

## ***A Student's Guide to Buying Tools***

Advice from Marine Systems Instructors

Welcome to the Marine Systems Program at the Northwest School of Wooden Boatbuilding. This program is designed to prepare you for an entry level position in the Marine Industry. The topics covered are diverse and your training includes both theoretical and hands-on learning. The other instructors and I are excited to help you advance your knowledge and prepare you for a professional career in this interesting and dynamic field.

Before arriving on campus, you need a basic kit of quality tools. This tool list will get you started in this field and are tools that you will use during this program. As you move forward with your education you will most certainly want to add to your tools.

The tool lists are grouped by category: Electrical, Corrosion, Mechanical, Layout, Other Tools, and Personal Protection Equipment (PPE). PPE use is required as your safety is always our priority. When a brand and model number is included, that is the recommended item. The prices listed are an estimate of the cost for a quality tool. Having the most expensive tools does not guarantee you will do better work, but you will want reliable and quality tools at hand to make your work more efficient.

As you accumulate tools you will need a way to carry and store them. When choosing tool storage, keep in mind the workplace of a marine technician. During a typical workday, you will be in and out of vehicles and on and off boats numerous times. You should choose tool storage to facilitate mobility, keep your tools contained to prevent loss off the dock, and to protect working surfaces. Soft-sided backpacks or cases are best to avoid damage to boat interior spaces.

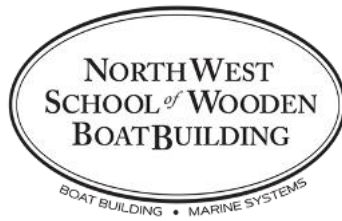
If you have any questions, please feel free to ask. We look forward to teaching and coaching you along on this adventure and wherever this endeavor takes you.

Respectfully,

Kevin Ritz

Marine Systems Program Director

Northwest School of Wooden Boatbuilding



## Marine Systems Program Tool List | 2024-2025 | Page 1 of 6

### Electrical Tools

**Tools listed in bold with a yellow background are the minimum required.** Other tools listed are strongly recommended. NWSWB does not recommend a specific tool vendor or supplier. The prices listed are an estimate of the cost for a quality tool.

| <b>Tool</b>  | <b>Model</b>   | <b>Price</b> | <b>Notes</b>  |
|--|--|--------------|---|
| <b>Digital Multimeter</b>                                    | Fluke 117 with Test Leads                                    | \$235        | Auto-ranging AC/DC multimeter with capacitor & diode test function, and “Low-Z” mode.   |
| <b>Circuit Analyzer</b>                                      | Extech CT70  | \$186        | Powerful tool for diagnosing and troubleshooting AC circuits. Much more functionality than a GFCI/AFCI receptacle tester.                                     |
| <b>Ratcheting Single-Crimp Tool</b>                          | Ancor 703010 (straight)<br>-OR-<br>703015 (angled)           | \$60         | For installing terminals on wires. There are a lot of similar tools, some have interchangeable crimping dies for versatility.                                 |
| <b>Wire Stripper</b>   | Knipex 1262180<br>-OR-<br>Klein Katapult (11063W) or similar | \$30-\$50    | The Knipex is a pistol-grip wire stripper. The Klein is more of a pliers-style stripper. Very handy for removing insulation from wires smaller than 12 gauge. |
| <b>NEMA L5-30 Male Plug &amp; Female Receptacle Set</b>      | Journeyman Pro L5-30PR Set                                   | \$30         | A plug and receptacle set of power cord ends to build a ‘split cord’, used for shore power testing.   |
| <b>Power Cord Adapter</b>                                    | Marinco S30-15   | \$40         | An adapter to allow circuit analyzer to be plugged into a shore power pedestal.   |
| <b>Precision Flush Cutter</b>                                | Klein D275-5 Pliers  | \$13         | For <i>clean</i> cuts on cable-ties and smaller-gauge wire.   |
| AC/DC Clamp Meter  | Fluke 325  | \$350        | AC/DC current, voltage, frequency etc. Necessary for full diesel engine diagnostics   |
| Wire and Cable Cutter  | Ancor 703005 or Klein 63050                                  | \$28         | For clean cuts on larger wire.  |
| Insulated Screwdriver Set (Optional, but very nice to have!) | Phillips, Slotted, Square                                    | \$30-\$60    | The metal shaft of the screwdriver is sheathed in plastic to prevent accidental electrical shorts.  |
| Alligator Clip Test Leads                                    |  | \$10-\$15    | Useful for troubleshooting and prototyping. Make sure they are at least 16-gauge wire.  |

**Corrosion Tools**

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| <b>Tool</b>   | <b>Model</b>                      | <b>Price</b> | <b>Notes</b>   |
|---|-----------------------------------|--------------|--|
| <b>Mil. Spec. Zinc Reference Electrode**</b><br>**Discount may be possible if purchased through class** | Electro-Guard RP-2                | \$98         | Used when measuring galvanic activity during corrosion survey data collection.   |
| <b>Scratch Awl (Wood Handle)</b>  | Stanley 69-122                    | \$10         | We'll modify one of these into a test probe tool. An awl is a useful tool for layout and otherwise – consider buying a package of 3 of these (~\$26) |
| <b>12 AWG Black Silicone Stranded Wire</b>  | 25 feet                           | \$15         | Used to build a corrosion test probe.  |
| <b>Banana Plugs (Solder-on)</b>   | Mueller Electric Co. BU-3261410-2 | \$7          | High quality banana plug for test probe. Beware of cheap plugs!  |
| Small Wire Brush  |                                   | \$2          | Used to clean metal for corrosion data collection. Lots of uses.   |
| Sawzall Blade   |                                   | \$10         | Used to expose bare metal for corrosion data collection.   |
| AC Leakage Clamp Meter  | Sonel CMP-200                     | \$79         | Sensitive clamp meter, used for troubleshooting and safety surveying.  |

**Tool Tip:**

Think of a way to identify your tools – it could be spray paint or a paint pen or an engraving tool. Permanent marker will likely wear off. Many of you will have identical tools and each of you should figure out a recognizable way to mark all the bits and pieces. These tools are an investment and should be protected as such!

**Mechanical Tools**

A note on these tools: If you already have a set of wrenches and sockets and screwdrivers and so on, use what you have. Also, good storage solution (a toolbox/bag) is important to keep everything together.

If you are just starting to build a tool kit, buying a packaged set like those listed below takes a lot of the guesswork out of the process. The case helps to keep things organized and offers a nice, portable storage solution. Buying tools at garage sales is also viable but piecing a whole kit together could take some time.

When it comes to torque wrenches, buy a good one that comes *with a certificate*. These tools are calibrated, and if you buy a cheap one or buy second-hand, there's no guarantee that it's still accurate.

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| <b>Tool</b>  | <b>Model</b>   | <b>Price</b>                       | <b>Notes</b>  |
|--|--|------------------------------------|---|
| <b>Metric and SAE inch sockets, regular and deep 1/4" and 3/8" drive</b> | Williams 50602 1/4" drive socket set 67 piece<br><br>OR<br><br>Williams 50607 3/8" drive set | \$154.40<br><br>OR<br><br>\$199.99 | There are a lot of comparable kits out there; invest in a good one. It may seem like a lot of tools in there, but a kit like this will take care of a large portion of your wrenching needs.<br><br>The set listed comes with a blow-molded case, which is very nice if you don't have a place to put 185+ bits & pieces.<br><br>Don't be afraid to mix and match smaller kits. |
| <b>Metric and SAE Allen wrenches</b>                                     | Eklind SAE & Metric 13222  | \$22                               |   |
| <b>Metric and SAE open ended wrenches</b>                                | Duratech & other companies have affordable quality sets                                      | \$50+                              |   |
| <b>Mini Combination wrenches</b>   | Duratech mini wrench set   | \$20                               | Smaller-sized wrenches for little stuff and tight spaces.   |
| <b>1/4" Drive Torque Wrench</b>  | eTork C1200  | \$58                               | 40-200 <i>inch-pound</i> torque range   |
| <b>3/8" Drive Digital Torque Wrench</b>                                  | eTork EC2250   | \$55                               | 25-250 <i>inch-pound</i> torque range   |
| <b>Screwdriver Style Torque Wrench</b>                                   | Sanliang<br><br>OR<br><br>Wheeler  | \$29.99 - \$60                     | 20-100 <i>foot-pound</i> torque range   |

**Mechanical Tools – Continued**

| <b>Tool</b>  | <b>Model</b>   | <b>Price</b> | <b>Notes</b>   |
|--|--|--------------|--|
| <b>Channel Lock Pliers or Knipex Cobra Water Pump Pliers</b> | 10"  | \$30         |  |
| <b>Diagonal Cutters</b>                                      | Klien  | \$25         |  |
| <b>10" Adjustable Wrench</b>                                 | Crescent   | \$17         | Other brands available consider multiple sizes.  |
| <b>10" Needle Nosed Pliers</b>                               | Irwin 6" long-nose pliers  | \$12         | Indispensable tool for fine manipulation.  |
| <b>Megapro Multi-Bit Screwdriver</b>                         | Multiple Different Options                                       | \$24         | The example is 15-in-1. Compact and capable of many jobs.  |
| <b>Feeler Gauge set</b>                                      | Gearwrench KDT-161   | \$6-12       | Used to precisely measure very small gaps between parts. Get a set marked with both metric and SAE (or one of each).   |
| <b>Thread Pitch Gauge SAE/Metric</b>                         | Boltsize-It Gauge -or- Parker Thread ID Kit (\$70)               | \$10         | Used to identify screws and bolts, including length, diameter, and thread pitch.   |
| <b>Hole Saw Kit</b>  | Milwaukee 49-22-4105   | \$200        |  |
| <b>Carbide Scraper</b>                                       | Titan or PT  | \$24         | Used to remove gaskets and clean up sealing surfaces.  |
| <b>Dead Blow Hammer</b>                                      | Harbor Freight, several weights                                  | \$10-15      | Softer-headed mallet filled with sand or shot for low-bounce percussive persuasion.  |
| <b>12" &amp; 18" Adjustable Wrenches</b>                     | Crescent   |              |  |
| <b>Cordless Drill</b>  | Lots of Options (e.g., Milwaukee M18 Brushless Drill/Driver Set) | \$180        | A good cordless drill motor is a very frequently used tool. If you don't already have one, <b>seriously consider buying one</b> . We have a limited number available for shop use. Be sure to get one that includes a battery and a charger – sometimes sold as "tool only." |

**Layout Tools**

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| <b>Tool</b>                                      | <b>Model</b>   | <b>Price</b> | <b>Notes</b>  |
|--|----------------|--------------|---|
| <b>Tape Measure</b>                              |                | \$10-20      | A 16' or 25' tape is a good length for most purposes.                                       |
| <b>Scratch Awl<br/>(Separate from corrosion)</b> | Stanley 69-122 | \$10         | Can scratch layout lines, punch index holes for drilling, and so on. See corrosion section. |
| <b>Starratt Combination Square</b>               | 6"             | \$105        |   |

**Other Tools**

| <b>Tool</b>                                 | <b>Model</b>                 | <b>Price</b> | <b>Notes</b>  |
|---|------------------------------|--------------|---|
| <b>Box Cutter,<br/>Retractable/Foldable</b> | Stanley 10-499               | \$12         | All-purpose utility knife.  |
| <b>Drill Bit Set</b>                        | DEWALT DWA1181<br>Fuller Set | \$20-\$50    | 1/16" to 1/2", 21 pieces. A decent general-purpose set of drill bits.                 |
| <b>Digital Caliper</b>                      | Jiavarry or iGaging          | \$14         | Used to take inside and outside measurements.   |
| Ball Peen Hammer                            | Xtremepower15145xp           | \$20         | Dead blow hammer with metal faces.  |
| Small Parts organizer                       | Plano 2370500                | \$13         | Useful for organizing fasteners and other small parts.                                |
| Headlamp and/or Flashlight                  |                              | \$15-\$45    | A small battery-powered work light or flashlight is great, too. Rechargeable is nice. |

**Personal Protective Equipment (PPE)**

We strive to establish good safety habits in the shop that you will take out into the workplace. Having PPE that is comfortable and works well makes those habits much easier to put in place and – shop safety is part of your grade!

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| <b>Tool</b>  | <b>Model</b>                  | <b>Price</b> | <b>Priority</b>  |
|--|-------------------------------|--------------|--|
| <b>Safety Glasses or Goggles with Side Shields</b> |                               | \$10-\$20    | Find a comfortable pair, so you get in the habit of wearing them. If you wear glasses, get something that fits comfortably over them.  |
| <b>Hearing Protection over-ear or plugs</b>        | 3M 90565-4DC-PS               | \$10-\$30    | Noise is harmful and exhausting. A good pair of over-ear muffs is recommended. Go for a high Noise Reduction Rating (NRR) – 30dB or greater. Ear plugs are good for protecting hearing, but they tend to get lost and are not as environmentally friendly. |
| <b>Dust Masks Non-Vented</b>                       | 3M-8200 or Honeywell RWS54001 | \$15-\$25    | Go for R95 (somewhat resistant to oil) or P95 ratings (strongly resistant to oil). The P95 will be more expensive but have a longer life. The familiar N95 masks are OK for particulate but are not oil resistant.   |
| <b>Dual Cartridge Organic Respirator Mask</b>      | 3M 53P71                      | \$25         | This is for protection against organic vapor (usually evaporating solvents). These usually come in small/medium/ large. We will review basic fit-test procedure in class.  |
| <b>Nitrile Gloves</b>                              |                               | \$25-\$35    | Latex gloves don't stand up to solvents as well as nitrile. There's a lot of variation in fit, we have some samples.   |
| Long-sleeve Coveralls                              |                               | \$30-\$50    | For dirty work   |