Transmitted by the Experts from OICA and CLEPA

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Operation of Endurance Brakes and Illumination of Stop Lamps

For some considerable time this topic has been debated within the GRRF following which agreement was reached such that vehicles equipped with endurance brakes should provide a signal to illuminate the stop lamps. Following a proposal from Japan to require ABS equipped vehicles to provide the above signal based on a deceleration threshold, industry presented an Informal Document GRRF-60-4 which showed that while this was possible, the vehicle on-cost would be approximately €200/vehicle, which could not be justified. Industry was subsequently requested to consider differentiating between vehicles equipped with EBS and those with ABS. At the 61st GRRF a proposal was discussed and amended to GRRF-61-19 Rev1 and in principle the content agreed, this was subsequently turned into official document GRRF/2007/6 and was adopted without amendment at the 62nd Session of GRRF.

At the same meeting Germany presented Informal GRRF-62-26 which proposed an amendment to document GRRF/2007/6 to require non EBS equipped vehicles to fulfil the following requirements:

"5.2.1.30.2.2. In the case of vehicles equipped with a braking system of a different specification to that defined in paragraph 5.2.1.30.2.1. above, the operation of the endurance braking system ~~shall~~ **may** generate the signal for max. 4sec +/- 1 irrespective of the deceleration produced.

During discussion Germany revised the proposal to change the "shall" to "may" as reflected in the above text.

This proposal received no verbal support from any government delegate and was opposed by industry on the same grounds that resulted in previous proposals to include a 4 second rule being rejected, as follows:

Endurance brakes are primarily installed on heavy commercial vehicles and coaches to provide a retarding force during down hill descents, to prevent the service brakes from over heating and therefore reducing in efficiency. Whether the retarding force produced by the endurance brake is able to prevent the vehicle from accelerating or decelerating in a down hill descent is dependent on the following variables:

- Gradient of the descent
- Vehicle load
- Performance of the endurance brake
- Operational state of the endurance brake selected by the driver.

Taking into consideration the above variables, the possibility for the retarding force produced by the endurance brake to ensure that the vehicle maintains a constant speed during the descent is extremely unlikely.

It has been argued by Germany that the 4 second rule would benefit following drivers in that, if the driver of the vehicle with the endurance brake now needed to decelerate the vehicle and applied the service brake, then the stop lamps would re-illuminate and remain illuminated as long as the service brakes were being applied. This may seem a reasonable approach but unfortunately does not take into consideration other vehicle specifications, specification of the endurance brake, or other different operating conditions when the endurance brake is used.

Vehicle Specifications:
How the endurance brake is engaged is very much vehicle dependent and may be any of the following:

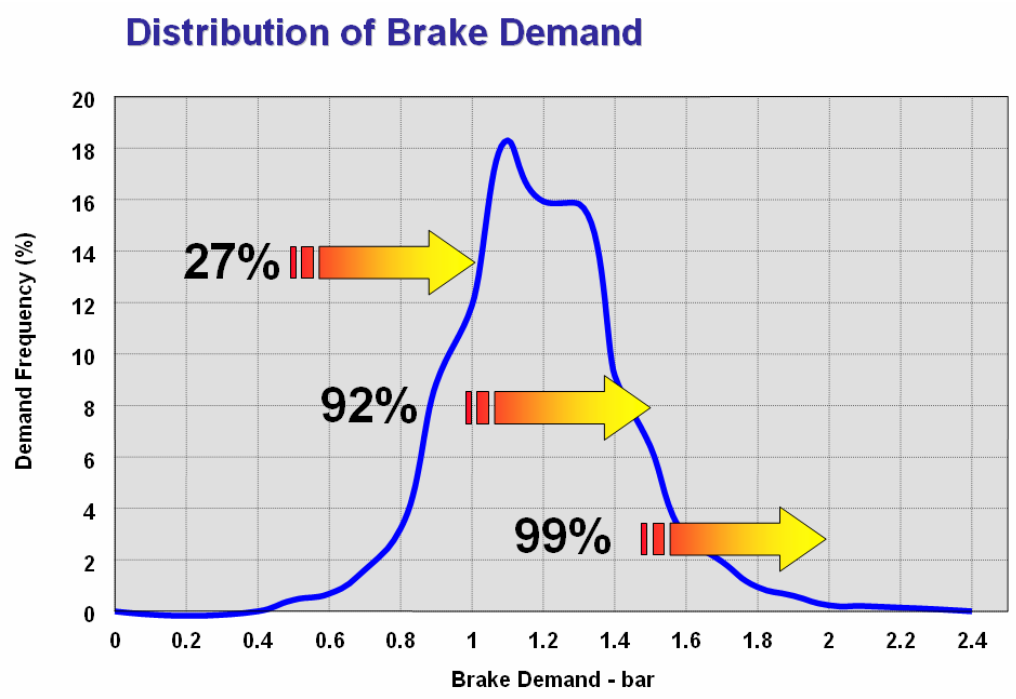
1. Independent control directly selected by the driver.
2. Integrated into the foot brake control so that operation of the service brake control first engages the endurance brake and then as driver demand increases introduces the service brakes.
3. Release of the accelerator pedal automatically engages a low level of endurance brake operation.

In the case of option 2 above it would be mandatory to generate the signal to illuminate the stop lamps as long as the service control is being applied, see paragraph 5.2.1.30.1 of ECE Regulation 13, where the definition of the service braking system includes the control. In this case the 4 second rule would not be applied.

Specification of the Endurance Brake:
It is common for endurance brakes on heavy commercial vehicles for the endurance brake to have multiple operating stages which are either individually selected by the driver using an independent control, or dependent on travel of the service brake control. These multiple stages are essential due to the significant variation in vehicle load and gradients encountered during vehicle operation. The 4 second proposal takes no account of changes in retarding force generated by the endurance brake which may then result in significant deceleration, without providing any warning to the driver of a following vehicle.

Operating Conditions:
While the endurance brake may have been installed on a vehicle to provide a retarding force when travelling down hill, there is nothing to prevent the driver from using the endurance brake under different driving conditions. Obviously when the endurance brake is controlled by the operation of the service brake control, the endurance brake will generate a retarding force whenever the service brake is applied and not just when travelling down hill, and the stop lamps will always be illuminated for as long as the service brake control is applied. However, in the case of an endurance brake which is operated by the driver independent of the service braking system, the driver controls when the device will operate.

It is well known that drivers of vehicles equipped with endurance brakes use the retarding force of the endurance brake instead of applying the service brake control under any operating condition. The graph below illustrates the brake distribution of a typical commercial vehicle or coach:



From the above it can be seen that more than 90% of all brake applications result in a brake pressure of <1.5bar, which equates approximately to a vehicle deceleration of 0.1g. The retarding force associated with this level of deceleration is able to be generated by the typical endurance brake installed on heavy commercial vehicles and coaches, and is used repeatedly by the driver to decelerate the vehicle without applying the service brake. If a 4 second rule was introduced the following driver would initially see the stop lamps illuminate and then go off, and would reasonably assume that the vehicle in front was no longer braking and release the brake of his/her vehicle, only to find that the vehicle in front was continuing to decelerate with the potential risk of an accident.

Japan has had practical experience of this condition and has stated within GRRF that **this did in fact result in accidents due to the condition described above**.

Conclusion:
Based on the above and the fact that not all vehicles have endurance brakes, and the service brakes are used to “hold” the vehicle in down hill descents, the introduction of a 4 second stop lamp illumination rule would do nothing to improve road safety, in fact the contrary is more likely.