

Gin polling up large masts

By G8MNY

(Updated Jun 18)

(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

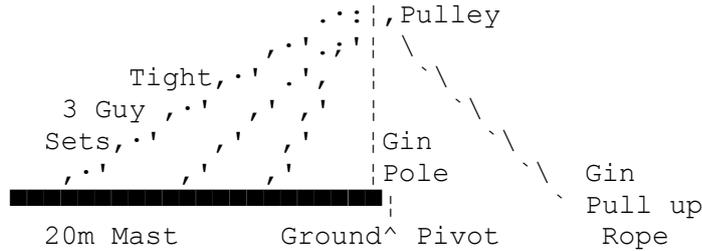
A 20M MAST

Over the years I have tried several aerial systems. But settled on a well tried & tested gin pole system.

The biggest used to date uses 3x 21' (3x 6.5m) aluminium scaffold poles with reinforced Jaybeam joiners & a 42' (2x 6.5m) steel gin pole. (as we are getting older a 2nd gin pole is used for putting up the gin!)

3 tiers of 4 guys @ 90° ensures stability.

This design is the mainstay of nearly all my contest & /P activity.



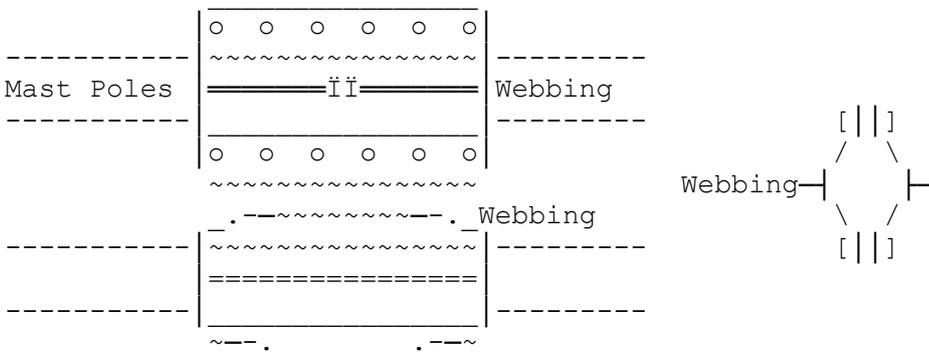
Structures higher than 66' (20m) have been attempted, but computer calculations showed this to would be unstable, & these were borne out in practice when unstable attempt proved it, i.e. they tend to buckle the mast on lifting with any head load at all!

METHOD

The mast is always put up with NO aerals first, to make sure all the mast bits work properly & are in the right place before, the mast is loaded up. With the aerial load the mast should be raised slowly & a spotter person used to sort any snags out. Generally you can tie off the gin up rope at any angle up to the point of balance, above that someone should slowly pay out the rear 3 mast guys to stop any sudden shock on the mast as it comes vertical & the rear gys tighten.

If there is to be any length of unsupported mast above the too guy ring, like in a 17el over 17el on 2m, then an extra top guy is needed during gining up the mast to stop the top of the mast bending away from the gin (when total collapse failure is possible!). And this is then untied from the gin & allowed to rap around the mast when in use.

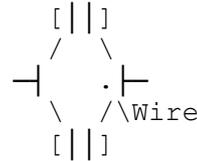
REINFORCED JOINTS



To stop the joiners tearing along the perforated centre line, extra steel webbings (0.4 x 2 x 25cm) were welded over the weakness both sides. To lighten it a bit the webbing ends can be cut down.

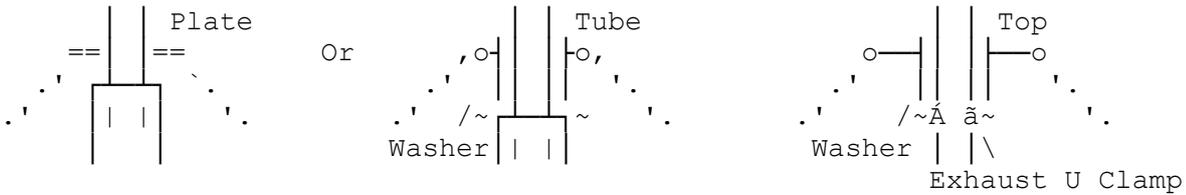
SLIPPING JOINTS

If the joints stretch & start to slip (aerial poles rotate), then put a thin wire (coat hanger) under one of the sides & clamp up, this will bite into the smooth pole & stop slips.



GUY BEARINGS

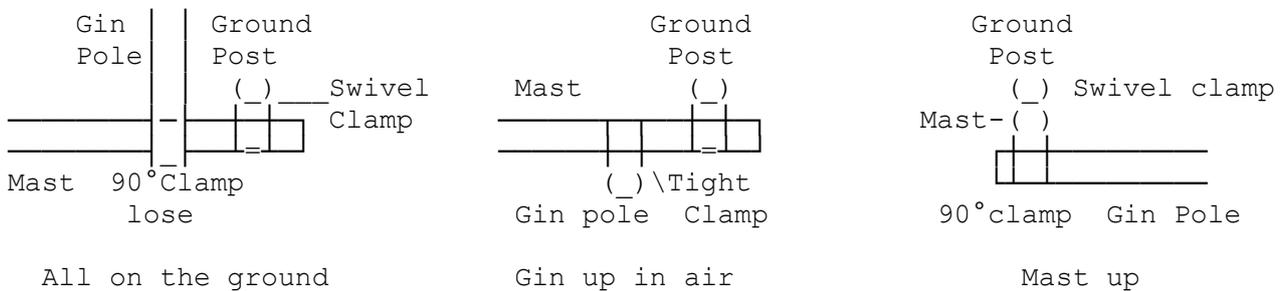
Made from either plate or tube collars, resting on a large 2" (50mm) greased ally washer above the joiners. The top set of guys will rest on an exhaust U clamp, it also has an enlarged guy spacer is needed to stop the steeper guys rapping around the pole.



Never use a long unguyed pole (e.g. 10ft) above a guyed joiner, as the wind loading on your aerial & the pole leverage will try to shear the joiner in two! Always use a top guy set & U clamp close to the aerial as possible.

Halyard pullies for wire aerials etc. can be put on the top guy set to, so they do not rotate with the mast.

CENTRE GROUND POST (plan views)

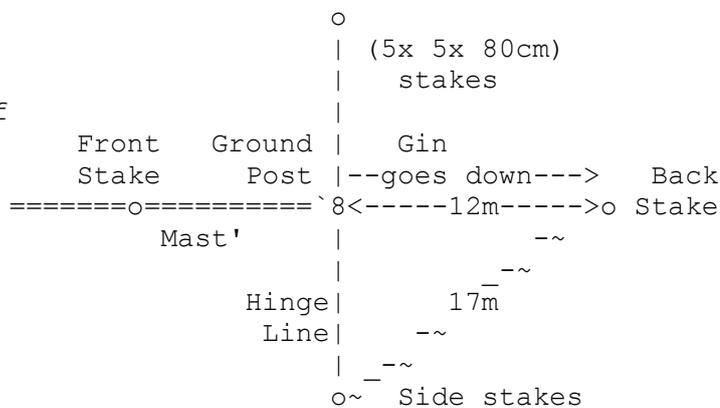


The gin pole clamp is initially left slightly lose on the mast, so that when the gin is erected from the side it can rotate on the mast.

GROUND LAYOUT

All guy ropes use a safe "clove hitch" knot on the bottom of the angled stakes.

Once the mast is up & no further adjustment is needed the clove hitch can be locked with a simple over knot.

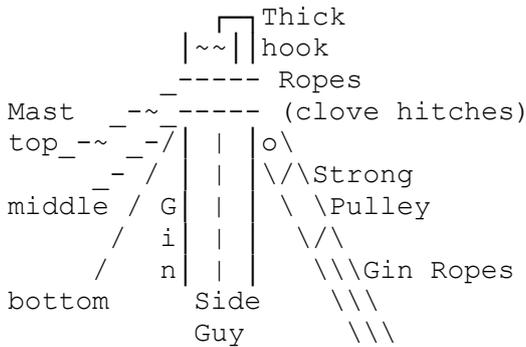


A short 1m x 49mm steel ground pole is put in the middle (after making a hole with the spare 5th stake first) to take all the hinge forces.

ROPES

A full mast rope set of 3 tiers of 4 guys & a gin pole pulley system + 2 guys, takes 1,024' (312m) of rope. Using mainly 8mm polypropylene for strength & cheapness, caused a storage problem, as the rope is ultra-violet light sensitive. For speed we do not detach the measured ropes from the guy bearings for neat rope hank storage, so a single guy tier of 4 ropes with its bearing is chain-laced together (3x shorter then) to give quick & untangled storage. The bulky & UV free storage was solved using 2 large dustbins (for 3 mast sets). One for the 1st mast & Gin pole, & the 2nd for the rest of the masts.

GIN PULL ROPE

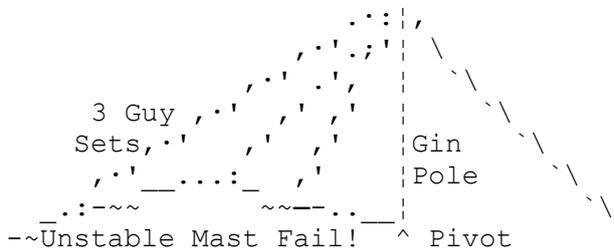


The pull up rope is a thicker 20mm for hand hauling & uses a 2:1 pulley on the gin pole that hooks on the pole with the mast ropes tied over the steel hook & eye.

The gin pole will need 2 side guys, these need not be @ full length 2/3 is OK.

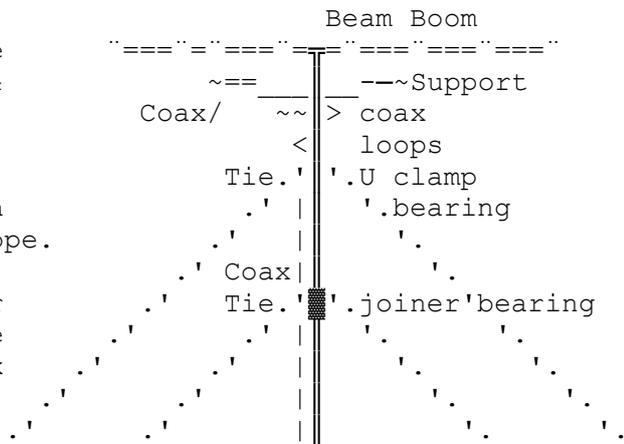
GUYS

The top guy to the gin needs to be low stretch & pre-tightened, so that the top of the mast ALWAYS bends (curved up) towards the gin pole. This avoids the unstable failure mode, when the top guy ends up in parallel to the mast & the very high compression forces on the mast WILL cause a collapse.



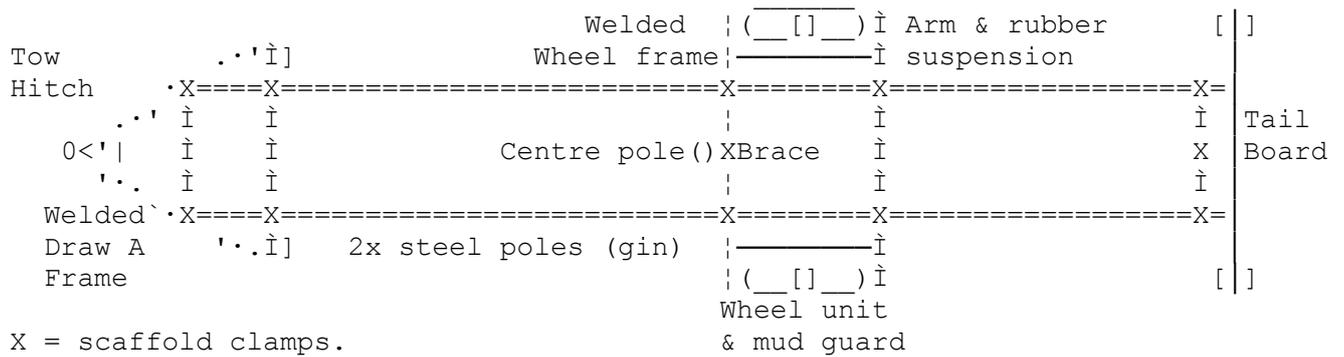
COAX TIES

With a rotary mast system, reusable coaxes ties were used on the coax & reused to attached it to the mast above the top bearing. Then 1 or 2 lose turns/loops & then attached to one of the top bearing guys with a cable tie threaded through the rope. (stops it slipping down the rope) This is then repeated at each lower bearing to take each section of the coax's weight, & also keep the coax away from the bearings.

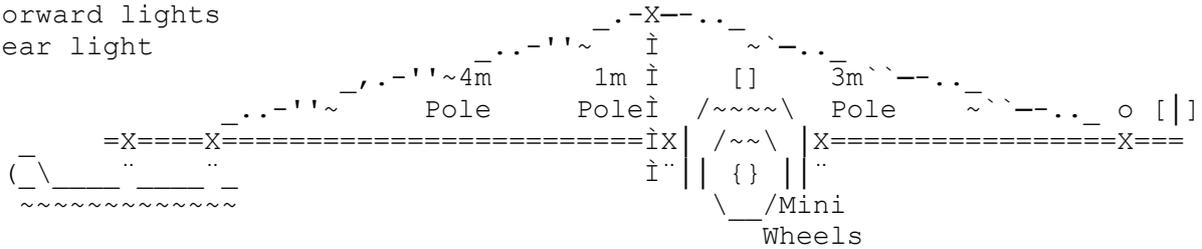


TRANSPORT

With the large poles, only roof racks could be used, this caused noticeably top heavy problems with the vehicles. After some research we solved the problem, with a designed for a dismantlable pole trailer. The UK law on the length of long trailers is simple, the trailer other than it's drawbar, must not be longer than the divisible load.



X = scaffold clamps.
] poles
 [forward lights
] rear light



We welded up the design, added the trail arm rubber block suspension & axel & wheels. The upper framework adds essential stiffness for bounce free ride. It lived up to all expectations, regarding cornering & loadings etc. The only problem has been the requirement to manually drag the rear & around tight corners like into the contest site entrance. With experience the wheel unit can be clamped at a position to set the hitch load to 50kg, dependent on the planned trailer load. As well as the tail board there are 6 additional running lights to make the trailer conspicuous as well as being painted in bright colours. The wiring loom is rapped around the poles & plugs in the fixed lights etc.

There are 2 shorter bracing poles, that form 2 triangles & are tensioned up before moving by standing on the long steels & doing up the top swivel camps, this then forms a very ridged trailer.

The trailer can handle 6 Ally scaffold poles clamped on plus loads more on top. So it can carry poles for 3 masts using the 2 steels as the shared gin.

The pole trailer is completely dismantled for storage.

AERIALS USED

Mainly concentrating on VHF contests, I have used quite a collection...

BAND

- 160m 100m random wire to halyard to trees, many other dipoles too!
- 80m Insulated 66' mast as 1/4 Wave vertical
- 80m/40m Trap Dipoles, inverted Vs & also plain QRO dipoles
- 20/15/10m 3el TH33 Mosley beam with QRO traps
- 6m 3el Coax & Bamboo Quad
- 6m 5el yagi beam
- 4m 2x 5el yagi & phasing harness
- 2m 5el, 7el, 11el small beams, 17el & even 2x 17el 11ft apart
- 2m 4x 17el yagis Box, 11ft apart stacking frame & power splitter
- 70cm 9el, 19el, 23el yagis, 88el multibeam
- 70cm 27el quad loop yagi
- 23cm 24el, & 65el loop yagi
- 13cm 40el with tranverter on 10ft extention pole

For 2m we used to use a box of 4x 17el, stack/baying frame & 4 way power splitter, but due to its weight it could only be put up at 42' & took a good

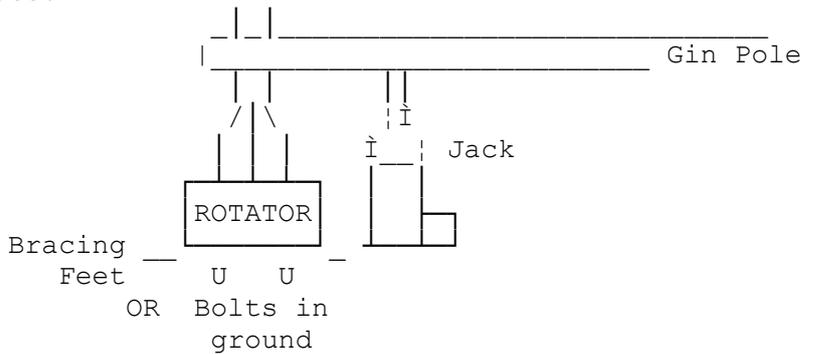
hour to assemble onto the mast. This gave a theoretical 20dB gain or 40kW ERP! However the simpler, 2x17el staked at 10'(3m) apart with a coax splitter works as well in practice at 20m with is wider beam width.

On 4m we stacked 2x5el at 10'(3m) apart as well.

ROTATORS

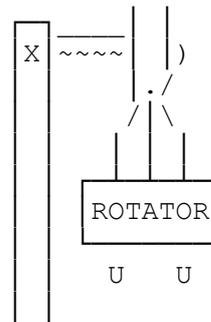
Generally I use mast ground rotation, avoiding putting the heavy rotators at the top of the mast. The slightly faster arm strong methods, have been superseded with bottom of pole rotators, mainly because of access to the mast under all contest weathers. But I have seen direct drive gearboxes & shaft into the shack used on simular masts.

To put a heavy mast on the rotator, either have several helpers to lift a tiller bar with the guys fairly loose. Or use a car jack under the horizontal gin pole to lift the load while you assemble the rotators clamp on the pole.



EARTHING

When the whole mast is rotated I put a flexible 1-2 turn earth strap from the ground post to the mast rotator clamp. This earth will take some of the nearby lightening current safely to earth & not via the shack. N.B. Any direct strike will do lots of damage!



WINDAGE

Generally this is not a problem as the gining up process puts much higher loads on everything than the wind will. Do check guy tensions & knots at least once a day & after/during any storms. If there are problems & you have the extra rope it is possible to add an additional guy in situ by lassoing a mast guy set at ground level & slipping the new guy up the others & stake out windward etc.

In strong wind raising & lowering, should ONLY be done side on to the wind! So the only effect it has is to keep one side set of guys tight, & not help/hinder the mast raising & lowering.

Y Don't U send an interesting bul?

73 de John G8MNY @ GB7CIP