Annual Report for 1969

Institute for
Road Safety Research SWOV

Stichting
Wetenschappelijk Onderzoek
Verkeersveiligheid SWOV

P.O. Box 71
Deernsstraat 1
Voorburg 2110
The Netherlands

Contents Annual Report for 1969

Foreword

In 1969, the activities of the Institute for Road Safety Research SWOV were concentrated on completing research dating from the early years of its existence. When SWOV was founded, over fifty projects had been commissioned, all concerned with the government's need for data in order to decide its policy on a number of material subjects.
As SWOV could not commence all these projects at once the government, as the sponsor, decided the priorities for the work.
When SWOV's applied research related to an increasing number of subjects, it was found that there was a great shortage of fundamental scientific knowledge on people's possibilities and limitations as road users. An effort has been made, in carrying out research focused upon particular objectives, to make up for this lack of knowledge. In doing this, it has become obvious that road safety would ultimately derive most benefit from a research programme aimed at the systematic broadening of this fundamental knowledge. This can then be drawn upon more easily for statistics required by sponsors. When the number of research projects in hand decreased with their completion, it was agreed with the sponsors that in 1970 SWOV would examine the need for fundamental knowledge in a number of fields. After this, an amended list of priorities will be drawn up which is less affected by incidental projects. Approval has already been given to preparing fundamental research. An analysis of the road user's driving task will be given special attention.
The widening of fundamental knowledge will not have to bring about a division between the thinking of those doing practical work on the science and methods of road usage and of those approaching the many aspects of road safety scientifically.
More than in the past, SWOV will try to facilitate the transmission of information, for instance by publishing articles in technical and professional periodicals. The graphic design and readability of our own reports will receive great attention, as far as there is scope for this in the presentation of scientific research.
SWOV realises that this must not terminate its endeavours to transmit information. It is considering more possibilities of assisting policy-making bodies for instance in interpreting research results, but without being directly involved in policy itself. This would, of course, be incompatible with SWOV's position as an independent scientific institute.
In order to meet the needs mentioned above, therefore, a start was made in the past year with setting up Government Working Parties with the object of assisting policy-making bodies in their work. The SWOV has an advisory function in these parties which are being set up by the government.

In 1969, there were several changes in the SWOV Council. Mr. J.C.van Laer resigned as a council member upon leaving his post as chairman of the Netherlands Association for Automobile Insurance (Nederlandse Vereniging van Automobielassuradeuren NVVA). Mr. Van Laer who, as Treasurer, had been a member of the Executive Committee since SWOV's inception, played an important part in the Institute's foundation.
Mr. A.E.J.Nap, Chief Director at the General Board of Roads and Waterways, reached retirement age in 1969 and resigned from the Council. Mr. Nap, who had been a member of the Executive Committee from its inception, also played an important part in the foundation of SWOV.
Upon the recommendation of the NVVA, the SWOV Council accepted the membership of Mr. J.D.J.Idenburg, Director of Winterthur, the Swiss Accident Insurance Company, and member of the NVVA committee, to succeed Mr. Van Laer, and appointed him member of the Executive Committee and Treasurer.
Upon the recommendation of the Minister of Transport and Waterways, the SWOV Council accepted Mr. J.W.Tops, Chief Director at the General Board of Roads and Waterways as successor to Mr. Nap on the Council, and appointed him a member of the Executive Committee.
Mr. Th. van der Meer, General Secretary of the Netherlands Association of Bicycle and Automobile Industry RAI (Nederlandse Vereeniging De Rijwiel- en Automobielindustrie RAI), who had been a member of the Council since 16th April 1964, was appointed a member of the Executive Committee.
Dr. P.Siderius, Director General of Public Health, was appointed a member of the SWOV Council upon the recommendation of the Minister of Welfare and Public Health.

Th.J.Westerhout,
Chairman of the Council

Introductory

It is generally realised that the prevention and/or reduction of casualties through road accidents is the basis of all SWOV's research. In view of this objective, it was initially examined what research and what measures would have most effect. Available knowledge might suggest that research into the technical adaptation of traffic conditions to the limitations and characteristics of human beings as road users was most advisable. Research in this field was carried out mainly on the basis of accident statistics. As experience of road safety research grew, it became clearer that such studies have a positive effect which, though not unimportant, is marginal compared with the possibilities of reducing traffic hazards if more fundamental knowledge were available on road users' behaviour.
SWOV regards human beings, vehicles and roads as components of a single system. In order to be able to define the interactions between these components systematically and to understand and forecast the influence of the individual components upon the system, systematic models are an essential aid.
Suitable systematic models making proper allowance for the relevant aspects of road traffic are not at present available and will therefore have to be developed
The human being is the most important component in the system, but his behaviour in varying internal and external circumstances (for instance in traffic conditions) is foreseeable to only a very limited extent. There is even insufficient fundamental knowledge of what human beings really can and can not do.
Meanwhile, research has been carried out, among others by SWOV, into perceptibility in road traffic. In the course of the years many people have also done research into the occurrence of phenomena such as aggression, carelessness and inattention and their definition and clarification. These studies have not yet led to concrete information, however, of use in proposals for measures leading to a demonstrable and hence actual reduction in the number of accidents.

It is in fact understandable that there is little fundamental knowledge of human beings taking part in fast road traffic. The man/motor 'phenomenon' is in fact still fairly new. Study of man himself is relatively little older. But is has become clear that human behaviour is extremely complex. It is governed by numerous extraneous factors. These 'external' factors change constantly, especially in road traffic. Human behaviour is also governed by factors in man himself. These 'internal' factors also change greatly. The changing 'external' factors moreover affect the 'internal' factors. If one wishes to determine the conditions in which human beings can be the safest possible road users, one will first have to be able to record road users' behaviour in such a way that this information can be scientifically analysed. In the science of road traffic no effective measuring methods have so far been evolved for recording

human behaviour at the wheel. Attempts are now being made to split road users' tasks into partial tasks, and to analyse these. In doing this, an effort is made to record the psychological processes, starting with a limited number of tasks in a limited number of circumstances, such as keeping to the road and reacting to other vehicles. Such data can be used for further research. With the work on 'Analysis of the driving task' the first steps are being taken towards widening our knowledge of human beings as road users.

As this research is taking place in almost unexplored territory, for which analysis and recording methods are still in the stage of development and it is thus unlikely that driving tasks will be analysed within a foreseeable number of years, it is all the more necessary to continue optimalising technical conditions wherever possible and to go on investigating these. It is, indeed, known that simplified and uniform traffic conditions, together with measures to reduce casualties and medical care will have a continuing and positive influence on road safety.

E. Asmussen,
Director Institute for Road Safety
Research SWOV

Members of the Council

Th. J. Westerhout, Chairman

A. Blankert, Deputy Chairman
on the recommendation of the Koninklijke Nederlandsche Toeristenbond ANWB (Royal Dutch Touring Club ANWB)

J. Volmuller, Secretary
on the recommendation of the Minister van Onderwijs en Wetenschappen (Minister of Education and Sciences)

J. D. J. Idenburg, Treasurer
on the recommendation of the Nederlandse Vereniging van Automobiel Assuradeuren (NVVA) (Netherlands Association for Automobile Insurance NVVA)

J. W. Tops
on the recommendation of the Minister van Verkeer en Waterstaat (Minister of Transport and Waterways)

Th. van der Meer
on the recommendation of the Nederlandsche Vereeniging De Rijwiel- en Automobielindustrie RAI (Netherlands Association of Bicycle and Automobile Industry RAI)

O. P. F. M. Cremers
on the recommendation of the Nederlandse Wegverkeers- en vervoersfederatie Centraal Overleg (Netherlands Federation of Transport Organisations 'Centraal Overleg')

G. Dekker, surgeon
on the recommendation of the Koninklijke Nederlandsche Maatschappij tot Bevordering der Geneeskunst (Royal Netherlands Medical Association)

W. J. van Eijkern
on the recommendation of the Minister van Justitie (Minister of Justice)

Th. M. J. de Graaf
on the recommendation of the Vereniging van Nederlandse Gemeenten (Netherlands Association of Local Authorities)

F. R. Mijnlieff
on the recommendation of the Minister van Binnenlandse Zaken (Minister of Home Affairs)

P. Siderius
on the recommendation of the Minister van Sociale Zaken en Volksgezondheid (Minister of Welfare and Public Health)

H. Zandvoort
on the recommendation of the Vergadering van Hoofden van Provinciale Waterstaatsdiensten (Joint Directors of the Provincial Bureaus of Public Works)

In personal quality:

J. Kreisel
Hoofdbestuurslid van de Bond van Automobiel-, Garage- en Aanverwante Bedrijven en Voorzitter van de Stichting Vakopleiding Automobielbedrijven
(Councillor of the Association of Motor-Car Trades, Garages and Related Industries and Chairman of the Foundation for Professional Training in the Automobile, Motorcycle and Allied Trades (VAM)

P. Muntendam
Hoogleraar in de Sociale Geneeskunde aan de Rijksuniversiteit te Leiden en oud-Directeur-Generaal van het Ministerie van Sociale Zaken en Volksgezondheid
(Professor of Social Medicine in the Leyden State University and formerly Under Secretary of State)

H. A. W. Nijveld
Hoofd van de Economisch-Technische Afdeling van de Centrale Organisatie TNO (Head of the Economic-Technical Department of the Central Organisation for Applied Research TNO)

The six members first mentioned are forming the Executive Committee.

The bureau

The bureau was organised as follows at 31th December 1969:

Management
E. Asmussen, Director
K.W. de Bruijn, Administrative Management advisor
F.C. Flury, Scientific Management advisor
Mrs. H.M.E. van Iperen-Heidekamp, First secretary
Miss J.W. Huijsen, Second secretary

Research advisors
J.H. Aarts, Medical advisor
M.J. Koornstra, Statistical advisor

Road and Vehicle Department
J.H. Kraay, Scientific worker
J. van Minnen, Scientific worker
H.G. Paar, Scientific worker
A. van Deth, Research assistant
W.H.M. van de Pol, Research assistant
A.A. Vis, Research assistant
Miss M. Bakker, Secretary

Human Factors Department
D.J. Griep, Head
P.C. Noordzij, Scientific worker
A. Hamel, Scientific worker
J.A.G. Mulder, Research assistant
Miss I. Piller, Secretary

Basic Research Department
D.A. Schreuder, Head
H.L. Oei, Scientific worker
Miss T.C. Schoonbrood, Research assistant
Miss C.E. Jansen, Secretary

Statistics and Documentation Department
J.C.A. Carlquist, Head
J.G. Arnoldus, Research assistant
A. Blokpoel, Research assistant
J.M.J. Bos, Research assistant
A.F. Lans, Research assistant
Mrs. J.E. van de Pol-Lindeyer, Research assistant
H.P. Scholtens, Statistical assistant
P.J.G. Verhoef, Statistical assistant
V.B.M. van den Akker, Administrative assistant
W.P.M. Metselaar, Administrative assistant
J.F. Demmenie, Documentalist
Mrs. M.V.A. de Vries-van Vught, Assistant documentalist
Mrs. G. Teeuw-Jongsma, Librarian
Miss D. Wassenaar, Library assistant
Mrs. L.M. van Zon-van Pelt, Secretary

International Co-operation Department
E. Thöenes, Head

Public Relations/Editorial-Production Department
R. Maas, Head
G.C. Ederveen, Editor
Miss A.D. Kant, Secretary

Records
J.A. Willemse

Personnel
C. Kablau

Personnel administration
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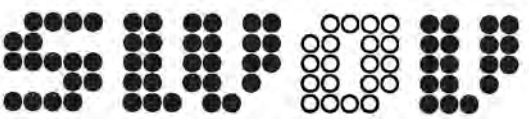
Finance
J.C. Balten

Planning and Progress Control
M. Lamers

Typing
Miss G.J. van Gaalen, Head
Miss W.M. Frielink
Miss J. van den Berg
Miss C.J.G. van den Heuvel

Research



Railway level crossings
After information on road and traffic conditions at and near about 2800 level crossings had been collected in 1968, a study was made in 1969 of special statistical analysis methods, an idea having been gained of the volume and variety of this material.
The data will have to be processed with these methods in order to obtain useful results. At the same time, together with the Netherlands Railway Company, efforts were made to evolve a system so that more complete information could be obtained on level crossing accidents. Owing to the decision taken in 1968 that alongside the statistical work requiring many years a start should also be made with research into possibilities for technical improvements at and near level crossings, an inventory was made of technical safety systems for crossings and the conditions under which these are used. The next phase will consist of seeking improvements in these systems.

Speed limits outside built-up areas
To arrive at criteria for road authorities to use in deciding whether a speed limit should be introduced on certain roads, speed and density measurements were made until the end of 1968 on a number of 'research' and 'control' roads. In 1969 the resulting 750,000 measurements were made suitable for electronic data processing.
A new programme of measurements was commenced for the period after abolition of the speed limits on these roads. This work was completed at the end of 1969.
Two supplementary projects were carried out. On State Road 4 – between Hoofddorp and Burgerveen – the effects were examined of a relatively low maximum speed limit. On State Road 12 – between Maarsbergen and Oosterbeek – the effect was measured of a speed limit combined with intensified police supervision.
In October 1969, the data for 15,000 accidents on the research and control roads were completed. A start was made with computer programming in order to process these.
A review was drawn up of research in other countries into the effect of speed limits. At the request of the Economic Commission for Europe, SWOV is now preparing a report on this, together with Statens Trafiksäkerhetsverk, Sweden.

Roadside safety structures
Research was undertaken into the effectiveness of several means of stopping guide rail structures sinking in soft soil. Use was made of knowledge available at the Soil Mechanics Laboratory, Delft, and the Rijkswaterstaat.
Some tests were made with cars colliding against crash barriers fitted with 'stiffened' beams.
The results were embodied in the report Roadside Safety Structures; A description of the crash barriers developed in the Netherlands, which can be published in 1970.

Safety structures for bridges
A start was made with a series of tests with cars colliding against various types of safety structures for bridges.

Vehicle characteristics/Safety belts
A major difficulty of the Vehicle characteristics/Safety belts project was to obtain sufficient data on accidents involving safety belt users. To obtain some idea of the time data would take to collect, information was gathered in 1968 on the number of accidents per annum on a number of roads. Enquiries were made on these roads in 1968 and 1969 regarding the fitting and use of safety belts.
It was already known that about half the persons asked to help by giving fairly detailed information about themselves and the accident they were involved in respond favourably. From the information obtained it was forecast that it would be 1972 before accident statistics for belt-users would be sufficient for statistical comparison with data for non-users. This was regarded as too long. Organisational steps were obviously required to obtain more accident notifications. The police responded to a request. Besides the road patrols of the Royal Dutch Touring Club ANWB, who had collaborated from the very beginning, some groups of the State Police and The Hague City Police started reporting accidents to the SWOV in 1969. In that year there was also some improvement in the number of drivers responding to SWOV's request for information. The consequence of all this is that enough data will now probably be available by the end of 1970. The medical statistics already available are being analysed by the Institute of Biomechanics and Rehabilitation of the Free University,

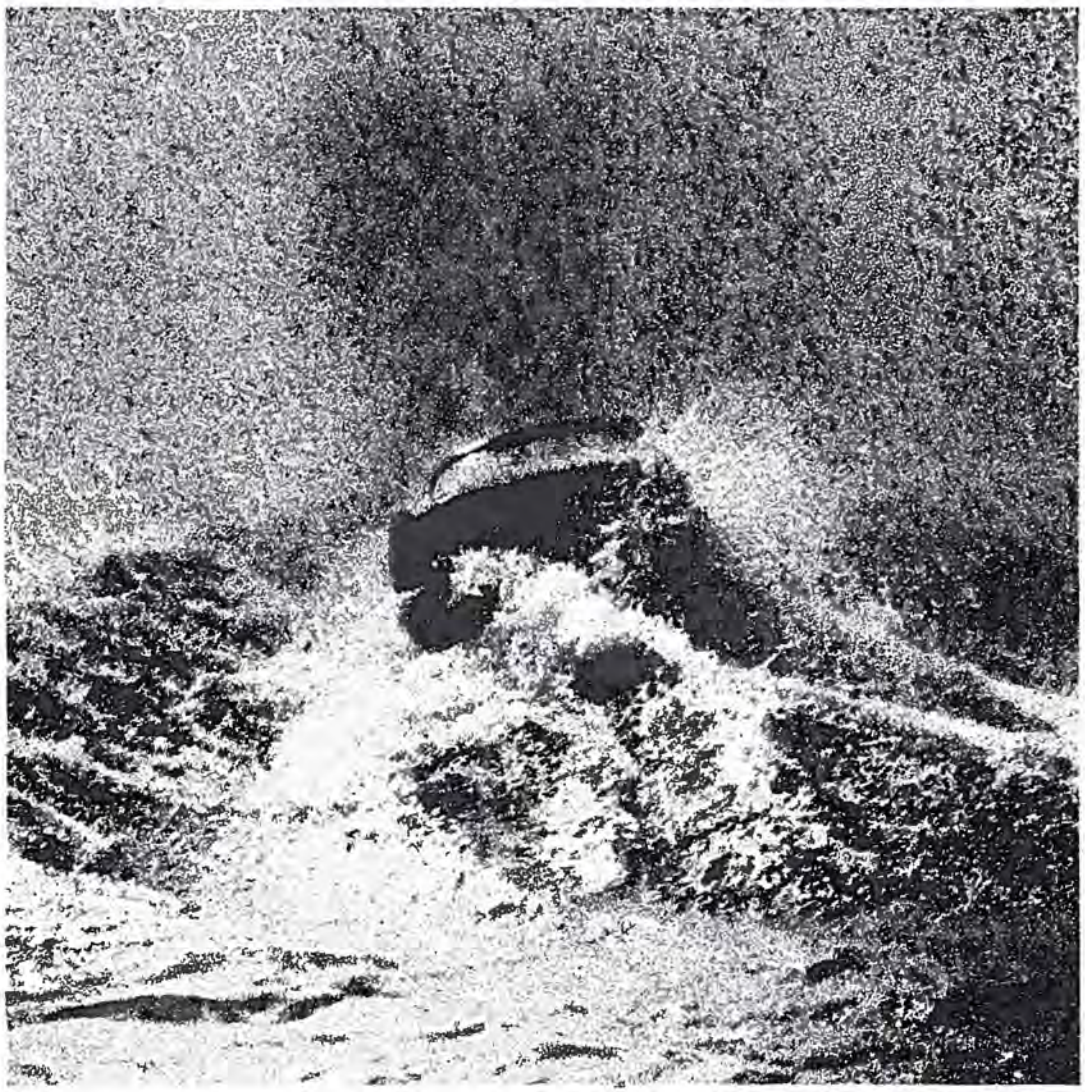
Amsterdam. The vehicles involved in the accidents are inspected by staff of the College of Automobile Technology, Apeldoorn, and the Institute for Road Vehicles TNO, Delft. Car drivers' and passengers' personal details are analysed by the SWOV. In due course, multivariate analysis methods will be applied to each group of processed data. Study of the methods to be used commenced in 1969. It is hoped that the investigations will disclose relationships between occupants' injuries and certain car constructions and safety equipment such as safety belts.

Tyres, Road surfaces and Skidding accidents

The first interim report by the Working Party of the same name was presented to the sponsor, the Minister of Transport and Waterways, and afterwards published. The report, inter alia, makes recommendations for further research. For this purpose, several sub-parties were set up within the Working Party, with their own research assignments. Some of these made good progress in 1969. For instance, apparatus was designed and built for measuring the capacity of tyre profiles to transmit water. Further research necessitated determination of this 'transmission capacity' experimentally. Good progress was also made with scheduling factors of tyres and road surfaces for experimental multi-factor research. Exploratory investigations of the relationship between accidents hazards and road surface friction yielded such interesting results that it was decided to make full investigations into this. During the year a sub-party was set up to study vehicle braking-power distribution and its implications for deceleration and stability of vehicle.

Submerging vehicles

The practical tests of the 'Submerging vehicles' project were completed at the end of the year. There was some delay because the test area in The Hague was no longer available owing to public works being carried out there. Another site on deep water had to be found, and this was at Sumatrakade, Amsterdam. Co-operation was provided by the Amsterdam Department of Docks & Trading Facilities, the Municipal Transport Department and the Fire Brigade. A start could be made in 1969 on processing practical test data.



Priority rules

The third phase of preliminary research into the effect of various priority conditions on road users' behaviour was completed. This work was done at a fairly complex set of crossings in Den Helder. The first phase meant observing crossing times and behaviour under conditions with the usual priority rules and partial police traffic-control. The second related to observations during traffic control with signs giving priority to right handed traffic coming from the left. The third phase comprised recording road users behaviour after traffic lights were installed.

Like those from the previous phases, the films from the third phase were analysed frame by frame. This time-consuming work was completed in 1969. Preliminary work was done on a paper on observation methods tried out during the work in Den Helder and other exploratory research and the results of these initial investigations.

Pedestrian safety

Data were processed relating to accidents to pedestrians and the location of zebra crossings. The information was collected in ten municipalities. A compilation will be supplied to the government, as an appendix to preliminary study of research already carried out elsewhere, for the purpose of research into pedestrian safety. At the request of the Organisation for Economic Co-operation and Development, a programme was drawn up for comparative international research into the pedestrian safety in cities. This programme was presented to the OECD Research Group on Pedestrian Safety.

Human Factors Department

Analysis of the driving task

Nearly every investigation encounters the difficulty that the psychological and physiological processes governing drivers' behaviour are not precisely known. As long as these processes are unfamiliar, there can be no indication of the ideal form of driving conditions, especially their visual aspects. Such research might be very important in giving driving instruction. In order to learn more about this, driving should be analysed. For this purpose, the entire complex known as car driving must be split into a number of individual parts each of which it should be possible to record and analyse separately. For the purpose of this psychological research a statement of the problems of geometrical possibilities of keeping course was elaborated in 1969.
The effect of drinking on keeping to the road was examined at SWOV's request by the Institute for Perception RVO/TNO, Soesterberg.
This Institute was also requested to study the effect of drinking on decision behaviour under laboratory conditions.

Standards for driving

A research project was prepared into the effect of a simulator on learning to drive. As the type of simulator with which tests could be made had already been decided upon without SWOV being involved, no information could be obtained from the tests about the value of simulators in general. The sponsor was informed of this in advance. The Institute for Applied Behavioural and Agological Research of Amsterdam University (Intagon) undertook the study at SWOV's request; a report (in Dutch) was issued in 1969.

Vehicle perceptibility

The part projects of 'Vehicle perceptibility' research dealing with reflectorized registration plates and red warning triangles were completed. Reports on both projects will be published in 1970.
The study of vehicle category indications was started. The intention is that road users can see from far away by indications on vehicles to what categories they belong, for instance whether they are passenger cars or agricultural tractors. If the approaching road users recognise them in time, they can adjust their speed accordingly.

Steering Group on Human factors in the prevention of road accidents
In 1969 the Steering Group endeavoured, with the support of the Ministeries of Welfare and Public Health and Transport and Waterways, to reach agreement with the Ministeries of Justice and Home Affairs on investigations into the blood alcohol concentrations of road users taken at random traffic who had no objections to this. Exploratory investigations in Middelburg in 1968 had been very successful. Such investigations, if carried out nationally and well before introduction of a legal maximum b.a.c. for road users, followed by a second and perhaps third enquiry of a similar nature, would furnish information about road users' driving and drinking habits and perhaps also about the effect of regulations. Little progress was made in the negotiations in 1969.
At the end of 1969 the Ministry of Transport and Waterways set up a steering committee. It has representatives of the Ministeries of Transport and Waterways, Home Affairs, Justice, Welfare and Public Health and also SWOV. Its purpose is to obtain facilities for carrying out the investigations.

Breath analysis methods
Data were processed on the proportion of alcohol in breath and blood samples obtained at random from road users. This information is needed for calibrating breath analysis devices. If these prove reliable they could be used for national research into drinking by drivers. The data led to the compilation of a paper published at the Fifth International Congress on Alcohol and Road Safety in Freiburg im Breisgau (Western Germany) from 22nd to 28th September 1969.

Danger of medical deficiencies
In spring 1968 information was collected in The Hague for a pilot study on medical deficiencies of motorists involved in accidents and of a control group of drivers passing the accident sites.
In 1969 a statistical method was devised with which an attempt can be made in 1970 to analyse the multiplicity of complicated medical and biographical particulars of the 'accident' and 'control' groups.

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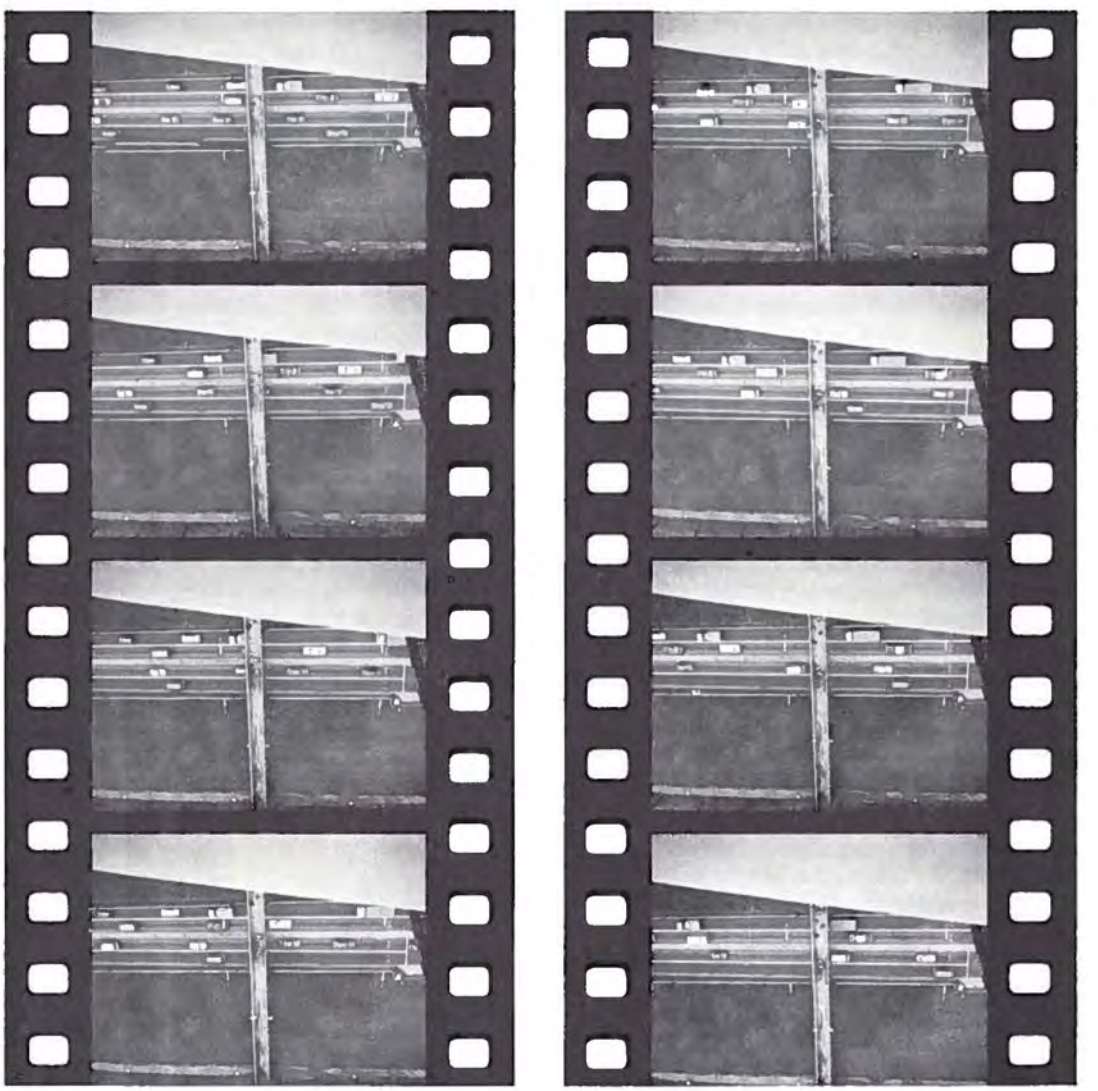
Basic Research Department

22 **Side lights and low-beam lights in built-up areas**
The investigations were completed in 1969. A report was finalised.

General characteristics of retro-flectors
For a number of SWOV projects more must be known about the general characteristics of various types of reflectorised devices. Preparations have been made for these to be investigated by the Lichttechnisches Institut of Karlsruhe University, Germany.

Fog
A study of the scientific literature on fog was commenced. The Royal Dutch Meteorological Institute, De Bilt was contacted regarding frequency and local distribution of fog and the British Atomic Energy Research Establishment was contacted, inter alia, on droplet-size distributions.

Traffic flow models for traffic arteries and measuring methods for these
Various investigations were made into methods of measuring and recording vehicle movements for experimental verification of appropriate mathematical models of vehicle-following distances in traffic flows.
Films taken from the air are useful for this, but analysis of driving behaviour from these is very labour-consuming. Other more efficient methods are therefore being sought, both for analysing films and for recording driving behaviour. As regards the former, work is being done in co-operation with the Central Technical Laboratory TNO. Alternative methods are being sought in consultation with the British Road Research Laboratory as regards ultrasonic and optical measurement methods, and with Decca Radar Ltd. as regards radar and lasers. Research into the possibilities of Doppler radar involved inter alia the Physical Laboratory of N.V. Philips' Gloeilampenfabrieken. General exploratory research into possible applications of lasers is being carried out by the Technical Physical Department TNO/Delft University of Technology. Meanwhile further work is being done on mathematical models of vehicle following-distances. Contributions have been made by Prof. F.A. Haight, of Pennsylvania State University, U.S.A., who was temporarily resident in the Netherlands for this purpose.



3 **Documentation research**

Discussions took place with six institutes, the State Road Laboratory, the Delft University of Technology (Department of Civil Engineering), the General Service Directorate of the Rijkswaterstaat, the Central Organisation for Applied Research TNO, the Institute for Road Vehicles TNO and the Royal Dutch Touring Club ANWB, with the object of co-operating on traffic and road safety documentation and creating wide facilities for utilising the International Road Research Documentation (the IRRD pool) of the Organisation for Economic Co-operation and Development. As part of the work for the IRRD pool a report was drawn up for the International Road Federation on current Road Research projects in the Netherlands. For the IRRD, the SWOV designed new classification charts for road traffic medicine.

It was examined at the British Road Research Laboratory what use can be made of facilities for literature research by computer.

Reports, publications and papers

In 1969 the following reports, publications and papers have been published:

Verkeersveiligheid en alcohol (Road safety and alcohol). Consequenties van maatregelen ten behoeve van de verkeersveiligheid in het bij die maatregelen behorende onderzoek. D.J. Griep, research psychologist. Tijdschr. soc. Geneesk. 47 (1969) 3: 85–91.*

Propaganda en alternatieve middelen, zoals selectie, juridische maatregelen en wegverbetering, tot bevordering van de verkeersveiligheid (Propaganda and alternative countermeasures). D.J. Griep, research psychologist. Publikatie 1969-1. SWOV. 56 pp.

Multivariate analysis of categorical data with applications to road safety research. M.J. Koornstra, Research advisor of the Institute for Road Safety Research SWOV. Accid. Anal. & Prev. 1 (1969) pp. 217–221.

Alcohol and Road Safety. Countermeasures and research. A critical survey of the literature. Report 1969-1. Institute for Road Safety Research SWOV, 2nd edition. 42 pp.

A stop sign for use in the dark. Report 1969-2. Institute for Road Safety Research SWOV. 22 pp., ill.

Jaaroverzicht 1968 (Annual report for 1968). Rapport 1969-3. SWOV. 40 pp.

Annual report for 1968. Institute for Road Safety Research SWOV. 28 pp.

Slipongevallen (Skidding accidents). Beschouwingen over eigenschappen van wegdekken en voertuigen. Een overzicht van de stand van zaken. Voorlopige aanbeveling ten aanzien van de stroefheid van wegdekken. Een onderzoekprogramma. Eerste Interim rapport van de SWOV-werkgroep Banden, wegdekken en slipongevallen. Rapport 1969-4. SWOV. 64 pp., ill.

Voor preventie verkeersongevallen moeten gegevens komen (To prevent traffic accidents data have to be at the disposal). R. Maas. Verkeerstijdschrift 19 (1969) 3: 18–20.*

Betrachtungen über die Anwendung von Halogenlampen für die Kraftfahrzeugbeleuchtung. J.B. de Boer & D.A. Schreuder. Lichttechnik 21 (1969) 8: 88A–92A.

The effectiveness of statutory countermeasures. D.J.Griep, research psychologist. Paper presented to the Working Party on Efficacy of general deterrents and individual sanctions. In: Alkohol und Verkehrssicherheit. Konferenzbericht der 5. Internationalen Konferenz über Alkohol und Verkehrssicherheit, Freiburg im Breisgau, 1969. Ch. IV, pp. 24–25. Hans Ferdinand Schultz Verlag, Freiburg im Breisgau.

Comparison of instruments for determining blood alcohol concentration. P.C. Noordzij, research psychologist. In: Alkohol und Verkehrssicherheit. Konferenzbericht der 5. Internationale Konferenz über Alkohol und Verkehrssicherheit, Freiburg im Breisgau, 1969. Ch. II, pp. 33–40. Hans Ferdinand Schultz Verlag, Freiburg im Breisgau.

Measuring devices and methods for determining blood alcohol concentration. P.C. Noordzij, research psychologist. Publication 1969-2. Institute for Road Safety Research SWOV. 64 pp., ill.

Enige opmerkingen bij het artikel 'De verkeersonveiligheid op de weg in Nederland' (Some remarks on the article by J.de Vries on 'Road unsafety in the Netherlands'). E.Asmussen. Verkeersrecht 17 (1969) 9: 185–187.*

Kanttekeningen bij de 'Beschouwingen met betrekking tot de Nota Verkeersveiligheid' van drs. A.van der Burgh en de 'Stellungnahme' van dr. D.von Klebelsberg (Marginal notes to an article by A.van der Burgh and a Stellungnahme by Dr. D.von Klebelsberg). D.J.Griep, research psychologist. Ned. Tijdschr. Psychol. en grensgeb. 24 (1969) 9: 593–605.*

SWOV-onderzoek leidde tot flexibele en snel te repareren geleiderailconstructies (SWOV-research leads to flexible and swiftly repaired guide rail structures). E.Thoenes & M.Slop. Wegen 43 (1969) 10: 296–304.*

Retroflecterende kentekenplaten en alternatieve middelen. Functie, vormgeving en toepassing. (De waarneembaarheid van voertuigen). (Reflectorized registration plates and alternative means). Rapport 1969-5. SWOV. 74 pp., ill.

30 Stads- en dimlichten binnen de bebouwde kom. (De waarneembaarheid van voertuigen). (Side lights and low-beam headlights in built-up areas). Rapport 1969-6. SWOV. 80 pp., ill.

Side lights and low-beam headlights in built-up areas. Report 1969-7. Institute for Road Safety Research SWOV. 69 pp., ill.

Gevarendriehoeken. Functie, vormgeving en toepassing. (De waarneembaarheid van voertuigen). (Red warning triangles). Rapport 1969-8. SWOV. 69 pp. ,ill.

Flexibele geleiderailconstructies en lichtmasten in middenbermen (Flexible guide rail structures and light standards in central reservations). W.H.M. van de Pol & M. Slop. Wegen 43 (1969) 12: 358–361. *

* Only available in Dutch

32 Designed by:
Cees van Dorland,
Krommenie, The Netherlands

Printed by:
Meijer Wormerveer nv
The Netherlands