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World Forum for Harmonization of Vehicle Regulations

Working Party on Brakes and Running Gear

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Geneva, 2-5 February 2010

Item 3(a) of the provisional agenda

REGULATIONS Nos. 13 AND 13-H
(Braking)

Emergency Stop Signal

Proposal for amendment to Regulation No. 13-H

Submitted by the experts from the International Organization of Motor Vehicle Manufacturers *

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) in order to improve the wording of the prescriptions for electric regenerative braking. This document is based on GRRF-66-24. The modifications to the existing text of the Regulation are marked in bold or strikethrough characters.

* In accordance with the programme of work of the Inland Transport Committee for 2006-2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance performance of vehicles. The present document is submitted in conformity with that mandate.

A. PROPOSAL

Paragraph 5.2.22.4., amend to read (inserting also a reference to the existing footnote 6/):

"5.2.22.4. Electric regenerative braking systems **as defined in paragraph 2.17.**, which produce a retarding force upon release of the ~~throttle pedal~~, **accelerator control**, shall generate the signal mentioned above according to the following provisions:

Vehicle decelerations	Signal generation
$\leq 0,7 \text{ m/s}^2$	The signal shall not be generated
$> 0,7 \text{ m/s}^2$ and $\leq 1,3 \text{ m/s}^2$	The signal may be generated
$> 1,3 \text{ m/s}^2$	The signal shall be generated

In all cases the signal shall be de-activated at the latest when the deceleration has fallen below 0.7 m/s^2 . 6/

6/ At the time of type approval, compliance with this requirement shall be confirmed by the vehicle manufacturer. "

Insert new paragraphs 12.5. and 12.6., to read:

"12.5. As from the official date of entry into force of the Supplement [9] to the original version of this Regulation, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by Supplement [10].

12.6. Contracting Parties applying this Regulation shall continue to grant approvals to those types of vehicles which comply with the requirements of this Regulation as amended by Supplement [9] to the original version of this Regulation during the 36 months period which follows the date of entry into force of Supplement [10]."

B. JUSTIFICATION

At its sixty-sixth session, the Working Party on Brakes and Running Gear (GRRF) had an extended discussion about deceleration thresholds for the generation of the stop lamp signal due to activation of the Electric Regenerative Braking (ERB). This document is produced to clarify the provisions about the generation of the ERB taking into account the comments expressed during the sixty-fifth and sixty-sixth sessions of GRRF. One of the main comments was indeed to examine the possibility of harmonizing the activation and de-activation thresholds between light and heavy vehicles. This was achieved for the vehicles common to UNECE R13-H and R13, i.e. M_1 and N_1 , and the same text is now proposed for both regulations for those vehicles. A parallel document will be proposed to improve the wording of the corresponding paragraph in Regulation No. 13.

Concerning the lead time before application, as the proposed text turns an interdiction into an obligation, GRRF agreed that some transitional provisions were necessary. While the original proposal (GRRF-66-25) introduced a delay of 48 months, some comments received in the mean time revealed that some contracting parties would favour a shorter lead time. As a compromise solution, OICA proposes hence here transitional provisions of 36 months.

The remaining text of the justifications below is a reminder of the justifications set out in the previous documents dealing with this question (ECE/TRANS/WP.29/GRRF/2009/2 and informal document No. GRRF-65-10).

Reminder of the background

Electric regenerative braking systems on electric vehicles and hybrid/electric vehicles allow substantial improvement of fuel economy. There are hence some benefits in increasing the efficiency of the electric regenerative braking process.

However, the regenerative braking system may induce higher retardations than most conventional engine/gearbox associations on current vehicles can do. This is the reason why it appears opportune to allow the generation of the "signal that will be used to illuminate the stop lamps" at decelerations above 1.3 m/s^2 produced by the electric regenerative braking activated by the driver.

The value of 1.3 m/s^2 is considered as a reasonable trigger value sufficiently different to the extinguishing value of 0.7 m/s^2 , in order to avoid flickering of the stop lamps in case of slow decelerations.

The proposed text aims to make the deceleration thresholds the most relevant for daily traffic. The intention is to illuminate the stop lamps when the vehicle is braking, for obvious safety reasons, and in the same time to avoid too frequent stop lamp illuminations that provoke safety counter-effects. The particularity of the vehicles of category N1 (< 3.5 tons) is that they can have a weight varying within a range of 1:2.5 according to their load. As it is not possible to define within a regulatory text a deceleration threshold for each particular case, the proposed solution is to let some flexibility to the manufacturer, but impose a lower threshold that can be the best compromise in real traffic. The general principle is, as in the case of ESS, that no stop lamp illumination can occur below that lower threshold. The text is hence aligned with the provisions for ESS.

The value of 0.7 m/s^2 is considered representative of the "natural" deceleration due to conventional engine/gearbox association (see paragraph 5.2.22.2. of Regulation No. 13 H and paragraph 5.2.1.30.3. of Regulation No. 13). It is consistent to propose the same value in the present proposal as it covers similar situations.

The graph below shows the decelerations achieved by a common M1 vehicle, unladen, diesel combustion engine, upon release of the accelerator control inside the whole possible speed range for each gear. The two proposed deceleration values (namely 0.7 m/s^2 and 1.3 m/s^2) are indicated by the red lines. This graph clearly shows that the natural engine/rolling resistance deceleration is always below the required generation value (1.3 m/s^2), and is nearly always below the lowest required suppression value (0.7 m/s^2). The range between the lower and the upper value is necessary to avoid flickering of the stop lamps when the vehicle decelerates around the threshold value. This implies that the proposed amendments for the regenerative braking will not have any adverse effect on safety because no stop lamp will illuminate at decelerations in the range of the natural engine brake of a common combustion engine.

This proposal will improve road safety for vehicles with electric regenerative braking which currently represent a small market share. However, because of their environmental benefit, OICA believes that the market share of those vehicles will increase in future.

Finally, the promotion of electric regenerative braking systems facilitates the vehicle manufacturer's efforts to improve the fuel economy of the production.

Natural engine brake, M₁ diesel vehicle, 1-5 gear

