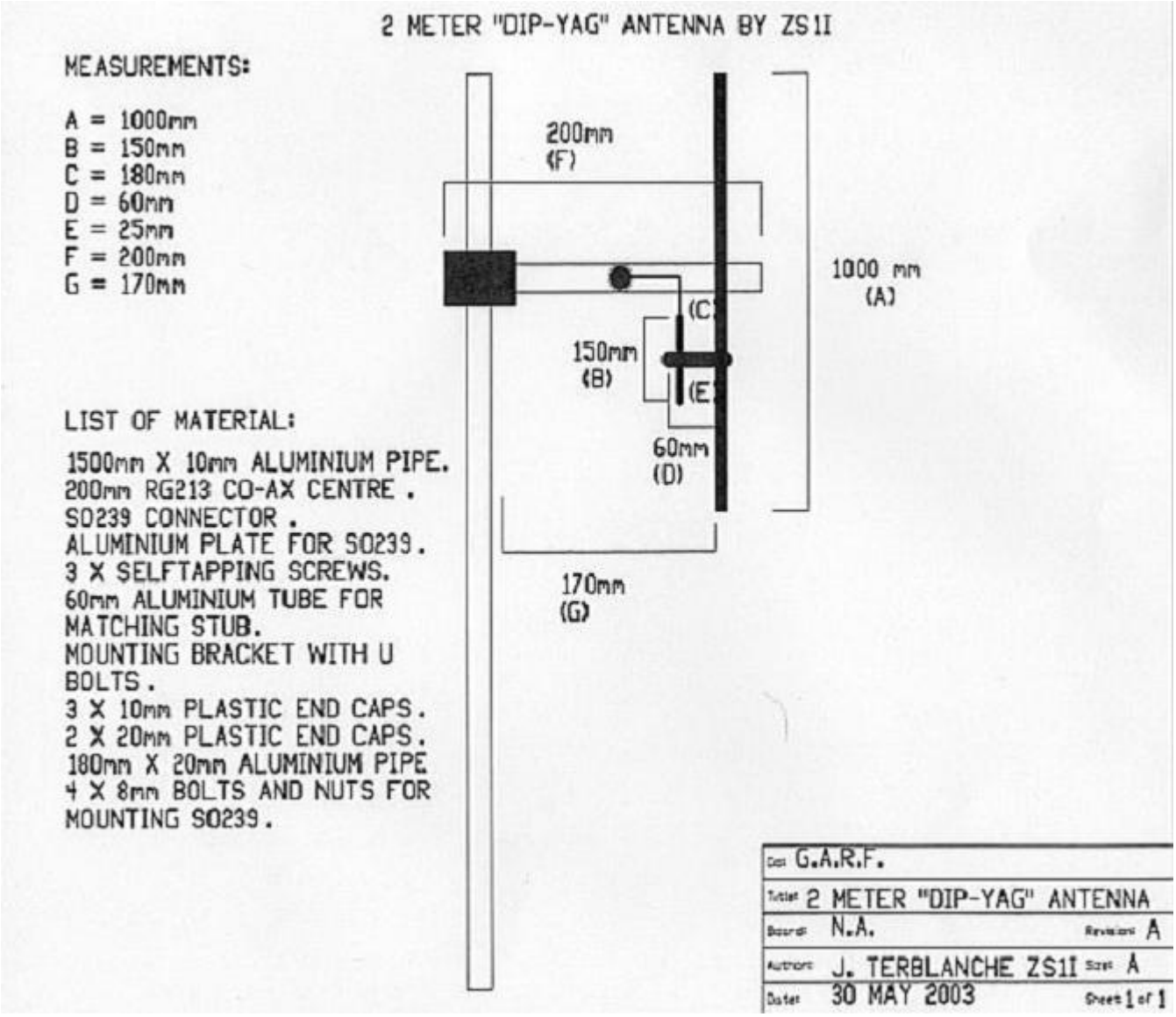
THE ZS1I
DIP-YAG PROJECT FOR 2 METERS

Photo: Dip-Yag Antenna (Bottom antenna view)

During the December 2002 I worked up the design for this antenna purely by co-insidence. I needed two stainless steel selftapping screws and my eye fell on the 3 element yagi that I constructed for 2m operation. This "odd" measurement yagi with stainless steel selftapping screws were mounted on a mast 4m high from the ground. I unscrewed and removed both the reflector and director elements in order to obtain the said screws. The driven element and funny looking boom were left intact on the mast. Later that evening I decided to contact Francois ZS1Q in George. I was greated with the following remark:
"Wat het jy nou aangevang? Jy blaas my uit die hok uit. Wat se versterker gebruik jy? "

Translation:
What did you do know? You are "blasting" me out of the shack.
What type of amplifier are you using?

I only then realized that I was using this "funny looking" yagi. Tests were conducted and this led to the constructing of the odd measurement "DIP-YAG" antenna. In amateur circles the "DIP-YAG" will rightfully be called a 2 Meter Dipole Antenna. Or will it? Be as it may this antenna give excellent results and is cheap and easy to construct.



Overall layout of Dip-Yag antenna

(Use the handy conversion calculators at this link to convert from metric measurements used in this project to whatever you desire!)

To construct the antenna we first drill the hole for the element through the boom. Push the element through the hole and affix the element with a self tapping screw exactly in the centre of the element. You will now have a T-shape antenna. Fit 2 X 10mm Plastic end caps to each opening of the element and 1 X 20mm plastic end cap to one end of the boom. The SO239 connector is affixed to a piece of aluminium plate bent in a "L" shape. A hole is drilled at the short

end of the "L" through the plate, the SO239 is fastened with 4 X 8mm bolts and nuts. The long end of the plate is fastened to the boom with a rivit-gun, approx. 80mm away from the element.

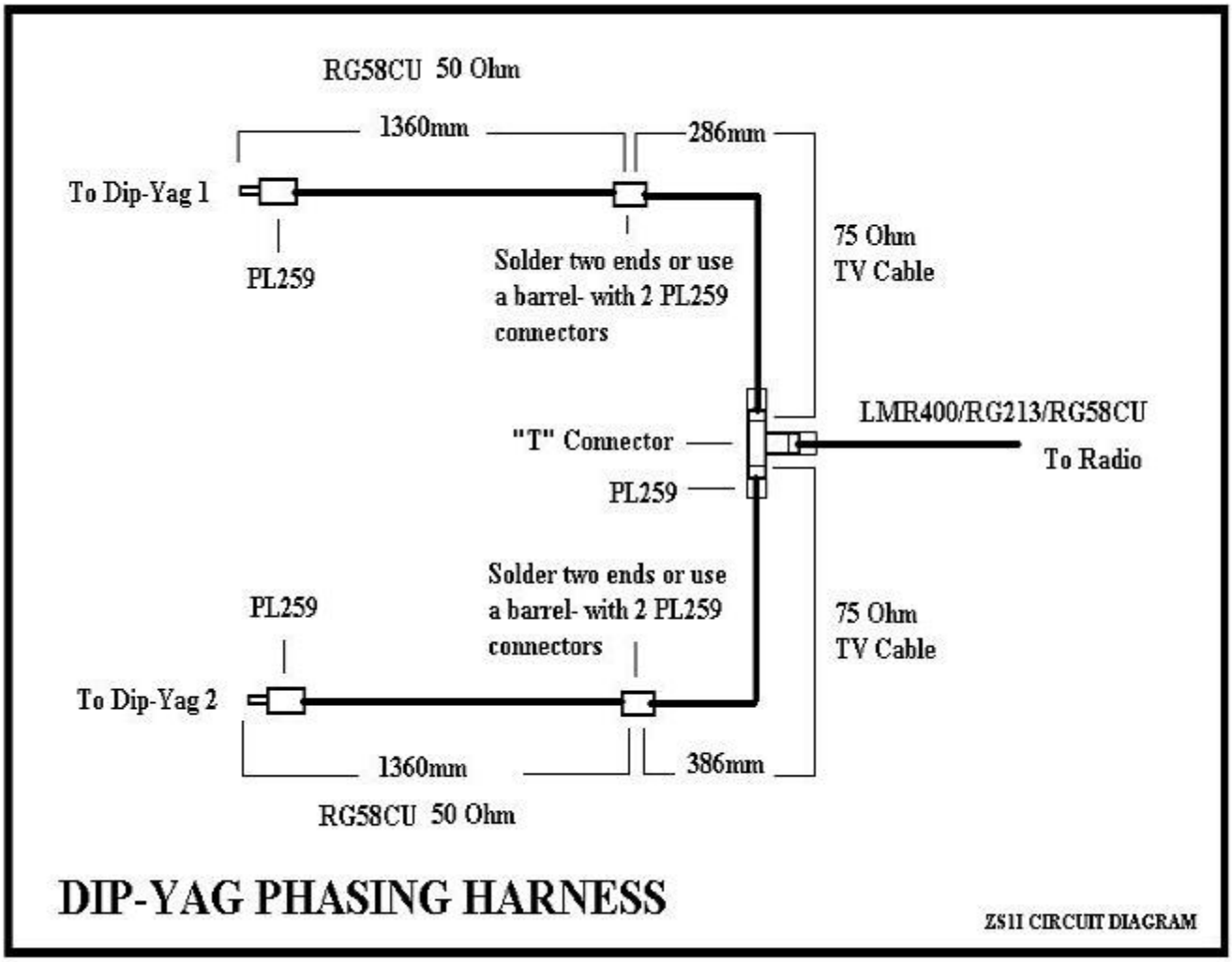
Photo: Showing the Gamma Match of the Dip-Yag Antenna

The gamma match consists of a 150mm length of 10mm aluminium tubing. The 200mm piece of RG213 co-axial centre (the outer cover and braid is removed) is slipped inside this tubing which telescopes into the aluminium tubing. One end is then soldered to the connector. Sliding the RG213 centre in and out of the tubing tunes the gamma match. Take the 60mm aluminium tube and drill two 10mm holes 25mm appart through this piece of tube. Fit the 2 x selftapping screws on the side of this tube. These screws act as a "lock-nut" to tighten the element and the gamma match for the best SWR. Affix the boom with a mounting bracket to the mast. Note: The best SWR is obtained by moving this matching stub up and down, as well as the sliding of the RG213 centre core in and out of the 150mm piece of tubing. After obtaining a 1: 1 SWR tighten all screws and affix the co-ax cable to the boom and mast with cable ties. One 10mm- and 20mm plastic end cap is affixed to the other end of the boom and to the end of the gamma match. Seal all holes and openings with an appropriate water tight sealer.

One of these "dip-yag" antennas works fine for a basic, slightly off center, omni-directional antenna. The angle of radiation is lower than that of a ground plane so it does tend to

work better (I guess 3 db in the favored direction). You can use more than one by stacking them vertically. Losses might make it undesirable to stack more than 2 or 4. I am currently using a two stack arrangement with the following phasing harness measurements.

PHASING HARNESS FOR STACKING:



Phasing Harness layout

2 X 1.36m 50 ohm RG58 co-ax cable
2 X 386mm 75 ohm Good TV co-ax cable

The 50 ohm and 75 ohm cable is joined together for each "dip-yag". The 50 ohm length is affixed to the antenna while the 75 ohm section on the other side is affixed to a "T" piece connector. A identical harness is made for the second antenna. A 50 ohm feed line is connected to the "T" piece and fed to the 2m radio. Note the distance I used between the two antennas is 2 meters.

PARTS NEEDED
3m x RG58U Coax Cable
1.2m x 75 Ohm TV Cable
6 x PL259 Connectors

1 x "T" Connector that except PL259 connectors.
15m x RG58, LMR400 or RG213 Coax Cable

IMPORTANT NOTE!
Always use good quality connectors and cable to curb excessive losses. Bad connectors and cables will give bad results.
Seal all connectors and joints with a good quality sealer.

This antenna is quite broad-banded and performs well during static buildup in the summer months. Thanks to Nico, ZS2N for the use of his MFJ Analizer and for the constructing of the phasing harness during his visit to Mossel Bay in April 2003.

I have done extensive tests with this antenna and has subsequently got rid of a Ground Plane Antenna, J-Pole and Slim-Jim. Construct this antenna and you will see why. If you build one of these antennas I'd love to hear from you and see pictures of your work.

Finally I would like to thank all Radio Amateurs for their input and help with initial tests.

Without this help the project would not have been possible.

Photo: Co-phased Dip-Yag's on the mast.

ADDITIONAL NOTES 6 JUNE 2008:

As a result of several e-mails received I decided to post new photos and more information including a diagram of the phasing harness.

This antenna gave very good results. This antenna was used for 2 Meter Simplex Communications with the one Dip-Yag antenna facing towards Hartenbos and the other in the direction of the greater Mossel Bay, George and Sedgefield area. The top antenna facing towards Hartenbos had the task of getting in behind a hill where one of my good friends stayed at the time. The J-Pole and Slim Jim used previously could not deliver the goods. The Dip-Yag did and excellent job in delivering what was expected from it. A yagi would possibly have done the

job, but then the George radio amateurs could not hear me and I could not hear them. The stacked Dip-Yag solved the problem and we could continue with our nightly 2M Simplex Nets.

What about feedline and connector losses? I used RG58 and a good quality 75 Ohm TV line for the phasing harness and still received 5.9+10 reports from Hartenbos and George. Use the best connectors and coax you have. If you use other cable than RG58 and 75 Ohm TV line then you have to re-calculate the length of cables as the velocity factor of cable differ. However the use of RG213, LMR400 and RG58 for the cable going to the radio need not be re-calculated.

The following formula can be used for the re-calculation of the 50 and 75 Ohm cables:

(234/145(Freq.)) x 12 = 19.23 inches
19.23 inches x (Velocity Factor) = (Inches) x 25.4 = (Millimeters/Length of cable)

I trust that the new information provided will be of further assistence to those currently busy constructing this very useful antenna. A single Dip-Yag is also very portable and could be installed and used for emergency communications.
I have one in my "Ready to go bag"!! 73 ZS1I (Zulu Seria 1 India) South Africa
See his Blog for more ham radio projects!

Editors note:

Use the handy conversion calculators at this link to convert from metric measurements used in this project to whatever you desire!
Although this design use 2 stacked Dip-Yag antennas for additional gain, there is no reason you can not use only one. The METAL mast appears to act as a reflector according to the author of the article SO....you will get a bit of gain from the single "Dip" (dipole)!!!
If you decide build one, please give us feedback on how it works for you!