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Outline Proposal for a New 1958 Agreement Regulation on Lane Departure Warning Systems.

Background At the 145th session of WP29, the representative from the European Union gave a presentation on the new European Commission proposal for a Regulation on the general safety of vehicles (see document WP29-145-8). A feature of this proposal is the introduction of advanced safety technologies in future vehicles. One of these technologies, Electronic Stability Control, is at an advanced stage, both in terms of the technology and in terms of regulatory standards. Other technologies such as Advanced Emergency Braking Systems and Lane Departure Warning Systems are starting to appear on new vehicles and preliminary studies have shown that there may be justification in making such systems mandatory on some vehicle categories as part of the proposed Regulation.

Clearly, before mandatory installation requirements for such systems can be implemented it is necessary to agree technical performance standards for such systems. The European Commission prefers that such technical standards should, where possible, be agreed at UNECE level to ensure a wide harmonisation of standards and thus reduce potential costs to manufacturers. This document outlines a proposal for a UNECE Regulation under the 1958 Agreement covering **Lane Departure Warning (LDW) and Lane Change Assistant (LCA) systems.**

Technical and Research Details. Lane Departure Warning (LDW) Systems monitor the position of the vehicle with respect to the lane boundary. When the vehicle is in danger of leaving the lane unintentionally, the system delivers a warning to the driver.

Available research on the frequency and characteristics of collisions resulting from a lane departure, mostly carried out in the United States, has revealed that three broad accident types are important: a vehicle leaving the lane and striking oncoming traffic in the opposite carriageway; a vehicle leaving the lane and striking traffic travelling in the same direction in an adjacent carriageway; a vehicle leaving the lane and the roadway and striking a stationary object and/or rolling over. Even when these accident types are combined, lane departure collisions are a relatively small proportion (around 10 percent) of the total number of police-reported collisions in the United States. Assuming that the situation in Europe is similar, the total number of collisions that could be avoided is nevertheless significant.

A system related to Lane Departure Warning is Lane Change Assistant (LCA) which monitors the adjacent lanes; if a lane change manoeuvre is initiated and the system detects a vehicle in the adjacent lane, the system will alert the driver. There are three main collision scenarios that can result from an unsafe lane change: the vehicle enters the new lane and experiences a side swipe collision with an approaching vehicle already in the lane; the vehicle enters the lane and experiences a rear impact with an approaching vehicle; the vehicle enters the lane and experiences a front impact with an overtaking vehicle that has braked. Other scenarios that are sometimes grouped with lane change collisions include: a vehicle leaving a parking space at the side of the carriageway; a vehicle turning across the path of another. Most of the research on lane change collisions was carried out in the United States, where these collisions account for around 5 percent of all Police-reported crashes.

A study by TRL for the European Commission is currently examining the potential European casualty benefits which could be gained from the wider use of LDW and LCA systems. Initial findings have indicated that the benefit-cost ratio of these systems is favourable for heavy duty vehicles (M2, M3, N2 and N3) so the Commission proposal for a Regulation on general vehicle safety proposes that LDW and LCA systems will be mandatory for new designs of vehicles in these categories from 2013. However it is possible that such systems may be mandated on cars at later date and in the meantime it may be beneficial to develop a standard which also applies to such systems, where fitted on light vehicles.

Possible Outline Requirements. Based on initial recommendations by TRL, an outline of the likely technical content and areas of discussion regarding a regulation on LDW/LCA is given below.

1. Scope and field of application. The regulation would describe performance requirements for LDW and LCA, either as separate systems or separate functions within a combined system. [*] As mentioned above, vehicles of categories M2, N2, M3 and N3 are seen as priorities; however vehicles in categories M1 and N1 could also be included. It is recognised that some of the requirements appropriate for large vehicles may differ from those which are appropriate for smaller vehicles. However, the requirements relating to the sensing systems may be similar for all classes of vehicle. Hence the working group will need to decide whether one regulation is appropriate for all vehicles or whether a separate regulation is preferable for light duty vehicles.

2. Functional requirements. These might include:

-the minimum radius of road curvature at which the system can operate

-the vehicle speed range at which the system can operate

For LDW.

- the threshold point (relative to the crossing of a lane boundary) at which the alarm is activated

- provision of pre-warnings

For LCA

-the minimum detectable size of the target vehicle

-the closing speed range of the target vehicle

3. HMI requirements

- visual, haptic or audible warnings

- communication of system status.

4. Sensor requirements

- detection capability (including assurance against false alarms, eg, stationary objects at the side of the road)

-environmental protection (heat, damp, snow, sand, etc.)

-electromagnetic compatibility (including permitted frequency ranges, where applicable)

A number of the above requirements are covered, at least partially, by ISO standards.

Timescale. The Commission proposal envisages that new heavy duty vehicle types should be fitted with such systems from October 2013. This means that, ideally, any new regulation should come into force by October 2011, which would require agreement by the November 2010 WP29. In order to support the development of this Regulation, the Commission is prepared to offer research and testing resources.

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[*] There are more advanced systems in existence such as 'Lane Keeping Assistance' (LKA) which uses information from the LDW system to assist the driver to keep the vehicle in the correct lane by means of steering assistance or corrective braking. The Current Commission proposal does not envisage making such systems mandatory, but GRRF may with to consider including such systems in the scope of a UNECE Regulation, perhaps as a second phase.