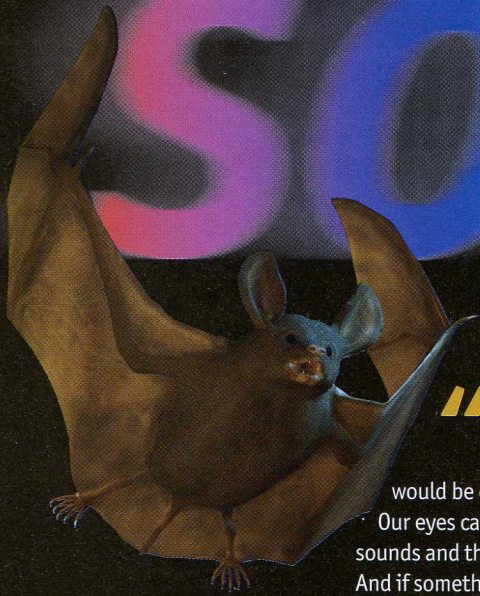


# The colour of

# sound



*How acoustic cameras help us see the invisible.*

*By Richard Warrilow.*

**“W**here’s that noise coming from?” It’s a question we’ve often asked and one which would be easier to answer if we could ‘see’ sound. Our eyes can’t, so our brains are left to process the sounds and then triangulate an approximate location. And if something is hard to hear, we tilt our heads a little – instinctively repositioning our ears to get better reception.

Because our ears seldom have identical performance, we are often deceived over the exact location of a sound, particularly if it is intermittent. Sometimes, the source of the sound may elude us completely. In some cases, locating and eliminating noise is of great importance. For instance, the luxury car industry pays particular attention to what it dubs BSR (buzz, squeak and rattle) issues.

Elsewhere in the automotive sector, noise – the right noise, that is – is desired and the characteristic deep throb on tick over of a performance car has always been a strong selling point. So there is great interest in seeing how sounds emanate from a car when designing its exhaust system and when fine tuning the engine.

Sounds can also play a role in automotive diagnostics and experienced technicians with ‘an ear for the job’ were diagnosing mechanical faults long before code readers came on the scene.

In other sectors, being able to see noise pollution would be of great benefit. With increasing road, rail and air traffic, faster production lines in factories and wind farms sprouting up, there is growing concern over the levels of noise affecting everyday life. Indeed, studies show that prolonged exposure to noise increases the risk of heart attack – and at night, disturbed sleep can affect our general health.

But where is all this noise? Until recently, recording and analysing the plethora of noises bombarding us would have been a time consuming and costly exercise;

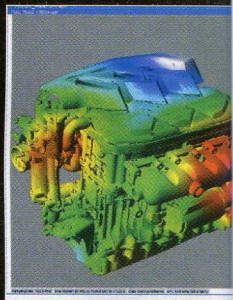
when all we really want to do is visualise how, and understand why, sounds are emanating from certain sources so that we might eliminate or at least reduce them.

## There it is

Seeing the invisible is nothing new – x-ray machines, MRIs and infrared and thermal cameras have been doing it for years. Where sound is concerned, the use of static or directional microphones, amplifiers and an oscilloscope and/or spectrum analyser allows us to at least visualise the properties of sound.

The technology for visualising sound goes back several years and early pioneers included NASA, Boeing, DLR and Airbus. During the mid 1990s, these organisations, working independently, were creating colour acoustic images; using microphone arrays and conditioning hardware and software to produce ‘sound maps’.

Also developing acoustic imaging technology



**Right:**  
*The noise generated by the turbine and rotor of a helicopter in flight.*

