



National enforcement guidelines for automated vehicles

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National Transport Commission

Outline

Title	National enforcement guidelines for automated vehicles
Type of report	Guidelines
Purpose	To assist police to enforce road traffic laws in relation to automated road vehicles.
Abstract	These national enforcement guidelines provide guidance about how the requirement of <i>proper control</i> in Australian Road Rule 297 should apply to vehicles with automated functions. The guidelines also confirm that the human driver is responsible for compliance with road traffic laws when a vehicle has conditional automation engaged at a point in time.
Key words	Vehicle with automated functions, national enforcement guidelines, Australian Road Rules
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1. Purpose

The purpose of these national enforcement guidelines is to:

1. provide guidance about how the requirement of *proper control* in Australian Road Rule 297 should apply to vehicles with automated functions
2. confirm that the human driver is responsible for complying with road traffic laws when a vehicle has conditional automation engaged at a point in time.

Australia's road traffic laws are based on the principle that the driver is in control of the vehicle. In the road rules, *drive* is defined to include 'be in control of'. The road rules have a performance-based requirement that a driver exercises *proper control* of the vehicle. Road Rule 297(1) states:

A driver must not drive a vehicle unless the driver has proper control.

These concepts of *control* and *proper control* are challenged by emerging technologies that are doing more of the driving, with humans monitoring the vehicle and acting as the fallback.

Guidelines are therefore needed to clarify the application of the current law to vehicles with automated functions.

2. Objectives

These national enforcement guidelines have been developed to:

- support road safety outcomes
- be consistently adopted by all states and territories
- be technology-neutral
- provide police with clear guidance about how Road Rule 297 and the requirement of *proper control* should apply to vehicles with automated functions
- confirm that the human driver is responsible for complying with road traffic laws when a vehicle has conditional automation engaged at a point in time
- be updated and kept relevant to ensure they reflect judicial interpretations of control, changes in legislation and developing technology
- have regard to all levels of driving automation in the longer term
- assist road transport agencies when considering the consequences of granting exemptions from traffic laws
- not affect current rules for drivers of non-automated vehicles.

3. Scope

These guidelines have been drafted for immediate use and are not reliant on any legislative amendments. The guidelines provide police with guidance only and do not fetter police discretion to determine *proper control* based on the particular circumstances of each case.

3.1 Matters in scope

These guidelines are limited to current road traffic laws only.

In relation to *proper control* in Road Rule 297, these guidelines provide examples of behaviours that indicate *proper control* for the following:

- vehicles that do not have any level of automation engaged at a point in time
- vehicles with driver assistance (Level 1)¹ and partial automation (Level 2) where the human driver performs part of the dynamic driving task
- vehicles with conditional automation (Level 3) where the human driver must be ready to respond to vehicle system failures and requests to take over the driving task.

3.2 Matters out of scope

The guidelines **do not** extend to civil liability or criminal responsibility for a crash or road trauma.

These guidelines **do not** currently provide examples of behaviours that indicate *proper control* for the following:

- Vehicles operating at high automation (Level 4) because these vehicles are not anticipated to be commercially released on the market until 2020 and vehicles operating at full automation (Level 5) because these vehicles are not anticipated to be commercially released on the market for the foreseeable future.

Guidelines for vehicles at these levels of automation will be considered when changes to road traffic laws recognise that the driver of a vehicle could be an automated driving system, with an entity responsible for the actions of the automated driving system. These reforms are not likely to be fully implemented in Australia until around 2020.

- Vehicles and automated features that cannot operate on public roads without a permit or exemption(s) from the road traffic laws such as low-speed driverless passenger shuttles and remote parking assistance features.

At the time of publication of these guidelines, remote parking assistance features are not being introduced into the Australian market because they cannot operate without an exemption. By way of example, Road Rule 213 (which is an offence provision) requires the driver to apply the parking brake effectively before leaving the vehicle. Road Rule 213 cannot be complied with when the remote parking assistance feature is engaged. As such, remote parking assistance features cannot currently legally operate on public roads in Australia.

If a permit or exemption(s) from the road rules is given, police will have regard to the requirements in the permit or exemption notice. The requirements outlined in an exemption or permit notice could be guided by the national enforcement guidelines and could include some of the indicators provided in the guidelines.

¹ These national enforcement guidelines adopt the levels of driving automation in SAE International Standard J3016, *Taxonomy and Definitions of Terms Relates to Driving Automation Systems for On-Road Motor Vehicles*. These levels have been summarised in section 4 of these guidelines.

4. Levels of driving automation

A number of vehicles on our roads are equipped with driver assistance, partial automation and parking assistance. The number of vehicles with automated functions (and the range of automated functions) will likely increase.

Manufacturers use different terminology when referring to the automation capability of their vehicles. These guidelines adopt the levels of driving automation set out in SAE International Standard J3016 (SAE J3016), *Taxonomy and Definitions Related to Driving Automation Systems for On-Road Motor Vehicles*. These levels of driving automation are based on the diminishing role of the human driver in performing the driving task.

An adaption of SAE J3016, grouped according to the interaction expected of the human driver (together with examples), is detailed in Table 1.

Table 1: Summary of the levels of driving automation

SAE J3016 level	Description	Example(s)
Human-driven vehicles		
Level 0 – No driving automation	The entire driving task is performed by the human driver, even when enhanced by active safety systems. ²	Many vehicles currently operate at Level 0 automation. These vehicles may still have features such as forward collision warning.
Level 1 – Driver assistance	The driving automation system ³ may take control of steering <i>or</i> acceleration and braking (speed), but the human driver is responsible for the rest of the driving task.	Adaptive cruise control (speed) <i>or</i> active lane control (steering). Many new vehicles have adaptive cruise control. Active lane control is less prevalent.
Level 2 – Partial automation	The driving automation system may take control of all of the steering, acceleration and braking in defined circumstances, but the human driver must continue to monitor the driving environment and the driving task, and intervene if required.	Controls steering and speed simultaneously. Some vehicles with these features are currently available on the market.
Vehicles capable of automated operation		
Level 3 – Conditional automation	The automated driving system (ADS) ⁴ drives the vehicle for sustained periods of time. The human driver does not have to monitor the driving environment or the ADS but must be receptive to any system failures and intervene if requested and be the fallback driver for the dynamic driving task.	At the time of publication of these guidelines, there are no vehicles on the market operating at conditional automation. However, such vehicles are likely to be on the market in the near future. These vehicles could operate without legislative amendments, permits or exemptions.
Level 4a – High automation	The ADS drives the vehicle for <i>sustained periods of time in some situations</i> , and no human driver is required to monitor the driving environment and the driving task, or to intervene, when the ADS is driving the vehicle. In other situations, a lower level of automation may be engaged.	At the time of publication of these guidelines, there are no vehicles on the market that operate at this level of automation.

² *Active safety systems* are vehicle systems that sense and monitor conditions inside and outside the vehicle for the purpose of identifying perceived present and potential dangers.

³ The *driving automation system* means the hardware and software that are collectively capable of performing *part or all* of the dynamic driving task on a sustained basis.

⁴ The *automated driving system* means the hardware and software that are collectively capable of performing the *entire* dynamic driving task on a sustained basis.

SAE J3016 level	Description	Example(s)
Vehicles with dedicated automation		
Level 4b – High automation	The ADS drives the vehicle <i>all of the time in defined places and conditions</i> , and no human driver is required to monitor the driving environment and the driving task, or to intervene, when the ADS is driving the vehicle.	At the time of publication of these guidelines, there are no vehicles on the market that operate at this level of automation. Examples include low-speed driverless passenger shuttles, which cannot currently operate on public roads in Australia without an exemption or permit. These shuttles do not have a steering wheel or a driver's seat and therefore are likely to be used as a passenger transport service rather than for private use.
Level 5 – Full automation	All aspects of the driving task and monitoring of the driving environment and driving task are undertaken by the ADS. The vehicle can operate in automated driving mode on all roads at all times.	At the time of publication of these guidelines, there are no vehicles on the market that operate at this level of automation.

Automated parking assistance features

Automated parking assistance features are also starting to emerge. Such features allow the vehicle to undertake the entire parking task (including one or more of angle, parallel and perpendicular types of parking). Some manufacturers also provide a remote capability using an app in a smartphone or the key fob, where the driver must be near, but not in, the vehicle.

Vehicles with parking assistance (with the driver remaining in the vehicle) and remote parking assistance (with the driver supervising in close proximity) are examples of features at Level 2 automation. When these automated parking assistance applications are engaged, there must be a human driver supervising the parking function, even if this is done remotely using a hand-held control.

5. Responsibility for compliance with road traffic laws and examples of behaviours indicating *proper control*

Table 2: Guidelines by level of driving automation

Level of automation			Examples of behaviours that indicate <i>proper control</i>			
Level of automation	Who is undertaking the driving task?	Responsibility for compliance with road traffic laws (who is in control?)	At least one hand on the steering wheel	Seated in the driver's seat	Alert enough to resume the entire driving task if requested or if there is an evident vehicle system failure (e.g. eyes open, checking the external environment)	Not reading or viewing a device or thing unrelated to navigation or driving (existing restrictions on mobile phones and visual display units continue to apply)
When there is no driving automation system engaged at a point in time	Human driven The human driver performs the entire driving task.	Human in control and responsible for compliance with road traffic laws The human driver performs the entire driving task although there may be active safety systems (that warn or intervene during a high-risk event or maneuver).	Yes	Yes	N/A The driver is always responsible for the entire driving task.	Yes The driver must not engage in any activity other than driving.
Level 1 – driver assistance (steering or braking and acceleration control)	Human driven The human driver performs the majority of the driving task.	Human in control and responsible for compliance with road traffic laws The human driver is required to perform all or part of the driving task.	Yes	Yes	Yes	Yes The driver must not engage in any activity other than driving.
Level 2 – partial automation (steering, acceleration and braking control)	Human driven The driving automation system cannot perform the entire driving task for a sustained period without a human in the loop to monitor the system.	Human in control and responsible for compliance with road traffic laws The human driver is required to perform all or part of the driving task.	Yes	Yes	Yes	Yes The driver must not engage in any activity other than driving.

Level 2 – partial automation (parking assistance – driver remains in driver’s seat)	Driving task shared between the system and the human driver The driving automation system performs the parking task and the driver is responsible for object detection and intervenes if an obstacle enters the vehicle’s path.	Human in control and responsible for compliance with road traffic laws The human driver is required to perform all or part of the driving task.	No	Yes	Yes	Yes The driver must not engage in any activity other than supervising the system.
Level 3 – conditional automation	System capable of operating the vehicle The ADS can perform the entire driving task for a sustained period without a human monitoring the system, but the human is expected to intervene with the driving task if requested or if there is an evident vehicle system failure.	Human in control and responsible for compliance with road traffic laws The ADS entity is not currently recognised in legislation and therefore cannot be in control. The human driver is not required to perform any of the driving task while the ADS is engaged but has a fallback role.	No	Yes	Yes	Yes While not driving, the human driver must not engage in activities that prevent him or her from responding to takeover demands, are not in line with the intended use of the automated driving function or are prohibited by law.

These guidelines should be read in conjunction with the following principles:

1. Where a vehicle is capable of more than one level of automation, the relevant indicators are those that apply to the level of automation engaged.
2. Drivers must comply with road traffic laws unless they have an exemption, including prohibitions on use of visual display units and mobile phones.
3. Drivers should comply with the manufacturer’s requirements for the operation of the vehicle, unless they conflict with a relevant road traffic laws.
4. Drivers should adapt their behaviour based on the degree to which their vehicle’s automated functions are being used at any given moment according to the designed and given capabilities and limitations of the system.
5. Drivers should adapt their behaviour depending on the road conditions.

6. Enforcement agency interaction with automated vehicles

Under current laws it is not possible to mandate physical signals on vehicles with automated functions to indicate whether an automated application is engaged at a particular time. Given current practice and indications from international developments, it is unlikely that manufacturers will provide such identification. There is also currently no requirement for the driver or manufacturer to provide access to information about whether or not an automated function is engaged, although it may be obtained via subpoena or summons.

Vehicle registration data, including information on the National Exchange of Vehicle Data and Information Service, is likely to include fields relating to the level of driving automation, or relevant automated functions (such as traffic jam assist) as part of future changes to registration systems and processes. This work will be progressed as part of the safety assurance system for automated vehicles project and is scheduled to be implemented by 2020. As such, a vehicle's registration data could provide an avenue for obtaining information about a vehicle's automated functionality.

6.1 How a human driver could demonstrate vehicle automation was engaged and the level of automation engaged

In determining whether there has been a breach of Road Rule 297, police officers must satisfy themselves that a driver of a vehicle did not have *proper control*. This may be based on observed behaviour. As a defence, the driver of an automated vehicle could claim they had *proper control* because of the automated function engaged at the time of the observed behaviour and the vehicle was operating in compliance with the road traffic laws.

In this situation there is no onus on police officers to determine whether a vehicle has a level of automation engaged at a point in time. Rather, the onus is on human drivers (or registered operators for camera-related offences) to provide evidence that a vehicle is automated and the level of automation engaged.

A human driver could demonstrate vehicle automation was engaged – and the level of automation – at a given point in time in the following ways:

- a statement made by the driver
- provision of the driver's manual, which is prepared by the manufacturer and contains a description of the vehicle's automated capabilities and how they should be used safely
- provision of information available to the driver about the make and model of the vehicle and its capabilities
- allowing visual observation of the in-vehicle dashboard screen that provides information about safe driving behaviours.

For example:

- An officer observes a driver in a vehicle turned to face the front-seat passenger without any hands on the steering wheel. The vehicle appears to be driving safely. The officer believes the driver may not have *proper control* of the vehicle and indicates the driver to pull over.
- The driver provides evidence that the vehicle is an automated vehicle operating with Level 3 automation, and therefore the observed behaviour is safe. The evidence includes the driver's manual and information contained on the in-vehicle dashboard screen.

- For this reason, the driver explains that he or she does not need to have any hands on the steering wheel or to be directly focused on the road because the vehicle controls the steering, acceleration and all other aspects of the driving task.
- On the basis of this information, the officer could apply the guideline behaviours in Table 2 to make an assessment of whether the driver had *proper control* of the vehicle.
- If a driver disagrees with the officer's assessment, he or she could elect to go to court to challenge any infringement notice or charge. In court, the prosecution would need to show why the driver did not have *proper control* by outlining the actions of the vehicle and the behaviour of the driver. In defence, the driver could argue that he or she did have *proper control* and his or her behaviour was appropriate for the level of automation that was engaged at the time of the alleged offence.

6.2 Other offences that may apply instead of a breach of Road Rule 297

Lack of *proper control* may also be indicated by:

- on-road behaviour that is addressed by specific traffic offences (such as, for example, changing lanes without indicating appropriately)
- a collision or crash that may be indicative of more serious offences (such as, for example, failing to exercise due care and attention or dangerous/negligent driving). These offences will require a case-by-case consideration of the duty of care and the way the driver discharged that duty. This will allow a full range of driver behaviours to be considered, including what was reasonable in the circumstances for the level of automation engaged.

A breach of Road Rule 297 should be considered when on-road observations show:

- the driver does not comply with the indicators of *proper control* outlined in Table 2,
and
- no specific traffic offence (or a more serious offence) applies.