THE HENTENNA 6 Meters

The Hentenna was developed by Japanese 6 Meter Hams, JE1DEU / JH1FCZ/ JH1YST in the 1970's and can be designed and built for hf thru uhf and possibly beyond!

After much experimentation, finally, the antenna was developed with good performance, however, it was difficult to explain why the performance was so good, or how it is worked basically at that time. So it was named Hentenna ,
"Hen" means "strange" in Japanese.

The antenna has good performance and many advantages and it has become very popular in Japan. Many JA stations make it and enjoy it at home or in the field. Some Japanese 6m beacon stations are using the Hentenna antenna.

HERE ARE SOME GOOD POINTS FOR THE HENTENNA

1. Good performance

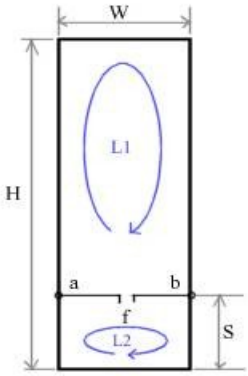
2.5-3 dBd gain
Low angle radiation
*** Total performance is equivalent to 2-3 element Yagi-uda antenna,**
Wide band width

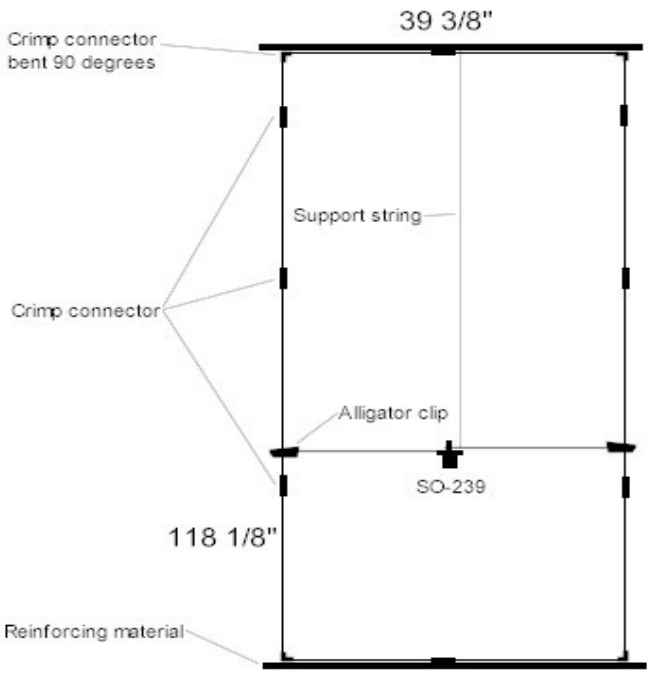
2. Easy to make

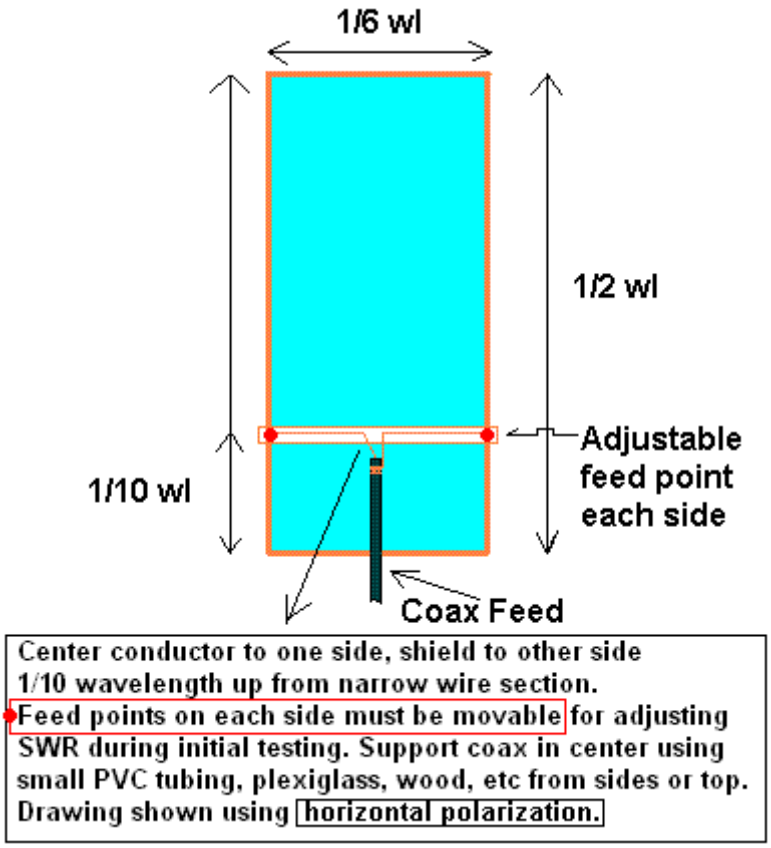
It is possible to adjust impedance and SWR perfectly, This means, not so difficult to make!
No special parts are required. You can use any electrical conductor to make the main rectangle.
Broad adjustment ....wide bandwidth

3. Easy to build up

If you use thin aluminum pipe and thin wire, you can make this antenna for 6m very light. It can be designed for most any band or frequency by using the included formulas below.
Due to it's construction, it is easy to put it in a higher position in the air. You can also use light mast for it.
As this is a vertically long antenna, it is easy to install the antenna on a veranda or small space.
It appears to be a vertical antenna but has mainly Horizontal radiation:
This is one of the reasons this antenna is "Hen",(STRANGE)







**This antenna is shown in drawings above horizontally polarized....
lay it on it's side for vertical polarization.
Also please note in the above English drawings that the Hentenna is basically a loop fed about 1/10 wavelength from the bottom element with 50 or 75 ohm coax attached to the top element of the bottom loop at the center point.**

Hentenna Basics

1. Basically 1 1/3 WL Loop antenna around outer edge of antenna
2. L1 works as 1 loop antenna
3. L2 works as matching section
**4. Vertical long rectangle has more gain than ordinary square loop and has less impedance.
L2 helps the matching and low angle radiation.**
5. 3D pattern is like shell of peanut (maximum gain directions looking at you and away from you) so it will be somewhat bi-directional.

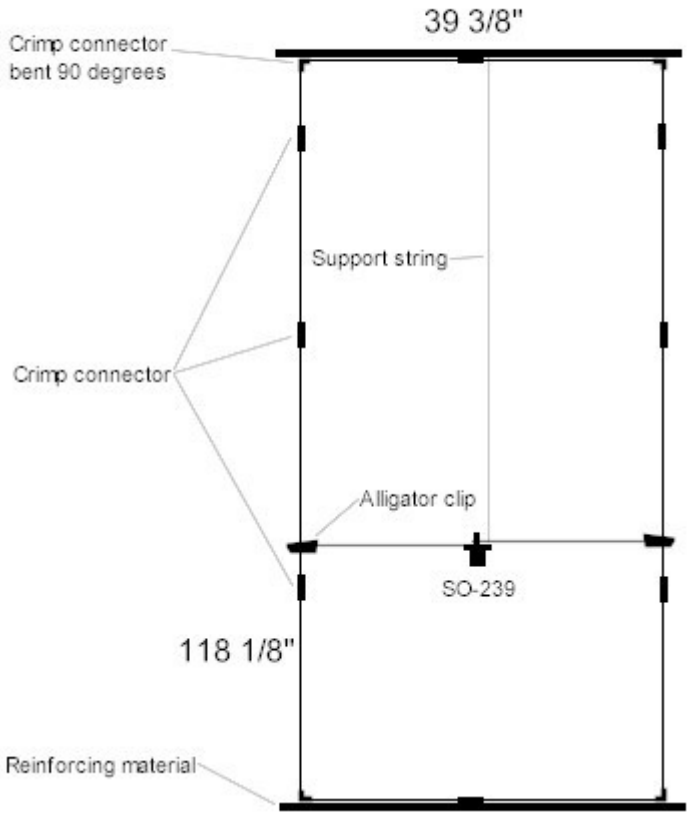
How to Adjust
**1. Move the "a" and "b" points to adjust swr. (move in equal amounts), move towards top (in the drawing) to increase resonant frequency,
move towards bottom to decrease resonant frequency.**

2. SWR may be higher than 1:1.5 at first so move matching points "a" and "b" in small increments up or down the loop until lowest swr is obtained and secure at these points with whatever method you choose depending on your construction materials. The overall outside (total) length may have to adjusted a small amount also.

**The construction materials you use for the loop will determine how the antenna is supported.
It will weigh more if made from aluminum or copper tube.
It will require a non conductive support mast or structure to attach it even if made from wire. Nylon cord or rope, heavy string or other non conductive material can be used for support at the four corners.**

A length of pvc pipe, plexiglass, wooden dowels, etc can be used as support for the top, bottom and coax feed point elements with the side wires strung between them or can be used to completly enclose the wire.
Use your own design.
Most JA hams use wire construction.
The final configeration in the air should be as close to a vertical rectangle as possible.
This antenna is shown in drawings above horizontally polarized....lay it on it's side for vertical polarization.
Experiment with your favorite support and try to keep conductor size under 1/4 inch. See the Japan site link below for more info.

6 Meter Version



THE MATH

Calculating the lengths for the Hentenna is simple and straightforward and can be used for HF THRU UHF and possibly beyond.
The formulas below will get you in the ball park for most any band or frequency. There are two methods for getting the approximate lengths. Chose the one that works best for your math abilities.

First method formulas:

Just start with 1 meter = 39.36 inches
1 inch = 2.54 cm
1 wavelength = 6 meters = 6 x 39.36 = 236.16 inches
(Remember, this is not a 1 wavelength loop! It is 1 1/3 wavelength)
1/2 wavelength per side = 3 x 39.36 =118.08 inches
1/6 wavelength = 6/6 =1 wavelength = 39.36 inches
1/10 wavelength = 236.16 x .1 = 23.61 inches

Second method formulas (The easiest)

These formulas were extrapolated from the Japaneese plans and should yield lengths that are a bit long for easier final tuning.

15744 / Freqmhz = total outside length in inches of the "rectangle"
5904 / Freqmhz = 1/2 wavelength in inches
1968 / /Freqmhz = 1/6 wavelength in inches
1180 / Freqmhz = 1/10 wavelength matching section feedpoints

Using these formulas in an example for 146mhz center frequency:

15744 / 146 = 107.83 inches total conductor length (1 1/3 wavelength)
5904 / 146 = 40.43 inches (1/2 wavelength sides each)

1968 / 146 = 13.47 inches (1/6 wavelength in inches) (top and bottom length as in drawing above)

1180 / 146 = 8.08 inches (1/10 wavelength for matching section feedpoint distance from bottom of antenna.) (Coax feed point distance from bottom)

Some adjustment of lengths may be required for peaking at design frequency. Experiment!

From the above method calculations we arrive at the lengths for the 6 Meter Hentenna:

1/2 wavelength sides = 118.08 inches each
1/6 wavelength top, bottom and coax connection element = 39.36 inches
1/10 wavelength matching point = 23.61 inches up from each side of bottom element.

The 2 Meter example yields these lengths:
40.43 inches (1/2 wavelength sides each)
13.47 inches (1/6 wavelength in inches) (top and bottom length as in drawing above)
8.08 inches (1/10 wavelength for matching section feedpoint distance from bottom of antenna.) (Coax feed point distance from bottom)
Total distance around the rectangle = 107.83 inches.

Again, take notice that this is not just a full wave loop!
At 6 meters, the total length around the outside of it is 314.88 inches which comes out to be 1 1/3 wavelength long.
AT first glance the above measurements make this 6 meter antenna to be HUGE! IT IS NOT. It is only about 9.8 feet tall by 3.28 feet wide!
A scaled down Hentenna for 2 meters would be 1/3 it's size or about 39 inches by 13 inches!

EXPERIMENT! EXPERIMENT!
Editors comments:
" I personally have not built this antenna YET and cannot judge it's performance....make sure you use low power when adjusting the swr and send me any comments you desire about this "strange" Hentenna.
IF YOU HAVE EXPERIENCE WITH THIS ANTENNA AND HAVE ANYTHING TO ADD, PLEASE LET ME KNOW."
N4UJW