ROLLS-ROYCE | MEDIA INFORMATION

**ROLLS-ROYCE MOTOR CARS:
BESPOKE AUDIO SYSTEM**

**Studio-quality design**

The marque had a clear brief when it began designing Bespoke Audio for its clients: to integrate studio quality audio into a motor car. Indeed, the men and women who created Bespoke Audio benchmarked the system against a recording studio’s playback room rather than systems created for automotive applications.

However, configuring an audio system for a motor car is significantly more challenging than creating an audio system for a static, purpose-built facility because external disruptions such as road surfaces, wind buffeting and ambient noise corrupt audio quality dramatically. Rolls-Royce Motor Cars’ response was to build the environment the audio system was destined for in tandem with the audio system itself.

**The Architecture of Luxury**

Only the Architecture of Luxury, the marque’s proprietary spaceframe, could allow the brand to meet its brief. Aluminum was selected as it has a higher acoustic impedance than steel, reducing external noise entering the cabin. Further optimising the material’s acoustic properties is the construction technique; engineers eschewed traditional methods, instead introducing extrusions and complex internal structures to both improve the rigidity of the motor car and minimise flat, resonant surfaces. Cast aluminum joints in a body-in-white and double-skinned bulkhead and floor sections better insulate sound; measures that both isolate external noise and optimise the performance of sound inside the cabin.

Designers also gave the acoustic performance of the bass speaker special consideration at the architectural stage. Exceptional low frequency performance is engineered into the very fabric of new Ghost as it incorporates a resonance chamber into the body’s sill section; the frequency response of the Bespoke Audio speaker component defined the chamber’s size and shape. In essence, the motor car itself is a subwoofer.

**The world’s most silent automotive soundstage**

In addition, new Ghost is equipped with acoustically dampened glass, which combines double-glazing with infrared and UV protection and high-strength laminated safety glass. Over 100kg of dense, high-absorption sound insulation is installed throughout the motor car. Its extensive application in the headliner, doors and boot cavity drastically reducing reverberation.

Rolls-Royce also worked closely with its tyre partner to invent ‘Silent-Seal' tires, which feature a specific foam layer placed inside the rubber carcass that reduces overall tyre noise by 9db compared with a standard alternative.

Once this highly insulated sound stage was created, components that generate sound waves almost imperceptible to the human ear were tracked and modified. These are known by acoustic engineers as ‘hidden inputs’. In the development of new Ghost, every component was interrogated to assess whether it created noises that engineers defined as unacceptable and were completely reengineered as a result. The inside of the air conditioning ducting, for example, created an unacceptable level of wind noise so it was removed and polished to inform the production of the final component. Even drivetrain hardware was adjusted to create new Ghost’s near-silent soundstage – the diameter of the prop shaft was adjusted and its rigidity increased to improve acoustics.

The final element of the formula was harmonising the motor car. The marque’s acoustic specialists experimented with a completely silent interior suite, but found the experience to be disorientating. To overcome this, they elected to create a ‘whisper’, a soft undertone that is experienced as a single, subtle note. To achieve this, each component had to be tuned so it shared a common resonant frequency. The seat frames in early prototypes, for example, resonated at a different frequency to the body, so mass damping units were developed to bring the noise together into a single note. Additionally, the large, 507-litre boot cavity produced a low frequency that could be felt at motorway speeds – ports were built underneath the rear parcel shelf that allowed these disruptive sound waves to escape and therefore better harmonise new Ghost’s overall acoustics.

**Unrivalled control**

The Bespoke Audio system incorporates 18 speakers comprising seven tweeters, seven mid-range, two low range and two exciter speakers. The latter two exciters are located behind the headliner to create a fully immersive 360 degree experience. Virtually inaudible, the exciters turn the starlight headliner into a psycho-acoustic speaker. Frequency range spans 20Hz to 25,000Hz.

These are powered by an amplifier controlling 18 channels (one for each speaker), providing a 1300-watt output. State-of-the-art optimisation technology and high precision magnesium-ceramic compound speaker cones enable near-infinitesimal changes in sound with an outstanding frequency response.

Two active microphones in the cabin also enable an adaptive function, detecting the absence or over emphasis of frequencies before triggering the amplifier to adjust the loudness of certain frequency ranges to counteract it. The Bespoke Audio system makes the most of the highest quality, uncompressed dynamic rate music providing an exceptional listening experience.

**Perfected by ear**

To finely tune the Bespoke Audio system, Rolls-Royce Motor Cars depends on the most sensitive of instruments – the human ear. This helps to judge intangible, subjective elements of audio, such as timbre, pace and responsiveness.

Thousands of miles are driven to ensure Rolls-Royce Motor Cars’ systems are the very best, listening to a wide range of music – from house to heavy metal, and trap to techno. Only when the engineers can truly ‘visualise’ musicians playing around them do they sign off the sonic delivery.

These factors contribute to a uniquely Rolls-Royce standard of sound for patrons of the marque, many of whom are themselves musicians and will settle for nothing less than perfection.

**Testing**

Rolls-Royce’s audio experts drew on their own eclectic music tastes in establishing the parameters for the Bespoke Audio system. Played in a high-quality, ‘lossless’ format, the following tracks form a unique playlist for Rolls-Royce, specially curated by the company’s audio engineers to test the range and resolution of the Bespoke Audio system:

1. Wish You Were Here – Pink Floyd, Wish You Were Here [1975]
2. From Here to Eternity – Giorgio Moroder, From Here to Eternity [1977]
3. Across the Lines – Tracy Chapman, self-titled [1988]
4. Sad But True – Metallica, self-titled [1991]
5. Bembe / Abakwa – Terry Bozzio, Solo Drum Music II [1992]
6. Klangfarben Melodie – Terry Bozzio, Solo Drum Music II [1992]
7. Know Your Enemy – Rage Against the Machine, self-titled [1992]
8. Fistful of Steel – Rage Against the Machine, self-titled [1992]
9. Passion - Gat Décor (Naked Edit) [1992]
10. Where Did You Sleep Last Night? – Nirvana, MTV Unplugged in New York (Live) [1993]
11. Stimela (The Coal Train) – Hugh Masekela, Hope (Live) [1994]
12. Hotel California – The Eagles, Hell Freezes Over (Live) [1994]
13. Paranoid Android – Radiohead, OK Computer [1997]
14. Lyric Lickin – Del The Funky Homosapien, Future Development [1997]
15. Insomnia – Faithless, Insomnia [1995]
16. Raining in Baltimore – Counting Crows, Across a Wire: Live in New York City (Live) [1998]
17. Safe in New York City – AC/DC, Stiff Upper Lip [Deluxe Edition] [2000]
18. Scrappy – Wookie, Wookie (Deluxe Edition) [2000]
19. Marionette – Matthew Jonson [2004]
20. Intro – Nemesea, Pure: Live @ P3 (Remixed & Remastered) [2012]
21. Bass Solo – Nemesea, Pure: Live @ P3 (Remixed & Remastered) [2012]
22. Drum Solo – Nemesea, Pure: Live @ P3 (Remixed & Remastered) [2012]

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TECHNICAL SPECIFICATIONS
**Ghost:**NEDCcorr (combined) CO2 emission: 343 g/km; Fuel consumption: 18.8 mpg / 15.0 l/100km
WLTP (combined) CO2 emission: 347-359 g/km; Fuel consumption: 17.9-18.6 mpg / 15.2-15.8 l/100km.

## FURTHER INFORMATION

You can find all our press releases and press kits, as well as a wide selection of high resolution, downloadable photographs and video footage at our media website,[**PressClub**](https://www.press.rolls-roycemotorcars.com/rolls-royce-motor-cars-pressclub).

You can also follow marque on social media: [**LinkedIn**](https://www.linkedin.com/company/rolls-royce-motor-cars/); [**YouTube**](https://www.youtube.com/user/RollsRoyceMotorCars); [**Twitter**](https://twitter.com/rollsroycecars); [**Instagram**](https://www.instagram.com/rollsroycecars/); and [**Facebook**](https://www.facebook.com/rollsroycemotorcars).

## EDITORS’ NOTES

Rolls-Royce Motor Cars is a wholly-owned subsidiary of the BMW Group and is a completely separate company from Rolls-Royce plc, the manufacturer of aircraft engines and propulsion systems. Over 2,000 skilled men and women are employed at the Rolls-Royce Motor Cars’ head office and manufacturing plant at Goodwood, West Sussex, the only place in the world where the company’s super-luxury motor cars are hand-built.

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