Introduction to Hardware Hacking

Tools of
the Warranty
Voiding Trade

☑ **The Essential Tools**

☑ **Taking it to the Next Level**

☑ **Hardcore Hardware Hackers Only**

Introduction

You'll need the right arsenal of hardware hacking tools to get the job done right. For some hacks, you may just need a single screwdriver. For others, you may need a workshop complete with power tools and advanced electronic equipment. For the most part, it isn't necessary to have a world-class laboratory in order to conduct most levels of hardware hacking.

The tools and supplies listed in this chapter are just a baseline of any good hardware hacking cache. We don't list every possible tool, and specific types of hardware hacks will have their own set of tools that people like to use. A selection of pictures are included that show some of the more unique tools of the trade. With these lists, we're just trying to give you an idea to get a good start so you can jump in and get down to hacking.

We have separated the listings into three parts:

- The Essentials
- Taking it to the Next Level
- Hardcore Hardware Hackers Only

The work area where your hardware hacking takes place should be a clean, smooth, and well-lit area where you can easily organize and handle parts without losing them. An inexpensive sheet of white poster board makes an excellent construction surface, while providing protection for the underlying table or desk. If you live in a dry environment that is prone to static electricity, it is recommended that you purchase an anti-static mat from a local electronics store to prevent static discharge and protect the sensitive circuitry.

WARNING: PERSONAL INJURY

Safety is an important consideration. With many of the tools listed here, improper or careless use can lead to accidents and personal injury. Please take the time to read all necessary instruction manuals and safety documentation before starting your hack. Be sure to use a suitable stand for your soldering iron, keep your work area free of unnecessary clutter, wear protective gear at all times, and avoid tangling the wires of your various tools.
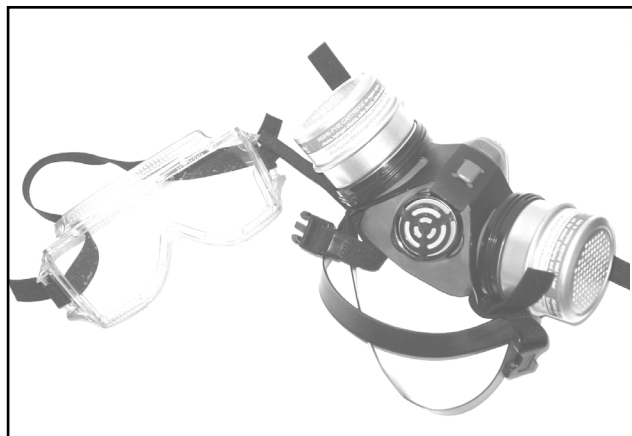
The Essential Tools

The following are a sampling of some basic tools for the beginner hardware hacker: someone who is curious about dabbling and experimenting with simple hacks. It always helps to have a good stock of various equipment, wires, tools, components, and other materials in your workshop so you do not have to run out to the store every time you need something.

- **Bright Overhead Lighting or Desk Lamp** Well-diffused overhead lighting is recommended – bright white fluorescent or incandescent bulbs serve this purpose. A smaller, high-intensity desk lamp will prove especially helpful for close-up work.

Figure 1.1 Protective Gear

- **Protective Gear** A sampling of protective gear is shown in Figure 1.1. Mask/Respirator, Goggles, Rubber Gloves, Smock/Lab Coat, Ear Plugs. To be worn at all times. Use the respirator to prevent breathing in noxious fumes and fine dust from painting, cleaning, cutting, or soldering. The goggles protect your eyes from stray plastic or wood chips during drilling. Use the smock to prevent damage to clothing (e.g., burns and stains).

- **Screwdrivers** Phillips, Flat Head, Jeweler's. As many sizes and types as possible.
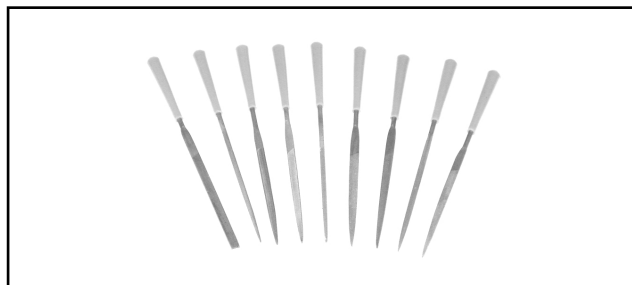
- **X -ACTO Hobby Knife** The modeling tool of choice for crafters, artists and hobbyists with over 50 different blade types. An essential general-purpose tool for hardware hacking.

Figure 1.2 Dremel Tool

- **Dremel Tool** Extremely useful carving tool for detailed and delicate work. Helpful for case mods and opening housings. Some models support rotation speeds from single digit revolutions per second up to tens of thousands. Many various bit types (drills, sanding, carving, engraving), accessories, and attachments are available. Example: Dremel 395 Variable-Speed MultiPro, $74.99 (Figure 1.2).

Figure 1.3 Needle File Set

- **Needle File Set** Designed for precise filing. Ideal for deburring drilled holes and preparing modified surfaces. Most five-piece sets include a square, flat, triangle, round, and elliptical file. Example: Radio Shack Needle File Set #64-1985, $6.99 (Figure 1.3).

- **Sand Paper**   100, 220, 400, 600, and 1000 Grit.

- **Glues**   Wood glue, Super Glue, epoxy, hot glue, acrylic cement, the more types of adhesive that you have on hand, the better off you'll be. A sampling of glue is shown in Figure 1.4.

- **Tape**   Duct tape, masking tape, electrical tape, scotch/transparent tape.

Figure 1.4 Types of Glue

- **Cleaning Supplies**   A good workspace is a clean workspace, typical supplies are cotton swabs, alcohol pads, paper towels, and some type of sprayable cleaning solution.

- **Miscellaneous Mechanical Pieces**   These are the standard hardware that you should have around the house in any type of workshop and include nails, screws, stand-offs/spacers, washers, nuts, and bolts.

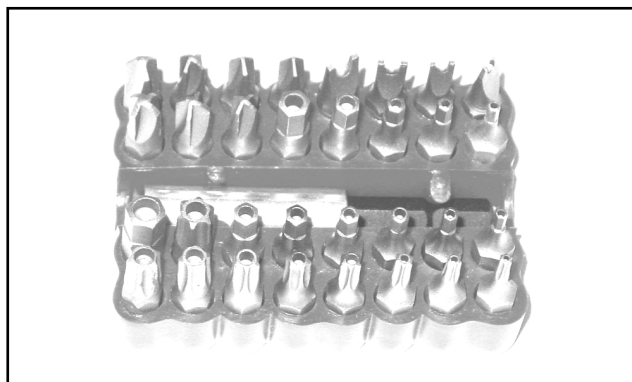# Taking it to the Next Level

These mid-range tools are for the more serious hardware hackers. With a few hacks under your belt, you might be getting more confident in your skills. Depending on your creativity and determination, you can use some of these tools to create your own hardware hacks and modifications.

- **Variable Speed Cordless Drill**   This is the essential multi-purpose tool. Especially useful for case mods. Example: Skil 18V Cordless Drill/Driver #2867 with 3/8" keyless chuck, and six torque settings, $69.99 (Figure 1.5).
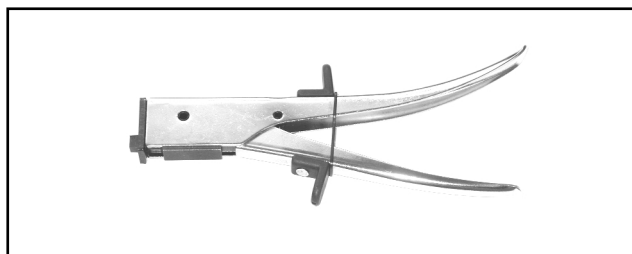
Figure 1.5 Variable Speed Cordless Drill

- **Drill Bit Set**   What good is your variable speed cordless drill without a complete set of various sized drill bits?

Figure 1.6 Security Driver Bit Set

- **Security Driver Bit Set** Commonly used security/tamper resistant bits to open specially-shaped screwheads. Useful for opening certain types of product housings. To identify a particular bit type you might need to acquire for a hack, visit www.lara.com/reviews/screwtypes.htm. A sample of a driver bit set for security fasteners can be seen in Figure 1.6.

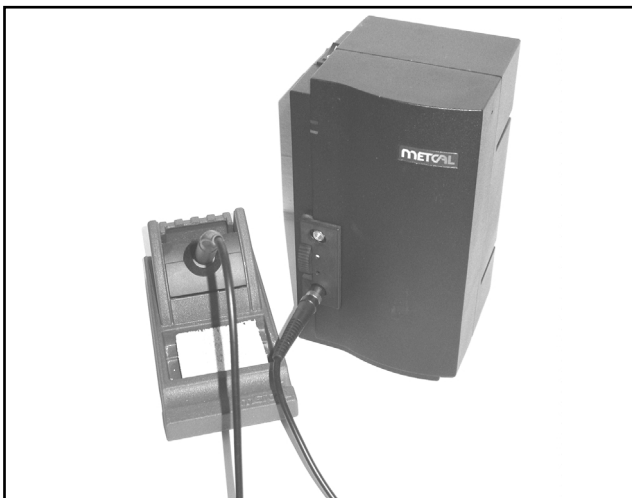- **Automatic Center Punch** Used to mark the target drill spot on a drilling surface.

Figure 1.7 Nibbling Tool

- **Nibbling Tool** This tool "nibbles" away at light-gauge sheet metal, copper, aluminum, or plastic with each squeeze of the handle. Good for housing modifications and custom shape creations. Example: Radio Shack Nibbling Tool #64–823, $9.99 (Figure 1.7).

- **Wire Strippers** For cutting or stripping 10- to 22-AWG wire. Example: Radio Shack Precision Wire Stripper #64–1922, $7.99.

- **Wire Clippers** Example: Radio Shack 4" Diagonal-Cutting Mini Pliers #64–2043, $4.99 or Radio Shack 5" Nippy Cutters #64–1833, $3.99.

- **Needle Nose Pliers** Example: Radio Shack 6" Narrow Jaw Needle-Nose Pliers #64–1803, $5.99.

Figure 1.8 Soldering Station

- **Soldering Station** Soldering tools, ranging from a simple stick iron to a full-fledged rework station, come in many shapes and sizes. More advanced models include adjustable temperature control, automatic shut–off, and interchangeable tips for various component package types and soldering needs. Recommended is a fine-tip, 700 degree F, 50W soldering stick iron. Approximate price range $10.00 – $1,000.00 Example: Weller W60P Controlled-Output Soldering Iron, $67.95 (Figure 1.8).

■ **Soldering Accessories** Essential soldering gear includes: solder, vacuum desoldering tool (a.k.a "solder sucker"), IC extraction tool, and ChipQuik SMD removal kit. Solder should be thin gauge (0.032" or 0.025" diameter) 60/40 Rosin core. The Desoldering Tool is a manual vacuum device that pulls up hot solder, useful for removing components from circuit boards (Radio Shack #64-2098, $6.99). The IC Extraction Tool helps lift integrated circuits from the board during removal/desoldering. The ChipQuik kit allows you to remove surface mount components quickly and easily. Some soldering accessories are shown in Figure 1.9.

Figure 1.9 Soldering Accessories

■ **Miscellaneous Cables** This category includes cabling and wiring such as test leads, alligator clips, spools of wire, and computer cables.

Hardcore Hardware Hackers Only

These tools are for the hardcore hardware hacker, the best of the best, seriously dedicated to his or her trade. More specific tools exist as well, but generally the tools in this section will get you as far as you need to go for a successful hardware hack of almost any type.

■ **Jig Saw** Essential power tool for cutting and shaping. Example: Bosch 1587AVSK Top-Handle Jigsaw, $134.99.

■ **Digital Multimeter (DMM)** Commonly referred to as the "swiss army knife" of electronics measurement tools (Figure 1.10). These are (usually) portable devices that provide a number of precision measurement functions, including AC/DC voltage, resistance, capacitance, current, and continuity. More advanced models also include frequency counters, graphical displays, and digital oscilloscope functionality. Reliable meters have high DC input resistance (also called *input impedance*) of at least 10Mohm. Approximate price range $20.00 – $500.00 Example: Fluke Model 111, $129.00.

Figure 1.10 Digital Multimeter