Room acoustics and treatments are among the most misunderstood and contentious subjects in the audio world. But if you want to build a new room, you’ve got to bite the bullet. One notable to chomp on said munition is mastering engineer Tony Mantz, aka, Jack the Bear, who recently employed the services of renowned American acoustician, George Augspurger to realise his dream.

Text: Andy Stewart
For anyone who doesn’t know Tony Mantz – or ‘Jack the Bear’ – Tony’s the guy we’ll be calling on to be the ruckman/hitman if and when the audio fraternity ever gets a football team together to play a one-off match against the film industry. Tony is er, how can I put it… big and imposing. The last time I’d seen Tony was several months ago in the halls of Sing Sing with his German Shepherd, Aron – a scary combination to be sure. We sat down that day over dinner (minus the dog) and it was then that I first heard of Tony’s plans to build a dedicated mastering room from the ground up.

What seems like no time later – but I’m sure for Tony it must seem like a lifetime – Deluxe Mastering is built and working away happily. Time flies when you’re not building a studio…

I caught up with Tony – or Jack, as I’ll call him from now on – in his brand new facility on Tinning St, Brunswick and was amazed to be greeted by the man himself at a classy front door and led inside into a world of door handles, furnishings, floor coverings and pictures. There were no paint smells or secret piles of hammers and saws waiting to be called into action the moment the client left the building (if we ignore Room Two, which is still without its acoustic treatments!). The remainder of the facility is actually finished as opposed to ‘up and running,’ which is often a euphemism for, ‘we’re out of money and if we want to finish the place we’d better just start work and earn some!’

My impression of the ‘money room’ – the mastering room – is of a comfortable and relaxed vibe with a minimalist clean-lined aesthetic that’s dominated by an imposing pair of Duntech Regent monitors that were trucked over from Sing Sing (along with Jack’s other gear) during the great escape.

Jack and I ordered pizza (amazingly, the pizza shop was already familiar with the address of the ‘studio down the road’), made a cup of tea in the sparkling new kitchen and headed into the mastering room, where we listened to some familiar CDs and had a lengthy chat. At some point during this discussion our pizza arrived…

**DELUXE MONITORING**

**Andy Stewart:** So Jack, you’ve had Duntechs as your main monitors for a while now, can you tell me what prompted that choice initially?

**Jack The Bear:** I’ve had those for almost six years now. I bought them after working in New York where there were a lot of Duntech and Dunlaveys in mastering studios; Masterdisk in particular had Duntechs from Australia, so I thought, ‘Well this seems to be the speaker of choice,’ so I saved my pennies and bought them… and I love them.

**AS:** Have you always used large floor-standing speakers like these?

**JTB:** Yep. The first set of floor-standing speakers I ever owned was a pair of Dahlquist DQ10s, which had a 10-inch Advent driver and a piezo tweeter. They looked a little bit like a Quad Electrostatic speaker – big and full range… even as a kid my first hi-fi speakers were ElectroVoice Interphase As, which were a large, great-sounding speaker.

**AS:** You’ve always liked to work with a large-scale image then?

**JTB:** Yeah, and any of the mastering studios I’d seen all had large freestanding speakers, occasionally large soffits… but it was always about the big full-range sound. I’ve always been into that sound and I think I’ll stay there.

**AS:** George Augspurger, who designed this new facility for you, was obviously aware that the Duntechs would be at the heart of the new room then?

**JTB:** He was. I told him what speakers I had, but beyond that I just presented him with the scenario of an empty space: ‘These are the dimensions of the building and what it’s made of, here are some diagrams and measurements… I’d like you to design me a mastering studio that’s appropriate.’

**AS:** Was the type and size of speaker you owned a key consideration or was that fairly immaterial to the planning?

**JTB:** No, we didn’t focus too much on that, although I was initially concerned about the height of the room to make sure it accommodated the speakers. But I basically gave George a blank canvas and let him design it as he saw fit. When he sent the initial plans over I did ask him whether we might be able to make the main mastering room a little larger, to which he responded; “Yes we can, but if we do there will be a lot of extra expense and little to be gained – in other words, we’ll be up against the law of diminishing returns and increasing costs. You’ve given me the blank canvas – this is the painting.” He was basically saying that the cost/performance ratio would make it prohibitive. To make it marginally bigger would have made it a hell of a lot more expensive.

But having said that, he was very open-minded. George has a very simple design philosophy. There’s no rocket science involved or mind-boggling mathematical complexity, no $3m diffusers or proprietary weirdness going on.

With George it just came down to good, basic acoustic design principles that work. That’s all. His fundamental belief was that a mastering room should look and feel like a lounge room, getting away from that ideal balance between scale image then?

**AS:** Did George’s design use every last scrap of height that was available in the basic structure?

**JTB:** It did. We’re a bit limited by height here and we used all of the building’s 3.0 metres. But given that most of the rooms George has designed in LA and New York have been in high-rise buildings, he was no stranger to this limitation.

**AS:** Did you swing a hammer or do any of the hard yakka during the build?

**JTB:** Yeah, I did most of the heavy hack along with my father-in-law who was here every day for the entire project. He’s pushing 70 and worked like a Trojan. We used over 330 sheets of Fire Check plaster and 150 sheets of yellow tongue flooring which we had to carry up 21 steps. I know each step by its first name now, and I’ve had many conversations with every single one of them!

I did the drilling and insulation work (toxic stuff, insulation), suffered lots of cuts and bruises. There were sprains and cursing, frustration, arguments, shouting and yelling and whatever, but looking back on it now, it’s been very rewarding.
DUNTECHS WITH SUBS?
JTB: I’ve got the subs in there to make sure I’ve got enough bottom end content – they’re an active pair of Legends, made in Canberra. I spoke to George about this and he felt that subs might help the Duntechs, although when he came here to tune the space he argued that they were unnecessary. But I really wanted them to stay…

They weren’t connected in the system at Sing Sing, but that room was a lot smaller and there was a bit of bottom end build-up. I really just wanted to be able to get a better sense of that bottom octave. I do a lot of electronic music and need to be able to hear it and feel it, and certainly the clients do too.

ACOUSTICAL CRAPSHOOT

AS: How did you come to use George Augspurger as your acoustician and designer in the first place?

JTB: Oh gee, where do I start? Well, when I finally reached the point where I was ready to pull the trigger on this thing, I just thought, well, I’ve only got one crack at this, one chance to do it properly, and with all due respect to the local acousticians (there are a lot of very clever people here), when I looked around locally there wasn’t anything that blew my mind and made me go, ‘Wow, I’ve got to have this room!’ So I started looking overseas and eventually spoke to Dave Collins, who’d previously worked at A&M and Marcussen Mastering in Hollywood – both of which, coincidentally, were designed by George Augspurger. In discussions with Dave we eventually concluded that I should have a chat to George and see where that led. But I’d talked to several other US mastering guys and was fearful of the prices they’d paid to hire a well-known acoustician. Anyway, I got a hold of George and, as it turned out, he was actually very reasonably priced for what he was offering – in fact, comparable to the price I’d pay for the same service locally. And given his wealth of experience and international standing, it just seemed a no-brainer to use him for my ‘ultimate room’.

AS: So has George realised your ‘ultimate room’ for you, would you say?

JTB: I say ‘ultimate room’, but I didn’t have a perfectly clear picture of the room in my head, to be honest. My only brief to him was that I wanted a great-sounding room.

We had philosophical and aesthetic discussions, and chats about general size and height. I asked him questions about bass trapping and how he took care of standing waves. But that was it really. Interestingly, when I got the initial concept drawing the first thing I noticed was parallel walls! My initial reaction to that – as I guess anyone’s would have been – was, ‘whoa, that’s dangerous, there’s the first problem right there… whoops!’… you know? But his response was that he uses different acoustic panels in the rooms, some of them absorptive and some of them reflective, and he assured me that it wouldn’t be an issue. [Read the accompanying interview with George Augspurger for a more detailed explanation of the design philosophy.]

AS: Was there ever a sense of trepidation going into the design process, given how diverse the philosophical range of opinion seems to be amongst acousticians?

JTB: I really didn’t have any idea what I was getting myself into, to be honest. Sure, I’d read about this and that design and the evolution of studios etc, but it was all as clear as mud. I had a lot of faith in George though. And Dave Collins was a great support too throughout the process. He’d worked with George several times before and been through it himself, so I was able to seek counsel from him, as it were. His bottom line was this: “George has been doing this for a very long time now… if you build it to his spec and you don’t improvise, it will all work out.”

And despite the fact that George was half way around the world (we just kept sending him photos and emails and he was always very quick to respond), it really wasn’t that painful a process, even though the idea of the designer being on the other side of the world initially seemed a little fraught.

AS: You obviously designed the room and consulted with George over email during the construction phase, but did he ever actually come here to complete the picture?

“There’s no rocket science involved or mind-boggling mathematical complexity, no $3m diffusers or proprietary weirdness going on”
JTB: He did. George came out here in early May to do the final tweaks, tune the room and sign off on the project.

AS: No dramas while he was here?

JTB: None. The good thing about George is that he will work with what you have. He doesn't carry the line that 'this is how I do it and this is how it has to be'. He'll design a room and if you've got an issue, be it financial or aesthetic, he's open to it. George has a real passion for this stuff. He's so into what he does; he just loves it. And I think that's reflected in the fact that he was so reasonably priced. I had a fixed budget and he worked to it. Admittedly we went a little bit over budget, but it's so hard to avoid!

AS: I presume the fancy toaster and the wide screen telly out in the lounge room put paid to the budget.

JTB: That's right; the toaster, the wide screen telly and the couches… which I had to get custom made. Like Rick [O'Neil] once said in his Last Word, couches are very important… so many people come in here and comment on the couches.

AS: Did you buy any new audio gear to go with the new room?

JTB: Apart from the sub-woofers [See Photo], the only new toys are the new Musical Fidelity amps from Britain. They're not super expensive, but after having tried Brystons and Crowns etc these ones just matched really beautifully with the Duntechs. The other equipment purchase was the Ampex ATR100 ½-inch, which I bought from Mixmasters in Adelaide. But that's about it as far as new gear goes. I did buy a couple of new things just before I moved from Sing Sing: a stereo pair of mastering API 550Ms and the two Chandler LTD-2 compressors, so they're newish. But I'm not into having endless equipment options. It's nice to have extra EQs but sometimes having too much gear just causes confusion. I like having my go-to boxes and a couple of other colours in the palette, but that's about it. For instance, the Chandlers are great on rock projects mixed 'in-the-box'. Contrary to popular opinion though, they're not a Neve – they have their own character. The Manley Vari-Mu is good for certain things as well, but the Crane Song STC8 is my primary compressor and the Millennia Media NSEQ-2 my primary EQ. Everything else in the rack is there for colour and vibe. I really think you're much better off getting to know your gear intimately and know how it reacts to different program material – whether something's better off being placed pre-compressor or post compressor, things like that – than having more gear.

NEARFIELDS BE GONE

AS: Getting back to your monitoring… what's the story behind your apparent dislike for nearfields?

JTB: I’ve never been able to get my head around nearfields. When I listen to music I like to hear the full spectrum and particularly the low end. And although I understand that people use them to help with translation – after all, not everybody at home has a pair of Duntechs – in my experience, nearfields just create confusion. A client will ask to hear how a master I’ve just created on the big speakers translates onto the nearfields – and obviously the small speaker can’t reproduce 20 cycles etc – and then you just start second guessing everything. Mark Wilder at Sony summed it up best when he retold the old saying: “a man with two watches never quite knows what time it is.” It’s a great analogy.

A client isn’t going to know for sure what something sounds like until they go home and listen to it anyway, so nearfields aren’t going to lessen that confusion. No matter how crappy their system is at home and no matter how much they love the sound of the mastering room, they can’t ultimately know until they take it home with them. Their ghetto blaster, their iPod or their car stereo is what they know and that’s where they make their decisions. How it translates on those systems is what matters to me. I have a pair of tiny JBL satellite speakers with a sub in the kitchen as a means of listening in the ‘real world’.

I’m not looking for an exaggerated image, or an overwhelming image, just a sense of realism that nearfields, to me, don’t create. As a mastering engineer you work day in, day out and you know your monitoring intimately and part of what people pay for is that knowledge. They’ve got to trust you in that, and you have to earn that trust.

In the end, it simply comes down to your focus. Your equipment must reflect the way you work, not the way someone else works. The end result is all that matters. If your image of the world is clear and sharp through your prescription lenses, then if that’s the right fit, then that’s the right fit.

Below: Jack’s analogue mastering chain includes several hi-end modern-day classics from Manley, Crane Song and Millennia Media.
“a substantial amount of experimentation is required to produce a really good-sounding room”

SECRET SOCIETY
AN INTERVIEW WITH ACOUSTICIAN GEORGE AUGSPURGER

Some might say that mastering is a black art, but what about acoustic design? I doubt there’s a more contentious, misunderstood or feared topic on the planet than room acoustics and mathematics. What’s more, a studio’s reputation can often be made or broken by the myths and nonsense perpetuated by others who might whimsically claim that such ‘n such a studio’s control room is ‘badly designed’, ‘has a lump at 250Hz’ or ‘doesn’t translate well’. Ask any studio owner about their design principles and they’ll change the subject, turn white with fear, or run out of the room to answer the phone – even though no one heard it ringing.

What’s particularly disturbing is that no two acousticians appear to agree on anything. They’re like great white sharks: scary, formidable and solitary.

Jack the Bear chose well-known American acoustician, George Augspurger, to design his dream room from George’s distant home in Los Angeles. George has worked on studio design for decades and has conjured up countless rooms, from Marcussen Mastering and Sunset Sound in LA to several mixdown and mastering rooms at Sony BMG Studios in New York, to name but a few. He’s ‘old skool’ – meaning, he’s actually a trained acoustician, not just a guy with a pencil, some paper and a penchant for mathematical equations. I caught up with George to find out a bit about his design philosophy, and initially equations. I caught up with George to find out some paper and a penchant for mathematical trained acoustician, not just a guy with a pencil, a few. He’s ‘old skool’ – meaning, he’s actually a

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George Augspurger: The unique feature of a mastering room is that it’s not a rental facility. It’s designed to meet the preferences of only one person – the mastering engineer. As it happens, the majority of them prefer a room of moderate size with freestanding loudspeakers. The acoustics and general ambience should be more like a good home listening room than a glitzy commercial mix room.

AS: Why should a mastering room feel like a lounge and yet a mix room somehow be ‘glitzy’? I realise a mastering studio is trying to translate the audio into the ‘real’ world, but is that not also the job of a mixing room? Can you elaborate on the differences...

GA: At the present time, good mix rooms tend to be surprisingly similar in design – generally trapezoidal in shape [trapezoidal being defined as a quadrilateral (four-sided) geometric figure having only two parallel sides] with a ceiling that slopes down in front, a ceiling height of 3.0 to 3.7 metres, 50% to 75% of the wall area covered with absorptive treatment, and a fair amount of space devoted to low frequency ‘traps’. In John Eargle’s Handbook of Recording Engineering, Fourth Edition, he sums up acoustical requirements as follows:

“The control room must be acoustically neutral with no audible standing waves, and this requires distributed absorption on the side walls and ceiling. The back wall often includes bass traps in the corners and diffusing elements over a large portion of the centre. The front wall sections surrounding the loudspeakers are often hardwood. The combination of absorptive and diffusive materials ensures that the control room will not be acoustically dead, and that is an important requirement. Actually, detailed measurements will show that the amounts of direct and reflected acoustical power at the prime listening positions are about equal.”

Notice that flushed-in (soffit-mounted) monitor speakers are taken for granted. The combination of a sloping front ceiling and flushed-in speakers can achieve super-punchy, in-your-face reproduction at deafening sound levels. Some successful engineers work at these elevated levels all the time. Others rely on the console-top speakers most of the time and switch to the big speakers only occasionally.

However, most mastering engineers are not interested in a zoomed-in analysis. They want to hear what the mix sounds like in a good home environment at typical sound levels, including very low sound levels. One can argue that this difference in viewpoint is what makes the mastering process valuable.

A mastering room that uses freestanding loudspeakers may or may not be trapezoidal. Given a free choice I will usually angle the front corners slightly, as I’ve done in Tony’s room. On the other hand, if the available space is already narrow then any additional angling may require that the speakers be too close together.

AS: So is Tony’s mastering room, in fact, trapezoidal, not rectangular?

GA: No, I would call it rectangular, with diffusion and trapping in all four corners, all arranged to be bilaterally symmetrical (side to side). In both mix and mastering rooms we try to achieve a stable, three-dimensional stereo image from two-channel program material, and this requires acoustical symmetry, especially in the front half of the room. This means that an absorptive panel on the left wall should be balanced by a similar absorptive panel on the right wall, and so on.

A good listening environment also requires a mixture of absorption and scattering on the walls and ceiling, largely based on practical experience. But beyond these guidelines, a substantial amount of experimentation is required to produce a really good-sounding room. Good stereo imaging is mostly subjective. Using a dummy head, we can make accurate measurements, but nobody knows exactly how to interpret them! A mastering room has a big advantage over most mix rooms because it allows more leeway for experimentation. The speakers can be moved, the console is small and can be moved, and there’s not a lot of outboard equipment to obstruct the passage of sound waves.

AS: Popular amateur acoustic philosophy would consider parallel walls out of the question, of course... Is the need for splayed walls simply a myth or just non-critical in your design philosophy?

GA: Loudspeaker manufacturers seem to believe that a trapezoidal enclosure ‘prevents standing
waves’, but this is nonsense. There’s nothing inherently wrong with a trapezoidal shaped room, and it may offer some acoustical benefits, but suppression of standing waves is not one of them. Most of the famous old European concert halls are shaped like rectangular boxes. And of course, the ultimate non-parallel room is a sphere, which is probably the worst possible shape for a listening room [in fact, in some ways, it’s the ultimate ‘parallel’ room, in that every point has an opposite parallel point]. In a room with a fair amount of sound absorption, non-parallel surfaces are often introduced to guard against flutter echo, but flutter echo can be controlled by other means as well.

AS: What’s the distinction then between flutter echo and standing waves, given that most people lump these two problems together? And does this mean there is hope yet for home studio owners who mostly endure a space that often has pairs of parallel walls?

GA: So far as home listening rooms are concerned, substantial compromises are often required. The locations of loudspeakers and listening area may be dictated by the interior designer and not subject to change. There may be no way to make the room acoustically symmetrical and the room is usually too small. The list of things to endure is fairly long, but parallel walls is not one of them. Parallel surfaces do not promote standing waves. We usually use that term to denote low frequency room resonances that result in large audible peaks and dips that change dramatically with location. Flutter echo, on the other hand, is a high frequency phenomenon that sounds like a stick being dragged along a picket fence. A couple of absorptive panels or diffusing elements will usually kill it if it shows up.

SIZE DOES MATTER

AS: How does size play a part in your designs George, and what constitutes a listening room that’s too small, or too large, in your opinion?

GA: A very low ceiling is usually one feature of a space that’s too small to begin with. Even if there’s sufficient floor space, a low ceiling will make a room sound small, and because the ceiling is already low you can’t apply thick absorptive treatment.

In the U.S. there are three or four well-known mastering rooms that I would call large. For example, Marcussen Mastering in Hollywood is about 160 cubic metres. On the other hand, I designed one mastering room that was less than 28 cubic metres! Most mastering engineers seem to be comfortable in rooms ranging from 70 to 110 cubic metres.

AS: Is the limitation of height then – given that most listening rooms are built inside pre-existing structures – what often determines the overall size of a room?

GA: There are no magic room proportions, but a very low ceiling can be a real limitation. A height of 3.0 to 3.5 metres seems to be preferred. Anything less than 2.7 metres can result in intractable acoustical problems. In the case of Tony’s room, I wanted enough floor area to allow 5.1 monitoring with reasonable spacing from the console to the loudspeakers. The existing ceiling height was adequate, but I didn’t want to reduce it any more than was absolutely necessary to achieve acceptable sound isolation.

FLOATING ROOMS

AS: What about the concept of the ‘floating room’... is there any benefit of a floated room other than sonic isolation from adjoining rooms; i.e., if you only had one room in a free-standing building, would it be necessary to float the floor?

GA: There is no such thing as a soundproof room, of course; it is all a matter of degree. However, good sound isolation generally requires double walls and ceilings. Floating the entire room on an isolated floor is usually done to minimise the transmission of structural vibrations, such as scrapes, thumps, and plumbing noises. It may also be needed to attenuate low frequency rumble travelling through the ground from exterior sources such as trains and traffic. In a quiet location, yes, it may be possible to build directly on the existing floor slab and achieve acceptable sound isolation.

AS: The floors you’ve designed for Jack’s mastering studio seem to almost literally float; i.e., there appears (from photos) to be little structural framing at all, or am I mistaken? Obviously your design seems to be keen to prevent resonances inside cavities...

GA: Tony’s room sits on a heavy concrete slab, so I wasn’t too concerned about low frequency leakage from the space below. In this case, the isolated floor prevents mechanical vibrations such as scrapes, taps, and plumbing noise from travelling through the slab into the room. It consists of a lightweight sandwich resting on a combination of neoprene pucks and compressed fiberglass board, providing a high degree of mechanical damping. Isolation at very low frequencies is marginal, but excess transmission at the system resonance is suppressed and high frequency vibrations are largely attenuated.

The outer walls of the mastering space extend from the slab to the existing ceiling. The inner walls rest on the floating floor and support the perimeter of the inner ceiling – they’re not tied to the existing structure. As for the ceiling, I wanted to get substantial low frequency isolation because there may be low frequency energy floating around in the crawl space above the existing plaster ceiling. My first plan was to remove the existing ceiling above the mastering room and hang a new isolated ceiling from the structure above. This turned out to be more expensive than anticipated. If the new ceiling were to be hung only a few centimetres below the existing ceiling, then the trapped air would not allow us to achieve the required low frequency isolation. The solution was to cut holes in the plaster every half-metre or so, allowing low frequency energy to vent into the attic space.

The result is that the ceiling and the double walls have enough air space to achieve good low frequency isolation from adjoining spaces. The floor did not require as much low frequency isolation, but it provides mechanical isolation for the interior floating floor and walls.