

TOYO TIRE TALK

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Technical Service Department Japan.

Technical tips and information that may allow you to better serve your customers.



We would appreciate your input, please contact us.

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Subject : TIRE/ROAD NOISE - Part (1) Prologue

Today, vibration and noise are attracting increasing attention due to increased motorization, rapid expansion of expressways, and the increased number and use luxury vehicles in the many countries. Noise issues cannot be avoided as these are included in the EU tire noise regulations, and also from the environmental viewpoint.

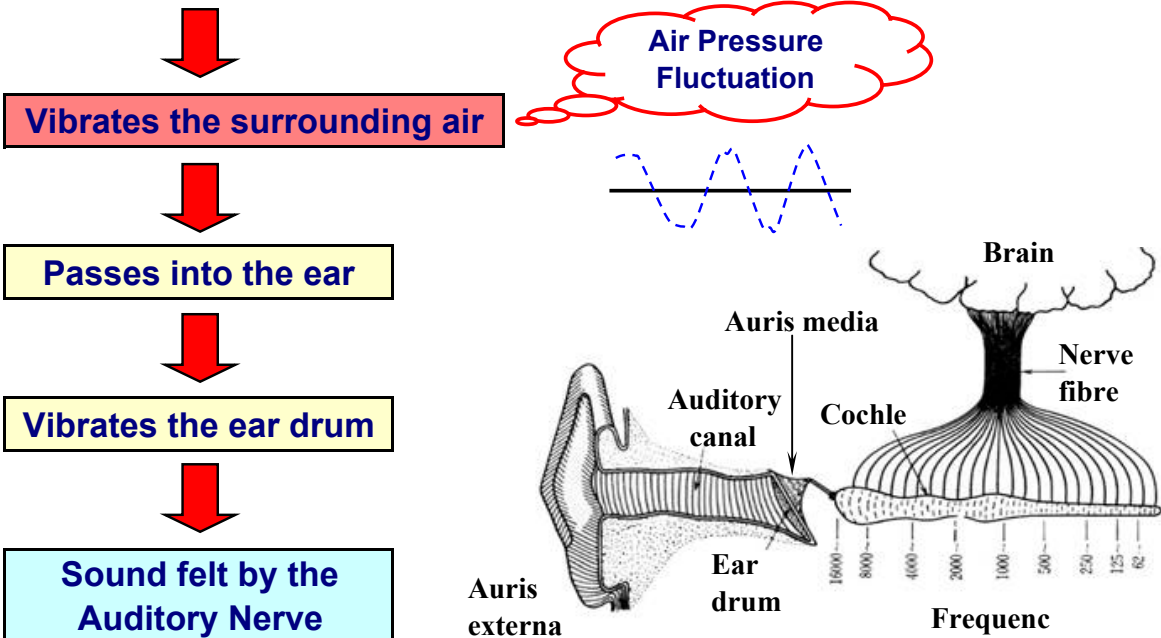
Recently the number of tire noise complaints is increasing day by day, and there is an increasing awareness of difficulties in taking action in the market.

Therefore, although this topic has already been issued and repeated in several previous Toyo Tire Talk issues, we are pleased to re-introduce this topic to enable action about this important and difficult subject.

1. INTRODUCTION

When an object is banged or compressed air released, the surrounding air vibrates and this vibrates the ear drum within the ear. Humans feel this noise via the nerve fibres picking up the vibrations from the cochlea connected to the ear drum.

- Bang an object (Tire : contact of the road surface and tire pattern blocks)
- Release compressed air (Tire : compressed air in the grooves)

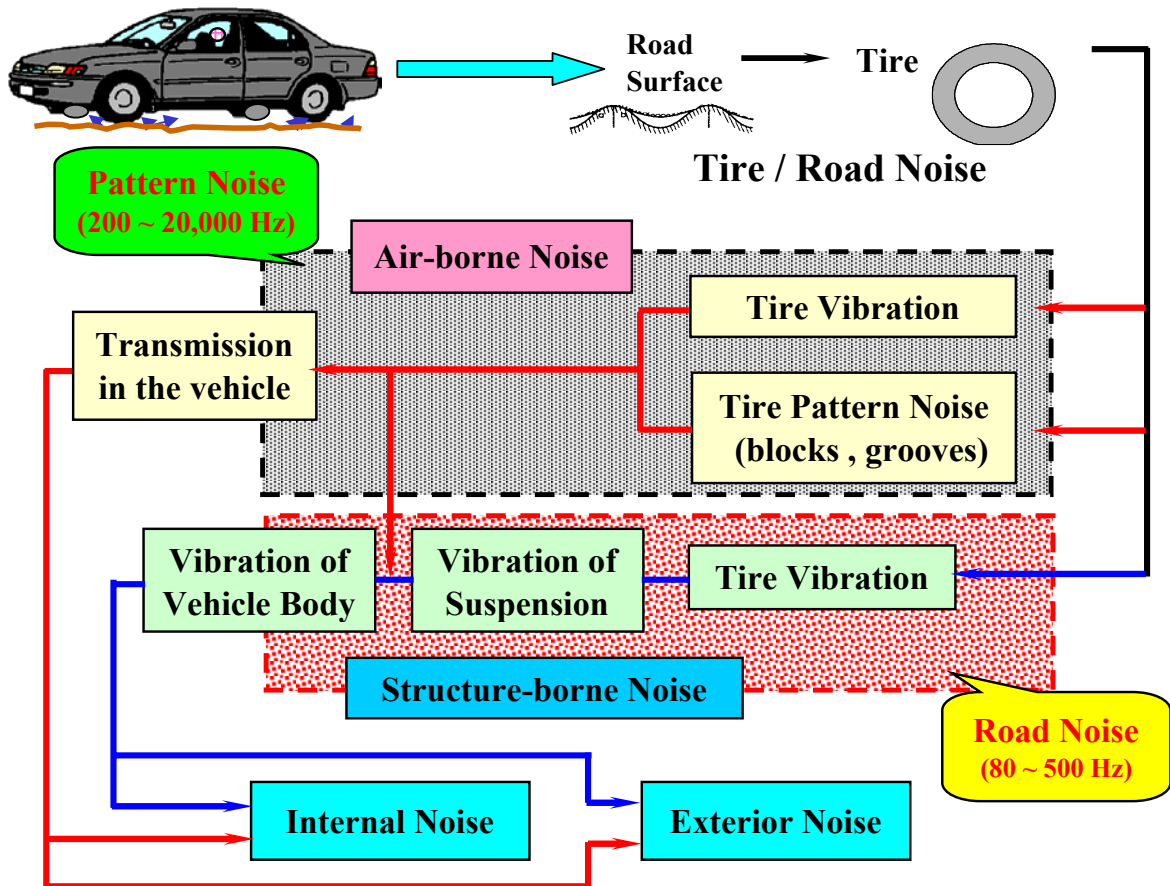


2. VIBRATION and NOISE

Transmission of Tire Noise and Vibration.

Tire noise is generally classified as pattern noise and road noise. The former is called air-borne noise, and latter is structure-borne noise. The following chart outlines the transmission route of noise and vibration.

Tire/Road Noise : Transmission Route of Tire Vibration Noise

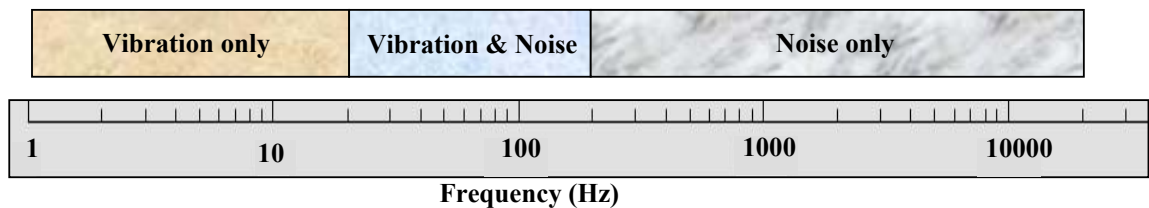


Vibration and noise are often considered to be different things, but this is not correct, and there is a very close relationship between the two. For example, when driving over a bumpy road, have you ever experienced vibration and noise? The reason is that the road bumps vibrate the tires, and this vibration is transmitted to the suspension and vehicle body. The vibrating vehicle body vibrates the air in the cabin, and this is heard as noise. The combined effect is audible internal noise and external noise. This phenomenon is called "Harshness".

The frequency of vibration audible to the human ear is generally between 20 and 200 Hz.

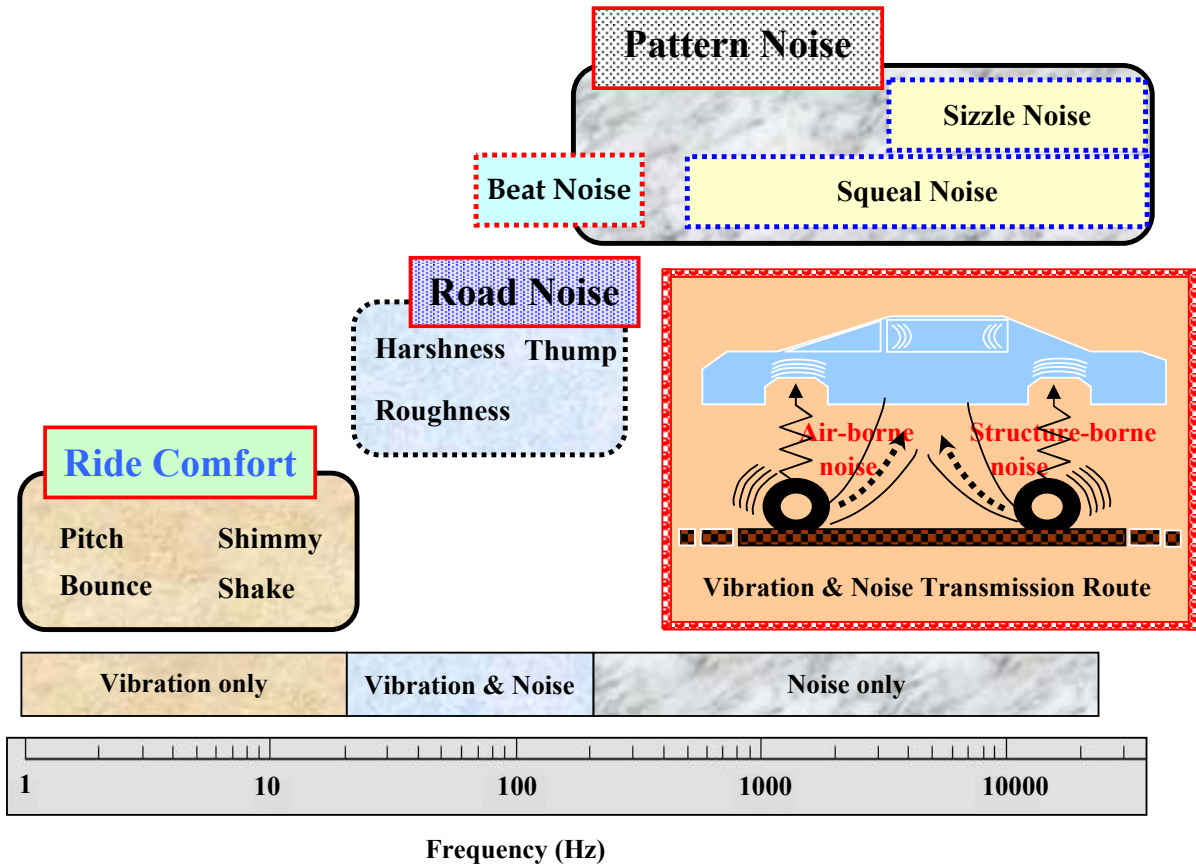
The following diagram shows the human senses vibration and noise.

Human Sensitivity to Vibration and Noise



3. CLASSIFICATION OF NOISE

The range of vibration and noise related to tires and vehicles is as follows.



The above diagram has the method of generation of vibration and noise. Each frequency of vibration for the noise type and vibration type is as follows.

- (1) Pattern Noise (Noise)
 - Sizzle Noise → approx. 2000 Hz and above
 - Squeal Noise → approx. 400 Hz and above
- (2) Road Noise (Vibration & Noise)
 - Harshness, Thump, Roughness → approx. 20 Hz through 200 Hz
- (3) Ride Comfort (Vibration)
 - Shimmy, Shake, Pitch, Bounce → approx. 20 Hz and below

In future issues of TTT, we will provide further information regarding noise and vibration.

Refer to the following past issues of TTT for tire/road noise articles.

- TTT-029 (Dated Jun. 22, 1995)
- TTT-037 (Dated Sep. 25, 1995)
- TTT-039 (Dated Nov. 17, 1995)
- TTT-042 (Dated Dec. 21, 1995)
- TTT-045 (Dated Jan. 31, 1996)