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A EUROPEAN PROJECT ON ELECTRONIC AIDS
FOR TRAFFIC ON MAJOR ROADS
(EUCO-COST 30)

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COMMISSION OF THE EUROPEAN COMMUNITIES
Directorate-General Science, Research and Development
Rue de la Loi 200 - B-1049 Brussels

1. THE PROBLEM

At the end of two prosperous decades between 1950 and 1970 many European countries had substantial motorway networks. As an alternative to normal main roads, drivers find them fast, safe and less tiring for long journeys. Public concern over spectacular multiple accidents during fog or heavy rain was countered by statistics which showed that the personal injury accident rate per vehicle kilometre on motorways was about half that on corresponding main roads. Nevertheless, those responsible for the operation on motorways face congestion and safety problems, particularly during peak periods, and several elementary systems have been introduced to give drivers information about traffic conditions.

The prospect of safe motorway journeys led to an increasingly heavy traffic flow year by year so that, in many places, each kilometre of motorway experienced more accidents than were occurring per kilometre on other main roads. If account was also taken of the higher average cost of motorway accidents, attributable at least in part to the higher speeds, it was clear that the busier sections of motorway could be regarded as the "accident black spots" of the highway network. It is somewhat paradoxical that such "black spots" still provided the safest routes for each individual driver, because the accident rate per vehicle kilometre remained low. Lengths of road with the highest accident figures are of course the sites where expenditure on remedial measures is most justified, because a higher benefit can be expected for a given outlay on engineering or on traffic control.

Road traffic throughout Europe had been increasing despite the mounting cost of fuel; at the same time, there had been a reduction in road building programmes. There was also an increasing proportion of cross-border traffic which was largely on high-speed roads. The consequent need for more assistance to drivers on these roads where the return on expenditure might be expected to be higher than elsewhere was the main justification for international cooperation on this subject.

The aims of international cooperation were twofold :

- (1) To encourage the exchange of information and results of research or of experience with high-speed roads;
- (2) To recommend standards, if they appear beneficial.

European Cooperation

The subject of electronic aids for traffic on major roads was suggested by the AIGRAIN Report* of 1969 as a topic for technological cooperation between the Six and other European countries. Work started in 1970 as part of the COST Programme**, with 11 countries - Belgium, France, Italy, The Netherlands, Sweden, the United Kingdom, the Federal Republic of Germany, Austria, Finland, Switzerland and Yugoslavia - ultimately being involved. After early discussions it became clear that a common European code of practice for the control of busy, high-speed roads would be a desirable objective, because the recent development of substantial motorway networks had given rise to new driving hazards which required prompt, efficient reactions from both drivers and control authorities.

International traffic was growing at a time when road building programmes were being reduced, and motorways were experiencing more accidents per mile of road than other parts of the network.

Scope

After considering the factors involved in controlling a network of high-speed roads, it was recognized that each country would adopt its own policy towards traffic control. However, when means of influencing drivers' behaviour in order to implement those policies were considered, it was evident that advice or instructions should always be given in a clear unambiguous manner which could be understood by all. Consequently it was agreed that :

- (1) A standard interface between the driver and the control system was an important requirement;
- (2) standards for manufacture would not be necessary, the adoption of functional standards would be sufficient.

* European Communities - Medium Term Economic Policy Committee - Scientific and Technical Cooperation between European Countries: Possibilities in seven sectors - Doc. 7301/II/69 - 9 April 1969.

**European Cooperation in the Field of Scientific and Technical Research - COST.

Throughout the work it was accepted that recommendations for standards should be limited to those areas where the benefits of common practice were very clear, because to some extent standards could deter beneficial development. Consequently, it was felt that, in the event of an interim system being recommended, its adoption should not be allowed to have the effect of inhibiting further research on the topic, nor prevent the future adoption of a better system should one be developed.

2. PROCEDURE

An important outcome of the earlier cooperation had been a proposal for an internationally funded installation of several forms of driver communication on a Swiss motorway, with the object of selecting the most suitable system, and also to allow road authorities and the public to experience a full-scale installation. Some countries were not convinced that the project would completely achieve these objectives so agreement was reached on a 3-year period of research, with the aim of resolving some remaining technical questions and then after two years reviewing the need for a demonstration project. The Memorandum of Understanding which described this programme was signed by the countries already participating and also by the European Commission.

Organization

The organization of EUCO-COST 30 followed closely the pattern of the earlier work. Nine topics were identified for study by specialist working groups; their work was coordinated by Management Committee representatives as indicated in the list hereafter :

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| (1) In-vehicle communication with the driver
by spoken words | (Coordinated by France) |
| (2) In-vehicle communication by visual presentation | (United Kingdom) |
| (3) Variable signs or signals | (Germany) |
| (4) Radio broadcasting of traffic information | (Netherlands) |
| (5) Information needs of drivers and road authorities | (France) |
| (6) Automatic or manual detection of incidents affecting traffic | (Sweden) |

- (7) Clear, correct and unambiguous terms for use in messages of different languages (Belgium)
- (8) Automatic detection of bad weather (Finland)
- (9) Equipment for control centres and control strategies, data transmission, proposals for an international demonstration (Switzerland)

Work on these nine topics was carried out entirely from funds which had been allocated by participating governments to their national research projects. Meeting rooms, interpreters and secretarial services were paid for by the European Commission. Switzerland seconded an expert to act as Secretary to the Management Committee. Considerable benefit was derived by the participants from the exchange of results from research and traffic experience.

3. CONCLUSIONS AND RECOMMENDATIONS

1. The need for communication with drivers :

- 1.1. Drivers value traffic information, but there is little justification at present for systems based on vehicle-borne equipment. The most suitable means of communicating with drivers on high-speed roads would be by external valuable signs and signals, forming part of a system which included rapid detection of traffic incidents and/or bad weather.
- 1.2. Radio broadcasting of traffic messages is not sufficiently fast to prevent accidents, other than a few caused by bad weather, but it has an important role as the only means of communicating long-range information to drivers on the greater part of the road network.

2. Recommendations which call for action by Governments:

- 2.1. Seven new symbols to warn of hazards encountered particularly on motorways should be added to the Vienna Convention*, symbols already included in the Convention should be used for all other situations. The new symbols would represent recommended (i.e. advisory) maximum speed, congestion, accident or breakdown, fog, danger caused by falling rain or snow, aquaplaning and skid risk from ice or snow. A symbol for fog is still being developed.
- 2.2. The use of light matrix signs should be sanctioned; it is considered possible to interpret the provisions of the Vienna Convention to allow this. If this interpretation were not acceptable, a suitable modification of the Convention should be initiated.

* Vienna Convention on Road Signs and Signals, 1968.

- 2.3. There are differing views on the urgency and importance of recommending a uniform system of traffic broadcasting for Europe, but most of the participating countries favour a uniform solution. A number of considerations indicate that in the near future the adoption of a system which identifies traffic messages on normal entertainment channels would be appropriate in those countries where VHF receivers are used in most vehicles. Most countries favour the adoption of such a system.
- 2.4. The location of emergency call boxes and similar devices available to the public should be clearly labelled using internationally recognized signs.
3. Conclusions and recommendations for road administrations and research institutes :
 - 3.1. Wherever possible the structure and phrasing of messages broadcast in different languages should be consistent; the following order was suggested :
 1. an audible alerting signal
 2. the nature and location of the incident
 3. its effect on traffic
 4. the probable duration of the obstruction
 5. recommendations for drivers' action
 - 3.2. The considerable research and development in progress on area broadcasting should be encouraged.
 - 3.3. The equipment used for displaying messages on valuable signs should not be standardized internationally.
 - 3.4. Automatic incident detection systems would form a valuable part of a motorway control system, but more work is recommended to achieve a method which operates satisfactorily at all levels of flow, misses no incidents and gives no false alarms. There is no need for a European standard for incident detection systems.
 - 3.5. No standards should yet be adopted for weather detection systems. Several existing technical standards apply to various components of such a system; it is recommended that these should be adopted wherever possible. A prototype weather station has been developed and tested.
 - 3.6. It would be unwise to standardize control equipment and data transmission because electronics are developing rapidly, and standards are not necessary from the drivers' point of view.
 - 3.7. It is premature to consider wholly automatic traffic control systems although certain parts of such systems already operate automatically.

4. Concerning a demonstration project :

- 4.1. The ideal outcome of the work of EUCO-COST 30 would be the adoption of the suggested standards and recommendations as a result of this report by all European countries. Since this was regarded as unlikely, a demonstration project was recommended after careful balancing of the factors involved. It is not possible to propose more than one such demonstration despite the limitations imposed by choosing only one site, but national projects in which various components had been developed will remain in use.
- 4.2. It was agreed that the enhancement of an existing national site would be the best procedure, and that the demonstration should be run on a concerted action basis rather than from a common fund.
- 4.3. The Committee believed that an extension of the EUCO-COST 30 Memorandum of Understanding would be the most practical way of proceeding if a demonstration were agreed.
- 4.4. After detailed consideration of several technically suitable sites the final choice, based both on estimated cost and on technical qualities, was part of the motorway system south of The Hague in the Netherlands.
- 4.5. The project is to be managed by three groups - a Management Committee, a Project Management Group of experts assigned to work part-time when necessary, and the Dutch team responsible for the site.
- 4.6. If all goes well the demonstration should be operational from Spring 1982 and a report would be published in Autumn 1983.
- 4.7. The estimated cost of additional equipment is 810.000 Dutch Guilders at 1979 prices, and manpower requirements will be about 130 man months; neither figure includes an allowance for contingencies. Contributions of hardware, manpower, or financial assistance will be expected from all Signatories who agree to participate. The aim is to achieve general equity rather than strict financial parity, so it is not possible to predict a country's possible commitment at this stage.

5. Future research cooperation :

- 5.1. Systems based on vehicle-borne microprocessors, which are already being considered for engine control and monitoring purposes, could be worthwhile in the future and cooperation on this topic should continue. For example, if automatic route guidance should become economically justifiable, it would be valuable to use the same system throughout Europe.
- 5.2. The problems arising from the use of citizens band mobile two-way radios in some European countries seem sufficiently serious to justify further study.
- 5.3. Work on automatic incident detection will be carried out in conjunction with the proposed demonstration project.
- 5.4. Further work is also required on area broadcasting, weather detection and variable direction signs.
- 5.5. It was agreed that ways should be found to maintain the fruitful cooperation which has been built up.