



COMMONWEALTH OF AUSTRALIA

**AUSTRALIAN DESIGN RULE 28A
FOR
MOTOR VEHICLE NOISE**

As Endorsed by the
Australian Transport Advisory Council

The intention of this Australian Design Rule is to define limits on external noise emitted from motor vehicles in order to limit the contribution of motor traffic to community noise.

The Australian Transport Advisory Council has recommended to Commonwealth, State and Territory Governments that all motor vehicles specified below shall comply with Australian Design Rule 28A - Motor Vehicle Noise.

VEHICLE CATEGORY	RULE		AMENDMENT	
	MANUFACTURED ON OR AFTER			
	28A			
Passenger Cars				
Forward Control Passenger Vehicles up to 8 seats	1 Jan 1985			
9 seats	1 Jan 1985			
Other Passenger Cars	1 Jan 1981			
Passenger Car Derivatives	1 Jan 1981			
Multi-Purpose Passenger Cars	1 Jan 1981			
Omnibuses up to 3.5 tonnes GVM				
up to 12 seats	1 July 1980			
over 12 seats	1 July 1980			
up to 4.5 tonnes GVM	1 July 1980			
over 4.5 tonnes GVM	1 July 1980			
Motorcycles	N/A			
Mopeds	N/A			
Specially Constructed Vehicles	N/A			
Other Vehicles not listed above				
up to 4.5 tonnes GVM	1 July 1980			
over 4.5 tonnes GVM	1 July 1980			

N/A - Not Applicable

GROSS VEHICLE MASS - Abbreviated to 'GVM'

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28A.1 Definitions

28A.1.1 Drive Train - The vehicle components which transmit engine power to the driven wheels.

28A.1.2 Net Engine Power (N.E.P.) - The maximum output at the fly wheel of an engine representing a standard version, and fitted, where applicable, with the following engine parts which must be representative of those used on the engine in service:-

Intake and exhaust system
 Engine cooling fan
 Water pump or cooler blower
 Fuel pump and/or injection pump
 Generator (under no load)
 Standard carburettor
 Standard ignition or fuel injection system

The test shall be conducted with the engine adjusted according to the manufacturer's specifications using a commercial fuel as prescribed by the vehicle manufacturer, and at the coolant and lubricant temperatures occurring in normal operation.

The measured output shall be converted to standard conditions of barometric pressure and temperature (760mm mercury, 20° Celsius) according to the following formula:

$$\frac{760}{b} \sqrt{\frac{273 + t}{273 + 20}} \times (\text{Measured Power})$$

Where b = the observed barometric pressure in the laboratory in millimetres of mercury

t = the temperature of the air at the engine air intake in °C.

28A.1.3 Overdrive - for the purposes of Clause 28A.6.2.2(iii), overdrive is any device additional to the normal gearbox which if engaged would result in a higher vehicle speed for the same engine speed, in the gear selected for test.

28A.1.4 Overall Gear Ratio - the ratio of the engine output shaft rotational speed to the vehicle driven wheel rotational speed calculated disregarding slip in any fluid coupling device.

28A.2 Requirements

28A.2.1 When any vehicle is operated in accordance with the requirements of Clause 28A.6 the sound level measured at the microphone position specified in Clause 28A.5.2 shall not exceed the limits specified for the vehicle in Table 1.

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TABLE 1

<u>VEHICLE CATEGORY</u>	<u>MAXIMUM SOUND LEVEL</u> <u>IN dB(A)</u>	
A. Passenger Cars	81	
B. Passenger Car Derivatives, Forward Control Passenger Vehicles and Multi-Purpose Passenger Cars	82	*
C. Omnibuses with Gross Vehicle Mass		
(i) not exceeding 3.5 tonnes	82	
(ii) exceeding 3.5 tonnes and with an engine not exceeding 150 kW N.E.P.	86	
(iii) exceeding 3.5 tonnes and with an engine exceeding 150 kW N.E.P.	88	
D. Other Vehicles with Gross Vehicle Mass		
(i) not exceeding 3.5 tonnes	82	
(ii) exceeding 3.5 tonnes but not exceeding 12 tonnes	87	
(iii) exceeding 12 tonnes and with an engine not exceeding 150 kW N.E.P.	87	
(iv) exceeding 12 tonnes and with an engine exceeding 150 kW N.E.P.	89	

28A.3 Sound Level Measurement

- 28A.3.1 Sound level measurements shall be carried out using a sound level meter which complies with the requirements of either publication 179 (1965) 'Precision Sound Level Meters' of the International Electrotechnical Commission (IEC), or Australian Standard Z38-1967 'Sound Level Meters Type 2 - Precision', and which incorporates the A-weighting network which shall cause the sound level meter to have the appropriate frequency response as specified in either of the above standards.
- 28A.3.2 The sound level meter shall be set such that the A-weighting network and the 'fast' dynamic characteristic as specified in either of the standards nominated in Clause 28A.3.1, shall be utilised.
- 28A.3.3 The highest sound level indicated on the sound level meter whilst the vehicle is being operated in accordance with the test procedure specified in Clause 28A.6 shall be recorded.

*Amended February 1984

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- 28A.3.4 At least two measurements shall be made on each side of the vehicle.
- 28A.3.5 The accuracy of the sound level meter shall be checked by means of a suitable reference sound source as recommended by the manufacturer of the sound level meter. Checks shall be made not more than 30 minutes before and after any measurement is made.

In the case where the sound level meter registers a discrepancy exceeding one dB between two consecutive checks, any measurements carried out in the interval between those two checks shall be deemed invalid.

28A.4 Test Conditions

- 28A.4.1 Measurements shall be carried out with the vehicle at unladen mass, plus the vehicle occupants. For all vehicles with a gross vehicle mass not exceeding 3.5 tonnes, the driver shall be the sole occupant. For all other vehicles one occupant in addition to the driver may be carried.
- 28A.4.2 Measurements shall be made only when the level of ambient noise at the test site is at least 10 dB(A) below the permissible noise level for the vehicle as specified in Table 1.
- 28A.4.3 Measurements shall be made only when the temperature and humidity specifications prescribed by the manufacturer of the sound level meter are met.
- 28A.4.4 Any windshield used on the microphone shall be such that any error introduced into the overall noise measurement system due to the use of the windshield does not exceed one dB at any frequency below 4 kilohertz.

28A.5 Test Site

- 28A.5.1 The test site shall consist of an area of not less than 50 m diameter. The centreline CC' of the vehicle test path shall be substantially straight and shall pass substantially through the centre of the test area.
- 28A.5.2 The test area shall be as shown in Figure 1. The microphone shall be located at a height of $1.2 \text{ m} \pm 0.1 \text{ m}$ above ground level at a distance of $7.5 \text{ m} \pm 0.2 \text{ m}$ from the centreline CC' of the test path measured along the line PP' substantially perpendicular to that centreline. Line PP' shall pass substantially through the centre of the test site. The axis of the microphone shall be substantially horizontal and when viewed in plan shall be substantially perpendicular to and directed toward the centreline of the test path. Two lines AA' and BB' substantially parallel to line PP' shall be situated respectively $10 \text{ m} \pm 0.2 \text{ m}$ forward and $10 \text{ m} \pm 0.2 \text{ m}$ rearward of that line.

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The test track and the test area between the microphone and the vehicle shall have a sealed surface consisting of concrete, bitumen or other approved material which is substantially flat level dry and clean. The remainder of the test area and test site shall be substantially level and free from obstacles.

28A.5.3 During testing there shall not be any person other than the vehicle occupant(s), within the area which shall include the microphone and is bounded by lines AA', BB' and lines parallel to and not less than 9.5 m from line CC'.

28A.6 Vehicle Operation

28A.6.1 The engine shall be tuned to the vehicle manufacturer's specifications and brought to normal operating temperature.

28A.6.2 The vehicle shall approach the test area with the vehicle centreline substantially along the test path centreline CC' at a steady speed under the following conditions.

28A.6.2.1 Approach Speed - The approach speed shall not exceed by more than 5 km/h or be more than one km/h below:

- (a) 50 km/h, or
- (b) the speed which corresponds to 75 percent of the engine speed at which the engine develops its N.E.P., or
- (c) the speed which corresponds to 75 percent of the maximum engine speed permitted by the engine governor, whichever is the lowest.

28A.6.2.2 Gear Selection

- (i) Where a vehicle has two or more overall gear ratios for forward drive, the numerically second highest overall gear ratio shall be used, except that, for a vehicle with more than four overall gear ratios, the numerically third highest overall gear ratio shall be used. If the use of this overall gear ratio causes the engine speed developed during the test to operate the governor or exceed the vehicle manufacturer's recommended maximum engine speed, the first numerically lower overall gear ratio of that drive train which ensures that governor operation does not occur or vehicle manufacturer's recommended maximum engine speed is not exceeded, shall be used. Any overall gear ratio which is designed primarily for 'off road' operation shall not be used during the test.

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For vehicles in categories C and D with optional drive train systems, testing shall be conducted on the system which provides the greatest number of overall gear ratios, or on a system which provides the same or greater calculated acceleration through the test area, to that system with the greatest number of overall gear ratios.

- (ii) Any device which would automatically select a numerically higher gear ratio may be disconnected.
- (iii) For vehicles in categories A and B, overdrive shall not be engaged during the test.

28A.6.3 When the most forward point of the vehicle reaches the line depicted as line AA' in Figure 1, the throttle shall be fully opened as rapidly as practicable.

28A.6.4 When the most rearward point of the vehicle reaches the line depicted as line BB' in Figure 1, the throttle shall be fully closed as rapidly as practicable.

28A.7 Interpretation of Results

28A.7.1 A set of two measurements shall be considered valid if the difference between two consecutive measurements on the same side of the vehicle is not more than 2 dB(A).

28A.7.2 The noise level of the vehicle shall be deemed to be the highest measurement of a set of measurements which shall include at least two consecutive measurements on each side of the vehicle, except that if the set includes not more than one measurement which exceeds by not more than one dB(A) the maximum noise level specified for the vehicle in Table 1, then the set may be replaced by a second series of measurements, including at least two consecutive measurements on each side of the vehicle.

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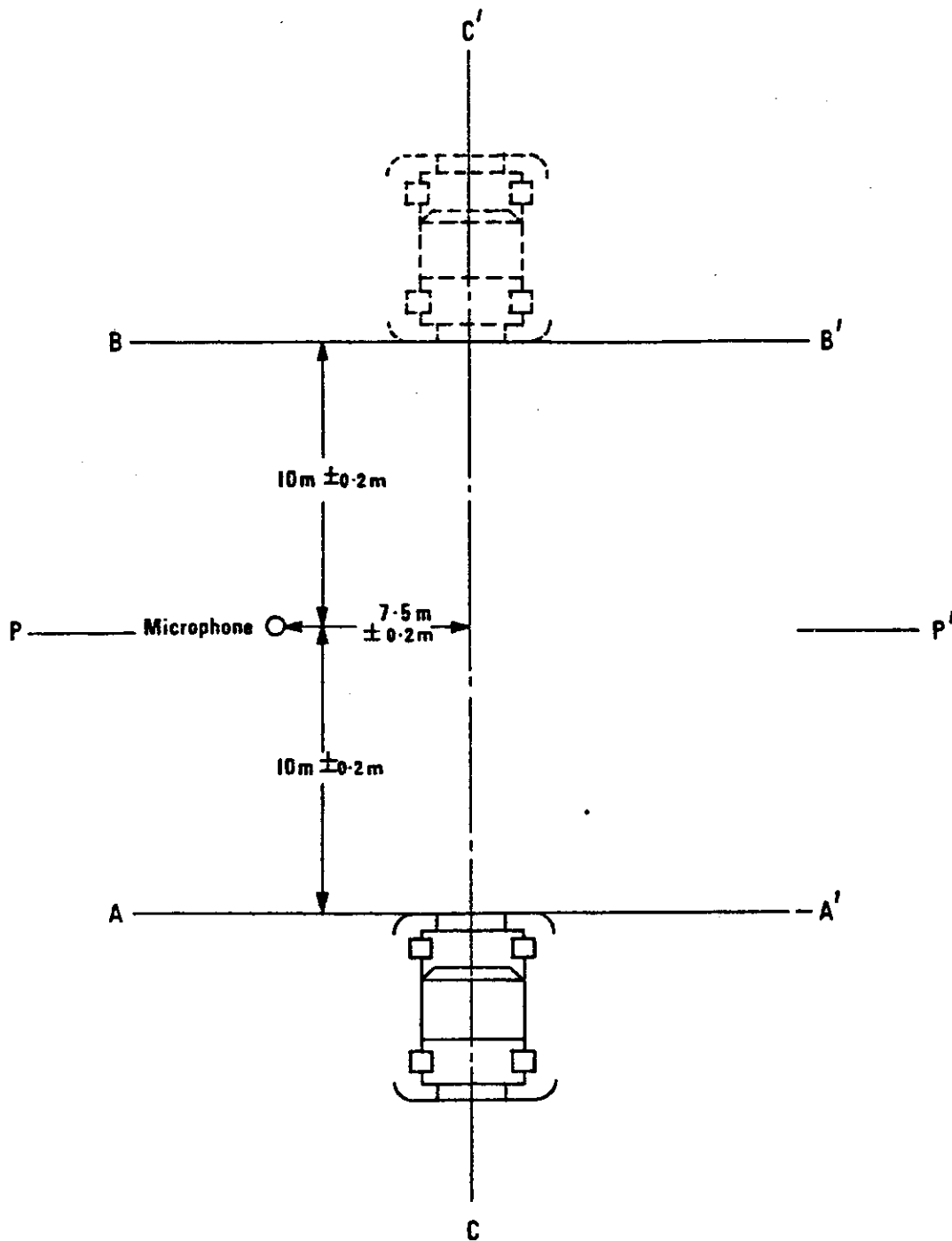


FIG. 1 - TEST AREA