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A One Person, Safe, Portable and Easy to Erect Antenna Mast

Consider this approach to Field Day antenna installation — especially if you're short of trees!

Bob Dixon, W8ERD

Widely available military surplus mast sections can be used in a variety of ways to make excellent amateur antenna masts. The key to making them work well, in my experience, is the mast tripod available from Barans (stores.shop.ebay.com/barans-military-surplus-and-radio). The tripod consists of three downward angled sockets that the mast sections plug into, and a vertical central shaft that the mast sections can slide through. This makes four contact points on the ground, providing a stable base. Note that this is different from the military GRA-4 tripod, which does not work for this purpose. Figure 1 illustrates the tripod and masts, and shows the general idea of how they all fit together.

Many of us have had bad experiences with push-up type masts that are difficult to erect, even with a crew of several people, regardless of whether you stand on a ladder and push each section up, or use the tilting up technique. Attempting to raise these masts by tilting often breaks them off in the middle. Either approach can be dangerous for the erectors. The mast erection system described here eliminates all those problems.

The military surplus mast sections are

often available at hamfests and on the Internet (see Table 1). Their original purpose was to hold up camouflage netting. Each section is about 4 feet long, and the aluminum ones are about 1¼ inch outside diameter and ½ inch inside. I don't recommend any other size. They are also available in fiberglass, but be careful if you buy those. Many of them are defective rejects and break easily at the joints. They must have the reinforcing ring at the ends. For this mast project, fiberglass sections can be used for the tripod lower legs if you wish, but they are not suitable for the vertical portion because they will not fit thru the tripod.

Assembling and Erecting the Mast

One example of a 40 foot mast that can be constructed with these materials is explained here in detail, although many other combinations are possible, and are limited only by your imagination. See Figure 2 for the general concept. You need six mast sections for the legs. The vertical part is 10 sections high, and must be aluminum. You will need a total of 16 mast sections.

You will also need guy ropes, a guy ring (see Figure 3) and a mast clamp (see

Figure 4) to fasten the ropes to the masts. If you plan to use the mast to hold up a wire antenna, mount a pulley and pull rope (halyard) at the top, so you can pull up the antenna after the mast is erected. Snap rings are also available to make it easier to attach the guy ropes to the guy rings, mast clamp, guy ring and ground stakes.

The erection process is what makes this design so nice. Make sure you have a level surface to start with. Start with one mast section and plug it into a tripod angled socket. Continue around the tripod with two more mast sections and set the initial tripod structure upright. Then start with one leg, tilt the structure backwards, and add another mast section. Again continue this around the base until you have two mast sections in each leg. Now put two mast sections up the middle. This puts the initial top of the structure at a height that is easy to work with, while adding things to the mast. Add the top guy ring (with loose guy ropes attached) and the pulley (with a loose loop of rope equal to at least the height of the mast, threaded through the pulley) to the top. Or attach a small antenna and coax to the top if desired. Then grasp the center mast below the tripod, lift it up about 4 feet and insert another mast section. Slide more sections up from the bottom, one at a time. One person can do this, and it will easily support itself to 40 feet, as long as it is level and there is little wind.

When you reach the halfway point, install the mast clamp, along with its loose guy ropes. Note that a normal guy ring will not work there, because you can't get it



Figure 1 — Lower portion of the mast, with my wife Judy and dog Olivia for scale.

Table 1

Some Suppliers of Masts and Accessories

Barans Surplus, baranoskybunch@aol.com

Bayway Deals, stores.shop.ebay.com/bayway-deals

TeeVee Supply, www.teeveesupply.com/product_pages/antennas/antenna_mounting_hardware.htm

The Mast Company, www.tmastco.com

Note that the dealers do not always list all their materials on their web pages. If necessary, send them e-mail and inquire.

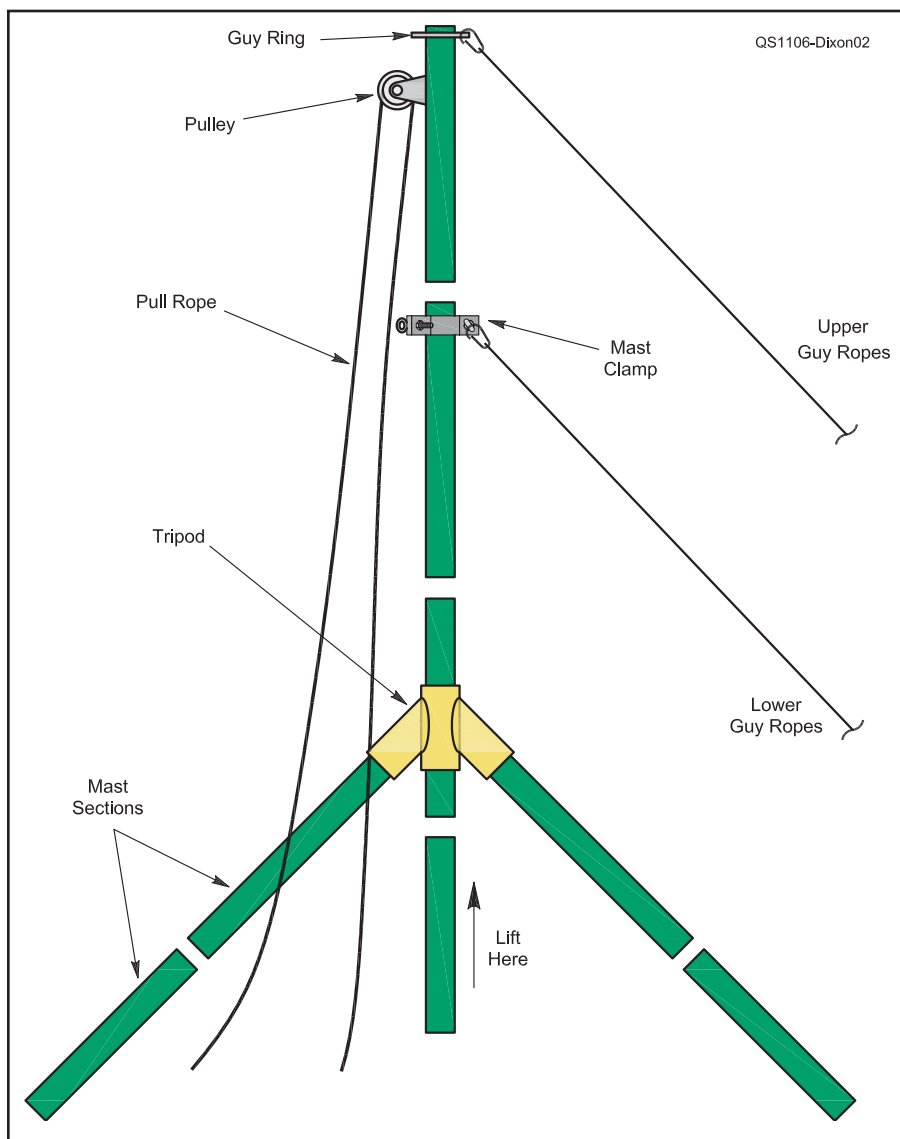


Figure 2 — Portable mast functional diagram — not to scale.



Figure 3 — Guy ring used to fasten guy ropes to the top section of the mast.



Figure 4 — Mast clamp used to fasten guy ropes at intermediate heights.

onto the mast once you start the erection process.

When the mast is fully up, pound in the guy rope stakes at suitable locations, and tighten all the guy ropes evenly so the mast stands straight. Attach a wire antenna to the pulley rope and pull it up. A video of the installation process is available on the QST-in-Depth website.¹

Disassembly and Storage of the Mast

To take it down, just reverse the above process. It slides down very easily. Start by detaching all the guy ropes from the guy stakes. Leave the other ends of the ropes attached to the guy ring and mast clamp permanently.

After the mast is completely down and disassembled, wind each rope up separately starting from the inner end, and tape each in two places. Then tape all the rope loops together at each level. Next, tape both levels of rope together to leave you with a single coil of tangle free guy ropes for the next time. Also wind up and tape the pulley rope and leave it on the pulley.

The mast sections usually come with canvas storage bags. I have found that home supply stores offer a medium size latching

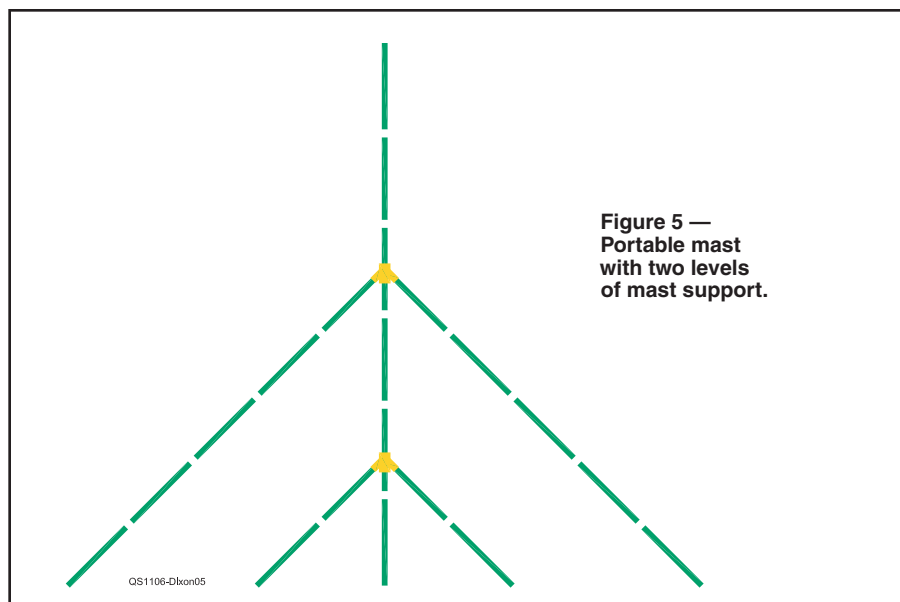


Figure 5 — Portable mast with two levels of mast support.

¹www.arri.org/qst-in-depth

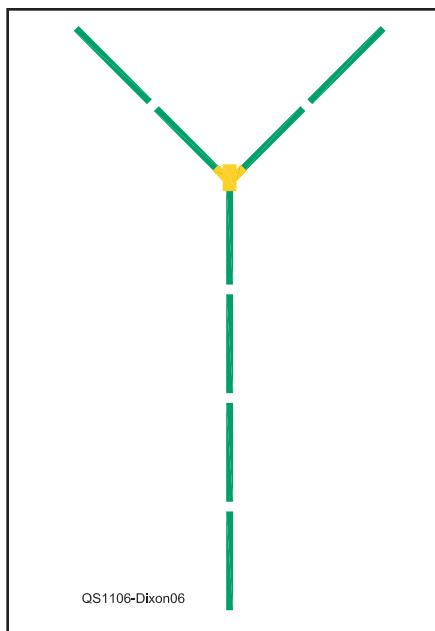


Figure 6 — Mast with inverted tripod and top loading for a vertical antenna.

plastic storage bin that perfectly holds all the other parts. The Home Depot store calls theirs Sterilite.

Keep in mind that gravity and the guy ropes are what holds all the mast sections and the tripod together, so if there is a strong

upward wind or the guy ropes come off, the sections could separate. These masts can also be used nicely for fixed antennas, and in that case you should drill holes and insert bolts at each joint.

The Delaware Amateur Radio Association (Delaware County, Ohio) used two of these masts with great success at the last ARRL Field Day.

Other Possibilities

Other mast configurations are possible, and some are illustrated in Figures 5 and 6. You could have more than one level of “guy masts,” for a strong higher mast. Or you could invert a tripod and put it at the top and make a top-loaded vertical antenna. In that case, drill small holes in each top mast section and use tap screws and wire to be sure there is good contact between the masts and the tripod. The masts themselves make good electrical contact with one another, but the tripod may not make contact through the paint on the mast sections.

This mast is also very useful as a temporary mounting for an antenna, such as a VHF or small HF Yagi that is being assembled, tested and tuned. It will easily support such antennas at a low working height for assembly and initial testing, and can then be temporarily extended to 16 or 20 feet to determine the effect of height on tuning.

Photos by the author.

ARRL Life Member and Amateur Extra class operator Bob Dixon, W8ERD, was first licensed in 1955 as WN9OKN, and then progressed to W9OKN before receiving his current call. He prefers operating CW on the HF bands and 6 meters, and is active with the Delaware County (Ohio) Amateur Radio Association and ARES®. He has confirmed every DXCC entity except North Korea. He is partially retired, but continues to work in the field of computers for the Ohio Academic Resources Network, where he has worked with video conferencing, satellite Internet and providing Internet services to tiny Appalachian towns. He received BS and MS degrees in Electrical Engineering from the University of Wisconsin, and a PhD from Ohio State University, working with John Kraus, W8JK. He is a Senior Life member of IEEE, and a licensed Professional Engineer. He has worked in the field of SETI for many years at Ohio State, and now with the North American Astrophysical Observatory, developing a new omnidirectional radio telescope concept called Argus (www.naapo.org). You can reach Bob at 2131 Klondike Rd, Delaware, OH 43015 or at w8erd@hughes.net.



Strays

ARRL FOUNDATION AWARDS 2011 GOLDFARB SCHOLARSHIP TO PETER YAO, AC8EF

◇The Board of Directors of the ARRL Foundation has unanimously awarded the prestigious four year William R. Goldfarb Memorial Scholarship to Peter Yao, AC8EF, of Hudson, Ohio. Peter will graduate from Hudson High School this year with a 4.0 grade point average and a rank of second in his class of 422 students. Peter holds an Amateur Extra class Amateur Radio license. He has been accepted into the prestigious Whiting School of Engineering at Johns Hopkins University to pursue a degree in biomedical engineering. Peter credits his Amateur Radio experience as the catalyst for his interest in science. He has already experienced research and clinical study as an intern at the Akron City Hospital and volunteered at the Rainbow Babies & Children's Hospital.



HAROLD KRAMER, WJ1B



Ham volunteers support Boston Marathon: The busy group of hams at Course Net Control for the Boston Marathon held April 18. Net control was located at the Clay Center for Science and Technology in Brookline, Massachusetts. More than 250 hams provided communications assistance for this year's Marathon.

BILL GILLENWATER, K3SV



Dahs meet dits: Bill Gillenwater, K3SV, of Carlyle, Pennsylvania, is the proud owner of a QSL card from an all-dit station as well as one from an all-dah station.