University, trees were found to dampen sound effectively, with young Douglas firs being the best attenuators.

Road traffic and railway noise propagation computer prediction models are being developed and tested in Austria. The end product is to be highly accurate, and serve as an aid for creating environmental impact studies. Sweden is investigating the effects of weather on the propagation of sound. Other research teams working in West Germany are investigating the effect upon the propagation of sound as a result of the orientation of buildings and blocks of houses. An investigative team at the University of Adelaide is studying the radiation of sound through holographic observation.

#### Barriers

Interest in barrier research continues to be quite widespread. Nine countries reported research projects on this topic. However, with the exceptions of Sweden and West Germany, none of the countries reported

more than two projects. This pattern indicates general, but not an intensive effort to learn more about the effects of and on barriers. Research efforts can be divided into research on the types of barriers, the effect of the weather on barrier efficiency, and general research on highway barriers. A model is being developed in Austria to predict the effectiveness of barriers against traffic noise. A field study of the sound loss attributable to barriers is being conducted by the University of Manitoba in Canada. Earthen and vegetation barriers are being investigated in Denmark and Sweden respectively. Sweden is conducting a long-running program in screening the noise from heavy vehicles. Another Swedish research team is investigating the traffic safety aspects of noise screens that must be placed very close to the road. (A similar study has been conducted in West Germany.) A West German research team investigated to what extent the constructional formation of noise protective walls could be standardized. The conclusion was that standardization through unequivocal legislative regulations was impossible.

#### Architectural Acoustics

Most of the research in this field has been theoretical and measurement oriented, as opposed to experimental, with different construction techniques being explored. The Japanese are analyzing the attenuation characteristics of the N-fold wall. There are two such studies in progress. The Swedes have recently (8/80) concluded a study that has investigated the design of balconies with respect to traffic noise. This study team concluded that balconies can be designed as a significant feature in the attenuation characteristics of a building. However, even without the application of a special acoustically absorptive lining, balconies were found to

attenuate noise by 5-10 dB.\* An interesting project conducted by the West Germans has studied the effects of creating a traffic tunnel to combat traffic noise.

#### Impact and Vibration

Most of the reported research on this subject has been involved with damping the effects of ground vibrations caused by subway trains. In both West Germany and Japan, research has been conducted on vibration-proof sleepers (a medium placed between the rail and the tie). A system in Japan has been developed that reduces, on the average, the vibration on adjacent ground by 11 dB.\*\* The system was based on a "very soft, rubber of elastic content 4 t/cm.\*\*\*" The West German system uses elastic elements composed of "rubber-pellet fabric or foamed plastics." In Japan, the propagation of subway train induced vibration from the tunnel to a nearby building is being investigated in two studies. In one study, a method that would accurately predict the vibrations and noise is being sought. In the other study, the ability of an application of urethane foam on the tunnel wall to reduce the ground tremor caused by the subway train is being examined. In another area of research, a British study to improve the vibration insulation of structures from power sources is under way. This is being done to increase human comfort.

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\* Measurement methodology unspecified in the project description.

\*\* No reference or measurement standard was given in the project description.

\*\*\* No explanation of for what "t" is an abbreviation is provided.

Acoustical Properties: Other

A project team of the Acoustical laboratory of Denmark is developing a correction term to be applied to the existing prediction procedure acoustical attenuation in residential areas. Their preliminary findings have revealed that outlying buildings such as sheds provide some attenuation, and this attenuation is unaccounted for in the existing models. Consequently, a correction term must be added.

### 3. SUMMARY AND TRENDS

The purpose of this section is to: summarize briefly the results of this survey by category; reiterate particular research highlights; examine the research efforts of particular countries; analyze certain trend data.

#### SUMMARY

##### Research by Category

Considering the research by category, as stated before, "Highway Noise" and "Surface Vehicle Components Noise" research have the most reported projects with 100 and 99 respectively. Acoustic Properties is third with 54 reported projects; "Rail Noise," "Methodology and Standards," and "Off Highway and Recreational Vehicle Noise" are fourth, fifth, and sixth respectively with 21, 13, and 7 reported projects.

Monies spent on these research projects are distributed in much the same order. Research projects in "Highway Noise," "Surface Vehicle Components Noise," and Acoustic Properties again were first through fourth respectively. The research categories "Methodology and Standards" and "Off Highway and Recreational Vehicle Noise" switched places, becoming sixth and fifth respectively. Table II shows these rankings and the accompanying funding amounts.

Within the category of Surface Vehicle Components Noise, research apparently is heaviest in the subcategory Engines (51 reported projects).

Many countries are experimenting with the development and construction of quiet diesel engines. Other experiments concern the development of quiet diesel engine components. For example, in the United Kingdom, design work is under way to inject fuel into the piston in such a way that less noise will be generated. Significant with most of this research, is the range of design criteria being incorporated with these research design projects. The researchers are not trying just to develop a low

Table II: Ranking of Research Project Categories by Number of Reported Projects and by the Amount of Money (in approximate millions of dollars U.S.) Reported

Category	Number of Reported Research Projects	Ranking	Amount of Money (in approximate millions of U.S. dollars) Reported	Ranking
Highway Noise	100	1	32	1
Off Highway and Recreational Vehicle Noise	7	6	0.9	5
Rail Noise	21	4	1.8	4
Surface Vehicle Components Noise	99	2	8.9	2
Methodology and Standards	13	5	0.3	6
Acoustic Properties	54	3	2.9	3
<b>Total</b>	<b>294</b>		<b>46.9</b>	

noise engine, but a low noise engine which will produce substantially the same power and use approximately the same amount of fuel. This type of balanced research produces an end product which is better suited to the market.



Several projects in this survey appear as being significant. Either they report a unique type of research, a significant finding, or are especially useful to the lay community. In West Germany, a low noise commercial truck was developed. The noise from this 130 horsepower, 7.5 ton modified truck, when measured according to ISO R362, was reduced by 8-10 dB. The West German Federal Post Office will street test 50 of these vehicles for reliability. In France, a report was completed that contained recommendations for public authorities as to the most cost-effective means of reducing or limiting street noise levels. The Swedes have developed a computer program for the calculation and automatic drawing of contour maps of road traffic noise. A West German research team has developed a diesel engine for subcompact cars which has high fuel economy and low noise emission levels. With this engine, the external noise of a VW Rabbit was reduced 8 dB, as measured by ISO R362. Encapsulation was used as well as the new engine in order to achieve this reduction. Finally, the British have tested the General Motors two-microphone acoustic intensity technique for engine acoustic source identification and ranking, and have found it to give good results both for total and individual source acoustic power in a much shorter time than would be possible with conventional techniques.

#### Research By Country

The four countries reporting the most projects are the United Kingdom (76 reported projects), West Germany (74 reported projects), Sweden (with 30 reported projects), and Japan (with 21 reported projects).

Within the United Kingdom most of the research project dollars are being spent on Highway Noise Medium and Heavy Trucks research (\$30 million U.S.), and on Surface Vehicle Components Noise/Engines (\$0.78 million U.S.) and Exhaust Muffler research (\$0.14 million U.S.).

Within West Germany, a tremendous interest is reported in the study and development of low noise commercial vehicles such as trucks. Both developmental projects and street testing of shielded trucks are in progress. Monies reported spent on this type of research amounted to approximately \$18.7 million (U.S.). These projects are reported within the Highway Noise/Medium and Heavy Trucks category/subcategory. The second largest reported amount of money being spent in West Germany on research projects was for Surface Vehicle Components Noise/Engines (\$3.7 million U.S.).

In Sweden, Surface Vehicle Components Noise/Tires received the most reported money with \$0.62 million (U.S.); second was Highway Noise/Other with \$0.47 million (U.S.).

In Japan, Acoustic Properties/Impact Vibration received the most reported money with \$0.28 million (U.S.); second was Highway Noise/Other with \$0.23 million (U.S.).

#### TRENDS

Because the previous survey (1976-1978) established a baseline, an analysis of research trends is now possible.

Three trends definitely can be reported: 1) annualized research dollars have remained approximately constant; therefore, after adjusting for inflation, real research dollars probably have declined; 2) research dollars for "Highway Noise" and "Surface Vehicle Components Noise" have increased; 3) research dollars for "Methodology and Standards" and "Rail Noise" have decreased.

As can be seen from Table III, though the number of Highway Noise research projects approximately has remained constant (109/100) the money allocated has soared (\$4.4/\$31.9 million U.S.). Similarly, Surface Vehicle Components Noise research shows approximately the same number of projects (74/99), but a large increase in money allocated (\$2.5/\$8.9 million U.S.). Research in Methodology and Standards appears to have decreased. The number of reported research projects fell by 53 from 66 to 13. The money allocated declined from \$3.6 to \$0.3 million (U.S.).

The total number of projects reported has remained approximately constant (364/294). However, the money allocated has risen from \$14.9 to \$46.9 million (U.S.).

The length of the surveying periods is different. In the previous survey, 1976-1978 was the period investigated; the recent survey investigated the 1978-1981 period. In both surveys, data for the last year was sketchy. Consequently, the last year is counted as a half-year period. Including this half-year, the duration of the first survey is considered 2.5 years, the duration of the second survey is considered 3.5 years.

Table III. A Comparison of the Results Obtained From the 1976-1978 Survey, and the 1978-1981 Survey

	1978 - 1981		1976 - 1978	
294 Project Descriptions			364 Project Descriptions	
\$46.9 million (U.S.)			\$14.9 million (U.S.)	
Approximate reporting period:			Approximate reporting period:	
3.5 years			2.5 years	
66 percent (195/294) reporting financial data			33 percent (123/368) reporting financial data	
	1978 - 1981		1976 - 1978	
Category	Number of Projects	Millions of Dollars U.S. Reported	Number of Projects	Millions of Dollars U.S. Reported
Highway Noise	100	31.9	109	4.4
Off Highway and Recreational Vehicle Noise	7	0.9	6	-
Rail Noise	21	1.8	39	2.1
Surface Vehicle Components Noise	99	8.9	74	2.5
Methodology and Standards	13	0.3	66	3.6
Acoustic Properties	54	2.9	74	2.0
Subcategory Gained: Hovercraft				
Subcategories Lost: Rapid Rail Transit and Training				
<u>Calculated Estimates:</u>				
Millions of Dollars (U.S.) Reported per Year				
\$13.4 million (or \$67,000 per year per project)		\$5.96 million (or \$48,000 per year per project)		
Estimate of Total Dollars (adjusted for reporting rates) (in millions of dollars U.S.)				
\$71.0 million		\$45.2 million		
Estimate of Total Dollars per Year (in millions of dollars U.S.)				
\$20.3 million		\$18.0 million		

Three estimates have been calculated for Table III: 1) millions of dollars (U.S.) reported per year; 2) estimate of total dollars (adjusted for reporting rates); 3) estimate of total dollars per year.

As can be seen from Table III, during the more recent survey period, 1978-1981, an average of \$13.4 million (U.S.) was allocated for research for each of the 3.5 years. In the earlier period, only an average of \$5.96 million (U.S.) was allocated for each of the 2.5 years. These amounts represent an approximate difference of \$20,300 (U.S.) per year for each of the projects reporting financial data.

Reporting of financial data was incomplete for both surveys--66 percent in the 1978-1981 period; 33 percent reporting in the 1976-1978 period. An amount for total funding for all reported projects can be estimated assuming all projects have similar financial data. Using this assumption, total funding for all reported projects in the 1978-1981 period is estimated to be \$71.0 million (U.S.). Funding in the earlier period is estimated to be at \$45.2 million (U.S.), \$25.8 million (U.S.) less. The amount of money allocated for all reporting projects per year for the 1978-1981 period is estimated to be \$20.3 million (U.S.); for the earlier period, the estimate is \$18.0 million (U.S.). This approximate difference of \$2.3 million (U.S.) is so small as to be meaningless in the light of the number of approximations taken in the estimation process.

On the whole, research efforts are becoming more developmental than fundamental in nature. Though this survey did not attempt to classify projects by such types of research, as did the previous survey, a reading of these project descriptions reveals projects on the construction and

fine-tuning of designs created during the 1976-1978 period. For example, barrier research projects are now more a series of projects on the effects of weatherization on barriers or the effects of barriers on driving safety than on the possible benefits of barriers versus no barriers. This trend in research probably indicates that barriers were constructed, and now spinoff research must be conducted to optimize their use.

Research efforts apparently have declined in two areas. No project descriptions were reported in the subcategory Rapid Rail Transit (within the category Rail Noise), and in Training (within the category previously titled Measurement and Enforcement). Consequently, these subcategories are not listed. The remaining subcategory within Measurement and Enforcement, Methodology and Standards, now is carried as a category.

The order of the countries reporting the most research projects has changed from the first survey. Table IV reflects this change.

Table IV: The Countries Reporting the Most Research Projects in the 1976-1978 and 1978-1981 Surveys

Ranking in 1976-1978	Country	Ranking in 1978-1981
1	United Kingdom	1
2	West Germany	2
6	Sweden	3
5	Japan	4
7	Canada	5
3	Netherlands	7
4	Switzerland	11

As can be seen from Table IV, the United Kingdom and West Germany remain first and second respectively. Japan, too, has remained in approximately the same position, rising from fifth to fourth. Sweden shows the most upward change (sixth to third), while the largest drop was sustained by the Swiss (fourth to eleventh).

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FUNDING TABLES



TABLE V: SUMMARY  
 SURFACE VEHICLE NOISE R&D  
 FUNDING IN THOUSANDS OF U.S. DOLLARS  
 1978-1981  
 COUNTRY

\* Some funding for other years included  
 because projects extended longer  
 than 1978-1981.

CATEGORY	Australia	Austria	Belgium	Canada	Denmark	ERIC	France	Greece	Hungary	Israel	Italy	Japan	Netherlands	Northern Ireland	Norway	Poland	Sweden	Switzerland	Turkey	United Kingdom	West Germany	Totals	Projects with Funding Reported
Highway Noise	74	55	423	239	23		86	10			475*			393	101	666	1,721	4	3,455	24,193*	31,925	79 of 100	
Off Highway and Recreational Vehicle Noise																	32				906*	938*	5 of 7
Rail Noise			43	94	30		30							25		61	30		54*	1,473	1,840*	17 of 21	
Surface Vehicle Components Noise	157		550	17			92				150			33		763*			1,007*	6,190*	8,959*	46 of 99	
Methodology and Standards				183																23	114	320	8 of 13
Acoustic Properties	33	62*		836	55						286*			53	232	256	50		8*	1,047*	2,918*	40 of 54	
TOTALS	264	117*	1,016*	1,369*	108*		208	10			911*			504	333	1,778*	1,808*	4	4,547*	33,923*	46,900*	195 of 294	

TABLE VI: HIGHWAY NOISE R&D  
FUNDING IN THOUSANDS OF U.S. DOLLARS  
1978-1981  
COUNTRY

\* Some funding for other years included  
because projects extended longer  
than 1978-1981.

CATEGORY	Australia	Austria	Belgium	Canada	Denmark	France	Greece	Hungary	Israel	Japan	Netherlands	Norway	Poland	Sweden	Switzerland	Turkey	United Kingdom	West Germany	Totals	Projects with Funding Reported
Medium and Heavy Trucks											37		86	1633*		3000	18,730*	23,486*		11 of 12
Light Vehicles																	1,690	1,690		1 of 1
Buses																				0 of 3
Highway Planning and Land Management						43			130*		110		105				183	571*		6 of 6
Highway Model Analysis and Prediction	39	47	43	91	23	43			108		193		5	40		33	66	731		32 of 40
Other	35	8	380	148		10			237		53	101	470	55	4	422	3,524	5,447		29 of 38
Totals	74	55	423	239	23	86	10		475*		393	101	666	1728*	4	3455	24,193*	31,925*		79 of 100

TABLE VII: OFF HIGHWAY AND RECREATIONAL  
 VEHICLE NOISE R&D FUNDING IN  
 THOUSANDS OF U.S. DOLLARS  
 1978-1981  
 COUNTRY

\* Some funding for other years included  
 because projects extended longer  
 than 1978-1981.

CATEGORY	Sweden	United Kingdom	West Germany	Totals	Projects with Funding Reported
Motorcycles			906*	906*	4 of 4
Motorboats	32			32	1 of 2
Hovercraft					0 of 1
Totals	32		906*	938*	5 of 7

TABLE VIII: RAIL NOISE R&D FUNDING  
 IN THOUSANDS OF U.S. DOLLARS  
 1978-1981  
 COUNTRY

\* Some funding for other years included because projects extended longer than 1978-1981.

CATEGORY	Belgium	Bulgaria	Canada	Denmark	France	Netherlands	Norway	Sweden	Switzerland	United Kingdom	West Germany	Totals	Projects with Funding Reported
Locomotives and Passenger Trains											840	840	3 of 4
Innovative Guided Mass Transit											38	38	1 of 1
Rail Model Analysis and Prediction	43		94	30			25		30		595	817	8 of 10
Other					30			61		54*		145*	5 of 6
Totals	43		94	30	30		25	61	30	54*	1,473	1,840*	17 of 21



TABLE X: METHODOLOGY AND STANDARDS  
 R&D FUNDING IN THOUSANDS  
 of U.S. DOLLARS  
 1978-1981  
 COUNTRY

\* Some funding for other years included  
 because projects extended longer  
 than 1978-1981.

CATEGORY	Canada	EEC	Japan	Sweden	United Kingdom	West Germany	Totals	Project with Funding Reported
Methodology and Standards	183				23	114	320	8 of 13

TABLE XI: ACOUSTICAL PROPERTIES NOISE R&D  
 FUNDING IN THOUSANDS OF U.S. DOLLARS  
 1978-1981  
 COUNTRY

\* Some funding for other years included  
 because projects extended longer  
 than 1978-1981.

CATEGORY	Australia	Austria	Belgium	Canada	Denmark	France	Japan	Netherlands	Norway	Poland	Sweden	Switzerland	United Kingdom	West Germany	Totals	Project with Funding Reported
Propagation	33		828	25							195		248*	1,329*	12 of 14	
Barriers			8					53	232	52	50		455*	850*	10 of 19	
Architectural Acoustics		62*									9		344	415*	12 of 13	
Impact and Vibration						286*							8*	294*	5 of 7	
Others				30										30	1 of 1	
Totals	33	62*	836	55		286*		53	232	256	50	8*	1,047*	2,918*	40 of 54	

HIGHWAY NOISE  
MEDIUM AND HEAVY TRUCKS

See Also Page:

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(We prefer responses in English, but can accept material in other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: NORWAY

PROJECT TITLE:

NOISE FROM HEAVY VEHICLES

Performing Organization Name & Address:

AKUSTISK LABORATORIUM  
ELAB  
  
N-7034 TRONDHEIM-NTH  
NORWAY

Sponsoring Organization Name & Address:

VEGDIREKTORATET  
GRENSEVEIEN 92  
  
N-OSLO 6  
NORWAY

Principal Investigator(s):

KAI ABRAHAMSEN  
ASBJØRN KROKSTAD

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: )

1978: \_\_\_\_\_ 1980: \$ 38500

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: \$ 38500

Comments:

(N.kr. 200,000.-)  
\$36,740

Start Date: JANUARY 1980

Completion Date: Estimated: \_\_\_\_\_

Actual: JANUARY 1981

PROJECT OBJECTIVE:

To provide background data for noise emission legislation.

PROJECT DESCRIPTION:

Stationary noise measurements were carried out on 12 of the most sold trucks in Norway. The measurements were carried out near the most important noise sources, in a reference position, inside the cabin and of rolling noise at two vehicle speeds. The vibration levels of the engines were mapped at maximum engine speed. The data were used to rank and compare the sources of noise for the complete series of vehicles, and to discuss the influence of the various vehicle designs on the noise emitted.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Structural noise radiation from the engine was the most important noise source for 9 of the vehicles. Fan noise and exhaust noise were also significant for most of the vehicles, while air intake noise was negligible for all but a couple of the vehicles. Rolling noise was negligible for a vehicle speed of 50 km/h, but significant for a speed of 70 km/h.

The A-weighted cabin noise level did vary considerably between the different vehicles, depending upon the degree of insulation and absorption included by the manufacturers. Linear cabin noise level were up to 40 dB above the A-weighted level due to low frequency engine noise.

A noise emission forecast for the near future was made, based on the findings of the project and on available literature on low noise prototypes.

AVAILABLE PUBLICATIONS (of research findings):

ELAB REPORT: NOISE FROM HEAVY VEHICLES  
(Kai Abrahamson) (To be published in English)

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: Sweden

PROJECT TITLE:

Presence and Generation of Low-frequency Noise in Lorry Cabs

Performing Organization Name & Address:

National Board of Occupational Safety  
and Health  
Regionsjukhuset  
S-90185  
SWEDEN

Sponsoring Organization Name & Address:

Principal Investigator(s):

L. Liszka  
J. Hedendahl  
P. Loefstedt

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: January 1977

Completion Date: Estimated: 1979

Actual:                     

OR:

Total Funding Amount: \$38,000

Comments:

PROJECT OBJECTIVE:

This project will measure the noise both inside and outside a truck cab under different conditions. Some tests will be made on a roller conveyor to negate the effects of wind noise.

PROJECT DESCRIPTION:

The aim is to study the appearance and generation of low-frequency noise (particularly infrasonic) in lorry cabs. The levels of infrasonic noise and the variations over time are also being studied. The low-frequency noise is measured inside and outside lorry cabs at different speeds. To exclude the effect of wind speed, one lorry is driven at varying gear speeds on a roller conveyor. The results indicate that the turbulence round the lorry cabs causes the low-frequency noise.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings): Preliminary examination of infrasonic in lorry cabs. The importance of engine speed for generating of low-frequency noise in lorry cabs. (Infrasonic in lorries - hygienic judgement). Report 1977:34,89P. Report 1978:13. Report 1979:35,1977-10, 1978-04,1979-05 Arbetarskyddsstyrelsen.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: Sweden

**PROJECT TITLE:**

Investigation of Low-frequency Noise, Particularly Infrasonic and Clear Tones in  
Lorries and Excavators

**Performing Organization Name & Address:**

National Board of Occupational Safety  
and Health  
Regionsjukhuset  
S-90185  
Umeaa SWEDEN

**Sponsoring Organization Name & Address:**

**Principal Investigator(s):**

L. Liszka  
J. Hedendahl  
P. Loeffstedt

**Annual Funding:**

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: August 1978

Completion Date: Estimated: August 1980

Actual:                     

**OR:**

Total Funding Amount: \$48,000

**Comments:**

**PROJECT OBJECTIVE:**

This project will investigate various low-frequency and clear tones in different  
types of construction and heavy equipment.

**PROJECT DESCRIPTION:**

The aim is to investigate low-frequency noise (particularly clear tones) in  
different contractors vehicles such as excavators, tractors, refuse collection  
lorries, etc.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

**AVAILABLE PUBLICATIONS (of research findings):**

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Medium and Heavy Trucks</u>
		COUNTRY: <u>Switzerland</u>
PROJECT TITLE: <u>Noise Reduction 1977</u>		
Performing Organization Name & Address:  Adolph Saurer Limited  CH-9320 <u>Arbon</u>  Switzerland		Sponsoring Organization Name & Address:  No external financial assistance
Principal Investigator(s):  Acoustical Group in the Saurer-Department Research & Development Engines		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>June 1974</u>		OR: Total Funding Amount: <u>(sfr. 3,000,000.--)</u>
Completion Date: Estimated: <u>                    </u>		Comments: \$1,530,600
Actual: <u>October 1977</u>		No external financial assistance.
PROJECT OBJECTIVE: Reduction of noise emitted by Saurer commercial vehicles in view of the new more stringent Swiss regulations governing noise limitation, which came into effect with the first step on 1.1.1977.		
PROJECT DESCRIPTION: 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 characterized 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.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  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 ECE R9 (Actual Swiss limit is 88 dB(A) for heavy trucks with more than 147 kW engine power).		
AVAILABLE PUBLICATIONS (of research findings):  Summerauer, I. and Boesch, N.: Möglichkeiten aktiver Lärmbekämpfung an Fahrzeug-Dieselmotoren, Technoinform Vol. III, p. 1749/1775, Fisita-Congress 1978, Budapest		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Medium and Heavy Trucks</u>
		COUNTRY: <u>Switzerland</u>
PROJECT TITLE: <u>Noise Reduction 1982</u>		
Performing Organization Name & Address:  <u>Adolph Saurer Limited</u>  <u>CH-9320 Arbon</u>  <u>Switzerland</u>		Sponsoring Organization Name & Address:  <u>No external financial assistance</u>
Principal Investigator(s):  <u>Acoustical Group</u> <u>in the Saurer-Department</u> <u>Research &amp; Development Engines</u>		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____) 1978: _____ 1980: <u>(sfr 200'000)</u> 1979: <u>(sfr 50'000)</u> 1981: <u>(sfr 200'000)</u> OR: \$25,510 \$102,040 Total Funding Amount: _____
Start Date: <u>October 1979</u> Completion Date: Estimated: <u>1982</u> Actual: _____		Comments: <u>No external financial assistance</u>
PROJECT OBJECTIVE: <u>Reduction of noise emitted by Saurer commercial vehicles in view of the new more stringent Swiss regulations governing noise limitation, which come into effect with the second step on October 1982 and with the third step on October 1986.</u>		
PROJECT DESCRIPTION:  <u>In addition to noise abatement measures at the main source "engine", further vehicle-related measures are in the process of development. The focal point of work again is that noise abatement measures are effective as well as economical for mass production.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <u>Presently basic investigations of various possible measures are being analysed. Several acoustic improvements on the air-intake and exhaust system were already achieved due to the development of efficient silencers.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>Currently none</u>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: United Kingdom

**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

**Annual Funding:**

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

**Start Date:** \_\_\_\_\_

**Completion Date:** Estimated: \_\_\_\_\_

Actual: \_\_\_\_\_

**OR:**

Total Funding Amount: (£800,000)

Comments: \$1,761,600

**PROJECT 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.

**PROJECT DESCRIPTION:**

A cooperative research program involving the Motor Industry Research Association (MIRA), (cab noise, exhaust and cooling systems noise); Institute of Sound and Vibration Research, Southampton University (ISVR) (exhaust noise, quiet engine development); National Engineering Laboratory (NEL) (quiet fan development); Fodors Ltd, Rolls Royce Motors, Logland Vehicles. Supervised and coordinated by the Transport and Road Research Laboratory (TRRL) who also researched on tyre noise.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

A 32 ton 220 bhp tractor and a 40 ton 350 bhp tractor were modified in research form to produce 80dB(A) and 83dB(A) respectively at 7.5 metres using re-designed cooling and exhaust systems and quieted engines. The 40 ton vehicle, a Foden with Rolls Royce Hggle diesel engine was further developed to pre-production standard and achieved 80dB(A) at 7.5 metres (150 R62) and 72dB(A) in the cab. This vehicle is now being evaluated in fleet service. A first estimate of increased manufacturing cost is 7-8 percent.

**AVAILABLE PUBLICATIONS (of research findings):**

TRRL Supplementary Report SR 521

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks

COUNTRY: West Germany

PROJECT TITLE: Low Noise Trucks

Performing Organization Name & Address:  
-Research Institute for Motor Vehicles  
and Vehicle Engines Stuttgart  
Pfaffenwaldring 12, 7 Stuttgart 80  
-Magirus Deutz, Zipcode 2740, 79 Ulm  
-Klöckner-Humboldt-Deutz Inc,  
5000 Cologne 80  
West Germany

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33  
West Germany

Principal Investigator(s):  
Dr. Ing. Werner Liedel  
Dr. Ing. Dietrich Denker

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount: (2,643,000.--)

Comments:

\$1,240,888

Start Date: 1-1-1978

Completion Date: Estimated: 5-30-1980

Actual:                     

PROJECT OBJECTIVE: The exterior noise of a truck used in city distribution traffic (7.5t,130HP) according to ISO R 362 by 8-10 dB A). In addition, the noise reduction should be subjectively perceivable.

PROJECT DESCRIPTION: Noise reduction is achieved by motor-internal measures as well as encapsulation of the motor.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

The sound level reduction required in the statement of the task in the case of the noise emission according to ISO R 362 by 8-10 dB(A) could be achieved on a truck with an air-cooled Diesel motor and 7.5 t permissible total weight by installation of a mildly charged motor and a vehicle-side, partial encapsulation. A noise reduction by 16 dB(A) in the case of one test vehicle and by 13 dB(A) with a series vehicle was achieved by vehicle side, complete encapsulation of motor and transmission, which also fulfill; the improvement of noise with subjective evaluation required in the statement of the task. The cooling problems originating by encapsulation could be solved. The inside noise in the cab could be reduced by 4 dB(A) by the mildly charged motor, which applies for the partial capsulation and fully encapsulated vehicle. We also studied the rolling noises of seven series tires.

AVAILABLE PUBLICATIONS (of research findings):

Research report 80-105 05 104 (Federal Environmental Office)

Translated and transcribed from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks

COUNTRY: West Germany

PROJECT TITLE: Definition Study of Low Noise Commercial Vehicles

Performing Organization Name & Address:

Daimler Benz Inc.  
Mercedes St. 136  
7000 Stuttgart 60

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):

Dipl-Ing. P. Fietz

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount: (4,000,000.--)

Comments:

\$1,878,000

Start Date: 7-1-1978

Completion Date: Estimated: 6-30-1981

Actual:                     

PROJECT OBJECTIVE: Reduction of the outside noise of trucks of different performance classes by 8-10 dB(A).

PROJECT DESCRIPTION: Reduction of the outside noise by motor-internal measures, encapsulation of the motor and improved exhaust gas installation. Carrying out of measures with consideration of a possible series introduction.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Distribution Vehicle L 508 D: (63 kW)

The noise reduction measures are concluded; continuous testing and studies concerning realization of these measures and their costs in series are presently being investigated.

Communal Vehicle 1619 KO: (141 kW)

Noise studies (source analysis) and preliminary noise reduction measures (engine, ventilator) are carried out.

Overland Vehicle 1632: (235 kW)

Noise reduction measures are about to be concluded. Transmission and rear axle studies are presently being carried out.

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: West Germany

PROJECT TITLE: Development of Low-Noise Construction Site Trucks

Performing Organization Name & Address:  
-Magirus Deutz Inc. Zipcode 2740,  
7900 Ulm.  
-Klöckner-Humboldt-Deutz Inc. 5  
Cologne 80  
-Research Institute for Motor Vehi-  
cles and vehicle engines Stuttgart  
FKYS, Pfaffenwaldring 12, 7 Stuttg.80

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
Prof. Dr. Ing. U. Essers  
Dr. Ing. W. Liedl

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: 1-1-1980  
Completion Date: Estimated: 6-30-1982  
Actual:                     

OR:  
Total Funding Amount: (3,000,000.--)  
Comments: \$1,408,500

PROJECT OBJECTIVE: The possibilities for reducing noise emission are to be studied for a typical construction site vehicle (four-wheel drive Hauben dump truck).

PROJECT DESCRIPTION: The strived for goal of reducing the outside noise to less than or equal to 80 dB (A) according to the ECE measuring method with simultaneous clear reduction of the subjective annoyance factor should be achieved without changing the basic concept of the present day truck. The measures for noise reduction may not limit the use possibilities of the vehicle (terrain accessibility, ground clearance, angle of slope, obliquity of the wheels).

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: West Germany

PROJECT TITLE: Studies Concerning the Noise Behavior of Trucks and Busses.

Performing Organization Name & Address:  
Technischer Uberwachungs  
Verain  
Bayern  
Munchen

Sponsoring Organization Name & Address:  
Bundesanstalt fur  
Strassenwesen  
Kohn 51

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: August 1978

Completion Date: Estimated:                     

Actual:                     

OR:

Total Funding Amount:                     

Comments:                     

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: In the committees and working groups of the EG and ECE, there are deliberations to what extent the boundary noise values should be lowered in the case of trucks and busses. These laws are to go into force in 1985. There is special lack of clarity concerning the technical possibilities and their limits as well as concerning the expected costs. Noise measurements on series trucks and busses in different operational states should show how great the actual noise exposure is. Further measurements on improved vehicles (e.g. for Switzerland) and prototypes with special noise damping measures should provide starting values concerning technical possibilities, their realizability and the required cost. It should also be studied whether a great noise reduction can be achieved by limiting engine speed in city traffic according to the proposal of the M.A.N. Co. On the basis of the test results, proposals are to be made for future boundary values which give an optimum cost/use ratio.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Report No. 0609 162, Verlahresmissimen, Immissionsschutz, 701 844

Translated from the original German.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: West Germany

PROJECT TITLE: Demonstration Tests for Practical Testing of Quiet Running Trucks

Performing Organization Name & Address:  
-Magirus Deutz Inc. Zipcode 2740,  
7900 Ulm  
-Klöckner-Humboldt-Deutz Inc,  
5000 Cologne 80  
-Research Institute for Motor Vehicles and Vehicle Engines Stuttgart,  
Pfaffenwaldring 12, 7 Stuttgart 80

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):

Dipl.-Ing. J. Fischer

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount: (1,750,000.--)

Comments:

\$821,625

Start Date: 1-1-1980

Completion Date: Estimated: 4-30-1982

Actual:                     

PROJECT OBJECTIVE: Testing a fleet of 50 fully shielded vehicles (7.5 t, 130 HP) in practical use (distributor traffic) with the Federal Post Office.

PROJECT DESCRIPTION: Building upon the fully shielded vehicle which was available as a test vehicle, the full capsule used there should be converted into a standardized design. The use by the Federal Post Office in public street traffic should allow us to obtain information concerning the maintenance of the capsule parts as well as possible difficulties with repair and maintenance.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Medium and Heavy Trucks  
COUNTRY: West Germany

PROJECT TITLE:

Quieter Heavy Trucks with Under Floor Motor

Performing Organization Name & Address:

Machine Factory Augsburg Nürnberg  
Inc.  
Dachauer St. 667  
8000 Munich 50

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismark Place 1  
D-1000 Berlin 33

Principal Investigator(s):

Dipl.-Ing. K. Feitzelmayer  
Dipl.-Ing. H.P. Fingerhut

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR: Total Funding Amount: (1,500,000.--)

Comments: \$704,250

Start Date: 1-1-1981

Completion Date: Estimated: 6-30-1983

Actual:                     

PROJECT OBJECTIVE: On a heavy truck with underfloor motor, the outside noise was to be reduced to less than or equal to 80 dB(A) according to the ECE measuring method, where especially the subjective annoyance of the noise wall is to be reduced.

PROJECT DESCRIPTION:

2 trucks were encapsulated. In the case of the "extreme" solution, we studied the acoustically achievable and the thermally possible with regard to accessibility to the engine and possibility of maintenance. From this we derived a solution near to series for a second truck which corresponds to the requirements of the manufacture and of practical operation.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

HIGHWAY NOISE  
LIGHT VEHICLES

See Also Page:

236

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Light Vehicles  
COUNTRY: West Germany

PROJECT TITLE: Evaluation of vehicle-technical measures for the outside  
noise reduction with passenger cars.

Performing Organization Name & Address:

Volkswagen Inc.  
3100 Wolfsburg

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):

Dipl-Phys. H. Hartwig  
Dr. Ing. H. Danckert  
Dr. rer. nat. B. Standinger

Annual Funding:

(Check One: Fiscal Yr: Calendar Yr:

1978: 1980:

1979: 1981:

OR:

Total Funding Amount: (3,6000,000.--)

Comments: \$1,690,200

Start Date: 2-1-1978

Completion Date: Estimated: 12-31-1980

Actual:

PROJECT OBJECTIVE: Reduction of the drive noise (without rolling noise  
component) by about 8 dB(A) according to ISO R 362 with passenger cars.

PROJECT DESCRIPTION: The already known automobile body as well as motor  
encapsulation should be further developed so that the noise damping  
effect is maintained as far as possible, but the function of the vehicle  
is not badly impaired. The encapsulation measures are supplemented by  
suitable acoustical improvements on the intake and exhaust systems.  
Suitable designs are to be made and compared; the necessary calculations  
are to be carried out. Concepts with good prospects are to be installed  
and monitored in vehicles and optimized for noise, temperature, working life, capability  
of maintenance and other important criteria.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

The studies are almost concluded. The drive noise could be reduced  
with body encapsulation as well as with engine encapsulation by about  
8 dB(A), without greatly impairing the function of the vehicle.  
A concluding report is being drawn up at present.

AVAILABLE PUBLICATIONS (of research findings):

Research report 105 05 102 (Environmental Office) obtainable about  
January 1981.

Translated and transcribed from the original German.

HIGHWAY NOISE

BUSES

See Also Page:

52

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Buses  
COUNTRY: The Netherlands

PROJECT TITLE:

Technical and Environmental Aspects of Buses for Use in Urban and Rural Areas.

Performing Organization Name & Address:

Technisch Physische Dienst TNO-TH  
(Institute of Applied Physics TNO-TH)  
Postbus 155  
2600 AD DELFT  
The Netherlands

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date:                     

OR:

Completion Date: Estimated:                     

Total Funding Amount:                     

Actual: 4/5/78

Comments:

PROJECT OBJECTIVE: The aim of this study is to consider the possibilities of making buses used for public transport services quieter. Greatest consideration has been given to the "encapsulation" of present-day diesel buses and their conversion to liquified gas operation (LPG). Encapsulation could be employed relatively soon, and retrofit of present day buses is also a possibility.

SUMMARY OF FINDINGS (if project completed): The noise emitted by present-day diesel buses varies from about 85 to 88 dB (A) measured by the ISO type approval method. Encapsulation or conversion to LPG enables the noise to be reduced to about 80dB(A), and a greater reduction would seem to be possible in principle. The noise level of the trolley-bus depends partly on the system chosen, but it can be significantly less than the figure of 80 dB(A) already mentioned. Consideration has also been given to aspects such as safety, air pollution, consumption of materials and energy, reliability and durability. In these respects the encapsulated bus will not differ essentially from the present-day diesel bus; some reservations have to be made as to the durability and reliability of the encapsulation itself as there has been as yet no experience of it over lengthy periods. Buses powered by LPG require special safety precautions with regard to fuel-handling. The exhaust from an LPG bus has a much lower NO<sub>x</sub> content, and there is no smoke; the amounts of HC and CO emitted are comparable with those from a diesel engine. Energy consumption would increase somewhat with LPG. A comparison between similar urban services in Amsterdam indicates that fuel consumption increases by 67% in volume terms, which corresponds to an increase in energy consumption of 17%; this ratio is distinctly better than the first provisional data from Amsterdam indicated. The air pollution associated with trolley-buses occurs at the power station, which is found to produce a similar quantity of NO<sub>x</sub> for a given mileage to that produce a greater quantity of SO<sub>2</sub> and much less of the other exhaust components. The energy consumption of a trolley-bus with a chopper is about 12% less than that of a diesel bus; without chopper it is at least 5% more. The reliability of electric motors is probably greater than of diesel engines, but trolley-bus services are more liable to dealt with in the report is inadequate to give a proper idea of their effects on the various aspects mentioned.

AVAILABLE PUBLICATIONS (of research findings): see above  
Report VL-HR-03-02 of the ICG.  
Transcribed from the original.



(We prefer responses in English, but can accept material in other languages.)

TOPIC: Buses

COUNTRY: The Netherlands

PROJECT TITLE:

Noise Emission by Buses: Overall Noise and Individual Noise Sources

Performing Organization Name & Address:

Technisch Fysische Dienst TNO-TH  
(Institute of Applied Physics TNO-TH)  
Postbus 155  
2600 AD DELFT  
The Netherlands

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_

Actual: 10/5/78

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: The noise emitted by two types of the standard bus used by the NS-group (Dutch Railways) for rural bus services, namely the DAF and Leyland versions, was studied in collaboration with the CAB (N.V. Centraal Autoherstel Bedrijf). The overall noise emission of each type was measured at constant speed (50 and 80 km/h), at full acceleration using the ISO track (from stand-still and from 30 km/h), at various speeds with the engine switched off (rolling noise) and at standstill around the bodywork with the engine running at maximum speed. The test at full acceleration from 30 km/h was practically equivalent to the type approval test for these buses.

SUMMARY OF FINDINGS (if project completed): In order to determine what proportion of the total noise level the various individual noise sources (engine block, exhaust, air intake bodywork, fan, wheels) accounted for, measurements were made near them and of vibrations at some of them. This was done with the engine under load and no load condition with the aid of a "test bench". Measurements were also made, to determine the sound transmission from individual sources to large distances, the noise radiation by some of them and the vibration transmission from the engine block to the chassis and bodywork, using some new techniques (including the correlation method). Because of the great correlation method yielded only a limited number of useful results. The measurements gave a good idea of the proportion of total noise accounted for by the various sources under various conditions. By far the major source of noise was the engine block. The gearbox, exhaust, air intake, fan, and at higher speeds (above 50 km/h or so) the rolling noise also made a significant contribution. The precise order of the five last-mentioned sources depended on the operating conditions and the type of bus (DAF or Leyland). Rolling noise is considered by be a fixed quantity, which limits the reduction that can be achieved at higher speeds. The noise radiated from the bodywork and silencers was negligible.

AVAILABLE PUBLICATIONS (of research findings):  
Report VL-DR-03-04 of the ICG.

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Buses  
COUNTRY: The Netherlands

PROJECT TITLE:

The Cost of Quieter Buses on Town and Country Routes

Performing Organization Name & Address:  
Technisch Physische Dienst TNO-TH  
(Institute of Applied Physics TNO-TH)  
Postbus 155  
2600 AD DELFT  
The Netherlands

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

OR:

Completion Date: Estimated: \_\_\_\_\_

Total Funding Amount: \_\_\_\_\_

Actual: 7/78

Comments:

PROJECT OBJECTIVE: This is a study of the financial effects of using three types of quieter buses for public transport services in urban and rural areas: buses with encapsulated diesel engines, buses with engines converted to liquified gas (LPG) and trolley-buses.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The increase in cost resulting from a switchover to trolley-buses would depend on the frequency of the services in relation to the costs of the network. They would not therefore seem to be an available financial proposition on rural services. In urban areas, with their frequent services, the result of switching fifty per cent of bus kilometres (the busiest routes) to trolley-bus operation would be to increase the cost of that part of the network by 6%.

AVAILABLE PUBLICATIONS (of research findings):  
Report VL-HR-03-03 of the ICG.

Transcribed from the original

HIGHWAY NOISE  
HIGHWAY PLANNING AND LAND  
MANAGEMENT

See Also Pages:

155  
324  
336

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Planning and Land Management  
COUNTRY: 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  
Cadex, France

**Sponsoring Organization Name & Address:**

Ministry of Life Quality  
D.P.P.N.

**Principal Investigator(s):**

J. Lambert

**Annual Funding:**

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1/77

Completion Date: Estimated:                     

Actual: 4/79

OR:

Total Funding Amount:                     

Comments:                     

**PROJECT OBJECTIVE:**

To establish the most cost effective means of reducing or limiting noise levels by  
public authorities.

**PROJECT DESCRIPTION:**

The cost effectiveness of different noise reducing measures (reduction of exhaust noise,  
altering the infra-structure or buildings, action concerning the road surface,  
altering the speed limit) are examined. Remedial versus preventive action also is  
investigated. Estimated costs of three noise reducing programs, all ending in 1980,  
are compared.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

In the case of remedial action, in many cases the preferable action concerns the  
infrastructure rather than buildings. Reduction in exhaust noise is the most expensive  
dBA reduction. The cost of preventive treatment is appreciably less.

**AVAILABLE PUBLICATIONS (of research findings):** "Reduction of Traffic Noise in Areas  
Bordering Urban Express Ways: Basic Information Relevant to the Decisions that Need to  
be Made by Public Authorities in Taking Appropriate Action" J. Lambert. IRT, Center  
for the Evaluation of Research on Nuisances.

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Planning and Land Management  
COUNTRY: Japan

**PROJECT TITLE:**

Traffic Control Strategy to Improve Environment

Performing Organization Name & Address:  
National Research Institute of Police Science  
Traffic Division  
6 Sanbancho chiyoda-ku- Tokoyo

Sponsoring Organization Name & Address:  
Environment Agency  
3-1-1 Kasumigaseki Chiyoda-ku-Tokoyo

**Principal Investigator(s):**

Takashi ARIZONO

Yasushi NISHIDA

**Annual Funding:**

(Check One: Fiscal Yr:  Calendar Yr: )

1978: \_\_\_\_\_ 1980: (¥ 13,158,000)

1979: \_\_\_\_\_ 1981: (¥ 14,096,000)

OR: \$62,868

Total Funding Amount: \$67,350

Comments:

Start Date: April 1980

Completion Date: Estimated: March 1983

Actual: \_\_\_\_\_

**PROJECT OBJECTIVE:**

To develop one or more traffic control strategies to prevent traffic-oriented air and noise pollution.

**PROJECT DESCRIPTION:** his research consists of the following three phases.

1. To determine the relations between road-produced air and noise pollution and traffic flow parameters.
2. To by a software simulator or traffic pollution dynamics in connection with traffic control schemes.
3. To make the simulation study to attain the final objective of this project and also to explore the practical feasibility of the control strategies developed.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

The first phase is underway.

**AVAILABLE PUBLICATIONS (of research findings):**

Transcribed from the original.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Planning and Land Management

COUNTRY: Norway

PROJECT TITLE:  
An Analysis of Different Noise Abatement Strategies

Performing Organization Name & Address:  
Institute of Transport Economics  
Royal Norwegian Council for Scientific  
and Industrial Research  
PO Box 6110 Etterstad  
N-Oslo 6, Norway

Sponsoring Organization Name & Address:  
Ministry of Communication  
Ministry of Environment  
Highway Directorate

Principal Investigator(s):  
Multi-disciplinary team of engineers  
and an economist

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)  
1978: (kr1,500,000) 1980: (kr1,500,000)  
          \$27,555                   \$27,555  
1979: (kr1,500,000) 1981: (kr1,000,000)  
          \$27,555                   \$18,370

Start Date: 1976  
Completion Date: Estimated: 1981  
Actual: \_\_\_\_\_

OR: Total Funding Amount: \_\_\_\_\_  
Comments: \_\_\_\_\_

PROJECT OBJECTIVE: 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.

PROJECT DESCRIPTION: 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/mission side, but using traffic management techniques and different land use methods. The project is to a large extent based upon data obtained from the traffic noise mapping (1976) executed in connection with the Norwegian Road Plan (NVPII) and the mapping of the traffic noise climate at country level in 1978. The study concerned with the assessment of the existing traffic noise climate inside and outside urban areas was completed in 1979. The analysis was based upon data from an extensive traffic noise mapping exercise carried out in 1976 and 1978. The project included a survey of the number of dwellings exposed to different noise levels and costs involved if certain noise standards should be satisfied. The analysis show that about half a million inhabitants of the total population (12.5%) is exposed to outdoor noise levels over 60 dB(A). The required cost using conventional noise abatement measures was estimated to approximately 1900 mill nKr (380\$). 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 separately or in combination with other insulation measures as part of a more comprehensive noise abatement policy. The same applies to "lorry routes" when introduced in urban areas. The project has studied the effects of lorry routes in three different urban areas. The results are promising and the application of lorry routes and traffic management measures will be besides environmental benefits (less pollution, reduced external noise, etc.) also give improved traffic safety.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Planning and Land Management  
COUNTRY: Sweden

PROJECT TITLE:

Street Environment

Performing Organization Name & Address:  
Lund University of Technology  
Dept. of Traffic Planning and Engineering  
Box 725, S-220 07 Lund, Sweden and  
FOJAB Architects, Box 1191, S-221 05  
Lund, Sweden

Sponsoring Organization Name & Address:  
Swedish Council for Building Research  
S:t Goransgatan 66  
S-112 33 Stockholm, Sweden

Principal Investigator(s):

Mats Jacobson  
Mats Reutherborg

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: 1978

Completion Date: Estimated: 1981

Actual: \_\_\_\_\_

OR:

Total Funding Amount: (300.00S Kr)

Comments: \$64,770

PROJECT OBJECTIVE: To describe the environmental problems arising in the vicinity of arterial roads, and the forms these problems can take in different parts of the town planning standard.

PROJECT DESCRIPTION: Research has been carried on for a number of years into the environmental problems arising in the vicinity of arterial roads in towns. We have attempted to describe the forms these problems take in different parts of the town planning standard. Among the problems we have been dealing with are noise, air pollution, social effects and the effects on land use. These studies have lead to a special interest in the use of specially designed buildings as noise barriers. Buildings of this type can be used for different purposes, for example: housing, industry or communal facilities for residents of the area. At the moment we are working on an actual scheme of noise barrier housing in the vicinity of a motorway. Our aims with this project are to protect existing houses from road noise at the same time as the population of the area is increased. The population increase makes possible the retention of existing schools, shops, etc. The scheme leads to more efficient land use, areas blighted by road noise can be brought into use.

SUMMARY OF FINDINGS (if project completed):

AVAILABLE PUBLICATIONS (of research findings): Planned publications during 1981: Gatans omgivning (Street environment) (in Swedish with summary in English) and Kompletteringsbyggande i trafikstorda omraden (Noise barrier buildings and land use).

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Planning and Land Management

COUNTRY: Sweden

PROJECT TITLE: Consequences of Speed Standard and Intersection Design for Secondary Links  
in Town Road Networks

Performing Organization Name & Address:  
Lund University of Technology  
Dept. of Traffic Planning and Engineering  
Box 725  
S-22 007  
Lund 7  
Sweden

Sponsoring Organization Name & Address:  
Swedish Council for Building  
Research  
S-112 33 Stockholm  
Sweden

Principal Investigator(s):

J. Colliander  
S. Lundberg  
M. Reutherborg

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: Oct. 1976

Completion Date: Estimated: Jan. 1978

Actual:                     

OR:

Total Funding Amount: \$40,000

Comments:

PROJECT OBJECTIVE: The aim is to study effects of various combinations of speed standard and intersection designs for secondary links in urban road networks on residents, road users, etc.; such as noise, safety, costs, transport mode distribution.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings): (In Swedish): Träpkledsnat i tätorter, Konsekvenser av val av hastighetsstandard och korsnings utformning på huruttrafikleder Bulletin 23 1978, Lund University of Technology, Dept. of Traffic Planning and Engineering Box 725, S-2007, Lund, Sweden

Transcribed from the original.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Planning and Land Management  
COUNTRY: United Kingdom

PROJECT TITLE:  
The Darlington "Quiet Town Experiment"

Performing Organization Name & Address:

Department of Environment  
Noise Advisory Council  
London, United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: Sept. 1976

Completion Date: Estimated: Sept. 1978

Actual: Sept. 1978

OR:

Total Funding Amount: (£ 26,686)

Comments: \$58,762

PROJECT OBJECTIVE: The purpose of the experiment was to illustrate by practical example the scope for the reduction of noise nuisance at home, at work and in public places by means of education, publicity and experimental schemes.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

While it must always be difficult to assess the results of a project of this kind, it is concluded that the experiment overall was successful in conveying the message that noise is a problem worth tackling to the great majority of people in Darlington. The results of this project provide lessons for further work in the field of cooperation between local authorities and industry in noise abatement, and in indicating particular areas of public education and exhaustion which might be developed for use elsewhere.

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.



HIGHWAY NOISE  
HIGHWAY MODEL ANALYSIS AND  
PREDICTION

See Also Page:

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<small>(We prefer responses in English, but can accept material in other languages.)</small>		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>AUSTRALIA</u>
PROJECT TITLE: <b>FIELD MEASUREMENT OF ROAD TRAFFIC NOISE SHIELDING PROVIDED BY BUILDINGS &amp; BUILDING ELEMENTS</b>		
Performing Organization Name & Address: School of Architecture, University of New South Wales, P.O. Box 1, KENSINGTON NSW. 2033 AUSTRALIA		Sponsoring Organization Name & Address: N.S.W. State Pollution Control Commission G.P.O. Box 4036, SYDNEY, NSW, 2001 AUSTRALIA.
Principal Investigator(s): Associate Professor A. Lawrence Mrs. M.A. Burgess		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: <u>X</u> ) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(\$6,000)</u> Comments: \$6,929
Start Date: <u>1977</u> Completion Date: Estimated: _____ Actual: <u>1978</u>		
PROJECT OBJECTIVE: To develop a realistic prediction method for the shielding provided by rows of buildings.		
PROJECT DESCRIPTION: Simultaneous calibrated recordings of road traffic noise were made at up to four microphone locations. A reference location was usually chosen near the road and the other microphones were placed at various distances from the road either with line-of-sight or shielded by buildings or fences. Comprehensive traffic flow and composition data were also recorded. Later analysis provided attenuation figures. Results were compared with standard prediction methods.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  The United Kingdom Department of the Environment method gives a reasonably accurate prediction of the attenuation by shielding in fairly simple situations although it consistently underpredicts $L_p$ levels measured close to the road. The shielding provided by a building is underpredicted, thus the levels at the rear facade are less than predicted. Significant variations in the attenuation measured for individual vehicles under nominally identical conditions warrant further investigation.		
AVAILABLE PUBLICATIONS (of research findings): Lawrence, Anita & Burgess, Marion "Field Measurement of Road Traffic Noise Shielding Provided by Buildings and Building Elements" 1978 Report to NSW SPCC		
Lawrence, Anita & Burgess, Marion "Measurement of Traffic Noise Shielding Provided by Buildings" Applied Acoustics 13 pp 211-225, 1980		

Refer responses in English, or accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u> COUNTRY: <u>AUSTRALIA</u>
PROJECT TITLE: <u>EVALUATION OF TRAFFIC NOISE PREDICTION TECHNIQUES</u>		
Performing Organization Name & Address: AUSTRALIAN ROAD RESEARCH BOARD, 500 BURWOOD HIGHWAY, VERMONT SOUTH, VICTORIA, 3133, AUSTRALIA.		Sponsoring Organization Name & Address: AUSTRALIAN ROAD RESEARCH BOARD, P.O. BOX 156(BAG 4), NUNAWADING, VICTORIA, 3131, AUSTRALIA.
Principal Investigator(s):  STEPHEN E. SAMUELS		Annual Funding: (Check One: Fiscal Yr: <input checked="" type="checkbox"/> Calendar Yr: <input type="checkbox"/> 1978: _____ 1980: <u>(KAS\$28)</u> 1979: _____ 1981: _____ OR: _____ \$32,337 Total Funding Amount: _____ Comments: New project commenced June 1980. Cost details of preliminary project July 78 - June 80 not available.
Start Date: <u>JULY 1978</u> Completion Date: Estimated: <u>JUNE 1983</u> Actual: _____		
PROJECT OBJECTIVE: To evaluate and modify where necessary several existing traffic prediction models for Australian conditions.		
PROJECT DESCRIPTION: Australia does not yet have a road traffic noise prediction method which caters for the variety of traffic, road and other relevant conditions in the country. In the search for such a method, this project is evaluating several such overseas methods.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): In conjunction with Australian State Road Authorities, an extensive data base of traffic noise has been established. A methodology for the evaluation has been created and an initial evaluation of the U.K. Dept. of Environment method made. This method gave a mean overprediction in L10(18 hour) of 1.4dB(A) with a standard deviation of 2.3dB(A). Methods from Europe and USA will be evaluated shortly.		
AVAILABLE PUBLICATIONS (of research findings): SAMUELS, S.E. (1978). Evaluation of noise prediction techniques - preliminary appraisal of existing data base. ARRB Internal Report AIR 818-1.		

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Austria

**PROJECT TITLE:**

Effects of Traffic Control Measures on Highway Noise.

Performing Organization Name & Address:  
Dipl.-Ing. Dr. techn. Bernd Gabriel  
Anton Langer-Gasse 23/111/11, A-1130 Vienna,  
Austria

Sponsoring Organization Name & Address:  
Bundesministerium fuer Bauten und Technik  
(Dept. for Building and Technology)  
Stubenring 1, A-1011 Vienna, Austria

**Principal Investigator(s):**

Gabriel, B.

**Annual Funding:**

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: 1979

Completion Date: Estimated: 1980

Actual: Completed

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

**PROJECT OBJECTIVE:**

Model for prediction of road traffic noise

**PROJECT DESCRIPTION:** This project builds a framework model for determination and prediction of noise emitted by road traffic. The parameters of the traffic flow were used as input values. In analogy to regression analysis, the equivalent continuous sound level was defined as a function of the variables "kinetic energy of the traffic flow" and "traffic mix". With reference to the laws of hydrodynamics, the model draws upon the notion of motion not only for describing the traffic flow but also as a basis of the noise emission. This model is called "energy model" and it is supported and quantitatively supplemented by a series of measurements.

**SUMMARY OF FINDINGS (if project completed):** The effect of traffic control measures and road design on traffic flow parameters and noise can be evaluated with this model. The domain of useability of this energy model is not confined to stable traffic flow, but also unstable traffic flow. Thus it is possible to answer the question of what changes in noise level might result with changes in the timing or duration of application of traffic control measures, compared with noise from free flowing traffic. The rise in noise level in connection with signal-regulated intersections will be particularly studied. Using the measurement results, a relationship will be derived between noise level and the number of cars lined up at the signal. This will enable the evaluation of the influence of alternative strategies of signal arrangements for maximizing traffic flow on the noise emissions level.

**AVAILABLE PUBLICATIONS (of research findings):**

Gabriel, Bernd: Die Auswirkung verkehrsregelnder und verkehrsbeeinflussender Massnahmen auf die Laermmissionen des Strassenverkehrs. Published in "Schriftenreihe Strassenforschung", Heft 143, Ed: Bundesministerium f. Bauten und Technik, Vienna, 1980.

Translated in part from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Austria

**PROJECT TITLE:**

Comparing Study on Noise Propagation Models and Models to Compute Traffic Noise.

**Performing Organization Name & Address:**

Institut fuer Strassenbau und Verkehrs-  
wesen der Technischen Universitat Wien  
Gusshausstrasse 30  
A-1040 Vienna

**Sponsoring Organization Name & Address:**

Fonds zur Foerderung der wissenschaftlichen  
Forschung Garnisongasse 7/20  
A-1090 Vienna

**Principal Investigator(s):**

Univ. Prof. Dipl. - Ing. Dr. J.R. DORFWIRTH  
Dipl.-Ing. Dr. W. KOVACIC

**Annual Funding:**

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

**Start Date:** \_\_\_\_\_

**Completion Date: Estimated:** \_\_\_\_\_

**Actual:** \_\_\_\_\_

**OR:**

**Total Funding Amount: (oeS 115,420)**

**Comments:** \$7,652

**PROJECT OBJECTIVE:**

Noise propagation models for computers

**PROJECT DESCRIPTION:**

By the aid of an existing computer model for noise propagation considering free propagation, reflection, diffraction over and around obstacles or barriers the aim is to find the bounds for using such models, to compare the results of the computation with results of physical acoustic models in scale up to 1:64 and to find input parameters for the computer model (e.g. reflection coefficients)

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

The computation of a real noise propagation situation is finished, the measurement of the real noise values will start in the spring 1981.

**AVAILABLE PUBLICATIONS (of research findings):**

Report on Kolloquium aus Verkehrsplanung und Verkehrstechnik "Strassenverkehr und Umweltschutz", December 1, 1978, Technical University of Vienna.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Austria

PROJECT TITLE: MODEL 77 Computer Model for Noise Propagation Studies Applicability  
and Comparison with Other Noise Propagation Models

Performing Organization Name & Address:  
Institut fuer Strassenbau und Verkehrswesen  
der Technischen Universitaet Wien  
Gusshausstrasse 30  
A-1040 Vienna, Austria

Sponsoring Organization Name & Address:  
Technical University of Vienna  
Karlplatz 13  
A-1040 Vienna, Austria

Principal Investigator(s):  
Univ. Prof. Dipl.-Ing. Dr. J.R. DORFWIRTH  
Dipl.-Ing. Dr. Werner KOVACIC

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: December 1980  
Completion Date: Estimated: Summer 1981  
Actual:                     

OR:  
Total Funding Amount: 0  
Comments: Scientific research within the  
framework of the University

PROJECT OBJECTIVE:

MODEL 77 Computer Model for Noise Propagation Studies by Prof. Erick J. Rathe, Swiss  
Federal Institute of Technology

PROJECT DESCRIPTION:

The well prepared Computer Model MODEL 77 was installed at CYBER 170-computer of the  
Technical University of Vienna and will be tested for several noise propagation  
situations including road traffic and railway noise. The aim is to get an instrument  
for environmental impact studies with high accuracy in computing traffic noise.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Test data prepared by the model author were processed, the results were very  
satisfactory. A real propagation situation is prepared and will be processed  
soon.

AVAILABLE PUBLICATIONS (of research findings):

MODEL 77 Computer Model for Noise Propagation Studies by E.J. Rathe, Russikon  
Published by the Federal Office for Environmental Protection, June 1980



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Austria

PROJECT TITLE: NOIZOP Community Noise Countermeasures Cost-Effectiveness Analysis  
Applicability and Attempt to Include Other Noise Propagation Models

Performing Organization Name & Address:  
Institut fuer Strassenbau und Verkehrswesen  
der Technischen Universitaet Wien  
Gusshausstrasse 30, A-1040 Vienna  
Austria

Sponsoring Organization Name & Address:  
Technical University of Vienna  
Karlsplatz 13  
A-1040 Vienna, Austria

Principal Investigator(s):  
Dipl.-Ing., Dr. Werner Kovacic

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)  
1978: \_\_\_\_\_ 1980: \_\_\_\_\_  
1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: Spring 1981  
Completion Date: Estimated: Summer 1981  
Actual: \_\_\_\_\_

OR:  
Total Funding Amount: \_\_\_\_\_  
Comments: Scientific research within the  
framework of the university

PROJECT OBJECTIVE:  
NOIZOP Computer model for community noise countermeasures cost-effectiveness analysis.

PROJECT DESCRIPTION:

The well prepared computer model NOIZOP will be installed at CYBER 170-computer of the Technical University of Vienna and will be tested for several noise propagation and countermeasure situations including road traffic, railway and aircraft noise. An adaptation for Austrian conditions will be attempted.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

No experiences now, but soon processing of test data.

AVAILABLE PUBLICATIONS (of research findings):

Wyle Research Report WCR 75-2 Community Noise Countermeasures Cost-effectiveness Analysis by Robt. Rackl, Louis Sutherland, Jack Swing.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Austria

PROJECT TITLE: Noise nuisance on roads. Effectiveness and costs of noise protection  
measures - documents for planning

Performing Organization Name & Address:

Testing Institute for Health and Sound  
Technology  
Wachringstrasse 59, A-1090 Vienna,  
Austria

Sponsoring Organization Name & Address:

Dept. of Building and Technology  
Stubenring 1, A-1011 Vienna, Austria

Principal Investigator(s):

Lang, J/Stani, M

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1975

Completion Date: Estimated: 1977

Actual: active

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE:

Assessment of generally accepted limit values for traffic noise

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

In the program of the research projects it is planned to question a representative sample of the Austrian population on their subjective assessment of road traffic noise and the value of noise protection measures. This information will be used to arrive at generally accepted limit values for traffic noise. Detailed working documents for determining traffic noise during the planning phase of roads, taking account of various influences, are to be collected. Noise protection measures, and in particular noise barriers, are to be developed in cooperation with Austrian manufactures.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Austria

PROJECT TITLE:  
Protection against road traffic noise

Performing Organization Name & Address:  
University of Technology  
Institute for Machinery Components  
Getreidemarkt 9, A-1060 Vienna, Austria

Sponsoring Organization Name & Address:  
Bundesministerium fuer Gesundheit und  
Umweltschutz  
(Dept. for Health and Environmental  
Protection)  
Stubenring 1, A-1011 Vienna, Austria

Principal Investigator(s):  
Stasch, B  
Kazda, H

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: 1975  
Completion Date: Estimated: completed  
Actual:                     

OR:  
Total Funding Amount: (AS 600,000.--)  
Comments: \$39,780

PROJECT OBJECTIVE: Evaluation of conventional road traffic noise protection measures, proposals for effective road traffic noise reduction

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Noise protection measures were classified into primary measures associated with the vehicle (manifold and exhaust noise, low-noise design, tyre rolling noise, road surface noise) and secondary measures (noise protection walls, green areas, windows and doors, traffic control measures). Advantages and disadvantages were indicated. It was established that an effective reduction of road traffic noise can only be brought about from the source - driving noise, rolling noise, interaction between the vehicle and the road.

AVAILABLE PUBLICATIONS (of research findings): Kazda, H: Strassenverkehrs laermschutz No.2, 45p. 1976; published in "Beitraege Umweltschutz, Lebensmittelangelegenheiten und Veterinaerverwaltung". Bundesministerium fuer Gesundheit und Umweltschutz. (Editor).



(We prefer responses in English, but can accept material in other languages.)		TOPIC: Highway Model Analysis and Prediction
		COUNTRY: Canada
PROJECT TITLE: Noise Prediction Methods, Theory and Field Testing		
Performing Organization Name & Address: Highway Environment Research & Development Branch Ministry of Transportation & Communications 1201 Wilson Avenue Downsview, Ontario, Canada M3M 1J8		Sponsoring Organization Name & Address: Same as performing organization
Principal Investigator(s): F. W. Jung J. J. Hajek		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____ 1978: _____ 1980: \$25,000 1979: _____ 1981: \$25,000 OR: Total Funding Amount: \$50,000 Comments:
Start Date: January 1980 Completion Date: Estimated: January 1981 Actual: _____		
PROJECT OBJECTIVE: Include the effect of parallel barriers into highway noise prediction. Verify and, if necessary, adjust FHWA Prediction Model to reflect Ontario's conditions.		
PROJECT DESCRIPTION: Field noise measurements are compared with calculated data. For parallel barriers, geometrical acoustics utilizing image sources to account for reflections is being used.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings): "Effect of Parallel Highway Noise Barriers", J. J. Hajek, Proceedings of Inter-Noise 80, Miami, Florida, December 1980, pp 595-598. "Simplified Free Field Highway Traffic Noise Prediction", F.W. Jung, R&D Division, Ontario Ministry of Transportation & Communications, Report 80-AC-02, April 1980. "Performance of Parallel Highway Noise Barriers, Yonge Street to Bayview Avenue, Toronto" J. J. Hajek, R&D Division, Ont. Ministry of Transportation & Communications, Rep. 80-AC-01,		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Canada</u>
PROJECT TITLE: Assessment of Guidelines for Sound Level Limits in Residential Areas.		
Performing Organization Name & Address: McMaster University, 1280 Main Street West, Hamilton, Ontario, L8S 4K1, Canada.		Sponsoring Organization Name & Address: Noise and Vibration Section, Division of Building Research, National Research Council, Ottawa, Ontario, K1A 0R6. Canada
Principal Investigator(s): Dr. F.L. Hall Dr. S.M. Taylor S.E. Birnie		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u> OR: Total Funding Amount: <u>\$10,000</u> Comments:
Start Date: <u>September, 1979.</u>		
Completion Date: Estimated: <u>                    </u> Actual: <u>February, 1980.</u>		
PROJECT OBJECTIVE: To quantify the magnitude of the differences in response to aircraft and road traffic noise, indoors and outdoors.		
PROJECT DESCRIPTION: The data used was from 673 interviews at 56 sites with a variety of aircraft and road noise levels. Estimates of the indoor noise levels were made from information collected about the physical characteristics of the dwelling unit. The indoor and outdoor response variables were examined separately against the appropriate noise levels, and compared for aircraft and road traffic noise.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): Preliminary analysis showed that both indoor and outdoor effects of noise are important contributors to overall annoyance. When aircraft and road traffic responses were compared, both the indoor and outdoor analyses strongly supported the hypothesis that aircraft noise elicits a higher response than road traffic noise (for the same 24-hour Leq). The magnitude of the difference in response varied with the response variable being examined, and was slightly different for the indoor and outdoor case.		
AVAILABLE PUBLICATIONS (of research findings): Hall, F.L., Birnie, S.E., Taylor, S.M. (1980) Assessment of Guidelines for sound level limits in residential areas. Report submitted to the Noise and Vibration Section, Division of Building Research, National Research Council.		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction

COUNTRY: Denmark

PROJECT TITLE:  
Road Traffic Noise Attenuation in Built Up Residential Areas

Performing Organization Name & Address:  
The Acoustical Laboratory  
The Danish Academy of Technical Sciences  
DK-2800 Lyngby, Build. 352, Denmark

Sponsoring Organization Name & Address:  
Vejdirektoratet  
Vejdatalaboratoriet  
Stationsalleen 42  
DK-2730 Herlev, Denmark

Principal Investigator(s):  
Jørgen Kragh  
Bent Andersen

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)  
1978: \_\_\_\_\_ 1980: \_\_\_\_\_  
1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_  
Completion Date: Estimated: \_\_\_\_\_  
Actual: \_\_\_\_\_

OR:  
Total Funding Amount: \_\_\_\_\_  
Comments: (D.kr. 150,000)  
\$22,545

PROJECT OBJECTIVE: To establish a correction term for extra attenuation (if any) due  
to detached housing to supplement existing prediction procedure.

PROJECT DESCRIPTION:  $L_{eq}$  measurements were carried out at appr. 15 sites along roads with  
heavy traffic during autumn 1979 and summer 1980. Measuring points were situated in  
a 10 x 10 m grid, typically 30 m wide and 200 m long (perpendicular to road). Micro-  
phone height 1.5 m. Intergration time: 2 min. pr. microphones position.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Extra Attenuation - in excess of  
a) geometrical spreading and  
b) geometrical + ground attenuation according to the existing Scandinavian prediction  
procedure  
- have been determined.

Data processing not finished yet.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: France

PROJECT TITLE: Cost-Benefit Analysis of the Long Term Transportation Noise Abatement Policies.

Performing Organization Name & Address:  
Institute of Transport Research,  
Center for the Evolution and Research  
on Nuisances and Energy  
109 Avenue Salivior Allecuile  
69672 BRON, France

Sponsoring Organization Name & Address:  
Ministry of Environment and Life  
Quality - MER

Principal Investigator(s):

J. Lambert

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \$22,920 (115,000Fr)

1979: \_\_\_\_\_ (100,000Fr)

1979: \_\_\_\_\_ 1981: \$42,849

Start Date: July 1980

Completion Date: Estimated: 4/1/1982

Actual: \_\_\_\_\_

OR:

Total Funding Amount: (215,000Fr)

Comments: \$42,849

PROJECT OBJECTIVE: To elaborate and assess transportation noise abatement policies within the scope of long-term noise economic scenarios.

PROJECT DESCRIPTION: Phase 1 - Elaboration of the strategies (on vehicles - traffic management - road - buildings) and policies. Elaboration of the policies: cost-benefit and cost effectiveness analysis. Choice of the "optimal policy" for each scenario. Phase 2 - Implementation tools: regulations - changes. Implementation difficulties - financial, institutional and social constraints.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

For this research we used a model of noise exposure built in a recent study entitled: "Traffic Noise in Year 2000 in the French towns". (Feb. 1980)

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Statistical Fundamental Theory Suitable for the Observed Level Distribution of Noise and Vibration with Digital Levels and Its Experiment</u>		
Performing Organization Name & Address: Faculty of Engineering, Hiroshima University 3-8-2, Senda-machi, Naka-ku, Hiroshima City 730 Japan		Sponsoring Organization Name & Address:  NONE
Principal Investigator(s): Mitsuo OHTA Masafumi NISHIMURA and Hirofumi IWASHIGE		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    0    </u> 1980: <u>    0    </u> 1979: <u>    0    </u> 1981: <u>    0    </u> OR: Total Funding Amount: <u>    0    </u>
Start Date: <u>                    </u> Completion Date: Estimated: <u>                    </u> Actual: <u>Feb.16, 1976</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: We give a theoretical consideration of the statistical treatment of the level distribution of random noise or vibration suitable for the case where the real data are given in the form of digital levels and finite numbers.		
PROJECT DESCRIPTION: Some trials of the statistical treatment of the continuous level fluctuation of arbitrary random noise or vibration have been reported up to the present. However, recently the actual noise level data has very often been measured in the form of digital levels at finite discrete times. Furthermore, for this digital level data, the use of digital computer is essential for various statistical evaluations and the extraction of statistical information about the random noise.		
SUMMARY OF FINDINGS (if project completed): <u>STATUS REPORT (if in progress):</u> Compared with theories regarding a continuous level distribution, the 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 $P_x(x)$ can be used directly keeping its crude numerical form, i.e. there is no necessity for first approximating $P_x(x)$ with an appropriate function form. 2) When the difference operation is actually done in practice, the above infinite-series-type expansion expression is exactly truncated with a finite number of terms. 3) In the special case of taking $P_x(x)$ as a Poisson distribution, the above theoretical result agrees with the well known Charlier B type expansion series. 4) As another special case of letting the level width tend to 0, the above theory includes the well known expansion series distribution in the continuous level form.		
AVAILABLE PUBLICATIONS (of research findings): Acoustics Letters, Vol.1, pp.28-30, (1978).		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction

COUNTRY: Japan

PROJECT TITLE:

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

Performing Organization Name & Address:

Noise Section  
Research Institute for Environmental  
Protection, Tokyo Metropolitan  
Government, 2-7-1, Yurakucho, Chiyoda-ku,  
Tokyo 100, JAPAN

Sponsoring Organization Name & Address:

Principal Investigator(s):

M. Kobayashi  
I. Aoki  
N. Imazumi

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

(¥ 2,225,000)

1978: 810,631

1980: \_\_\_\_\_

1979: \_\_\_\_\_

1981: \_\_\_\_\_

Start Date: April 1, 1976

Completion Date: Estimated: \_\_\_\_\_

Actual: March 31, 1979

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE: Study on calculation of noise emitted by vehicles and noise control  
by changing driving condition.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A new trial for statistical estimation of road traffic noise in an arbitrary sound propagation environment by use of Stratonovich's viewpoint for random points system.</u>		
Performing Organization Name & Address: Faculty of Engineering, Hiroshima University.  3-8-2, Senda-machi, Naka-ku, Hiroshima city 730, Japan.		Sponsoring Organization Name & Address:  None.
Principal Investigator(s): Shizuma YAMAGUCHI, Mitsuo ONTA and Kazutatsu HATAKEYAMA		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    0    </u> 1980: <u>    0    </u> 1979: <u>    0    </u> 1981: <u>    0    </u> OR: Total Funding Amount: <u>    0    </u>
Start Date: <u>                    </u> Completion Date: Estimated: <u>                    </u> Actual: <u>Nov. 27, 1978.</u>		Comments: This work is based on regular expense of the national school of Japan.
PROJECT OBJECTIVE: The object of this work is to estimate statistically the road traffic noise in an arbitrary sound propagation environment from the unified analytical viewpoint.		
PROJECT DESCRIPTION: Up to now, many approaches for estimating the statistics of road traffic noise have been carried out by the introduction of several models, e.g., an equally-spaced vehicles model, an exponentially-distributed vehicles model and an Erlang distribution type model in a simplified sound propagation environment such as a free sound field. However, in several studies based particularly on the latest Erlang distribution type model, only the first and second order moments of the sound intensity fluctuation which can be derived from the statistical information on the location of mere one and/or two vehicles are taken individually into consideration. On the other hand, the higher order statistical properties of traffic noise are rather important in order to investigate whole shape of the noise levels.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): In this paper, our main interest is devoted to considering quantitatively the relation between the multi-dimensional correlation properties of the sound intensity and the higher order information on the vehicles flow by use of Stratonovich's stochastic theory for a random points system. Furthermore, the relation between our theoretical result and well-known previous studies is discussed with experimental confirmation for several lower order moments.		
AVAILABLE PUBLICATIONS (of research findings): Acoustical Society of America and Acoustical Society of Japan Joint Meeting (1978).		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Systematical Method for Estimating the Change of Noise Evaluation Index L<sub>x</sub> Caused by the Traffic Flow Control ( Theory and Experiment )</u>		
Performing Organization Name & Address:  Faculty of Engineering, Hiroshima University; 3-8-2, Senda-machi, Hiroshima City, 730 Japan		Sponsoring Organization Name & Address:  None.
Principal Investigator(s): Mitsuo Ohta Kazunori Nagai Kazutatsu Hatakeyama		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>February, 1979</u>		Comments: <u>This work is based on regular expenses of the national school of Japan.</u>
PROJECT OBJECTIVE: <u>The objective of this work is the establishment of the unified method of estimating the noise evaluation index L<sub>x</sub> ( X = 5, 10, ... ) after various traffic flow control are carried out.</u>		
PROJECT DESCRIPTION:  <u>There does not seem to be any work which studied the relation between the traffic flow controls and their effects on the noise evaluation index L<sub>x</sub> thus far. So, in this work, an unified method of estimating the noise evaluation index L<sub>x</sub> after various traffic flow control are carried out.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): <u>In this paper, a new unified method for estimating the representative noise evaluation index L<sub>x</sub> ( X = 5, 10, ... ) of the road traffic noise after various traffic flow controls are carried out to maintain the quiet environment ( e.g., near the hospitals and schools ) in the large cities, has been derived on the basis of the observed evaluation index value L<sub>x</sub> before practicing traffic flow control. More concretely, the above method has been derived from two types of typically different viewpoints in the following: (i) A direct way of evaluating the effect of the traffic flow control on the noise evaluation has been given under the first introduction of the equivalent model on road traffic noise reflecting explicitly an effect of the change of traffic flow owing to the traffic flow control. Then, the change of noise level distribution has been quantitatively estimated by use of this model. (ii) An indirect way of evaluating the effect of the traffic flow control on the noise evaluation has been given under the first introduction of a unified expression of the probability density and/or cumulative distribution functions of traffic noise, in the form of orthogonal and/or non-orthogonal expansion series reflecting concretely the change of the traffic noise based on traffic flow control in each coefficient. Furthermore, by applying the results of this theory to the traffic noise data actually observed in Hiroshima City, the partial legitimacy of this method has also been experimentally confirmed.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>The Journal of the Acoustical Society of Japan, Vol.35, No.9, pp.477-485 ( 1979 )</u>		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: A Statistical Analysis of the Mutual Relation between Two-Component Random Noises Based on the Information of the Composite Probability Distribution.		
Performing Organization Name & Address: * Faculty of Engineering, Hiroshima University; 3-8-2, Senda-machi, Hiroshima City, 730 Japan ** Faculty of Engineering, Fukui University; 3-9-1, Bunkyo-cho, Fukui, 910 Japan		Sponsoring Organization Name & Address:  None.
Principal Investigator(s): * Kazunori Nagai * Mitsuo Ohta ** Takuya Koizumi		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>April, 1980</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: The objective of this work is the proposition of the statistical analysis method of the mutual relation between two-component noises in an environmental noise system.		
PROJECT DESCRIPTION: A methodological study by statistical analysis of the mutual relation between two-component noises in an environmental noise system is theoretically proposed with the use of two identification methods of parameters ( based on the noise evaluation index $L_x$ and Kullback's divergence idea ). The validity of the theoretical procedure is discussed from an experimental viewpoint both by digital simulation and also by application to actual noise data.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): Up to now, environmental noise data observed using a sound level meter under a standardized procedure have been used very often for evaluation and/or regulation of the noise effect. However, it is practically important in the light of the prediction and/or control problems of environmental noise system to use composite noise data for the purpose of identifying the internal mechanism related to the mutual relation between component noises ( such as direct and reflective sound, objective and other noises, and road traffic and surrounding background noises.) In this paper, from the above practical point of view, a methodological study using statistical analysis of the mutual relationship between two-component noises in an environmental noise system is first discussed theoretically with two different methods: (i) a method using the noise evaluation index $L_x$ ( $X = 5, 10, \dots$ ) ( i.e. (100-X) percentile of noise level distribution form ); and (ii) a method using the idea of Kullback's divergence directly connected with whole shape of the level distribution form. Next, the legitimacy of these two methods is confirmed experimentally, not only by a digital simulation technique but also by applying them to actual noise data observed in Hiroshima City.		
AVAILABLE PUBLICATIONS (of research findings):  Acoustics letters, Vol.3, No.7, pp.147-148 ( 1980 )		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>Grouping Effect of Normative Road Traffic Model with Equally Spaced Vehicles under Two Typical Sound Propagation Environments on the Noise Prediction Problem.</u>		
Performing Organization Name & Address: * Faculty of Engineering, Hiroshima University; 3-8-2, Senda-machi, Hiroshima City, 730 Japan ** Hiroshima Mercantile Marine College		Sponsoring Organization Name & Address:  None.
Principal Investigator(s): * Mitsuo Ohta ** Kazumasa Nakamura		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>August 1978</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: The objective of this work is to improve the prediction method of road traffic noise.		
PROJECT DESCRIPTION:  In this work the prediction method of road traffic noise taking the pseudo-diffuse sound field and the grouping pattern in the actual traffic flow into consideration is newly proposed.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  In this paper, two basic improvements on the prediction method of road traffic noise have been made for the well-known equally spaced vehicles model in a free sound field. One is based on the standard model of typical city environment with skyscrapers which has the exponential type propagation characteristics of the pseudo-diffuse sound field, since we considered that it is essentially unreasonable to apply the above well-known model in a free sound field to urban road traffic noise. The other is based on a traffic flow model in which a grouping effect of vehicles has been taken into consideration on the standard traffic flow of equally spaced vehicles model, under two typically idealized sound propagation fields corresponding to rural districts and urban areas. Through the above improvements based on newly introduced ideal models of the sound propagation fields and the grouping pattern in traffic flow, we have been able to get more precise information on the predicted fluctuation pattern of road traffic noise though it still amounts to no more than a fundamental viewpoint for the actual road traffic noise.		
AVAILABLE PUBLICATIONS (of research findings):  The Journal of the Acoustical Society of Japan, Vol.35, No.10, pp.521-528 ( 1979 )		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: Investigation and study on highway noise prediction.		
Performing Organization Name & Address: Traffic Environment Division, Road Department, Public Works Research Institute Asahi 1, Toyosato-Cho, TSUKUBA-GUN, IBARAKI-KEN 305, JAPAN		Sponsoring Organization Name & Address: Ministry of Construction 1-3 KASUMIGASEKI 2, CHIYODAKU, TOKYO, JAPAN
Principal Investigator(s): Kozo KANEYASU (Director of Road Department) Yoshio ADACHI (Head of Traffic Environment Division) Hiroshi NONAKA (Traffic Environment Division)		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____) 1978: _____ 1980: <u>(150000)</u> 1979: <u>(160000)</u> 1981: <u>9716</u> OR: \$764
Start Date: <u>April 1979</u>		Total Funding Amount: _____
Completion Date: Estimated: <u>1982</u>		Comments:
Actual: _____		
PROJECT OBJECTIVE: To get a practical prediction method and effective countermeasures for highway traffic noise.		
PROJECT DESCRIPTION: <ul style="list-style-type: none"> <li>• Study on a prediction method of road traffic noise in urban area.</li> <li>• Investigation on sound power levels of vehicles.</li> <li>• Investigations on highway noise propagation in long distance.</li> </ul>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings): Noise propagation from a slit of two buildings along a street. Annual Meeting of Japan Society of Civil Engineering 1980.9. Experiment on noise distribution around a tunnel portal. Civil Engineering Journal Vol. 21, No. 2, 1979.2.		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: A unified statistical study of road traffic noise with many types of vehicles by use of an Erlang distribution model.		
Performing Organization Name & Address: Faculty of Engineering, Hiroshima University 3-8-2, Senda-machi, Naka-ku, Hiroshima City 730 Japan		Sponsoring Organization Name & Address:  None
Principal Investigator(s): Masafumi NISHIMURA, Mitsuo OHTA and Shizuma YAMAGUCHI		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>Nov. 27, 1978</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: The objective of this work is to predict the statistical properties of road traffic noise.		
PROJECT DESCRIPTION: As is wellknown, on a traffic noise problem approached with a systematic background of research, the exponentially distributed and the equally spaced vehicles models are very often used. The two typical models correspond, respectively, to two idealized situations of road traffic flow, that is, a probabilistic mode with perfect freedom of flow and a deterministic mode with equally restricted vehicle interval. But it admits without doubt that the actual mode of road traffic flow is somewhere between these two idealized situations. This fact means that the generalized model of traffic flowing with an Erlang distribution should be used for the actual traffic flow, since an Erlang distribution model can contain the above two situations as specialized cases.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): In this study, at first we consider the road traffic noise produced by the generalized traffic flow whose interval between two vehicles is distributed by an Erlang distribution and types of vehicles are allotted according to a multinomial distribution. After deriving the moment generating function of the road traffic noise theoretically, the correctness of the theoretical result is confirmed about several moments by use of the digital simulation technique.		
AVAILABLE PUBLICATIONS (of research findings): Acoustical Society of America and Acoustical Society of Japan Joint Meeting (1978).		



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Prediction Problem of Road Traffic Noise owing to a General Traffic Flow from a Static Viewpoint.</u>		
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 Akira Ikuta Shizuma Yamaguchi		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>January, 1979</u>		Comments: <u>This work is based on regular expenses of the national school of Japan.</u>
PROJECT OBJECTIVE: <u>The objective of this work is to predict the statistical properties of road traffic noise.</u>		
PROJECT DESCRIPTION: <u>Up to now, many approaches for estimating the noise intensity distribution function have been carried out in an idealized case with an exponentially-distributed vehicles model. However, an actual road traffic flow shows too complex a pattern to be exactly explained by the above simplified model. In our paper, we have focused on the prediction problem of distribution form of road traffic noise fluctuation in the near sound field which is important from the viewpoint of the noise environmental pollution problem.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <u>In this paper, we theoretically have derived an explicit expression of a probability distribution function of road traffic noise and several types of its simplified expression form applicable to the arbitrary road traffic flow containing the idealized traffic model as a special case. Next, we have discussed the relations between theoretical results and well-known previous studies, and shown that our theory includes the well-known previous results as special cases. Finally, we have applied our theory to actual road traffic noise observed in Hiroshima city for purpose of confirming experimentally the legitimacy of our theory.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>The Journal of the Acoustical Society of Japan, Vol. 35, No. 7, pp. 370-379 (1979)</u>		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>Statistical Estimation of Road Traffic Noise in an Arbitrary Sound Propagation Environment by Use of Stratonovich's Theory for a Random Points System.</u>		
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 Shizuma Yamaguchi Akira Ikuta		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>December, 1978</u>		Comments: <u>This work is based on regular expenses of the national school of Japan.</u>
PROJECT OBJECTIVE: <u>The objective of this work is to discuss systematically and generally the statistical properties of sound intensity fluctuation for road traffic noise in arbitrary propagation conditions.</u>		
PROJECT DESCRIPTION: <u>In the previous models for the prediction of road traffic noise, only the statistical properties related to the location of merely one and/or two vehicles (e.g., the distributions of the positions of the vehicles and of the distance between two arbitrary vehicles moving in the same direction) are considered as the fundamental statistical information. The other higher order information on complex multi-dimensional probabilistic properties being not considered at all. Our paper is devoted to considering the relationships between the multi-dimensional correlation properties of the sound intensity and the higher order information on the flow of vehicles by use of Stratonovich's stochastic theory for a random points system.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <u>In this paper, the relation between the statistical properties of road traffic noise intensity and the higher order statistical information on the grouping of many vehicles are discussed in detail. In the near sound field (the most noisy and important field in the environmental noise problem), especially, the grouping patterns of vehicle flow become the dominant factor in the fluctuation form of road traffic noise. By introducing Stratonovich's stochastic theory for a random points system, a statistical evaluation method universally applicable to arbitrary road traffic flow in arbitrary sound propagation conditions is theoretically derived. The relations between the theoretical results and those of well-known previous studies are discussed for the purpose of partial confirmation of the legitimacy of the theory.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>Journal of Sound and Vibration, Vol. 69 (2), pp. 275-284 (1980)</u>		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>Systematical Approach to the Excess Attenuation Effect on the Statistical Evaluation of Road Traffic Noise.</u>		
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 Shizuma Yamaguchi Akira Ikuta		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>October, 1979</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: The objective of this work is to consider systematically the exact statistical treatment on the noise fluctuation by taking the frequency characteristics of the excess <u>attenuation factor and of the acoustic power of vehicles into consideration.</u>		
PROJECT DESCRIPTION: As is well-known, the frequency characteristics of the acoustic power generated from individual flowing vehicles and of the excess attenuation factor have a great influence on the noise fluctuation form. So, it seems to be very important to consider exactly the effect of excess attenuation factor on the noise distribution form. From the above point of view, in our paper, we have paid our attention to the noise evaluation problem of road traffic noise under an arbitrary sound propagation environment including an arbitrary excess attenuation factor after generalizing a well-known propagation model in the previous paper.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  In this paper, by paying our attention to the systematical introduction of frequency characteristics of excess attenuation to the theory, we have derived a unified statistical evaluation method with respect to the road traffic noise under arbitrary sound propagation environment. More concretely, with the aid of the unified expression of the probability distribution function associated with the noise intensity fluctuation, from which any statistical evaluation quantity ( $L_{eq}$ and/or $L_x$ ( $x=10, 50, 90, \dots$ )) of the road traffic noise can be derived in the unified form of expression, we have discussed the difference between the statistical evaluation levels of road traffic noise in two cases with an effect of the excess attenuation factor and without the excess attenuation effect, under the assumption of an exponentially-distributed vehicles model. Finally, we have discussed theoretically and experimentally a new trial of simplified methods for noise evaluation by use of digital simulation technique.		
AVAILABLE PUBLICATIONS (of research findings):  Memoirs of the Faculty of Engineering Hiroshima University, Vol. 7, No. 2, pp. 1-7 (1980)		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Prediction for Level Probability of Random Noise with Quantitized Level ( Theory and Experiment )</u>		
Performing Organization Name & Address: Faculty of Engineering, Hiroshima University 3-8-2, Senda-machi, Naka-ku, Hiroshima City 730 Japan		Sponsoring Organization Name & Address:  NONE
Principal Investigator(s): Mitsuo OHTA and Seijiro HIROMITSU		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    0    </u> 1980: <u>    0    </u> 1979: <u>    0    </u> 1981: <u>    0    </u> OR: Total Funding Amount: <u>    0    </u>
Start Date: <u>                    </u> Completion Date: Estimated: <u>                    </u> Actual: <u>May 2, 1979</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: <u>A new trial to estimate the level distribution of the noise over a long time interval has especially been considered.</u>		
PROJECT DESCRIPTION: <u>A strictly stationary random noise seldom exists in practical random phenomena such as road traffic noise over a long time interval. Furthermore, noise data in a long time interval have recently been automatically measured in the form of quantitized digital amplitude level. Accordingly, in order to predict or estimate the statistics of the nonstationary noises, it will be necessary to find an advanced approach to data analysis by use of a digital computer.</u>		
SUMMARY OF FINDINGS (if project completed): <del>STATUS REPORT (if in progress):</del> In this study, with reference to the actual street noise, a new trial to estimate the level distribution of the noise over a long time interval has especially been considered on the basis of the local statistics of the noise fluctuation in a short time interval. It can also be shown that the present estimation procedure is much more suitable to the noise data observed in the form of quantitized levels and to any finite number of actual noise data. The validity of the proposed method has experimentally been confirmed by applying it to the street noise data observed in Hiroshima City.		
AVAILABLE PUBLICATIONS (of research findings): The Journal of the Acoustical Society of Japan (E), Vol.1, No.2, pp.107-111, ( 1980 ).		



We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Modal Analysis and Prediction  
COUNTRY: Norway

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  
forskningsråd,  
Munthesgt. 29, OSLO 2

Principal Investigator(s):  
  
Cand. real Kjell Gjaevenes  
covering. Sigurd Solberg  
Cand. sociol. Eystein Arntzen

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)  
1978: \_\_\_\_\_ 1980: \_\_\_\_\_  
1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: Jan. 1, 1976  
Completion Date: Estimated: July 1, 1981  
Actual: \_\_\_\_\_

OR: Total Funding Amount: \$141,449  
(NOK 770,000)  
Comments: Include external funding and  
internal contributions (perm. staff)

PROJECT OBJECTIVE: = Map the influence of different time-distributions (mainly  
on 24-h and week base) of traffic noise on peoples noise  
reaction

PROJECT DESCRIPTION: - Obtain a more well-defined basis for the choice 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

Social survey (500 respondents) and long-time measurement in areas with  
different time-distributions of road traffic. Observation of driving mode and  
noise emission from single vehicles in urban traffic flow. Measurements of  
facade insulation in typical dwellings.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):  
  
Practical work is completed. Final analysis is in progress. Final report  
(in Norwegian) will be completed during 1981. English reports on selected  
subjects are planned during 1981/82.

AVAILABLE PUBLICATIONS (of research findings): 8 working reports (in Norwegian),  
of these 2 contains preliminary findings: "Health condition and traffic  
noise" and "Field. measurements of sound insulation of windows in Oslo".  
The latter has summary in English.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>NORWAY</u>
PROJECT TITLE: TRAFFIC NOISE - CONTROL MEASUREMENTS.		
Performing Organization Name & Address: AKUSTISK LABORATORIUM ELAB  N-7034 TRONDHEIM-NTH NORWAY		Sponsoring Organization Name & Address: ELAB research fund (50%)  VEGDIREKTORATET (50%) GRENSEVEIEN 92 N-OSLO 6 NORWAY
Principal Investigator(s):  S.A. STOREHEIER		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____) 1978: _____ 1980: \$ 6000 1979: _____ 1981: \$ 10000 OR: Total Funding Amount: \$ 16000
Start Date: <u>APRIL 1980</u> Completion Date: Estimated: _____ Actual: <u>JUNE 1981</u>		Comments: (N.kr. 80.000,-) \$14,696
PROJECT OBJECTIVE: To investigate the variations in the attenuation of $L_{eqA}$ (road traffic noise) due to changes in meteorological and ground conditions. Comparisons with current prediction methods will be made.		
PROJECT DESCRIPTION: $L_{eqA}$ measurements are carried out at a site near a main roadway in a flat and open area. Two microphone positions, at reference distance 10 m and at 100 m, respectively, are used. Measurement of $L_{eqA}$ are made simultaneously. The measurement period lengths are made sufficient to minimize the statistical error in the source level estimate. The results will be evaluated in terms of $L_{eqA}$ attenuation and $L_{eqA}$ absolute levels.		
STATUS REPORT (if in progress):  The measurements continue to cover winter conditions at the site. The 25 measurements made mainly during summer conditions indicate a pronounced $L_{eqA}$ attenuation variation.		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: NORWAY

PROJECT TITLE:

ACOUSTIC SCALE MODEL FACILITY.

Performing Organization Name & Address:

AKUSTISK LABORATORIUM  
ELAB  
N-7034 TRONDHEIM-NTH  
NORWAY

Sponsoring Organization Name & Address:

VEGDIREKTORATET  
GRENSEVEIEN 92  
N-OSLO 6  
NORWAY

Principal Investigator(s):

J. ØYGARDEN  
S.A. STOREHEIER

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Start Date: JANUARY 1979

Completion Date: Estimated: APRIL 1981

Actual: \_\_\_\_\_

Comments:

(~ N.kr. 200,000 )  
\$36,740

PROJECT OBJECTIVE: To establish a basic acoustic scale model facility, including development of necessary automatic measurement and computational routines.

PROJECT DESCRIPTION: In order to investigate traffic noise propagation and/or evaluate effective noise reduction measures, a basic scale model facility is under development. The model source consists of a modified air jet of high efficiency. A model material simulating "soft" ground is found, considering a scale factor of 1:25. The measurement procedure is semi-automatic; the microphone has to be moved manually. However, a large number of measurements - suitably arranged in measurement sequences - can be made and the results stored in a computer. The data is stored as 1/3-octave bands of noise. The data evaluation procedure offers output flexibility. Real source spectra are simulated, the data presentation procedure provides results in terms of absolute noise levels, levels rel. "free field" or "insertion loss" data.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Project not yet finished. Facility to be used as a future "research tool".

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Sweden

PROJECT TITLE:

Computing Model for Road Traffic Noise

Performing Organization Name & Address:  
National Board of Physical Planning and  
Building  
  
Fack  
104 22 Stockholm 22  
Sweden

Sponsoring Organization Name & Address:  
Nordic Ministerial Council  
Postboks 1477 Vikta  
Oslo 1  
Norge

Principal Investigator(s):

Gosta Blucher

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: March 1976

Completion Date: Estimated:                     

Actual: Jan. 1979

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE: The project developed a computing model that will calculate the noise level emanating from vehicular traffic in several urban areas.

PROJECT DESCRIPTION: The model calculations are performed in five stages: basic value; geometrical attenuation; excess attenuation; facade attenuation; correction terms. In addition, certain simplifications are required. Final results are expressed in dBA.

SUMMARY OF FINDINGS (if project completed): By aid of the model, the equivalent noise level  
STATUS REPORT (if in progress): expressed in dBA emanating from vehicular  
traffic may be calculated for urban as well as rural areas. The model is intended to  
provide a correct mean value. The probability of a correct value depends on geometrical  
and meteorological conditions. The nomograms of the computing model facilitate a reading  
of 0.5 dBA. Final results expressed in dBA shall always be rounded off to a whole  
number.

AVAILABLE PUBLICATIONS (of research findings): "The Computing Model for Road Traffic Noise."  
Statens Planverk, Report NO. 48. ISBN 91-38-04657-1. Nordic Council of Ministers.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Sweden</u>
PROJECT TITLE: <u>Prediction and Visualization of Road Traffic Noise with Digitizer, Computer, CRT Screens and Electronic Plotter</u>		
Performing Organization Name & Address: Chalmers University of Technology Department of Highway Engineering S-412 96 GOETEBORG SWEDEN		Sponsoring Organization Name & Address: Chalmers Technical University S-412 96 GOETEBORG SWEDEN
Principal Investigator(s): G. Lannér		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: ( 25000 ) Comments: \$5,397
Start Date: <u>Oct. 1971</u>		
Completion Date: Estimated: <u>1981</u> Actual: _____		
PROJECT OBJECTIVE:		
PROJECT DESCRIPTION:		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): 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 CRTscreen. The acoustical consequences of changes in the road alignment or the environment can be studied easily.  A program for a quicker and more detailed coding of topographical data and construction data with a digitizer is now being developed.		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Switzerland</u>
PROJECT TITLE: <u>Calculation of Highway Noise with <math>L_{eq}</math> as Index</u>		
Performing Organization Name & Address:  EMPA <u>8600 Dübendorf</u> Switzerland		Sponsoring Organization Name & Address:  Federal Environmental Office <u>3003 Berne</u> Switzerland
Principal Investigator(s):  R. Hofmann		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>1980</u>		OR: Total Funding Amount: <u>ca. \$ 30,000</u>
Completion Date: Estimated: <u>1981</u> Actual: <u>                    </u>		Comments:
PROJECT OBJECTIVE: <u>Calculation of highway noise using <math>L_{eq}</math> as the measurement index.</u>		
PROJECT DESCRIPTION: <u>In Switzerland, the measure <math>L_{eq}</math> will be adopted for measurement and regulation purposes. Previously, the statistical levels, <math>L_{50}</math> and <math>L_1</math>, were used. The previous prediction schemes are therefore being modified, using <math>L_{eq}</math> as the basis.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <u>Measurements, previous experience and literature are being combined in the development of the prediction method. The goal is to present the theory in "handbook" style, for simple application.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>not yet available</u>		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Model Analysis and Prediction</u>
		COUNTRY: <u>Switzerland</u>
PROJECT TITLE: <p style="text-align: center;">Street Noise in Built-up Areas</p>		
Performing Organization Name & Address: <p style="text-align: center;">EMPA <u>8600 Dübendorf</u> Switzerland</p>		Sponsoring Organization Name & Address: <p style="text-align: center;">Kanton Zürich Special Commission II</p>
Principal Investigator(s): <p style="text-align: center;">R. Hofmann</p>		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____ 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>Ca. \$ 30,000</u> Comments:
Start Date: <u>1979</u> Completion Date: Estimated: _____ Actual: <u>1979</u>		
PROJECT OBJECTIVE: Study of the influences of various parameters on street noise in built-up areas, and simulation with computer model.		
PROJECT DESCRIPTION: The effects of vehicle speed, gear changes, traffic density, trucks, etc. were measured and analyzed, and formulated in a general calculation scheme. These formed the basis of a computer simulation model.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  Aside from establishing the influences of the above-mentioned parameters, the study drew conclusions concerning practical noise-control possibilities. The computer model incorporates the random characteristics inherent in street noise and permits calculation of the statistical parameters ( $L_{95}$ , $L_{50}$ , $L_1$ , etc.) and $L_{eq}$ . A graphical simulation of level fluctuations vs. time is also possible.		
AVAILABLE PUBLICATIONS (of research findings): Strassenverkehrslärm innerorts (Road Traffic Noise in Built-up Areas) in German EMPA Report 10'466, 1979		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: Switzerland

PROJECT TITLE:

MODEL 77, Swiss Computer Model for Noise Propagation Studies

Performing Organization Name & Address:

Laboratory of Applied Acoustics  
Swiss Federal Institute of Technology  
Sternwartestrasse 7, ETH-Zentrum  
8092 ZURICH,  
SWITZERLAND

Sponsoring Organization Name & Address:

Swiss Federal Office of Environmental  
Protection  
3003 BERN,  
SWITZERLAND

Principal Investigator(s):

Prof. Dr. E.J. Rathe  
Mr. A. Meury

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount: \$ 150000

Comments:

Start Date: 1976

Completion Date: Estimated:                     

Actual: 1980

PROJECT OBJECTIVE:

Comprehensive prediction method for noise impact evaluations

PROJECT DESCRIPTION:

Method is based on V3 octave source spectra, source directivity, all relevant traffic parameters; it includes topographic data with automatic barrier detection and evaluation. Results are available as overall levels, spectra, Leq, statistical levels. They can be printed, plotted on maps, compared. Means of optimizing barriers are included.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

User manual in English, and source programs for CDC6000 computers are available.  
A revised source program for DEC-computers is in development.

AVAILABLE PUBLICATIONS (of research findings):

Proceedings of INTER-NOISE 80, p. 531

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: United Kingdom

PROJECT TITLE: The prediction of ambient noise levels in urban areas.

Performing Organization Name & Address:

Aston University  
Gosta Green  
Birmingham  
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council  
P.O. Box 18  
Swindon SN2 1ET  
United Kingdom

Principal Investigator(s):

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

OR:

Completion Date: Estimated: \_\_\_\_\_  
Actual: \_\_\_\_\_

Total Funding Amount: £14,900 over 16  
Comments: \_\_\_\_\_ months.

PROJECT OBJECTIVE: The aim of the research is to develop and improve an area-based model for predicting ambient noise levels in major urban areas. This will be achieved by (i) developing and testing more refined methods for classifying areas according to their traffic density to be used in conjunction with existing land use classifications; and (ii) examining "within area" variance in the light of eight characteristics (iii) assessing the effects of "natural" rather than grid square based zoning.

POSSIBLE FORUM: (Comments by Mr. Alan Hay, Department of Geography, Sheffield University)

The idea would be of interest because we are aware that the United Kingdom research teams on these topics are fairly isolated, and have to work hard to exchange information internationally.

Location and timing are not of critical importance, but if a meeting could be held at the same time/place as a major conference, it could help United Kingdom groups to attend. We might draw their attention particularly to the Institute for Sound and Vibration Research (Southampton University) and the Joint Urban Research Unit (Aston University), both of which have approached the Joint Transport Committee for research support in these fields. On the first occasion a meeting which covered all aspects would probably be best if a good representative attendance could be assured.

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: West Germany

PROJECT TITLE: Determination of the Traffic Noise Situations by Model Tests/Computer  
Prognoses of Sound Levels.

Performing Organization Name & Address:

PTB Braunschweig  
TUV Cologne  
TUB Berlin  
MBB Munich  
Dorsch Consult., Munich  
CSTB, France

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33  
West Germany

Principal Investigator(s):

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1977

OR:

Completion Date: Estimated:                     

Total Funding Amount: (140,000DM)

Actual: 1979

Comments: \$65,730

PROJECT OBJECTIVE: Street traffic noise, noise prognosis methods.

PROJECT DESCRIPTION: The street traffic noise was measured and prognosticized for  
five city building situations. Different prognosis methods were used. A comparison  
of the predicted and measured sound level was carried out by the Federal Environmental  
Office.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Improvements are possible in the case of the methods used for measurement and prognosis,  
as well as in the case of propagation models.

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction

COUNTRY: West Germany

PROJECT TITLE: Street traffic noise at crossings with building at the edges.

Performing Organization Name & Address:

Bundesanstalt fur Strassenwesser Koln

Sponsoring Organization Name & Address:

Bundesminister fur Verkehr Bonn

Principal Investigator(s):

V. Bereich

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Start Date: June 1978

Completion Date: Estimated: \_\_\_\_\_

Actual: \_\_\_\_\_

Comments:

SUMMARY OF FINDINGS: The methods developed up to now for the calculation of street traffic noise can no longer be used in the calculation of noise at intersections. Noise measurements are to be carried out at intersections as a basis for new calculation methods. The following should be especially determined:

- the influence of light signal installations on the average level of street noise,
- the influence of reflection of building at the edge and
- the propagation of crossing noise into the boundary streets.

The studies are to be carried out on existing objects and supplemented on a model.

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

AVAILABLE PUBLICATIONS (of research findings):

Report No. 0609 129 Berkehrsemissioner, Immissionsschutz, IDS 701 638

Translated from the original German.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Model Analysis and Prediction  
COUNTRY: West Germany

PROJECT TITLE:  
Rolling Noise and Street Cover Travel Noise. Quantitative and Qualitative Analysis.  
Causality

Performing Organization Name & Address:  
Institut fur Strasser, Eisenbahnd  
Felsbau  
ETTI  
ZURICH

Sponsoring Organization Name & Address:  
Betonstrassen AG Wildesz

Principal Investigator(s):  
Prof. Dr. H. Gobb

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date:                       
Completion Date: Estimated:                       
Actual: 1977

OR:  
Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE: In the study, a closer investigation was made of these limiting quantities of noise development due to street traffic for higher speed ranges of the vehicles.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings): Report No. 0609 153, Verkehrsmissionem, Immissionschutz. Publications: Eichenberger, E.: Rolling noise and street cover noise, Inst. f. Streets, Railroads and Mining, ETH-Zurich, communication No. 35, Zurich 1977, p.68. Concrete streets, communication sheet of concrete streets AG, Wildegg, No. 112, July 1977  
Schweizerische Bauzeitung 95 (7/21/177) Vol. 29

Translated from the original German.

(We prefer responses in English, but can accept material in other languages.) TOPIC: Highway Model Analysis and Prediction  
COUNTRY: West Germany

PROJECT TITLE: Traffic noise prognoses on city streets.

Performing Organization Name & Address:

Muller- BBM Bablt  
Munchen

Sponsoring Organization Name & Address:

Bundesminister fur Verkehr  
Bonn

Principal Investigator(s):

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_

Actual: July 1978

Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: By evaluating the results of about 390 traffic noise measurements, in city streets, in which all recognizable data determining sound immissions can be recorded at the same time, it could be shown that the average level of traffic noises in front of house facades of city streets, can be calculated alone from the number of hourly passing passenger cars and trucks, the distance of the street center and the gradient, according to a simple equation with a standard deviation of 1.5 dB(A).

SUMMARY OF FINDINGS (if project completed): Only about 5% of the calculated average level STATUS REPORT (if in progress): deviated by more than 3dB(A) and only about 1% more than 4 dB(A) from the measuring values. The highest individual deviation amounted to 5 dB(A).

The standard deviation could be reduced to 1.2 dB(A) by the inclusion of other parameters (pavement cover, type of construction, special traffic conditions, differentiation between heavy and light trucks).

AVAILABLE PUBLICATIONS (of research findings):  
Report No. 0609 134, Verkehrsemissionen, Immissionsschutz, IDS 701 642

Translated from the original German.

HIGHWAY NOISE

OTHER

See Also Pages:

197  
269  
320

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>AUSTRALIA</u>
PROJECT TITLE: <u>Noise Data Bank and Prediction (with MAASRA) - 2/IR/78/8</u>		
Performing Organization Name & Address:  Main Roads Department of Queensland, SPRING HILL. 3LD. 4000 AUSTRALIA.		Sponsoring Organization Name & Address:  Department of Transport, P.O. Box 367, CANBERRA CITY. A.C.T. 2601 AUSTRALIA.
Principal Investigator(s):  1. Mr A.M. Hall 2. Mr G.H. Hollingworth		Annual Funding: (Check One: Fiscal Yr: <input checked="" type="checkbox"/> Calendar Yr: <input type="checkbox"/> (A\$15000) 1978: <u>-</u> 1979-80: <u>\$17,323</u> 1978-89: <u>(A\$10,000)</u> 1980-81: <u>(A\$5,000)</u>
Start Date: <u>78/79</u>		OR: Total Funding Amount: <u>-</u>
Completion Date: Estimated: <u>-</u> Actual: <u>May be continuing</u>		Comments: Future funding should not increase over 80/81 figure.
PROJECT OBJECTIVE: To gather high quality traffic noise data to assist MAASRA evaluation of prediction methods.		
PROJECT DESCRIPTION: MRD has been doing work in the field of road traffic noise which is receiving considerable attention because of its adverse environmental aspects. The Department is continuing to accumulate data on the consistent basis agreed to in a draft MAASRA document on measurement procedures. Establishment of the Queensland contribution to the Australian Noise Data Bank continues. Data will be used by MAASRA to evaluate prediction methods.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): Work is proceeding on the compilation of the data base, concurrent with preliminary examination of prediction methods. MRD (Qld) contribution to noise data bank is nearing completion.  A small study is being undertaken to ascertain the effect of traffic noise on people where a previously highly trafficked road has been reinstated as a lowly trafficked suburban street.		
AVAILABLE PUBLICATIONS (of research findings): Brown, A.L. and Hollingworth, G.H. (1978). Prediction of Freeway Noise Levels (L10): An Evaluation of the UK DOE Procedure. Proc. 9th ARRB Conf. 9(6), pp 248-62. Hollingworth, G.H. (1979). An Alternative Method of Traffic Noise Impact Evaluation and its Relevance to Traffic Noise Control. Aust. Rd. Res. 9(3), pp 3-12.		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other

COUNTRY: Austria

**PROJECT TITLE:**

Comparing study on noise propagation models and models to compute traffic noise.

Performing Organization Name & Address:  
Institut fuer Strassenbau und Verkehrs-  
wesen der Technischen Universitat Wien  
Gusshausstrasse 30  
A-1040 Vienna

Sponsoring Organization Name & Address:  
Fonds zur Foerderung der wissenschaftlichen  
Forschung  
Garnisongasse 7/20  
A-1090 Vienna

Principal Investigator(s):  
Univ. Prof. Dipl.-Ing. Dr. J.R.Dorfwrth  
Dipl.-Ing. Dr. W. Kovacic

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: Spring 1981  
Completion Date: Estimated: Autumn 1981  
Actual:                     

OR: Total Funding Amount: (oeS 115,420)  
Comments: \$7652

**PROJECT OBJECTIVE:**

Noise propagation models for computers

**PROJECT DESCRIPTION:**

By the aid of an existing computer model for noise propagation considering free prop-  
agation, reflection, diffraction over and around obstacles or barriers, the aim is to  
find the bounds for using such models, to compare the results of the computation with  
results of physical acoustic models in scale up to 1:64 and to find input parameters for  
the computer model (e.g. reflection coefficients).

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

The computation of a real noise propagation situation is finished, the measurement  
of the real noise values will start in the spring 1981.

**AVAILABLE PUBLICATIONS (of research findings):**

Report on Kolloquium aus Verkehrsplanung und Verkehrstechnik "Strassenverkehr und  
Umweltschutz", December 1, 1978, Technical University of Vienna.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: Highway Noise - Other
		COUNTRY: BELGIUM
PROJECT TITLE: Measurements of traffic noise in cities and inquiry about the annoyance		
Performing Organization Name & Address: Laboratorium voor Akoekstiek Warmtegeleiding Celestijnenlaan 200 D B 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		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: <u>finished</u> 1980: <u>---</u> 1979: <u>--</u> 1981: <u>--</u>
Start Date: <u>Jan. 1, 1974</u> Completion Date: Estimated: <u>Dec. 31, 1978</u> Actual: <u>Dec. 1, 1980</u>		OR: Total Funding Amount: <u>357,000 USA Doll.</u> Comments:
PROJECT OBJECTIVE: The objective was to seek a relation between the experienced annoyance and physical measurements of the noise level.		
PROJECT DESCRIPTION: For this investigation, 40 streets in Antwerp and 25 in Brussel were chosen according to traffic intensity of quite diverse character. As a functional relationship was sought between two "variables", namely annoyance and noise level, we strove to give these two variables the widest possible variation. Care was also given that certain "co-variables" or "parameters", such as street width, road surface, height of houses, were likewise of very diverse character.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): The results show that there is a substantial correlation between most noise indices in the day-time and "disturbance of activity during the day". The best correlation was obtained with $L_{eq}$ . Still $L_{10}$ and $L_{50}$ are almost just as good. Even $L_1$ has a noteworthy coefficient of correlation. Also simply counting the number of vehicles can give a good indication of the expected annoyance. More complicated indices, such as TNI and NPL, have obviously less conformity with the annoyance. The factor "Disturbance during the night" causes a lot of problems.		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>Belgium</u>
PROJECT TITLE: Study of noise production during car and motorcycle speed and cross country races		
Performing Organization Name & Address: Laboratorium voor Akoestiek en Warmtegeleiding Celestijnenlaan 200 D B 3030 Heverlee (Belgium)		Sponsoring Organization Name & Address: Organizers of races ordered by: Ministry of Health Environmental Section Vesalluskwartier Rijksadministratief Centrum 1010 BRUSSELS (Belgium)
Principal Investigator(s): Prof. Dr. H. Myncke Dr. A. Cops -		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___ 1978: _____ 1980: - 1979: _____ 1981: _____
Start Date: <u>1975</u> Completion Date: Estimated: <u>1980</u> Actual: <u>December 1, 1980</u>		OR: Total Funding Amount: <u>23,000 USADoll.</u> Comments:
PROJECT OBJECTIVE: The aim of this study was to investigate the real distance required to eliminate the noise inconvenience to local residents caused by cross-country and speed races by motorcycles and racing cars.		
PROJECT DESCRIPTION: From 1975, the Acoustics Laboratory of the K.U.Leuven, by order of the Ministry of Public Health and the Family, carried out sound measurements on and around racing circuits during motorcycle and racing-car cross-country and speed races. The aim was to scientifically investigate the real distance required to eliminate the noise inconvenience to local residents caused by such races. The sound measurements yielded useful data not only about minimum distances but also about the effect of wind direction, growth, ground damping, screening by houses, unevenness of the terrain and other similar variables.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): When investigating the sound levels by motorised sports competitions, a distinction should be made between sound levels produced on the circuits and those in nearby residential areas. Around the circuits sound levels are inconvenient for almost every race. Hence a revision of legislation concerning maximum levels permitted at the source is a prerequisite. Furthermore, it is extremely necessary to stimulate research on noise reduction at the source. Under the present permitted sound levels, minimum distances from residential areas differ from one race to another, depending upon screening, unevenness of terrain and other variables. Part of this research has resulted in a royal decree of 10 July 1976 arranging the organization of races and trainings by motorised vehicles. Until now controls are made at different places.		
AVAILABLE PUBLICATIONS (of research findings): H. Myncke - Community noise a field for further research - Proc. X <sup>th</sup> ICA Sydney 1980 H. Myncke - Traffic noise: a field for further research - Proc. 19 <sup>th</sup> Conf. on Acoustics - Strbska Pleso 1980, vol. II, p. 23-24.		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>Canada</u>
PROJECT TITLE: Noise exposure data for truck drivers		
Performing Organization Name & Address: The Industrial Research Institute, University of Windsor, WINDSOR, Ontario. N9B 3P4 Canada		Sponsoring Organization Name & Address: Road & Motor Vehicle Traffic Safety Branch, Transport Canada, Place de Ville, Ottawa, Ontario. K1A 0N5 Canada
Principal Investigator(s): Z.F. Reif A.R. Howell T.N. Moore A.E. Steevensz		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(\$56,973)</u> Comments: \$47,384
Start Date: <u>1976-06</u>		
Completion Date: Estimated: _____ Actual: <u>1979-07</u>		
PROJECT OBJECTIVE: (1) Obtain quantitative data on truck driver noise exposure (2) Compare actual exposure with Canadian occupational health guidelines (3) Compare predictive value of simple in-cab measurement standards		
PROJECT DESCRIPTION: On-road measurements of truck cab interior noise levels have been compared with measurements made on the same vehicles under three simple standard procedures. On-road measurements were made for a range of vehicles under various operating conditions.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): (1) The combination of current vehicle operating conditions and current permitted in-cab noise levels causes present occupational health guidelines to be exceeded in a number of cases. (2) A simple in-cab noise measurement with the vehicle stationary can be combined with simple descriptive information on route composition to produce useful estimates of driver noise dose.		
AVAILABLE PUBLICATIONS (of research findings): REIF, Z.F. et al. 'Noise exposure of truck drivers' SAE Paper 800278 (in SAE SP456)		





(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other

COUNTRY: Canada

**PROJECT TITLE:**

Noise in Truck Cabins

**Performing Organization Name & Address:**

Ontario Hydro  
400 University Avenue  
Toronto, Onto.  
M5G 1X6  
CANADA

**Sponsoring Organization Name & Address:**

**Principal Investigator(s):**

A. Behur

**Annual Funding:**

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:            1980:           

1979:            1981:           

Start Date: 1/16/80

Completion Date: Estimated: 8/81

Actual: 8/16/80

OR:

Total Funding Amount:           

Comments:

**PROJECT OBJECTIVE:** A) To set up a measuring procedure for the noise on truck cabs  
B) To perform measurements in every prototype used in our fleet

**PROJECT DESCRIPTION:**

A) We are interested in the noise while the truck is in motion. So we are going to try different situations such as change of gears, rpm, speed, etc., as well as situations inside the cab windows open and closed, different microphone locations, etc. We are also to correlate SL measurements with noise dosimetry on truck drivers.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

The project is just started.

**AVAILABLE PUBLICATIONS (of research findings):**

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: France

PROJECT TITLE: Traffic Noise in the Year 2000 in French Cities

Performing Organization Name & Address:  
Gerpa  
Irt-Cerne

Sponsoring Organization Name & Address:

Principal Investigator(s):  
M. Maurin (IRT-CERNE)  
M. BAYE (GERPA)  
J.P. Bordet (AKLAB)  
J. Lambert (IRT-CERNE)

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date:                       
Completion Date: Estimated:                       
Actual:                     

OR:                       
Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE: Simulation of different strategies for noise control in the year 2000  
for several socioeconomic, scenarios and evaluation of their efficiency.

PROJECT DESCRIPTION:

The simulation model "Noise-2000" is described. Using this model, four alternative socioeconomic situations, each including four strategies for noise control, were simulated. The simulation permitted to compare respective efficiencies of different noise control policies.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

In agreement with the U.S., British and Swiss studies, it is recommended to strengthen emission standards for motor vehicles, reduce noise from cars, and to modify arrangement of urban and semi-urban spaces in order to improve appreciably the present situation. The socioeconomic development situation will have little effect on acoustic environment with respect to different strategies for noise control.

AVAILABLE PUBLICATIONS (of research findings):

LeBruit deLa Circulation en l'ian 2000 dans les Villes Francaises. ERLB, GERPA, IRT-CERNE, 2/80.

Translated from the original French.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>FRANCE</u>
PROJECT TITLE: <u>COST OF THE SOUND PROOFING OF ROAD VEHICLE</u>		
Performing Organization Name & Address: Institut de Recherche des Transports Centre d'Evaluation et de Recherche des Nuisances et de l'Energie 109, Avenue S. Allende 69500 - BRON FRANCE		Sponsoring Organization Name & Address: M. JUNGER European Economic Community
Principal Investigator(s):  C. LAMURE		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>03.07.1980</u>		OR: Total Funding Amount: <u>                    </u>
Completion Date: Estimated: <u>1.11.1981</u> Actual: <u>- id -</u>		Comments:
PROJECT OBJECTIVE: Evaluation of the difficulties for reducing the noise emitted by the highway vehicle -		
PROJECT DESCRIPTION: - To identify the methods for the sound proofing of the vehicle - To analyze the cost of the methods and the consequences on the energy consumption - To study the relations between the noise emission and cost or energy consumption		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  1 - The methodology of the useful comparisons between vehicles is established -  2 - For insulated truck engines and for existing european cars there is no relation between consumption and noise emission (measured by the ISO method)		
AVAILABLE PUBLICATIONS (of research findings):  None		

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Noise - Other

COUNTRY: Greece

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PROJECT TITLE: Urban Noise of Thessaloniki.

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<b>Performing Organization Name &amp; Address:</b> Laboratory of Architectural Design Polytechnical School University of Thessaloniki Thessaloniki Greece	<b>Sponsoring Organization Name &amp; Address:</b> Same
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<b>Principal Investigator(s):</b> Emm. techakis, Dr. Eng. Senior Lecturer G. Papanikolxou, Dr. Eng. Lecturer S. Konidaris, Architect. Assistant	<b>Annual Funding:</b> (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
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Start Date: <u>Spring 1978</u> Completion Date: Estimated: <u>1982</u> Actual: <u>                    </u>	OR: Total Funding Amount: <u>\$10,000</u> Comments: <u>Out of regular yearly laboratory funds</u>
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**PROJECT OBJECTIVE:** To study the noise situation of Thessaloniki and to help decision-making on needed policies.

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**PROJECT DESCRIPTION:** Step by step area noise monitoring and mapping.

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**SUMMARY OF FINDINGS (if project completed):**  
**STATUS REPORT (if in progress):**

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**AVAILABLE PUBLICATIONS (of research findings):**

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other

COUNTRY: Hungary

PROJECT TITLE: Study of procedures for measurement and evaluation of environmental noise.

Performing Organization Name & Address:

National Institute of Hygiene  
Gyali ut 2-6  
H-1966 Budapest  
Hungary

Sponsoring Organization Name & Address:

Principal Investigator(s):

Laszlo Czabalay

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1976

Completion Date: Estimated:                       
Actual: 1980

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE: Elaboration and improvement of methods for the measurement and prediction of traffic noise.

PROJECT DESCRIPTION: The project was divided into the following sub-themes:

1. Evaluation of impulsive noise.
2. Study on the propagation of traffic noise.
3. Investigation of road traffic noise.
4. Investigation of railway traffic noise.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

1. The determination of the equivalent A-weighted sound level by use of the meter characteristic "impulse" was investigated and theoretically supported.
2. A computation method was developed for the prediction of traffic noise.
3. Linear and second degree relations were set up between various noise parameters and traffic density on the basis of road traffic noise measurements at 650 sites.
4. Theoretical model was established and compared with measurement results of noise caused by passing trains.  $L_{Aeq}$  was expressed as a function of speed, length, distance and number of the passing trains.

AVAILABLE PUBLICATIONS (of research findings): Czabalay, L, and Hirka, F. Theoretisches Modell und Untersuchung des durch vorbeifahrende Züge verursachten Larms, 11th AICB Congress, Varna, Bulgaria, Oct. 7-11, 1980.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: Israel

PROJECT TITLE:

Socio-Acoustic Survey

Performing Organization Name & Address:

Environmental Protection Service  
Ministry of the Interior  
Jerusalem, ISRAEL

Sponsoring Organization Name & Address:

Environmental Protection Service  
Ministry of the Interior  
Jerusalem, ISRAEL

Principal Investigator(s):

Ms. Osnat Arnon  
Mr. Nissim Moses

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date:     June 1978    

Completion Date: Estimated:     March 1981    

Actual:                     

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE:

Evaluation of public response to aircraft and traffic noise.

PROJECT DESCRIPTION:

1. Field survey or public response based on questionnaires.
2. Noise measurement in the same areas where the questionnaires were distributed.
3. Statistic and data evaluation of information gathered.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Field survey and noise measurement completed.  
Data evaluation incomplete at present time.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: Israel

PROJECT TITLE: Traffic Noise Survey.

Performing Organization Name & Address:  
Environmental Protection Service  
Ministry of the Interior  
Jerusalem  
Israel

Sponsoring Organization Name & Address:  
Environmental Protection Service  
Ministry of the Interior  
Jerusalem  
Israel

Principal Investigator(s):

Ms. Oshat Arnon  
Mr. Nissim Moses

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: January 1980

Completion Date: Estimated: December 1981

Actual:                     

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE: Finding and evaluating noise propagation in urban (builtup) areas  
and development of a model to assist in predicting traffic noise.

PROJECT DESCRIPTION:

1. Simultaneous noise measurements at various heights inside and outside buildings.
2. Noise measurements in relation to proximity of buildings and their proximity to each other.
3. Noise measurement in respect to the position of the building vis a vis the road (the source of noise).

SUMMARY OF FINDINGS (if project completed):

Various regression models were developed.  
Our complete findings are being written up at present.

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>JAPAN</u>
PROJECT TITLE: <u>Effects of Traffic Conditions, Road Conditions, and Environmental Structure Conditions on Traffic Noise</u>		
Performing Organization Name & Address: JAPAN AUTOMOBILE RESEARCH INSTITUTE INC. (JARI)  Yatabe-cho Tsukuba-Gun, Ibaraki 305 JAPAN		Sponsoring Organization Name & Address: JAPAN AUTOMOBILE MANUFACTURERS ASSOCIATION, INC.  Otemachi Bldg., 6-1, Otemachi 1-chome, Chiyoda-ku, Tokyo 100 JAPAN
Principal Investigator(s):  SADAO Iwamoto, TSUNEO Kamitamari		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____  OR: Total Funding Amount: _____
Start Date: <u>April 1979</u>		Comments:
Completion Date: Estimated: <u>March 1981</u> Actual: _____		
PROJECT OBJECTIVE: To get the proposal data for concrete counterplan of decreasing the public nuisance caused by traffic noise.		
PROJECT DESCRIPTION:  Project is intended to carry out over two years from 1979 to 1981. A main task of the first year is to collect the data through field measurement, and an analysis will be made in the next year.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  In order to investigate the effects of traffic conditions, road conditions, and environmental structure conditions on traffic noise along the road, about 900 samples of data were measured at the various sites in TOKYO and others. Noise indexes used in this study were statistical noise levels such as L05, L10, L50, L90, and L95, and equivalent noise level Leq. Traffic conditions, road conditions, and environmental structure conditions were measured simultaneously. These data will be analyzed to get the predictive models of noise indexes using quantification theory of the 1st kind, and the quantitative effects of each conditions on noise indexes will be also clarified.		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: Japan

PROJECT TITLE: Measurement of Noise Emitted by Road Vehicles under Conditions Representative Urban Driving

Performing Organization Name & Address:  
Traffic Safety and Nuisance Research  
Institute, Ministry of Transport  
6-38-1 Shinkawa Mitaka  
Tokyo, JAPAN

Sponsoring Organization Name & Address:

Principal Investigator(s):

Takeo Ando

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: <u>0</u>	1980: <u>(¥16,895,000)</u> <u>\$ 80,724</u>
<u>(¥13,858,000)</u>	<u>(¥18,763,000)</u>
1979: <u>\$66,213</u>	1981: <u>\$89,649</u>

Start Date: April 1979

Completion Date: Estimated: March 1981  
Actual: March 1981

OR: Total Funding Amount: (¥49,516,000)  
Comments: \$236,587

PROJECT OBJECTIVE: Noise measurement procedure of motor vehicles under the provisions of noise legislation is presently based upon ISO Standard R-362, and its objective is to measure "The highest noise level consistent with normal driving", that is the so-called "Maximum noise potential" of the vehicle. Naturally cars, because they form a large proportion of the traffic population, make an important contribution to normal urban noise levels, so that another noise measurement procedure should be considered and represent the driving conditions which are typical of the noise-producing behavior of cars in urban area. We went into to gather the data necessary to develop the operating conditions for this measurement, which would evaluate the real nuisance value of the vehicles, as is manifested during urban driving.

AVAILABLE PUBLICATIONS (of research findings): Environmental Research in Japan, 1979  
Environment Agency

SUMMARY OF FINDINGS (if project completed): 1) Studies on the relation between driving conditions and its noise levels. In these studies we have performed basic tests to obtain precise data of driving conditions of vehicle speed, acceleration, engine speed, power and noise level for various models of vehicles, 8 different models of light trucks and passenger cars, on proving ground. As the results of data analysis, it was found the noise emitted by the vehicle L could be well estimated from the vehicle speed V, acceleration A and engine speed N by use of an empirical formula. ( $L=A+bV-CA+dN$ ). Also we carried out the comparison analysis of noise estimate methods from road driving conditions and comparing the values empirical formula method L and isophonic line method L' the assumption that L is better than L' can be found to be accurate. (2) Research on the simple method for the test procedure of acceleration noise. In the first phase of this research, we carried out the noise measurement tests with the conditions of wide open throttle and each transmission gear selection on 4 different passenger cars currently offered for sale. From these basic tests, it was found that the noise test would be simple and have good correlation with replacement of vehicle entrance speed and gear position, and it will be possible to obtain the appropriate and effective simple measuring method for the test procedure of acceleration noise in such a way.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: The Netherlands

PROJECT TITLE: Regular testing of motor vehicles for noise levels.

Performing Organization Name & Address:  
Ministry of Health and Environmental  
Protection

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date:                     

OR:

Total Funding Amount:                     

Completion Date: Estimated:                     

Comments:

Actual: November 1979

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: Consideration is being given to measuring noise levels as part of the regular testing of private cars and motorcycles, to which end exploratory studies have been carried out into the feasibility and usefulness of measuring noise levels in stationary vehicles according to ISO/DIS 5130.

The report describes experiences with commercially available devices with which the noise levels and engine speeds of petrol-driven vehicles and "normal" ignition systems may be measured relatively simply.

Clearly recognizable and audible defects in the exhaust system proved impossible to detect by measuring the noise from a stationary vehicle using ISO/DIS 5130, with the aid of only one microphone positioned 0.5 m from the exhaust aperture.

AVAILABLE PUBLICATIONS (of research findings):

Report No. VL-HR-02-05. Ministry of Health and Environmental Protection, The Netherlands.

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: The Netherlands

PROJECT TITLE: Effects of noise abatement measures on residences alongside  
Highway 16 at Dordrecht.

Performing Organization Name & Address:

Ministry of Health and Environmental  
Protection

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_  
Actual: August 1978

OR:

Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

As it is possible to protect people who are exposed to excessive noise only in a limited number of cases by soundproofing their dwellings, it is necessary to study the effects of the measures taken.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):  
Report No. VL-DR-14-01. Ministry of Health and Environmental Protection, The Netherlands.

Transcribed from the original

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other

COUNTRY: Norway

PROJECT TITLE:

- (A) Survey of International Literature, Road Traffic Noise  
(B) Field Measurements, Screens and Noise Emission from Vehicles

Performing Organization Name & Address:

Kilde  
Postboks 229, N-5701 VOSS  
NORWAY

Sponsoring Organization Name & Address:

VEGDIREKTORATET  
Postboks 8109 Dep.  
OSLO 1  
NORWAY

Principal Investigator(s):

Edvard Falch  
Matias Ringheim

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: )

1978: \_\_\_\_\_ 1980: \$20,000

1979: \$8,000 1981: ca \$25,000

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_

Actual: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Comments: At least part (A) of project is  
likely to continue in 1982

PROJECT OBJECTIVE: a) Keeping the Norwegian Road Authorities informed of new research  
results b) Carrying out supplementary measurements

PROJECT DESCRIPTION: a) Summary and classification of results in international literature.  
Basis for improvement of prediction methods, noise criteria and formulation of national  
research needs. Concentration on one topic each year: 1980, control of Scandinavian pre-  
diction method; 1981, effects of noise control measures;... b) Field measurements of  
natural and artificial screens with special emphasis on: road edge screening effects, small  
effective screen height, short screen-observer distance and screens on both road sides.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

a) First summary report published, covering  
84 references, suggesting improvements in the  
Scandinavian prediction method for road traffic noise. b) Measurements completed and  
analyses partly completed. Measurement report planned for early 1981. Measurements to  
continue with measurements of vehicle noise emission for driving speeds below 50 km/h, 1981.

AVAILABLE PUBLICATIONS (of research findings):

KILDE rapport 17. VEGTRAFIKKSTØY LITTERATURBOENOMGANG. Del 1 Kontroll av nordisk  
rekne metode. (In Norwegian)

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>Poland</u>
PROJECT TITLE: An acoustic Evaluation of Automotive Vehicles from the point of View of Noise and Vibrations Influence on Driver's Work		
Performing Organization Name & Address: Research Institute Of Road Transport 40 Stalingradzka Str. 03 - 301 Warszawa POLAND		Sponsoring Organization Name & Address: National Motor Transport Enterprise 17 Grójecka Str Warszawa POLAND
Principal Investigator(s): Dr eng. Jerzy Wiazga Krystyna Janicka, M.Sc. Jadwiga Bak, M.Sc.		Annual Funding: 1978: _____ 1980: _____ 1979: <u>(420 454 zł)</u> 1981: _____ OR: <u>532342</u> Total Funding Amount: <u>(894 502 zł)</u>
Start Date: <u>1<sup>st</sup> February 1979</u> Completion Date: Estimated: <u>30<sup>th</sup> Nov. 1979</u> Actual: <u>30<sup>th</sup> Nov. 1979</u>		Comments: Part I of this <sup>788507</sup> project was completed in 1976/77.
PROJECT OBJECTIVE: Determination of vibro-acoustic climate in heavy vehicles during their normal exploitation. Examination of driver's psychophysiological functions before and after work.		
PROJECT DESCRIPTION: Investigation of acoustic climate inside drivers' cabs; consisted of vibration and noise measurements in home produced heavy vehicles during their normal exploitation. Noise investigations were limited to determining its parameters according to requirements of the National Norm PN-77/S-04052. Psychophysiological examinations were carried on in order to determine correctness of important psychophysiological functions formation, influencing ability to drive in noisy heavy vehicles drivers' cabs.		
SUMMARY OF FINDINGS (if project completed): The results of vibroacoustic investigations were useful to determine noise influence upon the drivers psychophysiological fitness. It was found, that it decreases constantly during driving, which may cause dangerous situations on the road. The results have indicated that noise above 80 dBA worsens these functions, which are the most important for driving. Decrease of psychophysiological functions to such a degree, which is indicated by the results, leads to several practical conclusions aiming at softening heavy vehicle's cabs.		
WHERE FINDINGS PUBLISHED: Published in the papers of XXVII Open Seminar on Acoustics. Puławy, September 1980, Poland.		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: Sweden

PROJECT TITLE:

The Effects of Traffic Noise on Sleep

Performing Organization Name & Address:

Department of Environmental Health  
University of Lund  
Soalvegatan 21  
S-22362  
Lund  
~~SWEDEN~~

Sponsoring Organization Name & Address:

Principal Investigator(s):

J. Eberhardt  
M. Berlin

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: July 1973

Completion Date: Estimated: June 1981

Actual: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE:

This project will study the adaptation of men during sleep to traffic noise.

PROJECT DESCRIPTION:

This is an investigation of the adaptation to traffic noise during sleep of men, 20-25 years old, living in streets with heavy traffic. Their EEG, EOG, EMG and EKG are recorded during sleep in their normal sleeping environment. Measurements, with noise insulation of their bedroom windows, are also made for two or three nights per person. Acute effects are studied. A series of experiments on men, more than 60 years old, has started.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Influence of disturbing sound on Sleep LLL: SNV 7-163/76 Report 1977-01 Lunds Universitet, Inst. Foer Hygien

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other

COUNTRY: Sweden

PROJECT TITLE:

Road Network and Environment. Studies of Environment and Accessibility Factors

Performing Organization Name & Address:

Department of Traffic Planning & Engineering  
Box 725  
S-22007  
Sund 7  
Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

M. Reutherborg  
M. Jacobsson

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: January 1978

Completion Date: Estimated: August 1979

Actual:                     

OR:

Total Funding Amount: \$20,000

Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: The aims are: (1) To study environmental effects of road traffic and their relation to other regional factors, and (2) To study two or three areas in each of the two towns with respect to noise, barrier effects, accessibility of different groups of individuals, and supply of services.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: Sweden

PROJECT TITLE: Work Environment of the Professional Driver

Performing Organization Name & Address:  
Road User and Vehicle Division  
National Swedish Road and Traffic Research  
Institute  
Fack Linköeping  
S-58101 SWEDEN

Sponsoring Organization Name & Address:

Principal Investigator(s):

H. Laurell  
G. Magnusson  
U. Sanberg

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: Sept. 1979

Completion Date: Estimated: 1980

Actual:                     

OR:

Total Funding Amount: \$450,000

Comments:

PROJECT OBJECTIVE: This project will study all aspects of the driving environment  
of the professional driver. Among other aspects considered will be noise.

PROJECT DESCRIPTION: The aim is to study all aspects of the professional driver's work  
environment. Especially those which affect health, safety, and comfort. The project is  
divided into the following problem areas: (1) The driver's seat, (2) Layout of the  
working place, instruments and controls and other tasks of the job except driving,  
(3) Visibility and lighting, (4) Climate and air quality, (5) Vibration, and (6) Noise  
and infrasound.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>Switzerland</u>
PROJECT TITLE: <p style="text-align: center;">Noise from Highway Tunnel</p>		
Performing Organization Name & Address: <p style="text-align: center;">EMPA 8600 Dubendorf/SWITZ. and Dubendorf/SWITZ. BBS,</p>		Sponsoring Organization Name & Address: <p style="text-align: center;">Federal Institute for Road Construction Dept. of the Interior 3003 <u>Berne</u></p>
Principal Investigator(s): <p style="text-align: center;">A. Rosenheck R. Hofmann</p>		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>ca. \$ 55,000</u>
Start Date: <u>1980</u>		OR: <u>                    </u>
Completion Date: Estimated: <u>Feb. 1981</u>		Total Funding Amount: <u>                    </u>
Actual: <u>                    </u>		Comments: <u>                    </u>
PROJECT OBJECTIVE: <p style="text-align: center;">Prediction Method for noise radiating out of a highway tunnel</p>		
PROJECT DESCRIPTION: <p style="text-align: center;">Measurement in the vicinity of tunnel as well as Model measurements (scale 1:16) were performed in an effort toward developing the desired prediction scheme.</p>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): <p style="text-align: center;">Measurements are almost completed. The effort of sound absorbing material in a tunnel has also been investigated as well as the general radiation characteristics from the tunnel. We hope to be able to formulate the results in "guidebook" form, for simple application.</p>		
AVAILABLE PUBLICATIONS (of research findings): <p style="text-align: center;">not yet available</p>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other

COUNTRY: Turkey

PROJECT TITLE: Environmental Noise Conditions and Noise Effects in and around  
Istanbul City.

Performing Organization Name & Address:  
Istanbul Technical University  
Architectural Faculty  
Chair of Physical Environmental Control  
Istanbul  
Turkey

Sponsoring Organization Name & Address:  
Turkish Scientific and Technical Research  
Establishment (TBTAK)  
Engineering Research Group  
Ataturk Bulvari 221  
Kavaklidere, Ankara  
Turkey

Principal Investigator(s):  
Dr. Selma Kurra (Dipl. Eng. Arch.)  
Dr. Nurten Aksugur (Dipl. Eng. Arch.)

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: Dec. 1, 1979

Completion Date: Estimated: Jan. 31, 1981  
Actual:                     

OR: Total Funding Amount: (350,000.-TL)  
Comments: \$3,800

PROJECT OBJECTIVE: By analyzing the noise levels and noise effects, the aim is to propose  
national noise criteria and standards related to local conditions from noise control  
standpoint.

PROJECT DESCRIPTION: The research includes the following studies:  
a. Measurements of noise levels propagated from different noise sources in various  
residential sites having the greatest noise problems in Istanbul.  
b. Social surveys in order to determine the disturbance from prevailing noise levels.  
c. Work on determining the Turkish standards and criteria units.  
d. Evaluation of noise control systems in respect to building economics.  
e. Determination of correlations between different parameters related to traffic noise  
conditions and the environment.

STATUS REPORT (if in progress):

External noise measurements have been completed in selected 12, 4 and 3 sites respectively  
for traffic, train and aircraft noises; then the levels related to the noise criteria  
units have been obtained.  
Sound insulation measurements were applied on sampling building elements exposed to  
main traffic arteries and the TL, SIR and STC values have been determined.  
A social survey dealing with the affects of noise on people has been made and  
approximately 1,000 persons were interviewed.  
The evaluations of the results and correlation calculations are still going on.

AVAILABLE PUBLICATIONS (of research findings):  
Not published yet.

(We prefer reports in English, but can accept material in other languages.)

TOPIC: Highway Noise - Other

COUNTRY: United Kingdom

**PROJECT TITLE:**

Measurements of External and Internal Noise on Commercial Vehicles during Various Test Procedures Including the Lug Down Test

**Performing Organization Name & Address:**

M.I.R.A.  
Watling Street  
Nuneaton  
Warks CV10 0TU  
United Kingdom

**Sponsoring Organization Name & Address:**

U.K. Department of Transport  
2 Marsham Street  
London  
United Kingdom

**Principal Investigator(s):**

D.T. Aspinall  
R. Hedges

**Annual Funding:**

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

**OR:**

Total Funding Amount: (£5,000)

Comments: \$11,010

Start Date: August 1978

Completion Date: Estimated:                     

Actual: May 1979

**PROJECT OBJECTIVE:**

To compare the results of internal and external noise measurements in trucks when tested according to BS 3425:1966, EEC 70/157, SAE J366b and the Lug Down Procedure.

**PROJECT DESCRIPTION:**

17 HGV's and 3 light commercial vehicles were tested according to various procedures. The Lug Down test is essentially carried out on free running rollers and the vehicle decelerated with the engine loaded by the vehicle primary braking system.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

It is shown that the degree of correlation between the data from the statutory external noise tests on moving vehicles is mostly high ( $r = 0.92$ ) and that the correlation between these tests and the Lug Down test, although lower ( $r = 0.82$ ), is sufficient to enable a reasonably accurate prediction of the noise level on a statutory test to be made from the Lug Down Test.

The degree of correlation between the internal noise data obtained during the statutory tests and the Lug Down tests is mostly even higher.

The stationary EEC test was exceptional in showing low correlation with any of the other tests.

**AVAILABLE PUBLICATIONS (of research findings):**

Report No X12367. Measurements of External and Internal Noise on Commercial Vehicles During 70/157/EEC, BS 3425:1966, SAE J366b and the Lug Down Test Procedure.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: United Kingdom

PROJECT TITLE: Reliability and Seasonal Effects of Response to Traffic Noise.

Performing Organization Name & Address:  
Building Research Establishment  
Garston, Watford WD2 7JR  
Herts  
United Kingdom

Sponsoring Organization Name & Address:  
Department of Environment  
Marsham Street  
London S.W.1  
United Kingdom

Principal Investigator(s):  
F.J. Langdon  
I.D. Griffiths

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: November 1977  
Completion Date: Estimated: December 1978  
Actual: August 1979

OR: Total Funding Amount:                       
Comments:

PROJECT OBJECTIVE: Establish reliability coefficients test-retest over one year period for dissatisfaction/nuisance scales.

PROJECT DESCRIPTION: Carry out 4 interviews and traffic noise measurements at 8 sites over one year. Process data to establish scale reliabilities, compare different scales and estimate seasonal effects of changes in traffic flow.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Subjective effects of traffic noise exposure: reliability and seasonal effects.  
I. D. Griffiths (F.J. Leyder & M.A. Sevan). J. of Scale and Vibration 71(2):227-240, 1980.

(All reports must be in English, but can accept material in other languages.)

TOPIC: Highway Noise - Other

COUNTRY: United Kingdom

PROJECT TITLE: The Cost Effective Reduction of Vehicle Noise

Performing Organization Name & Address:  M.I.R.A Watling Street Nuneaton Warks CV10 0TU UK	Sponsoring Organization Name & Address:  Joint UK Department of Industry/MIRA
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Principal Investigator(s):  G.D. Callow	Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___ 1978: _____ 1980: _____ 1979: _____ 1981: _____
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Start Date: <u>June 1978</u>	OR: Total Funding Amount: <u>(£60,000)</u>
Completion Date: Estimated: _____ Actual: <u>March 1980</u>	Comments: <u>\$132,120</u>

PROJECT OBJECTIVE:  
To investigate the most cost-effective way of optimising the control of noise emitted by vehicles in the urban environment.

PROJECT DESCRIPTION:  
High quality tape recordings of traffic noise were made indoors and outdoors at four urban main road sites. Sections of these recordings were selected as stimuli for pair comparison subjective experiments. Subjective scales and objective measurements were obtained for traffic noise indoors and at the facade.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

It was found that at the point of assessment, both indoors and outdoors, sound level dBA Leq correlated well with the subjective scale. However there was no significant correlation of the indoor preference scale with outdoor measurements. This result was caused by the widely different transmission characteristics of the building structure on the four sites measured and suggests that the design of the structure is at least as important in controlling noise level indoors as is the external noise spectrum.

For four sample vehicles, the maximum noise level measured outside the building correlated well with test results on the vehicles during procedure 70/157/EEC, which is currently used for legislative purposes, whereas the maximum level measured inside the buildings did not. The reason again was the different transmission characteristics of the buildings.

AVAILABLE PUBLICATIONS (of research findings):

1. MIRA Report 1980/3. Subjective Response to Traffic Noise Related to Objective Measurements inside and outside of Dwellings.
2. Institute of Acoustics : Acoustics 80 Paper 2.11 Subjective Response to Traffic Noise in Dwellings alongside urban main roads.
3. Human Factors in Transport Research, Academic Press, Vol 2 pp 179-185 : Subjective Response to Outdoor and Indoor Traffic Noise.

(We prefer reports in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>United Kingdom</u>
<b>PROJECT TITLE:</b> The Subjective Response of Occupants to the Noise Inside Vehicles		
<b>Performing Organization Name &amp; Address:</b> M.I.R.A. Watling Street Nuneaton Warks CV10 0TU UK		<b>Sponsoring Organization Name &amp; Address:</b> Joint UK Department of Industry/MIRA
<b>Principal Investigator(s):</b> G.D. Callow, R. Hedges		<b>Annual Funding:</b> (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: (£74,000) Comments: \$162,948
Start Date: <u>August 1975</u> Completion Date: Estimated: _____ Actual: <u>June 1978</u>		
<b>PROJECT OBJECTIVE:</b> To establish an objective measurement of noise inside vehicles which shows a high correlation with subjective appraisal of acoustic comfort.		
<b>PROJECT DESCRIPTION:</b> The development of a facility is described in which vehicle noise could be accurately reproduced and replayed to groups of naive subjects who carried out pair comparison listening tests. A detailed study of the responses, including multidimensional analysis, was carried out to evaluate the merits of various ways of processing the objective data.		
<b>SUMMARY OF FINDINGS (if project completed):</b> <b>STATUS REPORT (if in progress):</b> It was found that sound level dBA provides a reasonable first order estimate of subjective preference ( $r = -0.9$ ). However subjects appeared to attend selectively to either the frequency region above 800 Hz or the region below firing frequency, depending on the relative levels in these two bands. Further investigation showed that Sound Level dBA and measurements of the levels in two frequency regions could be combined vectorially to form a Composite Rating of Preference (CRP) for the noise inside cars which showed a higher correlation with subjects' judgments than any other measure ( $r = 0.96$ ). The use of CRP facilitates the identification of subjectively dominant broad band noise sources and enables a desired degree of acoustic comfort to be achieved more reliably and more economically by quantifying the levels of noise in frequency regions that are subjectively important. Also, the measurement of the two factors needed in addition to Sound Level dBA can be obtained from relatively inexpensive instrumentation.		
<b>AVAILABLE PUBLICATIONS (of research findings):</b> Report No 1979/1 The Subjective Response of Occupants to the Noise Inside Vehicles.		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: United Kingdom

PROJECT TITLE:  
Cancellation of Noise in Industrial Cabs.

Performing Organization Name & Address:  
University of Essex  
Wivenhow Park  
Colchester, Essex

Sponsoring Organization Name & Address:

Principal Investigator(s):  
Prof. G.B.B. Chaplin

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: August 1, 1980  
Completion Date: Estimated: July 31, 1982  
Actual:                     

OR: Total Funding Amount: (536,066)  
Comments: \$74,417

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: To cancel engine induced low frequency noise (e.g. 30 to 200 Hz) in a region around the driver's (or operator's) head, in industrial cabs, such as heavy vehicles, tractors and earth moving machines.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: United Kingdom

PROJECT TITLE: Determination and Allocation of the External Costs Caused by Road Vehicles.

Performing Organization Name & Address:  
Mr. A.J. Harrison  
69, York Mansions  
Prince of Wales Drive  
London, SW11-England

Sponsoring Organization Name & Address:  
Commission of the European Communities  
Directorate-General for Transport  
200, rue doe la Loi  
1049 Brussels - Belgium

Principal Investigator(s):

idem

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: contract not yet authorized

Completion Date: Estimated:                       
Actual:                     

OR: Total Funding Amount: (13000 UK pounds)  
Comments: \$28,626

PROJECT OBJECTIVE: To develop a simple practical methodology for the determination and allocation of the external costs (including noise) caused by road vehicles, particularly the heavier categories, based on the present state of the art.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress): Part of the European Economic Community's common transport policy is based on the concept that all the costs arising from the use of transport infra-structure should be identified, allocated to and borne by the users. These costs include, as well as wear and tear, those due to traffic congestion, noise and air pollution (i.e. aspects external to the existence of the infrastructure proper.)

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: Highway Noise - Other
		COUNTRY: West Germany
PROJECT TITLE: Large test for determining the suction and pressure exposure by flowing traffic and wind exposure as a basis for economic measurement of noise protection walls on bridges (A 45 Talbrücke Sassmücke)		
Performing Organization Name & Address: Stromungslaboratorium Fachhochschule Aachen		Sponsoring Organization Name & Address: Bundesminister für Verkehr Bonn
Principal Investigator(s): Prof. Dr.-Ing. Kramer		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: _____ Comments:
Start Date: March 1979 Completion Date: Estimated: _____ Actual: _____		
PROJECT OBJECTIVE: Large test for the Talbrücke Sassmücke (A 45) to determine the suction and pressure exposure by flowing traffic and wind exposure as a basis for economic measurement of noise protection walls on bridges.		
PROJECT DESCRIPTION: In the framework of the research plan, measurements of the suction and pressure exposure on noise protection devices are to be carried out on the Talbrücke Sassmücke. These measurements are to lead to answering the basic question whether aerodynamic force effects can be assumed as measuring purposes for predominantly static load or whether and to what degree additional assumptions are to be made with which the dynamics of wind stresses are considered. The stress from natural wind effects from different directions, the stress from the flowing traffic and the combination of these stresses are to be assumed as the cause of aerodynamic exposure. In the case of natural wind effects, we are especially interested in which side section of the noise protective wall blown against by the wind is to be calculated as the result of the gust effect. By means of the large test, data are to be obtained concerning the quasistatic stresses and dynamic stresses, which should lead to answers to the posed questions. The measuring values are to be clearly ordered to determine actual wind and traffic situation. The evaluation of the results should take place in such a form that we have direct practical useable data for measurement of noise protective walls.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings): Report No. 0609 156, Verkehrsmissionen, Immissionsschutz.		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other

COUNTRY: West Germany

PROJECT TITLE: Disturbance Effect of Expressway Noise to Those Nearby.

Performing Organization Name & Address:  
Institut fur Hygiene  
Universitt Dusseldorf

Sponsoring Organization Name & Address:  
Bundesminister fur Verkehr  
Bonn

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1978

OR:

Completion Date: Estimated:                     

Total Funding Amount:                     

Actual:                     

Comments:

PROJECT OBJECTIVE: To study various aspects and effects of freeway noise.

PROJECT DESCRIPTION: At 5 points of the North Rhine westphalia expressway we determined the objective exposure to expressway noises by means of acoustical tests and we determined the subjective disturbance effect of autobahn traffic noise on a total of 359 residents by means of questionnaires. We studied the following: (1) the picture of subjective disturbance effect and freeway noises by using an exposure model, which was developed in an earlier study. (2) differences and similarities of freeway traffic noise disturbance effect of freeway traffic noise, namely house type, position of the residence with relation to the freeway and distance of the residence from the freeway. The repetition study shows that the exposure reaction represents a timestable feature, which is well reproducible with the used method. While under the building effects, the type of houses allow us to recognize only unclear and technical effects, the position of the residence rooms gave clear effects in relation to the freeway.

SUMMARY OF FINDINGS (if project completed): The results show that freeway noises experience a much more negative evaluation than street traffic noises.

AVAILABLE PUBLICATIONS (of research findings):  
Report No. 0609 127, Verkehrsemission Immissionschutz, IDS. 701-449

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE:		
Performing Organization Name & Address:  Heinrich Gillet KG Postfach 100 6732 Edenkoben West Germany		Sponsoring Organization Name & Address:  Government of the Federal Republic of Germany
Principal Investigator(s): Obering. Günther Fritzsche Reiner Neuman (Dipl.-Phys.)		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: <u>(90,000 -- DM)</u> 1979: _____ 1981: <u>(60,000 -- DM)</u> OR: Total Funding Amount: <u>(150,000 -- DM)</u> Comments: 1980: \$42,255 1981: \$28,170 Total: \$70,425
Start Date: _____		
Completion Date: Estimated: <u>1981</u>		
Actual: _____		
PROJECT OBJECTIVE:		
PROJECT DESCRIPTION: The firm of Heinrich Gillet KG, under the direction of Obering. Günther Fritzsche (Director) and Reiner Neumann (Dipl.-Phys.) is carrying out a noise investigation of 50 cars regarding the correlations of various noise levels at the car, i.e. engine noise, intake noise, roll noise and exhaust noise, by order of the Umweltbundesamt of the German government. Special measurement methods are developed which make it possible to register the various noise levels when the vehicle is driving. The research work is carried out in the years 1980 and 1981.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  To be completed in 1981		
AVAILABLE PUBLICATIONS (of research findings):  not yet available		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: <u>Evaluating the annoyance of motor vehicle noise</u>		
Performing Organization Name & Address: PIGE Inc. Pass St. 119 5100 Aachen		Sponsoring Organization Name & Address: Federal Environmental Office Bismarck Place 1 D-1000 Berlin 33
Principal Investigator(s): Dipl.-Ing. H. Steven		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>98,850.--</u>
Start Date: <u>1-1-81</u>		OR: Total Funding Amount: <u>(98,850.-- DM)</u>
Completion Date: Estimated: <u>6-1-81</u>		Comments: <u>\$46,410.</u>
Actual: <u>                    </u>		
PROJECT OBJECTIVE: <u>Development of objective criteria to describe subjectively low noise vehicles.</u>		
PROJECT DESCRIPTION: <u>Determination of those physical structural features of vehicle noise which with consideration of psychological and sociological factors best correlate with the results of an effect analysis (evaluation by test persons). First studies on low noise trucks and light motorcycles.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings):		

Translated from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: West Germany

PROJECT TITLE:

Study of the legal basis for working out and regulating noise protection on present streets.

Performing Organization Name & Address:

Sponsoring Organization Name & Address:  
Bundesminister für Verkehr  
Bonn

Principal Investigator(s):  
Prof. Dr. E. Schmidt-Assmann  
Bochum

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)  
1978: \_\_\_\_\_ 1980: \_\_\_\_\_  
1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: August 1977

Completion Date: Estimated: \_\_\_\_\_  
Actual: \_\_\_\_\_

OR:  
Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE: The occasion of the study is the great lack of sureness and difficulties with the legal evaluation of claims for traffic noise on present streets. It is the task of the study to show legal bases for the evaluation and regulation of noise protection on present streets.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The following questions arise:

- a) Which constitutional-legal and other legal minimum preconditions are to be taken into account with regard to noise protection on present streets?
- b) Which claim bases were considered according to the valid law?
- c) Which property uses are worthy of patenting with regard to the effects of traffic noise? Can patentability only include certain areas of a piece of property?
- d) With the regulation of noise protection on present streets, is it constitutionally-legally permissible to proceed on the basis of a higher immission boundary value than in the case of new building of streets?
- e) Is there a different patentability between planned areas or in connection with built up places and the outside area? Is there also a different patentability within the named areas?
- f) What is the effect of other noise exposures originating from other sources on patentability?
- g) Can conditions lying in the sphere of the property owner exclude or reduce the patentability? What are we dealing with and from when can the effects be felt?

AVAILABLE PUBLICATIONS (of research findings):

Report No. 0609 136, Verkehrsemissionen, Immissionsschutz, IDS 701 764.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>Federal Republic of Germany</u>
PROJECT TITLE: <u>Emission values for motor vehicles - scientific technical preparation of legal regulations and EG-guidelines for determining and reducing emission boundary values for trucks, buses, passenger cars and cycles</u>		
Performing Organization Name & Address: <u>Research Institute for Noises and Vibrations Inc. - FIGE Pass St. 119 5100 Aachen</u>		Sponsoring Organization Name & Address: <u>Federal Environmental Office Bismarck Place 1 D-1000 Berlin 33</u>
Principal Investigator(s): <u>Dipl.-Ing. Heinrich Steven Dr. Ing. Hubert Frenking</u>		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___ 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(6,500,000.--)</u> Comments: <u>\$3,051,750</u>
Start Date: <u>10-1-1975</u> Completion Date: Estimated: _____ Actual: <u>8-31-1980</u>		
PROJECT OBJECTIVE: <u>Comprehensive description of the noise situation in city traffic for motor vehicles of all categories. Working out bases for reducing emission boundary values for vehicles of all categories.</u>		
PROJECT DESCRIPTION: -Travel-by noise measurements on more than 100,000 vehicles of all categories, selection of measuring sites with regard to determining representative travel and operating conditions for city traffic. -Determining the influences of operating and travel conditions on noise emissions on 23 special vehicles from all categories. -Working out proposals for alternative emission measuring methods as well as reduced boundary values.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): -Extensive data material exists concerning noises coming from motor vehicles. -The loudest vehicle categories with city-typical driving conditions are small motorcycles, motorcycles, busses and trucks. Passenger cars and delivery trucks lie much lower. -No clear relationships exist between the noise boundary values and noise emissions in city traffic. -Noise scatterings of more than 10 dB(A) are possible by means of the driver's gear selection with the same vehicle type and the same driving condition. -The contributions of the individual noise sources, motor, exhaust and tires were analyzed.		
AVAILABLE PUBLICATIONS (of research findings): <u>Research report 80-105 05 101</u> <u>Concluding reports exist partially.</u> <u>Special report 1: Travel by noise emissions on motor vehicles.</u> <u>Special report 2: Noise emissions on special motor vehicles. 2 further special reports follow as well as a final report.</u>		

Transcribed from the original German.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Highway Noise - Other</u>
		COUNTRY: <u>Federal Republic of Germany</u>
PROJECT TITLE: <u>Experience report concerning traffic stabilization and traffic jams with regard to noise and exhaust gases.</u>		
Performing Organization Name & Address: <u>Richter-Richard Planning Office</u> <u>Saar St. 86</u> <u>5100 Aachen</u>		Sponsoring Organization Name & Address: <u>Federal Environmental Office</u> <u>Bismarck Place 1</u> <u>D-1000 Berlin 33</u>
Principal Investigator(s): <u>Dipl.-Ing. Jochen Richter</u>		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____) 1978: _____ 1980: <u>(5,900.00)</u> 1979: _____ 1981: <u>(74,081.50)</u> OR: _____ <u>\$34,781</u> Total Funding Amount: <u>(79,981.50)</u>
Start Date: <u>11-1-1980</u>		Comments: <u>\$37,551</u>
Completion Date: Estimated: <u>6-15-1981</u> Actual: _____		
PROJECT OBJECTIVE: <u>The knowledge obtained with this plan should flow into the research plan for large surface traffic stabilization.</u>		
PROJECT DESCRIPTION: <u>In connection with the ongoing and planned F+E plan concerning the possibilities of noise reduction by the introduction of traffic stabilized zones, short-term information is to be gathered concerning the state of the traffic stabilization measures carried out up to now in the Federal Republic of Germany, including Berlin. It is of special interest to what extent with the carried out measures, the possibilities for noise reduction are considered or at least the noise situation is determined before and after and whether special traffic jam measures are necessary. In some cases, the subsequent estimation of the situation should be enquired into.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): <u>The project will begin with the finding of places which have carried out traffic stabilizing measures. Then a more comprehensive questionnaire can be presented to the concerned community.</u>		
AVAILABLE PUBLICATIONS (of research findings):		

Translated from the original German.



(We prefer responses in English, but can accept material in other languages.)

TOPIC: Highway Noise - Other  
COUNTRY: Federal Republic of Germany

PROJECT TITLE:  
Effects of Noise On Sleep

Performing Organization Name & Address:  
Physikalisch-Technische Bundesanstalt  
Bundesallee 100  
3300 Braunschweig  
Technische Universität Berlin,  
Institut für Psychologie  
Dovestrasse 1-5 100 Berlin 10

Sponsoring Organization Name & Address:  
Umweltbundesamt  
Bismarckplatz 1  
1000 Berlin 30

Principal Investigator(s):  
H. - O. Finke  
R. Buski

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr: x)  
1978: (8,099 DM) 1980: \$143,198  
(158,000 DM) (206,000 DM)  
1979: \$74,181 1981: \$96,717

Start Date: 1979

Completion Date: Estimated: 1981  
Actual:     

OR:  
Total Funding Amount: (677,000 DM)  
Comments: \$317,852

PROJECT OBJECTIVE: It is intended to determine the exposure to traffic noise in typical town areas. Methods of social science will be applied to describe the quality of sleep and disturbance of sleep in the population of these areas to determine the contribution of noise to the disturbance of sleep, and to see which noise situations are experienced as being unacceptable. Additionally, the validity of the rule that the noise level at night should be 10 dB below the noise level during the day will be tested.

PROJECT DESCRIPTION: In the city of Berlin 21 typical areas are selected. In each area questionnaires are answered by about 30 persons. Noise measurements are performed in each cluster at 4 work days. Additional measurements describe the noise level difference between the window facing the traffic and the head position on the pillow in the bedroom. The measurement results will be described by a number of different acoustical quantities which will be used in correlation calculations with the data of the social scientific investigations. The construction of the questionnaires is such that the quality of sleep and the sleep disturbances can be described by its psychic and somatic components.

SUMMARY OF FINDINGS (if Project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

OFF HIGHWAY AND RECREATIONAL VEHICLE NOISE:

MOTORCYCLES

See Also Page:

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(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Motorcycles  
COUNTRY: West Germany

PROJECT TITLE: Official measuring data survey for the source-specific noise emission  
of motorcycles.

Performing Organization Name & Address:  
Not yet determined.

Sponsoring Organization Name & Address:  
Environmental Protection Office  
Bismarck Place 1  
D-1000 Berlin 33  
West Germany

Principal Investigator(s):  
Not yet determined.

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1981: (50,000 DM)      1983: (100,000 DM)  
1982: (150,000 DM)

Start Date: 1981  
Completion Date: Estimated: 1983  
Actual:           

OR:  
Total Funding Amount: (300,000 DM)  
Comments: 1981: \$23,475; 1982: \$70,425;  
1983: \$46,450; total: \$140,850

PROJECT OBJECTIVE: To study whether the measurement of the source-specific noise  
emission with motorcycles is logical and possible, and which operating states are suitable  
for this.

PROJECT DESCRIPTION: In the case of motorcycles, motor noise and gas exchange noise  
are subjected to special conditions. Often the rolling noise cannot be neglected.  
Noise measurements are to be carried out on different motorcycle types in different  
operating conditions, in order to be able to indicate suitable source-specific  
measuring conditions.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Motorcycles  
COUNTRY: West Germany

PROJECT TITLE: Measures to reduce noise of small motorcycles and  
reducing the subjective annoyance.

Performing Organization Name & Address:

Zundapp-Works Inc.  
Anziger St. 1-3  
8000 Munich 80

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
Dipl.-Ing. Karl-Heinz Menzl

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: 1,137,500.--

Comments:

\$534,056

Start Date: 2-1-1978

Completion Date: Estimated: \_\_\_\_\_

Actual: 3-31-1980

PROJECT OBJECTIVE: Development of low-noise small motorcycles with a  
nominal power of 5 kW and increased piston displacement.

PROJECT DESCRIPTION: Research vehicles were developed with 80 cm<sup>3</sup> and 100 cm<sup>3</sup>  
piston displacement and compared with series vehicles (50 cm<sup>3</sup>).  
Because of the limited nominal capacity of 5 kW, the rotational speed  
level could be clearly reduced with increasing stroke volume. In addition,  
noise reducing measures were carried out on intake filters and exhaust  
gas sound dampers.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Small motorcycles of previous definition show a high noise level and have  
an annoying, high frequency noise.

Critical partial noise component of the propulsion noise is the engine  
noise, which must be reduced by a drastic reduction of the operating  
rotational speed.

Constructive, theoretical and test-technical studies form the basis  
for a proposal of a new definition.

A stroke volume of a two stroke individual cylinder of 100 cm<sup>3</sup> is a  
characteristic for a new engine concept. Further piston displacement  
increases are not practical for acoustical reasons. The achieved sound  
level reductions amount to at least 8 dB(A) compared with the presently  
valid regulations with the ISO-travelling past measurement.

AVAILABLE PUBLICATIONS (of research findings):

Research Report 105 05 107 (Federal Environmental Office)

Translated from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Motorcycles  
COUNTRY: West Germany

PROJECT TITLE: Measures to reduce the manipulation capability of piston displacement limited motorized two wheelers, phase 1: analysis and conception.

Performing Organization Name & Address:  
Battelle-Institute Inc.  
Am Römerhof 35  
6000 Frankfurt am Main

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
Dipl.-Ing. Hans-Volker Wünschler

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:      1980:       
1979:      1981:     

Start Date: 7-1-1979  
Completion Date: Estimated:       
Actual: 2-29-1980

OR:  
Total Funding Amount: (246,500--)  
Comments: \$115,731.

PROJECT OBJECTIVE: Reducing the manipulation capability of piston displacement limited motorized two wheelers.

PROJECT DESCRIPTION: It is our task to explain the outer field of manipulation on piston displacement-limited motorized two wheelers and a concept is to be indicated how a two wheeler should be built, so that it is sufficiently manipulation-safe. By the outer field of manipulation we mean the motives of manipulation as well as legal questions.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The analysis of the manipulation of piston-displacement limited motorized two-wheelers (Mofa 25, Moped/Mokick 40, Small Motorcycle) is carried out according to type, frequency and effects. After this measures are developed and evaluated for reducing the manipulation capability, which according to suitable choice lead to "load notebooks" for vehicles similar to bicycles and motor cycles.  
In addition, possible non-technical measures are proposed for reducing noise- and safety-relevant manipulations.

AVAILABLE PUBLICATIONS (of research findings):  
Research Report 105 05 114/01 (Environmental Protection Office)

-Translated from the original German.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Motorcycles</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: <u>Studies of typical manipulation possibilities on motorized two wheelers and working out preconditions for better monitoring and reduction of manipulation.</u>		
Performing Organization Name & Address: <u>Battelle-Institute Inc.</u> <u>Am Römerhof</u> <u>6000 Frankfurt am Main</u>		Sponsoring Organization Name & Address: <u>Federal Environmental Office</u> <u>Bismarck Place 1</u> <u>D-1000 Berlin 33</u>
Principal Investigator(s): <u>Dipl.-Ing. Hans-Volker Wünacher</u>		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>10-1-1980</u>		OR: <u>    </u> Total Funding Amount: <u>(245,500)</u>
Completion Date: Estimated: <u>7-31-1981</u> Actual: <u>                    </u>		Comments: <u>                    </u> \$115,262
PROJECT OBJECTIVE: <u>Aimed combatting of the manipulation possibilities on speed-limited motorized two wheelers.</u>		
PROJECT DESCRIPTION: <u>By means of the comprehensive market overview in all classes of piston displacement-limited motorized two wheelers, it was to be shown what is offered on known easy to manipulate and manipulation limited vehicles or vehicle components. The possible manipulations were studied with regard to ease of operation, recognizability and effect on noise emission. For checking instances, a general view was to be given concerning type-specific conventional manipulations.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings):		

Translated from the original German

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Motorcycles  
COUNTRY: West Germany

PROJECT TITLE:

Official Measuring Data Survey for the Source-Specific Noise Emission of Motorcycles.

Performing Organization Name & Address:  
not yet determined

Sponsoring Organization Name & Address:  
Environmental Protection Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
see above

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)  
(50,000) (100,000)  
1981: \$23,475 1983: \$26,950  
(150,000)  
1982: \$70,425 1981: \_\_\_\_\_

Start Date: 1981  
Completion Date: Estimated: 1983  
Actual: \_\_\_\_\_

OR:  
Total Funding Amount: (300,000)  
Comments: \$140,850

PROJECT OBJECTIVE: Study whether the measurement of the source-specific noise emission with motorcycles is logical and possible, and which operating states are suitable for this.

PROJECT DESCRIPTION: In the case of motorcycles, motor noise and gas exchange noise are subjected to special conditions. Often the rolling noise cannot be neglected. Noise measurements are to be carried out on different motorcycle types in different operating conditions, in order to be able to indicate suitable source-specific measuring conditions.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

OFF HIGHWAY AND RECREATIONAL VEHICLE NOISE  
MOTERBOATS

See Also Page:

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(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Motorboats  
COUNTRY: Sweden

PROJECT TITLE: Structurebound Sound in Small Crafts Excited by Mechanical and Acoustical Forces from Engine and Propeller

Performing Organization Name & Address:

AB Volvo Penta  
30508 Gothenburg  
SWEDEN

Sponsoring Organization Name & Address:

Styrelson for Tekuisk  
Utueching, Stockholm,  
SWEDEN

Principal Investigator(s):

Lennait Brandt

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )  
(60,000) (20,000)  
1978: \$12,954 1980: 4,318  
(70,000)  
1979: \$15,113 1981:     

Start Date:     

Completion Date: Estimated:     

Actual:     

OR:

Total Funding Amount: (150,000)  
Comments: 32,385

PROJECT OBJECTIVE:

How to decrease structurebound sound in small crafts.

PROJECT DESCRIPTION:

Study of forces emitted at engine mounts, through propeller shaft bearings in water from propeller blades. Holographic investigation of boat vibration modes. Vibration transmission in boats of different build.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Propeller pulses from water and bearing are just as important a noise source as engine. Gas pulse forces twist boat and excite vibration. Boat bottom close to propeller should be stiff and not sensitive to pulses. Visco-elastic material and sandwich construction, heavy engine bed in boat withstands vibrations.

AVAILABLE PUBLICATIONS (of research findings):  
STU-report 76-4630 (In Swedish)

Motorboats  
Abbreviated Listings

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9, 5NH, United Kingdom. H.L. Pullen. Marine auxiliary engine noise and its reduction.

OFF HIGHWAY AND RECREATIONAL VEHICLE NOISE  
HOVERCRAFT

Hovercraft  
Abbreviated Listings

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9, 5NH, United Kingdom. D. Anderton. Environmental and propeller noise of hovercraft.

RAIL NOISE  
LOCOMOTIVES AND PASSENGER TRAINS

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Locomotives and Passenger Trains

COUNTRY: Japan

PROJECT TITLE:

New Noise-proof Wheel

Performing Organization Name & Address:

Sumitomo Metal Industries, Ltd.  
Osaka Steel Works  
3-1-109, Shimaya, Konohana,  
Osaka  
JAPAN

Sponsoring Organization Name & Address:

Principal Investigator(s):

Shigeo Sugawara  
Manager, No.1 Designing Section

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

Start Date: April 1980

Completion Date: Estimated: April 1982

Actual: \_\_\_\_\_

PROJECT OBJECTIVE:

Develop new type of noise-proof wheels for heavy transit cars

PROJECT DESCRIPTION:

- 1) Design new noise proof wheel
- 2) Manufacture sixteen (16) test wheels
- 3) Laboratory test
- 4) Running test
- 5) Endurance test

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Design, manufacture and laboratory test were completed.  
Running test will be conducted on February 1981.

DISCUSSIONS (of research findings):



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Locomotives and Passenger Trains

COUNTRY: West Germany

PROJECT TITLE: Location and Identification of Sources of Railway Noise

Performing Organization Name & Address:

DFVLR-Berline  
Muller - Breslan Str. 8  
1 Berlin 12, Germany

Sponsoring Organization Name & Address:

BMFT (Federal Ministry for Research  
and Technology)  
Bonn, West Germany

Principal Investigator(s):

W.F. King III  
D. Berhert

Annual Funding:

(Check One: Fiscal Yr: _____ Calendar Yr: _____)	
1978: (DM 250,000)	1980: (DM 460,000)
1978: \$117,375	1980: \$215,970
(DM 280,000)	(DM 250,000)
1979: \$131,460	1981: \$117,375

Start Date: Dec. 1977

Completion Date: Estimated: June 1981

Actual: \_\_\_\_\_

OR:

Total Funding Amount: (DM 1,240,000)

Comments: \$582,180

PROJECT OBJECTIVE: Locate and identify radiated railway noise sources which include wheel/rail interactions and aerodynamic fluctuations.

PROJECT DESCRIPTION:

A linear array of 15 microphones was used to locate sources of radiated noise generated by high-speed electric trains travelling at speeds up to 250 km/h. The ultimate goal of this project is to provide information useful in reducing radiated noise levels on new German trains designed to operate at speeds up to 350 km/h.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Not yet available.

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Locomotives and Passenger Trains  
COUNTRY: West Germany

PROJECT TITLE: Causes and Limiting Quantities of Sound Level Scatterings Occuring  
in the Contact Area Between Wheel and Rail.

Performing Organization Name & Address:  
Technical University Berlin  
-Institute for Vehicle Technology  
Field of specialty "Track-bound  
vehicles"  
-Institute for technical acoustics

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
Prof. Dr. Ing. H. Bugarcic  
Prof. Dr. rer. nat. M. Heckl

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 4/1/79

OR:

Total Funding Amount: (380,000)

Completion Date: Estimated: 7/31/81

Comments:

\$178,410

Actual:                     

PROJECT OBJECTIVE: It was our objective to investigate the parameters for the sound  
radiation of vehicles running on rails.

PROJECT DESCRIPTION:

- Working out and laboratory testing of different measuring methods.
- Testing different measuring procedures on a city trolley car.
- Measurements on city trolley cars with the help of measuring methods found to be suitable and study of the relevant parameters for noise radiation in the wheel set, in the contact zone as well as on the highway (top of roadbed).

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

RAIL NOISE  
INNOVATIVE GUIDED MASS TRANSIT

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Innovative Guided Mass Transit  
COUNTRY: West Germany

PROJECT TITLE:

Innovative Noise Protection Methods in the Rail Area of Railroads

Performing Organization Name & Address:

Dorsch Consult  
Engineering Firm Inc.  
Elsenheimer St. 63  
8000 Munich 21

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):

Dr. Ing. Wolf-Dietrich Sammer

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount: (81,500.--)

Comments: \$38,264

Start Date: 11-1-1979

Completion Date: Estimated:                     

Actual: 6-30-1980

PROJECT OBJECTIVE: Reducing noise propagation of the wheel-rail noise  
in railroads.

PROJECT DESCRIPTION:

We studied the possibility of using low sound protection walls  
(wall height between 0.35 and 0.8 m) at a small distance from the rail.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

This report concerns itself with the phase in which the legal and  
operational requirements, the tests up to now for sound reduction on  
railroads were analyzed. Possible protective measures for sound  
reduction were developed in the area of the contact zone between wheel  
and rail and the effectiveness was theoretically determined and discussed.  
The effectiveness in practice was tested with temporary measures and  
verified by measurements. The study includes the railroads of the  
German Railroad as well as trolley and streetcar tracks.

AVAILABLE PUBLICATIONS (of research findings):

Research Report 105 05 602/01 (Environmental Protection Office)

Translated from the original German.

RAIL NOISE  
RAIL MODEL ANALYSIS AND PREDICTION

See Also Pages:

81  
82  
110  
366  
367  
370

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Rail Model Analysis and Prediction</u>
		COUNTRY: <u>Belgium</u>
PROJECT TITLE: <u>Guide-line for the calculation of railway traffic noise</u>		
Performing Organization Name & Address: <u>Laboratorium voor Akoestiek en Warmtegeleiding Katholieke Universiteit Leuven Celestijnenlaan 200 D 3030 Heverlee (Belgium)</u>		Sponsoring Organization Name & Address: <u>Commission of the European Communities rue Guimard 10 BRUSSELS</u>
Principal Investigator(s): <u>H. Myncke A. Cops P. De Belger</u>		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    </u> 1980: <u>    </u> 1979: <u>    </u> 1981: <u>    </u>
Start Date: <u>December 1979</u>		OR: <u>    </u> Total Funding Amount: <u>43,000 USA Doll.</u>
Completion Date: Estimated: <u>    </u> Actual: <u>October 1980</u>		Comments: <u>    </u>
PROJECT OBJECTIVE: <u>Creation of a guide-line for railway traffic noise prediction intended for non specialists in acoustics, viz. the local authorities of the European municipalities</u>		
PROJECT DESCRIPTION: <u>Starting from the existing literature on the subject a simple, useful prediction method for railway traffic noise had to be drawn up, using graphs, nomograms and tables to keep the procedure as simple and clear as possible for outsiders.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): <u>The final report contains following parts:</u> 1) parameters of railway noise and possible improvements (noise source propagation path/receiver) 2) calculation method: $-L_{max}$ of one train pass-by $-L_{eq}$ of the hourly railway traffic 3) examples of calculation 4) selected bibliography		
AVAILABLE PUBLICATIONS (of research findings): <u>H. Myncke, A. Cops, P. De Belger - Guide-line for the calculation of railway traffic noise - C.E.C. (Commission of the European Communities). Final report 1980, 105 p.</u>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Rail Model Analysis and Prediction

COUNTRY: Bulgaria

PROJECT TITLE: Theoretical Model and Investigation of Pass-by Noise from Trains

Performing Organization Name & Address:  
National Office for Environment and  
Conservation, State Institute for  
Hygiene  
Budapest  
HUNGARY

Sponsoring Organization Name & Address:

Principal Investigator(s):

L. Czabalay  
F. Hirka

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_

Actual: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE: To develop a prediction model to measure the noise from different  
length and types of trains and engines.

PROJECT DESCRIPTION: A theoretical prediction model was developed including such parameters as the length and velocity of the train and the distance of the observer from the tracks. The model assumed that the train was a line source, with the cars as loud as the locomotive, which proved a good approximation for electric trains. Field measurements were taken in the free field at a height of 1.5 m, 50 m from the tracks for 51 train pass-bys. 155 measurements were taken on freight trains, diesel trains, and non-welded rail. Measurements were also made on electric trains and welded rail.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

The means difference between measured and predicted results was 0.9 dBA, with a standard deviation of 1.7 dBA.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Rail Model Analysis and Prediction

COUNTRY: CANADA

PROJECT TITLE:  
Noise Study in and around the CP Rail Agincourt  
Marshalling Yard

Performing Organization Name & Address:  
Independent Acoustic Laboratories Ltd.,  
Suite 32,  
1262 Don Mills Rd.,  
DON MILLS, Ontario.  
M3B 2W7

Sponsoring Organization Name & Address:  
Railway Transportation Directorate  
Transport Canada  
27G Tower C  
Place de Ville,  
Ottawa, Ontario.  
K1A 0N5

Principal Investigator(s):

S.S. Wilson

Annual Funding:

(Check One: Fiscal Yr: X Calendar Yr:     )

1978:                      1980:                     

1979: (112,700) 1981:                     

OR: \$93,732

Total Funding Amount:                     

Comments:

Start Date: FEB. 1979

Completion Date: Estimated:                     

Actual: MARCH 1980

PROJECT OBJECTIVE: To develop mathematical models to predict  $L_{eq}(24)$  contours  
around railway hump yards

PROJECT DESCRIPTION: Measurements and Tape Recordings were made for:

- 1151 Master Retarder Events
- 214 Group Retarder Events
- 791 Pull-Outs at inert Retarders
- 188 Coupling Events
- Locomotive noise at the hump, diesel shop, inbound, out-bound trains, pull-out operations, yard engines
- Long term noise monitoring at 9 position in yard, 19 outside yard

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Mathematical models were developed for

- Master Retarder Squeal
- Group Retarder Squeal
- Inert Retarder Squeal
- Coupling Impact Noise
- Locomotive Noise

AVAILABLE PUBLICATIONS (of research findings): -

Nil

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Rail Model Analysis and Prediction</u>
		COUNTRY: <u>Denmark</u>
PROJECT TITLE: <u>Computing model for rail noise</u>		
Performing Organization Name & Address: Acoustical Laboratory Technical University Building 352 DK-2800 LYNGBY DENMARK	Sponsoring Organization Name & Address: Nordic Ministerial Council (Nordiska Ministerrådet) Postboks 6753 St Olavs plass OSLO 1 NORWAY	
Principal Investigator(s):  Jürgen Kragh	Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: <u>(130,000 (Sw Cr))</u> OR: Total Funding Amount: <u>\$ 30,000</u> Comments:	
Start Date: <u>1981</u>	Completion Date: Estimated: <u>1983</u> Actual: _____	
PROJECT OBJECTIVE: To give possibilities to calculate the noise level instead of measure it		
PROJECT DESCRIPTION: The schedule for the project is 1981 - collect existing information - draw conclusions from the information - choose noise descriptor 1982 - work out the computing model 1983 - considerations		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  The project has not yet started.		
AVAILABLE PUBLICATIONS (of research findings):		



(We prefer responses in English, but can accept material in other languages.)

TOPIC: Rail Model Analysis and Prediction

COUNTRY: Netherlands

PROJECT TITLE: Yardsticks and Limits for Noise from Railways

Performing Organization Name & Address:  
Technisch Physische Dienst TNO-TH  
(Institute of Applied Physics TNO-TH)  
Postbus 155  
2600 AD DELFT  
NETHERLANDS

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: 1976

OR:

Completion Date: Estimated: \_\_\_\_\_  
Actual: \_\_\_\_\_

Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: This report discusses yardsticks and limits for noise from railway lines based on present knowledge, pending the results of surveys in The Netherlands and other countries. It concludes that it is not necessary for the time being to retain  $L_{max}$  as a yardstick for noise in addition to  $L_{eq}$ . It proposes using  $L_{d(rail)}$  as a provisional yardstick for noise near dwellings, defined as the equivalent noise level over day-evening-night in dBA. It also concludes that the provisional maximum noise level  $L_{d(rail)}$  of 60 dBA can be regarded as giving reasonable to good conditions; the percentage of people "annoyed" is less than 30 and does not include any "seriously annoyed". Provisionally, again, very good to excellent conditions can be expected with a noise level ( $L_{d(rail)}$ ) of no more than 55 dBA, the percentage of people "annoyed" being less than 15. The yardstick and limits can be used for all locations near railway lines and for the ratios between passenger and goods trains customary at present, provided limits are placed on the noise emitted by trains. Where new lines are constructed in existing residential areas it would seem that allowance must be made for poorer noise conditions with the noise levels mentioned.

SUMMARY OF FINDINGS (if project completed):

AVAILABLE PUBLICATIONS (of research findings):

Report RL-HR-03-01

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Rail Model Analysis and Prediction  
COUNTRY: Norway

PROJECT TITLE: Noise From Rail Bound Traffic

Performing Organization Name & Address:

Kilde  
Postboks 229, N-5701 VOSS  
Norway

Sponsoring Organization Name & Address:

MILJØVERNDEPARTEMENTET  
Postboks 8013 Dept., Oslo 1. Norway  
  
SAMFERDSELSDEPARTEMENTET  
Dept. Oslo 1, Norway

Principal Investigator(s):  
Matias Ringheim

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr: x)  
1978:                      1980: 15,000  
1979:                      1981: 10,000

Start Date: March 1980

Completion Date: Estimated: Early 1981  
Actual:                     

OR:  
Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE: To develop a simple prediction procedure for rail traffic noise and to present a foundation for noise immission criteria.

PROJECT DESCRIPTION: Rail traffic does not represent a noise problem on the same scale as road traffic noise. Plans for increasing train speeds, more powerful engines, increasing traffic etc. are factors which may change this. Immission criteria and prediction methods are seen as necessary aids to the planner - also in relation to the building of new houses near existing lines and extension of new lines (to industrial premises and to existing subway lines, in particular) - in order to avoid future problems.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

A proposal for a simple prediction method will be completed early in 1981. This will be used, with possible modifications, as a guide to planners until the Scandinavian prediction method for railway noise is available by approx. 1983.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Rail Model Analysis and Prediction</u>
		COUNTRY: <u>Switzerland</u>
PROJECT TITLE: <u>Calculation Model for Railroad Noise</u>		
Performing Organization Name & Address:  EMPA <u>8600 Dübendorf</u> Switzerland		Sponsoring Organization Name & Address:  Federal Environmental Office <u>3003 Berne</u> Switzerland
Principal Investigator(s): R. Hofmann A. Rosenheck		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>1978</u>		OR: Total Funding Amount: <u>ca. \$ 30,000</u>
Completion Date: Estimated: <u>                    </u> Actual: <u>Nov. 1978</u>		Comments:
PROJECT OBJECTIVE: <u>Calculation Model for Railroad Noise</u>		
PROJECT DESCRIPTION:  A large number of measurements of train pass-bys was performed at various distances. Based on these measurements, experience and literature, the calculation model was formulated.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  The prediction method takes into account the train speed, length, distance to observer, sound frequency, and number of pass-bys per hour. The noise characteristics are based on the assumption that the wheel radiates as a dipole source. Factors such as ground and air attenuation are also accounted for; the design of barriers is also discussed.		
AVAILABLE PUBLICATIONS (of research findings):  Berechnungsmodell für Eisenbahn (Calculation model for Railroad Noise) in German, EMPA, Dübendorf, Switzerland		

I prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Rail Model Analysis and Prediction</u> COUNTRY: <u>West Germany</u>
PROJECT TITLE: <p style="text-align: center;">Basic Investigations on the Noise-Generating-Mechanisms          of the Rail/Wheel-System.</p>		
Performing Organization Name & Address: Institut für Technische Akustik Technische Universität Berlin Einsteinufer 27 1000 Berlin 10 West Germany	Sponsoring Organization Name & Address: Federal Ministry for Research and Technology (BMFT) (Fed. Rep. of Germany)	
Principal Investigator(s): Prof. Dr. rer. nat. Manfred Heckl Joachim Feldmann Heinz-Martin Fischer	Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____ 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(416,490.-- DM)</u> Comments: \$195,542	
Start Date: <u>1. Aug. 1977</u> Completion Date: Estimated: <u>3/31/80</u> Actual: <u>3/31/80</u>		
PROJECT OBJECTIVE: Basic Investigations on the Structure-Borne-Noise Generating-mechanisms of the Rail/Wheel-System under different parameters.		
PROJECT DESCRIPTION: Extensive measurements of sound pressure and structure-borne- sound at standing and driving trains and at rails of "Deutsche Bundesbahn" were done. The behavior of the several interesting components under different para- meters was examined. In addition investigations on a simple rolling model gave some fundamental information about the rolling noise/steel on steel. Finally the investigations were completed with theoretical considerations and some bibliography studies to a general view of possible generating mechanisms of structure-borne-noise of the Rail/Wheel-System.		
SUMMARY OF FINDINGS (if project completed): The noise of railroad passenger trains <del>STATIONARY AND MOVING TRAINS</del> essentially is generated in the contact area of rail/ wheel and is radiated as well from the wheels and the bogie as from the rails and the track. The important parameters of the noise e.g. are the driving-speed, rail and wheel design or track and tread quality. There are many dependences between these parameters. The results show that the noise-behavior is very dependent on the investigated Rail/Wheel-System (e.g. Deutsche Bundesbahn), so that it is critical to make a comparison with other Systems like SNCF, British Rail, MBTA, Pullman etc. A look of mechanisms still shows (in connection with the rolling model and the theory) that the main noise source lies in the rolling process it- self. But it is dependent on roughness and the impedances of the rolling body and track and is under great influence of drive dynamics (Indirect noise mechanism). Other not so important possible mechanisms are found in the periodic supported track with a moving load and in the changes of the contact area. Because of the very complex behavior of the Rail/Wheel-System and in case of noise reduction provisions it is necessary to continue these investigations.		
AVAILABLE PUBLICATIONS (of research findings): Untersuchungen zur Körperschallentstehung beim Rad/Schiene-System, Research Summary Report, Technische Universität Berlin, Inst. für Techn. Akustik, Nov. 1980. Fischer, H.M., Noise Generation by Railroad Coaches, Journ. of Sound and Vibration (1979) 66(3), 333 ff. Deutsche Eisenbahn Consulting, Frankfurt: Statusseminarberichte.		

We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Rail Model Analysis and Prediction

COUNTRY: West Germany

PROJECT TITLE: Basic Investigations on the Noise Generating Mechanisms of the Rail/Wheel-System and Preparation of Methods for Noise Reduction.

Performing Organization Name & Address:

Institut für Technische Akustik  
Technische Universität Berlin  
Einsteinufer 27

1000 Berlin 10  
West Germany

Sponsoring Organization Name & Address:

Federal Ministry for Research and  
Technology (BMFT),  
West Germany

Principal Investigator(s):

Prof. Dr. rer. nat. Manfred Heckl  
Joachim Feldmann  
Heinz-Martin Fischer  
Werner Scholl

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: (775,600,--- DM)

Comments: \$364,144

Start Date: 7/1/80

Completion Date: Estimated: 2/29/84

Actual: \_\_\_\_\_

PROJECT OBJECTIVE:

Basic investigations of structure-borne-noise of the Rail/Wheel-System, generating mechanisms, noise reduction methods.

PROJECT DESCRIPTION: Based on the preceding project, the investigations of structure-borne-noise generating mechanisms of the Rail/Wheel-System are continued. Therefore it is necessary to carry on with measurements at the real system just as those at a simple rolling model. Special aspects like roughness, excitation- and brake-noise problems shall be examined. This knowledge in connection with theoretical studies are the fundamentals for the following noise reduction methods: i.) reduction of the structure-borne-noise in the contact area and ii.) reduction of the noise transmission to other components. Such methods have to be worked out.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

\* On the preceding page.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Rail Model Analysis and Prediction

COUNTRY: West Germany

PROJECT TITLE: Noise measurements on rail vehicles.

Performing Organization Name & Address:  
Research Institute of Noise and  
Vibrations FIGE  
Pass St. 119  
5100 Aachen  
West Germany

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33  
West Germany

Principal Investigator(s):  
Dipl. Ing. Folker Moschel

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: January 7, 1980

Completion Date: Estimated: Oct. 6, 1980  
Actual:                     

OR: Total Funding Amount: (75,000 DM)  
Comments: \$35,212

PROJECT OBJECTIVE: The data in a draft of the regulation to §38 BImSchG (Limiting Noise Emission of Rail-Running Vehicles) is to be tested. Noise emissions of present rail-running vehicles should be determined according to the measuring method.

PROJECT DESCRIPTION: Noise emission measurements were carried out on 35 driven vehicles and cars of the most different types and models for the Association of Public Transport Operations (VOV) and the Federal Ministry of German Railroads (BDE). Modern universal vehicles as well as older, partially modernized vehicles were included in the studies. The selection of the operating states as well as the measuring procedures belonging thereto were given. It was to be determined to what extent the measuring method can be carried out in practice. Also, emission values of track-running vehicles should be determined according to the measuring method.

#### SUMMARY OF FINDINGS:

It was shown that adhering to the given operating conditions provided no difficulties. It was more difficult to adhere to the requirements made for the measuring place and the roadway. That applies especially for the area of public short-range traffic, sections of which run partially only in built-up areas. The individual measuring results of the vehicles show that the emission boundary values planned in the draft of the regulation were selected completely realistically, since older modernized vehicles can adhere to the boundary values.

#### AVAILABLE PUBLICATIONS (of research findings):

Research Report 105 05 601/01 (Federal Environmental Office)

Translated from the original German.

RAIL NOISE

RAIL NOISE - OTHER

(prefer responses in English, it can accept material in other languages.)		TOPIC: <u>Rail Noise - Other</u>
		COUNTRY: <u>FRANCE</u>
PROJECT TITLE: <p style="text-align: center;">Interference of Train Noise and Road Noise with Sleep</p>		
Performing Organization Name & Address:  IRT- CERNE 109, Avenue Allandé 69672 Bron Cédex FRANCE		Sponsoring Organization Name & Address:  <p style="text-align: center;">S N C F</p>
Principal Investigator(s):  M. VERNET		Annual Funding: 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(150,000 FF)</u>
Start Date: _____ Completion Date: Estimated: <u>1976</u> Actual: <u>1979</u>		Comments: <u>\$29,895</u>
PROJECT OBJECTIVE: <p style="text-align: center;">Interference of train noise and road noise with sleep</p>		
PROJECT DESCRIPTION: In situ recording of sleep physiological parameters of inhabitants living near road and train tracks. Comparison between the sleep interferences by train noise and road noise.		
SUMMARY OF FINDINGS (if project completed):		
<ol style="list-style-type: none"> <li>1) For the same value of Leq, three times as many disturbances due to the noise from road traffic were found as there were due to the train noise. The data on sleep reactions for all the noise events (with same peak level) does not show a better adaptation than that for the road noise.</li> <li>2) In a quiet place, emergence - namely difference between peak level and back ground noise - is a very important factor in sleep disturbances. In both, there is a very good correlation between peak level and sleep disturbance.</li> </ol>		
WHERE FINDINGS PUBLISHED:		
<ol style="list-style-type: none"> <li>1) Journal of sound and Vibration ( 1979 ) <u>66</u> (3), 483 - 492</li> <li>2) Conclusions ; unpublished.</li> </ol>		



(We prefer responses in English, but can accept material in other languages.)

TOPIC: Rail Noise - Other  
COUNTRY: Sweden

PROJECT TITLE:

Annoyance Reactions due to Railway Noise.

Performing Organization Name & Address:

The National Institute of Environmental  
Medicine  
Box 60208  
S-104 01 Stockholm  
Sweden

Sponsoring Organization Name & Address:

The National Swedish Environment  
Protection Board  
Box 1302  
S-171 25 Solna  
Sweden

Principal Investigator(s):

Stefan Sörensen

Annual Funding:

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: (SwCr 250,000)

Start Date: January 7, 1975

Completion Date: Estimated: December 1980

Actual: \_\_\_\_\_

Comments:

\$53,975

PROJECT OBJECTIVE:

To study the distribution of annoyance reactions from the exposure of noise from trains.

PROJECT DESCRIPTION:

Social survey studies to assess the presence of general annoyance were made in different areas exposed to railway noise. The areas of investigation were chosen in order to evaluate conditions in areas exposed to 70-90 dB(A).

SUMMARY OF FINDINGS (if project completed):

The results show that an increase in the number of passing trains increases annoyance up to a certain level, after which a leveling off takes place. Hence, there is no real annoyance in areas exposed to a maximum of 50 train passages/24 hours until the noise level reaches above 85 dB(A). If, on the other hand, train passages are 60 or more, annoyance increases according to the dB(A) level from the noisiest type of train.

WHERE FINDINGS PUBLISHED:

To be published.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Rail Noise - Other

COUNTRY: Sweden

**PROJECT TITLE:**

Relation between train noise studies in Sweden, Denmark, Great Britain and Holland

**Performing Organization Name & Address:**

The National Institute of  
Environmental Medicine

**Sponsoring Organization Name & Address:**

Nordic Ministerial Council  
(Nordiska Ministerrådet)  
Postboks 6753 St Olavs plass  
OSLO 1  
NORWAY

**Principal Investigator(s):**

Stefan Sørensen

**Annual Funding:**

(Check One: Fiscal Yr: Calendar Yr:  
(32 000 Sw Cr))

1978: \_\_\_\_\_ 1980: \$ 6,909

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

**OR:**

**Total Funding Amount:** \_\_\_\_\_

**Comments:**

**Start Date:** 1980

**Completion Date: Estimated:** \_\_\_\_\_

**Actual:** 1981

**PROJECT OBJECTIVE:**

To choose the best noise descriptor

**PROJECT DESCRIPTION:**

The following fields will be discussed

1. Noise descriptors (number of events,  $L_{eq}$ , day/evening/  
night noise etc)
2. Annoyance scaling
3. Train noise vs aircraft and traffic noise
4. Indoor/outdoor noise
5. Legislation

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

The project will be finished in the year of 1981

**AVAILABLE PUBLICATIONS (of research findings):**

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Rail Noise - Other  
COUNTRY: United Kingdom

PROJECT TITLE: Community Reactions to Railway Noise

Performing Organization Name & Address:

Institute of Sound and Vibration Research  
The University  
Southampton SO9 5NH  
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council  
Swindon, Wilks, UK  
British Railways Board  
Railway Technical Center, Derby, UK

Principal Investigator(s):

J.M. Fields and J.G. Walker

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: 1974

Completion Date: Estimated: \_\_\_\_\_

Actual: 1979

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE:

To study the reactions to railway noise in residential areas close to railway lines in United Kingdom.

PROJECT DESCRIPTION: The Institute of Sound and Vibration Research at the University of Southampton has concluded a four year study of reactions to railway noise in residential areas. The study was carried out using a combined social survey and noise measurement program in which residents' reactions and railway noise levels were measured in 403 neighbourhoods along 75 sections of railway routes in Great Britain. The reactions of 1453 residents were measured in 45 minute interviews. The descriptions of railway noise levels were based on complex computer analyses of tape recordings of over 1,700 pass-bys from the 403 measurement sites. The use of a probability sample design has enabled statistics to be computed which are statistically representative of the British population near railway lines.

SUMMARY OF FINDINGS (if project completed): The 24 hour Leq dBA noise index appears to be the most practical choice of indices for representing railway noise. The noise and number trade off implicit in Leq fits the data better than any of the other established indices tested. There appears to be an additional duration effect which Leq does not account for. The comparison of these railway data with three aircraft surveys (around Heathrow) and two English road traffic surveys, suggests that, at least above 60dBA Leq, railway noise is less annoying than noise from these other sources. The estimated size of the difference in reactions depends upon the survey with which the comparison is made as well as the noise level. As noise level increases the gap between reaction to railway and other noise sources increases. At railway noise levels equivalent to 74dBA Leq the same level of annoyance is reached with the other sources at a noise level of 6 dB lower in one case and at least 10 dB lower in other cases. At high noise levels people alongside overhead electrified routes report less annoyance than people near third rail or diesel routes. In the 55-75 dBA Leq range the difference in general annoyance is equivalent to at least a 10 dBA difference in noise level.

AVAILABLE PUBLICATIONS (of research findings): J.M. Fields and J.G. Walker 1980. ISVR Technical Report 102. Reactions to railway noise: a survey near railway lines in Great Britain.

Transcribed from the original.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Rail Noise - Other

COUNTRY: UNITED KINGDOM

PROJECT TITLE: Study of Relationship between Railway Traction Type and Noise Annoyance.

Performing Organization Name & Address:

University of Southampton  
Southampton  
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council  
PO Box 18  
Swindon SN2 1ET  
United Kingdom

Principal Investigator(s):

Professor J.B. Large  
Mr. H.E. Williams  
Mr. R.L. Pocock

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:      1980:     

1979:      1981:     

Start Date:     

Completion Date: Estimated:       
Actual:     

OR:

Total Funding Amount: (£24,200 over)  
2 years  
(£53,282)

PROJECT OBJECTIVE: The objectives of the work proposed here are: 1) To determine the causes of the different annoyance reactions to diesel, third-rail electric and overhead electric trains and routes; 2) To examine the acoustical characteristics of the train noise which may be responsible for these differences; 3) To determine the subjective effect of changing from diesel to electrification of a route; 4) To examine other relevant factors which affect responses.

PROJECT DESCRIPTION: Comments by Prof. Large: 1) I believe that cooperative research in this field is important for not only does it avoid duplication of effort but it enables technology to be transferred into problems that have similar solutions, for example, some of the mechanisms of railway wheel noise generated are equivalent to the noise generating mechanisms found in automobile tyres and therefore research in either area could have an effect on development of a noise control strategy in the other. The cooperative research is also very important in the area of noise effects particularly if standardised experimental techniques can be agreed. 2) Location: ISVR. Timing: Three possible dates next year are available for such a meeting. The first is in relation to an international course on engine noise and vibration control to be held at ISVR 23/26 March. The second is the Third Railway Noise Workshop jointly sponsored by US Dept. of Transportation, Bolt Beranek & Newman, and ISVR to be held in Pueblo, Colorado, May 6/7/8, and the third is Internoise 81 in Amsterdam on Oct. 6/7/8. Participants: Representatives from sponsoring organisations and researchers should be invited to participate but participation should only be for those directly involved with a particular subject. Breadth: Single topics are more effective for example, the railway noise workshops have stimulated work in this area, the meeting comprises of workers from a number of countries who have a direct and active interest in railway noise control. The frequency of the meeting is dependent on the results of the first discussions and it is important any discussions be recorded and perhaps published as a document or paper in a journal.

AVAILABLE PUBLICATIONS (of research findings):

**SURFACE VEHICLE COMPONENTS NOISE**

**ENGINE**

**See Also Pages:**

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(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: Australia

PROJECT TITLE: Significant Aspects of Engine and Exhaust Brakes

Performing Organization Name & Address:  
CIPAC & PARTNERS PTY. LTD.  
30-32 Claremont St.,  
South Yarra. 3141  
Victoria, Australia.

Sponsoring Organization Name & Address:  
AUSTRALIA ENVIRONMENT COUNCIL  
C/- State Pollution Control Committee  
GPO Box 4065  
Sydney, N.S.W. 2001.

Principal Investigator(s):

Dr. Norm Broner  
Russell Brown  
Peter Bunker  
Steve Mizzi

Annual Funding:

(Check One: Fiscal Yr:  Calendar Yr: )

1978: \_\_\_\_\_ 1980:  \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_

Actual: \_\_\_\_\_

OR:

Total Funding Amount: (\$10,000)

Comments: \$11,547

PROJECT OBJECTIVE: To document all significant aspects relating to use of engine and exhaust brakes on heavy vehicles.

PROJECT DESCRIPTION:

The existing types of engine and exhaust brakes in Australia were surveyed and details of their principles of operation reviewed. The market share of the major types of brakes was documented and user preferences established by means of a survey questionnaire. Noise and brake efficiency tests were carried out on all major combinations of engine, and exhaust brake and engine.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

In order to assess the noise emitted by and braking efficiency of engine/exhaust brakes on heavy vehicles, a representative mix of engine/exhaust brake types (e.g. butterfly, cone-in-seat, Jacobs and Dynatard) on the most common engine configurations was identified. A total of 12 different vehicles (including one with a hydraulic and one with an electro-magnetic retarder) were tested during a 2-day test exercise at Mangalore airport. A special noise emission test, designated Reverse 28A, was devised based on the present vehicle noise test requirement, Australian Design Rule 28A. Passby-at-speed tests were also conducted with microphone layout as per A.D.R. 28A.

Transcribed from the original.

AVAILABLE PUBLICATIONS (of research findings):

VIPAC REPORT NO. 30/799

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Engine  
COUNTRY: Austria

PROJECT TITLE: Future Diesel Engine

Performing Organization Name & Address:  
AVL - Anstalt fuer Verbrennungskraft-  
maschinen (Institute for internal com-  
bustion engines)  
Kleiststrasse 48, A-8020 Graz, Austria

Sponsoring Organization Name & Address:  
Forschungsfoerderungsfonds der  
Gewerblichen Wirtschaft  
Rotenturmstrasse 16-18, A-1011 Vienna,  
Austria

Principal Investigator(s):  
Greier, J / Skatsche, O / Schreiber, E /  
Cartellieri, W

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1975

OR:

Completion Date: Estimated: 1978  
Actual: active

Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE: Development of a prototype Diesel engine to power light vehicles in urban areas with low fuel consumption.

PROJECT DESCRIPTION:

STATUS REPORT (if in progress):

The aim is to develop a prototype Diesel engine which meets problems like fuel consumption, environmental pollution, operational behavior, weight and production costs better than conventional Diesel engines. The project is divided into four main sections: (1) design and construction of the parts necessary for the provisional development of a suitable combustion system for single cylinder engines; (2) testing of various combustion system concepts on single cylinder engines; (3) design and construction of a multi-cylinder prototype having the combustion system judged as optimum; (4) final development of the combustion system for the multi-cylinder prototype and testing of the engine with respect to the requirements laid down.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine

COUNTRY: Austria

PROJECT TITLE: Study of new types of low-noise engines to determine relations between noise and parameters associated with the casing

Performing Organization Name & Address:

AVL - Anstalt fuer Verbrennungskraft-  
maschinen (Institute for internal  
combustion engines)

Kleiststrasse 48, A-8020 Graz, Austria

Sponsoring Organization Name & Address:

Forschungsvereinigung Verbrennungskraft-  
maschinen e.V.

Lyoner Strasse 18, D-6000 Frankfurt/  
Main, West Germany

Principal Investigator(s):

Thien,GE / Fachbach,HA / Groebner,W

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount:                     

Comments:

Start Date: 1975

Completion Date: Estimated: 1977

Actual: active

PROJECT OBJECTIVE: Research into the occurrence of noise in a new generation of engines

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Research into the occurrence of noise in a new generation of engines and on the influence of various parameters of the body noise insulation. This led to an external casing which is supported at few points by flexible sound-damping elements inside. This closed external casing may be used to silence a conventional engine, and may also be integrated into the design of the engine.

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>Austria</u>
PROJECT TITLE: <u>New ways of designing low-noise cooling and ventilation systems for internal combustion engines, especially for motor vehicles</u>		
Performing Organization Name & Address: <u>AVL- Anstalt fuer Verbrennungskraftmaschinen (Institute for internal combustion engines)</u>  <u>Kleiststrasse 48, A-8020 Graz, Austria</u>		Sponsoring Organization Name & Address: <u>Forschungsvereinigung Verbrennungskraftmaschinen e.V.</u>  <u>Lyoner Strasse 18, D-6000 Frankfurt/Main West Germany</u>
Principal Investigator(s): <u>Thien,GE / Fachbach, HA / Hofe,V</u>		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>1976</u>		OR:
Completion Date: Estimated: <u>1980</u> Actual: <u>active</u>		Total Funding Amount: <u>                    </u> Comments:
PROJECT OBJECTIVE: <u>to provide basic physical and technical data relating to noise reduction in cooling and ventilation systems</u>		
PROJECT DESCRIPTION:		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <p>The project produces basic physical and technical data relating to noise reduction in the cooling and ventilation systems, taking account of special technical and economic requirements and boundary conditions related to internal combustion engines. Another objective is to describe the qualitative and quantitative effects of various factors on individual components and the total system. Achievement is a noise reduction of the whole system of at least 10 db(A).</p>		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: Austria

PROJECT TITLE: Ways of decreasing the conduction of body noise from the engine structure to neighboring parts.

Performing Organization Name & Address:  
AVL - Anstalt fuer Verbrannungskraft-  
maschinen (Institute for internal  
combustion engines)  
Kleiststrasse 48, A-8020 Graz, Austria

Sponsoring Organization Name & Address:  
Forschungsvereinigung Vergrennungskraft-  
maschinen e.V.  
Lyoner Strasse 18, D-6000 Frankfurt/Main,  
West Germany

Principal Investigator(s):  
Thien, GE / Deutschbein, G / Fachbach, HA

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: 1974  
Completion Date: Estimated:                       
Actual: active

OR:  
Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE: Reduction of body noise from the engine structure.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Previous research on the reduction of noise from Diesel engines concerned exclusively with the noise emitted by the surface of the engine. This work provides a number of solutions which brought improvements up to 20 db (A). The practical mounting of engines with markedly reduced noise level into vehicles has shown that the extent of noise reduction achieved is not fully effective over the whole spectrum of noise, as parts of the car which are linked with the engine, such as frame and auxiliary machines, are turned into secondary sources of noise by the conduction from the engine. The aim of this project is to draw up recommendations for the optimum design of the link members.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>France</u>
PROJECT TITLE: <u>Reduction of the noise emitted by the Diesel engine and the tire.</u>		
Performing Organization Name & Address: Institut de Recherche des Transports Centre d'Evaluation et de Recherche des Nuisances et de l'Energie 109, Avenue Salvador Allende 69500 - BRON FRANCE		Sponsoring Organization Name & Address:
Principal Investigator(s): Several : C.LAMURE Sté RENAULT METRAVIB Sté PEUGEOT		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>1.01.1979</u>		OR: Total Funding Amount: <u>                    </u>
Completion Date: Estimated: <u>1.01.1981</u> Actual: <u>                    </u>		Comments:
PROJECT OBJECTIVE:		
PROJECT DESCRIPTION:		
<ul style="list-style-type: none"> <li>- To perform methods for identifying the noise radiating surfaces of the engine</li> <li>- To reduce the emissions of the different parts of the engine</li> <li>- To build a wheel and the instrumentation for studying tire noise</li> <li>- To analyze the emission by the tires.</li> </ul>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
<p>The correlation of the acoustical radiation between different parts of the engine can be high, there is a need for sophisticated measurement methods. The noise radiation of the engine seems elastically controlled. Antenna can be used both for engine and tire noises.</p>		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engines</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: The Committee of the Engine Noise Control		
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. Motokazu Fukuda Manager: Prof. Shoichi Furuhashi And 12 professors		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>    </u> ) 1978: <u>US\$50,000</u> 1980: <u>          </u> 1979: <u>US\$50,000</u> 1981: <u>          </u>
Start Date: <u>September 1976</u>		OR: <u>          </u>
Completion Date: Estimated: <u>          </u> Actual: <u>August 1979</u>		Total Funding Amount: <u>US\$150,000</u> Comments: <u>          </u>
PROJECT OBJECTIVE:		
PROJECT DESCRIPTION:		
<ol style="list-style-type: none"> <li>1) The research in noise control due to the vibration of the engine block by piston slap, crank shaft vibration and others.</li> <li>2) The research in noise control due to the combustion in engines.</li> <li>3) The research in noise control due to the air flow and gas flow.</li> <li>4) The research of noise controlling by the muffler and enclosing.</li> </ol>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
<p>This project is completed.</p> <p>The summary of findings has been printed in total.</p> <p>This book has been distributed to the sponsoring members, but it is not open to the public.</p>		
AVAILABLE PUBLICATIONS (of research findings):		
<p>[The summary mentioned above]</p> <p>It will be possible in future (perhaps in a few years).</p>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: N. Ireland

PROJECT TITLE: Further sophistication of computer prediction of exhaust/intake noise and performance characteristics of two-stroke cycle SP engines.

Performing Organization Name & Address:

Dept. Mechanical/Industrial Engr.  
The Queen's University of Belfast  
Belfast

Sponsoring Organization Name & Address:

Research Group from Industry  
Mercury Marine (USA)  
OMC (USA)  
Yamaha (Japan)

Principal Investigator(s):

Prof. G. P. Blake

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: January 1981

Completion Date: Estimated: Dec. 1983

Actual:                     

OR:

Total Funding Amount:                     

Comments: Confidential

PROJECT OBJECTIVE: To provide computer software for prediction of exhaust/intake noise of multi-cylinder outboard marine engines.

PROJECT DESCRIPTION: Computer software already exists for single-cylinder two-stroke engines (piston port/reed or disc valved) with tuned and untuned exhausts and with intake and/or exhaust mufflers of varying complexity, to predict exhaust/intake noise (total and spectral) and performance characteristics (power, fuel consumption as a function of speed [RPM]). This is to be extended to multi-cylinder two-stroke engines of the outboard marine type (1, 2 and 3 cylinder units) to provide accurate design programs for the entire engine with its silencers.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>NORWAY</u>
PROJECT TITLE: NOISE FROM SMALL INTERNAL COMBUSTION (I.C.) ENGINES		
Performing Organization Name & Address:  AKUSTISK LABORATORIUM ELAB N-7034 TRONDHEIM-NTH NORWAY		Sponsoring Organization Name & Address:  NTNF SOGNSVEIEN 72 N-OSLO 8 NORWAY
Principal Investigator(s):  KAI ABRAHAMSEN		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>X</u> ) 1978: <u>                    </u> 1980: \$ <u>21,200</u> 1979: \$ <u>13,400</u> 1981: <u>                    </u>
Start Date: <u>JANUARY 1979</u>		OR: <u>                    </u>
Completion Date: Estimated: <u>                    </u> Actual: <u>JANUARY 1981</u>		Total Funding Amount: \$ <u>34,600</u> Comments: (N.kr. 180.000,-) (\$33,066)
PROJECT OBJECTIVE: To classify and rank the noise sources on typical small I. C. engines and to evaluate simple noise control measures.		
PROJECT DESCRIPTION:  Acoustic intensity measurements were used to determine noise source distribution and strength on three small I. C. engines, taken from a lawnmower, a chainsaw, and a moped. The various noise source mechanisms were considered. Some simple means of noise control were tested on one of the engines.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  Conventional methods for locating noise sources are unsuited for small I. C. engines due to their compactness. The exhaust noise is the major problem due to limited space for mufflers. Apart from the exhaust, the most intense zones were found near the Carburetor, fan intake and cylinder. Because of its larger size, the cylinder is the most significant source of the three. Some reduction in the noise level of one of the engines was easily achieved by applying damping treatment to various covers and by use of partial enclosures around the most intense zones.		
AVAILABLE PUBLICATIONS (of research findings):  ELAB REPORT: NOISE FROM SMALL AIR COOLED INTERNAL COMBUSTION ENGINES (Kai Abrahamson) (To be published in English)		



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: <p style="text-align: center;">DIESEL COMBUSTION NOISE</p>		
Performing Organization Name & Address: Lucas Industries Noise Centre Lucas CAV Limited P.O. Box 36 Warple Way, Acton London W3 7SS United Kingdom		Sponsoring Organization Name & Address: Lucas CAV Limited P.O. Box 36 Warple Way, Acton London W3 7SS United Kingdom
Principal Investigator(s): M. F. Russell A. J. Herbert Mrs. B. E. Head		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>                    </u> 1977		OR: Total Funding Amount: <u>                    </u>
Completion Date: Estimated: <u>                    </u> Actual: <u>                    </u>		Comments: <u>                    </u>
PROJECT OBJECTIVE: <p style="text-align: center;">To find ways of reducing diesel combustion noise.</p>		
PROJECT DESCRIPTION: Improved techniques to measure combustion noise are being developed and the noise from alternative combustion systems is being assessed. The influence of fuel injection parameters is being studied on a selection of these combustion systems.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  1. Techniques to measure and assess combustion noise have been refined, and a simple comparative 'Combustion Noise Meter' has been developed for use with Lucas CAV engine indicator instrumentation.  2. A clear understanding of the changes which may be made to diesel combustion systems to reduce noise has been achieved.		
AVAILABLE PUBLICATIONS (of research findings): 1. "Establishing a Target For Control of Diesel Combustion Noise" by M F Russell and E J Cavanagh, Soc. Auto. Engrs. Paper 790271 in SAE publication P80 'Diesel Engine Noise Conference', 1979. 2. "Understanding the Generation of Noise by Diesel Engines with a View to its Control" by M F Russell (UK) Institute of Acoustics Conference 'Diesel Engine Noise Research', Loughborough, Sept. 1980 (from IOA Edinburgh)		



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: <p style="text-align: center;">NOISE FROM DPA PUMPS</p>		
Performing Organization Name & Address: Lucas Industries Noise Centre Lucas CAV Limited P.O. Box 36, Warple Way, Acton, London W3 7SS United Kingdom		Sponsoring Organization Name & Address: Lucas CAV Limited P.O. Box 36 Warples Way, Acton, London W3 7SS United Kingdom
Principal Investigator(s): M F Russell A J Herbert S W Nicol		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>                    </u> 1974		OR: Total Funding Amount: <u>                    </u> Comments:
Completion Date: Estimated: <u>                    </u> Actual: <u>                    </u> 1979		
PROJECT OBJECTIVE: To develop a complete understanding of the noise generating processes in the DPA diesel fuel injection pump; to examine all ways of controlling noise from this pump; and to demonstrate practical means for controlling this noise.		
PROJECT DESCRIPTION: The project commenced with a thorough analysis and ranking of the impacts and forces which originate sound, and an analysis of the structural vibration of the pump. Several designs for quieter pumps have been considered and the best of these has been tested in the laboratory.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  A pump design has been demonstrated which is 8 dB(A) quieter than previous designs of rotary fuel injection pump.  An uprated drive shaft and stiffer housing are now options on many current production pumps, and the technology developed is being incorporated into new pump designs.		
AVAILABLE PUBLICATIONS (of research findings): "Identification and Modelling of Rotary Diesel Fuel Injection Pump Noise Processes" by A J Herbert and M F Russell, Soc. Auto. Eng., paper No. 750803 in SP397 'Diesel Engine Noise Conference', Milwaukee, 1975.		

(we prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: <u>Low Noise/Weight Engine</u>		
Performing Organization Name & Address: Ricardo Consulting Engineers Ltd., Bridge Works, Shoreham-by-Sea, Sussex. BN4 5FG United Kingdom		Sponsoring Organization Name & Address: " " "
Principal Investigator(s): B.J. Challen D. Morrison		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    </u> 1980: <u>    </u> 1979: <u>    </u> 1981: <u>    </u>
Start Date: <u>Oct. 1978</u>		OR: Total Funding Amount: <u>    </u>
Completion Date: Estimated: <u>Dec. 1980</u> Actual: <u>    </u>		Comments: <u>    </u>
PROJECT OBJECTIVE: To design, procure and test a prototype engine for low noise and weight, based on a radical re-design of the engine structure.		
PROJECT DESCRIPTION: A production 2½ l IDI diesel engine was extensively modified in the areas of the crankcase and oil pan in order to increase the cylinder block stiffness and to minimise vibration transmission paths between the crankshaft main bearings and the structure outer surfaces. The oil pan was either made from a well damped steel or was a heavily ribbed cast aluminium structure.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): Good noise reductions were achieved over the speed and load range when the engine noise was measured in an anechoic test cell. Work is continuing on weight reduction and development for further noise reduction and the results will be published in due course.		
AVAILABLE PUBLICATIONS (of research findings): None as yet. May be subject of later paper.		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: Noise and Vibration Research Rig		
Performing Organization Name & Address: Ricardo Consulting Engineers Ltd., Bridge Works, Shoreham-by-Sea, Sussex. BN4 5FG United Kingdom		Sponsoring Organization Name & Address: " " "
Principal Investigator(s): B.J. Challen M.D. Croker D. Morrison		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>February 1980</u>		OR: Total Funding Amount: <u>                    </u>
Completion Date: Estimated: <u>                    </u> Actual: <u>August 1980</u>		Comments: <u>                    </u>
PROJECT OBJECTIVE: Dynamic modelling of a small engine crankcase simulation. Basic research into noise and vibration characteristics of a simulated engine crankcase.		
PROJECT DESCRIPTION: The small block simulation was finite element modeled (f.e.m.) for frequencies up to 2.5kHz. The f.e.m. predictions were compared with results from experimental modal analysis. The rig was also used as a simple structure for measuring the effects of materials and ribbing on noise/vibration. Lead covering tests were also carried out.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  Simple f.e.m. modeling can yield good results for a dynamic simulation. The basic rig work is continuing.		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: <u>The Analysis and Control of Diesel Engine Noise</u>		
Performing Organization Name & Address: Perkins Engines Eastfield, Peterborough United Kingdom		Sponsoring Organization Name & Address:
Principal Investigator(s): P. Hanks R. Pettitt		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: <u>7 technical</u> OR: <u>staff + 3</u> Total Funding Amount: <u>fitters</u>
Start Date: <u>1978</u>		Comments: Three semi-anechoic test cells, with digital signal analysis systems, are available.
Completion Date: Estimated: <u>1982</u> Actual: <u>-</u>		
PROJECT OBJECTIVE: To enable the noise level of diesel engines to be reduced		
PROJECT DESCRIPTION: a) A predictive technique is being implemented to assess the noise characteristics of the engine cylinder block and covers at the design stage. b) Cost effective methods of applying noise reducing materials to engines are being evaluated. c) Methods of reducing combustion and mechanical engine noise are being investigated.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): a) The response of a cylinder block has been predicted from cylinder pressure data applied to the main bearings b) A sprayable constrained layer damping system will be in production, on engine components, during 1981. c) A new phase of combustion and mechanical noise reduction is about to commence Jan 1981.		
AVAILABLE PUBLICATIONS (of research findings): Noise Reductions of Diesel Powered Installations. R. A. Pettitt, Noise & Vibration Control May 1980		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Fumigation to Control Combustion-induced Noise in Diesel Engines.

Performing Organization Name & Address:

Department of Transport Technology  
Loughborough University  
Leicester LE11 3TU  
United Kingdom

Sponsoring Organization Name & Address:

Lucas CAV Ltd.  
London W3 7SS

Principal Investigator(s):

Dr. Sam David Haddad (Supervisor)  
Mr. Don Palmer

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: October 1, 1979

Completion Date: Estimated: Sept. 30, 1981

Actual:                     

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

In addition to turbocharging there are other techniques that can be employed to reduce combustion-induced noise in diesel engines; fumigation is one which has been shown experimentally to have great potential.

This project is aimed at an investigation of the means for introducing secondary fuel into the engine in the form of a "Micro-fog" or vapour, or other means which ensures a finely divided (less than 5µm), well mixed, fuel spray into the intake manifold.

Evaluation of such systems would then take place on combustion-controlled diesel engines to measure the effect on smoke, fuel consumption, power output and combustion-induced noise. Two past final-year automotive student projects on this topic produced some useful results and now research work is in progress to develop the fumigator unit.

Reference

S.D. Haddad, "Application of the Coherence Technique to Quantify Combustion Noise in a Diesel Engine," Euromech 131, Besancon, France, 23-27 June 1980.

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: <u>High Speed Automotive diesel engine</u>		
Performing Organization Name & Address: Institute of Sound & Vibration Research, University of Southampton, Highfield, Southampton SO9 5NH United Kingdom		Sponsoring Organization Name & Address: National Research & Development Corporation, Mechanical & Civil Engineering Division, PO Box 236, Kingsgate House, 66/74 Victoria Street, London SW1E 6SL
Principal Investigator(s): E.C. Grover, R.D.H. Perry		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    </u> 1980: <u>    </u> 1979: <u>    </u> 1981: <u>    </u>
Start Date: <u>Sept. 1976</u>		OR: Total Funding Amount: <u>£75,000</u>
Completion Date: Estimated: <u>    </u>		Comments: <u>\$165,150</u>
Actual: <u>May 1979</u>		
PROJECT OBJECTIVE: <u>Design &amp; evaluation of light weight, low noise automobile diesel engine.</u>		
PROJECT DESCRIPTION: <u>Design of 2.0 litre 4 cylinder diesel engine incorporating novel crankcase structure. Construction of engine. Conducting of initial performance &amp; noise development.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  1. Engine performance was very satisfactory: 50 kW at 4200 rev/min giving low specific weight of 3.34 kg/kW.  2. Maximum noise level of 98 dB A at 1 metre was a reasonable achievement considering the low weight and high output. The potential exists for further noise reduction. Project terminated on exhaustion of funds.		
AVAILABLE PUBLICATIONS (of research findings):  SAE Congress, Detroit, Feb '79 : An experimental passenger car diesel engine, E.C. Grover & R.D.H. Perry. 790443		



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Noise Radiation Efficiency of Diesel Engine Components and  
Multilayer panels.

Performing Organization Name & Address:  
Department of Transport Technology  
Loughborough University  
Leicester LE11 3TU  
United Kingdom

Sponsoring Organization Name & Address:  
Perkins Engines Co.

Principal Investigator(s):  
Dr. Sam Haddad  
Dr. Roy Faulkner  
Mr. David Howard; Mr. John Moores

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: 1977  
Completion Date: Estimated: July 1980  
Actual:                     

OR:  
Total Funding Amount:                       
Comments:                     

**PROJECT OBJECTIVE:**

For predictions of engine noise from vibration measurements, it is required that accurate radiation efficiencies of the various engine surfaces should be known. This project provided measurements and analysis of radiation efficiency of various components of a Perkins 4.236 engine. Using a small reverberant room, values of radiation efficiency were determined in 1/3-octave bands in the frequency range 240Hz to 5kHz for the following components -- cylinder head, inlet manifold, exhaust manifold, lubricating oil filter, fuel filter and water pump. Each component was excited in turn and measurements were taken of the velocity of vibration on the surface of the component and the sound pressure level produced in the reverberant field. The radiation efficiency could then be derived, knowing the average absorption coefficient and surface area of the room and the surface area of the component.

The present work is concentrated on evaluating the noise radiation characteristics of multi-layer damped panels and how these are affected by variation of surface temperature. A controlled test set-up has been developed for this purpose, but the optimum panels will ultimately be evaluated on a running engine.

**Reference**

1. Haddad, S.D. and Howard, D.A. "Evaluation of the Radiation Efficiencies of Some Components of the Perkins 4.236 Diesel Engine" Progress Report No. 2, August 1978.
2. Haddad, S.D., J.P.E. Moores and R.G. Faulkner. "An Investigation into Constrained Layer Materials for Low Noise Diesel Engines," I.O.A. Conference on Diesel Engine Noise Research at L.U.T., Sept. 21-23, 1980.

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: Development of Reliable Fault Diagnosis Techniques for an Internal Combustion (I.C.) Piston Engine		
Performing Organization Name & Address: Department of Transport Technology Loughborough University Leicester LE 11 3TU United Kingdom		Sponsoring Organization Name & Address: L.U.T. and short term sponsorships
Principal Investigator(s): Dr. Sam D. Haddad (Supervisor) Mr. Roshan Hansran Prof. C. Cempel		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>October 1, 1979</u>		OR:
Completion Date: Estimated: <u>Oct. 1, 1981</u> Actual: <u>                    </u>		Total Funding Amount: <u>                    </u> Comments: <u>                    </u>
PROJECT OBJECTIVE: Increased automation coupled with inherent complexities and greater manpower movement have in the last few years necessitated the development of certain objective techniques of condition monitoring and fault diagnosis to replace the subjective methods. The I.C. piston engine is one such machine that has gained prominence in practically all fields of industry -- with increasing demand on performance, reliability and maximum utility. To meet these demands, it is useful and economical to monitor its condition during operation.		
PROJECT DESCRIPTION: This project is aimed to produce: 1. A survey of conventional and unconventional techniques available to detect abnormal operation in engines. 2. In-depth study (theoretical and experimental) and development of a few techniques to form a package for reliable detection of any abnormal engine operation.		
<u>References</u> 1. Haddad, S.D. and Corless, M.J. "Vibration Measurements to Monitor Faults in Rotating Machines" <i>Internoise 78</i> , May 1978. 2. Haddad, S.D. "Vibration Oscillographs and Frequency Analysis to Detect Events and Faults in Diesel Engines." A Seminar Paper Given to UKMHEG, January 1979. 3. Haddad, S.D. "Diagnosis of Abnormal Operation in Diesel Engines Using Vibration Oscillographs and Frequency Analysis." <i>Acoustics 80 Conference</i> , April 1980. 4. Haddad, S.D. "Noise and Vibration Applied to Engine Diagnostics." <i>Internoise 80</i> , Miami, Dec. 8-10 1980.		

Transcribed from the Original.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Engine  
 COUNTRY: United Kingdom

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PROJECT TITLE: Minimum Mechanically-induced Noise Levels in Diesel Engines

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Performing Organization Name & Address: Department of Transport Technology Loughborough University Leicester LE11 3TU United Kingdom	Sponsoring Organization Name & Address: Lucas CAV Ltd. London W3 7SS United Kingdom
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Principal Investigator(s): Dr. Sam D. Haddad (Supervisor) Mr. David A. Howard	Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u> OR: Total Funding Amount: <u>                    </u> Comments:
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Start Date: July 31, 1976  
 Completion Date: Estimated:                       
 Actual: July 31, 1980

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**PROJECT DESCRIPTION:**

The project started by producing a survey of known methods of controlling mechanically-induced noise. This was followed by a theoretical study of the mechanism of piston slap incorporated into a computer program to enable the prediction of optimum piston design features for low noise, without adverse effects on engine mechanical efficiency.

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**PROJECT SUMMARY:**

At the moment some of these predictions are being correlated with experimental results from a running 4.236 Perkins diesel engine installed in our new semi-anechoic chamber.

References

Haddad, S.D. and Howard, D.A. "Piston Slap-induced Noise in Combustion-optimized Diesel Engines." Progress Report No. 2, CAV Research Contract, May 1978.

Haddad, S.D. and Howard, D.A. "Analysis of Piston Slap-induced Noise and Assessment of Some Methods of Control in Diesel Engines." SAE Paper No. 800517, February 1980.

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Using Simulation Techniques to Study Piston Slap in Diesel Engines.

Performing Organization Name & Address:  
Department of Transport Technology  
Loughborough University  
Leicester LE11 3TU  
United Kingdom

Sponsoring Organization Name & Address:  
Science Research Council  
(Engine and Components from Perkins Engine  
Co.)

Principal Investigator(s):  
Dr. Sam D. Haddad (Supervisor)  
Research Assistant (vacancy)

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: June 1, 1980  
Completion Date: Estimated: June 1, 1982  
Actual:                     

OR:  
Total Funding Amount: ( E 8,734 )  
Comments: \$19, 232

PROJECT OBJECTIVE: The experimental piston slap simulation rig aims to realistically simulate the slapping pistons, so that a study may be made into methods of reducing noise from this source.

PROJECT DESCRIPTION: The rig consists of a Perkins 4.236 in-line, four-cylinder diesel engine, mounted on an isolated frame. The crankshaft is rigidly fixed such that number two cylinder is at TDC. The connecting rod of this same piston has the big end cap replaced by another connecting rod so that the two connecting rods are connected back to back. The lower connecting rod may now be excited, through the small end eye, to initiate piston slap in the cylinder. The resultant noise and vibration produced can then be measured at one meter for noise, and at selected points on the engine structure in the case of vibration.

STATUS REPORT (if in progress):

Work is in progress to achieve as accurate a simulation as possible so that it may be reliably used to study the effect of varying piston parameters on piston slap-induced noise and correlate with analogue and digital simulation and running engine conditions.

Reference

Haddad, S.D. "Study of Piston Slap. Induced Noise and Vibration in Diesel Engines."  
A special paper to SRC-UNICEG Symposium, "Research in Internal Combustion Engineering in  
U.K. Universities and Polytechnics," held at King's College, London, April 17-18 1980.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Study of Minimal Cooling Systems and Associated Noise Reduction Design Features.

Performing Organization Name & Address:  
Institute of Sound and Vibration Research  
University of Southampton  
Highfield, Southampton  
United Kingdom

Sponsoring Organization Name & Address:  
National Research Development Corporation  
P.O. Box 136, Kingsgate House  
66/74 Victoria Street  
London SW1E 6SL  
United Kingdom

Principal Investigator(s):  
Prof. J. Priede  
Dr. W.P. Mansfield

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: November 1975

Completion Date: Estimated:                       
Actual: October 1978

OR:  
Total Funding Amount: (£100,000 approx.)  
Comments: \$220,200

PROJECT OBJECTIVE: As regards noise, reduction of diesel engine noise.

PROJECT DESCRIPTION: Tests were made on an 80 hp. 4 cylinder water-cooled diesel engine, to determine what reduction of heat flow to cooling water could be made by using a modified cooling system. Some changes of engine structure design were tested also.

SUMMARY OF FINDINGS (if project completed):

The main finding regarding noise was that if the original radiator and fan were retained, and the fan speed were reduced to match the smaller heat flow to the radiator, the fan sound power level would be reduced by as much as 8dB in some applications.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Computer Optimisation of Engine & Gearbox Structures for Low Noise.

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

Sponsoring Organization Name & Address:  
I.S.V.R. (Self Financed)  
  
(Previously financed by Science Research  
Council)

Principal Investigator(s):

N. Lalor  
\*N. Somkhanay  
\*N. Erotokritos

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978: ( £12,475 (SRC) ) 1980:      \*  
1979:      \* 1981:      \*

Start Date: 1975

Completion Date: Estimated:       
Actual: Ongoing

OR:  
Total Funding Amount:       
Comments: \$27,469  
Salaries of researchers marked \*.

PROJECT OBJECTIVE: To reduce the noise of existing structures by lasting changes that are acceptable to existing production plants and to investigate new design concepts for noise reduction.

PROJECT DESCRIPTION: A finite element model of the structure is set up and, using iteration techniques, it is optimized for minimum noise within the framework of production, weight, and strength constraints.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

To date, 8 different engine blocks have been modified by this method and the overall noise level has been reduced by up to 2.5 dBA with only a few percent increase in block weight. A similar number of engines have been assessed at the design stage and, in some, high noise features have been attenuated before building hardware. Similar analysis on gearboxes and flywheel housings has identified problem areas.

AVAILABLE PUBLICATIONS (of research findings):

The Practical Reduction of Bare Engine Noise from a Conventional Diesel Engine. I.Mech. E. C137/79.  
Computer Aided Diesel Engine Design, ISATA 80 (Turino 1980).  
Computer Optimized Design of Engine Structures for Low Noise. SAE 790364.  
The use of Finite Element Techniques for the Prediction of Engine Noise. I.Mech.E.C146/79.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Prediction of noise and performance characteristics of Internal  
Combustion Engines.

**Performing Organization Name & Address:**

The Queen's University of Belfast  
Mechanical & Industrial Engineering  
Ashby Building  
Belfast BT9 5A4  
Northern Ireland, United Kingdom

**Sponsoring Organization Name & Address:**

Science Research Council  
State House  
High Holborn  
London WC1R 4TA  
United Kingdom

**Principal Investigator(s):**

Professor G.P. Blair

**Annual Funding:**

(Check One: Fiscal Yr:      Calendar Yr:     )

1978: \$50,000      1980: \$30,000

1979: \$30,000      1981: \$15,000

Start Date: 1978

Completion Date: Estimated: 1981  
Actual:           

OR:

Total Funding Amount:             
Comments:           

**PROJECT OBJECTIVE:**

To convert prediction work for 2-stroke engines to 4-stroke units.

**PROJECT DESCRIPTION:**

Much work on prediction on noise has already been undertaken and checked experimentally -- see SAE Papers 720153, 730160, 740713. See EPA Report 550/9-78-206, p. 449; Also I.Mech.E. Conference 1978 CI20/78. This work extends that for 2-stroke engines to multi-cylinder four-stroke units and to the same level of sophistication with experimental evidence to back up theoretical prognostications.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

In progress.

**AVAILABLE PUBLICATIONS (of research findings):**

See above.

And please do not accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>United Kingdom</u>
<b>PROJECT TITLE:</b> General Study on Light Diesel Engine Developments		
<b>Performing Organization Name &amp; Address:</b> Institute of Sound & Vibration Research University of Southampton, Highfield, Southampton SO9 5NH, U.K.		<b>Sponsoring Organization Name &amp; Address:</b> Transport & Road Research Laboratory Crowthorne, Berkshire, U.K.
<b>Principal Investigator(s):</b> A.D.H. Perry		<b>Annual Funding:</b> (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(£18 000)</u> Comments: <u>\$ 39,636</u>
Start Date: <u>March 1980</u> Completion Date: Estimated: <u>Sept 1981</u> Actual: _____		
<b>PROJECT OBJECTIVE:</b> A study to identify the lines of development in light diesel engines which offer most promise for their application in cars, taxis and light vans.		
<b>PROJECT DESCRIPTION:</b> This is a paper study which will only be backed with a limited amount of experimental work. Areas to be examined include: Noise levels and methods of reduction Fuel supplies Alternative combustion systems		
<b>SUMMARY OF FINDINGS (if project completed):</b> <b>STATUS REPORT (if in progress):</b> Literature survey still in progress. Some experimental work to follow in 2nd half of project period.		
<b>AVAILABLE PUBLICATIONS (of research findings):</b> None.		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Modeling and data analysis of engine vibration.

Performing Organization Name & Address:

Lanchester Polytechnic  
Eastlands  
Rugby  
Warwickshire  
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council  
P.O. Box 18  
Swindon SN2 1ET  
United Kingdom

Principal Investigator(s):

Dr. R. M. Mercer

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: December 1, 1978

Completion Date: Estimated: November 30, 1981  
Actual:                     

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE: The aim is to produce and evaluate models of the vibration characteristics of the engine that will enable:

- (a) the vibration pattern of the engine caused by known mechanical stimuli to be predicted; and
- (b) the location and amplitude of a mechanical stimulus to be estimated from a measurement of the vibration of the engine structure.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: United Kingdom

PROJECT TITLE: Wear of Piston Rings and Cylinder Liners in both Petrol and Diesel Engines.

Performing Organization Name & Address:

Brunel University  
Uxbridge UB8 3PH  
United Kingdom

Sponsoring Organization Name & Address:

Science Research Council  
P.O. Box 18  
Swindon SN2 1ET  
United Kingdom

Principal Investigator(s):

Dr. T. S. Eyre

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: April 1, 1980

Completion Date: Estimated: March 31, 1983

Actual:                     

OR:

Total Funding Amount: (£38,210)

Comments:

\$24,133

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: Improved materials are required for the next generation of critical components for engines. In particular it is anticipated that surfacing techniques including electrodeposition and metal facing by flame or plasma have considerable potential. Experimental data are required on which to base our theoretical understanding for future materials selection to economize in materials, lubricants, and energy in manufacture.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Engines  
COUNTRY: West Germany

PROJECT TITLE: Development of new possibilities for the layout of quiet cooling systems for Internal Combustion Engines (ICE) devices, especially motor vehicles.

Performing Organization Name & Address:  
AVL Gesellschaft für Verbrennungskraftmaschinen  
und Meßtechnik m.b.H.  
Prof. Dr. Dr. h.c. Hans List  
A-8020 Graz, Kleiststraße 48  
Austria

Sponsoring Organization Name & Address:  
Forschungsvereinigung Verbrennungskraft-  
maschinen e.V.

Lyonerstraße 18, Postfach 109  
D-6 Frankfurt/Main-Niederrad 1  
West Germany

Principal Investigator(s):  
Dr. G.E. Thien  
Dipl.-Ing. R. v. Hofe  
Dr. H.A. Fachbach

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr: X)  
1978 VSS127.000,- 1980: US\$ 64.000,-  
1979 VSS111.000,- 1981: US\$ 124.000,-

Start Date: April 1976  
Completion Date: Estimated: Dec. 1982  
Actual:                     

OR:  
Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE: Provision of fundamentals for the optimum layout of cooling systems for IC engines considering the noise limits and installation conditions (especially the space available)

PROJECT DESCRIPTION: Cooling systems for IC engines in vehicle installations feature a great number of parameters, some of them also influencing each other. This is due to the limited space availability and the many compromises which are made for cost saving reasons. As it is not possible to determine theoretically the effect of all the parameters, particularly their quantitative effect, a great number of experimental investigations has to be carried out by varying the parameters in all kinds of different arrangements and considering all types of systems in question.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress): The investigations carried out so far mainly concerned the conventional cooling system, consisting of radiator, cowl with fan ring and steel pressed fan or fan with air foil section blades, downstream of the radiator and in close distance to the front of the engine. With this system the influence of all parameters was considered in the different installation conditions occurring in existing vehicles. The results are stored in a dimensionless manner based on the minimum specific sound power of each configuration. As the experience already shows it is possible to adequately predict with these data the noise of planned cooling systems as well as to optimize existing systems. The investigations are continued considering cooling systems using centrifugal fans as well as tangential fans.

AVAILABLE PUBLICATIONS (of research findings):  
Paper to be published in 1981 in "Motortechnische Zeitschrift" (MTZ)/West Germany



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Engine  
COUNTRY: West Germany

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  
West Germany

Sponsoring Organization Name & Address:  
Bundesminister fur Forschung u. Technologie  
(Secretary of Research and Technology)  
Postfach 12 03 70  
5300 Bonn 12  
West Germany

Principal Investigator(s):

Mr. P. Hofbauer

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount: \$500,000

Comments:

Start Date: January 10, 1975

Completion Date: Estimated:                       
Actual: September 30, 1979

PROJECT OBJECTIVE: Disadvantages of the diesel engine compared to the spark engine should be reduced and if possible eliminated.

PROJECT DESCRIPTION: Theoretical and hardware study of encapsulated diesel engine. Improvement of diesel engines applicable for subcompact cars. One major point of this program is noise reduction.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The external noise of a VW Golf/Rabbit with diesel engine was reduced by 8 dB in ISO R 362 test. This was achieved by an engine encapsulation using sheet metal with a foam layer. The solution showed the capability of substantial noise reduction. Further investigations to reduce heat and maintenance problems appeared to be necessary.

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Engine</u>
		COUNTRY: <u>West-Germany</u>
PROJECT TITLE: <u>Reduction of starter noise, preliminary study</u>		
Performing Organization Name & Address: Dr. Ing. h.c. F. Porsche Inc. Porsche St. 42 7000 Stuttgart 40 West Germany		Sponsoring Organization Name & Address: Federal Environmental Office Bismarck Place 1 D-1000 Berlin 33 West Germany
Principal Investigator(s): Dipl.-Ing. Krauter		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>January 1, 1981</u>		OR: <u>    </u> Total Funding Amount: <u>(98,000.--)</u>
Completion Date: Estimated: <u>March 31, 1981</u> Actual: <u>                    </u>		Comments: <u>\$46,011</u>
PROJECT OBJECTIVE: The planned preliminary study is supposed to explain whether the development of quieter starter systems is feasible with regard to use in series passenger cars.		
PROJECT DESCRIPTION: -Maintenance analysis of starter noise with present day vehicles. -Study of the origin mechanisms for starter noises -Working out of attachment points for improved analysis systems. -Discussion and success prospects of improved starter systems with regard to the possibility of use in series passenger cars.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Engine  
COUNTRY: West Germany

PROJECT TITLE: Development of a low noise truck for building sites.

Performing Organization Name & Address:

Forschungsinstitut für Kraftfahrwesen und Fahrzeugmotoren Stuttgart  
Pfaaffenwaldring 12, 7000 Stuttgart 80  
Magirus-Deutz AG, Postfach 2740, 7900 Ulm  
Klockner-Humboldt-Deutz AG, 5000 Köln 80  
West Germany

Sponsoring Organization Name & Address:

Umweltbundesamt  
Bismarckplatz 1  
1000 Berlin 33  
West Germany

Principal Investigator(s):

W. Liedl, R. Hommel, K. Gendel  
P. Muhe, J. Fischer  
H.-A. Kochanowski, H. Haller

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: July 1, 1980

OR:

Total Funding Amount: DM 2,098,214.--

Completion Date: Estimated: Dec. 31, 1982  
Actual:                     

Comments: Self-funding of Magirus-Deutz AG and Klockner-Humboldt-Deutz AG DM 1,000,000.

PROJECT OBJECTIVE:

Reduction in the noise emission level of 8 to 10 dB(A).

PROJECT DESCRIPTION:

The noise reduction is expected to be achieved by encapsulation of the engine and the gearbox.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Engine  
Abbreviated Listings

Sweden. Limitation of the Sound Level of Vehicle Engine Cooling Systems. Department of Internal Combustion Engineering, Chalmers University, Fack, S-41296 Goeteborg, Sweden. L. Collin, A. Pettersson. July 1975 - July 1979. The aim of the project is to minimize the noise emission level of cooling systems for vehicle engines. \$110,000.

United Kingdom. Engine Design. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor. Damping of lightweight engine covers using rubber inserts.

United Kingdom. Engine Design. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. T. Kawakami, D. Anderson. Comparison of dynamic characteristics of small and large diesel engines.

United Kingdom. Engine Design. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. L.C. Grover, G. Bazeley, P. Prust, and T. Priede. Low noise engine design.

United Kingdom. Engine Design. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. W. P. Mansfield, K. J. Young, and T. Priede. Study of precision cooling systems and associated noise reduction design features.

United Kingdom. Engine Structure Excitation Vibration Characteristics and Radiation of Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor, D. Anderson, J. M. Baker, J. Dixon, E. W. Gardiner, N. Erotokritos, and N. Lalor. Experimental techniques to determine minor modifications of engine structures for reduced noise.

United Kingdom. Engine Structure Excitation Vibration Characteristics and Radiation of Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. M. Petyt, N. Lalor, D. Croker, E. W. Gardiner, and N. Erotokritos. Optimisation of engine structures for low noise by modelling techniques.

United Kingdom. Engine Structure Excitation Vibration Characteristics and Radiation of Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. D. Anderson, E. C. Grover, N. Lalor, and T. Priede. Optimisation of design parameters for quieter diesel engines.

United Kingdom. Mechanical and Accessory Noise of Automotive Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Hutton, D. Anderton. Study of mechanical noise of engines by motoring tests.

United Kingdom. Engine Structure Excitation Vibration Characteristics and Radiation of Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. M. Baker, J. Dixon, and D. Anderton. Petrol engine noise problems -- fundamentals of engine rumble.



Engine  
Abbreviated Listings

United Kingdom. Engine Structure Excitation Vibration Characteristics and Radiation of Noise. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. H. L. Pullen, D. Anderton. Correlation of engine surface vibration and noise.

United Kingdom. Mechanical and Accessory Noise of Automotive Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. M. Baker, E. C. Grover. Optimisation of oil lubrication characteristics to reduce impact noise in the bearings of internal combustion engines.

United Kingdom. Mechanical and Accessory Noise of Automotive Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. K. Ewida, N. Lalor. Effect of oil film on impact noise in engines.

United Kingdom. Combustion, Emissions and Heat Transfer of Internal Combustion Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. P. Stravropoulos, D. Anderton. The modelling of combustion noise in diesel engines.

United Kingdom. Combustion, Emissions and Heat Transfer of Internal Combustion Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. El-Adawi Shaban, D. Anderton. Effect of fuel chemical composition on noise.

United Kingdom. Mechanical and Accessory Noise of Automotive Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. M. Baker, E. C. Grover. Mechanical noise of petrol engines.

United Kingdom. Mechanical and Accessory Noise of Automotive Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. N. Lalor, J. Dixon, and T. Friede. Piston slap noise.

United Kingdom. Mechanical and Accessory Noise of Automotive Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. H. L. Pullen, T. Friede, and F. Bakhtari. Origins of injection equipment noise and pump mounting systems.

United Kingdom. Combustion, Emissions and Heat Transfer of Internal Combustion Engines. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. G. J. Hawksley, H. Gani, and N. P. Stravropoulos. Studies into combustion and noise in diesel engines.

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Dixon, M. Avnir, D. Anderton, and E.C. Grover. Relation between vehicle cooling, fan and radiator design and noise.

Engine  
Abbreviated Listings

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. H. L. Pullen. Reduction of engine noise by close fitting shields.

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Dixon, D. Anderton, and H. L. Pullen. Engine enclosure design.

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. P. O. A. L. Davies, J. E. Temple. Source characteristics of internal combustion engine exhausts.

SURFACE VEHICLE COMPONENTS NOISE

EXHAUST MUFFLERS

See Also Pages:

48  
50

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Exhaust Mufflers  
COUNTRY: Austria

PROJECT TITLE: Theoretical and experimental study of single and multi-chamber  
filters for damping the noise from exhausts.

Performing Organization Name & Address:  
AVL - Anstalt fuer Verbrennungskraftma-  
schinen (Institute for internal combustion  
engines)  
Kleiststrasse 48, A-8020 Graz  
Austria

Sponsoring Organization Name & Address:  
Forschungsvereinigung Verbrennungskraft-  
maschinen e.V.  
Lyoner Strasse 18, D-6000 Frankfurt/Main  
West Germany

Principal Investigator(s):  
Thien, GE / Nowotny, B / Mayer, KP

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1976

Completion Date: Estimated: 1979  
Actual: active

OR:  
Total Funding Amount:                       
Comments:

PROJECT OBJECTIVE:

Method to design exhaust noise dampers for internal combustion engines.

PROJECT DESCRIPTION: The aim of this project is to find a method to design exhaust  
noise dampers for internal combustion engines. This method is to be derived from  
well-known gas dynamic and acoustic relations and to be available to motor  
manufacturers.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Fundamental tests are carried out to determine coefficients which have to be  
checked by further tests.

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.





(We prefer responses in English, but can accept material in other languages.)

TOPIC: Exhaust Mufflers  
COUNTRY: United Kingdom

PROJECT TITLE: Acoustic performance of perforate liners.

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

Sponsoring Organization Name & Address:  
E.E.C. Fellowship (for J.L. Bento-Coelho)  
Grants and small consulting projects

Principal Investigator(s):  
P.O.A.L. Davies  
J.L. Bento-Coelho

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:      1980:       
1979:      1981:     

Start Date: October 1979  
Completion Date: Estimated: September 1982  
Actual:     

OR: Total Funding Amount:       
Comments: Two grants of £750 each from  
B.P for equipment, etc. \$1652

PROJECT OBJECTIVE: To provide models for prediction of perforated liner performance in flow ducts.

PROJECT DESCRIPTION: Single frequency and broadband excitation of a duct with a perforate section enclosed in an expansion chamber. Excitation levels, perforate and duct geometry varied over wide ranges to establish data sheets for design predictions.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Details of acoustic behavior depend on excitation levels in range 70 - 150 dB. Range to be extended to 180 dB or higher, to correspond to engine exhaust system levels.

AVAILABLE PUBLICATIONS (of research findings):

All project reports in English,  
but can accept material in  
other languages.)

TOPIC: Exhaust Mufflers

COUNTRY: United Kingdom

PROJECT TITLE: Development of Quiet Low Back-Pressure Exhaust Silencers Using a  
Performance Prediction Computer Programme

Performing Organization Name & Address:

M.I.R.A  
Watling St  
Nuneaton  
Warks CV10 OTU  
United Kingdom

Sponsoring Organization Name & Address:

Joint United Kingdom  
Department of Industry/MIRA

Principal Investigator(s):

D.T. Aspinall  
J. N. Devlukia

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_ 1980: \_\_\_

1979: \_\_\_ 1981: \_\_\_

OR:

Total Funding Amount: (£65,800)

Comments: \$144,891

Start Date: July 1977

Completion Date: Estimated: \_\_\_

Actual: September 1979

PROJECT OBJECTIVE: To put the design of exhaust silencers (reactive) on rational basis  
using an iterative computer program.

PROJECT DESCRIPTION:

To investigate the design of acoustically efficient, low back-pressure exhaust systems, using a computer-based performance prediction program, with the aim of reducing fuel consumption and/or giving enhanced engine power. Practical silencers were constructed for both a high and a low power-to-weight ratio vehicle.

SUMMARY OF FINDINGS (if project completed):

The design targets for the exhaust systems of the LPWR vehicle of substantially lower back pressure (about 50% of O.E) without detracting from the external noise requirements of EEC Directive 77/212/EEC were essentially met. On the HPWR vehicle a similar back pressure target and a more stringent (3 dBA better) performance compared to the O.E. exhaust system over the engine speed range bounding the EEC noise test were also substantially met. In spite of an increased volume (20 - 60% re O.E. silencer volume) the prototype silencers were fitted to the test vehicles without loss of ground clearance.

The reduced back pressures of the silencers resulted in improvements of better than 3% in maximum power and better than 3.5% in specific fuel consumption at maximum power.

The improved fuel consumption measured on the engine could not be detected on the vehicle on the ECE Urban driving cycle, but could be detected during tests at high (90 km/h) constant speeds.

Although the design targets were substantially met, the computer aided design procedure proved to be of only limited success and much more basic research is required before drawing board design of exhaust silencers becomes a practicality.

AVAILABLE PUBLICATIONS (of research findings):

Report No. 1980/2 Development of Quiet Low Back-Pressure Exhaust Silencers in  
Two Saloon Cars Using a Performance Prediction Programme



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Exhaust Mufflers

COUNTRY: West Germany

PROJECT TITLE: Study on the scatter of the acoustic quality of  
exhaust systems.

Performing Organization Name & Address:

Not yet determined

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33  
West Germany

Principal Investigator(s):

S.O.

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:      1981: (100,000)

1979:      1982: (100,000)

OR:

Total Funding Amount: (200,000, --)

Start Date: 1981

Completion Date: Estimated: 1982

Actual:     

Comments:

1981: \$46,950

1982: \$46,950

Total: \$93,900

PROJECT OBJECTIVE: It is to be investigated what influence moderate deviations  
and production defects have on the acoustical quality of passenger car  
exhaust systems.

PROJECT DESCRIPTION:

Exhaust systems are to be manufactured with moderate and constructive  
deviations and they are to be acoustically compared with original parts.  
Proposals are to be worked out for improving and supplementing the  
official authorization method for spare parts.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Exhaust Mufflers

COUNTRY: West Germany

PROJECT TITLE: Measurement Data Survey on the Exhaust Noise of Vehicles

Performing Organization Name & Address:

Heinrich Gillet Inc.  
Zipcode 100  
6732 Edenkoben  
West Germany

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck place 1  
D-1000 Berlin 33  
West Germany

Principal Investigator(s):  
Director Chief Eng. G. Frietzsche  
Dipl-Phys. R. Neumann

Annual Funding:

(Check One: Fiscal Yr:  Calendar Yr:   
1978: \_\_\_\_\_ 1980: (158,056)  
1979: \_\_\_\_\_ 1981: (24,794.--)

OR:

Total Funding Amount:

Comments: 1980: \$74,207  
1981: \$11,640

Start Date: May 1, 1980

Completion Date: Estimated: April 30, 1981

Actual: \_\_\_\_\_

PROJECT OBJECTIVE: Development of criteria to evaluate the acoustical quality of exhaust systems.

PROJECT DESCRIPTION:

Carrying out measurements of the exhaust noise on 50 passenger cars with original and supplementary parts sound dampers in different operational states, especially level characteristic curves concerning rotational speed. Selection of suitable measuring conditions for the description of the exhaust noise and proposal for quality criteria for acoustical characteristics.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Measurements on about 25 passenger cars concluded, partially with alternating elimination of the individual noise sources (engine noise, intake noise, exhaust noise, rolling noise). As yet there is no evaluation.

AVAILABLE PUBLICATIONS (of research findings):

None

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Exhaust Mufflers

COUNTRY: West Germany

PROJECT TITLE: Theoretical and experimental study of  
reflexive and resonator exhaust mufflers  
for internal combustion engines

Performing Organization Name & Address:

Gesellschaft für Verbrennungskraftmaschinen  
und Meßtechnik m.b.H.  
Prof. Dr.-Ing. H. List  
A-8020 Graz, Kleiststraße 48  
Austria

Sponsoring Organization Name & Address:

Forschungsvereinigung Verbrennungskraft-  
maschinen e.V.

Lyonerstraße 18  
D-6 Frankfurt/Main-Niederrad 1  
West Germany

Principal Investigator(s):

Dr. G.E. Thien  
Dr. K.P. Mayer  
Dipl.-Ing. B. Nowotny

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: y)

1978: US\$ 108.000,- 1980: US\$ 135.000,-

1979: US\$ 50.000,- 1981: US\$ 135.000,-

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

Start Date: Jan. 1976

Completion Date: Estimated: Dec. 1981

Actual: \_\_\_\_\_

PROJECT OBJECTIVE: Prediction of the radiated exhaust noise of internal combustion engines  
by computer simulation

PROJECT DESCRIPTION: A computational program for the design and analysis of reflexive and  
resonator silencers has to be developed. As opposed to the acoustic theory the present method  
should take into account a wave motion of finite amplitude. This means that the nonlinear part  
differential equations governing the nonstationary duct flow in the exhaust system have to be  
solved numerically. Consequently, the system of engine and silencer cannot be decoupled so th  
the reaction of the silencer on the engine performance can be considered simultaneously. The  
validation of the computational results has to be proved by experiments.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress): A computer code was developed in order to solve the  
nonlinear equations of the unsteady gas flow in the exhaust system by a predictor-corrector  
method. The flow is assumed as one-dimensional, but changes of cross-sectional area can be tak  
into consideration. By this, the variables of state and the velocity as function of time are  
obtained at the open end of the tail pipe. Using these results, the sound radiation from the  
tail pipe is calculated by the acoustic theory. Finally, the third octave analysis of the  
radiated exhaust noise is obtained at constant load and speed of the engine.

At present, the program is applicable to mufflers, composed of expansion chambers (with or wit  
out extended inlet and outlet) and volume resonators, by which a large variety of different  
muffler types can be covered. The comparison of computed results with experiments show good  
agreement up to 1 kHz. An improvement of the accuracy of the program for the range over 1 kHz  
is expected by partly introducing a two-dimensional model into the computation.

AVAILABLE PUBLICATIONS (of research findings):

Paper to be published in 1981 in "Motortechnische Zeitschrift" (MTZ)/West Germany

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Exhaust Mufflers  
COUNTRY: West Germany

PROJECT TITLE: Exhaust gas pipes for motor vehicles with reduced air  
sound propagation and reduced aperture noise.

Performing Organization Name & Address:  
Bremshey Inc.  
Ahr St. 5-7  
5650 Solingen 11  
West Germany

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33  
West Germany

Principal Investigator(s):  
Ing. (grad.) Günther Dungs

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_  
1978: \_\_\_\_\_ 1980: \_\_\_\_\_  
1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: January 1, 1978  
Completion Date: Estimated: \_\_\_\_\_  
Actual: December 31, 1979

OR:  
Total Funding Amount: (340,000)  
Comments: \$159,630

PROJECT OBJECTIVE: Development of exhaust pipe mufflers (without silencers)  
with reduced air sound propagation and reduced aperture noise.

PROJECT DESCRIPTION:

-Exhaust pipe mufflers were studied on a passenger car (active and  
passive pipe systems) with regard to outside noise reduction.  
-In addition, we studied the effect of flexible elements between  
the exhaust gas system and the exhaust manifold (compensators).

SUMMARY OF FINDINGS (if project completed): Simply designed exhaust pipe mufflers  
STATUS REPORT (if in progress): could show an acoustical improvement  
compared with present day exhaust systems. The double wall tubes found  
to be used here have increased vibration radiation because of their  
larger diameter compared with conventional pipes. The uncoupling of the  
motor vibrations from the pipe system requires compensators with a long  
service life. For a satisfactory orifice sound, pipe mufflers must be  
built up in an inhomogeneous manner, that is to say the inside pipe  
(mostly a spray pipe) consists of different designs (see pages 53 and 55  
of the report). This causes the system to lose facility of production.  
Clear noise improvements can be achieved also in the case of conventional  
exhaust gas systems, when the exhaust gas system is uncoupled from the  
engine with regard to vibrations by soft compensators. By means of this  
we achieve improvements by 3-5 dB(A) in the present measuring method for  
travel-by noise.

AVAILABLE PUBLICATIONS (of research findings):  
Research Report 80-105 05 105 (Federal Environmental Office)

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Exhaust Mufflers</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: Determination of Noise Emission from Passenger Cars -Effect and Quality of Special Exhaust Systems -Contributions of individual partial sound sources		
Performing Organization Name & Address: Dr. Ing. h.c. F. Porsche Inc. Porsche St. 42  7000 Stuttgart-Zuffenhausen West Germany		Sponsoring Organization Name & Address: Federal Environmental Office Bismarck Place 1 D-1000 Berlin 33 West Germany
Principal Investigator(s): Dipl.-Ing. Peter Sessing		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>X</u> ) 1978: <u>(332,024.--)</u> 1980: <u>    </u> 1979: <u>    </u> 1981: <u>    </u>
Start Date: <u>January 1, 1978</u>		OR: Total Funding Amount: <u>(332,024.--)</u>
Completion Date: Estimated: <u>    </u> Actual: <u>December 31, 1978</u>		Comments: <u>\$731, 116</u>
PROJECT OBJECTIVE: Comparison of Series and Special Exhaust Systems. (23 pieces on 4 passenger cars)		
PROJECT DESCRIPTION: -Influence of special exhaust systems on total noise. -Comparison of acoustic quality of series and special exhaust systems -Influence of partial sound sources in different operating states. -Judgment of lifetime, influence on engine performance, weight, Etc. of special exhaust systems.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): 94% of the studied special exhaust systems do not fulfill the acoustical criteria of the official authorization test and at least in some operating conditions are clearly louder than the series installation. Up to 20 dB(A) can originate in the exhaust noise between the quietest passenger car with series installation and the loudest passenger car. The data of the manufacturers with regard to longer working life, increase of engine efficiency and lower weight were mostly not fulfilled.		
AVAILABLE PUBLICATIONS (of research findings): Final report UBA-FB 79-046.		

SURFACE VEHICLE COMPONENTS NOISE

POWER TRAIN

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Power Train  
COUNTRY: United Kingdom

PROJECT TITLE: Driveline Vibrations of a Vehicle with a Front Wheel Drive.

Performing Organization Name & Address:

Cranfield Institute of Technology  
Cranfield  
Bedford MK43 OAL  
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):

Dr. D. Hodgetts

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: July 1, 1980

Completion Date: Estimated:                       
Actual:                     

OR:

Total Funding Amount: (£69,894)

Comments:

£53,906

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

A theoretical and experimental study of the engine and driveline of a front wheel drive vehicle, to establish the significance of the vibrations and the design variables which control their frequencies and amplitudes of vibration. Subsequently, to provide the motor industry with information which will be valuable for a full assessment of the safety, quality and reliability of motor vehicles with front wheel drive.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Power Train</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: Study of the influence of rotational speed limitation or automatic gears on noise emission, exhaust gas emission and fuel consumption of vehicles.		
Performing Organization Name & Address: Research Institute Noises and Vibrations - FIGE Pass St. 119 5100 Aachen West Germany		Sponsoring Organization Name & Address: Federal Environmental Office Bismarck Place 1 D-1000 Berlin 33 West Germany
Principal Investigator(s): Dipl-Ing. W. Kurtz		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____
Start Date: <u>July 1, 1980</u> Completion Date: Estimated: <u>Oct. 31, 1981</u> Actual: _____		OR: Total Funding Amount: <u>(640,000)</u> Comments: \$300,480
PROJECT OBJECTIVE: We studied the influence of driving method, especially driving at low rotational speeds on noise emission, exhaust gas emission and fuel consumption.		
PROJECT DESCRIPTION: Comparison measurements were carried out on 4 different passenger car types in actually 3 versions (hand gear shifts, automatic transmissions and rotational speed limitation by acoustic indications of the exceeding of the selected boundary rotational speed). In addition, different possibilities were realized for rotational speed limitation on a passenger car and included in the comparison measurements.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings):		



Power Train  
Abbreviated Listings

United Kingdom. Mechanical and Accessory Noise of Automotive Engines.  
University of Southampton, Institute of Sound and Vibration Research,  
Southampton SO9 5NH, United Kingdom. M. Avnir and E.C. Grover. Mechanical  
losses, lubrication and noise of vehicle transmission systems.

United Kingdom. Mechanical and Accessory Noise of Automotive Engines.  
University of Southampton, Institute of Sound and Vibration Research,  
Southampton SO9 5NH, United Kingdom. J. M. Baker and R. D. H. Perry.  
Transmission and gearbox noise.

SURFACE VEHICLE COMPONENTS NOISE

TIRES

See Also Pages:

48  
84  
210

Refer responses in English, (can accept material in other languages.) TOPIC: Tires  
 COUNTRY: AUSTRALIA

PROJECT TITLE: GENERATION OF ROAD SURFACE NOISE

Performing Organization Name & Address: AUSTRALIAN ROAD RESEARCH BOARD 500 BURWOOD HIGHWAY, VERMONT SOUTH, VICTORIA, 3133, AUSTRALIA.	Sponsoring Organization Name & Address: AUSTRALIAN ROAD RESEARCH BOARD, P.O. BOX 156 (BAG 4), NUNAWADING, VICTORIA, 3133, AUSTRALIA.
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Principal Investigator(s):  STEPHEN E. SAMUELS	Annual Funding: (Check One: Fiscal Yr: <input checked="" type="checkbox"/> Calendar Yr: <input type="checkbox"/> 1978: <u>(KAS26)</u> 1980: <u>(KAS66)</u> 1979: <u>(KAS44)</u> 1981: _____
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Start Date: <u>JULY 1977</u>	OR: Total Funding Amount: Comments: 1978: \$30,027 1979: \$50,015 1980: \$76,223
Completion Date: Estimated: <u>DEC 1981</u>	
Actual: _____	

PROJECT OBJECTIVE:  
 To investigate the manner in which road surface noise is generated.

PROJECT DESCRIPTION:  
 By measuring and analysing data collected using the passby technique at various test sites, a better understanding of the tyre/road contact noise generation mechanisms is being sought.

SUMMARY OF FINDINGS (if project completed):  
 STATUS REPORT (if in progress):  
 A range of tyres and road surfaces has been studied and the interactive effects of these two parameters are being demonstrated, analysed and described mathematically. The work currently in progress is advancing the state of the art beyond that of the International Tyre Noise Conference held at Stockholm, Sweden in August 1979.

AVAILABLE PUBLICATIONS (of research findings): Most recent publication:  
 SAMUELS, S.W. (1980). Further studies of roadside noise. Proc. 10th ARRB Conference, 10(5) pp 1-11.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Austria

PROJECT TITLE: Tire Rolling Noise.

Performing Organization Name & Address:  
Institut fuer Maschinenelemente der  
Technischen Universitaet in Wien  
(University of Technology of Vienna,  
Institute for Machinery Components)  
Getreidemarkt 9, A-1060 Vienna, Austria

Sponsoring Organization Name & Address:  
Bundesministerium fuer Gesundheit und  
Umweltschutz (Department for Health  
and Environmental Protection)  
Stubenring 1, A-1011 Vienna  
Austria

Principal Investigator(s):  
Stasch, B / Kazda, H

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: 1977

OR:

Completion Date: Estimated: \_\_\_\_\_  
Actual: active

Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE: Reduction of road traffic noise.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

One of the findings from the research on road traffic noise protection (see IRRD research project number 701565) was that an effective reduction of road traffic noise has to start at the source, i.e., the road vehicle. Ways of reducing the rolling noise of vehicles by an analytical study of all tire and carriageway types are being carried out with a test trailer first in order to exclude the influence of the vehicle chassis. These tests should lead to an assessment of tire rolling noise under various conditions (speed, load, tire air pressure, tire size, tread, type of carriageway). Later on, similar tests are planned with different types of vehicles from the production line.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Austria

PROJECT TITLE: Noise from Road Surfaces.

Performing Organization Name & Address:

Dipl.-Ing. Dr. Heinz Tiefenthaler  
Luis-Zuegg-Strasse 10/X  
A-6020 Innsbruck  
Austria

Sponsoring Organization Name & Address:

Bundesministerium fuer Bauten und Technik  
Stubenring 1  
A-1011 Vienna  
Austria

Principal Investigator(s):

Tiefenthaler, H / Fritzer, H /  
Rudelstorfer, K  
University of Innsbruck, Austria

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1977

Completion Date: Estimated: 1979

Actual: completed

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE: Literature review on the topic of rolling noise levels of road surface materials.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

A literature review of 109 publications in German or English on the topic of rolling noise levels of road surface materials and tire interaction sums up the findings of previous research in this field. Recent investigations have shown that roadways with articulated anti-skid properties could be laid to have low rolling noise levels.

AVAILABLE PUBLICATIONS (of research findings):

Tiefenthaler, H., and Rudelstorfer, K.: Laermverhalten von Fahrbahndecken. Auswertung und Zusammenfassung der Fachliteratur. Published in: "Schriftenreihe Strassenforschung" Heft 123, Bundesministerium fuer Bauten und Technik, Vienna, 1979.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Austria

PROJECT TITLE:  
Suppression of Noise from Road Surface  
Evaluation and Summary of Technical Literature (Issue No. 123)

Performing Organization Name & Address:  
Strabe - Umwelt - Verkehr  
K. RUDELSTORFER  
H. TIEFENTHALER  
Luis-Zuegg-Strabe 10/X  
A-6020 Innsbruck

Sponsoring Organization Name & Address:  
Bundesministerium fur Bauten und Technik  
Strabenforschung  
Stubenring 1  
A-1010 W i e n

Principal Investigator(s):  
K. RUDELSTORFER  
H. TIEFENTHALER

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)  
1978: \_\_\_\_\_ 1980: \_\_\_\_\_  
1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_  
Completion Date: Estimated: \_\_\_\_\_  
Actual: January 1979

OR:  
Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE:  
Suppression of noise from road pavement.

PROJECT DESCRIPTION:  
Evaluation and summary of technical literature. German- and English-language literature is collected and evaluated on traffic noise and rolling noise levels from concrete, asphalt, and paved surfaces, depending on speed, road structure, grip traction of dry and wet roads, passability and tires.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):  
Forschungsgesellschaft fur das Strabenwesen im osterreichischen  
Ingenieur- und Architektenverein  
Eschenbachgasse 9, A-1010 Wien

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Austria

PROJECT TITLE:  
Suppression of noise from the investigated concrete and asphalt road surfaces of the Inn  
Valley Highway.

Performing Organization Name & Address:

Strabe - Umwelt - verkehr  
K. RUDELSTORFER  
H. TIEFENTHALER  
E. KAMMERINGER  
Luis-Zuegg-Strabe 10/X  
A-6020 Innsbruck

Sponsoring Organization Name & Address:

Bundesministerium fur Bauten u. Technik  
Strabenforschung  
Stubenring 1  
A-1010 Wien

Principal Investigator(s):

K. RUDELSTORFER  
H. TIEFENTHALER  
E. KAMMERINGER

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: February 1981

Actual: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Comments: \_\_\_\_\_

PROJECT OBJECTIVE:

Suppression of noise from concrete and asphalt road surfaces.

PROJECT DESCRIPTION:

A concrete surface and two black top pavements were studied in dry and wet conditions. The maximum passing by noise level, the energy equivalent of constant noise level, the total frequency level, the octave band spectrum were evaluated. The relation of total noise level of free-flowing traffic to mixed traffic and to the distance from street was deduced for dry and wet roads.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

It was determined that, with increasing heavy traffic, noise level difference in energy equivalents of total noise level from dry road is reduced. Results for a wet road are differentiated. With an increase in distance from the highway, the frequency-dependent noise level reduction does not cause significant variations in level difference between different surfaces because of small differences between noise levels from the studied road surfaces in the octave band spectral range.

AVAILABLE PUBLICATIONS (of research findings):

Forschungsgesellschaft fur das Strabenwesen im Osterreichischen Ingenieur- und  
Architektenverein; Eschenbachgasse 9, A-1010 Wien

Translated from the original German.

(We prefer responses in English, but can accept material in other languages)		TOPIC : <u>Tires</u>
		COUNTRY : <u>BELGIUM</u>
PROJECT TITLE : <u>ACOUSTICAL ENVIRONMENT OF THE ROAD</u>		
Performing Organization Name and Address : CENTRE DE RECHERCHES ROUTIERES 42, BD DE LA WOLUVE B - 1200 BRUXELLES BELGIUM		Sponsoring Organization Name and Address : 1) IRSIA (INSTITUT POUR L'ENCOURAGEMENT DE LA RECHERCHE SCIENTIFIQUE DANS L'INDUSTRIE ET L'AGRICULTURE) 6, RUE DE CRAEYER B - 1050 BRUXELLES - BELGIUM 2) CENTRE DE RECHERCHES ROUTIERES
Principal Investigator(s) : DESCORNET GUY		Annual Funding : (Check One : Fiscal Yr : <u>    </u> Calender Yr : <u>X</u> ) 1978 : \$ <u>107,000</u> 1980 : <u>139,000 (1)</u> 1979 : <u>184,000</u> 1981 : <u>120,000 (2)</u>
Start Date : <u>JANUARY 1st, 1976</u>		OR : Total Funding Amount :
Completion Date : Estimated : <u>Dec. 31, 1981</u> Actual : <u>                    </u>		Comments : (1) Extrapolation based on 10 months. (2) Estimation.
PROJECT OBJECTIVE : To determine ways to improve the surface quality of roads with a view to reduce vehicle rolling noise without decreasing their skid resistance.		
PROJECT DESCRIPTION : <u>Phase 1</u> - Measurement of the rolling noise of test car (passenger) on various existing road surfaces. On the same test sites : measurements of skid resistance (SFC at 20, 50 and 80 km/h) and moulding of the surface texture and analysis in the laboratory. <u>Phase 2</u> - Search for correlations between noise 3rd octave band levels and longitudinal surface profile 3rd octave band spectral levels. <u>Phase 3</u> - Depending of the results of phase 2 ; translation of the noise-relevant characteristics of the texture into technological terms, partly by theoretical considerations, partly through extensive texture measurements (with laser profilometer) in order to correlate geometrical features with technological features.		
STATUS REPORT (if in progress) : It has been found that : 1) The road surface influence on tire noise can be characterized by pure geometrical features ; a large scale and a small scale macrotexture measure - 2) Two independant generation processes have been identified ; one, in the low frequency range is radial, roughness induced vibration; the other, in the high frequency range is tentatively identified as air-pumping or a closely related process - 3) The two processes give fairly equal contributions to the A-level for normally designed tires - 4) No friction influence has been found; there is no general conflict between skid resistance and low noise, on the contrary those demands can be easily combined.		
AVAILABLE PUBLICATIONS (of research findings) : 1) Experimental Study of the Rolling Noise of a Test Car on Various Existing Road Surfaces in Belgium by G. DESCORNET, Intl. Tire Noise Conf., Stockholm, 1979. 2) Road Surface Influence on Tire/Road Noise by U. SANDBERG and G. DESCORNET, INTER-NOISE, Miami, 1980. 3) Influence des caractéristiques de surface sur le bruit des véhicules, La Technique Routière (Belgium) No 4, 1980.		



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Canada

PROJECT TITLE:

"PAVEMENT TIRE NOISE AND LOUDNESS MEASUREMENTS"

Performing Organization Name & Address:  
Highway Environment  
Research & Development Branch  
Ministry of Transportation & Communications  
1201 Wilson Avenue  
Downsview, Ontario M3M 1J8  
Canada

Sponsoring Organization Name & Address:  
Same as Performing organization

Principal Investigator(s):

J. J. Hajek  
F. W. Jung

Annual Funding:

(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: (\$10,000)

1979: \_\_\_\_\_ 1981: (\$10,000)

OR:

Total Funding Amount: (\$20,000)

Start Date: June 1980  
Completion Date: Estimated: June 1981  
Actual: \_\_\_\_\_

Comments: 1980: \$8,317  
1981: \$8,317  
Total: \$16,634

PROJECT OBJECTIVE:  
Develop a practical method for assessing and ranking of the noise generation potential  
of pavement surfaces.

PROJECT DESCRIPTION:

Sound level measurements are conducted for

- (a) individual vehicle passbys
- (b) total traffic flow
- (c) individual rear-tire measurements. Relationships and/or correlation between results  
obtained by the different methods are analyzed and evaluated.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

No status reports yet available.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: France

PROJECT TITLE: Annoyance due to Rolling Noise.  
Annoyance due to Tire Noise.

Performing Organization Name & Address:

IRT - CERNE  
109, Avenue Allende  
69672 Bron Cedex  
France

Sponsoring Organization Name & Address:

SERES

Principal Investigator(s):

M. Vernet

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980: (140,000FF)

1979:                      1981: (70,000 FF)

Start Date: 1980

Completion Date: Estimated: 1981

Actual:                     

OR:

Total Funding Amount: (210,000 FF)

Comments: 1980: \$27,902 Total: \$41,852  
1981: \$13,951

PROJECT OBJECTIVE: Assessment of road noise and tire noise annoyance for the community.  
(Not for car drivers, or passengers.)

PROJECT DESCRIPTION:

- 1980: Noise records of traffic flow rolling on different road surfaces.  
In laboratory, assessment of the annoyance and of the noisiness provoked  
by these noise records on a jury.  
Relation between surface characteristics, noise spectras, and annoyance  
scores.
- 1981: Jury reactions to car tire noise. Assessment of annoyance versus  
spectral characteristics.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Italy

PROJECT TITLE:

Performing Organization Name & Address:  
Societa' Pneumatici Pirelli  
Viale Sarca, 202  
20126 - Milano  
Italy

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

OR:

Completion Date: Estimated: \_\_\_\_\_  
Actual: \_\_\_\_\_

Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE: Tire noise.

PROJECT DESCRIPTION: Evaluation of the influence of tread pattern design on noise emission.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Purchase of unidirectional noise detectors.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Tires</u>
		COUNTRY: <u>Sweden</u>
PROJECT TITLE: Test vehicle for tire/road noise research		
Performing Organization Name & Address: National Swedish Road and Traffic Research Institute (VTI) S-581 01 Linkoeeping Sweden		Sponsoring Organization Name & Address: The Swedish National Board for Technical Development (STU) Box 43200 S-100 72 Stockholm Sweden
Principal Investigator(s): Ulf Sandberg		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>Jan 1978</u>		OR: <u>    </u>
Completion Date: Estimated: <u>1981</u> Actual: <u>                    </u>		Total Funding Amount: <u>\$50,000</u>
Comments:		
PROJECT OBJECTIVE: To construct a two-wheeled towed test vehicle suitable for measuring tire/road noise emission from heavy vehicle tires.		
PROJECT DESCRIPTION: A two-wheeled test vehicle, to be towed by a truck, has been constructed. It is intended that one of the wheels (tires) be the test tire and the other should be as silent as possible by means of tread selection and enclosure. Thus it should be possible to use only one test tire each time, other noise sources being eliminated. The load on the test tire may be varied between 500 and 3200 kg. Tests using this design would allow the use of a microphone position fixed in relation to the tire, replacing the conventional coast-by method.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): The main part of the test vehicle (trailer) is finished. Certain parts remain to be constructed as well as the acoustic evaluation.		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires

COUNTRY: Sweden

PROJECT TITLE: Measurement of tire/road noise emission from heavy vehicle tires

Performing Organization Name & Address:  
National Swedish Road and Traffic Research  
Institute  
S-581 01 Linköping  
Sweden

Sponsoring Organization Name & Address:  
The Swedish National Board for Technical  
Development (STU)  
Box 43200  
S-100 72 Stockholm  
Sweden

Principal Investigator(s):

Ulf Sandberg

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

OR:

Total Funding Amount:                     

Comments:

Start Date: 1981

Completion Date: Estimated: 1984

Actual:                     

PROJECT OBJECTIVE: To test the tire/road noise emission levels and frequency spectra from a representative choice of heavy vehicle tires used in Sweden.

PROJECT DESCRIPTION: In the project it is intended to use a special test vehicle (two-wheeled towed trailer) on which the tires are tested.  
Sound power levels and frequency spectra from the tires are measured at different vehicle speeds.  
Retreaded tires are included in the tests.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Project planned

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Tires</u>
		COUNTRY: <u>Sweden</u>
PROJECT TITLE: <u>Road surface characterization with respect to tire noise generation</u>		
Performing Organization Name & Address: National Swedish Road and Traffic Research Institute, (VTI), S-581 01 Linköping Sweden		Sponsoring Organization Name & Address: The Swedish National Board for Technical Development (STU) Box 43200 S-100 72 STOCKHOLM, Sweden Part of project sponsored by performing organization (VTI)
Principal Investigator(s): Ulf Sandberg		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>October 1976</u>		OR: Total Funding Amount: <u>\$120,000</u>
Completion Date: Estimated: <u>1981</u> Actual: <u>                    </u>		Comments:
PROJECT OBJECTIVE: Make it possible to define a road surface with respect to its influence on tire/road noise. Make it possible to predict the noise generation on a road surface when its mechanical and acoustical characteristics are known.		
PROJECT DESCRIPTION: Methods and instruments for road characterization have been developed. E.g. a contactless fast profilometer has been constructed. Measurements of road characteristics like macrotexture, friction, drainage, sound absorption & propagation and mechanical impedance have been made and related to measured tire/road external noise for 57 tire/pavement combinations. Cooperation has been started between VTI and Centre des Recherches Routières in Belgium to compare and jointly analyze each others data. Involved in the research is also IFM Akustik-byrå AB in Stockholm.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): The results show that a macrotexture profile characterization is giving a good correlation between road and noise parameters. It is shown that at least two generating mechanisms are important. Corrections for sound absorption and surface structural characteristics improve the correlation.		
Publications: Sandberg, U: Characterization of Road Surfaces with Respect to Tire Noise. Proceedings of the International Tire Noise Conference, 1979, Stockholm. Sandberg, U and Descornet, G: Road Surface Influence on Tire/Road Noise - Part I and II. Proc. of INTER-NOISE 80, Miami (Papers A4 and A5).		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Sweden

PROJECT TITLE: Road Surface Characterization with Respect to Tire Noise.

Performing Organization Name & Address:  
Road User and Vehicle Division  
National Swedish Road and Traffic  
Research Institute  
Fack, S-58101, Linköping  
Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):  
U. Sandburg

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: October 1976

OR:

Completion Date: Estimated: June 1980

Total Funding Amount: \$150,000

Actual:                     

Comments:

PROJECT OBJECTIVE: This project will develop estimation techniques for relating road surface conditions and tire noise.

PROJECT DESCRIPTION: 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 tire 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 (macrotectura). Comparison will be made between tire noise generated on the surfaces for three types of passenger tires and the physical properties of the surfaces measured by the developed methods.

AVAILABLE PUBLICATIONS:

Road surface characterization with respect to tire noise VTI Report No. 114A, Road Texture Induced External Tire Noise. Empirical frequency response function for tires, characterization of road surfaces with respect to tire noise. Proceedings. Report; 21P, Rapport 174A, 20 p., Conference 1976, 1979, 1979 Statens Vaeg-Och Trafikinstitut, Statens Vaeg-Och Trafikinstitut, Internat. Tire Noise Conf., Stockholm, 1979.

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Sweden

PROJECT TITLE: Development of Tires and Road Surfaces which Create Less Roadside Rolling Noise.

Performing Organization Name & Address:  
IFM-Bureau of Acoustics Inc.  
Warfivings vaeg 26  
S-112 51  
Stockholm  
Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):  
N. Nilsson  
G. Gadefelt  
O. Bennerhult  
S. Sordarqvist

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: November 1976  
Completion Date: Estimated: November 1980  
Actual:                     

OR:  
Total Funding Amount: \$275,000  
Comments:

PROJECT OBJECTIVE: This project will design more quiet tires.

PROJECT DESCRIPTION: The aim of this project is to develop more quiet tires and road surfaces. During the first and part of the second year, the generation mechanisms are examined, which will include measurement of tire vibrations and air particle-velocities in relevant points of the tire fixed relative to the laboratory system, and correction to radiated noise. Part of the second, third, and fourth years will be devoted to the development of new tire and road surface construction. This will include the making of new tire molds and testing of new compounds in tires and roads.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS:

Radiation of airborne sound due to contact patch excited vibrations, generating mechanisms of external tire noise, parametric influence of external tire noise. TR 3.739.05, TR 3.709.14, TR 3.709.15 1975-08, 1976-01, IFM-Akustikbyraan AB, IFM-Akustikbyraan AB, IFM-Akustikbyraan AB.

Transcribed from the original.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: Sweden

PROJECT TITLE: Development of Methods for Characterization of Tires with Respect  
to Roadside Tire Noise.

Performing Organization Name & Address:

IFM-Bureau of Acoustics INC  
Warfvings Vaeg 26  
S-112 51  
Stockholm  
Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

N. Nilsson  
O. Bennerhult  
G. Hedefelt

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: January 1978

Completion Date: Estimated: July 1980

Actual:                     

OR:

Total Funding Amount: \$25,000

Comments:

PROJECT OBJECTIVE: The purpose of this project is to determine characteristics  
of tires that correlate to roadside noise.

PROJECT DESCRIPTION: The aim is to find methods of characterization of tires which  
correlate to roadside rolling noise. Examples of parameters that will be measured  
are: (1) surface roughness profile and wave number spectrum; (2) mechanical  
admittances of different vibration modes of the tire; (3) flow resistance; (4)  
friction characteristics; and (5) distribution of spring characteristics around  
the tire.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Transcribed from the original.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Tires</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: NOISE GENERATION AT THE TYRE-ROAD INTERFACE		
Performing Organization Name & Address: Dunlop Limited Tyre Technical Division Fort Dunlop Birmingham B24 9QT United Kingdom		Sponsoring Organization Name & Address:
Principal Investigator(s): J. C. Walker		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>                    </u>		OR: Total Funding Amount: <u>                    </u>
Completion Date: Estimated: <u>                    </u>		Comments:
Actual: <u>                    </u>		
PROJECT OBJECTIVE:		
PROJECT DESCRIPTION:  To investigate all aspects of the generation of noise at the interface between the tyre and the road.		
AVAILABLE PUBLICATIONS (of research findings):  The following papers have been published since 1978:- J. C. Walker, R. D. Oakes, The Reduction of Tyre-Road Interaction Noise, Aviation, Surface Transportation & Plant Noise Symposium, Dallas, January 1979. J. C. Walker, A. R. Williams, The Improvement of Noise and Traction due to Road/Tyre Interaction, International Tyre Noise Conference, Stockholm, August 1979. J. C. Walker, R. D. Oakes, Tyre/Road Interaction Noise, XVIII FISITA International Congress, No. 80.2.2.9, Hamburg, May 1980		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: West Germany

PROJECT TITLE: Investigation of the generating mechanisms of the tire noise  
on dry roads.

Performing Organization Name & Address:

1. Forschungsinstitut für Kraftfahrwesen  
und Fahrzeugmotoren Stuttgart - FKFS -,  
Pfaffenwaldring 12, 7000 Stuttgart 80
2. Institut für Technische Optik  
Universität Stuttgart, West Germany

Sponsoring Organization Name & Address:

Bundesministerium für  
Forschung und Technologie  
Heinemannstr. 2  
5300 Bonn  
West Germany

Principal Investigator(s):

1. W. Liedl, and R. Eberspacher
2. R. Litschel

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: February 1, 1979

Completion Date: Estimated:                       
Actual: February 28, 1981

OR:

Total Funding Amount: (DM 1,277,771.--)

Comments: \$599,913

PROJECT OBJECTIVE: Generating mechanisms of tire noise.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Principal investigations on roadways and on test stands, regarding source mechanisms of tire noise, indicate that in dry conditions mainly radially excited vibrations and tangentially excited friction vibrations in the tire contact area must be seen as the cause of the tire rolling noise.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Tires</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: Determination of noise emission of truck tires. Working step 1: Testing the measuring method.		
Performing Organization Name & Address: Research Institute for noise and vibrations - FIGE Pass St. 119 5100 Aachen		Sponsoring Organization Name & Address: Federal Environmental Office Bismarck Place 1 D-1000 Berlin 33
Principal Investigator(s): Dipl.-Ing. Wolfgang Enz		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___ 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(231,000.)</u> Comments: \$108,454.
Start Date: <u>May 1, 1980</u> Completion Date: Estimated: <u>January 31, 1981</u> Actual: _____		
PROJECT OBJECTIVE: Creation of a suitable noise measuring method for truck tires in the area close to the tires.		
PROJECT DESCRIPTION: The noise emissions of a cross section of truck tires representative for one tire size are to be determined by means of a single-axis measuring trailer designed for different tire sizes for the purpose of creating a suitable noise measuring method.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings):		

Translated from the original.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Tires</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: <u>The Noise Generating Mechanism of Vehicles Rolling on a Wet Road</u>		
Performing Organization Name & Address: <u>Institut für Technische Akustik Technische Universität Berlin Einsteinufer 27  1000 Berlin 10 West Germany</u>		Sponsoring Organization Name & Address: <u>German Research Society</u>
Principal Investigator(s): <u>Prof. Dr. Manfred Heckl Matthias Bergmann</u>		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>August 1, 1976</u>		OR: Total Funding Amount: <u>(117,000 DM)</u>
Completion Date: Estimated: <u>                    </u>		Comments: <u>\$54,931</u>
Actual: <u>July 31, 1979</u>		
PROJECT OBJECTIVE: <u>Detection of the generating mechanisms that are decisive for the rolling noise on wet roads,</u>		
PROJECT DESCRIPTION: <u>By means of parallel laboratory tests with tire segments and sound pressure and vibration measurements on the rolling tire it was tested which parameters have an important influence on the measured rolling noise on wet roads. It was investigated which part of the rolling contact on the wet road (the tire, the road surface or the water) is responsible for the noise generation.</u>		
SUMMARY OF FINDINGS (if project completed): <u>The measurements showed that neither the vibrations of the road surface nor the vibrations of the tire itself increased on a wet road. The laboratory tests showed that the entering of tread segments into the contact patch and the simultaneous impact to the surface of the water is the most important process for the rolling noise generation on a wet road. It became obvious by means of a calculation of the noise power of the suddenly accelerated water droplets at the leading edge using reasonable values for the size and velocity of the droplets and for the duration of the impact, that the acceleration noise of the water droplets at the leading edge of the contact patch is a very important generating mechanism for the rolling noise on a wet road. There is a very good agreement between this calculated sound power of the acceleration noise of the water droplets and the measured rolling noise on the wet road in the important frequency region above 1000 Hz.</u>		
AVAILABLE PUBLICATIONS (of research findings): <u>Bergmann, M. 1978, "Geräuschentstehung beim Rollen auf benetzten Oberflächen", Research Report, Technische Universität Berlin</u> <u>Bergmann, M. 1979, "Geräuschentstehung beim Rollen auf benetzten Oberflächen", Dissertation, Technische Universität Berlin</u>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: West Germany

PROJECT TITLE: Theoretical and experimental research about the generating  
mechanisms of the tire vibrations.

Performing Organization Name & Address:

Institut für Technische Akustik  
Technische Universität Berlin  
Einsteinufer 27, 1000 Berlin 10  
West Germany

Sponsoring Organization Name & Address:

Ministry for Research and Technology  
(Federal Republic of Germany)

Principal Investigator(s):

Prof. Dr. Manfred Heckl  
Dr. Matthias Bergmann  
Martin Jennewein

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: September 1, 1979

Completion Date: Estimated: Dec. 31, 1981

Actual:                     

OR:

Total Funding Amount: (458,000 DM)

Comments:

\$21,503

PROJECT OBJECTIVE: Tire Vibration Generating Mechanisms

PROJECT DESCRIPTION: We are trying to find the generating mechanisms for the tire  
vibrations by means of structure-borne sound measurements in the tread of passenger  
car tires and of laboratory and theoretical models.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

We have found interesting results about the vibration behavior of the profile of  
passenger car tires in radial, tangential, and axial direction, depending on different  
parameters such as driving speed, location of accelerometer, rubber hardness, etc.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: West Germany

PROJECT TITLE: Generating mechanisms of tire noise on wet roads.

Performing Organization Name & Address:  
Forschungsinstitut für Kraftfahrwesen und  
Fahrzeugmotoren Stuttgart - FKFS-  
Pfaffenwaldring 12  
7000 Stuttgart 80  
West Germany

Sponsoring Organization Name & Address:  
Bundesministerium für Forschung und  
Technologie  
Heinemannstr. 2  
5300 Bonn  
West Germany

Principal Investigator(s):  
W. Liedl  
E. Kohler

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: April 1, 1979  
Completion Date: Estimated: May 31, 1981  
Actual:                     

OR:  
Total Funding Amount: (DM 368,238.--)  
Comments: \$172,887

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: Parallel to the noise measurements with the FKFS-tire-noise-measuring trailer, there were also friction measurements done in wet conditions with the Stuttgart friction meter. The investigations included many different tire-roadway-combinations (passenger vehicle tires) in dry and wet conditions.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The results show that the often cited target conflict between noise reduction and driving safety does not exist; that is, that comparatively quiet roadways may enable decided high friction coefficients. On wet roadways, the sudden acceleration of water on the roadway is a primary noise source.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Tires</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: Development of tires with low noise		
Performing Organization Name & Address: Institute for Mechanics II Darmstadt Technical Institute Hochschul St. 1 6100 Darmstadt Federal Republic of Germany		Sponsoring Organization Name & Address: Federal Minister for Research and Technology 5300 Bonn 2 Federal Republic of Germany
Principal Investigator(s): Professor Dr. P. Hagedorn		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: (490,000.00 DM) Comments: \$230,550
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>October 31, 1981</u>		
PROJECT OBJECTIVE: Causes for the origin of noise.		
PROJECT DESCRIPTION: On the basis of body sound measurements of the tire as well as on the drum test stand, as well as on different roads, it should be explained whether tire vibrations are the main cause of originating noise and how these vibrations are brought about.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): Treatment of the elastic bedded circular ring as a model for belted tires and determination of model parameters. Measurement of radial and tangential accelerations of the belt on various roadways and with rotating miniature measuring pickups. Propagation of the measuring signals for correlation with the sound measurements of stationary microphones.		
AVAILABLE PUBLICATIONS (of research findings): /1/ The elastic embedded circular ring as model for belted tires. K.G. Krapf, Dissertation, TH Darmstadt, 1979 /2/ Vibration Measurements and Computation for the Radial Belted Tire and the Tire Noise, K.G. Krapf Inter. TIRE NOISE Conference, 1979		

Translated from the original German.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Tires  
COUNTRY: West Germany

PROJECT TITLE: Study of Feasible Reductions in Noise from Rolling Tires.

Performing Organization Name & Address:

Federal Highway Institute  
Zipcode 51 05 30  
Bruehler St., 1  
5 Cologne 51  
West Germany

Sponsoring Organization Name & Address:

Federal Transport Ministry  
Zipcode 100  
53 Bonn-Bad Godesberg 1  
West Germany

Principal Investigator(s):

Dr. S. Ullrich

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: April 1977

Completion Date: Estimated: June 1981

Actual:                     

OR:

Total Funding Amount: (DM 150,000)

Comments: \$70,425

PROJECT OBJECTIVE:

PROJECT DESCRIPTION: The origin of tire noise. Tire noise on normal roads and on 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.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

The classification of passenger car tires offered on the market, with regard to their noise emission, has been concluded. Measurements of noise emission of tires on different street covers, directly on the street and on an internal drum test stand, were continued.

(Translated from the original German.)

AVAILABLE PUBLICATIONS (of research findings): 1) Ullrich, de Veer: Measurement of noise emission of steel belted tires of different manufacturers on an internal drum test stand, Kautschuk-Gummi, Kunststoffe 32 (1979), vol. 2, p. 105-109.

Tires  
Abbreviated Listings

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. M. Underwood, D. Anderton, and T. Priede. Tyre noise.

West Germany. Investigation on the Originating Mechanism of Tire Noise. Performing Organization: Messerschmitt - Bolkow - Blohm. Sponsoring Organization: Ministry of Research and Technology of the Federal Republic of Germany (BMFT). 1980 - 1982.

West Germany. A Measurement Procedure to Determine the Distribution of Sound Sources Relating to Space. Performing Organization: Universitat Göttingen, West Germany. Sponsoring Organization: Ministry of Research and Technology of the Federal Republic of Germany (BMFT). 1980 - 1982.

West Germany. Measurements at the Vehicle. Performing Organization: Universitat Berlin, West Germany. Sponsoring Organization: Ministry of Research and Technology of the Federal Republic of Germany (BMFT). 1980 - 1982.

West Germany. Investigation of Resonances. Performing Organization: Technische Hochschule Darmstadt, West Germany. Sponsoring Organization: Ministry of Research and Technology of the Federal Republic of Germany (BMFT). 1980 - 1982.

West Germany. Investigations with a special Tire - Noise - Test - Device on Wet Roads Including Measurements of Traction; Test of a Laser-measurement Procedure. Performing Organization: Universitat Stuttgart, West Germany. Sponsoring Organization: Ministry of Research and Technology of the Federal Republic of Germany (BMFT). 1980 - 1982.

West Germany. Influences of the Road Surface on Tire Noise. Performing Organization: Fa. von der Wethern, Cologne, West Germany. Sponsoring Organization: Ministry of Research and Technology of the Federal Republic of Germany (BMFT). 1980 - 1982.

SURFACE VEHICLE COMPONENTS NOISE  
SURFACE VEHICLE COMPONENTS NOISE OTHER

See Also Pages:

57  
209  
216

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Surface Vehicle Components - Other  
COUNTRY: France

PROJECT TITLE: Perspectives for Vehicle Noise Reduction: 1985-2000, having regard  
to technical possibilities, energy consumption, and cost.

Performing Organization Name & Address:  
Institut de recherche de transports  
Centre d'evaluation et de recherche des  
nuisances de l'energie  
107, Avenue Salvador Allende  
BP 75, 69672 Bron Cedex  
France

Sponsoring Organization Name & Address:  
Commission of the European Communities  
Environmental and Consumer Protection  
Service  
200, rue de la Loi  
1049 Brussels  
Belgium

Principal Investigator(s):  
Messrs. Claude Lamure, Bernard Faure  
and Jacques Lambert

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: July 1980

Completion Date: Estimated: October 1981  
Actual:                     

OR:  
Total Funding Amount: (750,000 FF)  
Comments: \$49,825

PROJECT OBJECTIVE: To assess the energy and cost implications of vehicle noise reduction  
in 1985-2000, in the context of the present regulatory regime and the state of the art.

PROJECT DESCRIPTION: The various ways of silencing vehicles will be identified, and  
their effectiveness evaluated theoretically and practically in terms of noise reduction,  
energy consumption, and cost for selected types of cars and trucks.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

An interim progress report on the first half of the project has been presented.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Surface Vehicle Components - Other</u>
		COUNTRY: <u>Sweden</u>
PROJECT TITLE: The working environment of professional drivers (Noise and Infrasonnd)		
Performing Organization Name & Address: National Swedish Road and Traffic Research Institute S-581 01 Linköping Sweden		Sponsoring Organization Name & Address: Swedish Vocational Training and Working Environment Council of the Transport Trades (TYA) Vaestra vaegen 11A S-171 46 Solna Sweden
Principal Investigator(s): Ulf Sandberg Sven-Olof Lundkvist		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: <input checked="" type="checkbox"/> 1978: _____ 1980: \$33,000 1979: _____ 1981: _____
Start Date: <u>1977</u>		OR: _____
Completion Date: Estimated: <u>1985</u>		Total Funding Amount: _____
Actual: _____		Comments: _____
PROJECT OBJECTIVE: To determine a desirable noise and infrasonnd environment in vehicles with respect to drivers' health, performance and comfort.		
PROJECT DESCRIPTION: The present vehicle interior environment with respect to noise and infrasonnd is investigated and compared to different criteria. Where the environment is found to be unacceptable, proposals are made for improvements. The measurement methodology is investigated. Different criteria are reviewed using literature surveys, contacts with specialists and own experiments. Also, the generating mechanisms are investigated roughly in order to see what the improvement potential is.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): Just started is an experiment with the intention to determine the influence on different levels and combinations of noise, infrasonnd and vertical vibration on human performance and comfort. In the laboratory experiment, which uses a driving simulator, the driving task and environment is imitated as closely as practically possible. Measurements of noise and infrasonnd in buses have been made both systematically using fixed driving conditions, and using noise and infrasonnd dose meters giving average exposure levels for drivers during ordinary working days. The exposure ranges between 68 - 75 dBA (L <sub>Aeq</sub> ) in modern Swedish buses, while older buses can be considerably noisier. Generating mechanisms for infrasonnd and noise in buses have been identified as air turbulence in the entire frequency range (2-10000 Hz), road roughness in the frequency range 5-500 Hz, tire defects in the frequency range 4-25 Hz and engine noise in the frequency range 20-500 Hz. All these mechanisms are non-neglectable for one of the buses used for extensive tests, and their relative importance is depending on the frequency of interest, driving conditions, type of road, wind and type of bus.		
AVAILABLE PUBLICATIONS (of research findings):		



(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Surface Vehicle Components - Other</u>
		COUNTRY: <u>United Kingdom</u>
PROJECT TITLE: <u>The active damping of machine induced vibrations in relation to flexible structures.</u>		
Performing Organization Name & Address: Civil Engineering Department The University Leeds LS2 9JT United Kingdom		Sponsoring Organization Name & Address: Science Research Council United Kingdom
Principal Investigator(s): L. A. Walker J. D. Bolter		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>(£3,600)</u> 1979: <u>                    </u> 1981: <u>(£3,600)</u> OR: <u>                                    </u> (plus further year) Total Funding Amount: <u>                    </u> Comments: 1980: \$7,927 1981: \$7,927
Start Date: <u>Autumn 1979</u>		
Completion Date: Estimated: <u>Autumn 1982</u> Actual: <u>                    </u>		
PROJECT OBJECTIVE: <u>To improve the vibration insulation of structures from power sources in the situation of human comfort. This could apply to ground or engine induced vehicle body motions.</u>		
PROJECT DESCRIPTION: <u>The method of active damping seeks to improve on conventional passive damping techniques by the provision of an active control force applied to the moving structure. The force is processed from the output of a motion sensor on the structure and arranged to act in a damping role.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <u>Theory has been completed on the use of single and multiple damping units on metal plates. Damping measurements of noise and impulse induced motions are currently projected, more particularly with lightly damped framed structures.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>Characteristics of an active feedback system for the control of plate vibrations. L.A. Walker and P.P. Yaneske; J. of Sound and Vibration (1976):46(2), 157-176.</u>  <u>The damping of plate vibrations by means of multiple control systems. J. of Sound and Vibration (1976):46(2), 177-193.</u>		

Surface Vehicle Components-Other  
Abbreviated Listings

United Kingdom. Engine Design. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. R. F. Halliday and E. C. Grover. The evaluation of polymers for suitability for damping in automotive engineering applications.

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

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Lea, N. Lalor, and K. E. Kalafatoglu. Modelling of structural characteristics of sheet metal vehicle body structures.

United Kingdom. Automobile and Vehicle Acoustics and Vibration. University of Southampton, Institute of Sound and Vibration Research, Southampton SO9 5NH, United Kingdom. J. Lea and N. Lalor. Low frequency noise reduction in irregular shaped cavities.

West Germany. Braking Noise of Heavy Trucks (planned project). Forschungsvereinigung Automobiltechnik e.V. (FAT), Westendstrasse 61, D - 6000 Frankfurt/Main 17, West Germany. Investigations on the originating mechanism of braking noise of heavy trucks; experimental investigations using a complete rear axle of a truck and holographic measurement methods.



METHODOLOGY AND STANDARDS

See Also Page:

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(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Methodology and Standards  
COUNTRY: Canada

PROJECT TITLE: Site-to-site repeatability of stationary measurement procedures  
for truck exterior sound levels.

Performing Organization Name & Address:  
Harford, Kennedy, Wakefield Ltd.  
1727 West 2nd Avenue  
Vancouver, B.C.  
V6J 1H8  
Canada

Sponsoring Organization Name & Address:  
Road & Motor Vehicle Traffic Safety Branch  
Transport Canada  
Place de Ville  
Ottawa, Ontario  
K1A 0N5  
Canada

Principal Investigator(s):  
D. S. Kennedy  
E. R. Welbourne

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: May 1980

Completion Date: Estimated: June 1981  
Actual:                     

OR:  
Total Funding Amount: (\$32,064)  
Comments: \$26,667

PROJECT OBJECTIVE: To compare the site-to-site repeatability of SAE J1096 and CSA Z107.22.

PROJECT DESCRIPTION: The use in CSA Z107.22 of a microphone at ground level offers a theoretical advantage over the usual 1.2 m microphone height in reduced sensitivity of measurements to ground geometry and impedance and hence in reduced variability of measurements between sites on the same vehicle. Measurements have been made to both SAE J1096 and CSA Z107.22 on the same 4 trucks at 50 different sites, and the results are to be analyzed to compare the repeatability of the two procedures.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The experimental work is complete, but a complete and detailed analysis of the results has yet to be done. Preliminary indications are that the variance among sites for each of the 4 trucks is lower for CSA Z107.22 than for SAE J1096, although the differences are not significant at the 95 percent level.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Methodology and Standards  
COUNTRY: EEC Member States

PROJECT TITLE: Development of representative noise test procedure.

Performing Organization Name & Address:

Committee of Common Market  
Automobile Constructors (CCMC)  
5 Square de Meeus, Bte. 7  
B-1040 Brussels  
Belgium

Sponsoring Organization Name & Address:

Principal Investigator(s):

Engineering departments of the CCMC  
Member Companies

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1978

Completion Date: Estimated: 1981

Actual:                     

OR:

Total Funding Amount:                     

Comments: Data not available

PROJECT OBJECTIVE: Definition of a representative noise test procedure.

PROJECT DESCRIPTION: CCMC has now developed a noise test procedure for passenger cars with automatic transmissions and carried out comparative test programs to evaluate the various procedures under consideration with ECE and EEC since 1978, using CCMC procedure as a reference procedure. Work is now in progress to determine the best noise measurement procedure for the long term.

AVAILABLE PUBLICATIONS (of research findings):

- N/31/78: CCMC Proposal for a new noise test procedure for Cars with Automatic Transmission
- N/54/79: CCMC Position on the Different Exterior Noise Measurement Methods Presently under Discussion to replace ISO R 362
- N/03/80: CCMC Position on Passenger Car Noise Test Procedure

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Methodology and Standards

COUNTRY: Japan

PROJECT TITLE: A statistical consideration on a peak-distribution of arbitrary random noise and vibration waves.

Performing Organization Name & Address:  
Faculty of Engineering, Hiroshima University  
3-8-2, Senda-machi, Naka-ku,  
Hiroshima City 730  
Japan

Sponsoring Organization Name & Address:  
None

Principal Investigator(s):  
Shizuma YAMAGUCHI and Mitsuo OHTA

Annual Funding:  
(Check One: Fiscal Yr: 0 Calendar Yr: 0)

1978: 0 1980: 0

1979: 0 1981: 0

OR: Total Funding Amount: 0

Start Date: \_\_\_\_\_  
Completion Date: Estimated: \_\_\_\_\_  
Actual: Sep. 1979

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

PROJECT OBJECTIVE: The objective of this work is to discuss the mutual relationship between the peak distribution and the usual amplitude distribution.

PROJECT DESCRIPTION: In the noise and vibration environmental system, the statistical properties of the peak values are as important as the statistics connected with usual amplitude distribution such as mean value, variance,  $L_x$ ,  $L_{eq}$ , NPL etc. of the random noise and vibration wave, especially for the purpose of the psychological evaluation of random fluctuation and/or the consideration of noise and vibration control problem. Furthermore, the peak values also play an important role in the phenomena of fatigue failure of the structures caused by random vibration.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress): In this study, the statistical treatment of peak distribution for arbitrary random fluctuation waves of non-Gaussian distribution type is discussed in detail. Concretely, in order to throw light on the mutual relationship between peak and instantaneous amplitude distributions, the explicit expression for the peak distribution is derived in the general form of statistical expansion series, taking the amplitude distribution function into the first term. The effect of acuity of the actual random waves on the resultant peak distribution form is reflected in each expansion coefficient of the above general expansion expression. Then, the validity of the theoretical expression is experimentally confirmed by applying to the following two random fluctuation waves: i) the random waves simulated on a recorder of the analogue computer and ii) the actually observed wave of traffic random noise as one example of arbitrary non-Gaussian type random fluctuation waves.

AVAILABLE PUBLICATIONS (of research findings):

The Transactions of the Institute of Electronics and Communication Engineers of Japan, Vol. J62-A, No.9, pp.608-609

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Methodology and Standards</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: A unified expression for the multivariate joint probability density function of the output fluctuation of an arbitrary linear vibratory system with arbitrary random excitation.		
Performing Organization Name & Address: Faculty of Engineering Hiroshima University 3-8-2, Senda-machi, Naka-ku Hiroshima City 730 Japan		Sponsoring Organization Name & Address: None
Principal Investigator(s): Mitsuo Ohta Shizuma Yamaguchi Seihiro Hiromitsu		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u>
Start Date: _____		OR: Total Funding Amount: _____
Completion Date: Estimated: _____ Actual: <u>September 1977</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: A new form of the multivariate statistical approach to arbitrary linear vibratory systems has been introduced in the general context of statistical series expansions.		
PROJECT DESCRIPTION: In order to investigate in detail the response of a linear vibratory system with random excitation, especially in statistical evaluation of noise and vibration control systems by use of higher order statistics related to the higher order frequency spectrum information (such as power spectrum, bispectrum and polyspectrum), one must inevitably study the multivariate joint probability density function, or joint moments, for an arbitrary number of temporal samples of the output random fluctuation, in respect to particular input and system characteristics. Furthermore, for the purpose of the synthetic evaluation of a complex multivariate linear system structure, the multivariate joint probability density function plays an important role.		
SUMMARY OF FINDINGS: In this study, without any simplification of the problem such as assuming a simplified input model such as Gaussian distribution, white noise characteristics, etc., an exact explicit expression of the probability density function has been derived for output fluctuation in the case when an arbitrary random signal having linear and/or nonlinear correlation functions among arbitrarily chosen samples and also having an arbitrary probability distribution is passed through an arbitrary linear vibratory system of finite order. The theoretical expression is experimentally confirmed by considering not only several multivariate joint moments derived from the universal multivariate joint density function, but also a bivariate probability expression in terms of a conditional probability distribution, with the aid of a digital simulation technique.		
AVAILABLE PUBLICATIONS (of research findings): Journal of Sound and Vibration, 56(2):229-241, 1978.		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Methodology and Standards</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Methodological Study on Statistical Evaluation of Noise and Vibration Control System — Simplified <math>L_w</math> Evaluation Procedures for Single Wall and Double Wall</u>		
Performing Organization Name & Address: Faculty of Engineering, Hiroshima University 3-8-2, Senda-machi, Naka-ku, Hiroshima City 730 Japan		Sponsoring Organization Name & Address:  NONE
Principal Investigator(s): Mitsuo OHTA, Hirofumi INASHIGE and Shizuma YAMAGUCHI		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>Nov. 30, 1978</u>		Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: We have proposed a new trial of two simplified procedures for statistical noise evaluation of sound insulation systems.		
PROJECT DESCRIPTION: It must be an essential problem to establish a new systematic method for evaluating the transfer characteristics of sound insulation systems from both deterministic and statistical viewpoints, not only by use of the well known deterministic method based on spectrum analysis in a frequency region, but also by use of the statistical method based on the probability distribution form in a time region.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  In this paper, we have focused our attention on the improvement quantity of noise evaluation $L_w$ on the output response of two kinds of sound insulation system, and proposed a new trial of two simplified procedures for statistical noise evaluation of sound insulation systems by use of only two kinds of lower order moments like the mean and variance.		
AVAILABLE PUBLICATIONS (of research findings):  Theoretical and Applied Mechanics, Vol.28, pp.387-398, ( 1980 ).		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Methodology and Standards</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Methodological study on statistical evaluation of transmitted sound waves based on the system change of sound insulation</u>		
Performing Organization Name & Address: <u>Faculty of Engineering, Hiroshima University</u> <u>3-8-2, Senda-machi, Naka-ku,</u> <u>Hiroshima City 730</u> <u>Japan</u>		Sponsoring Organization Name & Address:  <u>NONE</u>
Principal Investigator(s): <u>Hirofumi IWASHIGE ,</u> <u>Mitsuo OHTA</u> <u>and</u> <u>Shizuma YAMAGUCHI</u>		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    0    </u> 1980: <u>    0    </u> 1979: <u>    0    </u> 1981: <u>    0    </u>
Start Date: <u>                    </u>		OR: Total Funding Amount: <u>    0    </u>
Completion Date: Estimated: <u>                    </u> Actual: <u>Nov. 29, 1978</u>		Comments: <u>This work is based on regular expenses</u> <u>of the national school of Japan.</u>
PROJECT OBJECTIVE: <u>A general and fundamental consideration for statistical evaluation of transmitted sound waves has been theoretically proposed.</u>		
PROJECT DESCRIPTION: <u>From the practical viewpoint of control and regulation for such environmental noise, several statistics, directly connected with the probability distribution form of random noise fluctuation are very often used for evaluation of the human response.</u>		
SUMMARY OF FINDINGS (if project completed):  <u>It is essential to establish a systematic method for evaluating the effect of the system change of noise control on the widely-used standard noise index such as <math>L_a</math>. In this paper, a general and fundamental consideration for statistical evaluation of transmitted sound waves has been theoretically proposed, when the system characteristic of the sound insulation is changed by the improvement work. The theoretical result is experimentally confirmed not only by the result of the digital simulation technique, but also by the actual observed data obtained using the reverberation room method. The results of the experiment are in good agreement with our theory.</u>		
AVAILABLE PUBLICATIONS (of research findings): <u>The Journal of the Acoustical Society of America, Vol.64, Supplement No.1, p.578 ( 1978 ).</u>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Methodology and Standards  
COUNTRY: Sweden

PROJECT TITLE: Noise Protection Plan for Local Districts.

Performing Organization Name & Address:  
National Swedish Environmental  
Protection Board  
Fack  
S-17120  
Solna  
Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1976

OR:

Completion Date: Estimated: 1979  
Actual:                     

Total Funding Amount: \$33,000

Comments:

PROJECT OBJECTIVE: The aim is to work out guidelines to be used by local authorities  
for noise protection planning in built-up areas.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Methodology and Standards  
COUNTRY: United Kingdom

PROJECT TITLE: Measurement of reflection coefficients *in situ*.

Performing Organization Name & Address:  
I.S.V.R., University of Southampton  
Southampton SO9 5NH  
United Kingdom

Sponsoring Organization Name & Address:  
Science Research Council  
P. O. Box 18  
Swindon SN2 1ET  
United Kingdom

Principal Investigator(s):  
J. S. Bolton  
J. K. Hammond  
E. Gold  
P. E. Donk

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: October 1980

Completion Date: Estimated: October 1982  
Actual:                     

OR:  
Total Funding Amount: (£50,000)  
Comments: \$23,475

PROJECT OBJECTIVE: Development of experimentally simple method of measuring acoustical reflection coefficients.

PROJECT DESCRIPTION: A transient free field technique for measuring reflection coefficients *in situ* is being developed. The novel feature is the use of apstral processing to isolate the effects of reflection. All measurements are made using one microphone, and the direct and reflected signals may overlap. It will be used to measure the surface impedance of outdoor surfaces.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

"The Application of Apstral Techniques to the Measurement of Reflection Coefficients In Situ. Part 1. Simulations." By: J.S. Bolton and E. Gold. Royal Melbourne Institute of Technology Report No. 121007.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Methodology and Standards

COUNTRY: United Kingdom

PROJECT TITLE:

Acoustic Intensity

Performing Organization Name & Address:

Ricardo Consulting Engineers Ltd.,  
Bridge Works,  
Shoreham-by-Sea,  
Sussex.  
BN4 5FG  
UNITED KINGDOM

Sponsoring Organization Name & Address:

" " "

Principal Investigator(s):

B.J. Challen  
M.D. Croker

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_

Actual: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE: To assess the General Motors two microphone acoustic intensity technique for engine acoustic source identification and ranking.

PROJECT DESCRIPTION: Two microphone acoustic intensity measurements were compared with (18-microphone) sound power measurements made on a running engine. The engine was lead-uncovered for the 18-microphone tests and for the two-microphone intensity tests. The latter tests were repeated with the engine bare.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Within a useful frequency band the two-microphone intensity measurements gave good results for total and individual source acoustic power after a much shorter time than would be expected with lead-covering techniques.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Methodology and Standards  
COUNTRY: United Kingdom

PROJECT TITLE: Use of a Digital Voltmeter to Measure the Output of a Sound Level Meter.

Performing Organization Name & Address:  
Hull College of Higher Education  
Queen's Gardens  
Hull  
United Kingdom

Sponsoring Organization Name & Address:

Principal Investigator(s):  
L.W. Bean

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:            1980:           

1979:            1981:           

Start Date: January 1976

OR:

Completion Date: Estimated:           

Total Funding Amount:           

Actual: May 1979

Comments:

PROJECT OBJECTIVE: The project was to develop a computer program that would measure the varying output of a sound level meter.

PROJECT DESCRIPTION: The objective of the project was to develop a low-cost alternative to the special instruments that compute and display the value of quantities such as  $L_{10}$ ,  $L_{eq}$ , and so forth. A relatively inexpensive, and readily available digital voltmeter was seen as an alternative when used in conjunction with a computer.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Using an inexpensive and readily available digital voltmeter (a Digital Avometer type DA 114), and feeding the results into a computer, allows for flexibility, accuracy, and ease of operation. The method developed in this project was compared to existing techniques and found to be as reliable.

AVAILABLE PUBLICATIONS (of research findings):

Bean, L.W. "Use of a Digital Voltmeter to Measure the Output of a Sound Level Meter." *Applied Acoustics*, Vol. 13. Applied Science Publishers Ltd., Essex, United Kingdom, 1980, pp. 151-157.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Methodology and Standards

COUNTRY: West Germany

PROJECT TITLE: Testing of sound level meters and filters.

Performing Organization Name & Address:

Laboratorium fur Schallnormale der  
Physikalisch-Technischen Bundesanstalt  
Bundesallee 100  
3300 Braunschweig  
West Germany

Sponsoring Organization Name & Address:

Bundesminister fur Wirtschaft  
(Federal Minister of Economics)

Principal Investigator(s):

Dr. K. Brinkmann

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                     

1980:                     

1979:                     

1981:                     

Start Date:                     

Completion Date: Estimated:                       
Actual:                     

OR:

Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

Development of measuring methods for testing of sound level meters, integrating sound level meters, noise dose meters, and filters. Type approval tests for verification of these instruments.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Annual Reports of Physikalisch-Technische Bundesanstalt

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Methodology and Standards</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: <u>Development of a simple and practical vehicle noise emission control.</u>		
Performing Organization Name & Address: Technical Monitoring Association Bavaria Inc. Zipcode 46 8000 Munich 44 West Germany		Sponsoring Organization Name & Address: Federal Environmental Office Bismarck Place 1 D-1000 Berlin 33 West Germany
Principal Investigator(s): Dipl.-Ing. W. Betzl		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>(125,120.--)</u> 1979: <u>(26,600.--)</u> 1981: <u>(21,160.--)</u>
Start Date: <u>7-1-1979</u>		OR: Total Funding Amount: <u>(242,800.--)</u>
Completion Date: Estimated: <u>9-30-1981</u> Actual: <u>                    </u>		Comments: 1979: \$45,353; 1980: \$58,743; 1981: \$9,934; total, \$113,994
PROJECT OBJECTIVE: <u>Development of a measuring instrument for noise emission checks on vehicles in flowing traffic.</u>		
PROJECT DESCRIPTION: 1. Basic studies (equipment selection, acoustical preconditions) 2. Selection of optimum methods and compilation of measuring devices 3. Testing of measuring equipment in practice.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): There are difficulties in the following points: Frequency distortion with directional microphones. - Determination of maximum noise. - Measurement on different vehicles with different frequency spectra. - Automatic distance measurement microphone-vehicle. - Recalculation of measuring value to standard distance. - Different spectra and propagation conditions give a large scattering of the measuring values.		
AVAILABLE PUBLICATIONS (of research findings): None.		

Translated from the original German.

ACOUSTIC PROPERTIES

PROPAGATION

See Also Pages:

81  
122  
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(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>PROPAGATION</u>
		COUNTRY: <u>AUSTRALIA</u>
PROJECT TITLE: THE ROLE OF VEGETATION IN URBAN NOISE CONTROL		
Performing Organization Name & Address: Department of Architectural Science University of Sydney Sydney NSW 2006 AUSTRALIA		Sponsoring Organization Name & Address: N.S.W. State Pollution Control Commission G.P.O. Box 4036 Sydney NSW 2001 AUSTRALIA
Principal Investigator(s): DR. F.R. FRICKE DR. R.B. BULLEN		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>(\$12,500)</u> Comments: \$14,436
Start Date: <u>MAY 1979</u> Completion Date: Estimated: <u>DECEMBER 1981</u> Actual: _____		
PROJECT OBJECTIVE: To determine the effect of acoustic scatterers on sound propagation in urban and suburban areas and to determine the scattering ability of different types of vegetation.		
PROJECT DESCRIPTION: A theoretical determination of sound propagation through scatterers has been undertaken. The theoretical model has been verified using full scale and model scale tests. The final stage of the project is to gather data, for the theoretical model, on a wide range of types of vegetation.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): The theoretical model shows that scattering, not absorption, is the main factor in the attenuation of sound by vegetation. Below 1kHz 'realistic' belts of vegetation are almost transparent. Where significant attenuation by vegetation occurs, any attenuation by ground interference is lost. For greatest effect the vegetation should be close to the receiver and should be about as wide as it is thick. The effect of vegetation in urban and suburban streets is likely to have negligible effect on sound attenuation.		
AVAILABLE PUBLICATIONS (of research findings): The Role of Vegetation in Urban Noise Control. S.P.C.C. Report June 1980.		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Propagation</u>
		COUNTRY: <u>Australia</u>
PROJECT TITLE: <u>Study of Sound Radiation by Holography</u>		
Performing Organization Name & Address: <u>University of Adelaide</u>		Sponsoring Organization Name & Address: <u>Australian Research Grants Committee Dept. of Science and the Environment Canberra, N.S.W. Australia</u>
Principal Investigator(s): <u>Dr. D. Bies Mr. E.C. Semple</u>		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>                    </u>		OR: <u>                    </u>
Completion Date: Estimated: <u>                    </u> Actual: <u>                    </u>		Total Funding Amount: <u>(\$15,087)</u> Comments: <u>\$17,423</u>
PROJECT OBJECTIVE:		
PROJECT DESCRIPTION:		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):		
AVAILABLE PUBLICATIONS (of research findings):		



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Propagation

COUNTRY: Australia

PROJECT TITLE: The Measurement of Sound Energy Radiated by Transient Noise Sources Using  
Radiation Ratio Concepts

Performing Organization Name & Address:

Monash University

Sponsoring Organization Name & Address:

Australian Research Grants Committee  
Department of Science and the Environment  
Canberra, NSW  
Australia

Principal Investigator(s):

Dr. L. Koss

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date:                     

Completion Date: Estimated:                     

Actual:                     

OR:

Total Funding Amount: (\$ 3,000)

Comments: \$1,146

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Propagation  
COUNTRY: Austria

PROJECT TITLE: Model 77 - Computer Model for Noise Propagation Studies Applicability  
and Comparison with Other Noise Propagation Models.

Performing Organization Name & Address:  
Institut fuer Strassenbau und Verkehrswen  
der Technischen Universitaet Wien  
Gusshausstrasse 30  
A-1040 Vienna  
Austria

Sponsoring Organization Name & Address:  
Technical Univeristy of Vienna  
Karlsplatz 13  
A-1040 Vienna  
Austria

Principal Investigator(s):  
Univ. Prof. Dipl.-Ing. Dr. J.R. Dorfwirth  
Dipl.-Ing. Dr. Werner KOVACIC

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: December 1980

Completion Date: Estimated: Summer 1981

Actual:                     

OR:  
Total Funding Amount:     0      
Comments: scientific research within the  
framework of the University

PROJECT OBJECTIVE:

MODEL 77 - Computer Model for Noise Propagation Studies by Prof. Eric  
J. Rathe, Swiss Federal Institute of Technology

PROJECT DESCRIPTION: The well prepared Computer Model MODELL 77 was installed at CYBER 170-  
computer of the Technical University of Vienna and will be tested for several noise  
propagation situation including road traffic and railway noise. The aim is to get an  
instrument for environmental impact studies with high accuracy in computing traffic noise.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Test data prepared by the model author were processed, the results were very satisfactory.  
A real propagation situation is prepared and will be processed soon.

AVAILABLE PUBLICATIONS (of research findings):

MODEL 77 Computer Model for Noise Propagation Studies by E.J. Rathe, Russikon  
Published by the Federal Office for Environmental Protection, June 1980

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Propagation

COUNTRY: Canada

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:
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Principal Investigator(s): J.E. Piercy T.F.W. Embleton R. Donato G.A. Daigle	Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____) 1978: _____ 1980: <u>\$240,000</u> 1979: <u>\$240,000</u> 1981: <u>"240,000"</u>
--	--

Start Date: _____	OR: Total Funding Amount: _____
Completion Date: Estimated: _____	Comments: _____
Actual: _____	

PROJECT OBJECTIVE: The purpose of this project is to gain a better understanding of the mechanisms of outdoor sound propagation. (This is basic to the control and prediction of motor vehicle and aircraft noise in residential areas.)

PROJECT DESCRIPTION: 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.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):  
The present state of knowledge in this field is summarized in a review paper and book chapter recently prepared for publication, also continuing presentations at acoustical and engineering society conferences.

Topics considered include:

- 1) Theory of propagation over an impedance boundary
- 2) Measurement of ground impedance
- 3) Motor vehicle test site studies
- 4) Standard test procedures for vehicles
- 5) Theory of Multiple ray paths
- 6) Absorption of sound in the atmosphere
- 7) Influence of wind and temperature
- 8) Effect of atmospheric turbulence
- 9) Theory of propagation in fluctuating media
- 10) Prediction and performance of barriers

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Propagation  
COUNTRY: Canada

PROJECT TITLE: Sound Propagation Outdoors and Environmental Studies

Performing Organization Name & Address:  
Division of Physics  
National Research Council of Canada  
Ottawa, Ontario  
Canada KIA OR6

Sponsoring Organization Name & Address:  
National Research Council of Canada  
(An independent federal government  
research agency established by the  
Canadian Parliament)

Principal Investigator(s):  
J.E. Piercy

Annual Funding:  
(Check One: Fiscal Yr:  Calendar Yr:   
1978: \_\_\_\_\_ 1980: (\$43,000)  
          (\$40,000)                   \$35,763  
1979: \$33,228                   1981: \$39,084

Start Date: Outgoing project of indefinite  
Completion Date: Estimated: duration  
Actual: \_\_\_\_\_

OR: Total Funding Amount:  
Comments: Sci/Tech. manpower allocated to  
project is 3.2 man-years per annum (Approx.  
cost \$200 per annum)

PROJECT OBJECTIVE: The transmission of sound outdoors from noise sources such as aircraft and motor vehicles to noise receivers such as residents in urban communities is of fundamental importance in the measurement and specification of noise emission, the defining of environmental standards and environmental design. This project supports NRC's social objectives by (i) adding to the pool of scientific knowledge in this field, which falls far short of the needs created by the rapid growth of transportation and other noise sources, and (ii) applying that knowledge to the solution of practical problems. It also contributes to national and international standards activities.

PROJECT DESCRIPTION: This project is divided into seven tasks which are concerned with the theory of sound propagation over hard and soft-surfaces, the measurement of ground impedance, the interpretation of impedance data, the study of motor vehicle acoustical test sites, multiple ray paths and refractive effects, the absorption of sound in the atmosphere, sound propagation over barriers and atmospheric turbulence. Physical theory is interwoven with critical experiments and the evaluation of a diversity of data (much of it empirical) is guided by insight into the nature of the underlying mechanisms. Close cooperation is maintained with government, university and industrial laboratories in Canada and elsewhere, with national and international standards organizations, and with advisory bodies and government agencies especially the agencies which are responsible for regulating noise sources, assessing environmental impact and setting planning standards.

SUMMARY OF FINDINGS:

AVAILABLE PUBLICATIONS (of research findings): The laboratory provides scientific advice, consulting services, and other assistance to federal, provincial and municipal government agencies, universities and industrial laboratories. New knowledge, measurement procedures and experimental data are communicated at scientific meetings and seminars and are published in scientific journals, conference proceedings, books and reports.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Propagation

COUNTRY: Denmark

PROJECT TITLE:

**Road Traffic Noise Attenuation by Belts of Trees and Bushes**

Performing Organization Name & Address: The Acoustical Laboratory The Danish Academy of Technical Sciences DK-2800 Lyngby, Build. 352, Denmark	Sponsoring Organization Name & Address: Vejdirektoratet Vejdatalaboratoriet Stationsalleen 42 DK-2730 Herlev, Denmark
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Principal Investigator(s): Jørgen Kragh Bent Andersen	Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: _____) 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: _____
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Start Date: <u>August 1980</u> Completion Date: Estimated: <u>April 1981</u> Actual: _____	Comments: (D.kr. 165,000) \$24,800
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PROJECT OBJECTIVE: Analysis of attenuation obtained by belts of trees and bushes planted along roads.

PROJECT DESCRIPTION:

Tape recordings of road traffic noise have been made at 9 different sites. Belt widths were typically 20 m. One microphone was placed in front of and one behind the belt. Microphone heights: appr. 4 m (front) and 1,5 m (behind). 1/3 oct. band real time analyses are being carried out at present.

SUMMARY OF FINDINGS (if project completed):  
 STATUS REPORT (if in progress):

Data processing not finished.

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Propagation  
COUNTRY: The Netherlands

PROJECT TITLE: Effects of Noise Abatement Measures on Residences Alongside Highway 16  
at Dordrecht

Performing Organization Name & Address:  
Ministry of Health and Environmental  
Protection

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

OR:

Completion Date: Estimated: \_\_\_\_\_  
Actual: August 1978

Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed): As it is possible to protect people who are  
STATUS REPORT (if in progress): exposed to excessive noise only in a limited number  
of cases by soundproofing their dwellings it is necessary to study the effects of the  
measures taken.

AVAILABLE PUBLICATIONS (of research findings):

Report VL-DR-14-01. Ministry of Health and Environmental Protection. Netherlands

Transcribed from the original.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Propagation

COUNTRY: The Netherlands

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PROJECT TITLE: Propagation of Traffic Noise Between Buildings. Summary Results of a Survey in Marienhagen, a Residential District of Rotterdam, near National Highway 16.

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Performing Organization Name & Address: <u>Ministry of Health and Environmental Protection</u>	Sponsoring Organization Name & Address: 
Principal Investigator(s): 	Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u>
Start Date: <u>                    </u> Completion Date: Estimated: <u>                    </u> Actual: <u>July 1978</u>	OR: Total Funding Amount: <u>                    </u> Comments: <u>                    </u>

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PROJECT OBJECTIVE:

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PROJECT DESCRIPTION:

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SUMMARY OF FINDINGS (if project completed):  
 STATUS REPORT (if in progress):

A survey was carried out in a residential area near a busy road to gain information about the propagation of traffic noise between buildings. The area chosen was Marienhagen, part of the Groenhagen district of Rotterdam Ysselmonde, situated next to National Highway 16. The equivalent noise level in dBA resulting from the traffic on the road was measured at various points. Comparable figures were obtained with the aid of a mathematical model and a 1:100 scale model.

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AVAILABLE PUBLICATIONS (of research findings):  
 Report VL-DR-08-01. Ministry of Health and Environmental Protection, Netherlands.

Transcribed from the original.



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Propagation  
COUNTRY: Sweden

PROJECT TITLE:

Effects of Weather on Measurements of the Equivalent Noise Levels

Performing Organization Name & Address:

Department of Meteorology  
Uppsala University  
Box 516 S-75120  
Uppsala  
SWEDEN

Sponsoring Organization Name & Address:

Principal Investigator(s):

S. Israelsson  
C. Larsson

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: March 1976

Completion Date: Estimated: July 1980

Actual:                     

OR:

Total Funding Amount: \$45,000

Comments:

PROJECT OBJECTIVE:

This study studied the affects of meteorological variables on the propagation of traffic noise.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed): Simultaneous measurements of traffic noise propagation and meteorological variables have been carried out for a period of 18 months. This period contains many ground and weather conditions. In particular, wind direction and vertical gradients of wind speed and temperature have been measured together with the L (AEC) - levels. The wind and temperature gradients are very important meteorological parameters for the propagation of noise from a traffic route. A method of adding the total effects of wind and temperature stratification on the traffic noise level, by expressing the curvature of the sound rays, is presented. The investigation shows that traffic noise measurements for distances 25 M or more from a traffic route need simultaneous micro-meteorological measurements, and noise level can be expressed as a function of wind and temperature gradients.

AVAILABLE PUBLICATIONS (of research findings): The Effects of Meteorological Parameters on the Propagation of Noise From a Traffic Route. Bullerutredning Fraan en Trafikled. Meteorologiska data samt klimatfaktor. Reports No. 54 1979-04 Uppsala Univ, Meteorologiska Inst. Meteorologiska Inst.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Propagation</u>
		COUNTRY: <u>Sweden</u>
PROJECT TITLE: <u>Effects of weather and ground surface on the propagation of sound</u> <u>On effects of meteorological parameters on the use of barriers for noise</u>		
Performing Organization Name & Address: University of Uppsala Department of Meteorology Box 516 S-751 20 Uppsala Sweden		Sponsoring Organization Name & Address: Swedish Environment Protection Agency Forskningsnämnden Fack S-171 20 Solna, Sweden University of Uppsala Box 256 S-751 05 Uppsala Sweden
Principal Investigator(s): Sven Israelsson ,Ph Dr Conny Larsson ,MSc		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: <u>50000 \$</u> 1980: <u>50000\$</u> 1979: <u>50000 \$</u> 1981: <u>?</u>
Start Date: <u>1978-01-01</u>		OR: <u>Total Funding Amount: 150,000\$</u>
Completion Date: Estimated: _____ Actual: _____		Comments: <u>The money is coming from different organizations and the salaries are involved.</u>
PROJECT OBJECTIVE: <u>Determination of the effect of meteorological parameters on the propagation of noise for different surface conditions and also together with barriers.</u>		
PROJECT DESCRIPTION: In the projects studies of sound propagation from point and line sources are made for different surface and meteorological conditions. The sound propagation can be expressed as a function of both wind and temperature-gradients; viz the curvature of the sound rays. The aims of the studies are to express the propagation of sound in the atmospheric surface layers as a function of both refraction in the atmosphere and ground impedance conditions at the surface. Barriers will also be included in this.		
SUMMARY OF FINDINGS (if project completed): <u>The effects of wind and temperature gradients</u> STATUS REPORT (if in progress): <u>on the propagation of sound are studied and comparisons with theoretical models are carrying on.</u> Even effects of atmospheric turbulence are taken in consideration. Publications: (in English): <u>C. Larsson and S. Israelsson:</u> <u>The effects of meteorological parameters on the propagation of noise from</u> <u>a traffic route. Reports No 54. Dept of Meteorology, Uppsala 1979</u>		
AVAILABLE PUBLICATIONS (of research findings): <u>C. Larsson and S. Israelsson: The influence of the meteorological parameters on the sound-propagation from a traffic road. Proc. Inter-noise 79, Warszawa. C. Larsson and S. Israelsson: The influence of the meteorological parameters on the sound propagation from a point source. Proc. Inter-noise 80, Miami, USA</u>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Propagation  
COUNTRY: West Germany

PROJECT TITLE:

Sound propagation within extensively built-up areas

Performing Organization Name & Address:  
Professional Area of Building Physics  
and Constructional Materials of the  
University of Essen  
University St. 15

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
Prof. Dr. Ing. Karl Gerties

Annual Funding:  
(Check One; Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)  
1980: <sup>\$12,465</sup> (26,550) 1982: <sup>\$10,925</sup> (23,250)  
1981: (99,450.--) 1983: \_\_\_\_\_

Start Date: 1 October 1980  
Completion Date: Estimated: 31 March 1982  
Actual: \_\_\_\_\_

OR: \$46,691  
Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE: Development of a prognosis method with the help of  
statistical models

PROJECT DESCRIPTION:

A method is to be developed which makes it possible to make overall  
statements concerning sound level reductions in built up areas without  
a large amount of preliminary work (data investigation), without extensive  
acoustical knowledge and without a large amount of mathematical work.  
The influence parameters should be limited to a few and be easy to  
determine.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Propagation</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: <u>Diffusion of traffic noise in an area which has not been built up, dependence of ground absorption, height above ground, position of street in terrain.</u>		
Performing Organization Name & Address: Federal Highway Institute Zipcode 51 05 30 Bruchlehr St. 1 5 Cologne 51, West Germany		Sponsoring Organization Name & Address: Federal Transport Ministry Zipcode 100 53 Bonn-Bad Godesberg 1 West Germany
Principal Investigator(s): Dr. S. Ullrich		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>                    </u> 1980: <u>                    </u> 1979: <u>                    </u> 1981: <u>                    </u> OR: Total Funding Amount: <u>(DM 150,000)</u> Comments: <u>\$70,425</u>
Start Date: <u>6/76</u>		
Completion Date: Estimated: <u>                    </u> Accrual: <u>6/80</u>		
PROJECT OBJECTIVE: <u>Determining the diffusion function of street traffic noise in non built-up or loosely built up areas on federal streets and expressways.</u>		
PROJECT DESCRIPTION: Measurement of the energy equivalent continuous sound level of traffic noise on federal streets and expressways at different distances and heights above the street surface, obtaining basic data for the development of programs to calculate street traffic noise.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): The "noise source" street is no isotropic radiating system. It exhibits a vertical directional characteristic of the type that with increasing height above the street level, the energy equivalent continuous sound level increases. Consequences: - With constant measuring height above the street surface, the energy-equivalent continuous sound level is more strongly attenuated with increasing distance than had been previously anticipated. - The reduction effect of baffles can be much less, especially on streets with higher position, than was to be expected according to model studies.		
AVAILABLE PUBLICATIONS (of research findings): Ullrich: On the diffusion of average levels of street traffic noises in horizontal land which has not been built up, combatting noise 24 (1977), Vol. 6, p. 168-173.		

Translated from the original German.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Propagation

COUNTRY: West Germany

PROJECT TITLE:  
Noise Damping by Wooded Areas

Performing Organization Name & Address: Institute for the Study of Forestry Yields Freiburg University Bertoldstrasse 17 D 7800 Freiburg	Sponsoring Organization Name & Address: Deutsche Forschungsgemeinschaft Kennedyallee 40 D 5300 Bonn-Bad Godesberg 1
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Principal Investigator(s): Dr. Detlev Schoelzke, Institute of Silviculture, Freiburg University Bertoldstrasse 17 D 7800 Freiburg	Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____
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Start Date: <u>1. August 1972</u>	OR: Total Funding Amount: <u>(DM 170,000.)</u> Comments: \$79,815
Completion Date: Estimated: _____ Actual: <u>31. Oktober 1977</u>	

PROJECT OBJECTIVE: Propagation of sound in forests of different tree species  
Propagation of traffic noise in forests of different tree species

PROJECT DESCRIPTION: The propagation of sound was measured in pure stands of oak, beech, spruce and pine in various age groups. White noise was used as well as noise filtered through octave bands.

In the second study the spread of traffic noise (Autobahn) through stands of the four different tree species was investigated

SUMMARY OF FINDINGS (if project completed): Damping of noise becomes less the older STATUS REPORT (if in progress): the forest stands are. The differences between the four tree species in comparable growth stages are smaller than the differences between the different growth stages of one of the species. Damping of noise is correlated with the number of stems per hectare but soil cover and low plants influence the propagation of sound as well. When filtered noise was measured there was no damping effect in the octaves of 500 and 1000 Hz.

The spread of traffic noise was damped more by conifers than by deciduous trees. Especially spruce, fir and douglas fir are successful in damping noise, pine and larch are more like deciduous trees. Best damping was received in stands with more than 4000 stems/ha, a medium damping in stands with 1500-2000 stems/ha and the lowest damping showed old stands with 400-600 stems/ha.

AVAILABLE PUBLICATIONS (of research findings): Über die Schalldämmung in Reinbeständen der Baumarten Eiche, Buche, Fichte und Kiefer bei Verwendung einer künstlichen punktförmigen Schallquelle (Dissertation Freiburg 1977) / "Schalldämmung durch Wald" Allgemeine Forst- und Jagdzeitung, 148, 1977, Heft 7, J. D. Sauerländer's Verlag, Frankfurt a.M.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Propagation  
COUNTRY: West Germany

PROJECT TITLE: Description of Traffic Noise and Traffic Volume in Different Situations (Sound Propagation)

Performing Organization Name & Address:  
Physikalisch-Technische Bundesanstalt  
Bundesallee 100  
3300 Braunschweig  
Germany

Sponsoring Organization Name & Address:  
Umweltbundesamt  
Bismarckplatz 1  
1000 Berlin 33  
Germany

Principal Investigator(s):  
R. Martin  
H.-O. Finke

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr: x)  
1978:                      1980:                       
1979:                      1981:                     

Start Date: August 1, 1977  
Completion Date: Estimated: Feb. 18, 1980  
Actual:                     

OR:  
Total Funding Amount: ( 209,000)  
Comments: \$98,125

PROJECT OBJECTIVE: For two different traffic conditions the results of sound measurements are to be compared with calculated values and with the results of model investigations performed by different institutes.

PROJECT DESCRIPTION:

The PTB performed the acoustical measurements at two sites in the city of Braunschweig. During the measurements the traffic flow was determined. At each location 13 microphone conditions were used.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The results of the noise measurements together with the cartographical description of the measuring sites were given to the Umweltbundesamt for the use by other institutions for calculations and model investigations. The comparison of measured and calculated data was performed in a final report by the Umweltbundesamt. Differences up to 12 dB were found between the measured and calculated data of the time average of the A-weighted sound pressure level. There are no explanations for the differences.

AVAILABLE PUBLICATIONS (of research findings):

Not yet available.

ACOUSTIC PROPERTIES

BARRIERS

See Also Pages:

- 70
- 77
- 84
- 86
- 181

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Barriers

COUNTRY: Austria

PROJECT TITLE:

Development and Test of noise barriers on bridges and elevated roadways in urban areas.

Performing Organization Name & Address:  
Vereinigte Metallwerke Ranshofen-Berndorf  
AG  
A-5282 Ranshofen, Austria

Sponsoring Organization Name & Address:  
Bundesministerium fuer Bauten und Technik  
Stubenring 1, A-1011 Vienna, Austria

Principal Investigator(s):  
Michna, R / Uhlirsch, K / Laimighofer, J

Annual Funding:  
(Check One: Fiscal Yr:      Calender Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1976

Completion Date: Estimated: 1977

Actual: Active

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE:

Development and test of noise barriers.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

In order to reduce disturbance and damage caused by traffic noise to an acceptable level it is necessary to develop and test equipment which offers protection against noise. The aim of this sort of development has to be a significant reduction of the noise for people living in houses near these structures and the umbrella effect of noise protection walls is suitable for this. The research programme comprises: development of noise barrier prototypes and their practical testing; setting up of noise barriers in cooperation with the authorities, and testing of it over a period of about 4 years. Aluminium as a structural material has the advantage that its low weight results in low static loading of the bridge in opposition to heavy structures such as concrete noise barriers. Aluminium is resistant to attack by moisture, aggressive compounds in the air, exhaust fumes and deicing salt; aluminium structures retain their uniformly good appearance over a practically unlimited period - they are washable and easy to clean.

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: AUSTRIA

PROJECT TITLE: Calculation of noise barriers

Performing Organization Name & Address:  
Research Society for Highway Design in  
the Austrian IAV  
Forschungsgesellschaft fuer das Strassen-  
wesen in OEIAV  
Eschenbachgasse 9, A-1010 Vienna, Austria

Sponsoring Organization Name & Address:  
Bundesministerium fuer Bauten und Technik  
(Dept. of Building and Technology)  
Stubenring 1, A-1011 Vienna, Austria

Principal Investigator(s):  
Steindorfer, P.

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date: 1978

Completion Date: Estimated:                       
Actual: Active

OR:  
Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

A model is to be developed for predicting barriers against traffic noise. The work is to be the basis for Austrian guidelines, especially for enabling the evaluation of the potential for highway construction in a realistic manner. Quantitative goals for noise reduction are to be set and the relevant parameters for solution of the problem defined. In order to determine road traffic noise by means of measurements and calculations, studies will be performed to check the numerous calculations methods available, and integrate them in order to develop a standard procedure for Austrian road conditions.

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: CANADA

PROJECT TITLE:

Shielding of highway traffic noise by barriers.

Performing Organization Name & Address:  
Mechanical Engineering Dept.  
University of Manitoba  
Winnipeg Canada R3T 2N2

Sponsoring Organization Name & Address:  
Natural Sciences & Engineering  
Research Council of Canada

Principal Investigator(s):  
N. Popplewell

Annual Funding:  
(Check One: Fiscal Yr:  Calendar Yr:

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: 1978

Completion Date: Estimated: \_\_\_\_\_  
Actual: \_\_\_\_\_

OR: Total Funding Amount: (\$10,000)  
\$8,317

Comments:

PROJECT OBJECTIVE:

To determine the sound insertion loss of barriers and obstacles.

PROJECT DESCRIPTION:

Field measurements will be taken adjacent to a new highway to determine the practical feasibility of barriers/obstacles.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

The major part of the project has been completed and the minor part is continuing.

AVAILABLE PUBLICATIONS (of research findings):

K.W. Yeow et al. Shielding of noise from statistically stationary traffic flows by simple obstacles. J. of Sound & Vibration, 1978, 57, 203-224.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: CANADA

PROJECT TITLE:

Investigation of the effect of partial shielding on a major thoroughfare.

Performing Organization Name & Address:  
Mechanical Engineering Dept.  
University of Manitoba  
Winnipeg Canada R3T 2N2

Sponsoring Organization Name & Address:  
Mechanical Engineering Dept.  
University of Manitoba  
Winnipeg Canada R3T 2N2

Principal Investigator(s):  
N. Popplewell

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: Projected for Jan. 1981

Completion Date: Estimated: May 1981

Actual:                     

OR:

Total Funding Amount: None

Comments: Undergraduate thesis project using  
existing equipment.

PROJECT OBJECTIVE:

To determine the validity of complaints and the effect of partial shielding on a new major arterial thoroughfare.

PROJECT DESCRIPTION:

Standard measurement procedures will be used. No questionnaire will be distributed.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Probably internal report as I do not anticipate any new major findings.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: DENMARK

PROJECT TITLE:

Screening effect of earth barrier

Performing Organization Name & Address:  
The Acoustical Laboratory  
The Danish Academy of Technical  
Sciences  
SK-2800 Lyngby, Build. 352, Denmark

Sponsoring Organization Name & Address:  
Miljøstyrelsen  
Kampmannsgade 1  
SK-1604 København V  
Denmark

Principal Investigator(s):  
Jorgen Kragh

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)  
1978: \_\_\_\_\_ 1980: \_\_\_\_\_  
1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: 1975

Completion Date: Estimated: \_\_\_\_\_  
Actual: April 1978

OR: Total Funding Amount: \_\_\_\_\_  
Comments: \_\_\_\_\_

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

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.

AVAILABLE PUBLICATIONS (of research findings):

J. Kragh "Motorway Noise Propagation and Screening under varying wind conditions."  
Proc. Inter-Noise 79, Vol II paper H6-C, p. 303-306, Warsaw 1979.

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: The Netherlands

PROJECT TITLE:

Guide for the calculation of the insulation of a facade against traffic noise.

Performing Organization Name & Address:  
Ministry of Health and Environmental  
Protection

Sponsoring Organization Name & Address:

Principal Investigator(s):

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_ Calendar Yr: \_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: Estimated: \_\_\_\_\_  
Actual: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

After having defined some acoustical basic concepts, a method of calculation of sound transmission loss of a facade consisting of different parts is treated, taking diffusely incident road traffic noise with a "standard spectrum" as a sound source. This assumption is justified by recent results of foreign research workers. It is explained how by means of two simple monograms the influence of cracks on the sound transmission loss of a facade can be determined if their dimensions (length, width and depth) and place (in the middle of the facade surface or in a corner-edge) are known. An extensive example of such a calculation completes the report.

AVAILABLE PUBLICATIONS (of research findings):

Report #VL-DR-12-01. Ministry of Health and Environmental Protection, The Netherlands.

Transcribed from the original.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: Norway

PROJECT TITLE:

Performing Organization Name & Address:  
KILDE  
Postboks 229, N-5701  
NORWAY

Sponsoring Organization Name & Address:  
VEGDIREKTORATET  
Postboks 8109 DEP,  
OSLO 1  
NORWAY

Principal Investigator(s):  
Edvard Falch  
Matias Ringheim

Annual Funding:  
(Check One: Fiscal Yr:  Calendar Yr: )  
1978: \_\_\_\_\_ 1980: \$ 20,000  
1979: \$ 8,000 1981: ca\$ 25,000

Start Date: Autumn 1979

Completion Date: Estimated: Annual Reports  
Actual: \_\_\_\_\_

OR:

Total Funding Amount: \_\_\_\_\_  
Comments:

PROJECT OBJECTIVE:

Carrying out supplementary measurements.

PROJECT DESCRIPTION:

Field measurements of natural and artificial screens with special emphasis on: road edge screening effects, small effective screen height, short screen-observer distance and screens on both road sides.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Measurements completed and analyses partly completed. Measurement report planned for early 1981. Measurements to continue with measurements of vehicle noise emission for driving speeds below 50 km/h, 1981.

AVAILABLE PUBLICATIONS (of research findings):

KILDE rapport 17. VEGTRAFIKKSTOY LITTERATURGJENNOMGANG. Del 1 Kontroll av nordisk rekne metode. (In Norwegian)

Transcribed from the original.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Barriers</u>
		COUNTRY: <u>Poland</u>
PROJECT TITLE: The principles of employing natural and artificial barriers and other kinds of solutions in traffic noise protection of dwelling's housing and industrial building.		
Performing Organization Name & Address: Building Research Institute Acoustic Department Ksawerów 21 str. 02-656 Warszawa, Poland		Sponsoring Organization Name & Address: Main Research - Design Office of Common Building Wierzbowa str. 00-094 Warszawa, Poland
Principal Investigator(s): Prof. Jerzy Sadowski Ph.D., Eng.		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: (98.426 zł) 1980: (2.175.064 zł) 1979: (740.019 zł) 1981: -
Start Date: <u>2<sup>nd</sup> term, 77</u>		OR: Total Funding Amount: (3.013.509 zł)
Completion Date: Estimated: <u>December, 80</u> Actual: <u>December, 80</u>		Comments: 1978: \$7,571 Total: \$211,808 1979: \$56,924 1980: \$167,312
PROJECT OBJECTIVE:		
PROJECT DESCRIPTION: Project contains: Methods of traffic noise measuring and properties of town-planning factors /model's and field's/, results of noise measurement, town-planning solutions and design instructions deal with town and housing - planning protecting against traffic and industrial noises.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): Estimation of acoustic circumstances within housing can be done with following methods: - prognostic - models' - field measurement /needed methods were elaborated and verificated/. The acoustical properties of great number of town-planning solutions were listed. It has been elaborated also: - the charts for estimations of traffic noise dose to traffic streights within housing in different town-planning areas, - the methods of estimation the acoustic climate parameters of areas designed to housing, - the methods of estimation and projecting the natural and artificial housing barriers - instructions to correct shaping the acoustic climate of housing and its protection against traffic and industrial noise. The main point within this type of shaping is right coordination the projecting of noise protected traffic net and necessities of living quarters.		
AVAILABLE PUBLICATIONS (of research findings): Not published.		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: Sweden

PROJECT TITLE:

Vegetation as Noise Barriers

Performing Organization Name & Address:

Landscape Architects Soederblom and Palm AB  
Box 8120  
S-16321  
SP Aanga  
Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

P. Soederblom

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: July 1978

Completion Date: Estimated: June 1979

Actual: \_\_\_\_\_

OR:

Total Funding Amount: \$ 15,000

Comments:

PROJECT OBJECTIVE:

This project will study possible low cost earthwork and vegetation noise barriers.

PROJECT DESCRIPTION:

This project will test models for earthworks and grading together with vegetation plantation in order to provide vegetation growths of low construction and maintenance costs for noise barriers. Special interest will be paid to: (A) simple grading and planing, procedures, utilization of fill in the upper layers of the noise barriers, (B) the use of digested sludge, turf dust, bark and chip for soil improvement, (C) afforestation combined with cover plants.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):



(We prefer responses in English, but can accept material in other languages.)

TOPIC: Barriers  
COUNTRY: Sweden

PROJECT TITLE:  
Screening of Noise from Heavy Vehicles.

Performing Organization Name & Address:

IFM-Akustikbyran AB  
Box 30021

Sponsoring Organization Name & Address:

Swedish Board for Environmental Health  
(Statens naturvardsverk)  
Fack  
171 20 Solna, Sweden

Principal Investigator(s):  
Esse Kamph

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                       
1979:                      1981:                     

Start Date: July 1, 1977

OR: Total Funding Amount: (25.000 Skr)

Completion Date: Estimated:                       
Actual: June 30, 1978

Comments: \$5,398

PROJECT OBJECTIVE:

A literature study of different component noise sources of heavy trucks has been made. The study has provided relatively limited information about the extent and the placement of the sources.

PROJECT DESCRIPTION:

Based on the information available in literature and a limited field study, the component noise sources have been divided into three groups: the tires, the exhaust pipe opening and the engine, which includes the gear box, the radiator and the cooling fan. The tire noise source is typically 0 m above the ground and the engine noise source is typically 1 m above the ground.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Of over 400 heavy trucks studied the exhaust pipe opening was placed low above the ground (0.5 m) in about 12% of the cases and in the rest the exhaust pipe opening was placed high up (3 m). The screening effect of low noise screens has been estimated in a few cases. The placement of the exhaust pipe opening seems to be of primary importance. For an individual heavy vehicle the screening effect is appr 1.5-3 dB(A) lower than if the exhaust pipe opening is placed low down. In mixed traffic the effect of the placement of the exhaust pipe opening on the average screening effect is insignificant. Available estimation methods are based on approximate solutions that produce deviations from the estimated and the real value. It is hard to estimate the margin of error. It is also difficult to define the component noise sources. The present study should therefore be followed up with an experimental study of the screening effect in some critical cases (31 references).

AVAILABLE PUBLICATIONS (of research findings):

Kamph E, Skarmming av buller fran tunga vagfordon, Report 8017.01, IFM-Akustikbyran AB, Gothenburg

Translated from the original Swedish.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Barriers  
COUNTRY: Sweden

PROJECT TITLE:

Screening of Noise From Heavy Vehicles

Performing Organization Name & Address:  
IFM-Akustikbyran AB  
Box 30021  
400 43 Gothenburg  
Sweden

Sponsoring Organization Name & Address:  
Swedish Board for Environmental Health  
(Statens naturvårdsverk)  
Fack  
171 20 solna  
Sweden

Principal Investigator(s):  
Ease Kamph

Annual Funding:  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: July 1, 1978

OR:

Completion Date: Estimated: \_\_\_\_\_  
Actual: June 30, 1979

Total Funding Amount: (88.000 Skr)

Comments:

\$ 13,499

PROJECT OBJECTIVE:

The screen and ground damping effects for some different truck types have been determined by means of field measurements. The effect of the placement of the exhaust pipe opening and of large vertical areas (containers) have been given special attention.

PROJECT DESCRIPTION:

The studies have been limited to cases with thin (height 1.75 and 2.5 m) screens ("fences") at 5-10 m distance from the road and with the recording device at 20-40 m from the road. The damping effects measured were compared with damping effects estimated by means of the Nordic model for estimation of road traffic noise.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

The measurement values indicate that the effect of ground damping is lower for heavy vehicles than for passenger cars. When the ground damping effect is low there is no significant effect of the high placement of the exhaust pipe opening. The estimated and the measured screen damping effects correspond well with each other for vehicles in which the exhaust pipe opening is close to the ground and which have no superstructure (container). When the exhaust pipe opening is placed high the estimated screen damping for individual vehicles can be up to 7-10 dB(A) too high. For vehicles with large vertical surfaces (containers) the estimated screen damping may be up to 5-9 dB(A) too high. The report presents suggestions for a modified estimation method for the two latter vehicle types (7 references)

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original Swedish.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers

COUNTRY: Sweden

PROJECT TITLE:

Traffic Noise Screens Close to Buildings.

Performing Organization Name & Address:  
Ingemansson Acoustics  
Box 53037  
S-40014  
Goeteborg  
Sweden

Sponsoring Organization Name & Address:

Principal Investigator(s):

S. Ljunggren  
G. Lagerberg

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: May 1978

Completion Date: Estimated:                     

Actual:                     

OR:

Total Funding Amount: \$ 12,500

Comments:

PROJECT OBJECTIVE:

The objective of the project is to determine the necessary safety margins for traffic noise calculations when screens (barriers) are placed close to buildings.

PROJECT DESCRIPTION:

The project concerns studies of sound level rise due to standing waves between screen and building. Field measurements are performed on 16 objects. The result is compared to calculated traffic noise levels behind the screen during normal propagation conditions. The aim is to find necessary safety margins for traffic noise calculations when screens are placed close to buildings.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Barriers</u>
		COUNTRY: <u>Switzerland</u>
PROJECT TITLE: <u>Measurements of Reflections from Barriers</u>		
Performing Organization Name & Address:  EMPA <u>8600 Dübendorf</u> Switzerland		Sponsoring Organization Name & Address:  Federal Institute for Road Construction Dept. of the Interior 3003 Berne Switzerland
Principal Investigator(s):  R. Hofmann		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___ 1978: _____ 1980: _____ 1979: _____ 1981: _____ OR: Total Funding Amount: <u>ca. \$ 50,000</u>
Start Date: <u>1981</u>		Comments:
Completion Date: Estimated: _____ Actual: _____		
PROJECT OBJECTIVE: <u>Determination of Reflections from highway barriers</u>		
PROJECT DESCRIPTION:  Reflections from highway barriers may cause an increase in noise for residents on the other (unshielded) side. Using transient or steady-state methods, the reflection (or absorption) properties of various barriers will be measured. A general method will be developed.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <p style="text-align: center;">not yet started</p>		
AVAILABLE PUBLICATIONS (of research findings):  <p style="text-align: center;">not yet available</p>		

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: West Germany

PROJECT TITLE: Influence of wind on attenuation of noise barriers

Performing Organization Name & Address:

Lehrstuhl für Allgemeine  
Elektrotechnik und Akustik  
der Ruhr-Universität Bochum  
Postfach 102148  
4630 Bochum 1  
West-Germany

Sponsoring Organization Name & Address:

Minister für Wissenschaft und  
Forschung des Landes NRW

Principal Investigator(s):

G. Tüttemann  
U. Buschmann

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:            1980:           

1979:            1981:           

OR:

Total Funding Amount:           

Comments:

Start Date: 1.1.1979

Completion Date: Estimated: 31.12.82

Actual:           

PROJECT OBJECTIVE: measurement and mathematical description and prediction  
of attenuation of noise barriers in presence of wind

PROJECT DESCRIPTION:

Development of a mathematical model that allows calculation of the  
combined influence of

- diffraction
- wind gradients
- ground effect

on the attenuation of noise barriers

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Investigation study of applicability of asymptotic mathematical methods  
for the description of acoustic sound waves in a moving medium. Together  
with these theoretical studies outdoor measurements are carried out.

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Barriers</u>	
		COUNTRY: <u>West Germany</u>	
PROJECT TITLE: <u>Influence of Noise Protective Devices on the Ease of Flow, Fluidity and Security of Road Traffic Flow.</u>			
Performing Organization Name & Address: Federal Highway Institute Postfach 51 05 30 Bruehler Str. 1 5000 Koeln 51 West Germany		Sponsoring Organization Name & Address: Federal Transport Ministry Postfach 20 01 00 5300 Bonn 2 West Germany	
Principal Investigator(s): R. Hotop W. Burger		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>    </u> 1980: <u>    </u> 1979: <u>    </u> 1981: <u>    </u>	
Start Date: <u>4/76</u>		OR: Total Funding Amount: <u>    </u>	
Completion Date: Estimated: <u>6/81</u>		Comments: <u>no specific funds (normal budget)</u>	
Actual: <u>    </u>			
PROJECT OBJECTIVE: <u>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.</u>			
PROJECT DESCRIPTION: Measurements and analysis of vehicle speed, headways and transverse position in the area of noise protection screens (before and after construction of screens). Selection of screens with various height and various distance from the road.			
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  Last measurements 1980			
AVAILABLE PUBLICATIONS (of research findings):  "Straße und Autobahn", No. 8, 1979, p. 360			

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Barriers

COUNTRY: West Germany

PROJECT TITLE: Effectiveness of protective devices with consideration of weather influences.

Performing Organization Name & Address:

Technical Monitoring Association  
Rheinland Inc.  
Zipcode 10 17 50  
D-5000 Cologne 1

Sponsoring Organization Name & Address:

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
Dr. Sergio C. Martinez

Annual Funding:

(Check One: Fiscal Yr:)	Calendar Yr:
80 (\$272,752.00)	1980 (\$250,000.00)
1978: \$128,057	1980: \$117,375
1979: (\$246,317.44)	1981: (\$200,000.00)
OR: 81 \$113,646	\$ 83,000

Start Date: 1980

Completion Date: Estimated: 1983

Actual: \_\_\_\_\_

Total Funding Amount: \_\_\_\_\_

Comments:

PROJECT OBJECTIVE: Study of the effectiveness of screening devices with consideration of weather influences.

PROJECT DESCRIPTION:

A study was made whether it was possible to find the weather influence on the sound level reduction as a result of screening and to do so in a more precise manner. The plan should provide knowledge concerning the achievable sound level reductions at greater distances.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):

Translated from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: West Germany

PROJECT TITLE:  
Constructional noise protection on streets.

Performing Organization Name & Address:  
W. und J. Rapp A.G.  
Basel

Sponsoring Organization Name & Address:  
Eidgen. Department I. Innern  
Bern

Principal Investigator(s):  
D. Suter  
B. Traub

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date:                     

Completion Date: Estimated:                       
Actual: December 1978

OR:

Total Funding Amount:                     

Comments:                     

PROJECT OBJECTIVE:

It was the goal of the study to what extent the constructional formation of noise protective walls and ramparts could be the object of a standardization.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

It has been shown that hardly one of the problem circles pointed out in this study could be standardized in the sense of unequivocal regulations. Nevertheless, the study closes with a series of recommendations of general and descriptive type.

AVAILABLE PUBLICATIONS (of research findings):  
Report No. 0609 152, Verkehrsmissionen, Immissionschutz, IDS 701 605.  
Final report: Are standards desirable concerning constructional noise protection on streets?  
EDI-research contract 14/76.

Translated from the original German.



(We prefer responses in English, but can accept material in other languages.)

TOPIC: Barriers  
COUNTRY: West Germany

**PROJECT TITLE:**

Development and testing of noise protective walls on bridges and artificial buildings in the city area.

**Performing Organization Name & Address:**

Vereinigte Metallwerke Ranshofen-  
Berndorff AG  
Wien

**Sponsoring Organization Name & Address:**

Bundesministerium für Bauten und Technik  
Wien

**Principal Investigator(s):**

R. Michna  
K. Uhlrich  
J. Laimighofer

**Annual Funding:**

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: 1976

Completion Date: Estimated:                       
Actual:                     

OR:

Total Funding Amount:                     

Comments:                     

**PROJECT OBJECTIVE:**

The goal of the present development must be a reduction of traffic noise for the inhabitants in the houses bordering the named constructions, which is offered by the screening effect of noise protective walls.

**PROJECT DESCRIPTION:**

The work program includes development of constructions, building of prototypes and their practical testing, production and setting up of test walls in cooperation with the competent offices, testing of noise protective walls over a period of about 1 year.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

Aluminum offers the following advantages for the design of noise protective walls: Due to the low weight of aluminum, we have a small static and dynamic stress of the bridge edges, while heavier constructions, such as for example concrete walls, cannot be erected at the edges of bridge roadways. Aluminum is resistant to all attacks of moisture, aggressive city air, traffic exhaust gases, scattered salt. Aluminum constructions maintain their uniformly good appearance over a practically unlimited time. They can be washed and are easy to clean.

**AVAILABLE PUBLICATIONS (of research findings):**

Report No. 0609 148, Verkehrsmissionen, Immissionschutz, IDS 701 554.

Translated from the original German.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Barriers  
COUNTRY: West Germany

**PROJECT TITLE:**

**Influence of noise protection measures on the lightness, the fluidity and the safety of the traffic flow.**

**Performing Organization Name & Address:**

Bundesanstalt für Strassenwesen  
Köln

**Sponsoring Organization Name & Address:**

Bundesminister für Verkehr  
Bonn

**Principal Investigator(s):**

V. Bereich

**Annual Funding:**

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

**Start Date:** June 1976

**Completion Date: Estimated:** \_\_\_\_\_

**Actual:** \_\_\_\_\_

**OR:**

**Total Funding Amount:** \_\_\_\_\_

**Comments:**

**PROJECT OBJECTIVE:**

**PROJECT DESCRIPTION:**

In order to increase the effectiveness of noise protective measures, because of insufficient construction space or for economic reasons, protective constructions must be erected frequently as a solid obstacle directly beside the pavement. In this research contract, the effectiveness of different noise protective measures is to be worked out on the basis of evaluation magnitudes and the influence of measures is to be studied on the lightness, the fluidity and the safety of the traffic flow.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

**AVAILABLE PUBLICATIONS (of research findings):**

Report No. 0609 151, Verkehrsemissionen, Immissionschutz, IDS 701 639.

Translated from the original German.

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Barriers</u>
		COUNTRY: <u>West Germany</u>
PROJECT TITLE: <u>Open space and model studies on the influence of forming trough sections, embankments and house cells on the protective effect against street traffic noise.</u>		
Performing Organization Name & Address: Bundesanstalt für Strassenwesen Köln		Sponsoring Organization Name & Address: Bundesminister für Verkehr Bonn
Principal Investigator(s): V. Bereich		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: _____ 1979: _____ 1981: _____
Start Date: <u>June 1976</u>		OR: _____
Completion Date: Estimated: _____ Actual: _____		Total Funding Amount: _____ Comments:
PROJECT OBJECTIVE: To complete the calculation methods of the protective effect of walls and embankments, the influence of the following parameters is to be studied on the protective effect of noise protective installations.		
PROJECT DESCRIPTION: - Cross sectional construction of trough sections, especially slope of the trough walls and sound-absorbing lining of the walls. - Slope and planting of embankments, crown shape and crown width of embankments. - Ratio of height to thickness of sound screens, especially of house cells as "sound screens" and double embankments. The studies are to be carried out in the model and on existing objects.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): In the framework of this research contract, measurements were carried out on the traffic noise propagation in the direct vicinity of trough stretches in the ratio of 1/20 reduced trough models. It was tested to what extent trough structures are suited and how additional sound protective measures affect sound screening on protective walls of a trough, partial roofing over, in connection with sound screens on the roof edges and sound absorbing lining of the trough walls on the protective effect of troughs. From the procedure, a method could be derived for calculating the reduction of the average level.		
AVAILABLE PUBLICATIONS (of research findings): Report No. 0609 130, Verkehrsemissionen, Immissionsschutz, IDS 701 638.		

Translated from the original German.

ACOUSTICAL PROPERTIES  
ARCHITECTURAL ACOUSTICS

(All project references in English, but can accept material in other languages.)		TOPIC: <u>Architectural Acoustics</u>
		COUNTRY: <u>AUSTRALIA</u>
PROJECT TITLE: <p style="text-align: center;">IMPROVED TRAFFIC NOISE ATTENUATION OF FACADES</p>		
Performing Organization Name & Address:  Graduate School of the Built Environment University of New South Wales P.O. Box 1, KENSINGTON, NSW. 2033 AUSTRALIA.		Sponsoring Organization Name & Address:  1. Australian Research Grants Committee, P.O. Box 449, WODEN, A.C.T. 2606 AUSTRALIA.         2. NSW State Pollution Control Commission, GPO Box 4306, SYDNEY NSW. 2000
Principal Investigator(s):  Associate Professor A. Lawrence,  Mrs. M.A. Burgess		Annual Funding: (Check One: Fiscal Yr: _____ Calendar Yr: <input checked="" type="checkbox"/> 1978: _____ 1980: <u>(\$17,075)</u> <u>(\$19,000)</u> 1981: <u>(\$6,000)</u> 1979: <u>\$21,943</u> 1981: <u>\$6,929</u>
Start Date: <u>1980</u> Completion Date: Estimated: <u>1982</u> Actual: _____		OR: _____ Total Funding Amount: _____ Comments: Additional funding being sought for 1981, amount shown from ARGG only.
PROJECT OBJECTIVE: (1) To compare predicted and measured road traffic noise attenuation provided by typical Australian dwelling facades; (2) To devise economically feasible methods of increasing this attenuation.		
PROJECT DESCRIPTION:  A small experimental building is being constructed adjacent to major road. Two rooms have facades facing the road. The facades will be progressively modified from timber-frame, brick-veneer to double brick and various window and door systems will be installed at each stage. Simultaneous measurements of traffic noise will be made inside and outside the experimental rooms and the attenuation determined.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  This project has been delayed for over 18 months due to difficulties in obtaining a suitable site and in gaining planning and building approvals. The building is now under construction and it is hoped measurements will commence towards the end of 1980.		
AVAILABLE PUBLICATIONS (of research findings):  Lawrence, Anita "An Experimental Building For Facade Attenuation Measurements" Paper E 9.3, 10th International Congress on Acoustics, Sydney, 1980.		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Architectural Acoustics</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Unified Theory of Evaluating the Sound Shielding Characteristic of General N-fold Walls and its Experimental Confirmation ( A System Theoretical Approach to the Sound and Vibration Environment Part I ).</u>		
Performing Organization Name & Address:  Faculty of Engineering, Hiroshima University; 3-8-2, Sendai-machi, Hiroshima City, 730 Japan		Sponsoring Organization Name & Address:  None.
Principal Investigator(s): Mitsuo Ohta Kazunori Nagai Kazutatsu Hatakeyama		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>October, 1978</u>		OR: Total Funding Amount: <u>0</u> Comments: This work is based on regular expenses of the national school of Japan.
PROJECT OBJECTIVE: The objective of this work is the analysis of the attenuation characteristic of the N-fold walls.		
PROJECT DESCRIPTION:  The transfer function of the N-fold walls has not yet obtained, which is indispensable to the systematic analysis for the transmitted sound evaluation. So, in this work, the transfer function of the N-fold walls is derived by using newly the equivalent distributed constant circuit model.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  The attenuation characteristic of the N-fold walls is studied as a function of frequency by taking into consideration the effects of the resistive factor which was firstly introduced by A. London, the coincidence phenomenon and the internal dissipation factor in air space with the aid of the equivalent circuit method ( especially introducing an equivalent distributed constant circuit model for the system under consideration ) which seems more flexibly applicable than the wave equation method by A. London and the multiple reflection method by K.A. Mulholland. The validity of the present theory is confirmed experimentally using the transmission losses (measured at Kanagawa Prefectural Environmental Center and Hiroshima University ).		
AVAILABLE PUBLICATIONS (of research findings):  The Journal of the Acoustical Society of Japan, Vol.35, No.3, pp.118-125 ( 1979 )		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Architectural Acoustics</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Probabilistic Evaluation Method and Transient Response for the Sound Shielding Characteristic of General N-fold Walls ( A System Theoretical Approach to the Sound and Vibration Environment Part II )</u>		
Performing Organization Name & Address: Faculty of Engineering, Hiroshima University; 3-8-2, Senda-machi, Hiroshima City, 730 Japan		Sponsoring Organization Name & Address: None.
Principal Investigator(s): Mitsuo Ohta Kazunori Nagai		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>April, 1979</u>		Comments: <u>This work is based on regular expenses of the national school of Japan.</u>
PROJECT OBJECTIVE: <u>The objective of this work is giving a prediction method of the output probability distribution of noise level or noise evaluation index L in the case when the arbitrary random sound is passed through the linear acoustical transducer.</u>		
PROJECT DESCRIPTION: <u>A method of prediction of the output probability distribution of noise level or noise evaluation index L is studied in the case when the random sound pressure wave with non-Gaussian distribution type having the linear and non-linear correlation among many sampled time points is passed especially through the N-fold walls of the linear sound insulation system.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <u>In this work, the impulse response in a time domain is firstly derived for the N-fold walls from its transfer function in a frequency domain, and the input and output relation is described with this impulse response. The probability density function of transmitted energy through the N-fold walls is discussed by using this input and output relation. The validity of the theoretical results is verified by the experiment where an aluminum triple walls is set between two reverberation rooms and the sound pressure wave recorded in the actual traffic noise is used as a sound source.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>The Journal of the Acoustical Society of Japan, Vol.35, No.12, pp.681-688 ( 1979 )</u>		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Architectural Acoustics</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: <u>A Method for Estimating Unknown Parameters of Sound Insulation System Based on the Sequential Observation of Noise Evaluation Level Lx.</u>		
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 Akira Ikuta Kazutatsu Hatakeyama		Annual Funding: (Check One: Fiscal Yr: <u>0</u> Calendar Yr: <u>0</u> ) 1978: <u>0</u> 1980: <u>0</u> 1979: <u>0</u> 1981: <u>0</u> OR: Total Funding Amount: <u>0</u>
Start Date: _____ Completion Date: Estimated: _____ Actual: <u>November, 1979</u>		Comments: <u>This work is based on regular expenses of the national school of Japan.</u>
PROJECT OBJECTIVE: <u>The objective of this work is to estimate the unknown parameters of sound insulation system (e.g., the resistive factor <math>R</math> of the single wall) based on the observation of noise evaluation level Lx.</u>		
PROJECT DESCRIPTION: <u>It is well-known that the experimental results for transmission loss of a single wall usually show greater values than those based on only the mass law in the low frequency region. In order to explain this phenomenon, A. London introduced the resistive factor of the wall impedance in addition to the mass law. However, the value of this resistive factor <math>R</math> was established adaptively from the observed experimental data and was not systematically calculated from the standpoint of the internal energy dissipation mechanism of wall materials. Our paper proposed a trial of systematic method for estimating the resistive factor <math>R</math> of the single wall based on the sequential observation of noise evaluation level Lx.</u>		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress):  <u>In this paper, a trial of systematic method for estimating the resistive factor <math>R</math> of the single wall based on the sequential observation of noise evaluation level Lx is proposed. The stochastic approximation method is used in order to overcome the difficulties based on both the non-Gaussian property of random fluctuation wave form and the non-linearity being latent in the environmental noise phenomena. This estimation method is applied to observed data obtained by means of the reverberation room method. The estimated results are in good agreement with the experimental results obtained by other investigators and those by authors.</u>		
AVAILABLE PUBLICATIONS (of research findings):  <u>The Journal of the Acoustical Society of Japan, Vol. 36, No. 9, pp. 439-446 (1980)</u>		



(We prefer responses in English, but can accept material in other languages.)

TOPIC: Architectural Acoustics

COUNTRY: Japan

PROJECT TITLE: A Unified Theory of Sound Transmission Loss of General Double Walls and Its Practical Application to the Double Wall with Sound Absorbent Material in the Cavity

Performing Organization Name & Address:  
Faculty of Engineering, Hiroshima University  
3-8-2, Senda-machi, Naka-ku,  
Hiroshima City 730  
Japan

Sponsoring Organization Name & Address:  
  
NONE

Principal Investigator(s):  
Mitsuo OHTA and  
Hirofumi IWASHIGE

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:     0     1980:     0      
1979:     0     1981:     0    

Start Date:                       
Completion Date: Estimated:                       
Actual: Mar. 4, 1977

OR:  
Total Funding Amount:                     0                      
Comments:  
This work is based on regular expenses of the national school of Japan.

PROJECT OBJECTIVE: A new trial to the systematic evaluation of transmission loss for double wall by equivalent circuit method has been derived.

PROJECT DESCRIPTION:

It is a well known fact that the original method by A.London derived from the solution of a wave equation is widely used in predicting the transmission loss of a double wall, and further there are many modification of London's method. But none of the above methods is able to make strictly accurate prediction of transmission loss of sound at random incidence.

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

For the purpose of evaluating the transmission loss more accurately, the following results have been derived .  
1) This systematic theory of predicting the transmission loss of general double wall is given from a wide viewpoint of an equivalent distributed constant circuit of double wall. It is noteworthy that London's basic equation can be directly derived as a special case from our systematic theory. Furthermore, as the other special two cases, well known Brüel's theory and the evaluation method by the concentrated constant circuit theory are also easily derived from our theory.  
2) In addition, this paper shows that our systematic method can be extended to the double wall containing an absorbent material in the air gap, which is never theoretically investigated. Our experimental results agree with our theory satisfactorily.

AVAILABLE PUBLICATIONS (of research findings):

The Journal of the Acoustical Society of Japan, Vol.34, No.1, pp.3-10, ( 1978 ).  
( in Japanese )

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Architectural Acoustics

COUNTRY: Japan

PROJECT TITLE: A Study on Sound Transmission Loss of Double-walls Having Several Types of Geometrical Section by Use of the Improved Statistical Energy Analysis Method

Performing Organization Name & Address:  
Faculty of Engineering, Hiroshima University  
3-8-2, Senda-machi, Naka-ku,  
Hiroshima City 730  
Japan

Sponsoring Organization Name & Address:  
  
NONE

Principal Investigator(s):

Hirofumi IWASHIGE  
and  
Mitsuo OHTA

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:     0     1980:     0      
1979:     0     1981:     0    

OR: Total Funding Amount:     0    

Start Date:                     

Completion Date: Estimated:                     

Actual: Jan. 10, 1980

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

PROJECT OBJECTIVE: A new trial of improved S.E.A. method is proposed which introduces the proper nonresonant power flow into the Crocker and Price's method.

PROJECT DESCRIPTION:

By use of the S.E.A. evaluation method by Crocker and Price, a considerable discrepancy between the theoretically evaluated values and experimentally observed values can be seen specially in the low frequency region.

SUMMARY OF FINDINGS (if project completed):

~~STATUS REPORT (if in progress):~~

In this paper, a new trial of improved S.E.A. method is proposed which introduces the proper nonresonant power flow into the Crocker and Price's method. A good agreement between the theoretical values and experimental data is able to be found for several different types of double-walls. Essentially, our improved method is applicable not only to a general type of parallel double-wall but also to an absorbent double-wall having sound-absorbing material around the edges of the air cavity between two panels. Furthermore, for the purpose of confirming its effectiveness and flexibility, the evaluation method is newly proposed for non-parallel double-wall which has not been previously studied from a theoretical viewpoint. An agreement between theory and experiment is satisfactorily explained for these three kinds of double-wall structure by using our improved S.E.A. method.

AVAILABLE PUBLICATIONS (of research findings):

The Journal of the Acoustical Society of Japan, Vol.36, No.10, pp.447-458, ( 1980 ).

( in Japanese )

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Architectural Acoustics

COUNTRY: Sweden

PROJECT TITLE:

Design of Balconies with Respect to Traffic Noise

Performing Organization Name & Address:

IFM Akustikbyran AB  
Box 30021  
400 43 Gothenburg, Sweden

Sponsoring Organization Name & Address:

The Swedish Consult for Building Research  
Sit Goransgatan 66  
112 30 Stockholm, Sweden

Principal Investigator(s):

Esse Kamph

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

Start Date: March 1980

Completion Date: Estimated: \_\_\_\_\_

Actual: August 31 1980

OR:

Total Funding Amount: (40,000 Skr)

Comments:

8,636

PROJECT OBJECTIVE:

Balconies, Noise barriers

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

A survey of literature dealing with experimental and theoretical work concerning the attenuation of road traffic noise by balconies has been carried out. The object was to form an idea of the attenuation possible, and to collate references containing empirical/theoretical material which may form the basis of a calculation method. It must be stated that the excess attenuation due to balconies which is described in the literature shows that a balcony may be a significant feature in attenuating the noise due to road traffic. It is considered that attenuation of 5-10 dBA can be realistically achieved. Lining of the surfaces - especially the roofs - of balconies with sound absorbers is a very significant measure. One calculation method is described in the literature, but, on average, this gives excessive attenuations. Comparisons between measured and calculated values have only been made for balconies without side walls or roofs. This method is considered to be significant subject to certain modifications. It should however be tested on commonly occurring types of balconies and also on more complicated types. The affect due to lining the surfaces with different absorbers should also be studied.

AVAILABLE PUBLICATIONS (of research findings): Esse Kamph, Balkongers dämpning av vägtrafikbuller. En litteraturstudie, will be published by the Swedish Consult for Building Research, October-November 1980 as Report R130/1980.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Architectural Acoustics

COUNTRY: West Germany

**PROJECT TITLE:**

Working out scientific bases for city construction planning standards for anticipating and eliminating noise.

**Performing Organization Name & Address:**

German Standards Committee  
Reichspietschufer 72-76  
1000 Berlin 30

**Sponsoring Organization Name & Address:**

Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

**Principal Investigator(s):**  
Dipl.-Ing. Lindemann  
in the German Standards Committee

**Annual Funding:**  
(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)  
1978: \_\_\_\_\_ 1980: (\$43,130)  
          (\$57,261)                    \$20,249  
1979: \$26,884                    1981: (\$32,253)  
  \$15,142

**Start Date:** \_\_\_\_\_

**Completion Date: Estimated:** 12-31-1981

**Actual:** \_\_\_\_\_

**OR:** (\$139,874)

**Total Funding Amount:** \$ 65,670

**Comments:** (\$7,230)

**Portion of our own funds:** \$3,394

**PROJECT OBJECTIVE:**

Furthering studies of detail problems, which occur with the setting up of city-constructional planning norms as well as with the setting up of sound elimination and anticipation plans.

**PROJECT DESCRIPTION:**

Practice-related mathematical and evaluation bases are preconditions for preventive measures of sound protection in constructional planning, with which the surface determination of present and to be anticipated sound emission, sound propagation and sound immission are to be carried out for building areas. Computation methods should be worked out in the prognosis for the expected sound immissions, which are compared as evaluation basis for planning guide levels (immission guide values). The worked out bases offer as a standard the guarantees for a noise-protected building plan and should serve as a guide values for goal setting of noise protection plans and should provide an important contribution in the framework of noise anticipation and elimination.

**SUMMARY OF FINDINGS (if project completed):**

**STATUS REPORT (if in progress):**

The working out of the standard is found in an advanced stage.

**AVAILABLE PUBLICATIONS (of research findings):**

Translated from the original German.

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Architectural Acoustics  
COUNTRY: West Germany

PROJECT TITLE: Study of sound and building-technical possibilities and subsequent improvement of sound damping with existing buildings on the outside.

Performing Organization Name & Address:  
Institute for Building Physics  
of the Fraunhofer Co. Inc.  
Königs St. 74  
7000 Stuttgart 70

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):  
Prof. Dr. rer. nat. Friedolin  
P. Mechel

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR: \_\_\_\_\_ (\$326,778)  
Total Funding Amount: \$153,422

Start Date: 11-15-1976

Completion Date: Estimated: \_\_\_\_\_

Actual: Autumn 1980

Comments:

PROJECT OBJECTIVE: Economically feasible possibilities for subsequent sound damping on Buildings toward the outside.

PROJECT DESCRIPTION: Building on the studies which were carried out by the Research Society for Building and Residences at the Institute for Building Physics, and concerning sound damping of windows and outside constructional parts, economically feasible possibilities should be studied. a) For improving sound damping of windows without having to completely remove them; b) with regard to measures on outside walls for sound damping, it should be asked to what extent measures are necessary and possible (simple sound damping method, simple design shells to improve sound damping); a simple subsequent ventilation arrangement (with sound dampers).

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

A concluding report exists. After its evaluation, a decision will be made concerning its publication and likewise concerning use of the results.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Architectural Acoustics

COUNTRY: West Germany

PROJECT TITLE: Collection of Examples of Sound Protected Window Construction

Performing Organization Name & Address:  
Institute for Window Technique  
Aisingerwies  
8200 Rosenheim

Sponsoring Organization Name & Address:  
Federal Environmental Office  
Bismarck Place 1  
D-1000 Berlin 33

Principal Investigator(s):

Prof. Erich Seifer

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: \_\_\_\_\_)

1978: \_\_\_\_\_ 1980: \$7,042

1979: \_\_\_\_\_ 1981: (315,000.00)

OR: Total Funding Amount: \$14,296

Comments:

Start Date: 10-1-1980

Completion Date: Estimated: 4-30-1981

Actual: \_\_\_\_\_

PROJECT OBJECTIVE:

Simplification with the evaluation of sound protected windows.

PROJECT DESCRIPTION:

We set up an example collection of proven sound protected window designs, which makes possible a simplification with the development of a sound protection regulation according to the airplane noise law and the 1st traffic noise protection regulation to be expected shortly. Planners, builders, manufacturers and offices should thus achieve the possibility of evaluating sound protected windows according to design features and testing certificates which can be checked without great effort where they can offer and check them on the market.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Results are not yet available.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Architectural Acoustics  
COUNTRY: West Germany

PROJECT TITLE:  
Tunnel Against Traffic Noise - a New System.

Performing Organization Name & Address:

Sponsoring Organization Name & Address:

Principal Investigator(s):  
Volker Hahn  
Horst Widmann

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978:                      1980:                       
1979:                      1981:                     

Start Date:                       
Completion Date: Estimated:                       
Actual:                     

OR:  
Total Funding Amount:                       
Comments:                     

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

AVAILABLE PUBLICATIONS (of research findings):  
Hahn, Volker, Horst Widmann. "Der Larmschutz-tunnel - eine neue Larmschutzkanstruction."  
Strasse und Autobahn. V. 31, No. 9, September, 1980, pp. 396-400.

ACOUSTIC PROPERTIES

IMPACT AND VIBRATION

See Also Pages:

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(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Impact and Vibration  
COUNTRY: Belgium

PROJECT TITLE:

Traffic Noise Emitted by the Ring around Brussels (Provisory)

Performing Organization Name & Address:  
Instituut voor Hygiene en Epidemiologie  
(Ministry of Health)  
Juliette Wytmanstraat 14  
Brussel (BELGIUM)  
1050

Sponsoring Organization Name & Address:

Principal Investigator(s):

VINDEVOGEL Gisela  
Camerlynck Edwin  
Maveau Jose

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date: May 1977

Completion Date: Estimated: 12/17/81

Actual:                     

OR:

Total Funding Amount:                     

Comments:

PROJECT OBJECTIVE:

Measurement of the traffic noise emission

PROJECT DESCRIPTION:

Measurements have been carried out around the "Ring",  
before and after the opening of the latter.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

The measurements by day have been completed.  
The measurements are still to be carried out.

AVAILABLE PUBLICATIONS (of research findings):

None.

(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Impact and Vibration  
COUNTRY: Japan

PROJECT TITLE: Noise and Vibration of Wheel/Rail Interaction

Performing Organization Name & Address:  
Dept. of Precision Mechanics  
Kyoto University  
Kyoto,  
Japan

Sponsoring Organization Name & Address:

Principal Investigator(s):  
Susumu Sao  
Hiroshi Matsuhisa

Annual Funding:  
(Check One: Fiscal Yr:      Calendar Yr:     )  
1978: (¥ 4,000,000) 1980: (¥4,000,000)  
1979: (¥ 4,000,000) 1981: (¥4,000,000)

Start Date: 1976

Completion Date: Estimated:             
Actual:           

OR: Annual Funding 1978-81: \$19,112  
Total Funding Amount:             
Comments:           

PROJECT OBJECTIVE:

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):  
STATUS REPORT (if in progress):

Theoretical analysis of wheel vibration is completed now. Theoretical analysis  
of rail/wheel vibration is in progress.

AVAILABLE PUBLICATIONS (of research findings): Bulletin of the JSME 21-160, 1978 Study on the  
mechanism of train noise and its countermeasures (Part 1). Internoise 1979, 33-173, 1979  
Wheel-rail noise reduction of rail rapid transit (Part 2).

(We prefer responses in English, but can accept material in other languages.)

TOPIC: Impact and Vibration

COUNTRY: Japan

PROJECT TITLE:  
A Study of the Tunnel Vibration Propagation to a Nearby Building

Performing Organization Name & Address: <u>Institute of Industrial Science          University of Tokyo</u>	Sponsoring Organization Name & Address: <u>Teito Rapid Transit Authority          19-6, Higashi Ueno 3-Chome          Taito-ku, Tokyo, Japan</u>
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Principal Investigator(s): <u>Prof. Kiyoteru Ishii</u>	Annual Funding: (Check One: Fiscal Yr: <input checked="" type="checkbox"/> Calendar Yr: <input type="checkbox"/> 1978: <u>\$15000</u> 1980: <u>\$15000</u> 1979: <u>\$15000</u> 1981: <u>\$15000</u>
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Start Date: June 1977

Completion Date: Estimated: June 1982

Actual: \_\_\_\_\_

OR: Total Funding Amount: \_\_\_\_\_

Comments: \_\_\_\_\_

PROJECT OBJECTIVE:  
In order to obtain the way to predict the vibration propagation from tunnel to the nearby building.

PROJECT DESCRIPTION:  
The vibration itself and the noise caused by the vibration of wall and ceiling are the problems in the nearby buildings of the under ground railway. This investigation intended to find out the way to predict these vibration and noise in buildings.

SUMMARY OF FINDINGS (if project completed):  
 STATUS REPORT (if in progress):

- (1) The measurements in situ were carried out in many nearby buildings of reinforced concrete construction buildings, steel and reinforced concrete construction buildings and steel construction buildings.
- (2) Scale model experiments were done to investigate the propagation of structural borne sound.
- (3) Further investigation are in progress.

AVAILABLE PUBLICATIONS (of research findings):

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Impact and Vibration</u>
		COUNTRY: <u>JAPAN</u>
PROJECT TITLE: <u>Effect of vibration-proof sleeper laid in subway track</u>		
Performing Organization Name & Address: Teito Rapid Transit Authority 19-6, Higashi Ueno 3-Chome Taito-ku Tokyo Japan		Sponsoring Organization Name & Address: Teito Rapid Transit Authority 19-6, Higashi Ueno 3-Chome Taito-ku Tokyo Japan
Principal Investigator(s): Mr. Tokio Watanabe (T.R.T.A.) Mr. Takashi Yamamoto (T.R.T.A.)		Annual Funding: (Check One: Fiscal Yr: <u>    </u> Calendar Yr: <u>    </u> ) 1978: <u>(¥ 5,350,000)</u> 1980: <u>    </u> 1979: <u>\$25,562</u> 1981: <u>    </u>
Start Date: <u>Oct. 1976</u> Completion Date: Estimated: <u>Mar. 1977</u> Actual: <u>June 1978</u>		OR: Total Funding Amount: <u>(¥ 5,350,000)</u> Comments: <u>\$25,562</u>
PROJECT OBJECTIVE: <u>Development of vibration-proof sleeper of low elastic constant which absorbs vibration caused by trains</u>		
PROJECT DESCRIPTION: The better measure to minimize the tunnel vibration caused by trains propagating to the adjacent houses through the earth is to suppress vibration near at its source. In 1976 we began to develop vibration-proof sleeper with very soft rubber of elastic constant 4 t/cm and completed it in 1978. In order to verify the vibration reducing effect these sleepers were laid on the lines operated and the vibration measurements were made.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): As a result it was found that the vibration on the adjacent ground was reduced by 18 dB at biggest, 6 dB at smallest and 11 dB on the average in comparison with the concrete solid bed track. It is a satisfactory effect.		
AVAILABLE PUBLICATIONS (of research findings):		

(We prefer responses in English, but can accept material in other languages.)		TOPIC: <u>Impact and Vibration</u>
		COUNTRY: <u>Japan</u>
PROJECT TITLE: Effect of urethane foam wall on interception of ground tremors caused by subway		
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 (Univ. of Tokyo) Mr. Makoto Tokiyama (T.R.T.A.)		Annual Funding: (Check One: Fiscal Yr: ___ Calendar Yr: ___) 1978: _____ 1980: <u>\$50,000</u> 1979: <u>\$29,000</u> 1981: <u>\$45,000</u> OR: Total Funding Amount: <u>\$124,000</u>
Start Date: <u>1971</u> Completion Date: Estimated: <u>Mar. 1981</u> Actual: <u>going</u>		Comments:
PROJECT OBJECTIVE: A study on measurements to decrease environmental influences of the ground tremor caused by subway on buildings		
PROJECT DESCRIPTION: It is most effective to provide space on the propagation path in order to intercept the tremor from a tunnel into the surrounding ground. However, this method is not preferable in Japan with soft ground and earthquakes. We have conducted research since 1971 for forming an interceptive layer in lieu of the space by installing an urethane foam layer. After finishing the theoretical and experimental investigations, in 1978, a 30 cm thick tremor-interceptive wall of urethane foam was constructed in parallel to the tunnel wall outside the tunnel which exists close to buildings along a Tokyo Metropolitan subway line. Weight drop tests and ground tremor tests during the passing of a subway train were conducted on the both sides of this wall to evaluate its actual effectiveness.		
SUMMARY OF FINDINGS (if project completed): STATUS REPORT (if in progress): As a result, a sizable interceptive effect was qualitatively detected, but not confirmed quantitatively due to various difficulties. Presently, experiment and analysis are in progress to determine the quantitative effect of the wall on selected sites with ground conditions and the lay of the land suitable for measurements.		
AVAILABLE PUBLICATIONS (of research findings):		



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Impact and Vibration

COUNTRY: West Germany

PROJECT TITLE:  
Elastic Track Support

Performing Organization Name & Address:

Des U-Bahn-Referates  
Der Landeshauptstadt  
Hackenstrasse 12  
8000 Munchen 2

Sponsoring Organization Name & Address:

Principal Investigator(s):

Dipl.-Ing. Alfred Kriechke

Annual Funding:

(Check One: Fiscal Yr:      Calendar Yr:     )

1978:                      1980:                     

1979:                      1981:                     

Start Date:                     

Completion Date: Estimated:                     

Actual:                     

OR:

Total Funding Amount:                     

Comments:                     

PROJECT OBJECTIVE:

To minimize noise transmitted to neighboring buildings from subway trains rolling in a tunnel.

PROJECT DESCRIPTION:

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

The elastic track support system used on the Munich system since 1968, consists of a track trough, ballast bed, and track structure and elastic bedding elements made of elastomer materials (rubber-pellet fabric or foamed plastics) running crosswise or along the tunnel axis. This elastic bedding serves as a spring system to reduce structure-borne noise.

In the critical frequency range of 40-60 Hz, this spring system reduces structure-borne noise by 15-20 dB when compared to the classical type of ballast.

AVAILABLE PUBLICATIONS (of research findings):

"Korperschalldämmende Gleistöbe aus Fertigblechen und Ortbeton." Stuva-Tagung '79, pp. 173-177.

Transcribed from the original.

ACOUSTIC PROPERTIES  
ACOUSTIC PROPERTIES OTHER



(We prefer responses in English,  
but can accept material in  
other languages.)

TOPIC: Acoustical Properties-Other  
COUNTRY: Denmark

PROJECT TITLE:

Road Traffic Noise Attenuation in Built Up Residential Areas

Performing Organization Name & Address:

The Acoustical Laboratory  
The Danish Academy of Technical  
Sciences  
DK-2800 Lyngby, Build. 352, Denmark

Sponsoring Organization Name & Address:

Vejdirektoratet  
Vejdatalaboratoriet  
Stationsalleen 42  
DK-2730 Herlev, Denmark

Principal Investigator(s):

Jørgen Kragh  
Bent Andersen

Annual Funding:

(Check One: Fiscal Yr: \_\_\_\_\_ Calendar Yr: )

1978: \_\_\_\_\_ 1980: \_\_\_\_\_

1979: \_\_\_\_\_ 1981: \_\_\_\_\_

OR:

Total Funding Amount: \$30,000

Comments:

(D.kr. 150,000)

\$3,388

Start Date: October 1979

Completion Date: Estimated: March 1981

Actual: \_\_\_\_\_

PROJECT OBJECTIVE: To establish a correction term for extra attenuation (if any)  
due to detached housing to supplement existing prediction procedure.

PROJECT DESCRIPTION:

$L_{Aeq}$  measurements were carried out at appr. 15 sites along roads with heavy  
traffic during autumn 1979 and summer 1980. Measuring points were situated  
in a 10 x 10 m grid, typically 30 m wide and 200 m long (perpendicular to  
road). Microphone height 1.5 m. Integration time: 2 min. pr. microphone posi-  
tion.

SUMMARY OF FINDINGS (if project completed):

STATUS REPORT (if in progress):

Extra attenuation - in excess of

- a) geometrical spreading and
  - b) geometrical + ground attenuation according to the existing Scandinavian  
prediction procedure
- have been determined.

Data processing not finished yet.

AVAILABLE PUBLICATIONS (of research findings):

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