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TOOLBOX

Any job anywhere is easier and safer if you've got the right tools and tower work is no exception. If you are a weekend mechanic or handyman, you've probably already got most of what you need; all you need to do is add a few specialized items and you're good to go.

If, on the other hand, all you have is a hammer, pair of pliers and a screwdriver, you'll need to make a trip or two to the tool store before you can really do anything. When my son reached the age where he was using (and losing) my tools, I went to SEARS and bought him a basic set of *Craftsman* tools and a toolbox for less than \$100. That's probably about right for a minimum set of wrenches, sockets, etc.

Once you have them, you'll be all set whenever any of your buddies want help on their tower. There's nothing worse than rolling up to spend a day working and your buddy can't supply any really useful tools. Be prepared; you'll never go wrong.

Basic toolbox

Most amateur tower and antenna work can be done with a minimum of handtools. Nut sizes of $\frac{7}{16}$ ", $\frac{1}{2}$ " and $\frac{9}{16}$ " are all you'll usually need.

Essential tools

- 1 set of combination wrenches: $\frac{7}{16}$ ", $\frac{1}{2}$ " and $\frac{9}{16}$ "
- 1 set of sockets $\frac{3}{8}$ " drive
- 1 each deep sockets: $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{9}{16}$ "
- 1 each screwdrivers (blade and Phillips)
- 2 adjustable pliers or *Channellocks*
- 1 diagonal cutters (dikes)
- 1 razor blade utility knife
- 2 pulleys
- 1 driftpin or centering punch (for lining up tower sections)
- 1 hammer (I have a couple of feet of line on mine so it'll hook onto my belt or a tower member)
- 3 each adjustable (*Crescent*) wrenches—small, medium, and large
- 1 bubble level
- 6 carabiners
- 6 one-inch nylon webbing slings
- 250' rope (or more - this is enough for working on a 100' tower)
- 1 canvas bucket (for parts hauling and storage)
- 1 loos pt-2 guy wire tensioner
- 1 set nutdrivers
- 1 (or more) come-along or hand cable winch
- 1 (or more) cable grips
- 1 circular saw with aggregate blade or hand grinder (for cutting metal, including guywires)
- 1 tag line ($\frac{1}{4}$ " is fine—you chose the size and length)
- 1 cordless drill, with assorted bits and socket driver
- 1 set drill bits including step-drill, e.g. Uni-Bit
- 1 antenna analyzer, e.g. MFJ-269
- 1 ginpole
- 1 soldering gun and solder

Come-alongs

A come-along, or hand cable winch, is very useful for pulling tower sections together, tightening tramlines and tensioning guy wires. You'll probably find more uses for it. Cheap ones are fifteen to twenty dollars and are fine for occasional use. The best ones for tower work are the ones that have spring-loaded safety latches over the end of the hooks. Learn how to work it because you'll have to explain it to other people since come-along use eludes the first time user.

Cable grips

Two tools that go together are the come-along and the cable grip. A cable grip is a spring-loaded device that slides up the guy wire but clamps down when you put tension on it. Klein is the primary supplier of them and they come in lots of sizes and designs for use with various materials. For amateur use, the Klein 1613-40 is for 3/16" and 1/4" EHS guy material which happens to be what 90% of amateur towers use. When erecting a tower I carry 3 of them along with 3 come-alongs so that I can put initial tension on all 3 guy wires at the same time.

Steel cutter

Eventually you'll need to cut some steel. Guy wires, rebar, pipe, tubing, tower sections, etc. are all materials that

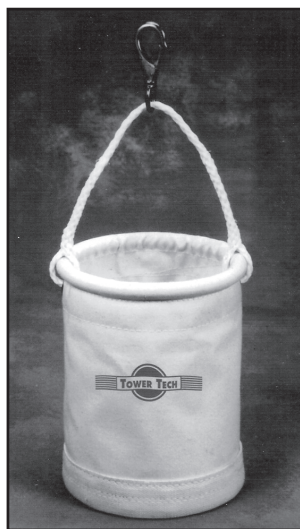


Photo 1: Canvas tower bucket.

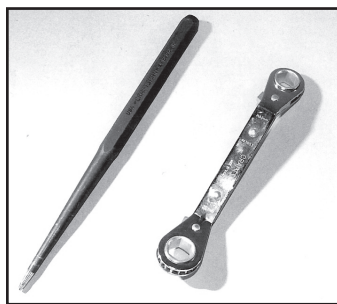


Photo 2: Drift-pin or taper punch and ratchet box-end ratchet wrench.

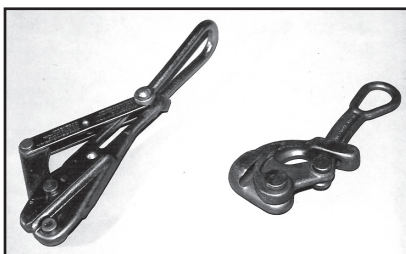


Photo 3: Klein cable grip on left and Klein rope grip on right.

can be cut easily with the right tool. I started out using a circular saw with a steel cutting aggregate blade. It was cumbersome and heavy but it worked. And since the steel cutting blades are cheap, it was an easy way to go. But the best cutting tool is a 4-1/2" hand, or angle grinder. Get one-eighth inch steel cutting blades for all your cutting jobs. You can also get grinding wheels, wire brushes and other accessories for it.

Cordless drill

You'll use this all the time, and it's just not for drilling. Other tasks you can use it for are tightening nuts, hose clamps and other hardware and wire brushing. While a typical household drill is okay for occasional small jobs, it's worth the investment to get one with higher voltage. The minimum voltage for the drill should be 12 volts. Higher voltages like 18 and even 36 volts are currently available. And be sure to have a spare battery. My Milwaukee cordless drill even has a half-inch chuck – a very desirable feature!



Photo 4: Step drill bits. The one on the left goes from 1/8" to 1/2". The one on the right goes from 3/16" to 7/8".

Drill bits

You'll obviously need a set of drill bits. Other very handy items are step-drill bits (also known as Unibits), socket drivers and single-sized nut drivers.

Ever tried to expand an existing hole? You take a bigger size drill bit and start drilling. Unfortunately many times the hole will ovalize as you try



Photo 5: Drill socket driver for 3/8" sockets and 5/16" nut setter for hose clamps.

to make the hole bigger. The solution is a step-drill, or Unibit. Most have a chisel tip to get you started and then you just keep drilling until you get the desired sized hole. Easy. And it's perfectly round every time. You'll wonder how you ever lived without them!

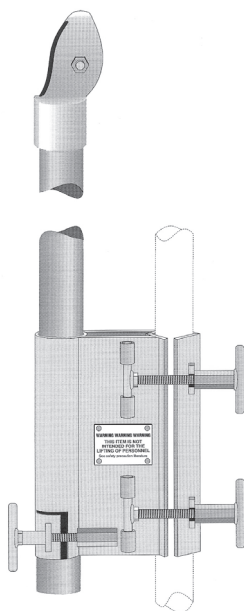
Antenna analyzer

These fabulous devices have made working on antennas easier than ever before. I have used an MFJ-259 for years and prefer it since you can sweep the frequency spectrum while you look for a dip.

Ginpole

The purpose of a ginpole is to provide a pick-point up high enough so that you can lift an object above the top of the tower, then drop it into place. Typical ginpole loads would be tower sections (10 feet long) and masts (6 to 22 feet long). You want to pick up these loads just above their mid or balance point, so that they will come up in the correct upright position for installation. The ROHN ginpole is twelve feet long, just right for lifting a ten-foot tower section. For twenty foot masts, a twelve-foot ginpole is very marginal because there is barely ten feet of working length available from the ginpole and a big mast will probably exceed the rating for the Rohn ginpole which is rated for a 45G section that weighs 70 pounds. Large, heavy-duty masts require special handling; there are several options for their installation. (See chapter 18, 'Tower Erection')

For ROHN 25G and 45G, a ROHN ginpole will be quite sufficient. Often these can be borrowed or rented from a local radio store or club so you don't necessarily have to own one. For ROHN BX, Trylon Titan or towers from other manufacturers that have angle legs, a different ginpole is needed. A universal ginpole can be fabri-



Drawing 1: Rohn ginpole.

cated utilizing a 12-foot to 15-foot piece of 6061-T6 aluminum pipe, or equivalent (2.0" OD, 1/8" wall is probably sufficient). If the ginpole doesn't have the correct leg mounting fixture, you can simply lash the ginpole to a leg with some short-lines- this will suffice for most ham towers. Take care to insure that the ginpole won't slip down the leg I use a sling with two carabiners on it - one carabiner hooks the bottom of the ginpole and the sling attaches to a convenient tower member with another carabiner.

Pulleys

Pulleys are used constantly in tower and antenna projects. There's always one at the top of the tower for the haul rope that will be used to bring up parts, equipment or hardware. Steel pulleys are relatively inexpensive and plentiful. Their biggest drawback for amateur projects is weight; a small one weighs two or more pounds. Climbing with a few of them on your belt turns into work. They cost \$25 to \$35, and can be found in many hardware stores or rigging shops.

The best pulleys I've found are made from nylon and are used by utility company line crews. Their nonconducting advantage for high voltage work is obvious, but they are just wonderful for amateur projects and available from Champion Radio Products. Two important things to consider when shopping for pulleys are sheave size and sheave

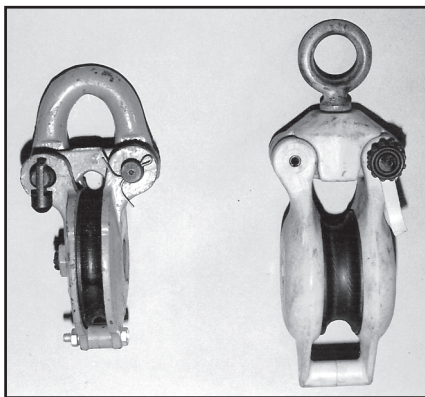


Photo 6: Closed snatch block pulleys.

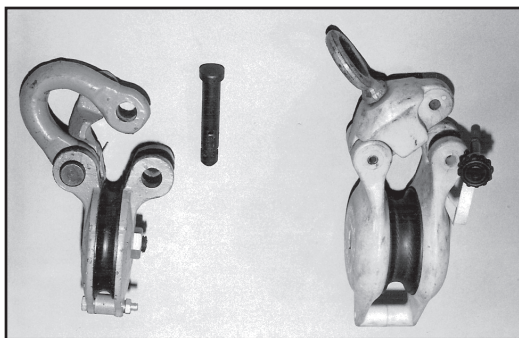


Photo 7: Open snatch block pulleys.

clearance. A sheave is a wheel with a groove in it, the wheel in the pulley. A two-inch diameter sheave is the minimum size you should consider. Anything smaller adds more friction to the effort of your haul rope, etc. A three-inch or four-inch pulley is even better.

The kind of pulley you want is called a snatch-block. With a snatch-block, the top of the pulley opens up so that you can put the pulley anywhere on the rope.

You want a jam-proof pulley that has zero clearance between the sheave and the pulley body. If there is any way for your haul rope or cable to jump the pulley and get jammed, it almost certainly will.