BUILD YOUR OWN 15' PORTABLE FLAGPOLE

FEATURES:

- Fifteen (15) foot tall, totally portable flagpole.
- Packs in a ski bag (packed size is ~6 feet long, ~7" wide, ~ 4" high).
- Can be assembled and disassembled in just a few minutes by one person (it's easier with two, but I've done it by myself ☺).
- Easily transportable.
- Practically un-tippable.

HISTORY

This style of portable Flagpole was originally designed and built by Rick Franzen, for Cub Scout Pack 28 in Bensenville, Illinois in 2005.

The design has been modified here. I had an old TV satellite dish mount that I used for the receiver (the sleeve and the flange). Since those aren't readily available, these plans show parts that are easier to find. This design is also a bit simpler than my first (the joys of hindsight ☺).

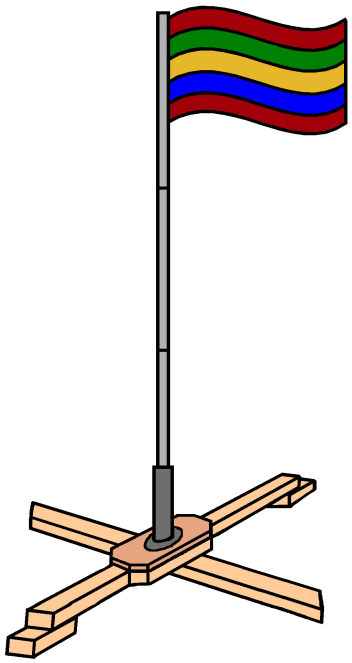
CONSTRUCTION NOTES

As far as difficulty of construction, I would rate this as an "intermediate" level. There's nothing too difficult, but it does require a few tools beyond just a hammer and screwdriver.

Feel free to modify as you see fit. I'll even be suggesting some alternatives in these plans, both in parts used and construction techniques. I'll try to give enough detail, both in description and pictures, so that even those who don't do much in the workshop can still figure out what I'm talking about. Those who are more handy or knowledgeable can do things however they choose ☺.

LEGAL NOTICE

Since I have no control over how you construct this flagpole, nor how you use it, your use of these plans constitutes your agreement that you are doing so at your own risk, and I am not liable for anything that happens as a result of your using these plans or your flagpole.



COUNTER – SINKING BOLT HEADS & NUTS

All bolts, unless indicated otherwise, should be counter-sunk, as per the "cross-section" picture, below. This means that neither the bolt head, nor the nut, should extend beyond the surface of the wood.

This is probably the most complicated part of the assembly, so I'll go into some detail on this page. The following is not actual assembly instructions, so you're not doing anything yet. It's just explaining how to achieve what's shown in the picture *(figure 1)*. Note that this picture uses "false colors" to show details (you don't really need red bolts, green washers, and blue nuts ☺). If you already understand how to do this, you can skip to the next page.

TOOLS NEEDED

METHOD #1	METHOD #2	METHOD #3
• Drill • Long thin drill bit • Drill bit just slightly larger than bolt diameter • Spade bit slightly larger than washer diameter	• Drill • Drill bit just slightly larger than bolt diameter • Hole saw slightly larger than washer diameter • Hammer • Chisel or old screwdriver	• Drill • Drill bit just slightly larger than bolt diameter • Hammer • Chisel or old screwdriver

All three methods achieve the same results. Method #1 is easiest, quickest, and produces the neatest result. Methods #2 & #3 will work just as well, but they take a bit more time and effort, and aren't quite as pretty when finished.

For all methods (#1, #2, #3):

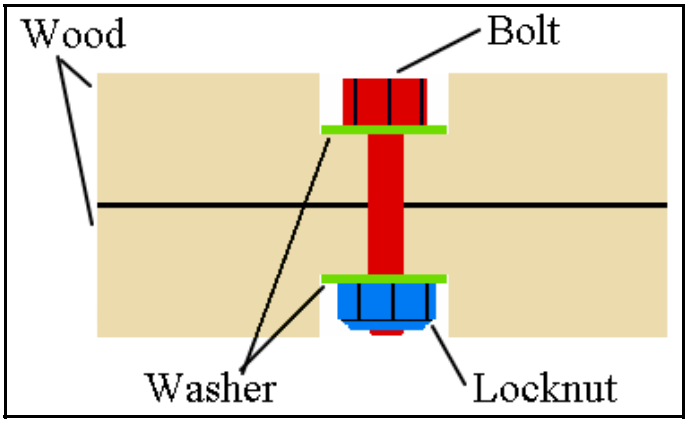


FIGURE 1 – False Colors to Show Details

⇒ Align boards. Temporarily clamping them together can help. If you don't have clamps, you can use rope or string, or just make sure you hold them tightly.

⇒ Mark and drill alignment hole, using the long, thin drill bit. This hole should go all the way through all boards at once, and should be just large enough to see. It's just so you get a straight hole through both boards. If you don't have a long drill bit, you can cut off the straight part of an old coat-hanger and use that.

⇒ If you don't have a drill press, or another way to hold the drill straight, you can use a scrap piece of 2x4. Using a square, draw a line on the side of the 2x4, and then lay it next to the mark for the hole. Keep your drill bit lined up with the line you drew, and also touching the scrap 2x4, and your hole should be very close to perfect. Particularly for the cross-pieces, having the finished hole straight through both pieces of wood, and perpendicular to the wood is very important or they won't turn easily.

⇒ Methods #1 or #2: Mark your spade bit or hole saw to cut slightly deeper than the height of the bolt head plus the fender washer. One way to do this is to put the washer all the way on the bolt, then set them next to the spade bit or hole saw, and then wrap a piece of tape around the bit or saw, slightly farther up than the bolt head plus washer. Using the alignment hole, drill into the first board to the marked depth. If using the spade bit, you're done with this side of the hole. If using the hole saw, you'll have to use the chisel or screwdriver to chip out the wood inside the circle cut by the hole saw. Repeat this procedure for the locknut and washer on the other board (note that this depth might be different).

⇒ Method #3: Center the fender washer on the alignment hole. Mark the outside diameter of the washer on the wood. Using the chisel or old screwdriver, chip out the wood to the proper depth.

⇒ All methods: Using the alignment holes, take the drill bit that's just slightly larger than your bolt diameter, and drill through the boards.

⇒ To assemble, put the first fender washer on the bolt, put the bolt through the first board, then through the next board. Add the second fender washer and then the nylon-insert locknut. If this if for the "pivot" part of the cross-piece (base), there might also need to be one or two additional fender washers between the two boards to allow them to turn. Also, the locknut for the pivot should not be tightened all the way. When assembled, the pivot should be stiff, but moveable. I'll give more details on some of this when discussing each individual assembly.

POLE ASSEMBLY

PARTS NEEDED:

- Two (2) 10' chain-link line poles (this is the top, horizontal pole on a chain-link fence). These must be the "swaged" type *(figure 2)* where one end is of a smaller diameter than the other.
- End cap with hole for chain-link line poles *(figure 4)*.
- Rope pulley. I'd recommend a "fixed eye" type, rather than a swivel eye. The one in *figure 5* has the eye so the bolt would be parallel to the pulley axle, the one in *figure 6* is perpendicular. Either one will work.
- Short mending plate. This may or may not be necessary. It's used to get the pulley out far enough from the pole so it hangs properly.
- Bolts with nylon-insert lock-washers to attach the pulley, and possibly the mending plate to the fence cap.
- Short, self-tapping metal screws.
- Double-ended lash-cleat. (If you don't know the term, that's the thing near the bottom of a flagpole that you tie the rope to ☺.)

ASSEMBLY:

⇒ Start with the two 10' lengths of chain-link line poles *(figure 2)*.

FIGURE 2

⇒ Cut each of the chain-line line poles in half. This makes them a nicer length for transporting.

⇒ You'll now have two pieces with the swage on the end, and two plain pieces as shown in *figure 3*. You'll only need one of the plain pieces. The plain piece that you keep is the top of the flagpole, the two swaged pieces are the middle and bottom pieces. Note that when assembled, the swaged ends go up.

FIGURE 3

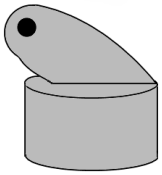


FIGURE 4

⇒ Place the end-cap *(figure 4)* over one end of the plain pole. Drill 3-4 holes through the cap and pole spaced evenly around the cap, and attach the cap to the pole with the self-tapping screws.

⇒ Using a bolt and lock-nut, attach the pulley to the hole in the end-cap. Use the mending plate and an additional bolt and locknut if necessary so the pulley hangs nicely. If it's at too much of an angle, the rope will rub on the pulley housing, which would make it fray and eventually break. (If you use the mending plate, and it has sharp corners, round them off first with a grinder. This prevents later cuts, both in the storage bag and those who might handle the flagpole.) The finished cap should look like either *figure 5* **or** *figure 6* (you don't need both of them).

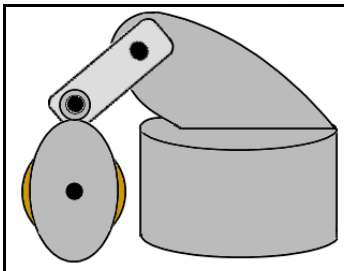


FIGURE 5

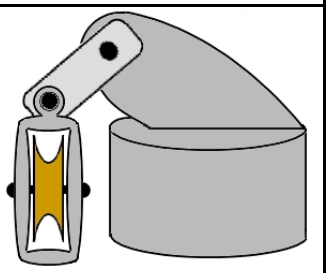


FIGURE 6

⇒ Take one of the swaged pieces. Measure up about 3-4 feet from the bottom (plain end) of this pole. This is where you'll attach the lash-cleat (lower for Cub Scout Units, higher for Boy Scouts and others).

⇒ Hold the cleat against the pole to mark the holes, then drill them and attach the cleat with self-tapping screws.

⇒ The pole with the lash-cleat is the bottom pole. The pole with the pulley is the top pole. The pole with one swaged end and nothing attached to it is, therefor, the middle pole.

⇒ The final step with the pole is to check all ends and such for any sharp edges, either those left by cutting, or those that were there when you bought the poles. Use a file or grinder to smooth everything, both inside and out, anywhere someone could possibly touch. Again, this saves wear and tear on the storage bag, and on people's fingers.

LIGHTNING SAFETY

Remember, as with all metal flagpoles, this makes a great lighting rod. Unlike a pole that's set in the ground, however, this one is *not* grounded. When we used ours, we set it up well away from the tents. If you're going to have it closer, you may want to attach a grounding clamp, a heavy wire, and a ground stake. You could even possibly run a heavy wire from the pole to the end of the base (there are stakes used to hold the base to the ground, (shown on page 5 of these plans)).

Since lighting is totally unpredictable, I can't guarantee anything, but the above is something to consider. If you practice safe lightning procedures, then this pole is no more dangerous than anything else that sticks up this high.

BASE (CROSS-PIECE) ASSEMBLY

PARTS NEEDED:

- Two (2) 2x4's, approximately 5' - 6' long. One should be 4" longer than the other.
- Two (2) pieces of 2x2, approximately 8" long.
- Piece of 3/4" plywood, about 8" x 12"
- Bolt, 3/8" or 1/2" diameter, 3-1/2" long.
- Three (3) fender washers for the above bolt.
- Nylon-insert lock nut for the above bolt.
- Two (2) 1/4" or 3/8" bolts, 5" long.
- Four (4) washers for the above bolts.
- Nylon-insert lock nuts for the above bolts.
- Six (6) deck screws or wood screws, 2-1/2" long.
- About 1 dozen deck screws or wood screws, 2" long.
- Wood glue (waterproof-type).

ASSEMBLY:

⇒ Determine if you have a preference for a "good side" on these two boards for the final finished top side. You'll be working on them upside down for now, so place them "good side down".

⇒ Place the longer 2x4 face down on the ground or your workbench. Measure in 3" from end on one side, and 5" from end on other side. Draw a line between those two marks. Do the same thing on the other end of the 2x4. The lines you've drawn should be on the wide (4") side of the 2x4, and should be parallel to each other. Make one "hash" mark across the line on one end of the board, and two hash marks across the line on the other end. These marks are so you know which piece came off which end, and so you can put them back together properly later. *Figure 7* shows the longer board with lines drawn and hash marks, and the shorter board below it.

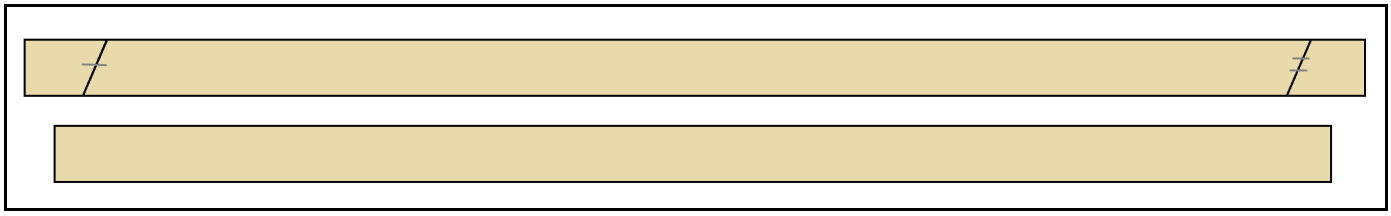


FIGURE 7

⇒ Cut along the angled lines (*not* along the hash marks). Keep all the pieces, the small "cut-offs" will become the feet for the top board.

⇒ The board with the straight ends is the top board. The board with the beveled (angled) ends is the bottom board.

⇒ Place the top board on the ground, or on your workbench. with the "good side" down.

⇒ Place the bottom board (beveled ends) on top of the top board., again, with the "good side" down.

⇒ Center the two boards and clamp them together. The bottom (beveled) board (which is currently on the top) will be shorter than the top board (which is currently on the bottom) Make sure you have the same amount of overlap on both ends.

⇒ Replace the two small cut-off pieces, aligning the hash marks you made earlier. These pieces should now make this board appear to be longer again, even though it's in three pieces.

⇒ Drill three pilot holes through each of the small cut-offs, into the top board. Using a waterproof wood glue and 2-1/2" deck screws, attach the cut-offs to the top board. Make sure the screw-heads are slightly counter-sunk into the wooden feet.

⇒ *Figure 8* shows the top board with the cut-offs (feet) attached. The side view (upper figure) has the bottom board removed for clarity (keep them clamped together for now). The bottom view (lower figure) would look the same, with or without the bottom board.

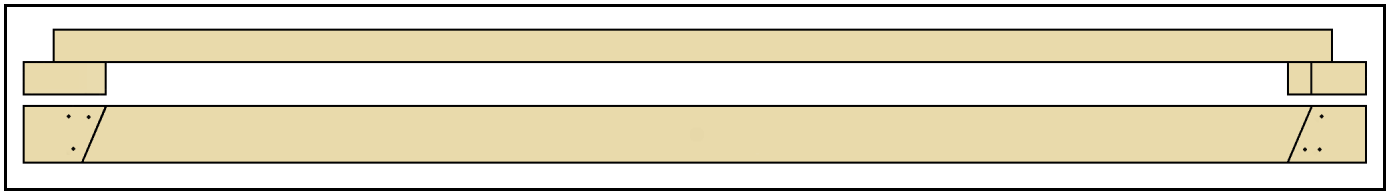


FIGURE 8

⇒ With the boards still clamped together, locate the exact center, both length and width and mark this point. This will be the pivot point for the cross-pieces.

this assembly is continued on the next page...

⇒ Drill and countersink for the large diameter bolt, using one of the methods listed on page 2. Use a portable drill press if you have one. The closer this hole is to square through the boards, the easier the cross-piece will work. Don't actually attach the bolt until later (or you'll probably have to take it off again to attach other parts). NOTE: In my original design (using the satellite antenna base for the receiver) I had to countersink both the top and the bottom boards for this bolt. If you use the parts listed in these plans for the receiver, you won't have to countersink the top board. *You WILL* need to countersink the bottom board (the one with the beveled ends), or else your flagpole will wobble if placed on a hard surface.

⇒ Cut the two pieces of 2x2. These should have either a bevel, as shown in *figure 9* or a radius (curve) on one side. The "long side" should be about 8".

FIGURE 9

⇒ These two boards will be attached to the top board (the one with the feet already attached to it as shown in *figure 10*. These "wings" act as both stabilizers for the crosspiece, and provide enough width for the base of the "receiver" (see page 6).

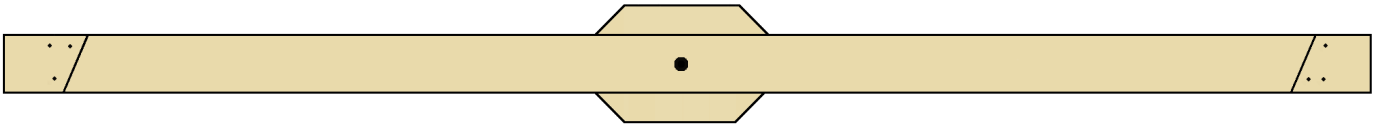


FIGURE 10

⇒ Drill and countersink for the two long bolts. The bolts go through the first 2x2, then through the 2x4, then through the second 2x2. The bolt holes should be in the short, flat sides of the 2x2, not in the beveled edges. Make sure these holes don't interfere with the center pivot hole. Glue and bolt the 2x2 wings to the top board.

⇒ Lay the assembled top board on top of the piece of 3/4" plywood. Trace around the 2x2 wings. Remove the plywood and finish drawing lines to connect the open ends. Cut the plywood along the lines. *Figure 11* shows the center section of the top board, and the plywood "cleat" already cut out.

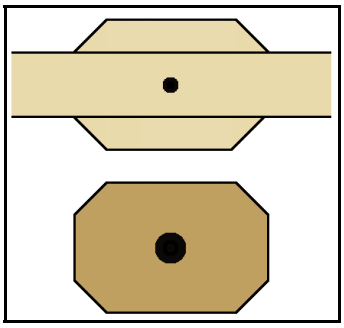


FIGURE 11

⇒ Drill or cut a hole in the center of the plywood cleat, larger than the fender washer for the large diameter bolt.

⇒ Apply wood glue to the cleat, align it over the top board and wings, and use the 2" deck or wood screws to secure it to both the 2x4 and the 2x2 wings. This cleat reinforces the wings and provides enough width and wood thickness for the base of the receiver.

⇒ The final step for the base is to drill the holes for the stakes. These need to be drilled on an angle, as shown by the grey lines in *figure 12*. Drill one hole in each of the feet, and one hole near each beveled end of the bottom board, angling them toward the center of the base. The actual diameter of these holes should be slightly larger than your stakes (see below). The stakes should go through the holes easily, but without too much play in them.

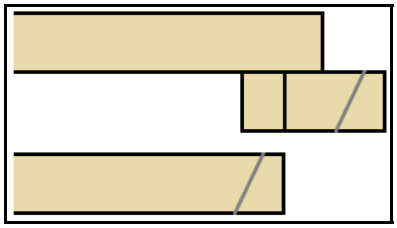


FIGURE 12

⇒ Remember, DO NOT attach the two cross-pieces together yet.

STAKES AND WEIGHTS

⇒ To keep the flagpole from tipping, the ends of the cross-pieces need to be staked down or weighted.

⇒ If used on a hard surface, such as a parking lot, sandbags, logs, or other weights can be used.

⇒ For normal usage, as in a field, you'll need stakes.

⇒ I used 12" long landscaping spikes. They look like really long nails.

⇒ For ease in pulling, I attached a strap to each stake, as follows:

⇒ Take a 6" - 8" piece of nylon strap.

⇒ Buy or borrow a grommet kit (if you're in a Scout Unit, somebody's got to have one ☺). Select a grommet size that fits the stake/spike tightly (don't worry if it won't quite go on now, as long as it's close, we'll "make it fit").

⇒ Fold the strap in half and punch the grommet hole in the overlapping ends. Insert and attach the grommet through both ends.

⇒ Find someone with a bench vise. Open the jaws of the vise so that the stake/spike slides between them.

⇒ Place the strap on top of the vise, with the hole in the grommet over the opening in the vise.

⇒ Put the point of the stake/spike in the hole in the grommet, and, using a hammer, gently tap the stake/spike all the way into the grommet until the head of the stake/spike hits the grommet. You'll now have a stake with a permanently attached pull-tab.

⇒ Alternately, you could just take a piece of heavy steel rod (3/8" diameter or similar), cut it to about 15" lengths, and bend the top 2" - 3" over for a handle (similar to the lightweight stakes many tents use). Sharpening the tip a bit will make it easier to pound into the ground. Remember, you want about 10" - 12" of stake in the ground to keep the flagpole from tipping over.

RECEIVER (SLEEVE AND FLANGE) ASSEMBLY

PARTS NEEDED:

- Galvanized water pipe 24" long. This should fit easily over the fence poles that you made the flag-pole out of . Ideally this should be about 1-3/4" inside diameter. In actuality, the closest you'll probably find will be 2" inside diameter. This pipe needs to be threaded on one end. (It can be threaded on both.)
- Galvanized floor flange for the above water pipe.
- Four (4) 2-1/4" long, flat-headed bolts to attach the floor flange to the base unit.
- Four (4) washers and lock-nuts for the bolts. (You won't need washers for the tops of these bolts, only the bottoms.)

ASSEMBLY:

⇒ Center the floor flange over the pivot bolt in the top board of the base unit. Try to align the hole placement so that the bolts will go through solid wood (rather than in the seam/crack between the 2x4 and the 2x2's), and so that the washers on the bottom won't protrude beyond the sides of the 2x2's. Mark for the holes.

⇒ Drill and counter-sink the bottom of these holes (this is why you didn't attach the two cross-pieces together earlier ☺ .)

⇒ Attach the floor flange to the top board of the base unit with the bolts. Make sure that the bolts don't extend beyond the bottom of the wood, or you won't be able to fold the base. You may have to use a hacksaw to cut off the ends of the bolts.

⇒ If your piece of water pipe is threaded on both ends, you can cut the threads off one end with a hacksaw. Use a file or grinder to remove any sharp edges, both inside and out. (This isn't necessary, but it looks nicer this way.)

⇒ Drill a hole, just above the bottom threads, all the way through the pipe. This hole should be big enough in diameter to allow you to put one of your stakes (landscape spike or bent metal rod) through it easily. This is your "pipe wrench". If someone screws the pipe too tightly into the floor flange, you can insert a stake through this hole and use it to turn the pipe to loosen it.

⇒ Now you can finally attach the two boards of the cross-piece together with the large diameter bolt, as shown on page 2. Try it first without the extra fender washer between the two boards. If they're too hard to turn, then add the washer.

FINISH AND FINAL ASSEMBLY

⇒ All counter-sunk holes *except for the top and bottom of the pivot* may be filled with wood putty, if desired.

⇒ All wood should be painted, stained, or varnished for weather protection. Don't forget to put your Unit's number on it as well.

⇒ Select a rope diameter that moves smoothly through your pulley. You'll need about 30' of rope.

⇒ Run the rope through the pulley and tie it into a loop. A Fisherman's knot works well here. If you have some heat-shrink tubing, you can slide that onto each end of the rope before you knot it, then feed the lose ends back into it. Shrink the tubing to hold the ends neatly to the main part of the rope (remember that nylon rope will also "shrink" if it gets too hot).

⇒ Attach two flag clips to the rope, one on either side of the knot (the knot should end up about in the middle of the back of your flag. Flag clips have a clip for the flag grommet, and a hole for the rope. The best way to attach these is to bend the rope, push the bend through the hole in the clip, and then pass the bend of the rope over the entire flag clip. This is almost like a square knot. This method allows you to easily replace a broken clip, and you can also easily adjust them if you get a different sized flag.

⇒ I also used a rubber spacer (it's a hollow rubber cylinder, about 1" long) on the rope between the pulley and the top knot. This was just to stop the knot and/or heat-shrink tubing from trying to feed into the pulley and getting frayed, or possibly jamming.

"USERS' MANUAL" - (INSTRUCTIONS FOR PUTTING IT TOGETHER EACH TIME YOU USE IT)

⇒ Lay the base on the ground. Pivot the boards to form an "X". ***Stake or weight them down BEFORE proceeding.***

⇒ Screw the short piece of water pipe into the floor flange to assemble the receiver. Don't over-tighten it.

⇒ Assemble the three pieces of the pole on the ground. The bottom piece has the rope cleat, and the top piece has the pulley.

⇒ Stand the pole upright, next to the center of the base, lift it up, and insert the bottom of the pole into the receiver pipe. Having a second person help with this makes it much easier to hit that small hole ☺ .

⇒ Check that the rope cleat is directly below the pulley. If it's not, you should be able to slightly lift the middle section of the pole and twist it until they align. You may need someone to hold the bottom section so it doesn't turn as you do this.

SAFETY TIPS – TO HELP AVOID TIPPING OR OTHER PROBLEMS

⇒ Never insert the poles into the receiver unless the base is staked or weighted properly.

⇒ Never use a windsock, a "sail-type" flag or an oversized flag. Remember this is "*practically un-tippable*", but it still ***can*** tip.

⇒ Never use near any overhead wires.

⇒ Stay away from the pole, and any other tall objects, when there is lighting in the area.

⇒ Make sure everyone and everything is clear of the area before assembling or disassembling. When putting it into and taking it out of the receiver pipe, it's top-heavy. If you lose control and it falls, you don't want to hit anything important.

⇒ Use common sense… of course, if everyone had that, we wouldn't need all these warnings on things, would we ☺ ?

⇒ Questions or comments? Feel free to contact me at get-in-ctrl {at} juno.com. (Replace the {at} with the @ sign.)