CLEPA/OICA proposal for amendments to GRRF/2015/02

Draft amendments to document GRRG/2015/XXX (LKAS informal group). This document is presented by the Chair of the LKAS informal group for improving the wording of the document GRRF/2015/XXX, and solving the pending questions with regard to the warning provision (wording remaining in square brackets). The changes to the text in document GRRF/2015/XXX are indicated in strike-through and bold characters.

I. Proposal

Insert a new paragraph 2.3.4.2.1., to read:

"2.3.4.2.1. "*Lane Keeping Assistance System (LKAS)*" means a system which assists the driver in keeping the vehicle within the chosen lane, by influencing the lateral movement of the vehicle."

Insert new paragraphs 5.1.6.2. to 5.1.6.5., to read:

"5.1.6.2. The LKAS shall be designed so that excessive intervention of steering control (e.g. an excessive steering torque) is suppressed to assure the steering operability by the driver and to avoid unexpected vehicle behaviour, during its operation.

The end of the intervention shall be such that the LKAS reduces its directional control to zero in a progressive manner, to ensure easy and safe handling of the vehicle, as defined in paragraph 5.1.1. The directional control fade-out strategy shall be at the discretion of the vehicle manufacturer.

The steering control effort necessary to override the directional control provided by the LKAS shall not exceed the value specified in paragraph 6.2.4.2. for an intact steering equipment."

5.1.6.3. When the LKAS is temporarily not available, for example due to inclement weather conditions, the system shall clearly inform the driver about the system status, except if the system is in the OFF mode, e.g. switched off. This exception does not affect the required warning in the case of a system malfunction.

5.1.6.4. The vehicle may be equipped with a means for the driver to activate or deactivate the LKAS.

5.1.6.5. ~~The LKAS shall provide a means of detecting that the driver is likely to be no longer in primary control of the vehicle (e.g. by sensing the driver's input on the steering wheel). This means of detection is required to work when the system is available (i.e. ready to intervene or intervening).~~

~~When the LKAS is available and has detected that the driver is likely to be no longer in primary control of the vehicle, [until the driver takes primary control again / encouraging the driver to take primary control again / to call the driver's attention], effective warnings shall be given simultaneously or in a cascade involving at least two means out of optical, acoustic and appropriate haptic."~~

When the LKAS is available (i.e. ready to intervene or intervening), it shall provide a means of detecting the driver's involvement in the driving tasks. In the event that the LKAS has detected the absence of driver's involvement in the driving tasks, [~~effective~~] warning shall be provided until driver's involvement has been detected again (e.g. input

on the steering wheel, brake pedal actuation.); or until the LKAS is deactivated, either automatically or manually.

The LKAS warning shall be provided by at least two means out of optical, acoustic and haptic given simultaneously or in a cascade."

II. Justification:

1. The structure of paragraph 5.1.6.5 is improved to be simpler and crisper.

2. The wording "driver's involvement in the driving tasks" is replacing "driver is likely to be no longer in primary control of the vehicle".

The original intention from CLEPA/OICA at the beginning of the ad-hoc group discussions was to avoid using the words "driver inattention", since the systems today are not able to directly detect whether the driver is attentive or inattentive, but rather monitor the driver activity related to the driving tasks. The detection in current systems may be done via a direct monitoring of the driver input on the vehicle control(s) (e.g. input to steering wheel, brake pedal etc.), or via a monitoring of the effect of the driver's input on the vehicle path (e.g. analysing the position of the vehicle in the lane, as a result of the driver's action), or possibly via both ways. Thus, requiring a means to detect "driver's attention" was –and is still- considered not appropriate, and OICA proposed using the wording "driver in primary control of the vehicle".

The main idea behind using "driver in primary control of the vehicle" was then to select a wording that already exists in the regulation (e.g. in the definitions of corrective and automatically commanded steering functions), in order to avoid divergence in the interpretations. But some further investigation within the Industry experts group led to the conclusion that this wording does actually create other potential issues or misunderstandings. For example, Park Assist systems have been approved as ACSF, which clearly means a driver can be hands-off while still in primary control of the vehicle. Thus, the wording "driver in primary control of the vehicle" does not match LKAS requirement of paragraph 5.1.6.5.

Following this conclusion, CLEPA/OICA defined the following: LKAS "shall provide a means of detecting the driver's involvement in the driving tasks". This wording indeed avoids all the issues listed above (related to "driver's attention", "in primary control" etc.), while not being design restrictive. Indeed, this wording is open to a system which may:

- monitor driver's input on the control(s);
- monitor the effect of the driver's input of the vehicle path;
- monitor the driver's attention (this is feasible to a limited extent today but may be developed in the future).

3. The new Industry proposal includes the proposed concept supported by some Contracting Parties that the warning shall be provided "until driver's involvement has been detected again". Furthermore, the opening given by NL in their mail dated 11 Nov 2014 has been included in the Industry proposal: the text now gives a clear possibility that the warning is stopped when the LKAS is deactivated. The wording "deactivated" has been preferred to "switched OFF", to stick to the terminology already used in paragraph 5.1.6.4.

4. Regarding the warning itself, the Industry proposal does not change the principle of the text issued at the last ad-hoc meeting, i.e. remains largely editorial. The given flexibility for the warning is a must for the vehicle manufacturers for keeping consistent the HMI between the different functions of the vehicle, e.g. to avoid AEBS warnings to be mixed up or interfere with LKAS warnings (AEBS also requires optical, acoustic and haptic warnings).

The only pending question about the warning is concerning the word "effective". CLEPA/OICA can accept this terminology but stresses that any warning has to be

"effective", for the obvious reason that a non-effective warning is not a warning. Industry suggest deleting the word "effective".