



# Technical Guide

## Audible Reverse Warning Devices



**TODAY'S TRUCKS**



**SAFER**



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**ESSENTIAL**

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This Technical Guide, the Guide, has been prepared under the direction of the Truck Industry Council (TIC) Board and endorsed by members of TIC.

This Guide was originally developed by the Truck Industry Council at the request of TIC members to encourage the take up of reversing alarms to protect vulnerable road users.

Operators, suppliers and enforcement agencies must comply with the Australian Design Rules (ADRs), the Australian Vehicle Standards Regulations, the Roadworthiness Guidelines and any specific information and instructions provided by manufacturers in relation to vehicle's systems and components.

Members of the Truck Industry Council will circulate this Guide throughout their dealer network to ensure maximum coverage.

## DISCLAIMER

TIC makes no representations and provides no warranty that the information and recommendations contained in this Guide is suitable for use by or applicable to all Original Equipment Manufacturers (OEMs), up to date, complete or without exception. Reliance or use upon the information or recommendations is voluntary and the user accepts all risks and responsibility for any such reliance or use and to the maximum extent permitted by law the TIC excludes all liability to any person arising directly or indirectly out of any such reliance or use.

## Technical Guide development process

This Guide has been prepared under the direction of the TIC Board, with input from the chief technical officers of each TIC member, reviewed by them and endorsed by TIC Board. Members to be circulated throughout their dealer networks.

### Document version control

Edition	Date	Nature of change / comments	Editors
First	July 2019	Initial development	Mark Hammond, TIC, Chief Technical Officer.

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## 1) Introduction

This Technical Guide documents the recommended fitment of Audible Reverse Warning Devices to all Heavy Vehicles. The technical guide provides guidance to manufacturers of heavy vehicles on recommended practice when fitting reversing alarms. It also provides guidance to owners wishing to update in service vehicles by the retrofitting of alarms.

This document reflects Coronial recommendations following an inquest into an accidental death.

The fitment of audible and/or visual reverse warning devices is a common practice on heavy trucks, it is however not a mandated requirement by Federal (Australian Design Rule) or State Vehicle Standards for heavy trailers.

This Guide has been prepared by, the Truck Industry Council (TIC) in consultation with key parties and recommends that vehicle manufacturers fit reversing alarms to all new heavy road vehicles with the wiring required to support the alarms as a part of their manufacturing process.

## 2) Australian Design Rules (ADRs)

### **Australian Design Rule (ADR) 42 General Safety Requirements.**

The function of this Australian Design Rule is to specify design and construction requirements to ensure the safe operation of vehicles.

ADR42/04 references superseded connector standards and adds confusion with Table 1.1 Circuits and Identification. It is still an applicable ADR and will apply to OLD or current ADR models from 1 July 2019

ADR42/05 has been updated and issued 25 October 2018. It references the current standards and deletes Table 1.1 referred above. This ADR is only mandatory for NEW ADR models from 1 July 2019. The relevant section from ADR42/05 is noted below: -

**Section 21 Electrical wiring, connections and installations of ADR42/05 refers to the following wiring standards for N-Group vehicles fitted with a coupling designed to tow a trailer with an ATM exceeding 3.5 tonnes or T-Group trailer with an ATM exceeding 3.5 tonnes:**

- a) ISO 1185:2003 (Road vehicles -- Connectors for the electrical connection of towing and towed vehicles, 7-pole connector for 24 V nominal supply voltage; or
- b) SAE J560 – 2016-04-01 version (Primary and Auxiliary Seven Conductor Electrical Connector for Truck-Trailer Jumper Cable); or
- c) AS 4735 – 2003 (Heavy road vehicles - Electrical connectors for articulated vehicles); or
- d) AS 4177.5 – 2004 (Caravan and light trailer towing components, Part 5: Electrical connectors).

### 3) Application of the reversing alarm and its wiring



It should apply to all ADR Category NB and NC (GVM above 3,500 kg) heavy vehicles (trucks)



It should apply to all ADR Category TC and TD (GTM above 3,500 kg) heavy vehicles (trailers)

### 4) Requirements

TIC recommends all heavy road vehicles should be fitted with a reverse alarm that is automatically activated when reverse gear is selected and the engine running. Alarms which vary the output in response to changes in the surrounding noise level, referred to self-adjusting type or smart alarms, are preferred where noise nuisance may cause problems.

Standard original equipment fixed output type reverse alarms fitted by the truck manufacturer are acceptable.

Specific requirements for alarm types may exist under workplace rules at some worksites. Operators should be aware of these requirements when advising vehicle requirements to the dealer and/or manufacturer.

The most common alarms are squawker alarms or beeper alarms. Beeper alarms are preferred for safety as the sound they generate is more likely to be heard in a high background noise situation. Beeper alarms are far more likely to generate nuisance noise in residential areas. Squawker alarms that adjust to ambient noise levels result in fewer complaints but are not as effective in high noise situations. Operators should balance these factors when specifying an alarm type.

When tested in accordance with SAE J994 or an appropriate equivalent standard, the alarm should fall within the noise level range of 80 to 100 dB(A) +/- 4dB(A) at 1.2 metres from the noise source.

#### a. Night time operations

In noise sensitive environments or for night time operations, it may possible to significantly reduce the alarm's noise levels. During this type of operation, the use of alternative means to warn road users or assist the truck driver, should be utilised. Refer to Section 6 Optional technologies for additional guidance.

### 5) Fitting

Truck manufacturers should ensure that alarms are fitted robustly at the rear of the vehicle and in a position that will ensure adequate protection from the weather, heat from vehicle exhaust, driveline and brakes and damage from road and other debris. All alarms must be clearly audible above the noise level of the truck. Self-adjusting type alarms must be mounted with an unobstructed 'vision' to the rear of the vehicle.

TIC recommends for heavy vehicles (trucks) that are manufactured to tow a trailer and fitted with a towing device, an approved electrical connector must be fitted and wired such that a

working reverse circuit is present in the connector in accordance with the standards listed in ADR42/05.

For those retrofitting alarms to heavy road vehicles, in addition to the above, ensure reversing alarms are fitted in accordance to the manufacturer’s instructions with particular care taken to ensure that all self-adjusting alarms are fitted and positioned correctly.

The alarm’s wiring harness should be suitably protected, routed and secured to the vehicles chassis and connected to either the correct pin in the connection plug or the vehicles reverse circuit in accordance with the vehicle Manufacturers Body Installation Guide.

## 6) Optional technologies

The following is a list of new and/or existing items, systems and technologies that may be available for fitment to some heavy road vehicles. The employment of one or more of these items could improve the driver’s visibility or awareness around the rear of the heavy road vehicles :



Fitting of ultrasonic, or similar, proximity sensors with an audio and/or visual driver warning



Fitting of electronic driver visual aid systems using camera and screen (vision) technologies

## 7) Electrical connectors - plugs and sockets

To support the fitment of reversing alarms, TIC recommends

- that all plugs and sockets should have an IP54 rating.
- wiring, other than suzi coils and similar connection cables, should be protected against abrasion with corrugated tubing or an equivalent level of protection.
- only use plugs and sockets compliant to the Australian Standards AS4735 for the heavy-duty connectors and AS4177.5 for light-duty connectors. Both of these standards require a reverse light / signal circuit.

### Australia Standard AS2513-1982

This standard is called up by ADR42/04. It was withdrawn and superseded November 1995 by AS4177.5-1995 with the Heavy Vehicle connectors being covered by AS4735-2003/2016. From 1<sup>st</sup> July 2019, this standard will only apply to old or current models as defined by the ADR.

Pin No	Circuit	Cable Colour
1	Left hand turn	Yellow
2	Reverse signal	Black
3	Earth return	White
4	Right hand turn	Green
5	Service brakes	Blue
6	Stop lamps	Red
7	Rear lamps, clearance & side market lamps	Brown



Cable entry

## Australian Standard AS4177.5-1995/2004

This standard is called up by ADR42/05 for new models as defined by the ADR from 1<sup>st</sup> July 2019. It applies to light vehicles up to 3.5 t GVM or ATM and only covers the flat 7 and 12 pin connectors which are typically not used for heavy vehicles.

### Heavy duty connectors

Connectors based on each of the 3 standards referenced in ADR42/05 and noted in the table below are interconnectable, but are wired slightly differently. The key functions are similar and allows for an adequate level of interconnectivity.

TIC recommends that connectors should be wired to Australian Standard AS4735 to ensure there is a reverse signal circuit available to support an alarm/warning system.

Pin No & wire colour	Recommended connector standard	ISO1185	SAE J560 (ref clause 8.4 table 4)
1 White	Common earth return	Ground	Ground
2 Black	Left-hand rear position / marker lights / clearance lights	Left side Tail lamps, clearance lamps/outline marker lamps, identification lamps and registration plate lamp	Clearance, side marker, and identification lamps
3 Yellow	Left turn light	Left turn signal	Left turn signal/hazard lamps
4 Red	Brake / stoplight	Stop lamps	Stop lamps and ABS Secondary Power
5 Green	Right turn light	Right turn signal	Right turn signal/hazard lamps
6 Brown	Right-hand rear position / marker lights / clearance lights / registration-plate light	Right side Tail lamps, clearance lamps/outline marker lamps, identification lamps and registration plate lamp	Tail and license plate, clearance and/or side marker lamps
7 blue	Reversing light	Trailer brake control	Continuous ABS primary power/auxiliary devices



7 Pin Plug



7 Pin Socket

Cable entry view

### Notes:

The ISO 1185 plugs and sockets are similar to SAE J560 but specified for 24V. As a result, an ISO 1185 connector may not be able to support wire sizes to support the current demands of a 12V system.

## 8) Action to be taken by TIC members

The following action will be taken by members of the TIC:



TIC members should fit a reversing alarm to all new trucks wholesaled by their organisations, in accordance with Sections 4, 5 and 6 above.



Advise all members of the company's authorised sales outlets that they are required to comply with this Guide and that if fitting a body or equipment to the rear area of the truck and/or fitting an electrical trailer connector that they should comply with Section 7 above. Also, that systems and technologies may exist to improve the driver's visibility or awareness around the rear of the truck, as listed in Section 6 **Optional technologies** above.



Have members of the dealer body advise all their customers of the requirements of this Guide, and that there are new technologies and features that may be available that could improve the driver's visibility or awareness around the rear of the truck and that where applicable these should be discussed with the customer.

## 9) List of TIC members

- Allison Transmissions Australia Pty Ltd
- Cummins South Pacific Pty Ltd
- Daimler Truck and Bus Australia Pty Ltd (Fuso, Mercedes-Benz & Freightliner Trucks)
- Eaton Pty Ltd
- Hino Motor Sales Australia Pty Ltd (Hino Trucks)
- Isuzu Australia Ltd (Isuzu Trucks)
- Iveco Trucks Australia Ltd (Iveco Trucks, Iveco Vans & International Trucks)
- Navistar AusPac Pty Ltd
- PACCAR Australia Pty Ltd (Kenworth & DAF Trucks)
- Penske Commercial Vehicles Australia Pty Ltd (Western Star, MAN & Dennis Eagle Trucks)
- Penske Power Systems Ltd
- Scania Australia Pty Ltd (Scania Trucks)
- Volvo Group Australia Pty Ltd (Volvo, Mack & UD Trucks)

The current member listing can be found on the TIC's website –

[www.truck-industry-council.org](http://www.truck-industry-council.org)