Chapter 15

Mechanical

A Tilt-Over Mast for Portable Microwave Operation

Jean-Paul, F5AYE

(English translation by G3PHO)

The System offers two important functions:
1) Easy assembly of antennas, with the mast in the horizontal position and then erection of antennas and mast with minimum effort.
2) Perfect verticality, even on uneven ground

An adjustable, ladder-like structure was constructed and fixed horizontally to make the upper support frame for the system (see figs. 1 and 2 below). It is bolted to solid metal roof bars on the vehicle. The mast pivots at the height of the vehicle's tow bar ball joint. (see figs 6 and 7).
The whole assembly can be dismantled after portable operations are over.

Some comments:

- The higher the roof of the vehicle, the more rigid the mast structure.
- If the roof bar supports are high you can stiffen them further by cross-bracing from one to the other (see fig. 3).
- The description is given here without sizes and dimensions, but it should allow anyone to visualise their own version with its own possibilities and materials.
- In my case I used a lot of aluminium. The mast is telescopic and, when wound down, can stay in

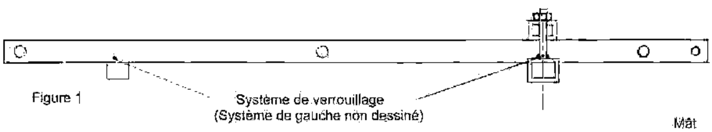


Figure 1

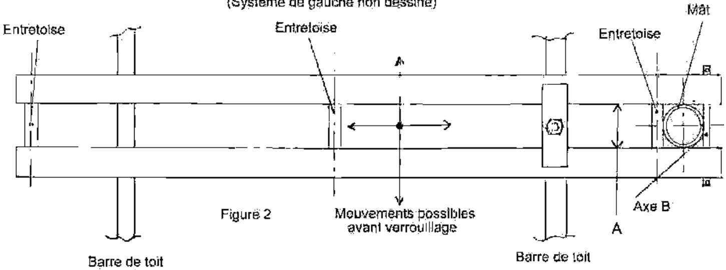


Figure 2

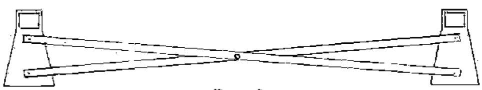
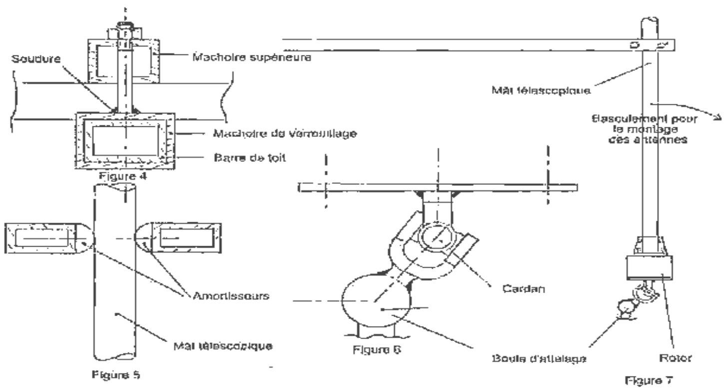


Figure 3



position during the journey to and from the site.

- The lower joint is a home made item (see fig 6) but a reclaimed car universal joint or similar would serve just as well.
- The easiest way to install this joint is to weld it to the ball joint but there are certainly better, alternative methods.

Specific Points:

- Removable spindle or axle (B) is held in place by two pins.
- Leave sufficient space between spindle B and the support frame cross beam so that it allows the mast to be tilted up and down between the two sides of the ladder structure.
- Cover the cross beam, where it contacts the mast, with some kind of synthetic material such as hose pipe off cuts so as to reduce vibration noise during the journey to and from the portable site.
- On the ladder structure side arms, fix 2 half round pieces of synthetic material to form
- shock absorbers which can cut down noise and, above all, allow a high mast height with the minimum of play (fig.5).

In Use:

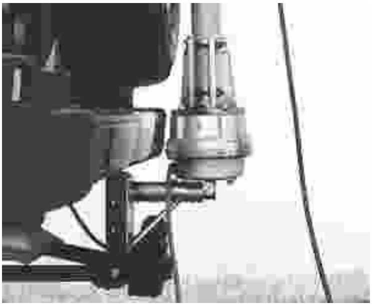
- Insert the mast, without antennas, into the end section of the ladder and retain in place by inserting and pinning axle B (see photo lower right)
- Slacken the clamps (fig. 4) so that the ladder structure can slide backwards and sideways on the roof bars.
- With the aid of a spirit level, set the mast in the vertical position.
- Tighten the clamps holding the support frame to the roof rack.
- Remove axle B in order to tilt the mast into the horizontal position for mounting the Antennas

EXPLANATION OF FRENCH TERMS USED IN THE DIAGRAMS:

VERROUILLAGE:
Bolt or clamping system
ENTRETOISE: Cross members
BARRE DE TOIT: Roof bar
MAT: mast
AXE: Axle or swivel bar
AMORTISSEUR: Shock absorber
BASCULEMENT: tilt-over/lowering
SOUDURE: welded joint

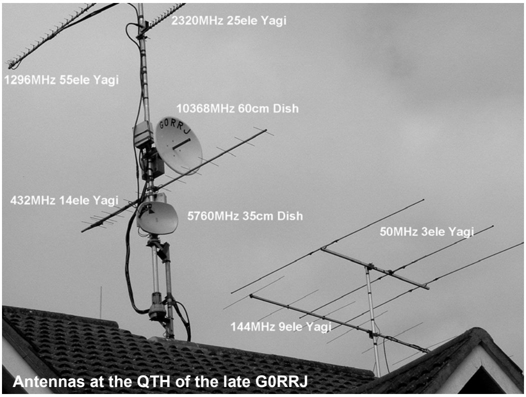
Below left:
The rotator stands on a home made bracket

Below right:
The Upper support holds the mast firmly



Will Your Antenna Stay Up Next Winter?

Mat Reilly



Antennas at the QTH of the late G0RRJ

From WA1MBA's microwave reflector on the Internet… it should be of interest to those readers who have or who are thinking of having a home station microwave antenna based on the old principle: " If it stayed up this winter it wasn't big enough" !

This is a gross rule of thumb. It derives from the Rad Lab series. Back during WWII, the folks at the Rad Lab did a study on dish wind resistance ... lots of wind-tunnel models, studies, measurements but all relatively crude. They came up with 40lb/sqft of antenna area in a 100mph wind. Andrew re-did all the studies in the sixties with much more expensive wind tunnels, lots of different orientations of the dish in relation to the wind direction, lots of different materials/surfaces/meshes. They came up with a max of about 40lb/sqft of antenna area in a 100mph wind.) So, the worst case force on the dish will be

F = k*v^2

This is a gross over simplification but I'm not sure this is the place for all the equations that none of us really understand.

Gentle reader, if you understand the governing equations, especially under conditions of compressibility, please send me mail, as I'm looking for some advice on numerical solutions to the Navier-stokes equations.
The empirical evidence is that

k = 40 lb/ft^2/10^4mph^2

So, a 30" dish in a 50mph wind produces:

F = (40 / 10^4) * 50 * 50 * 1.25 * 1.25 * 3.14
= 50 lbs.

I wish to heck I could come up with the reference! When I'm in the files next, I'll look for it. The major interesting tid-bit I got out of the Andrew study was that the maximal force was, of course, NOT when the wind was normal to the face of the dish.

As every sailor knows, you get a lot more force out of the sail when it is acting like a wing than you do when it is acting like a bag.

Self Locking Screws for Microwave Adjustments

André Jamet, F9HX

We often use screws to adjust microwave devices like filters made with copper, plumbing caps, frequency adjustment of DROs or as matching sections in a wave guide.

Unfortunately it's not all that easy at times to securely lock the nut after adjustment and, indeed, instability can take place during adjustment.

We can use a drop of varnish or to put a complementary nut to secure the assembly. Detuning sometimes occurs after adjustment.

One solution is to use a special nut with a slot in its head. This kind of nut is not commonly available in small nut sizes, so we have to manage ourselves using an ordinary nut, preferably made of brass, and to cut a slot with a junior hacksaw as shown in the diagrams left.

To have the desired effect we have to slightly compress the head in order to get a little tightening when the nut is screwed. In this way we can get good contact during both adjustment and after setting.

In fact, for me, it's easier to do it rather to explain it! Just study the drawings and you'll see what I mean.