Rural Training Center-Thailand: EmComm Paper

Light-weight Mast at Wangwa QTH

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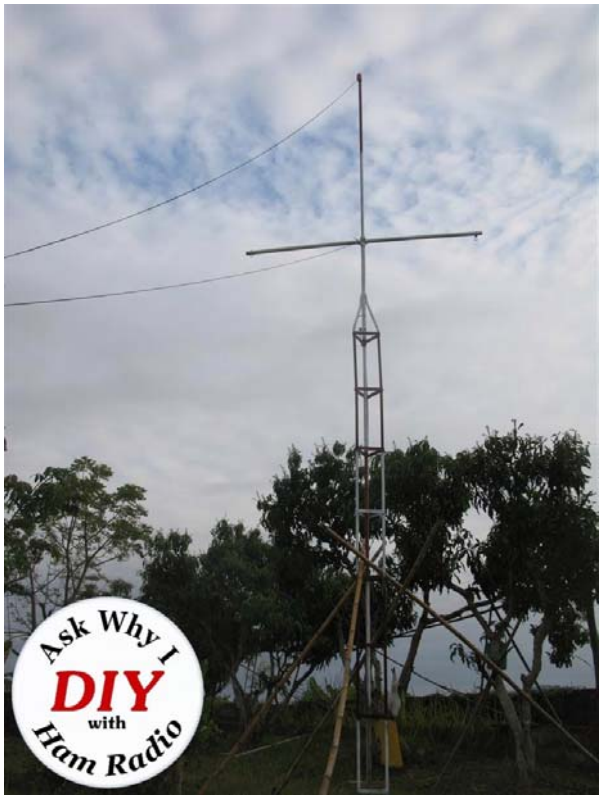

The RTC-TH Ban Wangwa QTH has a new feature in the backyard: a 9.6 m / 31.5 ft light-weight mast. The main purpose of the mast is for conducting preliminary antenna tests and supporting wire antennas. The site may not be ideal. It is among the fruit trees in the back of the property. But it is clear of the buildings and power lines on our property.

The project began with re-using a 4.5 m tower unit that began service as a TV antenna tower on the second floor balcony of the front building on the property. It was dismantled when the balcony was remodeled. I put a "save" tag on it to keep it from being sold as scrap metal. I had hoped to use it on the Ban Na Fa farm QTH. However, those plans were delayed for 2 years. There seemed to be no end in sight for the delay.

During some other antenna projects, I had gone out back to test the antennas, but always had to set up temporary masts for the tests. The set up time severely reduced time for testing. It got to be a hassle. That's when I decided it was time to set up a semi-permanent mast. I say semi-permanent because there is the possibility of moving it to the farm some day.

When the TV tower was removed for remodeling, the workers gave no thought to re-use. It was more of a demolition effort. So the first step was doing some repair to the legs and making a base for the tower section.

We used available scrap steel rods and pipe to even up the legs. Additional pieces were used to make a triangular base which would be anchored in concrete. Rebar fastened to the base would extend farther into the circumference of the tractor tire to firmly anchor the TV tower to the concrete base. The mast is intended for light-weight duty and not a permanent antenna.

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New stainless steel locking bolts were welded to the top mast section of the TV tower unit.

Pi Korn then cleaned and prepared the tower section for painting. The classic alternating red / white pattern was used. We got a 6 m long steel pipe for the mast to be inserted at the top of the tower unit. With a 0.9m overlap, the total height of the structure would be about 9.6 m / 31.5 ft AGL (above ground level.

The 6m steel mast and the 4.5 m tower section after being cleaned and painted.

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To make the light-weight mast semi-permanent I decided on a discarded tractor tire as a concrete filled based. A small truck with a winch on it could lift and transport this if it needed to be moved.

The tractor tire was 20 cm wide and 0.5 m in diameter. I estimated it would take about 0.15706 cubic meters of concrete to fill it. That would make the base weight about 335 kg. Very little property damage would occur if the base was not adequate to hold up the mast. I figured to try it and only guy it if needed.

Other Mast Refinements:

- **Mast Top Cap:** The bottom portion of an empty plastic deodorant bottle was used to cover the open end of the steel pipe mast.
- **Mast Truck Weather Shield:** The bottom of another empty plastic deodorant bottle became the cover for the mast truck. The truck is secured to the mast head with a stainless steel bolt.
- **Mast Safety Pin:** In addition to the 2 mast locking bolts, a safety pin was installed at the bottom of the mast sleeve. Should the locking bolts loosen, slip, or fail, the safety pin keeps the mast from falling through the mast sleeve.

- **PVC Yard Arms:** I decided to add yard arms (about 1 m to either side) to have 2 more hoisting points. Each yard arm is terminated with an S-hook secured by a stainless steel bolt going through a wooden dowel. The dowel stiffens the S-hook attachment point and closes off the end of the PVC pipe from possible nesting insects.

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The yardarm normally rest at the top of the masthead sleeve. It is hoisted aloft by the main mast halyard which is fitted with 2 stainless steel quick links. The halyard can lift the yardarm and have room to attach a bridle for a test antenna. The yardarm can also be fitted with halyards to hoist other items aloft.

- **Two Additional Halyards (for the yardarm):** These halyards can be put on to the S-hooks on the yardarm as needed. Each halyard consists of a stainless steel nylon truck, 2 stainless steel quick links, and 8.5 m of UV resistant Dacron braided line. Unlike the main mast halyard, these halyards are stored indoors until needed. Maximum hoist height is about 9.6 m AGL (above ground level). The trucks on these halyards are not weather as they are intended to be left outdoors for a prolonged period of time.

The installation of the light-weight mast began with leveling the site and leveling the tractor tire.

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A cinder block and plastic sheet to separate the tower base and concrete from the soil.

Saifon translating final instructions to Pi Noi (left) and Pi Korn as they position and level the tower section.

Placing the mast base, leveling, and bracing it with bamboo (cut from the back of the property) was made easier by the previous site prep work. Once stabilized, rebar was placed inside the tire and additional rebar was wired to the mast base itself.

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The overcast day was ideal for the concrete pour. Noi and Korn did the work between their regular duties in the smog check station where we assembled the materials for the concrete mix.

After mixing the concrete, water was spread in the tire and on the cinder block. The pour was done with 2 ½ wheelbarrows of concrete.

A final leveling check on all three legs of the base confirms everything is well. No adjustment of the braces was needed.

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The traditional call sign and date are inscribed on the convex mast base. The work crew is given the honor of adding their names to concrete base in recognition of their contribution.

The initial orientation of the triangular mats base was done so that one leg faces North. This was done as a matter of convenience and rapid orientation for antenna testing.

The photo on the left shows the light-weight mast at its lowest (stowed) position. When the mast is fully extended, the top reaches 9.6 m / 31.5 ft AGL. The yardarm normally rests at 4.5 m / 14.76 ft AGL. It can be raised to the full height of the mast.

On possible enhancement might be a shade shelter / stowage for the main halyard.

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