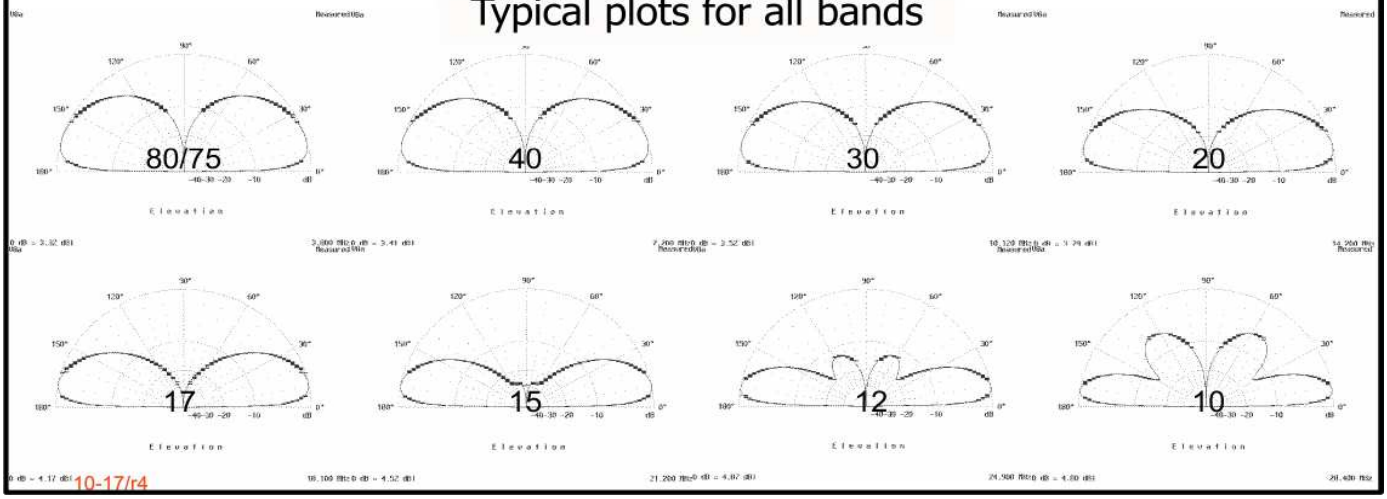
The perfect all band antenna for smaller locations,
portable operations and DXpeditions
Based on the proven Bravo 7K

3' sections, quick deploy and strong
remote auto tune 80-10m
8 bands & full power

nextgenerationantennas.com
tom@n6bt.com

Designed for MFJ & similar remote auto tuners to 1.5 KW
(can also be tuned at the transmitter)

Typical plots for all bands



10-17/r4

OVERVIEW and PRODUCT HISTORY V8™

Congratulations on your purchase of a next generation antenna by N6BT. In this case, it's a **V8**™ 8-band vertical antenna. This antenna is the product of over 20 years of vertical development and is intended to provide a low profile antenna that can cover 80 through 10 meters utilizing a remote auto tuner. The remote auto tuner is the key to the antenna system (antenna+tuner+coax) efficiency and some tuners are more efficient than others.

NOTE – the **V8**™ is a fixed-size antenna (approximately full size for 20 meters) and the tuner is matching complex feed point characteristics for a particular amateur band. The antenna can couple into other objects that are within a ¼ wavelength for the band in use and the feed point will change. The tuner might be able to accommodate these changes; however, on the lower bands, especially 80/75 meters, the feed point characteristics can be moved out of range for the tuner. For reference, a ¼ wavelength on 10 meters is about 8', on 20 meters it is about 17' and on 80/75 it is about 65'. These figures mean in all directions, not only horizontally – in a sphere around the antenna. It is easy to see that on 80/75, the antenna can easily be affected by objects/structures within a radius of 65' in all directions.

V8™

- The longest sections in the antenna are only 3' long, making it portable.
- Assembly is quick using simple tools (screwdriver/nut driver) and then coax and a tuner.
- The main connection to the (2) horizontal resonators is welded for zero loss.
- The power limit is determined by the tuner being used.
- The **V8**™ can also be used with the built-in tuner in a typical transceiver; however, the efficiency will most likely be less than having the tuner right at the antenna. This is due to losses in the coax between the antenna and the tuner.
- In practical installations like on an RV, using the rig's tuner is probably reasonable, since the coax feed line is relatively short.
- If the rig's tuner is used, it is recommended that the coax be wound into a coaxial RF choke before it enters the building. This will choke off RF that probably is flowing on the outer of the coax shield.
- A patent is pending on the **V8**™.

The **V8**™ is a valuable antenna in our Generation 7 ("Gen 7") series and is the product of research, testing and on-air development beginning in 1992 at my original antenna company, Force 12, Inc. (founded in 1991) and Next Generation Antennas started in 2009. The generations of N6BT-designed vertical antennas are the following:

Gen1 1992 – linear loaded verticals for 80 and 160
2 1993 – ZR, Z-axis radiator (full length)
3 2001 – Sigma (looks like a big letter "I")
4 2003 – SVDA (switchable vertical dipole array, full size)
5 2010 – Bravo (redesigned Sigma, no top T-bar, feed at the bottom)
6 2014 – Evolution Vertical (no horizontal components, enabling rotatable vertical arrays)
7 2017 – Gen 7 balanced current/voltage vertical dipoles and the **V8**™

INSTALLATION notes

1) The **V8**™ is designed to be inserted into a ground mount. A section of PVC is included that is inserted into a small 18" deep hole to receive the **V8**™ base.
2) The **V8**™ can also be attached to a post, or slid over a stake and guyed for stability.
3) The **V8**™ has been observed in 40-50mph winds using only the provided PVC base.
4) If heavy weather is expected, the **V8**™ can be guyed using small rope, such as 1/8" black dacron.
5) The vertical can be lifted up and out for a low visual footprint, or for bad weather.
6) The whole **V8**™ antenna can be lifted up and out from the tuner/base by removing the 10-24 screw and wing-nut.
7) The entire **V8**™ and tuner/base can be lifted up and out from the in-ground PVC.

A co mmon question is, "Do I need radials with the **V8**™ antenna?"
The answer is, "No", it is complete; however, adding wire on the ground can improve the ground conductivity in the near field. Improved ground conductivity usually will lower the take-off angle of the antenna. Physically raising the antenna will also lower the take-off angle, within a practical limit of about 3/8λ high, which on 40 is about 52', usually impractical. After 3/8λ elevation, vertical antennas begin splitting off a high angle lobe, rather than having a single, tall lobe. Another way to lower the take-off angle is to mount the antenna adjacent to sloping ground.

The first **V8**™ page shows typical take-off angles over average ground for each band. If you can mount the **V8**™ adjacent to sloping ground, the take-off angle will be lowered significantly in the direction of the slope. This has been confirmed by N6BT and his testing of antenna patterns utilizing a drone since 2014.

N6BT had noticed over a couple decades that sometimes verticals performed much better than anticipated, as evidenced by results in worldwide radio competitions. Eventually, a series of empirical (real-time) tests were performed to measure the actual take-off angle of vertical antennas over ground, sloping ground and salt water. The initial results were first presented at the Pacificon Convention Antenna Forum in 2015. In general, the typical computer model with good ground characteristics of 20,30 had the take-off angle almost 10 degrees higher than actual. The real-time vertical testing had the main lobe centered on 7-14 degrees (depending on the ground conductivity) and not at 20+ degrees as models showed.

The charts below are first at a location with dry, poor ground (a longhorn cattle ranch) and then at a good ground location (W6FM with 6' of top soil). To achieve the data, a high-tech airborne signal source was flown through the antenna patterns.

"Longhorn" Location poor ground	Computer Model		Measured
Antenna	good ground	Average ground	poor ground
Compact ZZ-5 vertical	24°	28°	17°
1/4λ vertical with (4) full-length radials	24°	28°	17°
Evolution Vertical 5K	20°	23°	13°

W6FM Location good ground	Computer Model		Measured	
Antenna	good ground	average ground	**W6FM** good ground	**"Longhorn"** poor ground
Compact ZZ-5	24°	28°	15°	17°
1/4λ vertical with (4) full-length radials	24°	28°	8°	17°
CushCraft R-7 @ 5'	N/A	N/A	6°	N/A
Evolution Vertical 5K	20°	23°	8°	13°
2el Evolution Vertical 52K	20°	23°	7°	N/A

The data from sloping ground is more dramatic. The testing shows that the vertical's energy follows down the slope. This produces energy below the horizon, but most importantly, energy down to the horizon (down to zero degrees), making the lowest angle possible for DX and ground wave. A second presentation was done at Pacificon in 2016, as well as at other clubs. Continued testing is on-going.

The **V8**™ antenna is complete in itself. Its efficiency remains the same over salt water or over ground. The antenna system, however, is both the antenna and the location/installation.

Vertical antennas induce vertically polarized energy into the ground. This means that if the ground has poor conductivity, the system will not be as good if the ground had high conductivity. Salt water is fantastic for the far field and helps the near (close-in) conductivity, too, as long as the vertical is within about ¼ wavelength of the water on 40 meters, or about 10 meters from the salt water boundary.

To improve the antenna <u>system</u>, lay wire on the ground under the verticals. This has been tested to improve the field strength by a maximum of about 1.5dB with only a few wires on the ground and desert soil. It can also lower the take-off angle on otherwise very poor ground.

Do not attach the wires to the antenna.

The ground wires can be any length and in all directions around the antenna.

They do not need to be like the spokes on the bicycle wheel.

The more wires, the better.

SPECIFICATIONS:

Overall height = ~19' vert + resonators 4'6" above ground = approx 24'
Overall resonator length = ~19 '
Resonator length = 8'6" typical, maximum length is 11'3"
Weight: 11.5#
Efficiency: determined by the tuner and installation (especially proximity to other objects).

Please be aware of the emission exposure limits set by the FCC. All ground-based antennas will emit more energy at "people" level than elevated ones. Since this antenna is probably going to be used at ground level and possibly close to people, be careful to keep the power level as low as practical.

SHORT EXPLANATION OF ANTENNA PRINCIPLES

Verticals over ground will lose some energy into the ground, which is why the ground should be as good as possible; good = electrically good and a metal roof is quite nice for this purpose. Salt water is incredible. In a different manner, the horizontal antenna will gain energy from ground effects, called "ground reflection gain." In practical terms, a horizontal dipole will achieve about 2dB gain compared to the isotropic source (properly stated 2dBi) due to the pattern being made into a figure 8 when the dipole is above ground. The side energy of the dipole, however, is reduced in order to achieve this 2dBi improvement.

If we begin with what is called the "isotropic radiator" (strictly theoretical), it is a sphere, with a single point source of energy located exactly at the center. It is emitting energy equally in all directions until it runs out – which is the skin of the balloon. It is also located out in "free space" and looks like this photo:

The horizontal antenna is, of course, not located in free space, but over ground. This causes the energy in the balloon to be redistributed like the next photo. As you can see, the balloon has been reformed, with more of it in 2 directions, which are broadside to the dipole. There is less energy where Tom's fingers are squeezing the balloon, which is in the direction of the ends of the dipole. By the ground effect of redistributing the energy, the dipole has 2dB gain over the isotropic source. This is known as 2dBi – 2dB compared to the isotropic source.

Probably all books on antennas instruct that a horizontally polarized antenna will have ground reflection gain, up to 6dB and that verticals do bot. This is not correct, as ground reflection gain also applies to vertically polarized antennas. In many comparative tests between horizontal and vertical antennas, the most observed has been about 1.5dB in favor of a full size dipole on a 12 degree slope, as compared to a ¾ size vertical. There is new modeling software that can now model layers of ground and this hopefully will clear up the mis-information and modeling from NEC. In short, if horizontal antennas truly had 6dB of additional gain, it would be easy to see on a spectrum analyzer and it simply does not show.

Thank you for selecting our product and let us know how it performs for you!

----------NOTICE----------

BE SURE THIS ANTENNA DOES NOT COME NEAR TO, OR IN CONTACT WITH POWER LINES, AS YOU CAN BE SERIOUSLY INJURED OR KILLED.
BE AWARE OF OTHER DANGERS AND ALWAYS CHECK THE AREA MORE THAN ONCE BEFORE ERECTING ANY ANTENNA.

Supplier: www. n6bt. com Warranty and Limitation of Liability

The supplier warrants its products for a period of one year from date of purchase. This warranty covers defects in manufacturing and workmanship. The supplier has the discretion of honoring the warranty if the product appears to have been abused, used in a manner that exceeds the specifications of the unit, or a use for which the product was not designed. This warranty does not cover transportation, installation, punitive, or other costs that may be incurred from warranty repair, or installation. The supplier must be notified and warranty repair authorized (only by the supplier who will issue a return material authorization, an RMA) before the supplier will accept any product returns. Please advise the date of purchase, model number, serial number if there is one and a brief description of the problem. There is a 30% restocking fee on products returned unused with an RMA issued by the supplier, at its sole discretion.

The customer, installer and user of these products individually and collectively acknowledge that these products can cause injury or death and individually and collectively accept full responsibility and liability for any and all personal and property damage (direct, indirect and punitive) caused during installation and/or use of these products and hold the supplier harmless for such damage.

(warranty notice date 4/1/2010)

V-8™

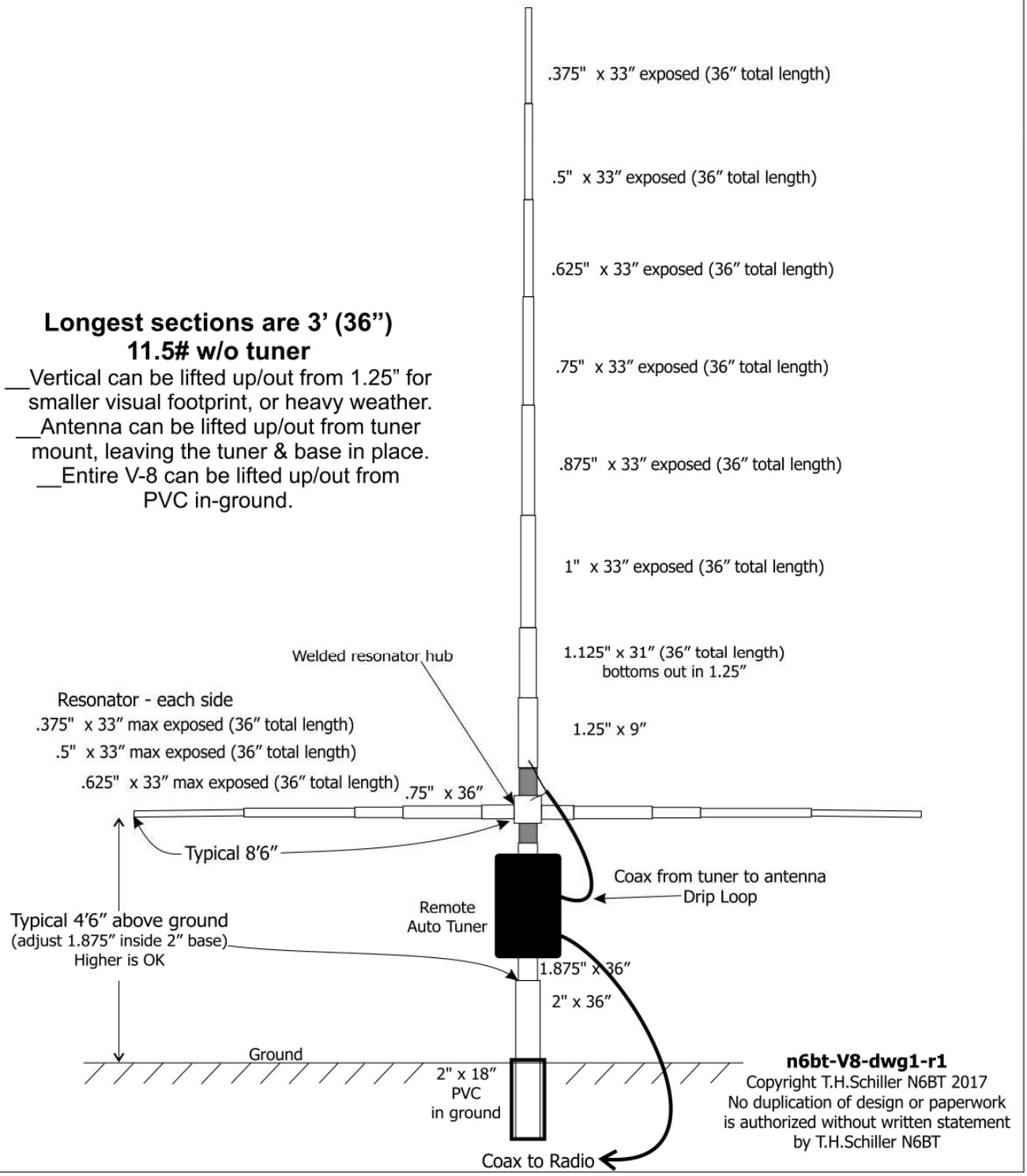
8-band (80-10m) 19' vertical using Remote Auto Tuner
for Permanent, Portable and DXpedition

Power & efficiency limited only by the Tuner
40-50mph with PVC in ground and no guys

-->Guy once half-way up for heavy weather operation<--

Longest sections are 3' (36")
11.5# w/o tuner

__Vertical can be lifted up/out from 1.25" for smaller visual footprint, or heavy weather.
__Antenna can be lifted up/out from tuner mount, leaving the tuner & base in place.
__Entire V-8 can be lifted up/out from PVC in-ground.

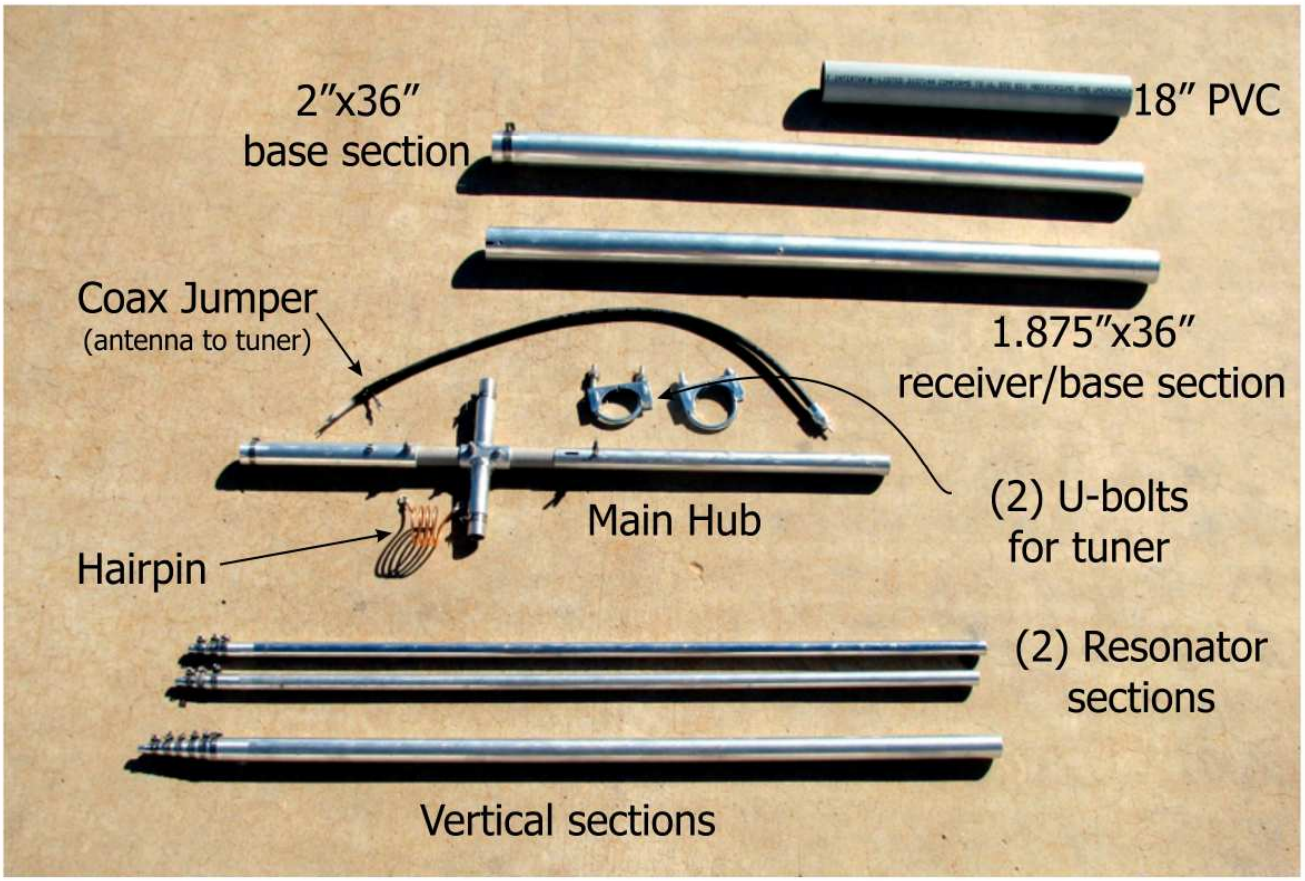


n6bt-V8-dwg1-r1

V-8™

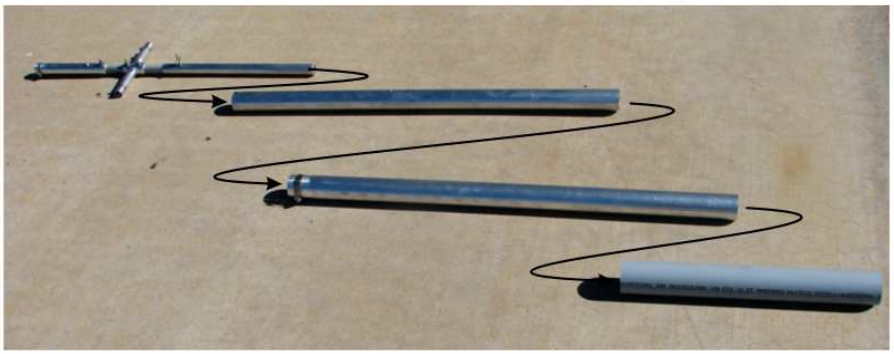
8-band (80-10m) 19' vertical using Remote Auto Tuner
for Permanent, Portable and DXpedition

STEP 1 - identify parts



– for reference –

Main Hub and base section assembly sequence



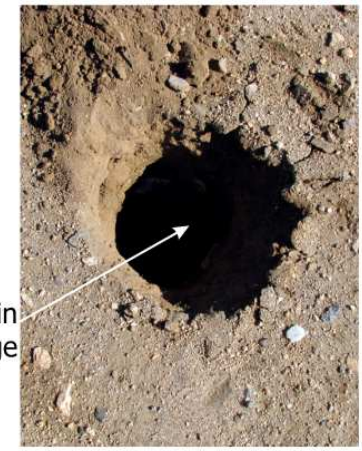
V-8™

8-band (80-10m) 19' vertical using Remote Auto Tuner
for Permanent, Portable and DXpedition

STEP 2 - install PVC into ground

Locate a good place for the V-8™
with as much open space around it as possible

Dig 18-20" deep hole
(post-hole digger shown)



Put a few stones in
the bottom for drainage

_Place the PVC in hole
__Insert 2"&1.875"
sections into PVC
__Level antenna base
__Fill with dirt and tamp
or fill with concrete

Ready for the V-8™

n6bt-V8-asm2-r1

V-8™

8-band (80-10m) 19' vertical using Remote Auto Tuner
for Permanent, Portable and DXpedition

STEP 3 - attach remote auto tuner to base

(MFJ 300 watt shown)

Insert (2) U-bolts and saddles through tuner mounting brackets. Add split lock washers and nots and do not tighten.

Hole in 1.875" for screw and wing nut.

Connections to tuner on this side. (MFJ will be upside-down.)

Slide tuner U-bolts over the 1.875" base section. Position the upper U-bolt about 1" below hole in 1.875" section.

Ready for the V-8™ antenna.

n6bt-V8-asm3-r1

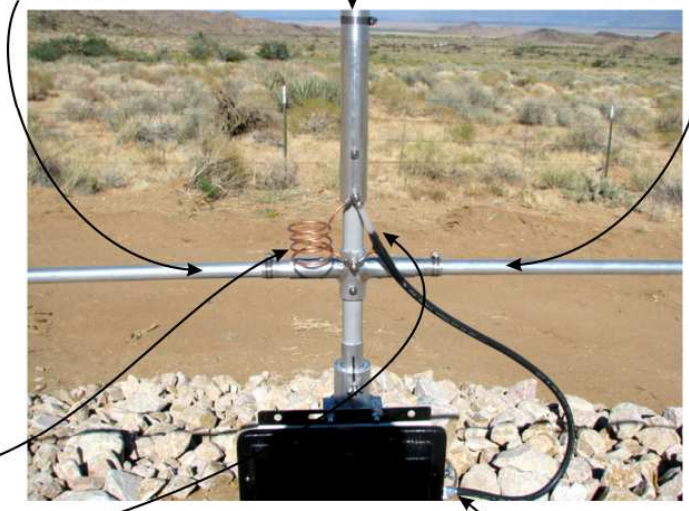
V-8™

8-band (80-10m) 19' vertical using Remote Auto Tuner
for Permanent, Portable and DXpedition

STEP 4 - insert vertical/resonators and attach tuner

Insert Main Hub into the 1.875" receiver/base section.
Align the holes and insert the long 10-24 machine screw, add split lock-washer/wing nut to secure.

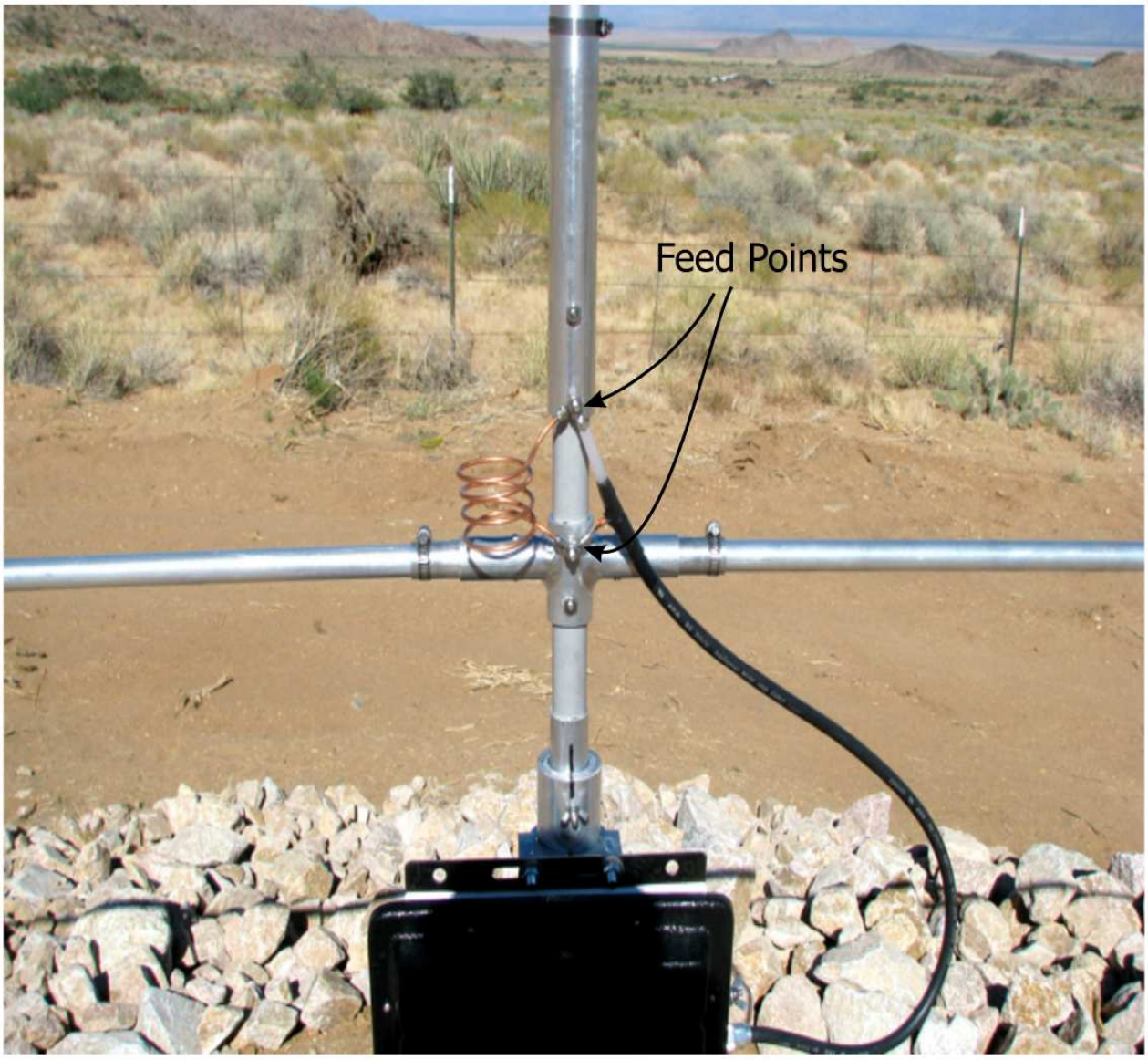
_Extend the vertical sections to full length.
__Extend (2) resonators to approx 8'6".
___Insert the vertical and resonators into the main Hub as shown in drawings/pjotos.



_Install hairpin across feed points.
__Spread hairpin turns as shown.
___Attach coax to feed points as shown.
____Attach coax to remote auto tuner.

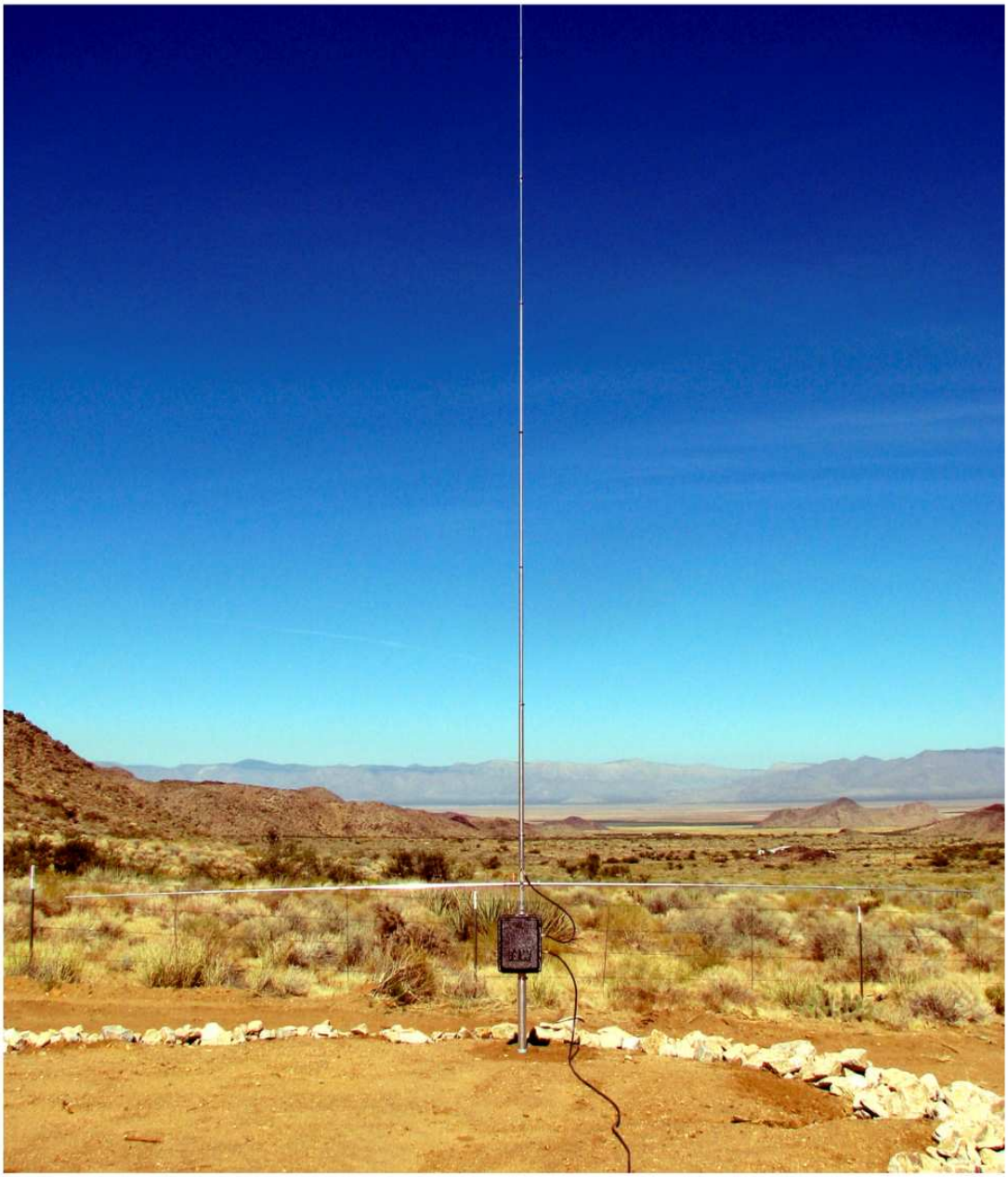
n6bt-V8-asm4-r1

STEP 4a - close up of Main Hub and connections



n6bt-V8-asm4a-r1

STEP 5 - attach coax to tuner, hook up rig, tune it up and enjoy the V-8™

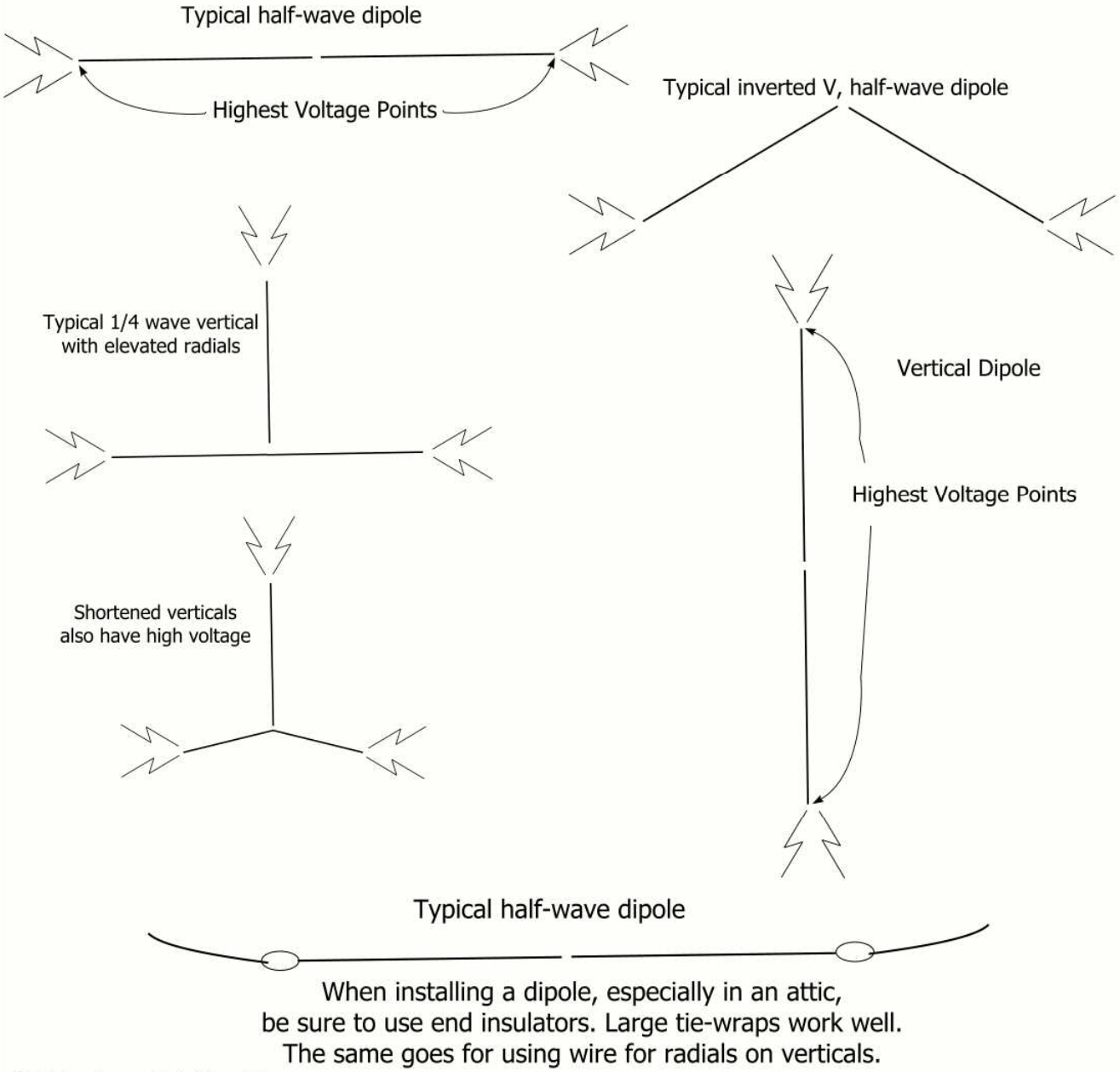


n6bt-V8-asm5-r1

Note: the **V-8**™ lengths can be adjusted for your particular tuner. These lengths are found to be good for the MFJ 300 watt remote auto tuner.

High Voltage Points on Antennas

The voltage present on antennas can be extremely high and is a personal and property danger.
Even at low power levels, this voltage can cause severe burns and ignite wood.
Be extremely careful.
Shortened, loaded antennas have similar high voltage points.



When installing a dipole, especially in an attic,
be sure to use end insulators. Large tie-wraps work well.
The same goes for using wire for radials on verticals.

Last page for notes.....

