

Beginners guide to setting up your own home studio.

For anybody setting up their own home studio for the first time, it can be quite a daunting task to plan what exactly you need to achieve the results you want.

Companies and retailers are always keen to try and sell you their latest products. Magazines also do this as they exist to serve the industry through advertising revenue. This means that its always worth pausing for a second to consider this especially when it comes to 'upgrading' your current equipment.

Most people when starting out have never used a Neve 1073 or a Neumann u87, and if you're reading this and you haven't either, chances are you will be doing lots of research and very soon and. You will!

I would say 99.9 percent of beginners do not need anything like this and could get the results they need for around \$300. For reference, the Neve 1073 is around \$2000 and U87 the same (if you're lucky!)

As a recording/mixing/engineer that has been through all this with over two decades of experience, I can tell you that having a basic but solid initial set up will benefit you more (and put less of a dent in your wallet) than the latest and greatest pieces that get lauded on internet forums.

Before talking about any equipment, although it sounds like a cliché, I will say it anyway.

The most important aspect of recording and mixing and production for that matter is the material (i.e the song, arrangement), the performance, the environment your recording in and last but certainly not least, your objective. What your trying to achieve sonically should never be forgotten, are you wanting to sound like a lush expensive sounding multi million dollar production? Or were you just trying to achieve an 'old blues tune on a 78 record' sound?

If your intention is the former you may want to reach for the best instruments/mics and environment you can to try and mimic what was used on your favorite 'lush sounding' record. If it's the latter then why not try a something a little more modest as that what was probably used at the time. Planning your outcome from the start can save you a lot of time down the line. A tip to take from the professionals here is that (in the big budget heyday), they would spend a week getting a drum sound right before they even recorded anything else. They were perfectly aware that they were building the foundations of the sound and to mess that up would be both costly and time consuming. I'm not suggesting you have to do exactly the same and spend a week on your drum sound but. If you have the time, then do experiment with placement of microphones and rooms to listen to what it sounds like recorded. You may end up preferring an environment/placement that you hadn't previously

considered, happy accidents are all over great recordings so don't feel that because you didn't plan it then it shouldn't work as it isn't always the case.

Room Acoustics

The environment in which you record and listen back to your recordings can make a big difference to the quality of your finished track. For most of us, the luxury of huge ceilings and wide rooms is not an option and often a compromise is required in a home studio in order to get the best possible results.

Small rooms can have a detrimental effect on captured sound by reflecting unwanted sounds back at very quickly. You can experience **slap echo**, **bass boom**, **comb filtering** and nasty early reflections that become part of the sound without you knowing about it due to the nature of how quick this echo is.

As it's a common problem, luckily there are products that help you deal with this. For dealing with those short echoes we have diffusors and they come in a few different shapes and prices. Aesthetically these skyline diffusors are hard to beat, but they are expensive and if your building them yourself, very time consuming. A cheaper option is foam and most hardware stores stock these type of diffusors so they can be easily found. These types cannot be 'tuned' to diffuse different frequencies like skyline diffusors can but in a lot of circumstance will do the trick nicely and improve your room set up straight away.

Getting Started- The Computer



Probably the most important part of a modern home studio is the computer. The operating system and DAW (recording and mixing program) is a personal choice but the attributes of the hardware architecture do need to be at a reasonable level in order to efficiently enable you to work. It might be a good idea to test out a friend's computer or even look at what other are using. A reasonably fast processor and a good amount of RAM is a good starting point. Your hard disk speed will play a big part and how your DAW reads and records the tracks your recording so it's worth taking into account when selecting this.

The specification will come down to what you can afford and also what you need your computer to do. If you're only recording and mixing a maximum of around 24 tracks then it's amazing what you could get away with. The only caveat to that is the amount (and type) of effects you're using. For example, if you want to use the latest Convolution Reverb plug ins then they could really start to slow things down. Generally though, efficient use of plug ins and modern PC's/Mac's will do the job.

The next consideration is your choice of DAW, this can be decided upon by many different means and cost can certainly be one if you're starting with no previous experience in this field. If you're planning to make a career from this then Pro Tools is the current industry standard and would probably be a good place to start and get used to the workflow and mechanics of this particular piece of software as each one is slightly different.

The cheapest professional option is called 'Reaper' and also available for to try for free. I wouldn't consider it a compromise to choose something else like Reaper as the general sound of a DAW is pretty much identical. The differences people report are mostly down to using the stock plug ins that are used as the controls and set up of these plug ins will influence the way you work and the overall sound.

Microphones

Nothing will happen in a studio without a microphone, were at the hub of the operation now and choices here could affect your overall sound more than anything you buy. If you're recording your own voice only then this really narrows down the plethora of choices you have available to you. If you aren't likely to be recording acoustic guitars or drums and you will be just your voice either for singing or voiceovers then a good condenser mic should be the number one aspiration for clarity and quality.

There are so many option in 2017 for a good condensor mic and plenty of places to buy them from. To narrow down this search, budget, character (some mics emphasize different frequencies for example) and quality are your main considerations.

The more expensive the mic, the better the quality? Well this is slightly subjective, but generally build quality is better as you go up the ladder but sound quality? I don't necessarily think this is a linear progression as to my ears the sound of a Neumann U87 is not 5x better than the Neumann TLM102 but it is nearly 5x the price. Some may even prefer the TLM102 over the U87 so it really is quite subjective. There is a good comparison I created here to show this,

<https://www.youtube.com/watch?v=ExzETWkSh6s>

One thing to watch out for here is the opposite of the diminishing returns philosophy described above and is that of marginal gains. The philosophy here is that the if you have a many well recorded parts all stacked up along with one another then the quality starts to become more noticeable than that of many sub par recording being stacked up. This is well worth considering when watching these comparison videos.

Interfaces and Pre amps

To get the sound of your microphone into your computer, you're going to need to amplify and convert this analog signal into a digital one that the can be stored and edited. What's needed in this process is a A/D converter. There are lots of different types all claiming to be far superior than the next using terminology like 'signal to noise ratio', 'Jitter' and 'transparency'. As with the microphone selection, you face a similar choice that contain diminishing returns the more you pay. One feature that gets overlooked and is perhaps one the most important is the stability of the interfaces drivers. The driver is the software that communicates with your computer via the interface and a happy relationship here means a trouble free experience recording. I once had a very expensive interface that sounded great with lots of features that would continually have trouble being recognized by the computer. If I couldn't use it then those features became irrelevant!

The pre-amp is the part of the equation that often gets talked up a lot and people love to spend a lot of money at this stage of the chain and it some ways this investment can be well placed. It is worth noting however that there a lot of copies of famous designs that would

put a lot less of a dent in your wallet than the brand originator. There are difference of course but are the better or just different? You can decide for yourself here.

<https://www.youtube.com/watch?v=GIY75P81tnE>

Things to look out for when choosing a pre-amp is the amount of gain that its capable of delivering (how loud it goes). The signal to noise ratio, (how much hiss it has when you turn it up) and whether it has any other bells and whistles like an equalizer. It's gain capabilities will be of interest if you have a ribbon microphone or a sensitive dynamic mic like a Shure SM7. Both need a lot of clean gain to get the best out of them and it's well worth considering a pre-amp capable of delivering 70db of gain in these cases.

Some pre-amps offer greater functionality than others like a **DI input** which allows you to directly connect your instrument to it.

The character of the pre-amp is determined by and large by its circuitry. Some are **digital**, some **solid state** and some are **tubes**, some are also variations of all 3.

The famous Neve 1073 is an example of a solid state design that uses **discreet components**, this means that it doesn't use microprocessors and instead uses many different parts that are hand wired. This of course takes time and money to manufacture that in part plays a big part in its high price.

Pop filters, reflection filters, Vocal booths,

A pop filter can be essential if you are singing very close to the mic and are producing lots of "P" and "B" sounds. These sounds produce a lot of air and briefly overload the sensitive diaphragm of the microphone. To counter this, the membrane of the pop filter slows down these burst or 'plosives' to lessen the impact on the diaphragm.

A reflection filter is an object that (in principle) lessens the amount of unwanted reflections (or echo) from a bad sounding room. You might think that you can't hear any echo as the traditional notion of an echo is that of the cartoon character in the mountains shouting and hearing himself back many times after. The type of echo we are worried about here is nothing like that. They are called '**early reflections**' and can be imperceivable as a traditional echo. This is because as the name suggest early reflections occur so quickly that, to our ears they appear to be part of the original sound, and in a bad sounding room this could really color what could be a very nice original sound.

For a home studio the colorization of the recorded sound is a huge factor why sometimes we don't quite get the sound were looking for. Here is an example of two recording of the same instrument play by the same player in two completely different rooms.

Cables

Cables, whether they be mic cables, digital cables etc can play a part in the sound you record. The huge emphasis is '*can*', a good working cable should be able to do the job perfectly adequately. You may ask why then do people spend fortunes on wiring up studios after reading lots of marketing material on how a particular type of cable can sound 'more transparent', 'have a bigger soundstage', the list goes on. In part, a lot of this is just marketing fluff designed initially to prey on the Hi Fi market. You only have to take one look at the popular magazine 'What Hifi' to realise that any knowledge on the science of conductance is something that has to be parked in order to buy the nonsense that is written

The important thing here is build quality which includes a good electrically shielded cable that has been built well enough to sustain years of use. Cheap cables generally use wire that is just fine for the job, unfortunately the connector ends don't quite survive years of use without issue. Look out for Neutrik connectors as they tend to suggest quality in this department.

Monitors

So now you have your sound recorded, you will now want to hear what you have! To do this you will need some speakers or 'monitors' as they're known in the studio world.

The objective for studio monitors is that they are as flat as possible in their reproduction of the sound. This is so you can hear everything as it supposed to be as opposed to be told you have a really great bass sound, only to find out that your monitors emphasized the low end and told you lies! Lies that when you got in the car to play to your friend your latest masterpiece, made it sound weak and lacking in the bass region and as a consequence quite harsh in the middle range.

Prices for monitors vary and so does quality! You can actually 'learn' a set of monitors though despite their shortcomings, a great example of this are the famous NS10's, not famed for being flat, more for being quite harsh but this led to engineers preferring them as a way of controlling the middle frequencies. However, if you'd never used them before, the chances are your low end may suffer the same fate as that in the example above.

When starting out, I would definitely recommend getting a good flat pair with a decent low end reproduction. I would even have a second pair if possible (as I do, in fact I have 3 pairs!). The reason for this is that different speakers do interpret your recording differently and you can get some nice and unfortunately nasty surprises when you hear your recordings back in certain environments. They don't have to be as flat or even expensive, they could be an old pair of Hifi speaker, it just gives you some more real world opinion on your sound. Another great means of monitoring are headphones.

Headphones

For me headphones are critical in most home studios, they're important for recording and also for listening back at the mixing stage. A lot of people almost exclusively listen to music on headphones and earbuds, this means that it's crucial to hear your music the way it's being consumed by your audience. Stereo information presented by headphones/earbuds can sound much more exaggerated due to the point source nature of having individual speakers on each ear. When you listen to music on speakers in a room, you are hearing two point sources but you are also hearing a mix of both channels as the waveforms from the speakers combine and smear as a result of reflections within the room.

This brings me on to another reason for using headphones in home studios. A good pair of headphones coupled with some **room emulation software** could really be a life saver if you have a poor sounding room or you need to listen to something at night and can't make any noise.

Microphone Stands

Not the most exciting part of your shopping list but crucial all the same. As with cables, a good mic stand should be built well enough to last years of use. The moving parts of the stand are usually the first things to perish so look out for cheap plastic parts in these areas as they tend to fail after repeated use so end up being a false economy.

Keyboard controllers, Synths and Soft Synths

The keyboard's role in the studio can be quite crucial for many things other than the obvious. Of course, if you want to record traditional keyboard parts like piano, organ then a keyboard is a must be also you can use it for laying down string parts, bass parts and even drums.

Analog synthesizers once were only found in vintage shops at hefty prices but these days many of the traditional manufacturers like Korg, Roland and Yamaha are now making reproduction of some of their famous designs. This means they are more available and more affordable to those

Outboard Gear

This is anything outside of the computer or interface that you're using that contributes to the recording or mixing process. This could be a character pre-amp as previously discussed or it could be an Equalizer, Compressor or Reverb unit. Many plugins today emulate these processors, but many engineers still prefer the physical version due to a number of factors including of course, a particular sound they have.

When starting out, all you really have to go on is what others say so it's best not to rush into a purchases here as outboard equipment can be very expensive especially when compared to its digital counterpart. I would advise a period of learning and trying out equipment wherever possible to ascertain what a particular piece does, only then can you really judge if you need it in your set up and you have the budget for it.

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As it's a common problem, luckily there are products that help you deal with this. For dealing with those short echoes we have diffusers and they come in a few different shapes and prices. Aesthetically these skyline diffusers are hard to beat, but they are expensive and if your building them yourself, very time-consuming. A great feature of these diffuser is that you set them up in such a way that they target a certain frequency range. This is great if you have some room measuring software to analyse where in the frequency spectrum your room is prone to problems. A cheaper option is foam and most hardware stores stock these types

of diffuser so can be easily found. These types cannot be 'tuned' to diffuse different frequencies like skyline diffuser's can but in a lot of circumstance will do the trick nicely and improve your room set up straight away.



Slap Echo

Slap echo or slapback is a single echo resulting from non-absorbing (i.e., reflective) surfaces, characterized by a significant amount of high frequency content. So-called because you can test for slap echo by sharply clapping your hands and listening for the characteristic sound of the echo in the midrange.

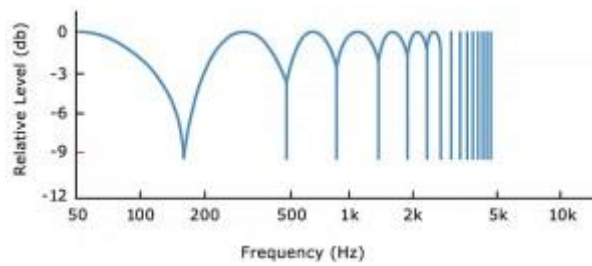
Bass Build Up

Room construction normally results in "strong" corners, where multiple axes of studwork and wall panelling converge and support one another in each direction. This results in rigid surfaces which tend to trap low frequency sound waves, and the strength of this build up will be most severe at the wall-ceiling-wall tri-corner. Also at each wall-wall or wall-ceiling or wall-floor junction there will exist bass build up to a lesser extent. The particular tones of bass build up will be dependent on room dimensions, as the bass waves are reaching

resonance between parallel surfaces. The standing wave created by this resonance will exhibit highest pressure at the corners of the room.

Comb Filtering

In signal processing, a **comb filter** adds a delayed version of a signal to itself, causing constructive and destructive interference. The frequency response of a **comb filter** consists of a series of regularly spaced notches, giving the appearance of a **comb**.



Mobile Recording (phones and tablets)



Over the past 5 years or so, it's now become possible to take the home studio out of the home in the form of an Ipad or even your smartphone. This allows for even more possibilities to capture your creativity when the moment takes you. Touring musicians have really taken to this technology and artists like Damon Albarn of the Gorillaz have used the Ipad to create a whole album. This really proves the ethos of 'It's not about the gear'.

For the Ipad the program 'Garageband' remains ever popular as it features its own instruments and guitar amplifier simulation plus the ability to record your audio either through the built-in microphone or a third party mic that can elevate the quality of the recording to quite a decent level.



The Apogee 96k



IK Multimedia iRig Mic

The Apogee 96k is a high quality microphone that is well worth a look if you have the budget, current retail is around €249 , £219. the IK multimedia iRig microphone is quite a bit cheaper at \$105, €118 but remains a good solid option for improved recordings.