

Proposed Amendments to the Australian Design Rules Pertaining to Mandation of Event Data Recorders in Australian Sold Vehicles

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Abstract

In 2016, 1295 lives were lost and 32,300 injuries suffered on Australian roads, an annual cost of \$33 billion. (Litchfield, 2017) Collisions are analysed by experts to determine causation including driver behaviour, speed, vehicle safety and road design. Criminal prosecutions and coronial investigations rely on collision expert findings. Collision investigation includes analysis of Event Data Recorders (EDR). EDR's have capability of recording pre-crash data including speed, braking and acceleration, Currently, no Australian legislation exists mandating that vehicles be fitted with EDR or that stored data be accessible. Such legislation would enhance collision causation analysis, increasing road safety and reducing road trauma.

Background

The use of EDR data has increased significantly since 2006. Information stored in EDRs can include pre-crash data such as vehicle speed, steering input, braking, acceleration and engine RPM. Figure 1 is an example of available pre-crash data that may be stored in EDR. Stored data also includes speed change (ΔV) up to 300 milliseconds post collision. Such information provides collision analysts the ability to calculate impact speeds and reliably determine causation. Physics allows the EDR data from one vehicle to be used to determine the speed and behaviour of other vehicles involved in the collision that don't have EDR.

Pre-Crash Data -5.0 to -0.5 sec (Event Record 1)

Times (sec)	Accelerator Pedal, % Full (Accelerator Pedal Position)	Service Brake (Brake Switch Circuit State)	Engine RPM (Engine Speed)	Engine Throttle, % Full (Throttle Position)	Speed, Vehicle Indicated (Vehicle Speed) (MPH [km/h])
-5.0	14	Off	1344	27	25 [40]
-4.5	18	Off	1408	33	25 [40]
-4.0	20	Off	1344	32	25 [41]
-3.5	31	Off	1344	44	26 [42]
-3.0	0	On	1728	23	27 [43]
-2.5	0	On	1408	15	27 [43]
-2.0	0	On	1216	15	25 [40]
-1.5	0	On	1088	14	22 [36]
-1.0	0	On	1088	14	19 [31]
-0.5	0	On	1024	14	18 [29]

Figure 1. 5.0 seconds pre-crash data from 2016 Holden Commodore

EDR in Australia

Within Australia, the only commercially available EDR reader is the Bosch Crash Data Retrieval (CDR) tool. In Australia, Bosch CDR supported vehicles are typically limited to Holden, Jeep and Toyota vehicles. In the USA, around 2500 vehicle models are supported by Bosch CDR including Nissan, Mazda, Mercedes Benz and BMW. Australia has less than 200 vehicle models supported by the same technology (Bosch, 2019). Despite being manufactured by the same company as the

USA counterparts, most vehicles sold in Australia are not supported because there is no legislative requirement. Alternative tools available internationally can successfully retrieve data from Australian sold Hyundai and Kia vehicles. The tool isn't available to law enforcement agencies in Australia.

Australian Design Rules

The Motor Vehicle Standards Act (MVSA) sets national uniform standards for vehicles entering the Australian market, primarily through Australian Design Rules (ADR) and Road Vehicle Certification System (RVCS). The Federal Chamber of Automotive Industries (FCAI) are a group of vehicle manufacturers whose mission is to promote the development and implementation of effective and well designed policy including vehicle design and safety. The FCAI support harmonisation of the ADR's to the United Nations (UN) and the subject of EDR regulation has been raised but given low priority due to development of autonomous vehicle technology (Federal Chamber of Automotive Industries, n.d.).

International Legislation

The enormous value of EDR data in collision investigation and vehicle safety has been recognised internationally. In 2011, Title 49 Part 563 of the Code of Federal Regulations, managed by the National Highway Traffic Safety Administration (NHTSA), was enacted in the USA (NHTSA, 2006). The legislative change mandated that all vehicles sold in the USA that have EDR fitted and are capable of recording data, must have such data available for download to assist collision investigation. The legislation stipulates that data must be in useable format and accessible by commercially available CDR tools. A selection of data available in accordance with Part 563 is shown in Table 1. The European Union (EU) is set to introduce similar rules in the EU from 2021.

Table 1. Part 563 EDR mandated data USA

Data element	Recording interval time (relative to time zero)	Data sample rate (samples per second)
Delta-V, longitudinal	0 to 250 ms	100
Maximum delta-v, longitudinal	0-300 ms or 0 to end of event	N/A
Time, maximum delta-v	0-300 ms or 0 to end of event	N/A
Speed, vehicle indicated	-5.0 to 0 sec	2
Engine throttle, % full	-5.0 to 0 sec	2
Service brake, on/off	-5.0 to 0 sec	2
Ignition cycle, crash	-1.0 sec	N/A
Safety belt status, driver	At time of download	N/A
Frontal air bag warning lamp, on/off	-1.0 sec	N/A
Multi-event, number of event(s)	Event	N/A
Time from event 1 to 2	As needed	N/A
Complete file recorded (yes, no)	Following other data	N/A

Conclusion

Road trauma is one of the highest ranked public health issues, nationally. Collision investigation is imperative to law enforcement and road safety. EDRs are pivotal in determining why collisions occur. Harmonisation of EDR regulations internationally with parity between Part 563 of the Code of Federal Regulations, USA and the ADR would increase the ability for collision analysts to determine criminal negligence and reduce road trauma, paving the way towards zero.

References

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