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Informal document No. **GRRF-71-08**
(71st GRRF, 13-15 September 2011
agenda item 3(a))

Proposal for draft amendments to ECE Regulation No. 13

This paper proposes that the mandatory installation of vehicle stability functions (Electronic Stability Control (ESC)) under Regulation No. 13 be extended to N_1 category vehicles.

I. Summary

- ESC is mandated through UNECE Regulations 13 and 13-H.
- However, for N_1 category vehicles, ESC cannot be mandated under these regulations where a manufacturer chooses to certify to Regulation 13.
- It is understood that GRRF focussed on heavy vehicles when developing the ESC requirements for Regulation 13.
- New Australian research shows an effectiveness of ESC for N_1 vehicles similar to that for passenger cars and a Benefit-Cost Ratio for mandating ESC for these vehicles of greater than one.
- As a net importer of vehicles, harmonised vehicle standards with an international approach to mandating effective safety technologies is important to Australia.
- Therefore, Australia proposes that ESC be mandated for N_1 vehicles through Regulation 13. This would be in line with actions already taken by the European Union and the United States.

II. Proposal

Paragraph 5.2.1.32., be amended to read:

"5.2.1.32. Subject to the provisions of paragraph 12.4. of this Regulation, all vehicles of the following categories shall be equipped with a vehicle stability function:

(a) M_2, M_3, N_2 12/ ;

(b) N_3 12/ having no more than 3 axles;

(c) N_3 12/ with 4 axles, with a maximum mass not exceeding 25 t and a maximum wheel diameter code not exceeding 19.5**;**

(d) N_1 having no more than 3 axles.

For vehicles of categories M_2, M_3, N_2 and N_3 the vehicle stability function shall include roll-over control and directional control and meet the technical requirements of Annex 21 to this Regulation. **For vehicles of category N_1 the vehicle stability function shall include at least directional control and meet the technical requirements of Annex 21 to this Regulation.**"

Paragraph 5.2.1.33. be deleted.

Paragraph 12.4.1., the table be amended to read:

Vehicle category	Application date (as from the date after entry into force of the 11 series of amendments)	
	Contracting Parties applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 11 series of amendments	Contracting Parties applying this Regulation may refuse first national or regional registration of a vehicle which does not meet the requirements of the 11 series of amendments to this Regulation
M_2	60 months	84 months
M_3 (Class III) 22/ M_3 <16 tonnes (pneumatic transmission) M_3 (Class II and B (hydraulic transmission) M_3 (Class III) (hydraulic transmission) M_3 (Class III) (pneumatic control transmission and hydraulic energy transmission) M_3 (Class II) (pneumatic control transmission and hydraulic energy transmission)	12 months 24 months 60 months 60 months 72 months 72 months	36 months 48 months 84 months 84 months 96 months 96 months
M_3 (other than above)	24 months	48 months
N_1	**[To be determined] months**	**[To be determined] months**
N_2 (hydraulic transmission) N_2 (pneumatic control transmission and hydraulic energy transmission)	60 months 72 months	84 months 96 months
N_2 (other than above)	48 months	72 months
N_3 (2 axle tractors for semi-trailers) N_3 (2 axle tractors for semi-trailers with pneumatic control transmission (ABS)) N_3 (3 axles with electric control transmission (EBS)) N_3 (2 and 3 axles with pneumatic control transmission (ABS))	12 months 36 months 36 months 48 months	36 months 60 months 60 months 72 months
N_3 (other than above)	24 months	48 months
O_3 (combined axle load between 3.5 - 7.5 tonnes) O_3 (other than above)	48 months 36 months	72 months 60 months
O_4	24 months	36 months

22/ Class III as defined in Regulation No. 107.

III. Justification

The 11 series of amendments to Regulation No. 13 introduced a mandatory requirement for certain categories of M_2, M_3, N_2, N_3, O_3 and O_4 vehicles to be equipped with a vehicle stability function. For light vehicles, requirements for Electronic Stability Control (ESC) based on Global Technical Regulation (GTR) No. 8 were implemented through Supplement 7 to the original series of Regulation No. 13-H. This was done on an optional basis, by allowing a choice of whether to mandate ESC via the nominated level of the regulation adopted by each Contracting Party (i.e. approvals could still be granted to the Supplement 6 level). However, in the case of N_1 category vehicles, Contracting Parties that are signatories to both Regulations 13 and 13-H recognise approvals to either regulation as equally valid. The effect of this is that N_1 is the only powered category covered by these regulations for which ESC cannot be mandated as it can be certified to Regulation 13 instead of 13-H.

N_1 category vehicles (light commercial vehicles (LCVs)) were not considered during the development of the amendments to Regulation No. 13. It is understood that the informal group decided that the focus for Electronic Vehicle Stability Control under this regulation should only be on heavy vehicles. This view is documented in the report of the 58th GRRF session (TRANS/WP.29/GRRF/58). It may also be the case that it was recognised at the time that ESC was more problematic for LCVs than for passenger cars, due to the complexity of cab-chassis configurations and mass distribution effects. This aspect is perhaps best reflected in a paper presented by Bosch at the 2007 Enhanced Safety of Vehicles Conference (paper number 07-0269) which describes the additional design considerations needed to deal with the specific characteristics of LCVs.

In 2010 Australia applied twenty nine UNECE regulations, demonstrating its increasing commitment to the 1958 Agreement. In addition, many other Australian regulations are aligned with UNECE regulations, such as Regulations 13 and 13-H under its braking rules, in terms of accepting them as alternative standards to its domestic requirements. In 2009 Australia mandated ESC for passenger cars, adopting the UNECE timetable under Regulation 13-H. It is now reviewing the case for LCVs and heavy vehicles. At the time of implementing the requirements, the full scope of GTR 8 (which included LCVs), was not adopted in part due to the technical issues as detailed above. Locally, industry did not support mandating ESC for LCVs because the technology was unavailable on most of these vehicles and it was claimed that the extensive range of load-carrying configurations made ESC calibration difficult. Just as importantly, from an effectiveness point of view, there were no direct estimates available for the effectiveness of ESC for LCVs.

The latest sales data shows that LCV sales now account for almost 20 per cent of new vehicle sales in Australia, having risen from 13 per cent in 2000. During this same period, passenger vehicle sales decreased from 83 per cent to 77 per cent of all new vehicles sold. The use of LCVs for private purposes has also grown, suggesting these vehicles are increasingly being used as de facto passenger cars. This can also be observed in the United States, where light trucks represent around 50 per cent of the "passenger car" fleet.

Recent market information also makes it clear that industry has worked through any earlier issues with the technology and in Australia ESC is becoming more common in LCVs. In 2009, between 8 per cent and 27 per cent of LCVs sold in Australia (depending on whether base or top variant models were purchased) were fitted with ESC as standard equipment. A list of LCV models available in Australia with ESC as standard or optional equipment is included at Attachment A. In addition, a recent Australian study into the likely safety benefits of ESC for LCVs indicated a positive case for mandating ESC for these types of vehicles. An effectiveness of ESC for LCVs was estimated using real-world Australian crash data. While not statistically significant due to sample size, an estimate tended towards at least the same effectiveness as for passenger cars. When this was supplemented with a review of the effectiveness from international studies, it resulted in a point estimate of 32 per cent for LCVs in terms of a reduction across all crash severities in crash types where ESC is likely to have an influence.

In Australia, crashes involving LCVs increased from approximately 13,000 to approximately 19,000 per year over the period 2001 to 2008. During this same period, an average of around 450 people were killed or seriously injured in LCVs each year. Using the effectiveness point estimate of 32 per cent, it was estimated that the fitment of ESC to LCVs would result in savings of $3.1 billion over 30 years, associated with reductions in fatalities, injuries and property damage. Assuming a cost of $450 for an ESC system, this gave a Benefit-Cost Ratio (BCR) of 2.34. A sensitivity analysis was conducted and showed that the BCR remained greater than one even when the effectiveness was reduced to 16 per cent. An excerpt from the study is included at Attachment B (the full report can be obtained by emailing Steven Hoy at Steven.Hoy@infrastructure.gov.au).

Given the increase in the use of LCVs and the findings of this study, Australia is now considering the case for mandating ESC for LCVs in line with actions already taken by jurisdictions such as the European Union and the United States.

A harmonised approach to mandating vehicle standards is important to countries such as Australia, which imports around 85 per cent of its new vehicles but represents only around 1 per cent of global vehicle production. While harmonising the technical requirements of standards is a fundamental part of this, as increasingly a net importer of vehicles Australia relies on its trading partners to mandate these standards so as to minimise the costs of requiring compliance solely for the Australian market. With a large proportion of Australia's LCVs imported from Asia it becomes very important for UNECE regulations to mandate ESC for LCVs beyond the markets of Europe and the United States. Therefore, Australia requests that GRRF consider the proposed amendments to mandate ESC for LCVs.

Attachment A – List of light commercial vehicles available in Australia with ESC

- Citroen Berlingo 2
- Citroen Dispatch
- Ford Falcon Ute
- Ford Transit
- Ford Transit C/C
- Holden Utility 4X2
- Holden Utility 4X4
- Hyundai iLOAD
- Mercedes-Benz Vito
- Mitsubishi Triton 4X2
- Mitsubishi Triton 4X4
- Peugeot Expert
- Peugeot Partner
- Ssangyong Actyon Sports 4X4
- Volkswagen Amarok
- Volkswagen Caddy
- Volkswagen Transporter

Attachment B – Excerpt from the Australian Monash University Accident Research Centre (MUARC) study on ESC for light commercial vehicles

As part of the work program funded by the Used Car Safety Ratings (UCSR) program sponsors, MUARC undertook an evaluation of ESC in Australasia, the results of which were published in Accident Analysis and Prevention (2008). The Scully and Newstead (2008) study formed the basis of the updated benefit calculations presented in Table 3.2. For the purposes of this report, we present the estimated effectiveness for all crashes, given that the rationale is to feed into the regulatory review agenda.

Following the original ESC evaluation in 2008, Scully and Newstead (2010) used three additional years of crash data (2006-2008) to further disaggregate the total fleet to determine the benefit, if any, of ESC for passenger cars, 4WD vehicles, and of direct relevance here, the effectiveness of ESC for light commercial vehicles. The statistical methods used to derive these effectiveness estimates is as per Scully and Newstead (2008) and these methods are not presented here for sake of brevity.

Table 3.2 presents the estimates of effectiveness of ESC in reducing the risk of all types of crashes (excluding rear impacts) for commercial vehicles and 4WD vehicles derived from the updated USCR database. None of the estimates of effectiveness for commercial vehicles were statistically significant and the low quantity of data meant that the estimated reduction in serious injury crashes was not calculated for commercial vehicles. This is the result of only 442 vehicles in the crash database being fitted with ESC. While not statistically significant, there was an indicative reduction in driver injury by 29.28% associated with ESC, with the 95% confidence bands suggesting that this could range from a reduction as high as 62% to a 32.8% increase. These estimates have been adjusted for year of manufacture and vehicle market class, as explained by Scully and Newstead (2008).

Table 3.2 Estimated percentage reduction in crash occurrence attributable to ESC

	# vehicles	% Crash reduction			95% CL	
	with ESC	Unadjusted	Adjusted	Stat. sig.	Lower	Upper
Commercials only						
All severities	365	11.43	10.31	0.535	-11.34	27.75
Driver injury	42	30.54	29.28	0.281	-32.78	62.33
Driver ser. inj.	***	***	***	***	***	***
4WDs only						
All severities	4,210	14.30	12.79	<0.001	5.89	19.19
Driver injury	566	43.66	34.04	<0.001	18.23	46.79
Driver ser. inj.	64	24.31	6.01	0.902	-151.18	64.83

Source: Scully & Newstead (2010)

Estimates of effectiveness for 4WDs showed that ESC was associated with a significant 12.8% reduction in crashes of all severities and a 34.0% reduction in driver injury crashes. The estimate of the reduction in driver serious injury of 6% was not statistically significant.

It is clear then that there is insufficient Australian crash data available at present to derive a statistically reliable effectiveness value of ESC for light commercial vehicles. There was however some evidence of benefit for 4WD vehicles. While it could be assumed that the general vehicle dynamics and the high centre of gravity of the commercial vehicles and the 4WD vehicles are comparable, this remains uncertain. To derive an effectiveness estimate of ESC for light commercial vehicles additional years of crash data is required.

The overall likely effectiveness of ESC in reducing road trauma for use in this report

Based on the literature review and the limited information available in the Australian context specific to light commercial vehicles, it was determined that a benefit reduction value of 32% across all crash severities where ESC is likely to be relevant is most appropriate. To supplement this, a sensitivity analysis with a lower benefit value of 16% and an upper benefit value of 45% is to be undertaken in this report.

Confidence in these values can be derived in the selected range of 16% - (32%) - 45% given that:

a) the point estimate of 32% is comparable to:

   a. the currently available 'best' driver injury crash reduction benefit estimate of 29.28% for commercial vehicles in Australia (Section 3.2);

   b. the observed 34% reduction benefit in serious injury for 4WD vehicles in Australia (Section 3.2);

   c. the reported 34% benefit for 'all fatal crashes' in a European study (Sferco et al, 2001);

   d. the reported 32% benefit for 'ESC sensitive crashes' in a German study (Kreiss et al, 2005);

   e. the reported 31.5% benefit for 'all crashes in a wet road' in a Swedish study (Lie et al, 2004);

   f. the lower bound of the reported (32%) benefit for multiple vehicle crashes in the US (Farmer et al., 2006);

b) the point estimate is lower than the mean reduction value of 40% for all studies reviewed in Table 3.1;

c) the lower bound (16%) is the lowest reported benefit for 'all injury crashes' (Lie et al., 2006) of the studies reviewed in Table 3.1, and

d) the upper bound (45%) is the highest reported benefit for 'all injury crashes' (Becker et al., 2003) of the studies reviewed in Table 3.1.

It is recognised that these benefit values include effectiveness values relating to passenger cars and 4WD's, as well as light commercial vehicles. In lieu of this, we examined the crash profile by urban / rural location and speed zone to assess comparability in the crash distribution across vehicle types. Data for 1,079,098 drivers (rural: 19%, n = 209,436) involved in a police-reported crashes in the period 2001 to 2008 inclusive in New South Wales (NSW), Queensland (QLD), South Australia (SA), Victoria (Vic), Western Australia (WA) and New Zealand (NZ) were examined with the results presented in Figure 3.1.

Of 1,079,098 vehicles involved in all crashes (irrespective of severity) in the period (80.5% urban), 83.5% were passenger cars (n = 901,167; 80% urban), 7.6% were 4WD vehicles (n = 82,026; 75% urban) and 8.9% were light commercial vehicles (n = 95,905; 72% urban). As can be observed in Figure 3.1, the distribution across urban / rural location and speed zone were similar, however there was a somewhat higher proportion of light commercial vehicles involved in crashes occurring on 100 km/h rural roads (7.7%) than 4WD vehicles (5.6%) and passenger cars (4.7%); the proportional difference is even greater in the 110 km/h rural locations. Notably, 41.4%, 37% and 34.6% of passenger car, 4WD and light commercial vehicle injury crashes, respectively, occur in metropolitan locations on 60 km/h roads.

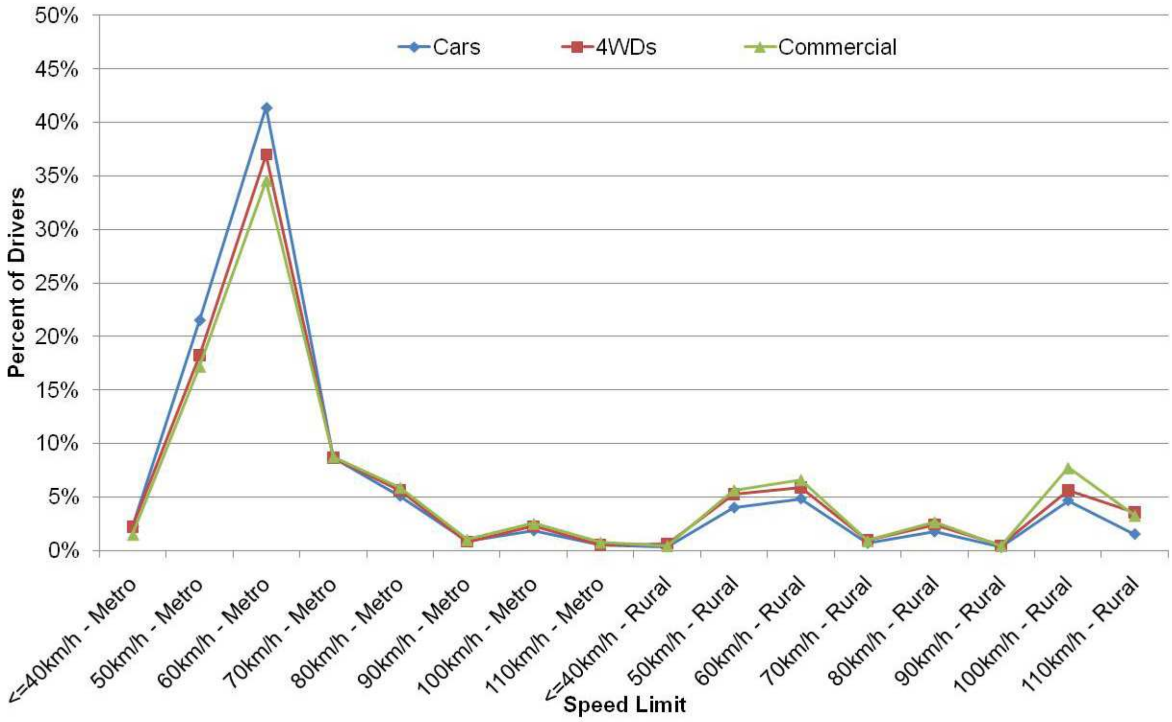

Figure 3.1 Passenger car, 4WD and light commercial vehicle crash distribution by urban and rural location and speed zone for *all injury severities*, 2001-2008.

Figure 3.2 presents the crash distribution by urban / rural location by speed zone for serious injury 24,868 crashes for passenger cars (n = 20,864, 80%), 4WD (n = 1,712, 7%) and light commercial vehicles (n = 2,292, 9%). The crash distribution is different to that for 'all severities' observed in Figure 3.1, with peaks in crash-involved vehicles in urban 60 km/h zones and rural 100 km/h zones. One-fifth (21.6%) of passenger cars involved in serious injury crashes occurred in urban locations on 60 km/h speed limit posted roads, while 15.2% and 12.5% of crash-involved 4WD and light commercial vehicles, respectively, occurred in these types of locations.

Crashes in rural locations clearly represent a significant contribution to the number of serious injury and fatality crashes. Approximately one-third of passenger car serious injury crashes occurred in rural location on roads with a posted limited of 100 km/h or 110 km/h, while 42.8% of 4WD and 46.5% of light commercial vehicle serious injury crashes occurred on rural roads with a posted limit of 100 km/h or 110 km/h.

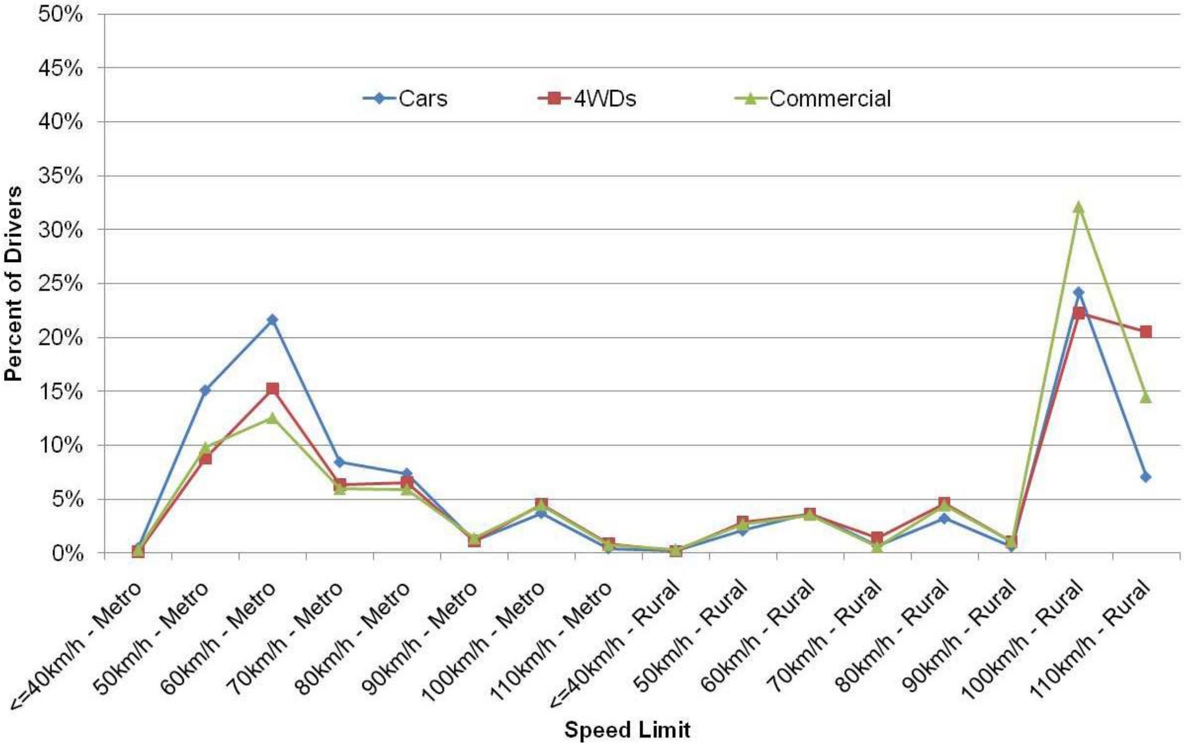

Figure 3.2 Passenger car, 4WD and light commercial vehicle crash distribution by urban and rural location and speed zone for *serious injury (+fatality) crashes*, 2001- 2008.

The differential crash distribution of passenger cars, 4WD and light commercial vehicles at the more severe injury level has implications for method and interpretation of the benefit analysis reported here. It would be optimal to disaggregate total crash numbers by severity level and apply an ESC location and speed zone specific benefit value however this is not possible at this time due to a lack of Australia specific ESC benefit information.

There are two points to be made here:

1. the general distribution of crashes across vehicles types is *relatively* similar, and

2. by using a 'flat' ESC benefit estimate and not considering the crash distribution for light commercial vehicles, it is likely that the benefit estimates derived here are conservative, particularly if the high benefit estimates for ESC were to hold for light commercial vehicles in the high speed zones where the benefits of ESC would likely to be the greatest given the findings of international research.