



## Section B

# Transmissions

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# Section B — Overview

## 1. Description

This section of Vehicle Standards Bulletin 6 (VSB6) relates to the fitting of replacement transmissions to heavy vehicles and should be used in conjunction with other relevant sections of VSB6.

It applies to all heavy vehicles and consists of the following modification code:

<b>B1</b>	<b>Transmission substitution or additional fitting</b>
	<ul style="list-style-type: none"><li>• minimum installation and performance requirements for replacement manual or automatic transmissions on heavy vehicles</li><li>• fitting of ancillary and transfer transmissions, transfer cases or power take offs (PTOs)</li><li>• altering of transmission gear ratios.</li></ul>

## 2. Related Australian Design Rules

The Australian Design Rules (ADRs) relevant to this section include:

ADR no.	Title
18, 18/..	Instrumentation
28, 28A, 28/.., 83/..	External Noise of Motor Vehicles
35, 35A, 35/..	Commercial Vehicle Brake Systems
42/..	General Safety Requirements
65/..	Maximum Road Speed Limiting for Heavy Goods Vehicles and Heavy Omnibuses

## 3. Record keeping

The person responsible for certifying the modification should:

- collate complete records, including drawings, calculations, test results and copies of the appropriate issue of Australian Standards and ADRs
- retain the records for a minimum of seven years after commissioning of the modified vehicle
- make the records available upon request for inspection by officers of the relevant federal, state or territory authority or heavy vehicle regulator.

### Reports and checklists

The person responsible for certifying the modification must complete and record the following report and checklist as applicable:

B1 Checklist	Transmission substitution or additional fitting
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## 4. Design requirements



### Advanced braking systems

Advanced braking systems are an important safety feature fitted to many new vehicles.

Advanced braking systems are programmed by the vehicle manufacturer and are specific to the vehicle to which they are fitted. Changes made to the vehicle, such as engine, tyre size, steering control, suspension characteristics, vehicle mass and its distribution, may impact the performance of the advanced braking system.

Exercise extra caution when modifying vehicles fitted with advanced braking systems. Electric braking systems may be known as:

- electronic stability control (ESC)
- electronic stability program (ESP)
- vehicle stability control (VSC)
- dynamic stability control (DSC)
- vehicle stability assist (VSA)
- roll stability control (RSC)
- roll control system (RCS)
- electronic braking system (EBS)
- trailer electronic braking system (TEBS).

-  Advanced braking systems and their components may be easily damaged by common modification, maintenance and servicing techniques, such as the use of rattle guns within one metre of the sensors. When undertaking any work on a vehicle fitted with an advanced braking system, ensure all modifiers are familiar with these systems and the precautions that must be taken.
-  Ensure that before undertaking any modification on a vehicle that is fitted with an advanced braking system, the modifier and approved vehicle examiner (AVE) consult with the vehicle manufacturer to determine the impact on the system.

# Modification Code B1 — Transmission substitution or additional fitting

## 1. Scope

Modifications covered under this code:

### Covered

- installation of alternative transmission
- installation of additional transmission
- installation of power take offs (PTOs)
- altering of transmission gear ratios
- conversion from manual transmission to automatic and vice versa

### Not covered

- fitting of a transmission that is rated for a lower GCM or torque than that of the vehicle.

## 2. Related standards

Modified vehicles must comply with all ADRs, Australian Standards, acts and regulations. Below are some but not all of the areas that may be affected by the modifications in this code and require certification, testing or evidence to demonstrate compliance.

The certifier must ensure that the modified vehicle continues to comply with all related ADRs.

This...	Must comply with...
Change of gear ratio	ADR 35, 35A, 35/.. (if vehicle's maximum speed is increased from below 70km/h to above 80km/h) ADR 28/.., 83/.. (as applicable) VSB6 Section S — Vehicle rating
Vehicle stability and gradeability	VSB6 Section S — Vehicle rating
Maximum road speed	ADR 65/.., VSB6 Section A— Engines
Transmission mountings	Good engineering practice
Tail shaft	VSB6 Section C — Tail shafts
Fitting of automatic transmission	ADR 42/..
Change speedometer ratio for accurate speedometer reading	ADR 18/..
Road speed limiting	ADR 65/..
Fitting auxiliary brake	VSB6 Section G — Brakes

## 3. Certification procedure

The certification procedure for this modification code is as follows:

1.	Modifier	Determine if the modification is within manufacturer specifications. <ul style="list-style-type: none"> <li>• If <b>yes</b>, the modification will need to be done in accordance with manufacturer specifications.</li> <li>• If <b>no</b>, the modification will need to be done in accordance with this modification code.</li> </ul>
2.	Modifier	Consult with an accredited B1 AVE for guidance on how to perform the modification.
3.	Modifier	Perform modification in accordance with AVE advice and this code.
4.	Modifier	Organise approval inspection by an accredited B1 AVE.
5.	B1 AVE	Perform inspection, complete B1 Checklist and determine if compliance has been achieved. <ul style="list-style-type: none"> <li>• If <b>yes</b>, proceed to step 6.</li> <li>• If <b>no</b>, do not proceed, advise modifier rework is required to ensure compliance. Return to step 2.</li> </ul>

6.	B1 AVE	Issue modification certificate, affix modification plate, and submit paperwork as required by the relevant AVE registration scheme.
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AVEs must be satisfied that vehicle modification requirements are being met. It is advised that before modifications are carried out they are discussed with the certifying AVE.

## 4. Compliance requirements

### Required:

- Comply with all ADRs applicable to the vehicle at the time of manufacture.
- Ensure all modifications are certified and performed in accordance with relevant sections of VSB6.
  - Certify all modifications to cabin or body of vehicle to the relevant sections of VSB6, in particular Modification Code K3.
  - If a transmission or engine retarder or any other auxiliary/endurance brake is fitted to the vehicle, consider effects on the tail shaft and transmission. For guidance see VSB6 Section C — Tail shafts and VSB6 Section G — Brakes.
  - Ensure that air accessories, such as shift controls or power take-off controls, are certified in accordance with the requirements of VSB6 Modification Code G6.
  - Ensure that any changes to the tail shaft have been made in accordance with the requirements of VSB6 Modification Code C1.
- Ensure all transmission modifications include an assessment of the tail shaft, even when no modification to the tail shaft is made.
- Ensure when additional gears which are isolated by the vehicle manufacturer are enabled the following is done:
  - Where the vehicle is available from the vehicle manufacturer with the additional gears enabled or the option is covered by the vehicle's RAV entry approval or manufacturer's identification plate approval, the modification is performed in accordance with the manufacturer's guidelines.
  - Where the vehicle is not available from the manufacturer with the additional gears enabled or they are not covered by the vehicle's RAV entry approval or identification plate approval, perform the modification in accordance with this modification code.

## 5. Design requirements

### Required:

- Ensure replacement transmissions have adequate torque capacity for the output of the vehicle's engine.
- Ensure the replacement transmission provides sufficient reduction to permit the vehicle, when laden to its rated gross combination mass (GCM), to meet whichever provides the lesser gradeability (typically 23%) and startability (typically 13%) requirements: the manufacturer, or VSB6 modification codes S3, S8 or S9.
- Ensure the tyres fitted to the vehicle have a speed rating equal to or exceeding the maximum speed capacity of the vehicle.
- Ensure that the vehicle's speedometer, odometer and road speed limiter accuracy have been maintained.
- Ensure the vehicle's road speed limiter accuracy is maintained and, where required, verified in accordance with VSB6 Modification Code A5.

## 6. Installation requirements

### Transmissions

#### Required:

- Ensure that fitting the replacement transmission does not require or result in removing or weakening sub-frames, chassis, cross-members or body members.
- Ensure any openings into the cabin needed for the gearshift control are adequately sealed to prevent entry of exhaust gases or road fumes into the vehicle cabin.
- Ensure that automotive type transmission mountings and suitably fabricated brackets are used to install the transmission.
- Ensure that all transmission controls are able to be operated safely from the driving position.
- Ensure that reversing lights, if fitted, operate when the reverse gear position is selected.
- Ensure that where a vehicle is fitted with an advanced safety system, such as anti-lock braking (ABS) or electronic braking systems (EBS), the transmission control unit (TCU) interfaces with the necessary safety systems (where applicable).

### Automatic transmission

#### Required:

- Ensure the transmission meets the requirements of ADR 42/.. or relevant heavy vehicle standards regulation as applicable.
  - Including the requirement that actuation of the engine start control must not cause the vehicle to move.

#### Recommended:

- Provide the transmission with a control lever mechanism with the neutral gear position located between the reverse and forward gear positions.

- Locate the park position (if applicable) adjacent to the reverse drive position.
- Make the reverse selection movement upwards, forwards or towards the left side.
- Display the transmission control lever position permanently within the cabin of the vehicle and illuminate it in conjunction with the vehicle lights.

### Power take offs (PTOs)

#### Required:

- Ensure where a PTO is installed it is installed in accordance with the PTO, vehicle, engine, transmission and tail shaft manufacturer's guidelines.
- Ensure that where supporting modifications are performed as part of the installation of the PTO that they are performed and certified in accordance with the relevant sections of VSB6.

#### Recommended:

- Ensure where a PTO can be controlled other than from the driver's normal seating position (remote control), including control of the vehicle's throttle, that the remote control is rendered inoperative unless:
  - the vehicle's transmission is in neutral; and
  - the park brake is engaged.

✎ Where the PTO interfaces with the engine, transmission or park brake system, ensure these modifications are performed in accordance with manufacturer's guidelines as well as the relevant sections of VSB6.



## B1 Checklist – Transmission substitution or additional fitting (example)

## B1 Checklist — Transmission substitution or additional fitting

➤ This checklist is for use by approved vehicle examiners (AVEs) when assessing modifications relating to transmission substitution or additional fitting

## Vehicle and modifier details

Vehicle make:	Vehicle model:	Month and year of manufacture:
VIN (if applicable):	Vehicle chassis no. (if applicable):	Vehicle modifier (company name):

## Advanced braking systems

Braking systems	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Is the advanced braking system (where fitted) un-effected or re-certified after the vehicle modification?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Modification details

Modification criteria	Check Yes, No as applicable:	Yes	No
1 Has the modification been performed in accordance with the manufacturer's guidelines?		<input type="checkbox"/>	<input type="checkbox"/>

## Substitution details

Gearbox	Applicable: <input type="checkbox"/>	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Does the replacement or additional gearbox have adequate torque capacity for output of the vehicle's engine?			<input type="checkbox"/>	<input type="checkbox"/>	
2 Has the replacement or additional gearbox been fitted without removal or weakening of sub-frames, chassis, cross members or body members?			<input type="checkbox"/>	<input type="checkbox"/>	
3 Are any openings into the vehicle (needed for the gearshift control) adequately sealed to prevent the entry of exhaust and road fumes?			<input type="checkbox"/>	<input type="checkbox"/>	
4 Does the replacement or additional gearbox provide sufficient reduction to permit the vehicle, when laden to its rated GCM, to meet manufacturer grade-ability requirements or VSB6 modification codes S3, S8 or S9 (whichever is lesser)?			<input type="checkbox"/>	<input type="checkbox"/>	
5 Are automotive type gearbox mountings used on suitably fabricated brackets?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Are all transmission controls able to be operated safely from the driving position?			<input type="checkbox"/>	<input type="checkbox"/>	

## Installation details

Automatic transmission (if applicable)	Applicable: <input type="checkbox"/>	Check Yes, No, N/A as applicable:	Yes	No	N/A
1 Does the transmission meet the requirements of Australian Design Rule (ADR) 42/.. or relevant heavy vehicle standards regulation, as applicable?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other fittings	Applicable: <input type="checkbox"/>	Check Yes, No, N/A as applicable:	Yes	No	N/A
2 Do the reversing lights (if fitted) operate when reverse gear position is selected?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Has the accuracy of the vehicle's speedometer and odometer been maintained?			<input type="checkbox"/>	<input type="checkbox"/>	
4 Are advanced safety systems such as ABS, EBS and TCU correctly interfaced?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Are air operated accessories such as shift controls or power take off controls certified in accordance with the requirements of VSB6 Modification Code G6?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Has an assessment of the tail shaft been made in accordance with VSB6 Section C – Tail shafts?			<input type="checkbox"/>	<input type="checkbox"/>	
7 Do the tyres fitted to the vehicle have a speed rating equal to or exceeding its maximum speed capability?			<input type="checkbox"/>	<input type="checkbox"/>	
8 Has the PTO been installed in accordance with VSB6, PTO, vehicle, engine, transmission and the tail shaft manufacturer's guidelines?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Compliance

Modification	Check Yes, No as applicable:	Yes	No
1 Does this modification meet all the requirements of the manufacturer's guidelines / Modification Code B1?		<input type="checkbox"/>	<input type="checkbox"/>
2 Is the quality of the work to an accepted industry standard?		<input type="checkbox"/>	<input type="checkbox"/>
3 Does the modified vehicle continue to comply with all affected ADRs, legislative and regulatory requirements?		<input type="checkbox"/>	<input type="checkbox"/>

## Authorisation

Other than modification criteria, if the answer to any relevant question is NO the modification is not acceptable.

Comments:			
Examined by:	Company (if applicable):	AVE no.:	
Signed:	Modification certificate no.:	Modification plate no.:	Date:

Vehicle chassis no./VIN:	Date:	Signed: