User's Guide

HFp

Vertical

7 MHz – 30 MHz Amateur Radio Antenna

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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 just over 2 pounds (1 kg). The antenna is highly configurable, and covers all the Amateur bands from 7 MHz to 30 MHz (as well as most 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 two tables showing optimum configurations for each Ham band. One table is for use with the HFp on the ground, and one is for the HFp elevated off the ground. The elevated configuration is when the antenna is on a balcony, or mounted with the optional Pole Mount Kit. There is also a laminated card in the antenna bag, with the same 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 half the length of the others, and has no stripe.

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 tables 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".

We have run extensive tests on the antenna, and our research verifies the "physics" of antennas: vertical antennas *require* radials to perform at their peak efficiency. Further, tuned radials optimize that efficiency.

The HFp is designed to operate optimally with **three tuned radial** wires. 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, you'll make a lot more contacts by taking the two or three minutes 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). 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.

HFp Vertical Parts List

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

Item Description	Quantity
Zero-stripe element	1
One-stripe element	4
Two-stripe element	1
Three-stripe element	1
Collapsible Whip	1
Inter-Element Connector	8
Base Insulator	1
Ground Lug Assembly	1
Base Plate	2
Base Feet	4
Coaxial Pigtail	1
Radial Wire Spool	3
Guy Spool	1
Radial/Guy Stake	6
Laminated Setup Card	1
Guy Line Sliders	3
HFp Wrench	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 *without* 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 the shield lug over the ground stud on the aluminum base plate, 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 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 Tables 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 are the Configuration Tables for the HFp. There are two tables – one for Ground Mount and one for Elevated Mount installations. Be sure to use the correct table for your setup.

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.

The different configurations each 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 lengths in the Configuration Tables may be deemed "starting points" for resonating the HFp at your frequency.

In some situations, where there are nearby objects 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.

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 each 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.

Table 1: Configuration for *GROUND* Mount

Band	Element 1	Element 2	Element 3	Element 4	Element 5	Element 6	Radial Length	Whip Length
40m cw	3-stripe up	2-stripe up	1-stripe	1-stripe	1-stripe	1-stripe	Full	4 ½ Sections
40m ssb	3-stripe up	2-stripe up	1-stripe	1-stripe	1-stripe	1-stripe	Full	2 Sections
30m	1-stripe	3-stripe down	1-stripe	1-stripe	None	None	8th mark	2 ½ Sections
20m	1-stripe	2-stripe down	1-stripe	1-stripe	None	None	7th mark	5 Sections
17m	1-stripe	1-stripe	1-stripe	2-stripe down	None	None	5th mark	4 ¼ Sections
15m	1-stripe	1-stripe	2-stripe down	None	None	None	3rd mark	2 ¼ Sections
12m	1-stripe	1-stripe	1-stripe	2-stripe up	None	None	2nd mark	1 ¾ Sections
10m	1-stripe	1-stripe	1-stripe	None	None	None	1st mark	Up all the way

Table 2: Configuration for *ELEVATED* Mount

Band	Element 1	Element 2	Element 3	Element 4	Element 5	Element 6	Radial Length	Whip Length
40m cw	3-stripe up	2-stripe up	1-stripe	1-stripe	1-stripe	1-stripe	Full	6 Sections
40m ssb	3-stripe up	2-stripe up	1-stripe	1-stripe	1-stripe	1-stripe	Full	3 Sections
30m	1-stripe	3-stripe down	1-stripe	1-stripe	None	None	8th mark	1 Section
20m	1-stripe	2-stripe down	1-stripe	1-stripe	None	None	6th mark	4 ½ Sections
17m	1-stripe	1-stripe	1-stripe	2-stripe down	None	None	4th mark	4 ¼ Sections
15m	1-stripe	1-stripe	2-stripe down	None	None	None	3rd mark	2 ¼ Sections
12m	1-stripe	1-stripe	1-stripe	2-stripe up	None	None	2nd mark	1 Section
10m	1-stripe	1-stripe	1-stripe	None	None	None	1st mark	5 ¾ Sections

Final Assembly Details

Using the correct 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 may wish to use the guy wires to secure the antenna. To do so, place the lugs between two of the elements 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.)

Your antenna is now ready for use. Connect your coaxial feed line to the pigtail. We have found that the SWR is lowest if you run your feed line parallel and close to one of the radials (lay it directly on top of the radial).

Fine Tuning

Using a radio to set up the antenna, 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 <u>too low</u> a frequency. <u>Shorten</u> the antenna whip one section, and do steps c) through e) again.
7. If the SWR is lower at the top of the band, and increases through the band, then the antenna is resonant at <u>too high</u> a frequency. <u>Lengthen</u> the antenna whip one section, and do steps c) through e) 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 a 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.

Set-Up Hints

One of the AEA or MFJ portable SWR Analyzers 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. **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.
2. **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.

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.

Guy Lines

On the lower frequency bands you usually need to take off the top assembly of elements in order to get to the whip to adjust it for the lowest SWR at your favorite frequency. Depending on their attachment point, the guy lines and attachment lugs can be a problem when you try to unscrew the elements above the guy attachment point.

But, if the guy line lugs are installed underneath the inter-element connector at the top of the fourth long element, and that inter-element connector is tightened a bit more than normal, then the top portion of the assembled antenna can be easily removed without the guy lugs loosening up and interfering. This makes whip adjustments on the longer setups much less of a hassle.

A set of three Guy Line Sliders is included in the kit to allow for easy tensioning of the guy lines.

Inter-Element Connectors

The Inter-Element Connectors (IECs) are solid brass for best corrosion-free connections between element sections. But, after some use, they may collect some dirt. One of the "Scotchguard" abrasive sponges works well at cleaning the IECs and the element ends.

An IEC may sometimes be hard to remove from the end of an element, if it has been tightened too hard. A special HFp Wrench is included in the kit to help with these stubborn IECs. The HFp Wrench is usually attached to one of the base plates for easy use. Just put the stud of the IEC into the hole in the base plate, align the nut with the wrench slot, and turn the element to loosen the IEC. The wrench may also be used in the hand. if necessary. And, as mentioned before, an old toothbrush works well to clean the IEC threads.

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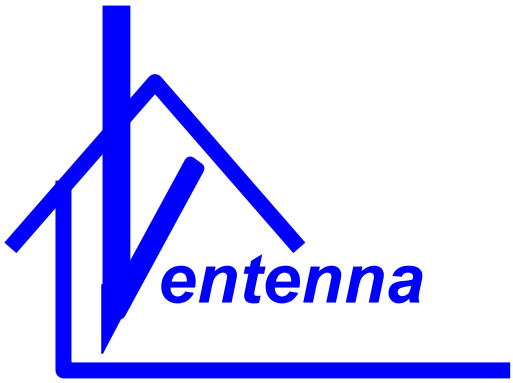

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