User's Guide

HFp

Vertical

7 MHz – 30 MHz Amateur Radio Antenna

Plus 6-Meters

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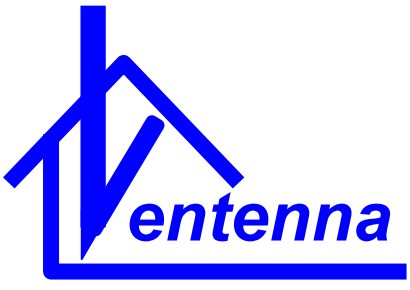

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The HFp antenna, assembled in its 40 Meter configuration, with included guy lines attached. It's about 11 feet tall – you can just see the top whip against the tree background. If the guy lines were black, it would almost completely disappear!

The *HFp* Antenna

The HFp design provides a highly efficient vertically polarized antenna design in an extremely portable package — the entire kit weighs a little over 2 pounds (1 kg). The antenna is highly configurable, and covers all the Amateur bands from 7 MHz to 54 MHz (as well as most of the frequencies in between). An optional coil is available for 80 Meters, which also provides operation of 75 and 60 Meters. Typical setup time is about 5 minutes.

In this User's Guide, you will find setup configurations for each Ham band from 40 Meters through Six Meters, for the antenna sitting on the ground. If the antenna is on a balcony, or mounted with the optional BackPack Mount Kit, you can use the configuration table as a starting point, but you will need to experiment to get the setup right with the different mounting. There is also a laminated card in the antenna bag, with the Ham Band configuration tables on it. The card makes it easy to take the setup information with you on your portable operation trips.

The antenna is configured for different bands by the selection and orientation of the seven elements that are included in the kit. Four of the elements are marked with a single stripe and contain no loading coil. One element is marked with two stripes and contains a small inductive load. One element is marked with three stripes and contains a larger inductive load. And one element is about 2/3 the length of the others, and has no stripe. The elements are coupled together by means of a threaded Inter-Element Connector (IEC).

In addition to using combinations of elements, the orientation of the loaded elements (the two and three stripe elements) either **UP** or **DOWN** determines the operating frequency. In the configuration table later in the User's Guide as well as on the laminated configuration card, you will see elements marked, for example, "2-stripe up". **If you assemble these elements in the wrong orientation, the antenna will not tune to the desired frequency.** The one-stripe and zero-stripe elements have no orientation, and may be assembled into the antenna either "up" or "down".

The HFp is designed to operate optimally with **three tuned radial** wires. We have found, after much testing, that less that three reduces the antenna's effectivity, and more than three doesn't seem to add much. This is true for ground mounted operation as well as elevated operation. The antenna will certainly radiate with one or two radials, but unless you are hanging from a cliff, it is worth the time to set up all three. The radial wires are coiled on plastic spools, and are marked in several places along their length. In use, the ring terminal is attached to the antenna base, and the wire is un-spooled to the correct mark for the band in use, as indicated in the Configuration Chart. This length is the correct "tuned length" for the radial wire, not the quarter-wave length, and will be different for ground-mount or elevated mount locations.

Guy lines are included with the HFp for use when it is windy, or when the antenna will be left up for some time. It is recommended that the guys always be used for the 40 meter configuration. The guy lines have lug rings which are placed between two of the upright elements (typically between the fourth and fifth elements from the bottom), using a special IEC. The lines are then run out to their full length and secured with the aluminum stakes provided, or tied to a handy rock. Some small flag material attached to the guys will help prevent people from walking into them. If the guys are run in the same direction as the radial wires, they will help protect the radials from being tripped upon, as well. The Guy Line Sliders make adjusting the guy lines very easy.

HFp Vertical Parts List

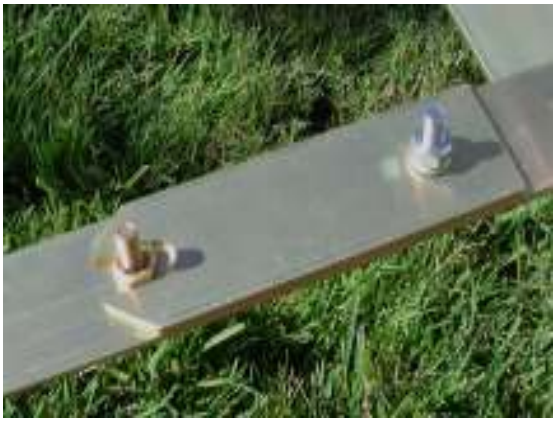
Before assembling your antenna, verify that you have all the parts in the list below:

Item Description	Quantity	Item Description	Quantity
Zero-stripe element	1	Base Plate	2
One-stripe element	4	Base Feet	4
Two-stripe element	1	Coaxial Pigtail	1
Three-stripe element	1	Radial Wire Spool	3
Collapsible Whip	1	Guy Spool	1
Inter-Element Connector (IEC)	8	Radial/Guy Stake	6
Base Insulator	1	Laminated Setup Card	1
Ground Lug Assembly	1	Guy Line Sliders	3
HFp Wrench	1	Special IEC	1

Assembling the Antenna for Use

1) Assemble the base by first screwing the four feet into the ends of the aluminum base pieces. After the HFp is set up, you can adjust these feet to make it vertical.

2) Insert the base insulator bolt with its split lock washer through the holes in **both** pieces of aluminum and install the Base Insulator on the bolt. Tighten the insulator, while holding the two base plates to form them into an "X", as shown.



3) Screw the Ground Lug Bolt, with the split lock washer into the threaded hole just offset from the center hole in one of the base pieces. Install the bolt from the bottom (the same side the black feet are on). Use the Wrench to tighten the bolt in the hole (gently - not TOO tight!).

4) Install the Wrench on the top of the plate, place the split lock washer on top of the wrench, and screw the nut on top of the washer. Use an IEC to align the Wrench to the IEC removal hole.

5) Place the center conductor lug of the coaxial pigtail over the top hole of the Base Insulator and use an Inter-Element Connector (IEC) to hold the lug in place.

6) Place a washer on the ground stud on the aluminum base plate, then put the coax shield lug on and screw the wing nut on top of it - not tight - you will need to take it off in a minute. Then place the base on the ground or another flat surface.

7) Place the lug from each of the three radial wires over the ground lug, then the second washer on top, and secure them tightly with the wing nut. Arrange the Radial Wires in an equally-spaced triangular pattern from the base.

8) Next, use the Configuration Table or the Laminated Card to determine which radiator elements you need for the frequency band on which you wish to operate, and their assembly sequence.

9) Install the elements in the correct sequence, set the Top Whip to the correct number of sections, and adjust the Radial Wires to the correct mark (see "Final Assembly Details", below). Adjust the base feet so that the antenna is standing vertical. Install the guy lines and secure their ends. You may use one of the Ground Stakes to hold the base assembly down, if you like.

HFp Configuration

On the next page is the Configuration Table for the HFp. There are two setups – one for the HF bands, and one for Six Meters.

Note that the length specifications for the extendable whip are in "Sections". The whip fully collapsed is one "section" long. The whip fully extended is six "sections" long.

Each different configuration calls out a specific setting for the whip, although it is important to remember that these lengths were determined with the HFp set up in an open area, away from any nearby objects. The antenna may be affected by nearby objects in any particular setup location, and the specified lengths may need to be changed. Thus the whip lengths in the Configuration Table may be deemed "starting points" for resonating the HFp at your frequency.

In some situations, where there are nearby objects strongly affecting the antenna's resonant frequency (typically lowering it), shortening the whip all the way may still not bring the SWR to its lowest level. If this is the case, simply change the top 1-stripe element to the zero-stripe, and move the whip to the top of the (now shorter) HFp. Then, once again, fine-tune the whip for the best SWR. (On 40 Meters, you may have to re-configure the elements - see "Fine Tuning".)

Be sure to notice the orientation of the stripes on the two-stripe and three-stripe elements. They are always specified as "stripes – up" or "stripes – down". Remember that the one-stripe and zero-stripe elements may be assembled either "up" or "down".

In the table, "Element 1" is the bottom element – the one screwed onto the base insulator.

With time, the element ends may become dirty, or develop corrosion. One of the "Scotchguard" abrasive sponges works very well at cleaning the element ends to assure good electrical contact.

The threaded inter-element connectors may also occasionally require cleaning, as well. An old toothbrush works well to clean the IEC threads.

HFp Vertical - Ham Band Configuration Chart 04/2009

Band	Bottom Element	Element 2	Element 3	Element 4	Element 5	Element 6	Radial Length	Whip Length
40M CW	0	3-Up	1	2-Dn	1	1	Full	5
40M SSB	0	3-Up	1	2-Dn	1	1	Full	2
30M	1	1	1	0	3-Dn	1	6th	2
20M	1	0	1	2-Dn	1	- -	5th	4
17M	1	1	1	2-Up	0	- -	3rd	3
15M	1	1	1	2-Up	- -	- -	2nd	5
12M	1	1	1	2-Up	- -	- -	2nd	2
10M	1	1	1	0	- -	- -	1st	3

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A chart listing configurations for all the frequencies the HFp can cover is available on the Ventenna website, at http://www.ventenna.com/Manuals.html.

Six Meter Setup

For six meters, assemble a One-Stripe and a Zero Stripe element, with a pull-out whip. Because the Zeroes and the Ones are not end-sensitive, they may be assembled in any order and any orientation. Screw the assembly onto the Base Insulator, and set the radial lengths to about three feet. Set the whip to about 4 sections. With proper adjustment of the whip and the radial lengths, you should be able to have the SWR below 1.5:1 across the entire 6-meter band, and under 1.2:1 at the center of the band.

Final Assembly Details

Using the Configuration Table, extend the whip to the length for the band. (Remember – fully collapsed is one "section".) Screw the whip into the top element.

Tightly screw the bottom element for the band you want onto the base insulator IEC (finger tight, not wrench tight). Be sure that the stripes are oriented "up" or "down" as required. Using the threaded inter-element connectors, assemble the remaining elements – all finger-tight.

Unwind the radial wires to the proper mark and stake the spools down with the provided stakes (or use rocks to weigh them down). You should try to evenly space the radial wires — place them approximately a 120 degree angles from each other.

If it is windy, you should use the guy wires to secure the antenna. To do so, place the lugs between two of the elements (using the Special IEC) and stake the other ends. (We recommend you always do this for 40m and longer configurations, or if you are going to leave the HFp up for a while… the wind can come up quickly.)

Fine Tuning

The best method to fine-tune the HFp is to use one of the portable antenna analyzers. There are a number of these available from MFJ, AEA, Autek and others. A list comparing the different models and prices can be found at http://www.eham.net/reviews/products/31.

Set up the HFp, with the extension cable you intend to use to connect it to your radio, and set the analyzer for a frequency range which includes your target frequency. There should be a null in the response at or near the target frequency. Adjust the whip to put it right on target.

If the null is out of the whip adjustment range, you will have to re-configure the elements to bring it closer. Use the techniques in Frequency Adjustments to change the antenna configuration to raise or lower the antenna's frequency. When you get close, use the whip adjustment to refine the SWR to the best reading.

You can also use your radio to set up the antenna. This is less desirable because it has the potential to generate some interference to other stations, so you should only use it if you have no other choice. The procedure is as follows:

1. Set up the HFp according to the chart for the band of interest.
2. Set the radio to AM mode, and for SWR indication. If the radio has adjustable power, use a low power setting.
3. Transmit a very short carrier at the low end of the band. Note the SWR reading.
4. Transmit a very short carrier in the middle of the band. Note the SWR reading.
5. Transmit a very short carrier at the top end of the band. Note the SWR reading.

Ideally, the SWR should be lowest at the middle of the band, and higher toward the top and the bottom of the band. If the SWR is not acceptable in the band, then do the next steps.

6. If the SWR is lower at the bottom of the band, and increases through the band, then the antenna is resonant at too low a frequency. Shorten the antenna whip one section, and do steps 3) through 5) again.
7. If the SWR is lower at the top of the band, and increases through the band, then the antenna is resonant at too high a frequency. Lengthen the antenna whip one section, and do steps 3) through 5) again.

If changing the whip length does not get the SWR to an acceptable level at your operating frequency, then the antenna will need to be re-configured. Use the techniques in "Frequency Adjustments" to change the antenna configuration to raise or lower the antenna's frequency. After each change, do steps 3) through 5) again. When you get close, use the whip adjustment to refine the SWR to the best reading.

HFp Antenna Notes

The following hints and kinks can ease your setup, as well as provide you with ideas for experimentation. While we have defined configurations for the ham bands, you can arrange the elements into other configurations to cover the same, or other bands. In fact, the HFp can be configured to ANY frequency between 3.5 and 35 MHz (when used with the 80M coil). We encourage you to experiment. If you find interesting configurations, please email us and tell us about your experiments at HFp@ventenna.com. There is also an HFp User's Group on Yahoo.com where HFp users exchange interesting ideas.

Antennas

Any antenna truly worth the name will exhibit as large a "capture area" as possible. That is, it will present the largest possible amount of resonant structure to capture (or radiate) signals. The larger the "capture area" the better the antenna works. The HFp configurations shown in the configuration charts were designed to have large capture areas, but it is possible to achieve a resonant antenna in a smaller assemblage of the elements, if having a smaller physical structure is desired. Experimenting with the mix of elements may result in different combinations of elements for any particular frequency. Just remember that the shorter antenna won't reach out as far as the longer one.

A Set-Up Hint

One of the portable SWR Analyzers mentioned before will make setting up (or experimenting with) the HFp antenna very easy, especially if the antenna is being used in an enclosed space, or a location where there are large objects nearby, which may make the configuration different from the chart.

Frequency Adjustments

Note - If you need to adjust the resonant frequency of the HFp because nearby objects are affecting it, most likely the resonant frequency will have to be raised.

1. **Raising the resonant frequency** – Moving an inductive load position higher in the antenna will raise the frequency. This can be accomplished by turning over one of the loaded elements (putting the stripes "up"), or moving it up in the assembly of elements.

   Removing a 1-stripe element, or replacing a 1-stripe element with the zero-stripe (making the antenna shorter) will also raise the resonant frequency. Shortening the whip will raise the resonant frequency.

2. **Lowering the resonant frequency** – Moving an inductive load position lower in the antenna will lower the frequency. This can be accomplished by turning over one of the loaded elements (putting the stripes "down"), or moving it down in the assembly of elements.

   Adding a zero- or a 1-stripe element (making the antenna longer) will also lower the resonant frequency. Extending the whip will lower the resonant frequency.

Radials and SWR

Although we have determined that the HFp will operate properly with the three radials provided, adding radials may help lower the SWR in some situations, particularly in elevated mount installations or over difficult ground. It is easy to add extra wire to the radial system to see what effect more radials might have.

You can also affect the performance of your antenna by lengthening or shortening the tuned radials. Change all the radials the same amount, a little at a time, and follow the "Fine Tuning" procedure to check SWR.

The HFp configuration charts define the tuned length radials for each Ham band. These tuned lengths are an important concept in the proper operation of a ground-mounted vertical antenna.

A write-up available on the Ventenna web site explains the effect of different radial lengths, and especially the problems which can be generated by radials that are too long. Go to http://www.ventenna.com/Manuals.html, and download "Radials for ground-mounted Verticals".

Guy Lines for the HFp Antenna

Use of the included Guy Lines is recommended if you intend to leave the antenna up for any length of time, or if it is windy. Although the antenna is quite robust, and can withstand strong winds, it will tip over under windy conditions if it is not guyed.

In the past, HFp Vertical Guy lines have been something of a problem because of being pinched between adjacent elements. If an element in the assembly needed to be re-adjusted, the guy lines clamped in place between the upper elements would twist and shorten when the element stack was rotated. Now this problem is solved.

A Special IEC (Inter-Element-Connector) has been developed, which has a short sleeve on it to allow the element stack to rotate with the Guy Lines attached. The short sleeve provides a small space between the element and the nut in the center of the IEC. The sleeve is crimped in place on the threaded portion of the IEC.

Here is a picture of the Special IEC, showing the sleeve.

The ring crimped to the end of the Guy Line has an opening large enough to allow it to fit loosely over the Special IEC sleeve. Because of the loose fit, the three rings can rotate freely when the element stack is turned, preventing the guy lines from wrapping around the element stack.

Here is a picture showing two elements, the Special IEC, and the three Guy Lines assembled together. This connection point for the Guy Lines is usually above the fourth element in the stack.

At the other end of the Guy Line, the Guy Line is threaded through two of the holes in the Guy Line Slider, and is tied to the third hole. A bowline knot is recommended here.

For each Guy Line, the loop between the tied end of the guy line and the middle hole goes over a Guy Stake, which is spaced about 10' away from the antenna base. Then the three sliders are adjusted to equally tighten the Guy Lines, while checking that the antenna is straight.

The slider moves very easily toward the antenna, tensioning the guy line. To loosen it, hold the guy line on the antenna side of the slider, turn the slider slightly with your other hand, and slide it toward the stake.

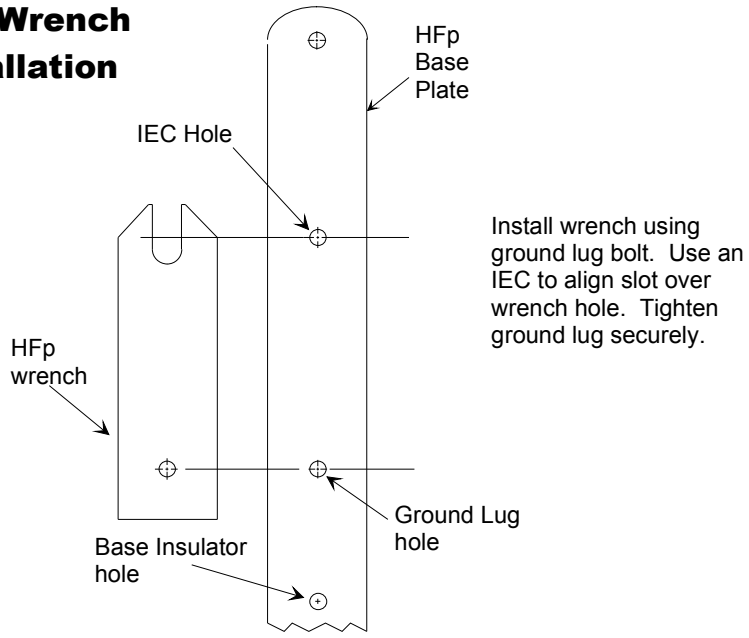
The HFp Wrench

The HFp wrench is designed to loosen a stuck IEC (Inter-Element-Connector) from the end of an element - a common problem when the elements are tightened securely. The wrench is made of hard aluminum, and may be used in the hand, or may be attached to the base plate of the Vertical. It weighs 1.2 ounces.

The Vertical base plate application of the wrench makes it extremely convenient to loosen a stuck IEC. Removing a stuck IEC is now a one-hand operation!

Install the wrench on your base plate, using the following diagram.

HFp Wrench Installation



To loosen a stuck IEC, simply insert the IEC stud into the wrench hole in the base plate, turning the element slightly to align the nut flats with the wrench slot. Then twist the element to loosen the IEC.

More Hints for setting up the HFp Vertical

Base insulator -

Place one of the 1/4-20 bolts into the hole in the center of one of the base plates. Place the second Base Plate on the bolt. Put one of the split washers on the bolt.

Thread the Base Insulator onto the bolt, and tighten it down hand-tight.

Using the Wrench, and, while holding the Base Plates crossed at right angles, tighten the bolt.

Ground lug -

Place one of the split washers one of the 1/4-20 bolts and thread it into the tapped hole closest to the center of the base plate. Use the Wrench to tighten the bolt. ***Make this bolt just snug - so the split washer just compresses. Don't over-tighten it!***

Next, place the Wrench on the top of the bolt, using an IEC (Inter-Element-Connector) to align the Wrench to the IEC guide hole. Leave the IEC in place until the wing nut is tightened.

Then put the second split washer on the top of the wrench, align the wrench with the IEC removal hole (using an IEC), and put the nut on top to hold the Wrench in place.

Place a flat washer on the ground bolt, then the three radial wires, then the second washer, and tighten everything down with the wing nut. Install the Radial lugs and the ground side of the Pigtail (the all-yellow wire), put on the second flat washer and tighten all in place with the wing nut.

Pigtail -

Older pigtails -

The lead which is all yellow is the shield braid of the coax, and goes to the Ground Bolt.

The lead which is mostly milky-colored, with a short yellow part at the end, is the center conductor of the coax, and goes to the top of the Base Insulator. Screw in an IEC to hold it in place.

Newer pigtails -

The black lead is the shield braid of the coax, and goes to the Ground Bolt.

The yellow lead is the center conductor of the coax, and goes to the top of the Base Insulator. Screw in an IEC to hold it in place.

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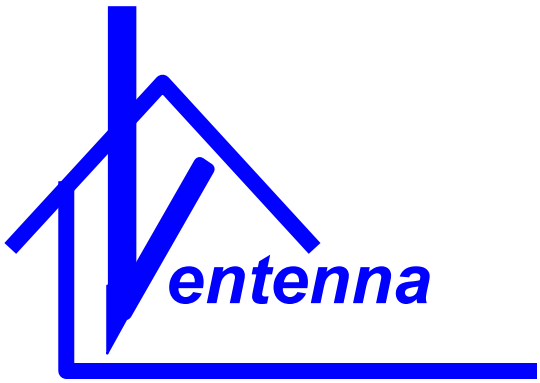

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