

The Kitting Out Cheap Handout

Version 0.5 (beta), for Westercon 65

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This document is supplemental material for after the panel. It covers the same ground, but in more depth. With this, 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.

This is an investment of time upfront to save time and money later. It's worth it.

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/>

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.

This is a reasonable howto video, but DO NOT use lead solder. Use silver-nickel instead:

<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.

In Studio:

A. Computer, to run studio software

If you're building your own, or upgrading a donor machine, go to 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.

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. Garage Band is a simple example.

If you have money, ProTools is the standard, but not only, option. If you don't, 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 running and understood. There's also Rosegarden, best 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)

Mac/OSX: Logic Pro, Pro Tools, Cubase, Ardour (free/open source),

Audacity (free/open-source), Reaper (30-day full-function trial)

- C. TRS and XLR interface/external sound card with no less than two connection points, 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

Most instrument pickups use 1/4” TRS connectors, or their fully-compatible subset, 1/4” TS connectors. You’ve seen these.

http://en.wikipedia.org/wiki/TRS_connector

A good external sound card (in a box) will let you plug in either or both, and will convert the sound to digital and send it to your DAW software digitally, usually over a USB cable, sometimes Firewire.

You want an external sound card because computers are full of interference and electrical noise. You don’t want to record that. Moving the analogue to digital conversion outside the computer solves many problems, not just that one.

On the cheap end, I like the M-Audio USB FastTrack Pro, no longer made. It’s only two inputs but that’s enough if you’re just recording yourself. The TASCAM US-800 is a six-input device. It’s a little noisier, but for the price, hard to beat.

- D. Microphone (pref. pair), cables, stand

As mentioned, there are many microphone types. The 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 big fan. Consider the AKG Perception 200, or the M-Audio Nova.

You may find “USB microphones” for sale, some of which will be large-can condenser microphones. If you must, try the M-Audio Producer. But I do not recommend them in general; they are too limiting.

- 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. I have both that and a set of Bose I got free via credit union rewards points; Bose made them and then cancelled the line because they weren’t noise-cancelling so weren’t selling. Which reminds me: **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, blankets, 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, that's critical. 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, and recording demands are higher. You want sound from you to be recorded, and all other sound reflections and sources to go away.

Here's my YouTube video on making nearly-free sound baffles, for noise control:

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

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, because the parts are bigger and spaced further apart. Keep that in mind.

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 kit sold by ray17760 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; not as good but 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. Do not confuse these for the little self-powered computer speakers, even if the idea is the same; these are specifically designed for this kind of application. The cost savings per quality here comes from the amps and speaker pairings being specifically designed for each other.

Playing Out:

A. PA amp that can handle your instrument and mic.

This is where you really need to be able to identify the thing that shouldn't be where you found it. For me, that was a Samson S63. Six inputs, individually mixed, effects channels, the whole lot, for around \$100. Whatever you get, throw as many different things at it as you can to test it.

B. One decent mains speaker (can be integrated with amp)

For me, this was again finding the thing that stood out in a pawn shop. I have a Crate UFM-15H snagged for <\$100. It had a blown tweeter coil that cost \$26 to replace. As this model had a habit of blowing those at high volumes - far higher than I'd ever need - I added inline fuses to prevent that.

I also use a pair of Phonic 710s at lower volume for left and right fills, at lower volumes. (And I built a cable device to lower and balance their volume against the Crate. Soldering at work!) They're being cleared, so if you find them, they'll be sharply discounted. They also work ok as mains in house concerts.

C. Vocals microphone, cables, stand.

The Shure SM-58. Old, beat up, filthy, doesn't matter, you can't kill these things. Not the sound quality of a newer-era microphone but a sound people know and expect, and durable, durable, durable. Perfect for the road. \$70ish if you dig.