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EMERGENCY BRAKE LIGHT DISPLAY

Previous UK Research

Transmitted by the expert from the United Kingdom

The UK is currently researching the safety benefits of emergency brake light display. The results of this work will not be available for some time. However previously work was carried out in 1994 and the results are attached.

Vehicle Technology and Standards
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Flashing hazard lights for heavy braking

Summary

This report describes a set of trials to investigate the use of hazard lights during heavy braking, intended to obtain better response from following drivers. It is assumed that an accelerometer or brake pressure transducer may be used to sense the heavy braking, which then operates the rear hazard lights in addition to the stoplights. Normal or slight braking will not operate the hazard lights. All the presentations used in this experiment included a third stoplight centrally placed, as this will probably be the display in use for new cars in Europe in future.

Results show that using the hazard lights to indicate heavy braking may produce a very small improvement during heavy braking, and a very small degradation during slight braking. The change is not large enough to be worthwhile.

Introduction

The previous chapter showed that use of flashing stoplights to indicate heavy braking had no effect on drivers' behaviour. It was, however, felt worthwhile to check the use of hazard lights for the same purpose, as they have a well-known meaning, are in a separate position, and are a different colour.

Twenty-seven members of the public drove the simulator, while following a lead vehicle which performed braking manoeuvres of several types. The driver had to brake to avoid a collision in all cases. Slight braking of the lead car was presented to simulate cases where the driver ahead was slowing down gently, just touching the brake. Heavy braking by the driver ahead, representing quite a severe manoeuvre, was simulated using a) the present system (no differentiation between severities of braking) and b) hazard lights in addition to the stoplights. The following drivers' responses, in terms of reaction times, peak brake pressure, together with the time and following distance at which this occurred, and closest approach during the braking manoeuvre were measured.

Mean values of performance measures

	Braking type			
	Slight		*Heavy*	
Performance measures	*Steady*	*Flashing*	*Steady*	*Flashing*
Time to throttle off	1.11 (277)	1.15 (283)	1.05 (278)	0.98 (284)
Time to brakes on	1.71 (256)	1.89 (267)	1.41 (286)	1.32 (291)
Time to max braking	2.83 (256)	2.99 (267)	2.65 (286)	2.57 (291)
Maximum brake pressure	952 (256)	906 (267)	1918 (286)	2041 (291)
Maximum brake distance	36.6 (256)	35.6 (267)	25.8 (286)	25.8 (291)
Closest approach	33.9 (84)	33.2 (85)	22.5 (228)	23.2 (240)

Slight braking

The throttle off time for slight braking is practically independent of whether hazard lights are used for heavy braking. There is however almost one fifth of a second additional delay before the brakes go on. This may be because the driver is 'waiting' to see if the hazard lights come on, or because he/she has realised that there is no urgency, as they have *not* illuminated. This delay is carried forward to the time of maximum braking, which is at a slightly lower level and slightly closer. The drivers ended the manoeuvre slightly closer, but with plenty of room.

Use of hazard lights during heavy braking

There was virtually no difference in the time taken to release the accelerator, and the use of hazard lights induced only a slightly quicker reaction to get the brakes on (one tenth of a second). This was carried over into the time to maximum braking effort, together with a slightly higher brake pressure. However, the distance at which this happened was the same as without the hazard lights, and the closest approach during the manoeuvre was only marginally better.

Conclusions

Overall, the use of hazard lights to indicate heavy braking seems to have very little effect on drivers who knew what to expect. They averaged only 0.7 metres more room during heavy braking, balanced against the same distance less, during slight braking.