A room at a price

There's more to a studio than a PC and a sound card, right? Leaving aside the operational differences between cheap and expensive audio systems, the one thing that unequivocally still takes considerable time, money and know-how to accomplish is a soundproofed room with decent acoustics and monitoring. JIM BETTERIDGE documents the rebuild of his studio.

I HAD BEEN INVOLVED in a previous studio project, Copper Blue, in the early 1990s where Roger Quested designed the acoustics and provided the monitoring and I was very pleased with the results. Roger not only designs the world renowned range of Quested monitors but has also designed rooms for some very big names in music and postproduction around the globe. So I called up Roger and asked him, how can I achieve good results without spending a fortune? The first thing we established was that this was not a rock 'n' roll studio, it would be largely for my own work and I had no desire to monitor at tinnitus-inducing levels. I did, however, want a decent 5.1 mixing room, for music and sound to picture projects. I needed to be able to work through the night without disturbing the neighbours and have the trains, planes, automobiles and drunken revellers of West London also carry on through the night without disturbing me.

Responsible for the copper and the blue of Copper Blue was designer Mike Stallion: a draftsman and art director whose credits include Tomorrow Never Dies, Lost In Space and The Mummy. I can't overemphasise the importance of having someone onboard who is used to thinking in terms of three-dimensional space and who can do proper working drawings. Beyond the function of the space, design is about successfully resolving the intersections between elements: where the carpet meets the dado, meets the architrave, meets the projector box... it can get quite mind boggling for a simple sound bloke.

So I did a rough outline of what I wanted from the space available and after days of discussion and doodling, Mike came up with a set of drawings that we presented to Roger. After a bit of mutual compromise Mike produced a final set of working drawings and some basic 3D sketches to show how things would look.

Clearly some form of room-within-a-room had to be built but Roger's first point was that this inner boundary would be far more effective in silencing the Great Metropolis if it was acting as a secondary defence to an airtight primary boundary. Once we removed all the skirting and the architrave from the doors and windows an alarming array of gaps was found around frames and in broken layers of lathe, plaster, plasterboard and even brick work, above and below the existing floor level. All this was made good and airtight.

The new high-mass acoustic structure was going to put a considerable extra load on the building and so at the early planning stage we called on the services of a surveyor and a structural engineer to ensure safety. Pre-existing RSJs and massive wooden beams meant that there was basically no problem but they did advise that we put in extra floor joists wherever we intended to build acoustic walls. Once the floorboards came up we found there was no real insulation so we threw in rockwool pellets (making sure not to cover electrical cables — they need some air to stay cool and meet their current ratings) and put down an entirely new tongue and groove floor, once again making sure of an airtight seal.

With the floor up there was a unique opportunity to run in cabling unobtrusively. However, every time you break the boundary of a wall, floor or ceiling you at least run the risk of reducing its acoustic effectiveness. With this in mind Roger suggested that mains was run only to a single point in each room, with all other cabling being routed along internal trunkings masquerading as dado rails. We also ran a few lengths of plastic pipe through the roof space to provide a cable path between rooms, making sure the runs were broken and indirect so as to reduce sound transmission.

It is of course necessary to make some holes in your carefully constructed boundaries through which to run all the required cabling, but we kept them as small as possible and stuffed in carpet underlay to close up the space, making them in practice very sound proof. Roger explained that the larger the hole, the lower the frequency that can escape. So keeping them small and stuffing them with dense material is the way to go.

So now we turned our minds to the room-within-a-room and how best to float it. Roger has long had a dislike for Rockwool for interior treatments because it's something of an irritant, it's not much fun to work with, and its fibres stay in the air long after the builders have gone home. One of the materials he uses to replace it as a means of deadening cavity walls is Britannia 56 carpet underfelt. I've also used it with some success in home studio projects as a means of floating a floor. So it was that Roger had the idea of swaddling the walls and floors of all the rooms in a double layer of the stuff, and building the inner shell within it. It thereby acted to kill the space between the old and the new walls acoustically and also to mechanically separate the inner from the outer.

The floors were a double layer of tongue and groove chipboard flooring (low ceiling height precluded the use of studs on the floor), with the tongues and grooves carefully removed from the edges of the room and screwing and gluing the two layers together to create a rigid, dense base. On top of this base we built the new walls: a 3-inch x 2-inch timber frame screwed to the new, floating floor but definitely not fixed through the underlay to the original wall (keep a firm eye on your builders!)

Underfelt, 3 x 2 plus T&G.

To this frame we screwed and glued a layer of tongue and groove plus one of plasterboard. A floating ceiling was built from a layer of T&G and plasterboard but, rather than lose ceiling height with studs, we opted for the use of resilient bar fixed directly through

Open wall and siliconed ceiling.

Wall layers in doorway.

Underlay on wall.

the existing ceiling to the joists above. It's surprising how few people know of resilient bar but it's an excellent way of creating a good degree of mechanical separation. Incidentally, you can buy it from any dry wall specialist for about half the price offered by most acoustics specialists. We ended up using it on the ceilings and also on the external walls, between the studs and the T&G to provide extra isolation.

So the floor was constructed first, then the ceiling, and then the frame for the walls was wedged in between the two giving it a firm fixing but keeping it mechanically isolated from the outside world. Of course, a sound barrier is only as good as its weakest point, so there's no point in building massive, dense boundaries if you're going to leave dozens of tiny gaps at the myriad junctions within the structure. Hence, you must resign yourself to committing a small fortune to tubes of silicone that are to be squeezed generously into any intersection where air might find a way through.

An important note here is that any boundary mounted on resilient bar must not be allowed to touch any 'unfloated' boundary or obviously the effect of the bars is negated. Hence a gap of a few millimetres should be left between the ceiling and the original wall that can then be filled with silicone; and be careful to use a putty knife or the corner of a piece of wood to clean off the excess before it dries, it's truly evil stuff in the wrong place.

In the past I've gone to some lengths to have large windows to the outside world and then immediately covered them up for acoustic reasons, to ensure privacy and because I'm mostly working to picture and so need a generally darkened room. So in this case we decided to frost 85% of the windows, thus allowing natural light in when desired but maintaining privacy. If you want to do this you are strongly advised to use self-adhesive frosting, rather than having the glass actually frosted. Without going into great detail, unsealed frosted glass will be marked for life by a single oily fingerprint and the sealing of frosted glass is expensive and apparently fraught with problems — talk to Pilkington for more details.

Glass technology has apparently come a long way in the last decade and the acoustic performance of Pilkington's 'Optilam Phon' range is significantly better than standard fare. It's basically two pieces of glass laminated with a central 0.8mm film of plastic material. We opted for two 6mm layers giving an overall thickness of 12.8mm. These we surrounded with a U-shaped rubber window gasket and mounted at an angle to the original windows, covering the window lining between the two windows with a deep pile, felt-backed carpet to kill the space acoustically. Once again we ran a bead of silicone around the original window to make good its seal.

A great deal of time and money can be spent on studio doors including the large, freezer-style closing mechanisms that very quickly give a place an industrial feel — something we wanted to avoid. So it was decided to go for 55mm solid timber fire doors that come with their own perfectly fitting hardwood frames and stops. Another common sight in project studios is the rubber strips, like heavy draft excluders, running around the door frame. These can work OK but require the aforementioned closing mechanisms and do lose their elasticity over time. Roger suggested using a system based on extruded aluminium frames that takes a profiled rubber gasket. This is mounted on the door stop and provides an excellent seal without the need for a high-pressure close. It also means you can change the rubber when it becomes tired or damaged. Next issue we'll look at the acoustic treatment and the equipment, including a new range of Quested powered monitors at an unusually affordable price.

Felt and silicone ceiling.

Resilient bar.

Panel half cut.

Resilient Bars: Travis Perkins, Wandsworth dry wall centre +44 20 7622 1022
British Gypsum technical info on resilient bar: +44 8705 456123 . Put 'resilient bar gypsum' into Google for loads of useful info.
Door gasket: www.sealmaster.co.uk/acou.html for door stop seals.
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