

MORE ABOUT AUTOMOTIVE EXHAUST NOISE

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Your article in Acoustics Forum [1] caught my attention. I have had a considerable involvement with exhaust noise acoustics and simulation from doctoral research, nine years in the exhaust manufacturing industry and several more in consulting [2, 3, 4]. However, I don't have to run a simulation to know that the exhaust system pictured in the article will make a car very noisy. I anticipate a broad noise peak at around 200 Hz with about 20 dB more noise than from an original vehicle, and about 10 dB more noise at other low frequencies to 500 Hz.

Legally, all new vehicles must adhere to a number of Australian Design Rules (ADRs). ADR 28 exists to "define limits on external noise generated by motor vehicles in order to limit the contribution of motor traffic to community noise". In my experience, no vehicle could pass the mandated drive-by test unless it were quiet; conversely, no vehicle perceived as even slightly noisy would pass the test. In practice, a sample vehicle is tested before vehicles are sold. Second-hand vehicles are free of the need for compliance with ADR 28, and to my knowledge, are subject to regulations imposed by the states. These regulations generally involve a different in-service test, and are far more generous in noise level permitted than ADR 28, by about 10 to 15 dB or so. I believe that some old Harley Davidson motorcycles have been imported into the country without ADR scrutiny. Many I see are unmuffled – these would certainly fail in-service tests.

Yes, some exhaust systems are fitted just to make noise. The excuse of wanting low back pressure is untenable. Original exhaust systems are designed for backpressure of no more than about 0.5 atmospheres at maximum engine speed and load. However, I have taken measurements of backpressure of exhaust systems on vehicles in on-road use many times and was able to observe that backpressure in most

practical circumstances was near zero. Maximum engine speed and load is a long way from the envelope of normal driving circumstances!

It is unfortunate that there is very little checking and enforcement of vehicles in service. An in-service test will still be needed for our imported second hand vehicles. However, a more effective way to put an end to noisy cars would be for legislation to put the onus on the fitter of the replacement part not to cause the vehicle to breach the ADR. Enforcement at muffler fitting shops, with financial penalties would put an end to noisy exhausts. It is possible that the Society could assist a third party's lobbying for a change like this, however we do need to find the third party, with clout, who wants this change.

1. N.H. Fletcher, "What are we doing about exhaust noise" *Acoust. Aust.* 33, 106 (2005).
2. A.D. Jones, "Techniques for Studying Muffler Performance", *Proc. Aust. Acoustical Soc. Conference on Motor Vehicle and Traffic Noise*, Leura Gardens, New South Wales, pp 93-99 (1985).
3. A.D. Jones, "Exhaust Noise Modelling for Muffler Design" *SAE-Australasia Paper No. 871198*, Fourth Intl. Pacific Conference on Automotive Engineering, Melbourne, (1987)
4. A.D. Jones, W.K. Van Moorhem and R.T. Voland "Is a Full Nonlinear Method Necessary for the Prediction of Radiated Engine Exhaust Noise", *Noise Control Engineering J.*, 26, 74-80 (1986)

Editors note: For example, the Maserati GranSport boasts an electronically controlled pneumatic valve system that enables a driver to increase exhaust noise by opening multiple ports in the exhaust system when the 'Sport' button is pressed on the central console.

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Acoustical Societies' Conference
November 20-22 2006
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Christchurch, New Zealand



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