

# The Kitting Out Cheap Handout

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mostly by [Dara Korra'ti](#), with contributions from [Jeff Bohnhoff](#).

With this document, we hope you will know *what you need to learn*.

**I. Before you do anything, first read up on what exists.** You can't make good decisions without knowledge; you can't shop for bargains without knowing what there is to *buy*. Try:

## ***Sound Advice: The Musician's Guide to the Recording Studio, Wayne Wadhams***

You need to learn about what a recording studio does. You need to know the value of a low sound floor (meaning a very quiet, non-echoing room), and a room that simply *sounds good*.

You need to know about the various types of microphones (large-can condenser, small-can condenser, dynamic, etc.), and about things like XLR connectors and TRS connectors.

Also, for critical advice in setting up a recording space - key to *any* successful studio - read:

## ***Mixing Secrets for the Small Studio, Mike Senior***

Read the first three chapters before you even consider picking your recording space. You can make several purchase decisions without it, but when it comes to arranging your environment, these three chapters are crucial. As a bonus, this book will teach you a lot about mixing. That's beyond the scope of this handout, but is obviously just as important overall.

**II. Learn to recognise quality and what stands out a bit.** I talk a lot about this here:

<http://crimeandtheforcesofevil.com/blog/2012/02/thrift-and-pawn-shop-spelunking/>

Thrift shop spelunking isn't what it used to be; all the pawns found eBay, and now price against it. But it's still worth dropping in once in a while, if one is convenient.

**III. Learn to solder.** I can't stress this enough. If you want to save money, be ready to DIY and repair things. You're trading *time* to get *value* and save *money*. If you've learned enough from research, it's not much time for a *lot* of value. I am currently (2015) restoring a pair of pro monitors. Their components are worth ~\$1500. I got them for FREE; I'll fix them for \$40. See again: *a lot of value*.

This is a reasonable how-to-solder video, but DO NOT use lead! Use silver-nickel instead. It requires higher temperature, but doesn't poison you:

<http://blip.tv/make/learn-how-to-solder-skill-building-workshop-130343>

**IV. Here's a list of what you need**, with tips on each item. I have a whole series on this on by band blog. The blog post series also talks about making a room into a good recording space:

<http://crimeandtheforcesofevil.com/blog/2013/06/the-studio-buildout-series/>

Or just go to [crimeandtheforcesofevil.com](http://crimeandtheforcesofevil.com), click on blog, then scroll down and look for "studio buildout series" in the left column.

*In Studio:*

### **A. Computer, to run studio software**

If you're building your own, or upgrading a donor machine, try gamer gear websites and look at equipment in the clearance sections. It'll have been top of the line gamer gear 18 to 24 months ago, and it'll be 75% off. Critically: if using USB gear, explore the machine to make sure it exposes a USB Hub Device where you can reach it! Most machines' USB ports are actually connected to an internal hub, which adds delay ("latency") and other problems.

### **B. Digital Audio Workstation software**

A digital audio workstation (or DAW) is basically a recording studio mixing board and editing table implemented in software. Good ones also do lots of other things, and support effects plugins. GarageBand is a simple example.

If you have money, Pro Tools is a standard - but it's not the only option. ProTools First is a reduced-capacity version that's given out at no charge. Audacity and Ardour are popular open-source packages. Audacity is much easier to learn, but will limit you. Ardour is *brutal* to start, but does amazing things once understood. There's also Rosegarden, for MIDI-heavy artists.

Here's a list of reasonably well known DAW options; if license status isn't mentioned, it's closed/pay software:

**Linux:** Ardour, Rosegarden, Audacity (all free/open source)

**Windows:** Sonar, Pro Tools, Cubase, Audacity (free/open source), Reaper (30-day full-function trial), Pro Tools First

**Mac/OSX:** Logic Pro, Pro Tools, Cubase, Ardour (free/open source), Audacity (free/open-source), Reaper (30-day full-function trial), Pro Tools First

### **C. TRS and XLR interface/external sound card with no less than two sockets, and which can supply "phantom power," which is needed by many microphones.**

*Essentially all* microphones of even semiprofessional quality use XLR connectors and cables. They can be seen here:

[http://en.wikipedia.org/wiki/XLR\\_connector](http://en.wikipedia.org/wiki/XLR_connector)

Most instrument pickups use ¼" TS connectors, or, rarely, occasionally, ¼" TRS connectors:

[http://en.wikipedia.org/wiki/TRS\\_connector](http://en.wikipedia.org/wiki/TRS_connector)

A good external sound interface will let you plug in either or both, and will convert the sound to digital and send it to your DAW software digitally over a USB cable, or Firewire. At our budget, you want an external sound card because computers are full of electrical noise. Moving the analogue to digital conversion outside the computer solves many problems.

At lowest cost, I like the M-Audio USB FastTrack Pro, no longer made but commonly found used. Only two inputs, but that's enough if you're just recording yourself. Lately, I'm using a six-input TASCAM US-800 I got for cheap on clearance - but the MIDI doesn't work with Linux at all, so be aware of that.

#### **D. Microphone (pref. pair), cables, stand**

As mentioned, there are many microphone types. The large-can condenser microphone is almost always the cheapest general-purpose solution of quality. The MXL 990 is probably the cheapest you can get which is worth having at all, but I'm not a fan. Consider the M-Audio Nova, or *maybe* AKG Perception 200. New options are often appearing, too.

You may find "USB microphones" for sale, some of which will be large-can condenser microphones. For music recording, I *do not* recommend them; they are too limiting. But for podcasting, they're everything you need. Try the M-Audio Producer, or the Blue Yeti; both are good podcast announcer mics.

#### **E. Reference headset**

You'll need to be able to listen to your recordings. In particular, you'll need to be able to listen to one track while recording another - say, listen to the instrument part you recorded earlier, while singing a vocal track. You need headsets that enclose your ears, to prevent sound leakage, and you want flat response across both low-pitched and high-pitched sounds.

A cheap quality example: Shure SRH-440, made specifically for this market by a company that knows this world. **DO NOT USE NOISE-CANCELLING HEADPHONES OF ANY KIND.** They will distort your playback in ways you won't predict.

#### **F. A good room/sound control (A good-sounding room, baffles, etc.)**

You need to make your room sound good. I can't stress this enough. If the room isn't quiet, if it's reflective, if it has lots of weird angles and does weird muddying things to sound, *no amount of good equipment will fix it.* In fact, Jeff Bohnhoff correctly points out that better equipment will often make a bad room *worse*.

Here's my article talking about why the room matters. It's in a home-stereo situation, but all of this applies even more to a studio:

<http://crimeandtheforcesofevil.com/blog/2012/06/rooms-and-sound/>

The room needs to be quiet, obviously. But the "sound" of the room matters just as much. Fundamentally, if you don't like music *played* in a room, you won't like it *recorded* there either. (Again: *Mixing Secrets for the Small Studio*, Mike Senior.)

Here's my YouTube HOWTO video on making nearly-free sound baffles:

<http://www.youtube.com/watch?v=toz0DozVNas>

Also, you can make highly effective bass traps for the corners of your room (basically a bass-specific version of the same idea, really important in corners where you get weird standing-wave action going on) by wrapping Corning 702 rigid fibreglass in a couple of layers of thin fabric. If you're getting weirdness in low frequencies, investigate this.

*Almost as critical but not strictly required:*

### **G. Studio monitor amp**

Listening on headset is not the same as listening on speakers. For that, you'll need both an amp and monitor speakers.

Cheap amp suggestions: 70s and early-80s Pioneer (particularly SA series) and Harmon-Kardon integrated amps, with their capacitors replaced with new ones of identical value. Bypass the tone knobs. If you really know what you're doing, old tube equipment; EICO if you can find them are cheap but awesome.

This is where soldering saves serious dosh: I have an EICO ST-40. I paid 25 *cents*. My Pioneer SA-5200 cost \$20. The replacement capacitors cost as much.

*As a rule*, I find older equipment easier to repair than new, just because the parts are bigger and spaced further apart.

### **H. Studio monitor speakers (multiple sets with different sound profiles, ideally)**

The Realistic Minimus-7 is a tiny speaker made by Radio Shack starting in 1978. It was a new and then-radical simplified design and about the best thing they ever made. They're a cult item - particularly the black ones - but you can get white metal pairs on eBay for \$20. Buy those and the simpler film-capacitor crossover upgrade kits sold by various people on eBay. (\$13ish.) There's no low-end to speak of - particularly below 70hz - but they are laser-like in precision, once upgraded.

The Minimus-11 series were a larger version; maybe worth having as a second sound profile. You'll want to upgrade those crossover circuits as well.

Some junk "computer speakers" are a good third sound profile because so many people listen to music on those now, you'll want to make sure people can hear you on them. Don't mix to them, but check on them occasionally. Get those free at a yard sale.

OR

### **G and H: Self-powered monitors**

These are basically speakers with amps built in, specifically designed for this purpose. Do not confuse these for self-powered consumer *computer* speakers; these are designed from the ground up for mixing. The cost savings here come from the amps and speaker pairings being specifically built around each other, and they're an effective solution.

*In closing:*

**The best extra dollar spent is spent improving your recording space, not your gear.**

Once you have the basics, if you have a dollar left over to spend on a better mic, vs. one improving your iffy room, *spend it on the room*. I know I harp on this, but it's true. Why?

**A better room will make up for poor equipment.**

**Better equipment will make a poor room sound worse.**