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INLAND TRANSPORT COMMITTEE
World Forum for Harmonization of Vehicle Regulations (WP.29)
Working Party on Lighting and Light-Signalling (GRE)
(Forty-ninth session, 30 September - 4 October 2002, agenda item 7.3.)

EXPLANATORY NOTES TO DOCUMENTS
TRANS/WP.29/GRE/2002/21/Rev.1 and
TRANS/WP.29/GRE/2002/22/Rev.1

Transmitted by the Expert from Germany

Note: The text reproduced below was prepared by the expert from Germany, in order to give explanatory notes to the proposals allowing the signalling of intensified/emergency braking (TRANS/WP.29/GRE/47, paras. 9 and 10).

Note: This document is distributed to the Experts on Lighting and Light-Signalling only.
1. INTRODUCTION

At the forty-seventh session of GRE, the expert from Germany made a presentation of the accident avoidance research, in which various possibilities of emergency braking brake light display were tested and evaluated, with various thresholds for activation and deactivation (informal document No. 11):

(a) increased brake light surface area and intensity at high deceleration;
(b) integral brake light (S3 lamp indicating braking deceleration degree);
(c) flashing hazard warning lamps at high deceleration;
(d) continuously alighted rear direction indicator lamps at high deceleration.

The expert from Germany drew attention to the final report of the study which is available in the website of the Bundesanstalt fuer Strassenwesen (Federal Highway Research Institute): http://www.bast.de .

At the forty-eighth session of GRE, a demonstration was given in the premises of the Palais des Nations of a number of configurations. On the basis of the ensuing discussion, the experts from Germany reviewed their proposals which are now presented in revised versions. Further, the Chairman proposed that all GRE participants reconsider the proposals with regard to the:

(i) cost-efficiency of such a system,
(ii) light-signalling device ("red coloured" stop-lamps or "amber coloured" hazard warning signal),
(iii) illuminating surface (single lamp or additional lamp),
(iv) mandatory or optional installation of emergency braking signalisation,
(v) value of deceleration at which the system has to operate,
(vi) flashing rates of the light-signalling device,
(vii) vehicles already stopped in the traffic as a result of emergency or ordinary deceleration.

There are solutions possible, which are very cost efficient with regard to the profit of increased safety.
The colour of the signal Stop is red.
The colour of Warning signals is yellow (amber). The following safety concept in addition to the revised proposals cover also the points (iii) to (vii) above.
An amendment in the Vienna Convention is necessary with regard to the red flashing of the Stop Lamps.

In addition, a diagram should pass on the idea visually, also a list of literature, which gives an impression about the activities and a number of research projects on this matter.
Safety concept for vehicle braking manoeuvres

In the past years, a series of investigations have shown that an improved brake signalling system may improve road safety!

The following concept is developed to improve the information “brake” by an increase of recognition through a brake force display. This improves traffic safety.

“normal” braking:
- stop signal at “normal” light level signal colour red
  - activation of the service brake
  - reduction of speed
  - stop manoeuvre at low speed
  - normal stop or brake manoeuvre in town traffic
  .......

“intensified” braking:
- stop signal at intensified light level (optional only!) signal colour red
  - strong brake manoeuvre with high deceleration (e.g. a > 5m/s² on usual dry roads)

   vehicle stops without problems
   and vehicle stops inside normal traffic conditions
   stopping vehicle is not necessarily an obstacle

“emergency” braking:
- flashing stop lamps with high frequency (f ~ 5Hz) signal colour red
  - braking with high deceleration in dangerous situations (e.g. a > 7m/s² on usual dry roads)

   is function of speed, deceleration, additional information as Brake Assistance, ABS, etc.

protection of a stopped vehicle:
- special signal for information “vehicle is an obstacle” → signal colour amber

   stopped vehicle is a dangerous obstacle
   automatic activation of hazard warning lamps e.g. after “emergency” braking manoeuvre [and low speed (v < 10km/h)]
   or after a crash.

Vienna Convention Chapter II, Article 32, paragraph 13:

13. Hazard warning signal may be used only to warn other road-users of a particular danger:

   (a) When a vehicle which has broken down or has been involved in an accident cannot be moved immediately, so that it constitutes an obstacle to other road-users;
   (b) When indicating to other road-users the risk of an imminent danger.
Proposal for Brake Force Concept

- **Emergency braking**: Realized e.g. by flashing and/or maximum intensity.
- **Intensified braking**: Realized by increased intensity and/or enlarged lighting area.
- **Normal braking**: Reduced intensity (e.g., reduction of speed).

Legend:
- **S1, S2, S3**: Different braking levels.
- **Deceleration**: A0, A1, A2, A3
- **Relative Intensity**
LITERATURE:

This is a collection of literature to the item “Improved Rear Lighting” without the claim of completeness!

The number of independent studies and investigations show the need for an improvement of the rear signalling system, especially the stop signal!


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