



Cabin Calm and a Chorus of Power in the Lexus LC Convertible

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- Stirring engine and exhaust sound central to the LC Convertible driving experience
- Sound management techniques adopted from the Lexus LFA supercar
- The “harmony of opposites” - great engine note at speed and a quiet cabin when cruising
- Noise-cleaning technology eliminate booming effect

The powerful sound produced by the engine and exhaust is a key part of the driving experience in the new Lexus LC Convertible. Great aural quality was an important goal for the car’s development team, and one that required precise engineering techniques to achieve.

The ultra-exclusive LFA supercar marks the origin of Lexus’s focus on the importance of the engine sound and the specialists who worked on its V10 power unit identified the separate qualities that come together to create the ideal sound “atmosphere”.

Where the LC Convertible is concerned, the power of the V8 engine’s note had to be balanced by a level of cabin quietness that overturns preconceptions about driving in a convertible - an equation Lexus calls a “harmony of opposites.”

To achieve the right effect, the sound of the engine changes in line with the rise and fall in rpm, becoming more powerful and urgent in tune with the driver’s use of the accelerator and the sequence of shifts through the rapid-action 10-speed Direct Shift automatic transmission. The exhaust note, too, heightens the sensation. By contrast, in gentle cruising, the sound is subdued, so conversation is easy when the roof is down.

Creating the ideal engine note

A continuous, pulsating sound is characteristic of a large-capacity, naturally aspirated V8 engine like the five-litre unit which powers the LC 500 Convertible. Lexus has used acoustic technologies to combine this with spectral harmony (perfect sound intervals that are pleasing to the ear), stereophonic sound, to create a depth of sound, and formants - acoustic qualities that stir the senses and generate a feel-good factor.

Active Noise Control is used to “clean” the sound frequencies experienced in the car. This emits anti-pulse sounds through the audio speakers which counteract any unwelcome low frequency booming sound from the engine and drivetrain.

In the LC Coupe, noise inside the cabin is monitored by a microphone in the roof, but for the

Convertible, it had to be relocated inside the driver's headrest. Being closer to the driver's ear means it can pick up a wider range of frequencies, but a complex algorithm had to be calculated to make sure it works accurately in any seat position.

Cabin quietness

Even though the LC Convertible has a soft top, Lexus wanted to secure the same kind of cabin quietness as in the LC Coupe when the roof is raised. Acoustic simulations were created to find out where dominant noises were entering the space, so that the amount and location of soundproofing and sound-absorbing material could be calculated.

The storage area behind the rear seats for the folding roof presented a particular challenge as it was a route for tyre and exhaust noise to enter the cabin. There was not enough room for soundproofing material to be added, so the team looked instead at adapting the trim material itself. By allowing air to pass through the structure and using sound-absorbing material on the reverse, the entire surface of the storage space soaks up noise.

As the area is visible and part of the car's interior, it also had to look good. Lexus assessed many different materials before choosing one usually used for lining the wings around the wheels. This meets safety standards and, being applied with extra density, has just the right appearance.

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