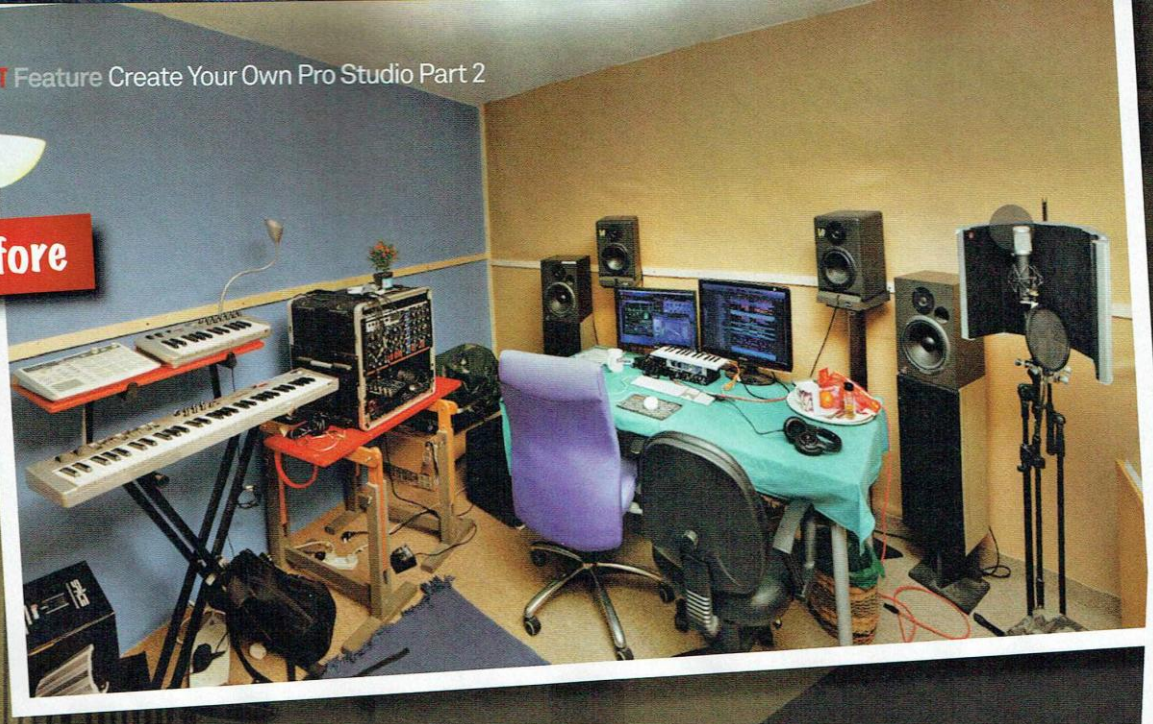


MT Feature DIY Studio Special

Create Your Own Pro Studio

Last month **Alex Holmes** began his huge DIY studio construction project. This month he completes the job with a pro acoustic finish...

Part two

COSTS

Soffit Bass Traps x2 =	£421.90
Soffit Bass Traps x2 = (custom size with Range Limiter)	£471.90
Monster Traps x 2 =	£190.00
244 Traps x4 =	£240.00
Brackets & Stands =	£95.00
=	£1,418.80
(+VAT) =	£1,702.56

Welcome back to my diary charting the journey of finding and treating a studio room. Last month we looked at the process I went through to find a studio space in Bristol, and then discussed a whole load of factors – such as location, security, transport and insurance – which are worth considering before you move in. This time we'll get on to the fun bit of actually getting all of the equipment setup and treating the room itself.

Testing Time

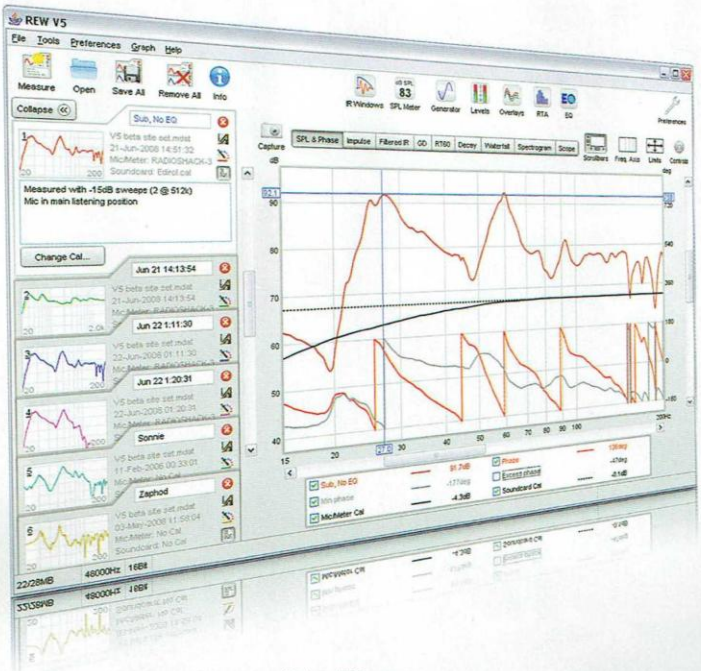
We moved all our equipment in under the cover of night and were up and running in a couple of days. At first, it was very odd to hear a set of speakers that you know inside-out in a completely different environment but we were just about able to get some work done. However, the next big step was to get the room set-up properly.

For testing duties, I was using the small pencil mic that came with my KRK ERGO Room Correction Unit, but any similar condenser will do the trick. It just needs to be omnidirectional to pick up the entire room, with a linear response across the frequency range, such as the reasonably affordable Behringer ECM8000 (£44).

Ideally, you'll also need some software which allows you to display and compare frequency graphs, waterfall graphs and reverb times, which are three different ways of measuring your room. The obvious choice for many is Room EQ Wizard, which can be downloaded free for Mac and PC via the Home Theatre Shack forum. Although this is an extensive bit of software that we're told works fine on PC, it didn't want to 'play nice' with my Mac and Firewire interface so I had to look elsewhere. I ended up using the Mac-only Fuzz Measure Pro 3 ($150) by SuperMegaUltraGroovy which, although is a little pricey, had all the features I needed for the task, and there's also a free 14-day trial version. Since then, Fuzz Measure has been updated to 4.0, which is "Completely redesigned for OS X Yosemite", and it's now available for $99 (**www.supermegaultragroovy.com**).

Once you've setup your mic, on a stand in the listening position, you simply blast a fairly short and loud, full-range sine wave sweep through your system (in my case a KRK sub and two KRK monitors), and you're presented with a high-resolution frequency plot just moments later. You might want to consider wearing ear plugs for this as you'll probably be taking quite a few readings. You can also opt to see the readout as a Reverb Time bar graph or the colourful and arguably most useful Waterfall Graph, which shows both the frequency and decay times in a single 3D display. This type of graph is especially useful for assessing low-end modal ringing, as you can see which frequencies peak and ring out longer than others.

A word of warning: after my first test things proceeded in a downward spiral, into the strangely addictive game of what I like to call test, tweak, test. You do a sine sweep, then make tiny adjustments to →



→ your room, then test again to see if the differences have improved or worsened the results. As I was soon to find out, if you have a 'perfectionist' type of personality this can become a bit of an obsession! If you're keen on getting the most accurate results possible, then you'll want to find and install a calibration file for your specific microphone, which allows the software to balance out any micro-anomalies. You can also perform a loop-back measurement using an additional output and input on your soundcard, which essentially means creating a feedback loop so that the software can determine and make allowances for any subtle discrepancies in the soundcard. In practice, as long as you have decent quality kit, these things aren't really necessary.

To **really tighten up** the room's acoustics, we needed to **call in the big guns**

Call in the pros

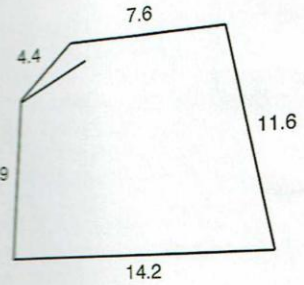
It turned out that my writing partner had a whole load of dusty acoustic foam in his attic, including plenty of small square panels and a couple of bass traps. In a moment of unknowing genius, our landlord had decided to line the walls of the studio with felt to help slightly deaden the sound. It just so happens that the foam panels stick to the felt and were easy to rearrange without using any glue or spray mount. Bonus! Alas, the actual affect of these panels was pretty minimal.

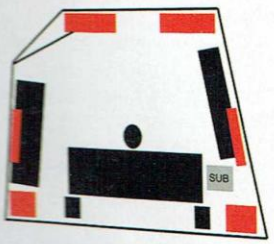
You can pick up a pretty extensive Auralex room kit for around £500. This might seem like a cheap option, and they certainly helped a bit, but to really tighten up the room we needed to call in the big guns. There are several companies that deal with the higher end of acoustic treatment, such as RealTraps or CM Acoustics, but we decided to go with GIK Acoustics, whose UK home is based in Bradford and run by a chap called David Shevyn. GIK manufactures acoustic treatments in the UK and North America and treats over 5,000 rooms annually – from studios and home theatres to churches and auditorums. (**www.gikacoustics.co.uk** / **www.gikacoustics.com**).

The company's Greensafe credentials, meaning that eco-friendly wood and materials are used, were a bonus, but the real reason we chose GIK was the way in which advice was offered on the company's website. Once you've measured the exact dimensions of your room, you fill in an Acoustic Advice Form,which asks for such details as the floor surface covering, your ideal budget and the sound issues that you're experiencing. The online form also invites you to send up to four photos or drawings of your room so that GIK can form a better idea of the optimum treatment. I promptly whipped out Photoshop and put together a crude line drawing of the room, with blocks to show where the room furniture and equipment was placed, and sent off all the info plus a few photos of the space.

I was then put in touch with Bryan Pape, the 'lead acoustician' at GIK's US branch, who sent over a review of my room along with some suggestions of pieces from their range of traps and panels. What then followed was a fairly extensive back and forth, as we worked through how to get the best out of the room. Although the unusual shape meant that there were less waves piling up in the centre of the room, its lack of symmetry made the measurements somewhat unpredictable.

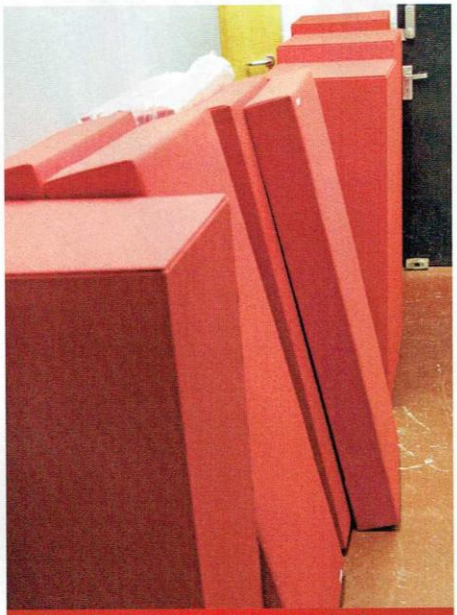
To my surprise, Bryan's first suggestion was to try moving the listening position and the entire setup. Although our initial decision on where to place the desk and monitors seemed natural, it hadn't occurred to me →





Above: Room EQ Wizard is an extensive – and free – piece of software for taking room measurements, available via the Home Theatre Shack forum

Right: The room, before and after – the latter showing the final placement of the desk, sub, furniture and other kit. Note that there are also two panels on the ceiling, centred above the listening position. Note: dimensions are in feet and the height was 7.11.



The first delivery of the lovely red panels we ordered from GIK Acoustics, prior to adding them to the room

→ that completely re-organising the whole room could give better results. This was one of the first big lessons and eye-openers which made me realise that I was going to need time and patience if I was going to get this right. After a lot of faff and shifting furniture, I sent off three different sets of measurements for three completely different room setups. Luckily, there was one obvious winner: it was the complete opposite of where we'd initially placed the desk and speakers.

It's a trap!

Now that we had this setup and the readings, Bryan suggested a batch of panels from their product catalogue to get us started. We were mainly interested in tightening up all the decay times, especially in the low-end, so the first delivery arrived by courier and included two 244 bass traps, two Monster Bass Traps, and two Soffit Bass Traps (see the *Buyer's Guide* on page 26). The 244s and the Monster traps are slab-shaped, with the larger Monster panels being placed at the back of the room, and the 244s on the walls directly left and right of the listening position. The Soffits are longer and squarer in shape – not sure if there's a better way to describe them, check out the pics – and as such fit well into the corners of the room. It's when you see these beasts in person that you begin to appreciate the difference in size and quality that a specially-made panel has over a simple piece of acoustic foam. Bass is big and powerful so if you want to tame it, you need something equally large and robust! When we ordered from GIK, we had the option to choose from a wide range of colours and went with a vibrant red. They also offer images printed on to the panels at an additional cost, but we figured that a band logo might have been going a bit too far...

What followed was an extensive game of test, tweak and test, as the panels were inched around the room to get the best results. One of the most important pieces of advice Bryan gave was to try not to have the listening position in the middle 40-60 per cent of the room length. Although I was trying to keep an equilateral triangle between my seat position and the monitors, we also concluded that it was more important to get out of the middle of the room than it was to be an equal distance from the speakers.

Typically, you'll lose some bass response if you move your head too close to your monitors (homework: read page 30 of the excellent book *Mixing with Your Mind* by Michael Paul Stavrou: **www.mixingwithyourmind.com**), but this wasn't necessarily the case here, as I have a separate sub in charge of bass duties placed elsewhere in the room. To my surprise, the best results also came with the monitors backed up as close to the wall as possible, but with care taken to make sure that they weren't exactly parallel to the computer monitors. Upon reflection, it made sense, because you're reducing the possibility of additional waves bouncing out the rear of the speakers and off of the back wall.

Final Placement

Once I had a reasonable first set of results, we decided on where best to place the second and final clutch of panels.

Bass is big and powerful so to tame it, you need something **equally large and robust**

MTM PRO TECHNIQUE

● Calibrating your Sub and Speakers

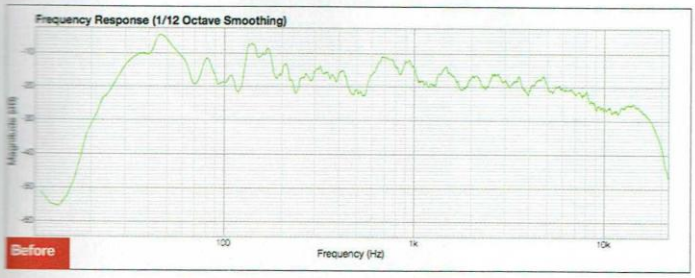
It's no use spending heaps of money on a high-end treatment if your speakers aren't placed and set-up properly. This becomes even more important if you're using a matched subwoofer to handle the bass frequencies. The best way to locate the optimum position is to place the sub in the listening position and walk (or crawl) around the room while playing a run of sine wave bass notes. Wherever the bass sounds smoothest and most even is a good place to start.

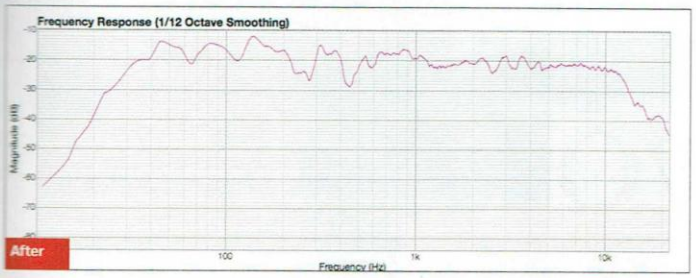
As a general rule, you'll feed the stereo out from your mixing desk or soundcard into the stereo in on the woofer, and then take left and right cables out to each of your monitors. There should also be a dial on the sub to control the crossover, with 80Hz as a good starting point. Try routing a band-limited pink noise test tone (500 -1000Hz should affect only the monitors) through the system and set the overall volume of the speakers to read 85db on an SPL meter (get a cheap iPhone app). If that's too loud, you may want to shoot for nearer to 79dB. Run another test tone of 35H-70Hz to target the sub, and set the same volume level. You should now have a volume-matched system.

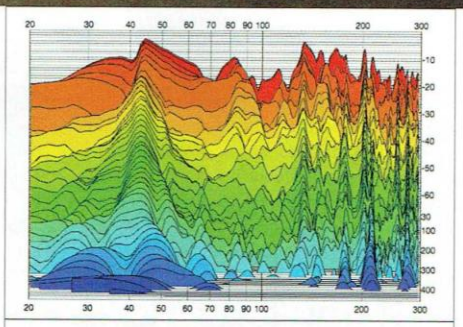
The final step is to check the phase alignment of the sub, as an out-of-phase signal will result in a dip or a boost around the crossover point. Turn the crossover to its highest and play a 60-120Hz pink noise tone. Try flipping the phase switch and leave it in the position that sounds the loudest. The test tones on this issue's DVD will help...

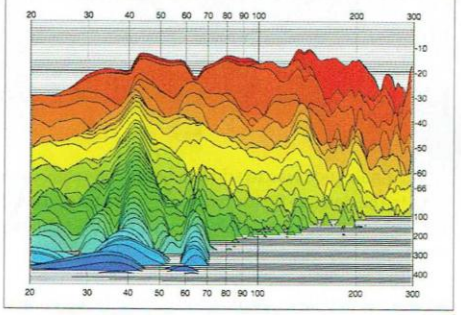
Once you've got all of your panels and treatment in place, you'll want to spend a decent amount of time doing multiple tests with your sub placement and crossover point, in order to get the best results possible. Simply moving the sub a foot at a time or changing the direction it's pointing can have quite a dramatic effect on the frequency response of the room, so it's well worth taking the time to get it right.

You don't have to match the makes of your sub and monitors but it's a good start. Adam Audio (**www.adam-audio.com**) offer an A7X and Sub 8 bundle for around £1,200









The Soffits sat half-way up the walls, in the corners either side of the monitors. We were keen to get another set to sit on top and completely fill the corners spaces of the room, from floor to ceiling. Unfortunately, after getting the tape measure out, another set wouldn't quite fit, but luckily GIK do a custom work and they shaved a few centimetres off so we could stack them. We also bought two more 244 panels, to put on the ceiling above the listening position, and a couple of stands to prop up the floor-standing Monster traps that we already had.

Above: the before and after results with graphs from Fuzz Measure Pro 3. Note that the frequency graph, although it isn't completely flat, has much less variation. The waterfall graph is tighter in the low-end, with much less ringing out in the high-end

This new pair of Soffits had something called a Range-Limiter, which basically cuts off 95 per cent of the absorption above 250Hz, to really hone in on tightening the bottom end. We were especially happy →

→ with these new additions, as the sonic results were dramatic. My partner, who's always complaining that he can't feel the bass, was especially happy, as it now felt like the sub-frequencies had shifted focus from the room's extremities to its centre. We attached the other panels to the ceiling using brackets and the help of the landlord and his drill and we were nearly all set.

If you're serious about getting good results, then you need to **put in the leg work...**

The final touch was to add in a bright red table cloth to the desk, to tie the whole room together! This also had the bonus of slightly reducing the reflections of the speakers bouncing off of the desk surface.

With a few more tests, and shuffling the sub a few inches here and there, we reached a decent set of readings that were much tighter than where we'd started. Most importantly, the sound of the room was much, much better. Everything felt closer, there was less ringing in the top end and the individual bass notes were much tighter and more even. We write bass-heavy dance music so this was godsend –subsequent mixes have come together much more quickly and translated well when tested on club sound systems.

As an extra note on the improvement, I did a room test using the KRK ERGO unit's software. This involves playing a loud blast of noise which sounds like a madman simultaneously playing 20 different notes on an organ, then pointing the calibration mic in different positions, to build up a set of readings and an image of the room. Once complete, it came up with a room score of 4/100 (previously it was 30/100), which basically means that it didn't have much work to do!

Done and dusted

So that was that. The room is now complete and we can get to work. I won't lie, the whole process – from initially searching for the room, to taking hundreds of measurements and moving things around – was lengthy. If you're serious about getting good results, then you need to put in the leg work and be willing to do multiple tests. You might think you already have the best room layout because of cable lengths or feng shui, but don't be put off testing other setups as you might find that you get much better results when you move things around, especially your speakers, sub and listening position.

In fact, the placement of the treatment was fairly simple, and it was the subtle adjustments of these three things which really fine tuned the results. As I was going in 'blind', it was really useful to have some experts on hand to answer my questions and suggest the best layout and products for the job. There's also an extensive 'Education' section on the GIK website, which some excellent articles to help get you started.

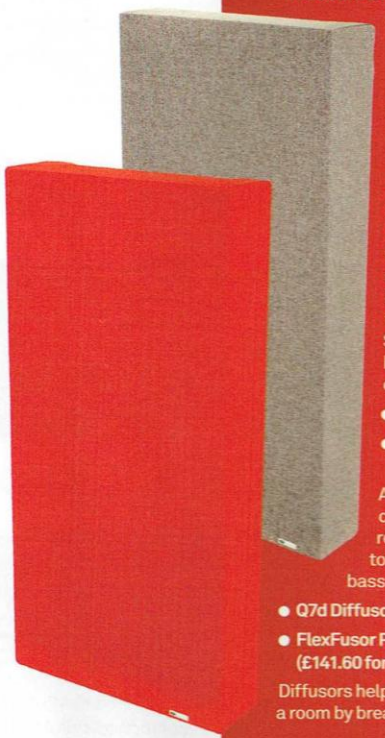
If you're worried about spending over £1,000 on sound treatment, look at it this way: you'll get more accurate mixes with £500 speakers and £1,000-worth of treatment than you will out of £1,500 speakers and no treatment! MT

BUYER'S GUIDE

DIFFERENT TYPES OF TREATMENT

Pretty much all acoustic problems are caused by reflections off of the floor, ceiling and walls. As a basic guide, you'll want to place bass traps in the corners, broadband absorbers on the side walls and ceiling reflection points, and absorbers or diffusors on the back walls. However, you have to be careful that you don't have too much high-frequency treatment, as these decay much quicker than low-frequencies and you'll end up with a skewed result.

Most manufacturers will offer a range of options for dealing with problems in different areas of a room. These are a few of the products offered by GIK Acoustics (**www.gikacoustics.co.uk / www.gikacoustics.com**):



- **242 Acoustic Panel (£173 / three).**
- **GIK 244 Bass Trap (£144/pair)**
- **Monster Bass Trap (£114 each)**

These are full-range panels which come in a variety of dimensions and they're useful for absorbing most frequencies –the bigger versions offer greater low-end absorption. GIK also have Range Limiter options, which focus on the effects below 250Hz, and Scatter Plates, to help disperse high frequencies and provide an even decay time.

- **Soffit Bass Trap (£229.14 each)**
- **Tri-Trap Corner Bass Trap (£238.80 per pair)**

As most of the bass energy collects in the extremities of a room, these are specially built to fit. They offer extended deep bass control, even below 50Hz.

- **Q7d Diffusor (£256.80 each)**
- **FlexFusor Panel (£114 each) & VersiFusor (£141.60 for four)**

Diffusors help give a sense of spaciousness to a room by breaking up zingy, slap echo sounds.