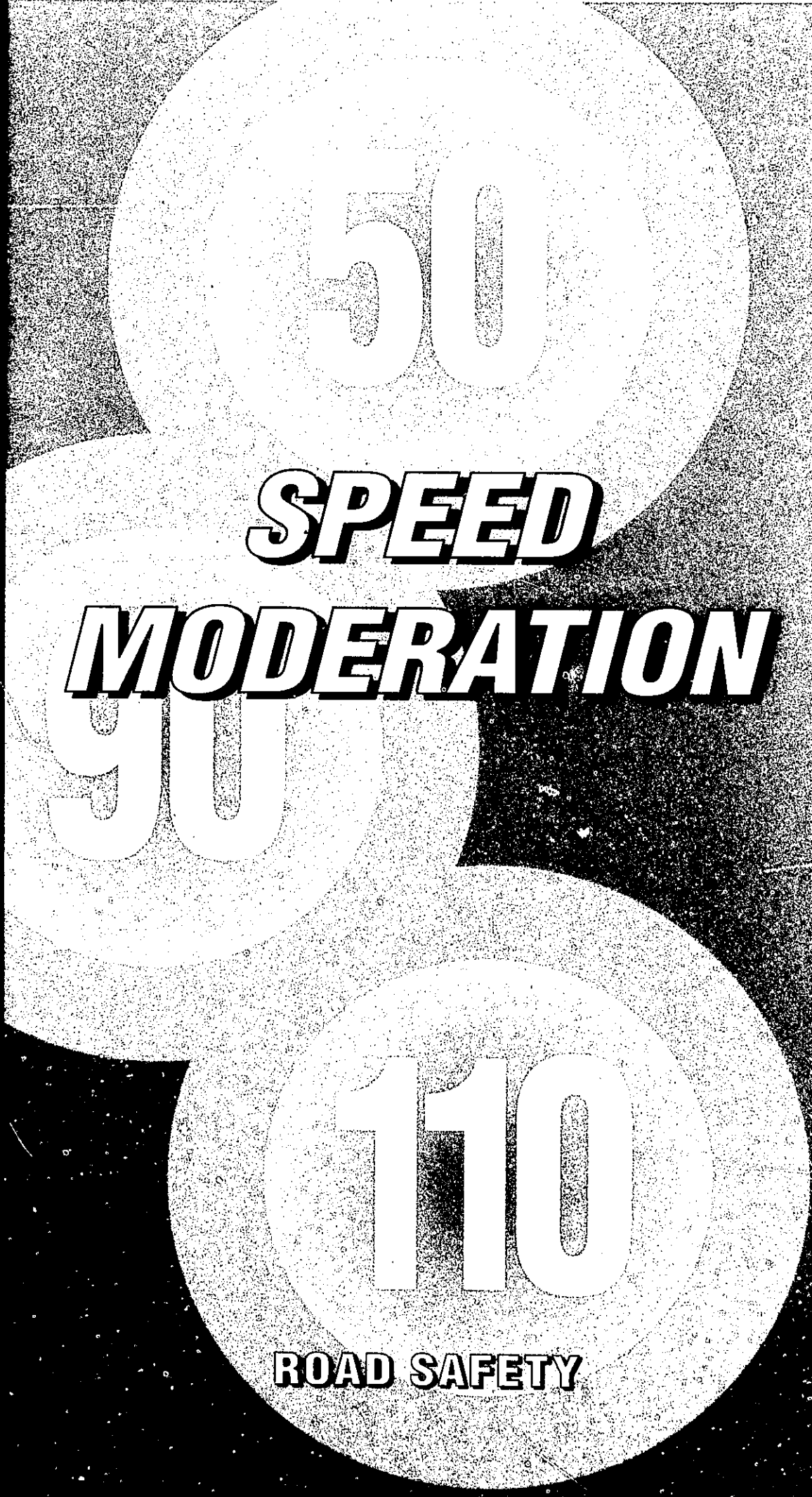


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EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT



SPEED

MODERATION

ROAD SAFETY

EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

ROAD SAFETY

Speed Moderation

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

THE EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT (ECMT)

The European Conference of Ministers of Transport (ECMT) is an inter-governmental organisation established by a Protocol signed in Brussels on 17th October 1953. The Council of the Conference comprises the Ministers of Transport of 34 European countries.¹ The work of the Council of Ministers is prepared by a Committee of Deputies.

The purposes of the Conference are:

- a) to take whatever measures may be necessary to achieve, at general or regional level, the most efficient use and rational development of European inland transport of international importance;
- b) to co-ordinate and promote the activities of international organisations concerned with European inland transport, taking into account the work of supranational authorities in this field.

The matters generally studied by ECMT – and on which the Ministers take decisions – include: the general lines of transport policy, investment in the sector; infrastructural needs; specific aspects of the development of rail, road and inland waterways transport; combined transport issues; urban travel; road safety and traffic rules, signs and signals; access to transport for people with mobility problems. Other subjects now being examined in depth are: the future applications of new technologies, protection of the environment, and the integration of the Central and Eastern European countries in the European transport market. Statistical analyses of trends in traffic and investment are published each year, thus throwing light on the prevailing economic situation.

The ECMT organises Round Tables and Symposia. Their conclusions are considered by the competent organs of the Conference, under the authority of the Committee of Deputies, so that the latter may formulate proposals for policy decisions to be submitted to the Ministers.

The ECMT Documentation Centre maintains the TRANSDOC database, which is available on CD-ROM or accessible via the telecommunications network.

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Moderation of speed is the first topic in a new series of publications to be edited by the European Conference of Ministers of Transport, with a view to illustrating the main topics on road safety dealt with by the Conference.

Today, the Conference has thirty four Member countries, all within the geographical frame of Europe. The countries associated with its work, as well as those which have observer status, give a universal dimension to those themes of the transport sector, and in particular road safety and environment.

Notwithstanding the many endeavours undertaken by the various countries and international organisations such as ECMT -- which promptly set up a group of specialists to use, to the best possible advantage, all the knowledge and experience acquired --, the casualty toll is still too heavy.

Very detailed analysis has shown that human error is the main cause of the vast majority of road accidents, or is at least a key contributory factor. Thus, it is necessary to focus on the human factor. While it is now considered much easier in principle to change technology rather than human behaviour, there are still several ways of influencing behaviour more or less directly. This can be achieved primarily through education, training and information, but also through checks, controls and penalties. It is, nevertheless, also necessary to study technical measures, linked with the infrastructure and the vehicle, as well as to adopt harmonised regulatory measures.

Moderation of speed is a topic which gathers together all these different aspects.

On the other hand, now that the Conference embraces geographically the whole of Europe, ECMT information, particularly in the area of road safety, is certainly relevant. Many of the Resolutions that have already been adopted by the more long-standing Member countries could, if adopted in Eastern Europe, have a positive impact as regards safety on the roads of the more recent Members participating in ECMT work.

Bearing this in mind, we have created this new series of publications which will illustrate the common interests pursued in the field of transport in Europe and which, at present, has already reached the entire continent.



Gerhard AURBACH
Secretary General
July 1996

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INTRODUCTION

All countries now recognise that excessive speed or speed that is inappropriate to the circumstances is one of the major causes of road accidents, and a factor that increases their severity. To improve road safety, it is therefore necessary to frame and implement a coherent set of measures to ensure calmer, uniform, and therefore more fluid and safer traffic. This objective can be achieved in various ways.

In the past, the ECMT concentrated on the regulatory aspects of the problem by setting general speed limits [Resolutions 24, 29 and 30 adopted between 1971 and 1974] and laying down the procedures for speed checks [Resolutions 25, 29 and 43 adopted between 1971 and 1982].

These strict speed limits have had beneficial induced effects on road safety by:

- lowering the speeds practised and reducing the level of top speeds;
- reducing the average speed over an entire network;
- narrowing the range of speeds on a section of road at any given time, since this range itself is also an aggravating factor;
- ensuring speeds are geared to the particular circumstances, not only from the standpoint of the infrastructure but also in the light of the presence of other more vulnerable road users -- depending on the function the road serves -- and the weather and conditions specific to the driver such as, for example, fatigue.

Today, however, it is recognised that strict regulations are not enough and that other measures are also necessary. It is no longer solely a question of imposing a speed limit but of adopting a speed that is appropriate in all circumstances, and combining speed limits with measures relating to the vehicle, its environment and driver, with a view to attaining the main objective

of road safety policy -- responsible behaviour on the part of the driver and calmer driving.

While it is true that the main objective of traffic calming measures is to promote road safety, they also have other aims: general speed limits were introduced in the early 1970s largely for their impact on energy conservation, which did much to gain acceptance for them by road users.

Although energy conservation is no longer a matter of such immediate concern, it is still a valid objective today and relates to the concern about environmental protection which, on the contrary, is today a key issue and involves not only the reduction of air pollution by vehicle emissions but also noise abatement, both problems associated with speed.

Lastly, the reduction of speed and the endeavours to ensure calmer driving, especially in built-up areas, are conducive to a better quality of life for everyone, an ancillary objective that is now recognised as having considerable weight.

For all these reasons, the Road Safety Group decided to review recent developments in Member Countries and to study, from the various technical, social and regulatory standpoints, European-wide approaches to, and future action on, traffic-calming policy, which is now a permanent feature of road safety policy in the various ECMT Member States.

CHAPTER 1. PRESENT SITUATION

All countries now recognise that excessive speed is a major determining factor in both the number and severity of accidents, even though the precise definition of "excessive speed", and the blame attached to the latter for causing accidents, still vary from one country to another. Nonetheless, high speeds, whether in absolute terms or in terms of speeds that are inappropriate to prevailing road conditions, are major contributors to the increased risk of an accident.

In Europe, as in all economically developed countries, no road safety expert or traffic engineer would challenge the need for speed restrictions, which, as accident analyses and statistics from studies carried out in Europe and elsewhere show, have convincingly proved their effectiveness in all countries.

1. Speed as a determining factor in the number and severity of accidents

Depending upon whether speed is perceived as the prime cause of accidents, and identified as such in police accident reports, or as a factor adding to the severity of accidents initially attributable to other causes (mechanical failure, failure of driver to give way, etc.), accident statistics can vary substantially.

More detailed types of analysis, such as the REAGIR surveys in France, have identified speed as a contributory factor in 50 per cent of all fatal accidents. In Finland, where, as in France, specialist teams carry out detailed investigations of every fatal accident, excessive speed has been cited as a determining factor in 61 per cent of all the accidents studied.

As a general rule, roads on which traffic flow speeds are highest are those on which the most severe accidents and highest number of casualties are reported. This is borne out in breakdowns, by road system, of the number of accidents and the number of seriously injured casualties (see Table 1). Thus in France, while two-thirds of all accidents involving casualties occur in urban

areas, such accidents only account for a third of all fatalities; in contrast, the remaining one third of accidents in rural areas accounts for two-thirds of the number of people killed in road accidents. The degree of severity of accidents (number of persons killed and seriously injured per 100 accidents) amounts to 27 in urban areas as opposed to 68 in rural areas where speeds are higher.

The large number of accidents in which a single vehicle leaves the carriageway at a bend, or even along a straight section of road, as a result of motorists losing control of their vehicles, proves that excessive speed is very often responsible for accidents.

Other studies have drawn attention to the influence of speed on the severity of an accident.

A study carried out by the Peugeot-Renault biomechanics laboratory into the injuries sustained in accidents by 100 000 occupants of small cars fitted with seat belts found that in the case of head-on collisions at speeds of 35 km/h and below there were practically no fatalities, whereas at speeds of 70 km/h the percentage rose to almost 50 per cent.

The risk of a pedestrian being fatally injured in a collision with a car increases linearly with the speed of the impact. The risk of death is almost 100 per cent if the car is travelling at 80 km/h, 85 per cent at 65 km/h, 30 per cent at 40 km/h, but falls to merely 10 per cent at a speed of 20 km/h.

These figures, together with the findings of accident studies, all show in different although converging ways the significance of speed in both the number and severity of accidents.

2. Impact of speed restrictions

The introduction of general speed limits has clearly helped to reduce both the number and severity of accidents in all highway systems. Experience in all countries has shown that speed restrictions help to improve road safety.

Initial experiments with a 90 km/h speed limit for cars and a 70 km/h limit for lorries on 2 000 km of road in France during 11 week-ends between 1959 and 1960 resulted in a 22 per cent reduction in the number of cars travelling at speeds above 90 km/h, a 13 per cent reduction in the number of lorries travelling at over 70 km/h/h, and a 23 per cent fall in the number of accidents.

After the oil shocks of the early 1970s, the introduction of speed restrictions according to type of network, irrespective of the country concerned, reduced average driving speeds and led to a 10-40 per cent reduction in the number of accidents involving personal injury. The largest reductions were generally reported in the number of motorway accidents, compared with ordinary highways, and in the number of fatalities compared with casualties, which clearly indicates a general decline in the severity of accidents. It should be noted, however, that the imposition of speed limits is most effective during the first few months following their introduction, and that to ensure that they remain effective other measures, such as public awareness campaigns or speed checks, need to be introduced.

3. Effect of lowering or raising general speed limits

There are many examples, in both Europe and the United States, which show that lower speed limits invariably reduce both the number of accidents and the number of casualties, and which show conversely that higher speed limits have an adverse impact on safety.

3.1 The general speed limits of 110 km/h on motorways and 90 km/h outside *built-up areas* which were introduced in **Denmark** in 1974 were lowered by 10 km/h in 1979 to 100 km/h on highways and 80 km/h outside built-up areas. The number of accidents on main roads fell in the short term by 18 per cent and by 14 per cent over the longer term. However, even in built-up areas, where the speed limit was unchanged, the number of accidents also fell by around 8 per cent.

In **Germany**, the introduction in 1970 of a general speed limit of 100 km/h on main roads and a recommended maximum speed of 130 km/h on motorways, aimed at combating an appalling road safety record of 19 000 fatalities a year, led to a 5-10 per cent reduction in the number of fatal road accidents, according to type of road, achieved as a result of lower average traffic speeds, and greater uniformity of driving speeds, at the cost of an increase in average journey times of merely 3 per cent.

Again in **Germany**, the introduction of a 100 km/h maximum speed limit on the motorway system during the winter of 1973-1974 resulted in a 20 per cent reduction in the number of collisions, a 31 per cent fall in the number of casualties and a 37 per cent reduction in the number of fatalities, although the degree of observance of speed limits was extremely high.

In the **United Kingdom**, in 1960, the raising of the speed limit in Greater London to 40 mph did not increase the number of accidents. In fact, in Kent the number of accidents actually fell.

In **Finland**, between November 1987 and September 1989, the speed limits of 100 km/h on main roads and 120 km/h on motorways were reduced in winter to 80 km/h and 100 km/h respectively.

As a result, average driving speeds on main roads fell by 6.8 km/h (8.2 km/h for cars alone) and on motorways by 3.9 km/h. At the same time, the number of accidents involving casualties fell by 11 per cent on main roads and by 10 per cent on motorways.

During the summer of 1989, the **Swedish authorities** lowered the speed limits on 5 500 km of road on a trial basis. The lowering of the maximum speed limits from 110 km/h to 90 km/h/h resulted in a decrease in average driving speed of 14.5 km/h on motorways and 11 km/h on other roads, and at the same time reduced the number of accidents involving casualties by 13 per cent and the number of fatal road accidents by 25 per cent. The sharpest falls were noted in the number of accidents caused by overtaking and in the number of rear-end collisions.

In **Switzerland**, following the lowering of the speed limit on motorways from 130 to 120 km/h in 1 January 1985, speeds fell by 5 km/h, the number of casualties by 4 per cent and the severity of accidents by 11.5 per cent. Following the reduction in the general speed limit from 100 to 80 km/h outside built-up areas on 1 January 1985, the general level of speeds fell by 10 km/h and the number of casualties by 10.3 per cent. The severity of accidents fell by nearly 8 per cent.

In the **United States**, as a result of the introduction in 1974 of a 55 mph speed limit on rural roads, the average driving speed has fallen from 65 mph to 57 mph and the number of road fatalities has been reduced by 12 per cent. On the other hand, several states have raised the speed limit on freeways from 55 mph to 65 mph.

Trials carried out in **France** since as far back as 1959 confirm the close link between speed restrictions and road accident and fatality rates. The introduction of a general speed limit of 120 km/h on motorways in 1973 reduced the road fatality rate (number of people killed per 100 million vehicle-kilometres) from 3.6 to 1.5. This rate rose to 2.1 when the speed limit was raised to 140 km/h in 1974, and then fell back to 1.5 when the limit was

subsequently reduced to 130 km/h, i.e. the same rate as that achieved previously with a speed limit of 120 km/h.

More recently, the general speed limit on motorways in the **Netherlands** was raised from 100 km/h to 120 km/h over almost 80 per cent of the network, with the speed limit on the remaining 20 per cent of the network, which mainly consists in sections accommodating high-density traffic, being left at 100 km/h. At the same time as the new speed limits were introduced, the Dutch authorities stepped up the measures taken to police these limits. The average driving speed on sections of motorway where the speed limit had been maintained at 100 km/h subsequently fell from 111 km/h to 104 km/h, and the average speed on sections where the speed limit had been increased to 120 km/h remained unchanged at 117 km/h. The result of these changes has been a 15 per cent reduction in the number of road fatalities, a 30 per cent reduction in road casualties, a 34 per cent decrease in CO₂ emissions and a decrease of around 5 per cent in NO_x emissions.

Special speed restrictions have been imposed during the winter months in **Finland** since 1992. These measures have lowered the number of accidents by 14 per cent. It is particularly significant that the best results have been obtained on roads with the best signing. It is also worth noting that these speed limits are broken by almost 50 per cent of drivers, which would indicate that they could be even more effective if the high number of motorists who ignore the speed limits could be persuaded to respect them.

3.2 Experiments conducted in *urban environments* in some countries have produced similar results but have also indicated the need for planners to take account of whether the speed limits imposed are acceptable to users and appropriate to the environment, to ensure that they are credible and thus respected by motorists, even if other concerns such as the safety of pedestrians, cyclists and moped riders, the most vulnerable categories of road user, need to be taken into account.

Over the past few years, the speed limits in built-up areas have been lowered from 60 to 50 km/h in Switzerland (1984), Denmark (1985), France (1990), Belgium (1992), Spain (1993) and Portugal (1994). In all these countries, the lowering of speed limits in urban areas has reduced the number of accidents and the number of fatalities by:

- 5 per cent and 10 per cent respectively in Switzerland, particularly on major road with low to medium traffic densities;

- 9 per cent and 24 per cent respectively in Denmark, with a decrease of 3 km/h in average driving speeds;
- 14 per cent and 15 per cent respectively over two years in France, while the number of accidents and fatalities in rural areas over the same period amounted to only 10 per cent and 12 per cent respectively.

These reductions in urban areas have been larger during the daytime than at night. A statistical study has estimated that the introduction of a 50 km/h speed limit in built-up areas in France has helped to avoid 14 000 accidents and thus to save 580 lives.

At the same time, the average driving speeds on main roads through built-up areas with fewer than 5 000 inhabitants have fallen from 65 km/h to 61 km/h during the daytime and from 74 km/h to 71 km/h at night. The percentage number of motorists driving at speeds of over 70 km/h, well above the speed limit for this type of road, has fallen from 36 per cent to 22 per cent during the daytime and from 58 per cent to 42 per cent at night.

The lowering of speed limits from 50 km/h to 30 km/h in certain areas in **Germany** has reduced the number of accidents by 10 per cent and the number of persons killed or seriously injured by 15 per cent compared with areas where the 50 km/h speed limit has been maintained. The average driving speed in Hamburg has fallen from 41.5 km/h to 38.2 km/h. However, the lowering of the speed limit from 50 km/h to 40 km/h in certain areas has not produced any improvement in road safety statistics.

Some results of such changes would seem to indicate that the speed limit should be consistent with traffic conditions and that a higher but more appropriate speed does not systematically have an adverse impact on road safety.

The **United Kingdom** and the **Netherlands** have recently experimented with the introduction of lower speed limits in residential areas. The United Kingdom authorities reported a 70 per cent decrease in the number of accidents within these areas. The Dutch authorities reported highly encouraging results and intend to introduce such low speed limits nation wide.

4. Impact of speed limits on the environment

Although speed restrictions have primarily been discussed in this paper from the standpoint of road safety, the impact of such restrictions on the environment can be quantified in terms of the reductions achieved in pollution, noise or energy expenditure.

A clear link exists between high vehicle speeds and the volume of gaseous emissions from vehicles. Although technical modifications have already been made to automobiles to improve their impact on the environment, further reductions in pollutant emissions can be obtained by modifying driver behaviour and by encouraging motorists to drive more slowly.

Studies carried out in Germany have shown that reducing the speed limit on motorways from 100 km/h to 80 km/h reduces noise level at a calculated rate of 3.9 dB (A), for those living nearby, without taking into account the main impact of the noise of lorries on the actual total noise level.

Few studies have been made of the impact of lower speed limits on pollutant emissions, and the findings of such studies have been fiercely contested. However, an Austrian study reports that lowering the speed limit from 130 km/h to 100 km/h reduces NO_x emissions by 17 per cent and CO₂ emissions by 25 per cent.

As noted earlier, the lowering of the speed limits on motorways in the Netherlands resulted in a fall in average driving speeds accompanied by a 34 per cent reduction in CO₂ emissions, a reduction of around 5 per cent in NO_x emissions, and energy savings of 40 million litres of petrol, 40 million litres of diesel fuel and 15 million litres of LPG.

With respect to energy savings, it has been calculated in the United States that increasing a steady driving speed from 55 mph to 70 mph increases fuel consumption by 17 per cent.

Various studies estimate that, for a car fleet of the type found in Germany, a reduction of x per cent in average driving speeds on rural road networks can reduce fuel consumption by 0.8x per cent.

Strict compliance with speed limits in France would save 350 000 tonnes of oil out the 25 million tonnes consumed annually by car drivers.

5. Current opinion

The public considers that speeding by drivers who fail to respect speed limits or who drive at speeds inappropriate to traffic or road conditions is one of the main causes of accidents. Drivers too, as a general rule, accept the aims, legitimacy and effectiveness of speed limits.

In a SOFRES survey carried out in France in 1986, 78 per cent of survey respondents were in favour of speed limits on motorways and 92 per cent approved the introduction of speed limits on other rural roads. According to a survey carried out in 1992, 70 per cent of those questioned supported the introduction of 50 km/h speed limits in urban areas. Those who were most in favour were women, the elderly and farmers, whereas men, young people, workers, senior managers and sales representatives constituted a stubborn but vociferous minority. There was also widespread agreement that, in order to reduce the number of accidents and the number of road casualties, priority had to be given to discouraging drivers from driving at excessive speeds. This was the view expressed by 89 per cent of the people canvassed in a survey carried out at the end of 1994.

The SARTRE (Social Attitudes to Road Traffic Risk in Europe) survey carried out in September 1994 in collaboration with the Commission of the European Communities revealed similar opinions in the 15 countries covered.

The above survey therefore indicates that a substantial majority of the general public, over 67 per cent and in some countries over 90 per cent, within Europe are in favour of a 50 km/h speed limit in urban areas and support the development of 30 km/h zones in residential areas.

Fifty seven per cent of Europeans are in favour of a standard speed limit of 120 km/h on motorways. Only 7 per cent of respondents would rather have no speed restrictions on motorway systems, a share that rises to 30 per cent in the West German *Länder* where the public would rather see speed limits imposed at specific locations or at specific times according to traffic conditions. According to studies carried out in Germany, almost half drivers from the West German *Länder* would agree to a general speed limit of 150 km/h.

The general conclusion to be drawn from this study is that Europeans accept the general principle of speed restrictions, even though opinions would seem to differ from one country to another over the level at which speed limits should be set.

It would also seem that a large number of drivers are in favour of speed checks by the police. Some motorists would even like to see the number of such checks increased (a third of United Kingdom motorists according to a survey carried out in the United Kingdom in 1993).

6. Observance of speed limits

Drivers' behaviour and, in particular, the degree of compliance with speed limits, can be renewed in various ways. However, it is not possible to measure exactly and permanently the actual number of offences, the percentage of offending drivers in the total of drivers, or even the seriousness of the offences, on the entire road network.

It is possible to obtain fairly general statistical data on speed limit violations from:

- automatic measurement of the speeds at which vehicles are travelling at a few specific locations along certain routes, using a method that allows averages to be calculated;
- surveys to determine the impact of new speed restrictions;
- the number of speeding violations reported by the police;
- the number of motorists disqualified for speeding offences.

a) The statistics show that along certain routes in some countries the average speed at which vehicles travel is lower than or equal to the speed limit as in Portugal where the average speed recorded on two-lane carriageways is 69 km/h for lorries and 73 km/h for private cars, or in general on motorways where average speeds are slightly below the speed limit. In other countries, in contrast, the average speeds recorded are above the speed limit notably on main roads. Thus the average speed on rural highways in France is around 100 km/h, whereas the general speed limit on such roads is 90 km/h. In the Netherlands in 1994, the average car speed on motorways was 112 km/h (for a speed limit of 120 km/h) and 104 km/h on highways (with a speed limit of 100 km/h). On two- and four-lane main roads with a speed limit of 100 km/h, the average speed was 85 km/h; on two-lane intercity roads (speed limit: 80 km/h), the average speed was 77 km/h.

b) A study carried out in 1990 revealed that over 60 per cent of motorists (60 per cent during the day and 82 per cent at night) travelling on main roads through towns with fewer than 5 000 inhabitants exceeded the speed limit.

Studies generally show that driver behaviour varies from one country to another according to type of road and even according to type of vehicle. The high proportion of drivers who fail to respect speed limits -- in some cases as much as 70 per cent -- clearly indicates the need for stronger forms of dissuasion using a variety of means such as information campaigns or stiffer penalties.

c) Data on the number of speeding offences reported by the police are not available for all countries, either because figures are not released or because no distinction is made between different types of offence and it is therefore not possible to differentiate between speed violations and other motoring offences. In addition, not all offences committed are detected. Thus the number of offences detected and acted upon by the police force only accounts for a very small percentage of the number of offences actually committed. In contrast, it would be reasonable to assume that the number of speed checks carried out by the police in a given country does not vary significantly from one year to another, except under exceptional circumstances, and that any change in the statistics would therefore reflect a change in the behaviour of road users.

The accuracy of the above data, however, depends upon the density of speed checks, which can vary substantially from one country to another. A comparison of such statistics cannot serve as a basis, therefore, for drawing conclusions regarding differences in driver behaviour from one country to another. The number of offences reported will depend upon national policy towards speed checks, the personnel and equipment assigned to such checks in individual countries, and regulations in force at national level.

In 1991, the Belgian police prosecuted 362 922 motorists for speeding offences. In Sweden, 76 000 speeding offences were reported in 1991 and fewer than 63 000 in 1992. The French police reported 220 000 speeding offences in 1991 and 114 750 offences in 1992. Speeding offences in Turkey accounted for 9 per cent of all motoring offences reported in 1992. In the United Kingdom, 460 000 motorists were fined for speeding in 1992, and 148 500 convictions were secured for speeding offences. In 1993, 695 894 speeding offences were reported in Spain and 523 175 in Romania.

d) The number of motorists disqualified from driving for speeding offences provides an indication of both the behaviour of road users and the severity of the penalties for speeding in different countries. This number does depend, of

course, on the number of speed checks carried out and the offences observed by the police officers responsible for carrying out such checks. Since legislation differs from one country to another, it is difficult to make comparisons.

As in the case of speeding offences, the statistics published in many countries do not indicate the precise reason for which driving licences are cancelled or suspended. Nonetheless, some figures are available.

In Romania, 4 per cent of all motorists who lost their licence for motoring offences did so for speeding. In Switzerland, the percentage of such motorists amounted to 43 per cent with a total of 21 178 motorists losing their licence for speeding offences. In 1992, 13 053 motorists lost their licence for speeding offences in the United Kingdom and 6 490 in Turkey.

CHAPTER 2. INFRASTRUCTURE, ROAD SIGNS AND TRAFFIC MANAGEMENT

1. Speed and infrastructure

For the past twenty or thirty years or so, infrastructure operators have tried to "improve" roads, making them steadily more suitable for higher speeds and increasingly large traffic flows, by:

- widening lanes;
- levelling the longitudinal profile;
- increasing curve radius;
- removing trees and houses that are too close to the road;
- providing protection from obstacles on the side of the road;
- widening the field of vision.

What they were aiming at was primarily to improve traffic flow, but "safety" was another argument often put forward (elimination of hazards).

In fact, more often than not, such improvements led to higher speeds, regardless of speed limit signs or roadside hazards. This showed that infrastructure induces drivers to behave in a certain way and it is by no means unusual to find that roads that have been improved, on the face of it for safety reasons, are even more dangerous than before, since they lull drivers into a false sense of security and encourage them to drive too fast. Overall, the route remains just as dangerous, certain "black spots" disappear, but the increased level of speed causes other to appear.

All the experts now agree that road design influences driver behaviour, and speed in particular. When it appears necessary to request the driver to reduce

his speed, such as when passing through small urban areas or when entering towns, a well thought out road design often proves to be more effective than reinforced road signs.

2. Infrastructure functions

In designing a road it is first necessary to decide what specific functions it serves: is it an access road; ring road; local, regional, national through road; inter-city road; route for wide/long vehicles, or for heavy traffic; a scenic route, ...

The objective is never simply to "reduce speed" (which speed?) but to suggest -- or constrain drivers to adopt -- a speed appropriate to the conditions. The choice of this speed should be dictated by the specific function a road serves, which is one of the key factors that has to be examined when designing it.

As a general rule, mixing functions is potentially hazardous as it leads to incompatibility: between vehicles using it as a through road and vehicles stopping on it; between those out for a drive and those who have a longer distance to cover; between heavy traffic and shuttle traffic, etc. Multiple functions inevitably mean vehicles travelling at different speeds.

Although seldom possible, the "ideal" solution would be single-function roads, as is virtually the case for 30 km/h zones and residential areas.

Without going quite that far, some degree of road specialisation is often feasible and desirable. For example, a motorway which takes both heavy and light long-distance traffic, but prohibits pedestrians and cyclists as well as use for local services.

The most problematic cases -- and the most frequent -- are multi-function roads on the fringes of or through residential areas. Such roads call for a least-risk management approach, i.e. very low speeds.

At any rate, some ranking of the road network still seems desirable, since it encourages infrastructure operators to cater for specific types of traffic, set priorities and seek design solutions that minimise incompatibilities.

3. Infrastructure design

The behaviour of road users is dictated by their own experience and observations. Whether or not a driver can predict precisely what will happen next largely depends on how easy it is to read the road, i.e. on his immediate perception of the meaning of all kinds of information supplied by his surroundings.

Good infrastructure design can induce drivers to reduce speed "instinctively" -- i.e. independently of speed limit signs or rules of the road.

Design is even more crucial where the function of a road changes. A break in the continuity of design is needed to draw attention to the change, make road-users more alert and encourage them to adjust their speed of their own accord when, for example, they enter a built-up area.

Any obstructions, changes in the continuity of the road or hazards must obviously be clearly signed, but this is often not enough to produce the desired result.

The tools available for influencing driver behaviour are: narrowing of the carriageway, provision of parking space on the verges, road markings, staggerings, road humps, rough bands, edge markers, road design, choice of materials, landscaping, roundabouts, etc. They have proved to be effective provided that they are used in accordance with specific standards. When they are not used properly they impair efficiency.

"Black spots" need special attention, as they are often an indication that the infrastructure is not adequately designed for a specific hazard. In dealing with them, it is necessary to take account of the route as a whole and not just under local circumstances, since these problems cannot be dealt with by moving them elsewhere.

The aim of good infrastructure design is ultimately not only to "guide" road users naturally along the right path, but also to ensure that they travel at the right speed.

A certain amount of standardization of infrastructure design at local, national or even European level can make it easier for drivers to understand, and thus accept the various signs and markings, thereby improving road safety considerably. Care should therefore be taken to ensure that certain "original" initiatives taken by the competent authorities to improve road safety at specific

points or in specific areas do not impair efficiency on the network as a whole. Technical guides would be prepared at national or international level for these authorities with a view to promoting such standardization.

4. Urban environment

Heavily trafficked roads frequently cut through built-up areas. Often, urban distributor roads are really major highways on which drivers are not really conscious of the many dangers surrounding them nor the fact that the environment has changed. These roads have been often designed solely according to the fluidity of the traffic, and the general speed limits are rarely observed.

Also, road signs which indicate to the driver that he is entering a built-up area are often located according to territorial boundaries and not according to the density of housing. Compliance with traffic regulations and thus calmer driving would be facilitated if the regulations were better adapted to the environment [Cf. ECMT Recommendation CM(94)5].

In cities, all-purpose roads give rise to major "conflicts of interest" between slow and fast-moving traffic; traffic and the environment; through traffic and local traffic, etc.

The only way to design infrastructure that will resolve conflicts and problems between road users is to set clear priorities.

Many experimental urban development schemes have demonstrated that road users automatically adjust their speeds in keeping with the designated purpose of the road and that drivers -- the same ones who fail to observe general speed limits or disregard mandatory road signs -- accept without question a reduction in speed if the infrastructure itself encourages it or imposes it.

Exchanges of experiences on those schemes should be promoted between countries and towns.

5. Motorways

The motorway network is a good example of a network with specific, clearly-defined functions.

Since motorways are particularly intended for transit traffic and avoid built-up areas, exclude local services and slow traffic, they are by and large safer than other roads.

Although accidents are fewer, they are more severe, clearly owing to the higher speeds on motorways.

Because users perceive motorways as "safe", they tend to drop their guard or drive too fast with the result that a "minor" incident (puncture, traffic jam, fog) often has serious consequences. In addition, the comfort of modern vehicles, the carriageways and roads in general diminish the driver's perception of the actual speed at which he is travelling.

It is therefore necessary to introduce regulations and technical measures to reduce speeds and improve driver's perception of their speed.

All European countries except for Germany have adopted a national speed limit on motorways: compliance with it needs to be improved, particularly by policing and speed checks.

Infrastructure design, together with proactive traffic flow management, must, and will have, a greater role to play in motorway safety.

Clear road markings and prominent edge markers in appropriately spaced sequences make the driver aware, subconsciously but effectively, of the speed at which he is travelling, i.e. precisely what he does not realise when his attention is focused on a zone in the distance.

6. Traffic management

The provision of real-time information is an effective way of getting the driver to adapt his driving to the circumstances and, in particular, to drive at a moderate speed. Modern traffic management systems can provide such information about the situations the driver will be confronted with at a specific place or over an entire area:

- real-time warning about specific hazards: accidents, traffic jams, fog, roadworks, etc., or about potentially hazardous situations: absence of hard shoulder, junctions, narrowing of the carriageway, etc.;
- possibly supplemented by messages urging to drive with care: speed limit, distance between vehicles;

- and, if need be, accompanied by reminders regarding statutory speed limits, no overtaking, etc.

These methods of traffic management also make it possible to vary speed limits according to the volume of traffic, weather conditions or other events, thereby optimising traffic flow and improving safety.

The real-time information made possible by the new technologies has an obvious educational value that should help to encourage drivers to drive at more moderate and safer speeds.

Advances in information transmission and communications on the side or above the road, or on board the vehicle, should enable substantial progress in traffic management within the next few years. Decision-makers, on both policy and technical levels, should be made aware of the need to provide existing infrastructure with the equipment required for traffic management and to allocate to it in future a bigger share of the budget earmarked for infrastructure.

7. Variable message signing

While one of the primary objectives of road signs and signals is to provide useful information so that the resulting appropriate behaviour will prevent accidents, they also indicate legally enforceable regulations at specific places.

The position and prominence and possible repetition of road signs and confirmatory signs are crucial from both a preventive and legal standpoint. The user must at all times know what rules he has to observe.

Fixed road signs provide permanent information about structural conditions or conditions that occur frequently at a particular place. In reality, conditions are often changing: hazards may arise due to weather conditions (fog, rain, ice), traffic conditions (tail-backs, heavy traffic) or to the unexpected (accident, fallen trees, subsidence).

Particularly for the motorway network, advances in information collection and transmission and communications technologies have made variable message signing a feasible option for proactive traffic management.

With telematics -- using roadside or overhead signs and in-vehicle radio -- traffic management can be much more finely tuned and road users can be kept continuously informed of hazards on their route. The main purpose of such

messages is to inform, and they are playing an increasingly important role in accident prevention policy.

By encouraging drivers to adjust their speed to a situation which they did not know about but which nonetheless constitutes a real danger, telematics will become increasingly useful in coming years, assuming that it is decided to invest in them.

Various electronic devices are used to remind motorists to take care: flashing road signs that tell them they have exceeded the speed limit; the speed of the offending driver is displayed, or a traffic light comes on further along the road.

In addition to messages informing the road user about specific incidents or which recommended caution, variable message signs can also be used to transmit actual road traffic signs in the prescribed format. Current regulations will have to be amended to make them legally enforceable.

When a traffic sign is set up at the roadside -- as stipulated in the Vienna Convention -- it has the force of law: for example, it is an offence to travel at 100 km/h when the sign indicates a speed limit of 70 km/h. It is easy to verify that the sign exists.

When the same sign is shown in lights or as a variable message, there is no tangible proof of its content at the time the offence took place, especially if it is operated by remote control.

The legal force of such information or instructions is not clearly established. The law should be amended so that the basis of proof is perfectly clear. This assumes a high level of reliability and a system for checking the messages transmitted (video camera recordings, for example).

Lastly, road signs and signals that are intended to moderate speed will generally lose all their effectiveness if infrastructure operators fail to ensure that the messages conveyed are consistent with actual road conditions at any given time. Inappropriate speed limits ultimately destroy the credibility of the signs and signals themselves [see the Recommendations adopted on 26 and 27 May 1994 in Annecy -- CEMT/CM(94)5].

Once again, international harmonization of the systems used is strongly recommended so that motorists understand them better, thereby making it possible to achieve the objective of speed moderation.

8. Conclusions

a) Infrastructure design influences motorists' behaviour and especially the speed at which they drive, particularly in and on the approaches to built-up areas.

It is essential to ensure consistency between the infrastructure itself and the prescribed speed. Well-designed infrastructure will often have more of an impact than a profusion of signs.

b) Greater specialisation in terms of the functions of individual roads and the ranking of networks offer a means of harmonizing speed limits. These are more likely to be observed when the driver can readily see what the function of the road is.

c) With international traffic on the increase, some harmonization of speed limits, signing techniques and infrastructure design is desirable.

d) Telematics must give drivers better information and encourage them to adjust their speed to the conditions.

e) By means of information transmission and management systems, infrastructure can now be managed pro-actively, not just in order to provide information to road users but in order to manage traffic (flow channelling, speed regulation, snow warnings, rescue services, etc.).

What is needed is further development of equipment in this area and sufficient funding for it.

The legal ramifications of variable signing also require attention (burden of proof, reliability).

CHAPTER 3. THE VEHICLE

1. Vehicle design

At present, the vehicle fleet in both East and West includes vehicles of modern design with fairly sophisticated passive safety features (resistance to impact, passenger compartments which crumple on impact, protection of vital functions, etc.) which encourage the driver to feel relatively safe behind the wheel -- a feeling reinforced by the availability of various extras aimed at improving comfort and safety (ABS, airbags, etc.).

Although most countries have introduced regulations laying down speed limits, the vehicles actually on the roads can travel at much higher speeds than the limits set on the different networks, more particularly on motorways. Irrespective of the type of vehicle, no restrictions are laid down at the manufacturing stage, that is to say of course within the bounds of technical feasibility. While some of the research effort is now devoted to securing greater comfort or protecting the environment, the fact remains that performance is still one of the main objectives of vehicle manufacturers.

Where the private car is concerned, just as in the rest of the world, no ECMT Member country has laid down rules for manufacturers to limit the top speeds of vehicles.

2. Vehicle use

Without seeking to influence vehicle design, certain rules may be introduced to restrict (or ban) use of high-performance vehicles. However, France alone has banned the registration on its territory of motor cycles with an engine rating of over 100 h.p., a measure that is certainly not being adopted readily in the European Union, even though a majority of States have said that they are in favour.

A first step towards limiting speeds that can in fact be achieved -- and, more importantly, cannot be exceeded -- has been taken by those EU Member

States which are complying with the provisions of a Directive (Directive 92/6/EEC of 10 February 1994) whereby, in the case of vehicles entering into circulation as from 1 January 1994, a device must be fitted which limits the speed of heavy goods vehicles of over 12 tonnes to 90 km/h and that of passenger transport vehicles of over 10 tonnes to 100 km/h.

Some of these countries have even introduced bans relating to the top speed for other categories of vehicles, such as public transport vehicles whose tonnage is lower than that set by the Directive (as in the United Kingdom for vehicles of over 7.5 tonnes).

It should be noted that no country other than those belonging to the European Union, except Switzerland, has introduced a mandatory physical restriction on the speed of heavy vehicles, a fact that -- in addition to the safety problems arising -- can introduce distortions in traffic rules and competition in international transport, even though general speed limits are applicable to all (notwithstanding the fact that they are not always complied with).

Moreover, the technologies used at present for the physical prevention of excess speed are not inviolable. With the development of electronic injection systems in the coming years, however, it can be expected that the systems will be more efficient and any tampering will be impossible or at any rate extremely difficult.

This initial step towards limiting vehicle performance concerns only heavy goods or passenger transport vehicles.

3. Equipment modifying or limiting vehicle performance

In addition to these mandatory requirements to limit the speed of vehicles when they are put into circulation, more than half of the countries have regulations which prohibit any tampering with the engine to step up performance. While half of the countries have introduced such regulations for lorries and public transport vehicles (DK, B, CH, PL, SLO, F), a number have introduced special regulations for motor cycles and mopeds (DK, B, CH, L, PL, FIN, SLO, NL, F) which, in some cases, prohibit the sale of special devices (DK, B, CH, FIN, F) or their fitting on vehicles (DK, B, CH, L, PL, FIN, F) or even tampering with the engine itself without specifying any particular method.

These regulations are laid down together with the relevant offences and penalties, usually in the form of fines of differing amounts.

In contrast with the situation in the United States, Europe has not developed to any real extent the use of equipment that enables drivers to establish a cruising speed which cannot be exceeded throughout the journey. No country has taken steps -- more particularly as regards public information -- to promote the use of such equipment. Tomorrow's intelligent car should encourage the introduction of this system which should lead to calmer driving, provided of course that the speed established by the driver corresponds to the speed normally suitable for the road and is at most equivalent to the specified speed limit. It is also necessary that the driver should not be deprived of his responsibility and must be able to gear his speed at any time to existing circumstances.

4. Equipment allowing drivers to evade speed checks

Although not specifically related to the vehicle itself, equipment to detect the speed monitoring facilities of policing authorities is regulated in some countries with respect to both the use of the equipment and its possession on board the vehicle in cases where it is designed specifically for the purpose (radar detectors). Other equipment such as Citizen Band radio ("CiBi") can be used to transmit information (such as the presence of control facilities) to other motorists. Some countries prohibit the use of any equipment or signals (such as the use of the vehicle's lights) to inform other road users of roadside controls. Others allow it, because, quite apart from the difficulty of ascertaining that such a signal has been given for that purpose, it has been found that speed limits are in fact complied with by users warned in this way, and that is the objective (the case in Spain and the Netherlands).

These different attitudes raise the problem of whether speed checks are an effective means of altering driver behaviour.

5. On-board monitoring equipment

Almost all countries require lorries and public passenger transport vehicles to be fitted with equipment that records the actual speeds on the road, a function that is also associated with the recording of other data such as driving and rest times (tachograph).

The speeds recorded in this way can subsequently be examined not only by means of roadside checks but also within companies. Fines are imposed for the offences recorded and in some countries vehicles may also be impounded.

6. Possible developments

Although not affecting vehicle speeds directly, numerous devices have been introduced, or are about to be, as optional extras which improve passive and active vehicle safety. ABS, designed to increase braking efficiency, is one example. In many cases drivers have been found to adapt their driving style accordingly, either by reducing the gap between themselves and the vehicle in front, or by braking late, thereby constantly exposing themselves to risk. The driving aids being developed under the European DRIVE and PROMETHEUS programmes must take account of this factor. Although the purpose of such devices is obviously to improve safety and traffic control, and to increase user comfort, they may lead to higher speeds and traffic volumes.

The possibility of such devices having adverse effects cannot therefore be ruled out. The automation of certain minor driving tasks will produce changes in driver behaviour such as those outlined in the study on the safety impact of new technologies which was the subject of a report on ergonomics and safety of in-vehicle information systems [document CEMT/CM(94)20], submitted to ECMT Ministers in Annecy.

Among the systems being developed under the PROMETHEUS programme, "intelligent speed control" will have an immediate impact on safety. This system is designed to detect the vehicle ahead, calculate its distance and maybe its speed, and to work out the distance and speed to which the tailing vehicle must keep in order to avoid collision and facilitate the flow of traffic.

Driving aids should help the driver to drive more safely and adjust better to actual traffic conditions. However, care must be taken not to diminish in any way his responsibility, since he must be in complete control of the vehicle at all times.

Calmer driving may also be expected to result from better (real-time) information for road users on road and traffic conditions, transmitted either by variable message signs, radio, or other in-vehicle equipment.

7. Conclusions

a) Because there are no uniform speed limits, some manufacturers continue to build more and more powerful cars, since there is a market for them. However, it is undesirable that performance should be used as a selling point [see Resolution No. 56 on "Advertising that Conflicts with Road Safety Aims" CEMT/CM(89)37].

b) In some cases, increasingly sophisticated passive safety equipment creates the opposite danger that it may encourage the driver to be less vigilant and therefore travel at unsuitable speeds.

c) In this connection, it might be useful to draw attention to the "code of good practice" recommended in the May 1994 Resolution on ergonomics and safety of in-vehicle information systems [CEMT/CM(94)20].

d) Following the implementation of the Community Directive 92/6/ECE and other road transport regulations, most heavy goods vehicles are now equipped with speed-limiting devices; it might therefore be appropriate to study the possibility of similar regulations for other categories of vehicles.

CHAPTER 4. THE DRIVER

The figures given in Chapter 1 show clearly that excessive or inappropriate speed is one of the major causes of road accidents as well as increasing their severity. While the majority of motorists acknowledge this fact, many of them still dispute that there is a direct link between speed and road accidents. Drivers must therefore be aware of the impact of speed on road safety, and be willing to modify their behaviour in order to comply with the regulations and to adapt their speed to the needs of the situation.

Modifying drivers' behaviour with a view to ensuring that they drive more safely and with more consideration for other road users is a priority of road safety policies in all countries. It is also a major concern of international bodies (WP1 of ECE/UN, OECD and the European Union).

As we have seen, such behaviour cannot be achieved solely by modifying infrastructure or vehicle design; it also needs to be taught from the earliest age, when learner drivers are preparing to take their driving test, and on an on-going basis via road safety campaigns and refresher courses. And of course, if that does not suffice, then checks and penalties with an educational value must be imposed.

1. Education and training

Education and training have an essential role to play. It is necessary to instil the right attitude from the start, when children first discover road traffic and the attendant risks. Later, young people need to be targeted, since they are the main victims of road accidents in all our countries. Young drivers are involved in accidents in which speed is a major factor, either because a taste for risk prompts them to drive at excessive speeds -- which, coupled with the fact that they are not in proper control of the vehicle, can have dramatic consequences -- or because from lack of experience they drive at speeds that are inappropriate to the circumstances.

1.1 Teaching road safety in schools

The Conference organised jointly by ECMT and the Council of Europe in 1994 on the theme "Road Safety education for young children and teenagers" stressed the importance of teaching road safety from school age and advocated a number of ways of gradually and continually inculcating from childhood the necessary knowledge and behaviour.

Right from school age speed should be placed at the centre of teaching since it is important to instil in children the idea that speed must be adapted to circumstances and to make them aware of its consequences. The theoretical aspects should be developed taking account of the child's age and understanding, backed up by practical exercises. The idea that speed must be appropriate to the circumstances can be introduced by the case of the pedestrian; for example, children get their first idea of what speed is when they are told not to run out into the street, or that they should slow down or put their foot on the ground when they arrive at a cross-roads on their bicycle.

The various facets of speed, its effects and consequences should be taught throughout the child's schooling, the teaching being adapted to the child's age and conditions of mobility. Teenagers can be introduced to the various aspects of the subject during mathematics, physics and technology lessons, for example by getting them to calculate braking distances or power developed aquaplaning, centrifugal force, speed at which the vehicle crumples under impact, etc. Other subjects (biology, natural sciences, for example) can also be used to develop awareness not only of the risks involved in fast and aggressive driving but also of its harmful effects on the environment (noise and pollution).

This teaching should be backed up by practical instruction on off-the-road tracks, these being ideal places to acquaint youngsters' with the rules of the highway code while to teaching them how to handle their vehicle and allowing them to feel the effects of speed, whether on a bicycle or other type of vehicle.

Similarly, schools -- the role of which is not solely to transmit knowledge but also to shape and develop the personality -- can encourage young people to have a positive perception of calm driving and behaving prudently in general.

Mention should also be made of the importance of the example set by adults, and parents in particular. It should be borne in mind that from birth the child will have been a passenger in his parents' car, will have observed the way they behave and tend to reproduce the same behaviour later.

The 4th Joint Conference also stressed the need to involve all the actors concerned -- educators, parents, the police, members of associations -- in the educative process. By the same token, the adults will also have the opportunity to refresh their own knowledge and perhaps they will be made to think about the way they drive themselves.

1.2 Driving instruction

The driving lessons taken to acquire a driving licence, whether for a powered two-wheeler or a car, should not only teach the driver how to control his vehicle but also make him aware of the risks involved in driving and of his own limitations, teach him how to cope with these limitations, give him a sense of responsibility for his actions and induce him to behave in a way that shows respect for the rules and other road users.

Speed should form part of this training. All countries now stress that knowing how to drive does not just mean knowing how to use the controls and steer the vehicle; it also means adjusting one's speed to the circumstances, i.e. essentially being able to recognise when it is necessary to slow down and then doing so. It also means the ability to anticipate what is going to happen, but to do this it is necessary to be in charge of one's vehicle.

The training should enable the learner to know when he must reduce speed, in particular when visibility is poor, when there is an actual or potential presence of other road users, or because of weather conditions, or because the highway code or road signs say he must do so, or because he lacks experience. He must also know the rules regarding speed, such as general speed limits, the role of road humps, the reasons why it is necessary to slow down when weather conditions are bad, the role of ABS, etc.

He must know that speed moderation also means maintaining a safe distance between vehicles, so that there is time to adjust speed or the vehicle's trajectory if something unforeseen happens.

The future driver must learn to appraise distances as accurately as possible, as well as the speed of his own and other vehicles, and to estimate his speed relative to that of other vehicles. To be able to do so, he must know the stopping distances for different speeds and how to estimate these distances from the speedometer, the speed at which the countryside flashes past, the noise of the engine or the rush of air.

He should also be able to identify why he misjudged his speed -- for example, because he underestimated the width of the road or because he had been travelling for a long time at high speed -- and the reasons why he misjudged the speed of other vehicles.

These various notions should be conveyed through a variety of exercises.

The ability to judge speeds is extremely important, and should be developed throughout the driving lessons using active teaching methods. While young people have to be taught the appropriate behaviour to adopt so that they do not get into dangerous situations, teaching is not enough by itself. Today all instructors and researchers are asking themselves the question: how can driving instruction be improved to get young people to drive calmly, when they are at age when they have a taste for risk and lack maturity? To answer this question, research must be carried out.

Driving school instructors must have both teaching and psychological skills, since besides conveying theoretical knowledge they must also instil behaviour.

The initial training for driving instructors should emphasize these teaching and training skills and train them in active teaching methods (the use of small groups, role games, etc.). Teachers' manuals containing practical exercises to introduce and test the knowledge and behaviour which has been taught could help instructors. Indeed, in several countries they already exist.

During the driving test, the examiner should test the knowledge and practical skills that have been acquired. To do so, he must be encouraged or obliged to put more emphasis on the behavioural aspects of driving, and be trained accordingly in the relevant notions of psychology and sociology.

1.3 Monitoring novice drivers

Everybody (researchers, instructors, etc.) agrees that even the best possible training cannot entirely replace the actual experience of driving: the novice driver will have to deal with a wide variety of circumstances and real situations. The only way to acquire this experience is to cover a lot of kilometres -- something that is not possible during a few hours of driving lessons in a circumscribed area.

It is therefore important to ensure that, during this period, young drivers acquire this experience in optimal conditions of safety, and that they are

monitored throughout it, so that their mistakes can be rectified and it can be checked that they are behaving responsibly, notably with regard to speed.

This monitoring can be done in various ways:

1.3.1 *The young driver*

-- *Before the driving test:*

experience can be acquired at that moment. The learner driver is allowed to drive accompanied by an experienced adult who has not committed any serious driving offence;

-- *After the driving licence has been obtained:*

-- during the initial period after the driving test, i.e. the period when the risk is greatest, the driver is subject to various restrictions: he may have to drive at reduced speeds, be subject to lower authorised alcohol levels, not be allowed to carry passengers or to travel on certain types of roads such as motorways on which the speeds are highest, or during certain periods (at night, during the weekend, etc.);

-- a **two-stage licence**, with a probationary period during which the young driver must:

- either take further lessons in how to be aware of traffic conditions or how to drive in difficult weather conditions;
- or be monitored more closely, coupled with an obligation to take refresher courses or to take the test again in the case of repeated offences.

The licence would become definitive only at the end of this probationary period.

-- Lastly, it should be noted that some of the countries that have introduced **penalty-point licences** have special provisions for young drivers; the number of points is the same as for other drivers but the number of points at which penalties are imposed or the driver must take a refresher course is lower.

The aim of all these arrangements is to enable the young driver to acquire experience and to ensure that he does not have to graduate from being a learner to a fully-fledged driver without any transition. They aim to facilitate this necessary transitional stage so that the young driver can acquire experience in optional safety conditions.

1.3.2 Driving offenders

Regardless of the measures taken to modify drivers' behaviour, there are -- and always will be -- a percentage of drivers who balk at the idea of driving calmly. It is for this reason that several countries require repeated offenders to take refresher courses. There are several types of courses, the content of which can be adapted to the type of offence committed. Given by psychologists using appropriate methods, they aim to make the offender aware of his behaviour with a view to modifying it. They are given either within the framework of a penalty-point system or as an alternative or complementary punishment.

1.3.3 Voluntary monitoring

In some countries, drivers who desire it can take a refresher course or further driving instruction either on a special circuit or on the road. Several countries are currently examining whether such courses should not be made obligatory, provided of course that their effect was not to encourage drivers to overestimate their driving skills, which would be the opposite of that intended.

2. Campaigns to promote calmer driving

While everybody recognises that alcohol is a major cause of accidents, and accepts the statutory limits on alcohol consumption, the situation with regard to speeding is different.

Drivers therefore have to be convinced of the harmful effects of speeding and the major role it plays in accidents, to be informed about speed limits and the reasons for them, to be encouraged to drive at a more moderate speeds in all circumstances and to show consideration for others and the environment.

In recent years, all countries have run campaigns on speed and driving behaviour in general, either to inform users about new regulations (general speed limits) or technical measures to reduce speeds (road humps, 30 km/h areas), or periodically to remind them about the way drivers should behave.

The tone of these campaigns varies from one country to another. We shall not discuss which is the most effective tone to adopt, since this will depend on cultures and mentalities. What is important is that the message gets through, whether to the general or a specific public.

Experience shows that campaigns are much effective when policy-makers co-ordinate their action with the police, and when speed checks are stepped up during the campaign.

As a previous ECMT report on ways of influencing drivers' behaviour pointed out, it is often very difficult to assess the effectiveness of such campaigns. This does not mean that they should be abandoned but rather that it is necessary always to be looking for mass communication techniques that can be used to influence the various target groups and encourage them to drive responsibly. To this end, road safety campaigns should draw upon mass marketing principles (see the OECD report "Marketing of Traffic Safety", Paris 1993).

Unfortunately, the impact of campaigns to improve driving is all too often negated by advertising that uses arguments to sell cars -- such as top speeds -- that are contrary to the aims of road safety. Some countries are trying to improve the situation by providing information, engaging in a dialogue or signing agreements with advertisers or manufacturers, or even banning some types of advertising. We shall not go into this aspect in detail, since the ECMT has already dealt with it thoroughly and has published a report and recommendations [CEMT/CM(89)37] which are still valid today and can be referred to usefully.

3. Conclusions

- a) The various spheres of education (family, school, driving school, etc.), must emphasize the risks involved in driving at speed, and the need for personal responsibility, self-control and, by the same token, the need to control speed.
- b) Every effort should be made to encourage learner drivers to become more aware of their responsibilities. This implies using not just traditional educational methods but also other methods of persuasion, such as linking road safety to popular themes, having recourse to advertising and exploiting the fashion effect.
- c) It seems that the present nature of the driving test does not test adequately the learner driver's resolution and sense of responsibility.

d) New ways should be devised of making drivers constantly aware of the need to travel at a speed appropriate to the prevailing traffic conditions.

CHAPTER 5. REGULATIONS CONCERNING SPEED LIMITS

Firstly, it should be said that there is not "one" but "several" speed limits, namely statutory **general limits** for particular categories of roads which, in principle, are not indicated on signs and **specific limits** (or exemptions from general limits) imposed on certain roads or sections of roads according to local conditions, either for safety reasons (infrastructure in poor conditions, traffic density, dangers that are not obvious) or to reduce traffic noise, improve the quality of life, etc. Other specific limits apply only to particular categories or road users (new drivers, learner drivers, handicapped drivers, etc.), or certain types or categories of vehicles (convoys, lorries, coaches, cars with trailers, transport of hazardous goods, etc.) or in certain weather conditions.

1. General speed limits

Although almost all European Member countries had introduced speed limit regulations in towns for the first time in the period 1950-60, it was not until the 1973 oil crisis that limits were more widely introduced in Europe. Before the crisis, only 10 countries had introduced speed limits outside built-up areas, applying either to the entire road network or to a substantial part of it, but only in Ireland, Norway, the United Kingdom and Sweden were they also applied on motorways.

Since the speed limits introduced during the oil crisis to save on fuel led to a remarkable decline in the number and severity of road accidents, most of these countries introduced new broader-based speed limit regulations, particularly on motorways, as soon as the crisis ended, in 1974.

The ECMT, which had adopted two resolutions concerning speed limits in 1971 [Resolution Nos. 24 CM(71)4 and 25 CM(71)22], re-examined the issue, adopting a further two resolutions [Resolution Nos. 29 CM(74)13 Final and 30 CM(74)22]. These took account of experience during the oil crisis, and its very positive effect on safety, and of the fact that the lack of a uniform speed limit in Member countries at the time was confusing for motorists travelling abroad. In Resolution 29, the ECMT thus recommended that Member countries

consider it inexpedient, from a road safety standpoint, to re-introduce freedom of speed on the road and motorways network and that they consider a limit exceeding 100 km/h on the ordinary road network inconsistent with road safety requirements (without, of course, precluding lower or higher limits justified by technical characteristics or special conditions on certain road sections). The Resolution added that the adoption of a 100 km/h limit should be considered as a first step towards European-wide harmonization of speed limits. Resolution No. 30 recommended Member countries *"to consider that general speed limits on motorways should fall within the bracket ranging from 110 to 130 km/h; [and] should exclude higher limits but not lower ones..."*.

The opening sentence of Article 13, paragraph two, of the Vienna Convention on Road Traffic of 8 November 1968, as amended on 3 September 1993, stipulates that domestic legislation must establish speed limits for all road categories. All countries have introduced general speed limits on all their road networks (except for Germany on part of its motorway network). Table 2 shows the current situation in Europe.

The German point of view on this regulation is reflected in Annex 1.

In the majority of countries, current speed limits are lower than those of 15 or 20 years ago, and their range is tending to narrow. Coupled with other measures, these limits have had a very positive impact on the accident curve and have helped to reduce air pollution and traffic noise. They have also made possible fuel savings. All these benefits have borne out the validity of the ECMT's earlier recommendation that limits be imposed on speeds on both road and motorway networks.

Like all legislative measures to improve road safety, speed limits are effective only if they are credible. They must therefore be set at levels that are not exaggeratedly low and that correspond to an optimal level of safety. They must also be adapted to the type of road layout and harmonized on roads that have similar infrastructural, traffic and environmental features. What is valid at national level is also valid at international level.

For this reason, at a time when international traffic and migratory flows are growing, it would be desirable to have maximum authorised speeds at European level on infrastructure with similar features and layout and that performs the same functions. This would make speed limits more credible. Denmark's point of view on this matter is reproduced in Annex 2.

2. Exceptions to the general speed limit

-- *Outside built-up areas* (motorways and ordinary roads)

Except for Turkey (motorways and ordinary roads) Denmark, Finland, Luxembourg and Sweden (ordinary roads), speed limits cannot be raised. However they do allow lower limits when warranted by infrastructure or safety considerations or in bad weather conditions. In four countries (F, L, NL, UK), general speed limits are lowered during bad weather conditions.

These exceptions may be temporary, indicated on variable message signs, and apply to all categories of vehicles (except in Turkey where they apply only to heavy goods vehicles). In some countries, they are laid down by national law and are seasonal (as in Finland) or applied when visibility is poor (as in France and Germany, where the speed limit is lowered to 50 km/h if visibility is less than 50 m).

Lastly, it is worth noting that five respondent countries (L, NL, S, CH, TR) reported that exceptions could be made to speed limits outside built-up areas in order to reduce high exhaust gas emissions and/or traffic noise.

-- *Built-up areas*

Excluding Romania, Slovenia and Turkey, all Member countries have legislation which provides for raising the general speed limit in built-up areas. Generally, higher limits are allowed only on well-designed major roads.

In all Member countries (except Romania and Slovenia), the authorities can lower the general speed limit in built-up areas where road safety considerations so warrant (state of road, heavy traffic, unseen hazards). In Luxembourg, the Netherlands and Turkey, exceptions can also be made in bad weather conditions.

Apart from the Slovak Republic and Slovenia, the legislation in all Member countries provides for restricting speed to 30 or 40 km/h on roads of a uniform nature, within a clearly defined or, in some cases, specially-developed area. Likewise, all Member countries, except Portugal, Romania, the United Kingdom and Slovenia, have "residential zones" indicated by sign E17a, of the European Agreement

completing the Vienna Convention on Road Signs and Signals, 1968, which designates specially-developed areas, primarily for pedestrians, where special traffic regulations apply (20 km/h speed limit, pedestrian priority, parking restricted to spaces designated by special markings or signs). All Member countries report that the introduction of these limits in such zones has improved road safety -- especially for more vulnerable traffic, i.e. cyclists and pedestrians -- and the quality of the environment. In Denmark, there is a recommended speed limit of 15 km/h in these areas.

3. Speed limits applicable to learner drivers and newly qualified drivers

3.1 Learner drivers

France and Lithuania are the only countries to impose speed restrictions on learner drivers and light motor vehicles: maximum speed, 70 km/h on roads for motor vehicles and ordinary roads outside built-up areas, in Lithuania; 110 km/h on motorways and 80 km/h on roads for motor vehicles, in France.

3.2 Newly qualified drivers

Only three Member countries, Luxembourg, Spain and France, impose speed restrictions on newly qualified drivers of light motor vehicles and motor-cycles, regardless of age. In Spain the applicable limit is 80 km/h; and in France, 110 km/h on motorways and 80 km/h on roads. In Luxembourg the limit is 75 km/h outside built-up areas and 90 km/h on motorways. The speed restrictions apply for one year in Spain and two years in France, from the date the licence is issued.

Finland, which had a similar system, has replaced it since 1 January 1996 with a penalty point licence particularly severe towards young drivers.

3.3 Speed limits on certain categories of vehicle

All of the respondent countries have introduced speed limits for certain vehicle categories, particularly heavy vehicles, with or without trailers, articulated goods and passenger vehicles (N or M) and light motor vehicles with trailers. Restrictions vary a great deal from country to country. For category N2 lorries (3.5 to 12 t) on motorways the speed limit ranges from 50 km/h in Romania to 110 km/h in France, and from 50 km/h (Romania) to 80 km/h (the Netherlands, Portugal, Slovak Republic, Switzerland) on the open road. For category N3 lorries (over 12 t) without trailers, the limit on motorways ranges

from 50 km/h in Romania to 100 km/h in Portugal and from 50 to 80 km/h on the open road. For coaches without trailers the limit on motorways ranges from 70 km/h in Romania to 110 km/h in the Slovak Republic and on ordinary roads from 70 km/h in Romania to 90 km/h in France, the Slovak Republic and Sweden. Limits are generally lower for the same categories of vehicle with trailers.

There is a certain amount of de facto harmonization in the European Union as a result of the implementation of Directive 92/6, which requires M3 category vehicles (passenger vehicles over 10 tonnes) and N3 category vehicles (goods vehicles over 12 tonnes) to be fitted with a speed governor, so that they cannot exceed 100 km/h (M3 vehicles) or 90 km/h (N3 vehicles).

Several Member countries (Spain, France, Lithuania, Luxembourg, the Netherlands, Portugal, the Slovak Republic, Slovenia, Romania and Turkey) have imposed speed limits on vehicles carrying dangerous goods. These range from 40 km/h (Romania) to 90 km/h (Lithuania and Luxembourg).

4. Minimum speeds

In Member countries, drivers are not permitted to impede traffic flow by travelling too slowly without due cause.

Local minimum speed limits may be imposed by sign D7 of the Vienna Convention on Road Signs and Signals, used in all respondent countries, except Belgium, Denmark, the Netherlands, Sweden, Turkey and France. It is used on bridges and tunnels in Spain, Luxembourg and the United Kingdom, on motorways in the Slovak Republic and Portugal and at vantage points in Poland.

It is also relevant to note that Article 25 of the Vienna Convention on Road Traffic prohibits from motorways motor and other vehicles which, by virtue of their design, are incapable of attaining on flat roads a speed specified in domestic legislation. The specified speed is currently 60 km/h in ECMT Member countries.

5. Advisory speed signs

With the exception of Belgium, France, Luxembourg, Poland and Switzerland, Member countries have all introduced advisory speed signs, sign G17 of the Vienna Convention, as amended. These indicate recommended speeds of travel provided that conditions are appropriate with a view to maintaining traffic flow by reducing speed ranges, and provided that no lower

speed restrictions apply to the particular category of vehicle. This sign is used in residential zones in Denmark, the Netherlands and on all types of road in the other countries which have introduced it.

Exceeding the advisory speed is not generally an offence, except in cases where the speed is totally inappropriate to road and traffic conditions.

6. Conclusions

It can be concluded from the review of the various regulations, as stated in Chapter 1, that:

- a) Speed limits considerably improve road safety (in terms of reducing its frequency and gravity of accidents) insofar as they are set at reasonable levels and enforced by appropriate checks.

- b) In order to reduce the confusion in the minds of drivers travelling across national boundaries which results from the lack of harmonization of speed limits, and to make such limits more credible -- especially at a time of growing migratory flows -- it would be desirable to harmonize speed limits at European level on roads with identical technical characteristics, and design that fulfil similar functions.

Thus, various international organisations have proposed that a 120 km/h speed limit be instituted on European motorways that meet these criteria, it being understood that this limit could be lowered if conditions warrant it. This limit is, moreover, currently in force in most ECMT countries. Nearly 60 per cent of people surveyed accept it (see Chapter 1).

- Outside built-up areas, the limit should not be higher than 90 km/h on ordinary roads or 110 km/h when the technical characteristics of the road (two-lane roads/highways) allow it, but this does not exclude lower limits when conditions so warrant.

- In built-up areas, the trials conducted by the majority of European countries demonstrate that reducing the limit from 60 to 50 km/h produced a positive improvement in road safety and that the 50 km/h limit, too, had been well received and understood by drivers, on the whole. It should preferably be adopted by all ECMT Member countries.

c) Exceptions to the general speed limits, whatever the road category (motorways, ordinary roads, roads in built-up areas) should be prescribed only where there is a valid reason. They must be used in situations which can be clearly recognised by the vehicle driver.

d) Outside built-up areas, on motorways and in open country, general speed limits constitute a ceiling that should never be exceeded. In built-up areas, it should however be possible to raise them on well-designed priority roads, or roads that carry a lot of through traffic, so as to improve the flow of traffic without impairing safety or the environment.

e) General speed limits should only be lowered if justified on road safety grounds, on traffic management grounds, or if lowering the limit can substantially reduce an environmental nuisance. It would also be appropriate to make legislative provision for setting still lower limits in certain residential areas (such as 30 km/h zones) and to create "residential zones" (sign E17a) intended primarily for pedestrians, where special traffic regulations apply (chiefly a 20 km/h speed limit).

f) Whether one is talking about minimum speeds, recommended speeds, or mandatory speeds for certain classes of driver or vehicle, one cannot but notice a considerable difference in the way these are handled by each country. This can to some extent be justified by the state of the roads or cars. Nevertheless, it is unfortunate that there continue to be so many differences.

CHAPTER 6. ENFORCEMENT -- PENALTIES

1. Introduction

The Council of Ministers has considered the question of compliance with speed limits on several previous occasions. In its Resolutions 25, 29 and 43 of 16 December 1971, 20 June 1974 and 26 May 1982, respectively, it recommended that Member countries take appropriate steps for effective enforcement of speed limits, with particular emphasis on the frequency of speed checks and on increasing penalties.

It is widely acknowledged that legislation and regulation can influence road users' behaviour, making it both more predictable and consistent. However, experience has shown that in many instances legislation and regulation alone are not enough to change driver behaviour: to enforce compliance, policing is essential. Although surveillance can bring about a change in driver behaviour, the change lasts only as long as the risk of actually being caught is perceived to be high.

There are two ways of carrying out speed checks -- one visible, the other discreet. The first method seeks primarily to prevent speed limits from being exceeded, the second to catch drivers who break them. While it cannot be denied that speed checks and prevention do have a combined effect, if all checks were visible road users would reduce their speed only if they saw the police. This, of course, is one of the aims sought, and in that sense it would be achieved.

Thus, as it would be unrealistic to have police posted permanently on the entire road network and to have speed measuring equipment everywhere, checks also have to be carried out discreetly, if possible at the most dangerous places, so that the driver knows that his speed can be checked at any time, and that he remains constantly watchful and moderates his speed.

The aim is always to improve road safety and reduce the number of road accident casualties by ensuring compliance with speed limits by the most appropriate means.

2. Methods and equipment used

According to the information supplied by 19 Member countries¹, various methods and types of equipment are used in ECMT member countries to carry out speed checks.

A. *Speed check methods generally used*

There are three speed check methods in use: they employ either stationary equipment mobile equipment or permanently installed (automatic equipment).

1. *Stationary equipment*

This is mounted on tripods or on board a stationary police vehicle that may or may not be unmarked.

2. *Mobile equipment*

The three following systems are currently used in Europe to carry out speed checks:

- a) Moving radar checks. These are used especially on very busy roads and are likely to become more common.
- b) Tailing-vehicle checks. These consist in determining the speed of the vehicle ahead of the police car by comparing speeds using properly-calibrated measuring equipment which reliably indicates the speed of the tailing vehicle (tachograph, computer, video device).
- c) Laser checks. Laser measuring equipment is extremely accurate and has a maximum range of 400 metres. It is linked with a video camera, which is used to prove that the vehicle being monitored is indeed travelling at the speed recorded.

3. *Permanently installed equipment*

Automatic speed metering equipment is used. For example: permanently installed road-side radar equipment; induction loop threshold detectors. Such checks do not involve immediate interception of the offending vehicle.

In addition to these three monitoring methods, speed can also be assessed by means of manual chronometers or on the basis of recordings from tachographs installed in vehicles being monitored (see Table 3).

However, the use of manual chronometers to determine vehicle speed is banned in the majority of countries (12 out of 19).

B. Equipment type-approval and periodic inspection

Any kind of measuring equipment used by the police to detect speeding must be totally reliable, so that findings are not contested and are accepted as evidence in the courts. Otherwise police officers could easily become demoralised and drivers could become even more lax.

In some countries equipment is inspected thoroughly.

1. Official type-approval

In some countries, all types of equipment must be officially approved. In the great majority of countries (14) only officially-approved mobile equipment can be used; in half of them tachographs and video equipment must also be officially approved. As a rule, an official body conducts a series of *in-situ* and laboratory trials and checks point by point that the equipment conforms to regulations.

2. Periodic inspection

All but three countries (B, L and UK) carry out a periodic inspection of equipment and its calibration at least once a year. In a couple of countries such checks are carried out every six months. If the equipment is faulty, it is important that it be repaired and reset solely by specialists employed by the manufacturer or supplier.

C. Speed check procedures

Most countries (10) require manufacturers' instructions to be officially approved. It may be noted that in almost all countries the police are required to draw up speed metering reports giving detailed information (date, time and location of metering; maximum permitted speed; name and position of police officers; make, registration number and recorded speed of offending vehicles), and they must check that equipment (threshold detectors and radar) is working

properly both before and after service, using apparatus provided for this purpose by the manufacturer.

However, only seven of the nineteen countries expected the police to carry out (before and after the series of readings) a calibration run at the maximum permitted speed on the relevant section of road, using a vehicle fitted with a standard speedometer.

It should also be noted that, to measure the speed of two-way traffic, especially if it is dense, it is necessary to have a camera or video camera (automatic recording devices) in addition to radar.

In the case of tailing-vehicle checks, in order for the check to constitute valid evidence, it is necessary in principle:

- to have a long enough stretch of road to carry out the measurement (generally at least 500 m);
- to maintain a constant distance between the police car and the vehicle being followed (between 50 and 100 metres, depending on vehicle speed).

Lastly, as regard laser measuring equipment, it can be operated either by holding it at arm's length or by placing it on a tripod that can be tilted. However, it cannot be used from a moving vehicle.

To sum up, it seems important that suitable steps be taken to guarantee the reliability of equipment and the accuracy of results in order that findings are not contested. Although such measures have generally been taken, they should be strengthened yet further if measurements are not to be technically worthless.

D. Margin of error

Despite all the conditions which officially approved equipment has to meet, there is no such thing as 100 per cent accuracy. Allowance must therefore, be made for a margin of error (maximum acceptable error) in the radar reading. This margin, which is used to determine the speed that will trigger legal and administrative action, is always weighted in favour of the road user. The questionnaire shows that it is expressed either in km/h or as a percentage of the speed registered by the equipment. Only four countries (LT, P SLO and UK) make no provision for margin of error.

Depending on the country and the speed this margin of error lies within the 3-10 km/h bracket. In some countries the margin varies according to the type of equipment used for speed checks (e.g. 5 km/h for stationary radar and 10 per cent for moving radar, when speeds are over 50 km/h).

3. Frequency of speed checks

According to the information supplied by 19 Member countries, checks are carried out occasionally in half the countries (eight) and frequently in Denmark, France, Lithuania, the Netherlands, Poland and the United Kingdom. In the latter country, the police carry out checks using permanently-installed equipment and also spot checks, at predetermined times and places. Only two countries (Slovak Republic and Romania) carry out checks during specific periods, (weekend, beginning and end of holiday periods). In most other countries, checks are carried out all the time, especially at accident black spots.

In any case, the frequency of checks should be such that the road user is constantly aware that he can undergo a speed check at any time.

4. Notification of driving offenders/Identification

A. *Immediate interception of speeders*

Depending on the equipment and methods used, the offender may or may not be intercepted on the spot. The most common method is to intercept the offender immediately.

In most of the 19 countries that replied to the survey, offenders are intercepted by the police a few hundred metres beyond the speed check.

If the driver is caught in the act, he cannot dispute his identity.

In order to maximise the educational value of the penalty and to simplify procedures, most countries require fines to be paid on the spot, usually for minor speeding offences or when the driver is not a resident.

If the driver is not a resident, he is usually obliged either to pay the fine immediately or to provide a deposit for the sum involved, or to furnish other suitable guarantees.

B. Speed checks without on-the-spot interception

When speed checks are carried out with automatically-operated roadside radar equipment, there is no possibility of intercepting offenders on the spot.

The advantage of such checks is that they can be carried out night and day, they require only a few people to carry them out, and the equipment can be installed anywhere. Their drawback is that it is more difficult to identify the offender and a fine cannot be levied on the spot. This means that there is a certain delay in sending out summonses, which varies widely from one country to another -- seven days in Sweden, eight days in Belgium, ten days in Switzerland and Turkey and 14 days in the United Kingdom. In other countries it is much longer (Spain: 60 days, Netherlands and Romania: 90 days, Slovak Republic: 365 days).

Identifying the driver poses a particular problem. Drivers claim that they themselves were not driving the vehicle at the time of the offence and that they have no knowledge of the person who was behind the wheel. It sometimes happens that the holder of the vehicle's certificate of registration is summoned to reveal the driver's identity, failing which he himself is considered to be the offending party.

According to the countries where this provision exists, checks and criminal proceedings are more efficient thanks to it. Providing that the vehicle's number plate has been read, the vehicle and the owner can be identified.

C. Foreign drivers

A particular problem arises if the driver involved is a foreigner who has gone back to his country by the time legal proceedings have been instituted.

In most cases legal action then becomes impossible, and this is why a number of countries prefer to impound the vehicle at the time of the offence, thus securing immediate payment of the fine.

In order to improve control efficiency and guarantee equal treatment for drivers, and in order not to leave unpunished infringements by drivers whose cars are not registered on the territory, a co-operation policy must be instigated.

5. Penalties

A. Amount of fines

The fines imposed vary considerably from one Member country to another, and it is thus not really possible to compare the systems used.

Nonetheless, it is worth noting that, on the one hand, fines increase exponentially in relation to the number of offences and, on the other hand, the type of penalty also varies according to the seriousness of the offence, ranging from a simple fine to disqualification and even imprisonment.

Some countries are of the opinion that, to be relevant, fines should be reasonable (Germany), while others think that penalties should be high in order to deter speeding (Switzerland).

Furthermore, in order to increase the educative effect of penalties many countries are developing a system of fixed fines with immediate payment, accompanied in some cases by a reduction in the amount of the fine.

B. Disqualification

In all but four of the 19 countries that replied to the survey countries (Poland, the Slovak Republic, Slovenia and Turkey (cf. Table 5) drivers who commit serious speeding offences can have their licence withdrawn usually 30/40 km/h over the limit.

The period during which they are disqualified from driving depends on how serious the speeding offence is, the driver's previous record, and the circumstances (built-up area or motorway, danger caused by the speeding, etc.) (cf. Table 4).

Also, in those countries that have a penalty points system, penalty points can be given (or deducted, depending on the system); after a given number of points have been accumulated, the driver's licence is suspended or withdrawn in addition to the traditional penalties. The number of points usually varies according to the seriousness of the speeding offence and whether the driver has already committed such an offence (cf. Table 5).

C. Rehabilitation courses

Some countries have legislated for compulsory driver education or rehabilitation courses for repeated traffic offences (particularly speeding offences).

In Belgium and France, following a period of disqualification, compulsory attendance at such courses is at the discretion of the magistrate. In Switzerland, the cantons can require attendance at driver education courses for traffic offences. In Germany and France, which have a penalty points system, drivers can recover points they have lost by taking such courses.

These courses, which are given partly by psychologists, seek to make offenders aware of the risks they are taking or the risks to which they are exposing other people, with a view to changing their behaviour and to getting them to take a more responsible attitude to the law and other people.

D. Alternative penalties

In many countries alternative penalties are developed, especially where imprisonment is concerned. This can be in the form of community work, if possible relating to road safety, such as training or in relation to road traffic victims, in hospitals.

6. Conclusions

- a) Speed checks, whether to deter drivers from breaking speed limits or to penalise them for having done so, are needed to ensure compliance with the regulations.
- b) To be effective, they must be carried out at locations presenting the greatest danger, and sufficiently frequently to ensure that the road user is aware that he can be checked at any time.

Furthermore:

- c) Equipment and procedures that are very simple to use need to be developed with a view to making checks more effective by the use of modern technology.
- d) It must be ensured, by means of appropriate measures such as official-approval procedures and periodic inspections of equipment or specific operating procedures, that the measurements made are sufficiently accurate to constitute valid evidence in the courts.

- e) If necessary, introduce regulations to deny drivers the possibility of escaping proceedings if their identity cannot be proved beyond doubt, so as to make speed checks more effective.
- f) Prohibit the manufacture, import, transport or sale of apparatus or devices which could render difficult, interfere with or otherwise invalidate official checks on road traffic (e.g. radar detectors).
- g) Shorten notification periods for offending drivers and speed up the payment of penalties as well as providing a flexible system of penalties for minor infringements so as to ease the burden on the courts and to increase the educational value of penalties.
- h) Ensure that fines are sufficiently high, and that disqualification procedures are introduced to act as a deterrent to drivers who tend to drive too fast.
- i) Develop retraining courses for repeated offenders, and the replacement penalties in the form of general community work.
- j) Ensure that existing regulations are actually enforced.
- k) Develop means of deterrence to ensure that drivers are constantly on their guard.
- l) Implement cooperation between Member States on legal proceedings for the prosecution of more major offences.

TABLES

Table 1. Number of accident causing casualties, killed, deaths within 30 days and total casualties on motorways, outside built-up areas and within built-up areas

PAYS COUNTRY	CF/FC	RÉSEAU AUTOROUTIER MOTORWAYS						AGGLOMÉRATIONS BUILT-UP AREAS			
		LONGUEUR KM LENGTH KM	%	VITESSE MAX. MAX. SPEED	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS	VITESSE MAX. MAX. SPEED	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS
A	1	1 589	20	130	2 285	179	3 718	50	25 077	298	30 402
B	1	1 631A		120	3 908	201	6 152	50	28 894	474	38 026
BG	1	277		120	65	30	3 104	60	5 103	675	6 358
CH	1	1 533		120	1 828	63	2 728	50	15 119	266	17 949
CZ	1	390	6.9	110	317	46	531	60	18 729	787	23 536
D	1	11 143	31	130*	26 549	1 105	43 247	50	248 995	2 594	306 619
DK	1	786		110	182	30	216	50	5 093	188	5 709
E	1	2 963	6.56	120	2 451	385	4 862	50	44 120	1 101	57 281
EST	1	64	4.3	90	21	14	36	50	1 019	171	1 311
F	1.057	8 030	15	130	4 815	471	8 204	50	90 719	2 894	118 635
FIN	1	337A		120	91	8	137	50	3 692	131	4 546
GR	1			120	5 103			50	4 338		
H	1	293	8.2	120	313	51	543	50	14 241	657	17 615
HR	1	302		130	47	6	96	60	10 979	620	15 259
I	1.07	6 311A		130	8 550A	750A	15 487A	50	111 644A	2 949A	151 416A
IRL	1	68	ND	112	6		6	48	3 680	137	5 149
L	1	156		120				50			

PAYS COUNTRY	CF/FC	RÉSEAU AUTOROUTIER MOTORWAYS						AGGLOMÉRATIONS BUILT-UP AREAS			
		LONGUEUR KM LENGTH KM	%	VITESSE MAX. MAX. SPEED	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS	VITESSE MAX. MAX. SPEED	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS
LT	1.07	1 544A		110				60			
LV	1.08							60			
N	1	ND	ND	90				60	2 421	315	3 007
NL	1	2 250p	38p	120	2 409	161	3 476	50			
P	1.3	579A	19.3A	120				50	28 073	457	32 324
PL	1	240	3	110	70	8	76	60			
RO	1			90				60	28 694	2 212	35 130
S	1	1 044A	10e	110	755A	33A	1 190A	60	4 629	1 034	5 087
SK	1	198	4.8	110	64	9	132	50	8 746A		10 900A
SLO	1	206	18	120	189	31	262	50	5 984	318	7 627
TR	1.3	1 070A						60	3 215	135	3 769
UK	1	3 141A	15A	112				50			
AUS	1	18 514A		100				48			
CDN	1	9 524A	ND	100	12 572A	945	20 147A	60		286	
JAP	1.3	5 410	ND	100	11 628	499A	18 701	50	106 565A	888A	150 666A
RUS	1	70 130A		100				60			
USA	1	ND	ND	ND		4 693		60			
MA	1	113		120	212	39	576	56		14 548	
								60	31 830	1 097	40 702

Notes: * vitesse conseillée / advised speed
données/data 1994

Table 1. (continued)

PAYS COUNTRY		HORS AGGLOMÉRATIONS OUTSIDE BUILT-UP AREAS			TOTAL			
		VITESSE MAX. MAX. SPEED	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS
A	1	100	16 938	1 040	24 754	44 300	1 517	58 874
B	1	90	20 216	1 017	30 852	53 018	1 692	75 030
BG	1	80	2 120	685	3 369	7 288	1 390	12 831
CH	1	80	6 579	350	9 280	23 526	679	29 957
CZ	1	90	8 549	804	13 237	27 595	1 637	37 304
D	1	100	117 210	6 115	177 363	785 508	19 628	1 053 458
DK	1	80	3 004	328	4 318	8 279	546	10 243
E	1	100	31 903	4 129	57 188	78 474	5 615	119 331
EST	1	90	544	179	849	1 584	364	2 196
F	1.057	90	37 192	5 654	62 526	132 726	9 019	189 365
FIN	1	80	2 462	341	3 877	6 245	480	8 560
GR	1	90	14 451			23 892	2 076	34 135
H	1	80	6 169	854	10 366	20 723	1 562	28 524
HR	1	90	1 820	178	3 128	12 846	804	18 483
I	1.07	70	33 199A	3 411A	55 842A	153 393	7 110	222 745
IRL	1	96	2 924	267	5 478	6 610	404	10 633
L	1	90				1 141A	76A	1 474A
LT	1.07	90				3 901	814	4 910
LV	1.08	90	1 393	459	2 090	3 814	774	5 097
N	1	80				0	0	0

PAYS COUNTRY		HORS AGGLOMÉRATIONS OUTSIDE BUILT-UP AREAS			TOTAL			
		VITESSE MAX. MAX. SPEED	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS	ACCIDENTS	DÉCÈS DEATHS	VICTIMES VICTIMS
NL	1	80	10 912	680	14 644	41 394	1 298	50 444
P	1.3	90				48 599A	2 727A	67 812A
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RUS	1	90				0ND	37 120A	229 922A
USA	1	80		21 196		0ND	40 915	0ND
MA	1	100	11 639	2 469	27 385	43 681	3 605	68 663

Notes: * vitesse conseillée / advised speed
données/data 1994

Table 2. General speed limits for light vehicles in ECMT countries

Country	1	2	3
	Motorways (Signal E15)	Outside built-up areas (except col. 1)	Within built-up areas
Germany	130 ²	100	50
Austria	130	100	50
Belgium	120	90	50
Denmark	110	80	50
Spain	120	90-100	50
Finland	120	80-100	50
France	130	90	50
Greece	80	80	50
Hungary	120	80	50
Ireland	97	97	48
Italy	130	90	50
Latvia	--	90	50
Lithuania	110	90	60
Luxembourg	120	90	50
Norway	90	80	50
Netherlands	100-120	80	50
Poland	110	90	60
Portugal	120	90-100	50
Slovak Rep.	110	90	50
Czech Rep.	110	90	60
Romania	90	90	60
United Kingdom	112	96	48
Slovenia	120	80	50
Sweden	110	70-90	50
Switzerland	120	80	50
Turkey	130	50-90	50
Morocco	120	100	40-60

Table 3. Tachographs are compulsory, at least in the 24 countries listed below

Country	Vehicle Category	Tachographs used to verify actual speed
Austria	Lorries, coaches	Yes
Belgium	Lorries, coaches	No. May only be used to substantiate other evidence
Czech Republic	Lorries, coaches	Only in the event of an accident or when the vehicle is clearly breaking the speed
Denmark	Lorries, coaches	Routinely. When the vehicle is clearly breaking the speed limit
Finland	Lorries, coaches	Only in the event of an accident and when the vehicle is clearly breaking the speed limit
France	Lorries	Routinely
Germany	Lorries, coaches	Yes
Greece	Lorries, coaches	--
Hungary	Lorries, coaches	Only for international journeys
Ireland	Lorries, coaches	--
Italy	Lorries, coaches	--
Luxembourg	Lorries, coaches, taxis	Only in the event of an accident or when the vehicle is clearly breaking the speed limit
Netherlands	Lorries, coaches, taxis	Only in the event of an accident or when the vehicle is clearly breaking the speed limit
Norway	Lorries, coaches	
Poland	Lorries	Routinely: in the event of an accident or when the driver is clearly breaking the speed limit
Portugal	Lorries, coaches	Routinely
Romania	Lorries	Routinely
Slovak Republic	Lorries, coaches, taxis	Only in the event of an accident or when the vehicle is clearly breaking the speed limit
Slovenia	Lorries, coaches, taxis	Routinely
Spain	Lorries, coaches	Routinely
Sweden	Lorries, coaches, taxis	Only in the event of an accident or when the vehicle is clearly breaking the speed limit

Country	Vehicle Category	Tachographs used to verify actual speed
Switzerland	Lorries, coaches, taxis	Only in the event of an accident or when the vehicle is clearly breaking the speed limit
Turkey	Lorries, coaches	Routinely
United Kingdom	Lorries, coaches	If there is proof that speeding was a contributory factor to an accident

Table 4. Possible withdrawal of driving licences for breaking speed limits

Austria	40 km/h over the speed limit in town or 50 km/h over outside built-up areas;
Belgium	10 km/h over the speed limit;
Denmark	usually 100 per cent or more over the speed limit;
Spain	50 per cent over the speed limit;
Finland	30 km/h over the speed limit;
France	30 km/h over the speed limit;
Hungary	50 per cent over the speed limit;
Latvia	20 km/h over the speed limit: withdrawal up to 5 months or penalty 40 km/h over the speed limit: withdrawal up to 6 months or penalty;
Lithuania	40 km/h over the speed limit;
Netherlands	for repeated offences, i.e. when the driver has three convictions for breaking the speed limit by more than 30 km/h;
Portugal	30 km/h over the speed limit, in the case of drivers of light vehicles, of motor cycles or mopeds; 20 km/h over the speed limit, in the case of heavy vehicles; 20 km/h over the speed limit, in relation to limits imposed according to the particular type of vehicle;
Romania	20 km/h over the speed limit;

Table 4 (continued)

Sweden	20 km/h over the speed limit, when the limit is 30 km/h 30 km/h over the speed limit, when the limit is 50 km/h;
Switzerland	30 km/h the licence is usually withdrawn for a minimum of one month. Depending on the circumstances and their past record, drivers can also have their licence withdrawn at speeds of less than 30 km/h over the limit. Tableau 4. Possibilité de retrait de permis et excès de vitesse

Table 5. Speeding and penalty-point licences

Finland	For three speeding offences in the space of one year, or four within two years, temporary disqualification. For newly qualified drivers, the system is even more restrictive.														
France	For exceeding the speed limit by: <table border="0" style="margin-left: 40px;"> <tr> <td>-- 0 to 20 km/h</td> <td>1 penalty point</td> </tr> <tr> <td>-- 21 to 30 km/h</td> <td>2 penalty points</td> </tr> <tr> <td>-- 31 to 40 km/h</td> <td>3 penalty points</td> </tr> <tr> <td>-- over 40 km/h</td> <td>4 penalty points</td> </tr> </table>	-- 0 to 20 km/h	1 penalty point	-- 21 to 30 km/h	2 penalty points	-- 31 to 40 km/h	3 penalty points	-- over 40 km/h	4 penalty points						
-- 0 to 20 km/h	1 penalty point														
-- 21 to 30 km/h	2 penalty points														
-- 31 to 40 km/h	3 penalty points														
-- over 40 km/h	4 penalty points														
Germany	For exceeding the speed limit by: <table border="0" style="margin-left: 40px;"> <tr> <td>-- 21 to 25 km/h</td> <td>1 penalty point</td> </tr> <tr> <td>-- 26 to 50 km/h</td> <td>3 penalty points</td> </tr> <tr> <td>-- over 50 km/h</td> <td>4 penalty points</td> </tr> </table>	-- 21 to 25 km/h	1 penalty point	-- 26 to 50 km/h	3 penalty points	-- over 50 km/h	4 penalty points								
-- 21 to 25 km/h	1 penalty point														
-- 26 to 50 km/h	3 penalty points														
-- over 50 km/h	4 penalty points														
Poland	For exceeding the speed limit by: <table border="0" style="margin-left: 40px;"> <tr> <td colspan="2">-- in built-up areas:</td> </tr> <tr> <td>• 20 to 30 km/h</td> <td>3 penalty points</td> </tr> <tr> <td>• over 30 km/h</td> <td>6 penalty points</td> </tr> <tr> <td colspan="2">-- outside built-up areas:</td> </tr> <tr> <td>• 20 to 30 km/h</td> <td>2 penalty points</td> </tr> <tr> <td>• 31 to 40 km/h</td> <td>4 penalty points</td> </tr> <tr> <td>• over 40 km/h</td> <td>6 penalty points</td> </tr> </table> <p>After accumulating 21 penalty points, the driver must take the driving examination again.</p>	-- in built-up areas:		• 20 to 30 km/h	3 penalty points	• over 30 km/h	6 penalty points	-- outside built-up areas:		• 20 to 30 km/h	2 penalty points	• 31 to 40 km/h	4 penalty points	• over 40 km/h	6 penalty points
-- in built-up areas:															
• 20 to 30 km/h	3 penalty points														
• over 30 km/h	6 penalty points														
-- outside built-up areas:															
• 20 to 30 km/h	2 penalty points														
• 31 to 40 km/h	4 penalty points														
• over 40 km/h	6 penalty points														
Romania	The new Road Bill provides for the deduction of penalty points.														

Table 5 (continued)

United Kingdom Automatic disqualification after accumulating 12 penalty points.

Turkey Five penalty points plus a fine up to 50 per cent over the limit.
Fifteen penalty points as from 50 per cent over the limit.
Drivers with 100 penalty points have their licence withdrawn for two months but do not have to appear before a magistrate.

ANNEXES

Annex 1: Reservation introduced by the German Delegation

The Federal Republic of Germany objects to the recommendation to introduce speed limits on all roads for the following reasons.

German experiences with the accident situation on motorways have taught us that:

1. the main cause of accidents is non adapted speed,
2. by far the greater part of accidents happens at speeds below the speed limit in question,
3. the more precisely instructions reflect a certain situation, the more the driver can understand their sense and comply with them,
4. the frequency of accidents is not homogeneously distributed over the whole motorway network, but is concentrated on certain sections of motorway.

The optimum of road safety is guaranteed by a flexible and not a rigid speed, but a speed which is adapted to the specific situation. For this reason the use of traffic control installations is promoted in Germany, which in the same way take into account topographic and constructional preconditions, weather conditions and circumstances relating to traffic volumes. The close connection between the traffic situation and the control installations leads to a high acceptance of the traffic restrictions concerned. The accident reduction rates are ranging between 20 per cent and 30 per cent. In some specific cases, it can be 50 per cent. The success of this approach can be seen from the fact that Germany as compared with other countries with a strict general speed limit is among those with the most favourable data in the fatal accident rates on motorways per vehicle-kilometre.

Annex 2: Reservation introduced by the Danish Delegation

In principle, Denmark cannot support the idea of harmonizing the general speed limits within the framework of ECMT. Denmark places much importance in the possibility of fixing speed limits nationally because of its policy of national road safety and for other reasons.

**RECOMMENDATIONS/CONCLUSIONS ADOPTED AT
THE COUNCIL OF MINISTERS IN BUDAPEST ON
29 AND 30 MAY 1996**

The Council of Ministers, meeting in Budapest on 29 and 30 May 1996,

CONSIDERING:

- the undeniable role played by excessive or inappropriate speed in both the number and severity of accidents;
- the positive impact on road safety reported when general speed limits are introduced or existing limits lowered; and conversely, the adverse impact on road safety of the raising of such limits, when effective supporting measures are not taken;

NOTING:

- the differences between regulations currently in force in European countries, notably with regard to general speed limits, leading to some doubt and confusion amongst international traffic road users with regard to the credibility of existing regulations, which is detrimental to road safety;

RECALLING THAT:

- driver behaviour is the main determinant of road safety;
- education, training, regulations, surveillance and penalties provide a variety of complementary means of influencing such behaviour by encouraging drivers to drive more safely, to comply more strictly with highway regulations and to show greater consideration for other road users;

- action taken to calm traffic flows and moderate vehicle speeds must be aimed at vehicles, at the infrastructure and at drivers;

RECALLING the various recommendations adopted in the past by the Council of Ministers of the ECMT,

RECOMMENDS THAT:

- general speed limits be introduced for all categories of vehicle in all networks and set at a level which is not only compatible with the requirements of safety and environmental protection but also perceived to be reasonable by road users³;
- general speed limits' harmonization be promoted⁴ at national and European level on homogeneous networks, which have similar physical characteristics and traffic conditions and which have equivalent functions, in order to improve safety on the road. To this effect, one should study the level of an harmonized general speed limit, which might take as a reference the following figures:
 - 50 km/h in urban areas⁵,
 - 120 km/h on motorways⁶;

these figures correspond to the average limits presently in force. They do not exclude general speed limits which may be set at a lower level when traffic management or circumstances -- geography, weather, technical provisions -- so require, or be kept when they are already in force;

RECOMMENDS THAT:

- **with regard to road networks**
 - road networks be classified in a way which takes account of the geometric design of highways carrying different types of traffic, i.e. through-traffic, local traffic, etc.,
 - speed limits in urban areas where protected road users and vulnerable ones coexist, be adapted to a level that promote a safe interplay between them,

- provision be made in highway regulations and specific adaptation measures be introduced to develop areas with reduced speed, for instance, 30 km/h zones in residential or built-up areas,
- the possibility be provided for highway regulations to permit higher speed limits on roads used principally to carry through-traffic in urban areas,
- steps be taken to ensure that driver behaviour, notably the speed limits that drivers must obey, is consistent with the infrastructure by providing appropriate indications of changes in the environment or function of the highway, notably at the entrance to built-up areas,
- **with regard to driver information**
 - action be taken to promote traffic management and to develop means of conveying information to drivers, notably through the use of telematics systems, in order to provide route guidance and to encourage drivers to match their behaviour to the prevailing traffic conditions,
 - road authorities develop variable message signs that can be used to modify speed limits according to the prevailing traffic and weather conditions,
- **with regard to on-board equipment**
 - efforts be made to ensure that the on-board technologies developed for use in vehicles are ergonomically compatible with safety objectives,
 - vehicle manufacturers fit speed governors to all new heavy goods vehicles and public transport vehicles they produce,
 - studies be made of the timeliness and feasibility of developing similar devices for other types of vehicle,
 - the voluntary use of speed governors be encouraged⁷,
- **with regard to driver training**
 - the initial training of drivers should, through the use of appropriate psychological techniques and teaching methods, inculcate a sense of responsibility that will encourage them to comply more strictly with

highway regulations and show greater consideration for other road users, notably with regard to driving speeds,

- the requisite training be given to driving school instructors and driving test examiners who will be called upon to train drivers, in the first instance, and to test the skills and behaviour of drivers in the second,
- progressive access to driving for young people be introduced through measures which will allow such drivers to acquire experience or which will monitor their performance⁸,
- efforts be made to promote driver improvement programmes through the provision of appropriate courses of further training that include in-depth examination and discussion of driver behaviour,
- **with regard to communication**
 - the use of road safety campaigns be stepped up, especially those targeted at speeding and driver behaviour,
 - action be taken, notably with regard to car manufacturers, to avoid forms of advertising which extol vehicle performance as far as speed is concerned, or which convey a message incompatible with road safety objectives,
- **with regard to enforcement and penalties**
 - a sufficient number of checks, notably of vehicle speed, be carried out on the roads to serve as a deterrent to drivers and to persuade them that they may be under surveillance at any time,
 - to increase the effectiveness of such checks
 - by developing equipment that is both of simple design and easy to operate in order to facilitate the performance of checks and to ensure that the results of such checks are indisputable,
 - by making it impossible for a driver who has committed an offence to avoid prosecution,
 - by prohibiting the use of devices designed to detect the deployment of speed measuring systems,

- to enhance the deterrent effect of penalties, for instance,
 - by matching the severity of the punishment to the seriousness of the offence, notably the amount by which the speed limit is exceeded,
 - by reducing the delay between the time an offence is committed and the application of the penalty,
 - by developing alternative penalties, such as, for instance, training in hospitals,
- promote the use of refresher courses, tailored to the type of behaviour penalised, for repeated offenders,
- develop judicial co-operation between States when it comes to taking legal action on.

INSTRUCTS the Committee of Deputies to monitor the implementation of these recommendations and in particular to study the possibilities for harmonised general speed limits, in order to improve road safety and to report in due time with more concrete proposals on this matter.

NOTES

- 1 B, DK, E, FIN, F, H, LT, L, NL, PL, P, SK, RO, UK, SLO, S, CH, TR, MA.
- 2 Recommended Speed.
- 3 The German Delegation entered a reservation under this point.
- 4 The Delegations of Denmark, Greece, Norway and the United Kingdom entered a reservation under this point.
- 5 The Norwegian Delegation entered a reservation under this point.
- 6 The German Delegation entered a reservation under this point.
- 7 The Greek Delegation entered a reservation under this point.
- 8 The Danish Delegation entered a reservation under this point.

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Authorities in all countries concur that excessive or inappropriate speed is not only a major cause of road accidents but also generally adds to the severity of accidents. In order to improve road safety, a coherent set of measures to achieve calmer, uniform, more fluid and safer traffic flows needs to be designed and implemented.

The ECMT Council of Ministers' meeting in Budapest in May 1996 adopted a series of recommendations, based on this report, relating to road networks, road signs, traffic management, driver information and training, design of vehicles and on-board equipment, regulations, communications, enforcement and penalties.

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