

THE ON-BOARD SOUND INTENSITY (OBSI) MEASUREMENT EQUIPMENT

This is a technical awareness PIN.

When it comes to trying to measure the noise characteristics of a particular pavement surface, we do not have suitable equipment to differentiate between the tire/pavement noise and the overall vehicle noise (eg engine, transmission, body rattles, wind and the like). Our standard measurement is with the “pass-by” method which lumps all noise generators together and of course, needs quite a set up and is expensive. At this stage there is no optimum surface that would simultaneously address the tire/pavement noise, texture, smoothness and friction, but a number of research projects are trying to come up with the answer.

In the last few years, in the US they have developed an OBSI measuring equipment that is relatively inexpensive, quick and easy to use. Apparently the data is quite reliable for use for comparison of the tire/pavement noise on various surface types and monitoring of the deterioration of acoustic longevity. Many US States now use this OBSI equipment.

Description

The instrument is fitted to a vehicle and does not require any special setting up. Figure 1 illustrates the method of measurement and the resultant output.



Figure 1. OBSI equipment setup.

The equipment is attached to one of the wheels of the test vehicle and consists of a (Brüel & Kjaer) front-end analyser with an associated “Pulse” software package, two probes (each consisting of a microphone pair), a mounting fixture and a standard reference test tire.

Each probe has two 13 mm diameter, phase-matched microphones spaced 16 mm apart and fitted with a wind screen.

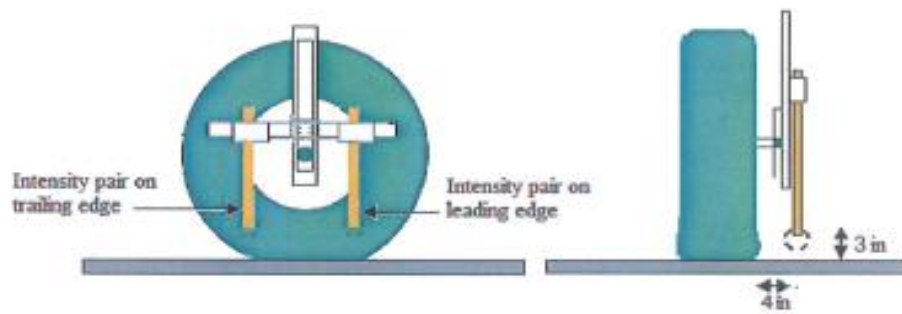


Figure 2. Schematic diagram depicting the microphone setup.

The two probes are 76 mm (3 in) above the pavement and 102 mm (4 in) away from the sidewall and positioned to capture the SI at leading and trailing edges of the tire contact patch. The SI at the two probes can be viewed on the onboard computer. The average of the two values gives the SI value.



This quite simple and apparently inexpensive methodology will give a far better comparison of the surface noise characteristics than any pass-by noise level measurement. Due to the simplicity and ease of operation it will be easy to carry out annual monitoring for input into noise deterioration curves for selected locations. (Fyi, the latter do not currently exist in Australia).

I am aware that RTA is currently doing a lot of work on noise generation and equipment like the OBSI would be a valuable asset for them.