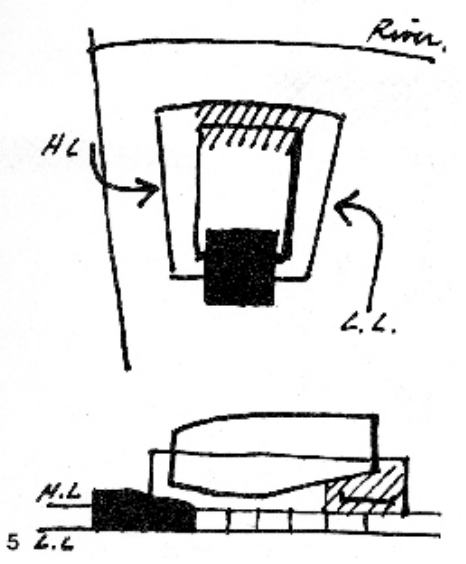
# Why we have changed the acoustics in the Royal Festival Hall

When the auditorium of the Royal Festival Hall was built in 1951, its 'egg in a box' design (see diagram by architect Leslie Martin, below) was a radical and clever conception, with the auditorium 'floating' inside the main structure, thus keeping out virtually all external noise. It was remarkably successful. Unfortunately all the internal details necessary to deliver the acoustic qualities, as envisioned by acoustician Hope Bagenal, were never fully achieved – audiences found the acoustic dry and performers found it very hard to hear their own playing on the stage. An electro-acoustic system was installed in the 1960s, which made the Hall a little more resonant but provided only part of the solution. This was switched off in 1999, not to be replaced.




The analysis of my acoustics firm, Kirkegaard Associates, has led to many significant changes, only some of these being immediately obvious. Others should be audible without being visible. The lack of reverberation and the weakness of low frequency sound together with the difficult performance conditions for musicians required heroic intervention in the architectural fabric of the Hall. Surfaces that had intentionally been constructed to absorb sound had to be transformed to support and sustain that sound.

Where surfaces have been made to reflect sound for natural acoustic performance, technical systems have been integrated to make those surfaces absorptive of sound to make them 'friendly' for strongly amplified performance. For example, sound engineers can now hide or reveal the tapestries on the back walls of the boxes and walls, and deploy additional absorbent blinds above the stage and around the Hall whenever needed.

The boxes now have integral speaker systems to allow a more natural experience of events in which spoken word is used with an orchestra. During the refurbishment works the wooden wall panels of the Hall were removed, relined to change their acoustic qualities and then restored and replaced. The famous undulating plaster ceiling panels look identical to those you will have seen before the closure of the Hall, but in fact have been completely reconstructed using more robust materials to provide greater warmth of sound and support for bass frequencies.

The 1951 plywood canopy over the stage was designed to maximise the sound projected to the audience. Very little energy was directed back to performers, which is why they struggled to hear themselves and each other. Over the stage you can see the new adjustable acoustic wings or canopies that stretch the width of the stage. The sound engineers can rotate these wings to allow low, or bass, frequencies to resonate in the space above the stage, and for higher, or treble, frequencies to be reflected back to improve feedback to performers.

The whole stage has been reconfigured to provide more space for performers, and the arrangement of walls around the stage has also been altered significantly. This improves ensemble conditions by allowing the performers to hear one another, and creates greater flexibility for different orchestral and choir layouts.

Even the seat you are sitting in has been acoustically changed. All the original Robin Day designed seats have been restored and reupholstered to make them more comfortable, and more acoustically appropriate.

I hope you enjoy this performance.

**Larry Kirkegaard**
Kirkegaard Associates