

# TECHNICAL TIPS

## N°1: NOISE

# BRAKE NOISE



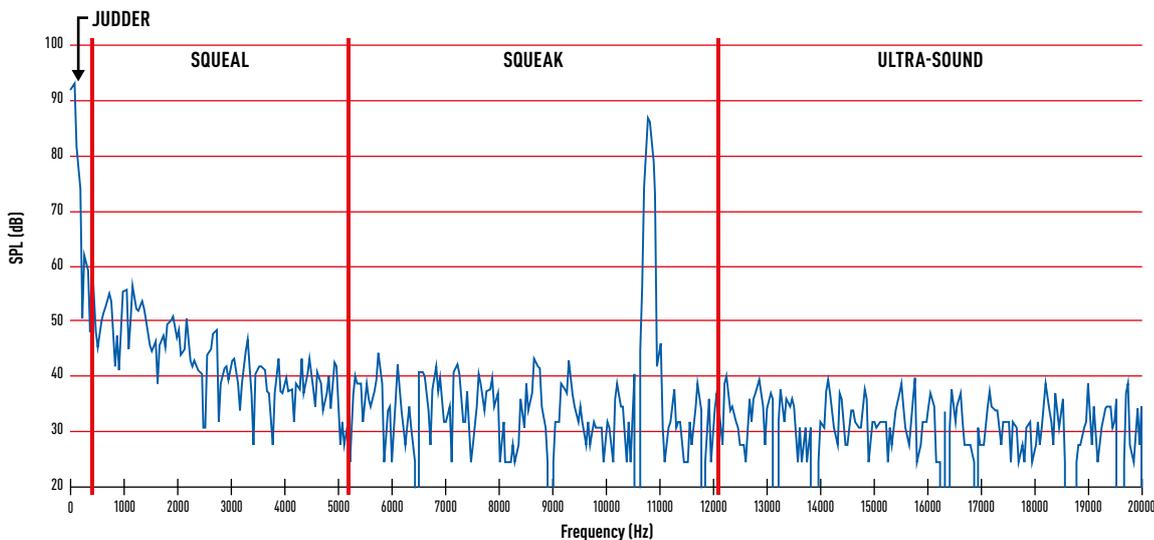
### EXPLAINING BRAKE NOISE

Brake noise is one of the major reasons for a driver to visit the workshop, and often creates dissatisfaction in otherwise happy customers. It can be a complex issue, and is often a difficult one to solve. Ferodo will provide a series of bulletins on brake noise and provide handy hints on diagnosing the problem, what symptoms to watch out for on the brake pad itself, and removal and reassembly tips to avoid brake noise in the future.

### WHAT IS BRAKE NOISE?

Brake noise typically originates from vibration on a part within the wheel end section of the vehicle – between the tyre, and the connection to the chassis. This vibration can originate in any of the parts from the wheel bearing to the ball joint – it is not always caused by the brake pad itself, although this is often blamed. Within the brake system itself, it is normal to experience several vibrations within the brake system, but frequently these are not audible, either because of frequency or intensity. It is only when the vibration increases that there is an audible noise.

### TYPES OF NOISE EXPERIENCED BY DRIVERS



### WHAT CAUSES THE NOISE?

When the noise intensity is very high, it is because of an “amplification” effect due to the overlap of the frequencies of impulse and the “resonance frequency” of some of the brake system parts. Put differently, two or more vibrations happen simultaneously, or one vibration increases in intensity and, when applied to the disc, the brake pad acts as a microphone – amplifying the noise and making the vibration heard.



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## BRAKE NOISE



### ▼ WHAT ARE THE TYPES OF NOISE EXPERIENCED?

#### LOW FREQUENCY VIBRATIONS – JUDDER



**DESCRIPTION** A deep noise with frequency below 300 Hz. It normally originates from macrovibrations of a brake system component e.g. the disc

**CAUSES**

- Poor tolerance
  - » Poor fitment on the hub
  - » Excessive disc thickness variation (DTV). NOTE: check 10 points around the diameter of the disc to determine the overall DTV.
- Disc damage

**SOLUTION** Replace the disc (**Picture 1**): (a) existing disc damage may be causing the judder, or (b) vibration caused by poor fitment of the disc onto the hub may have damaged the disc. It is also advisable to clean and lubricate all surfaces of the brake assembly according to the vehicle manufacturer's instructions.

#### MEDIUM FREQUENCY VIBRATIONS – SQUEAL



**DESCRIPTION** Noise with frequency in the range 300 - 5.000 Hz. It usually originates because of micro-vibrations in the caliper piston or in another part of the vehicle corner.

**CAUSES**

- Sticky movement of the caliper piston and/or the sliding parts of one of the calipers
- Non-planarity of the working surface of the disc, due to either incorrect assembly or friction material scoring
- Pad fitting errors, mainly if handed pads
- Incorrect allocation of eventual anti-noise fixings (e.g. shims etc.)
- Disc thickness is lower than minimum thickness (**Picture 2**)

**SOLUTION**

- Clean and lubricate surfaces of components of the caliper not correctly sliding
- Run proper actions to ensure that disc planarity, once fitted onto the hub, will stay within a tolerance of 0.1 mm (**Picture 3**). Clean hub surface, machine disc surface etc.
- Replace the disc
- Fit brake pads properly
- Fit the shim and accessories properly
- Damp intensity of the vibration(s) by using shims or brake pads with noise reduction features

#### HIGH FREQUENCY VIBRATIONS – SQUEAK

**DESCRIPTION** Noise with frequency higher than 5 kHz

**CAUSES** There are several possible origins of "squeaks", but the most frequent is a molecular vibration within the friction material, during application to brake disc

**SOLUTION** Replace the brake pad set. Also check that the accessories (e.g. the caliper clips) are the correct ones, and are properly fitted

#### VERY HIGH FREQUENCY VIBRATIONS – ULTRASOUND

**DESCRIPTION** Noise with frequency higher than 12 KHz, greater than the upper limit of human hearing.

### ▼ SOLVING NOISE

See Ferodo's next 2 bulletins on dismantling the brake system and checking for typical noise-related wear on the brake pads themselves.