Dominator Halfwave Antenna by KJ6ER

Introduction

The **Dominator** is a resonant *one-band-at-a-time* elevated halfwave vertical antenna for **17M-10M** sitting on a tripod. This antenna requires no radials or antenna tuner but *does* require a linked counterpoise. This is not a typical *multiband* EFHW antenna because it is halfwave resonant on *each* of the four bands *individually* by adjusting the telescoping whip and linked counterpoise to resonance. The tripod provides an *elevated feedpoint* for the transformer to alleviate ground effects and delivers peak RF current at the midpoint of the radiating whip with over **99%** structural efficiency. This is a fantastic portable antenna – easy to pack, fast to deploy, very effective and highly efficient!

I have computer modeled the antenna extensively in 4NEC2 and calculated optimal whip and counterpoise lengths for each of the four bands. You will have to experiment in your own surroundings to finetune these, but I typically get **<1.10:1 SWR** on 17M-10M. I have found through my modeling and significant experience in the field, this halfwave vertical antenna has more gain and a lower angle of radiation than a traditional quarterwave vertical antenna.

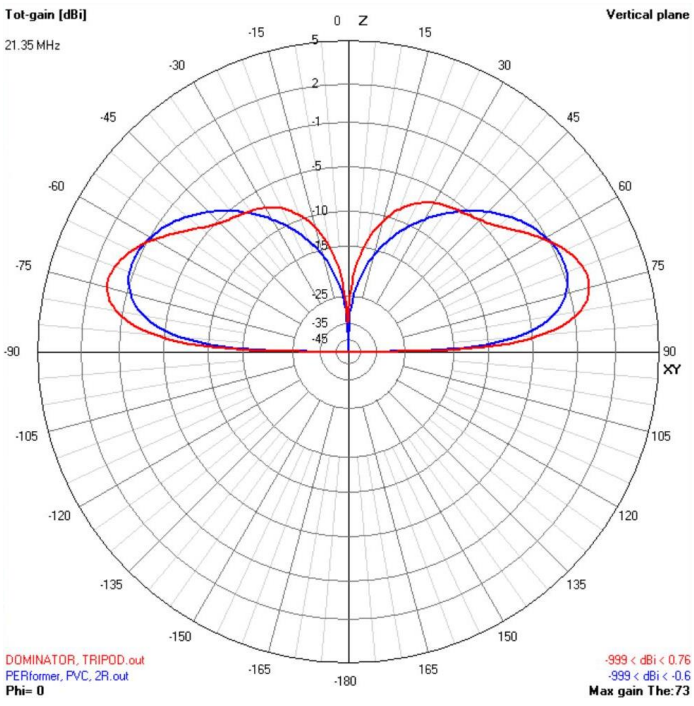
Why a Halfwave Vertical Antenna

At the time of this writing, Solar Cycle 25 is enhancing HF propagation on all bands. During the peak years of the cycle, you will be able to make DX QSOs more easily and during longer periods of the UTC Day. With these favorable conditions, give yourself global *domination* with the advantages of an end-fed halfwave vertical antenna.

There are **three key advantages** of a halfwave over a quarterwave vertical antenna:

1) Transmits with a lower angle of radiation for more DX (5-20 degrees).
2) Provides up to 2x more gain (+3dB) of transmitted RF for bigger signals.
3) Does not require an antenna tuner or multiple radials for faster deployment.

Note the far-field radiation patterns of the **halfwave vertical** (**red**) overlayed with the traditional **quarterwave vertical** (**blue**) antenna. Not only does the halfwave provide more gain but it has a lower angle of radiation for effective DX performance with a radiation peak around **18** degrees off the horizon compared with a typical quarterwave radiation peak between 25-30 degrees.



Halfwave vs. Quarterwave Radiation

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The **disadvantages** of a halfwave antenna are that it uses almost *twice the length* of radiating element over a quarterwave antenna, and it requires a *high impedance matching system* for traditional 50-ohm coax. It must also use a *linked counterpoise* wire off the transformer ground terminal. However, these disadvantages are easily overcome.

Antenna System Parts List with Prices and Links (as of December 2024)

Here are the components I *recommend* for the **Dominator** and **Dominator+** (substitute as you wish):

- Chameleon™ CHA SS25 25' telescoping whip ($100) for 17M-10M – chameleonantenna.com/shop-here/ols/products/cha-ss25, *or alternatively* for 12M-10M only: Chameleon™ CHA SS17 17' telescoping whip ($70) – chameleonantenna.com/shop-here/ols/products/cha-ss17
- Polarduck™ 78" tripod ($50) – amazon.com/dp/B0CNYK89TX
- TennTennas™ 49:1 Transformer for the **Dominator** ($46) – www.ebay.com/sch/i.html?&_nkw=tenntennas or *alternatively*, MyAntennas™ MEF-130-LP 56:1 *low insertion loss* Transformer for the **Dominator+** ($89) – myantennas.com/wp/product/mef-130-lp/
- Palomar Engineers™ RF Feedline Choke ($35) for the **Dominator** – palomar-engineers.com/antenna-products/Coax-Jumper-Choke-RG-8X-RFI-Range-1-8-65-MHz-30-dB-Noise-Reduction-1-5KW-PEP-Magnetic-Loop-Antenna-Choke-p159344870 or *alternatively*, Palomar Engineers™ *low insertion loss* RF Feedline Choke ($70) for the **Dominator+** – palomar-engineers.com/antenna-products/Coax-Common-Mode-Noise-Filter-500-Watts-PEP-1-60-MHz-38dB-Common-Mode-Noise-Suppression-p90897850
- Mirror mount with 3/8x24 to SO-239 stud, *replace* SO-239 with a 3/8x24 bolt ($12) – amazon.com/dp/B07GDGVSQ7
- BNTECHGO Bright orange 14 AWG radiator pigtail ($14 spool) – amazon.com/dp/B08M9PS4BY BNTECHGO Bright yellow 18 AWG counterpoise ($18 spool) – amazon.com/dp/B01MPZJOYN

The **Dominator** is a compact portable antenna system that is easy to pack and very fast to deploy in *under 2 minutes*. It is optimized for low angle DX communications when the band conditions are right.

While there are many telescoping whips available on the market, my preference is from **Chameleon™** because of its durability. The 25' whip will cover 4 bands, 17M-10M, as a halfwave antenna. Alternatively, the 17' whip will provide halfwave coverage on 2 bands, 12M-10M.

A **49:1 TennTennas™** or **56:1 MyAntennas™** transformer is required to match the feedpoint high impedance. The 49:1 transformer has an *insertion loss* of **-0.96 dB** for the **Dominator**, while the 56:1 transformer has a *lower insertion loss* of only **-0.40 dB** for the **Dominator+**.

An **RF choke** is *imperative* to prevent the coax shield from becoming a *second counterpoise* which would create *unpredictable* results.

Very Compact, Lightweight Package

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Traditional Calculations, 4NEC2 Model Computations and Field Measurements

Below are the traditional calculations and 4NEC2 computer model half wavelength computations for the 17M-10M bands. The **traditional 468 / f calculation** is assumed to be in perfect *free space* and is a good starting point for any antenna, even though it returns results that are typically too long.

The **4NEC2 computer model** represents the Dominator antenna in the *virtual world* by attempting to map current flows, component velocity factors, radiator end effects and ground interaction. As can be seen in the table below, it is reasonably close or a bit longer than the traditional calculation.

However, the most relevant results are the **field measurements** made in the *real world*. These factor everything in and around the antenna system including the configuration and interaction of all various components, imperfect and variable ground conditions and near-field surroundings. As many say, when it comes to antennas, "*everything affects everything*".

Do not be surprised if your **Dominator** antenna ultimately requires *a slightly different radiator* and/or *linked counterpoise length* due to your specific environment. Some experimentation will initially need to be performed. I suggest starting in your own backyard first before you take the antenna out to the field. While I recommend the feedpoint be elevated around 48-52 inches, you can also experiment with *slightly* lower elevations if required. This not only lowers the feedpoint but also lays more counterpoise directly on the ground. Given the very low current in the counterpoise, it has a negligible impact on radiation.

My field experiments and measurements ultimately revealed the radiator lengths can be reduced even further. Many dozens of hours in the field were spent testing various combinations of radiator and counterpoise lengths. I discovered by extending a **33% λ** counterpoise for the band of operation, I was able to reduce the radiator length to an average of **44% λ** for that band. This discovery allowed the 25' whip to fully cover four bands, 17M-10M. The 17' whip covers two bands, 12M-10M.

Even though the antenna leverages a 49:1 or 56:1 transformer to compensate for high impedance at the radiator end, it also uses the extended length of the counterpoise to provide a reliable return path for RF currents and impedance matching. This is imperative for optimal antenna efficiency and radiation.

The **linked counterpoise** wire ensures a predictable and highly efficient halfwave radiation pattern. For this reason, I *never* recommend using the coax shield as the counterpoise. The Dominator should *always* include an **RF choke** at the feedpoint to prevent the coax from becoming a *second counterpoise*.

Traditional Calculations, 4NEC Computer Model and Field Measurements for the 17M-10M Bands.

Traditional Calculations				Computer Model					Field Measurements				
Band	Target Freq. (MHz)	468 / f		Radiator		Counterpoise			Radiator		Counterpoise		
		Length	Inches	Inches	λ %	Inches	Incre. Seg.	λ %	Inches	λ	Inches	Incr. Seg.	λ
17M	18.140	25' 10"	310	315	50.8%	206	31	33.3%	278	44.9%	206	31	33.3%
15M	21.350	21' 11"	263	272	51.8%	175	25	33.3%	228	43.3%	175	25	33.3%
12M	24.940	18' 9"	225	233	51.7%	150	18	33.3%	199	44.2%	150	18	33.3%
10M	28.400	16' 6"	198	204	51.7%	132	132	33.4%	177	44.8%	132	132	33.4%

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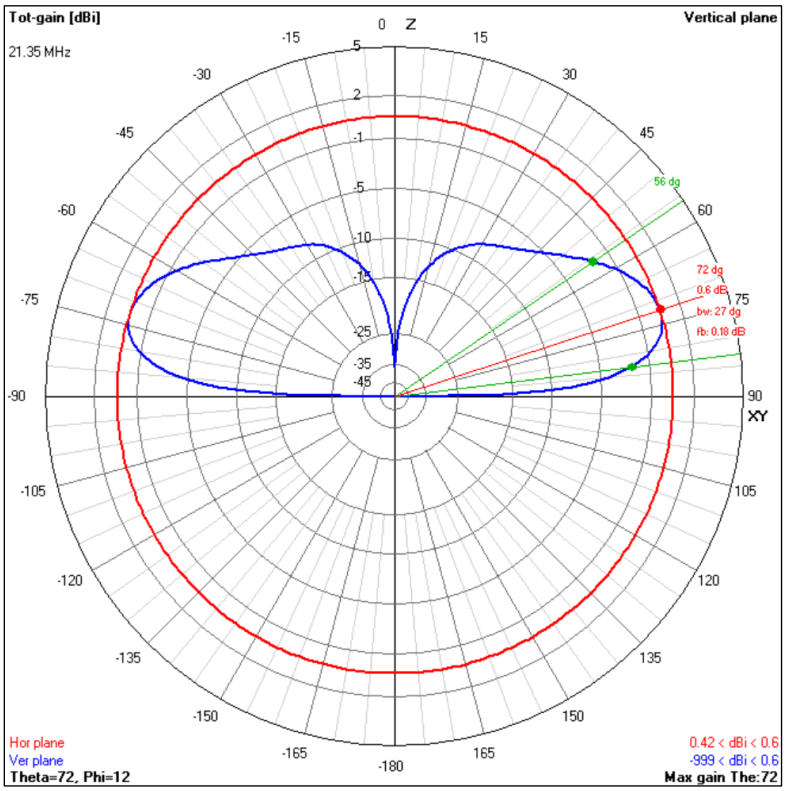
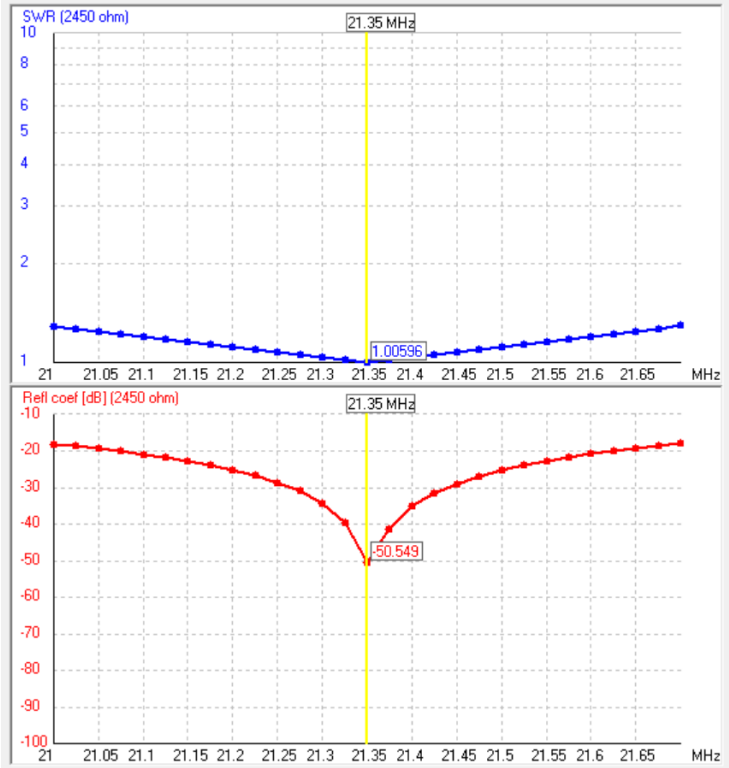
4NEC2 Computer Model Graphics Showing the Far-Field Radiation Pattern (vertical, horizontal planes) and Reflection Coefficient for 15M (21.350 MHz). The maximum gain of **+0.60 dBi** occurs at **18°** off the horizon with a -3 dB beamwidth of **27°** (-11°, +16°). The reflection coefficient is **-50.5 dB**.





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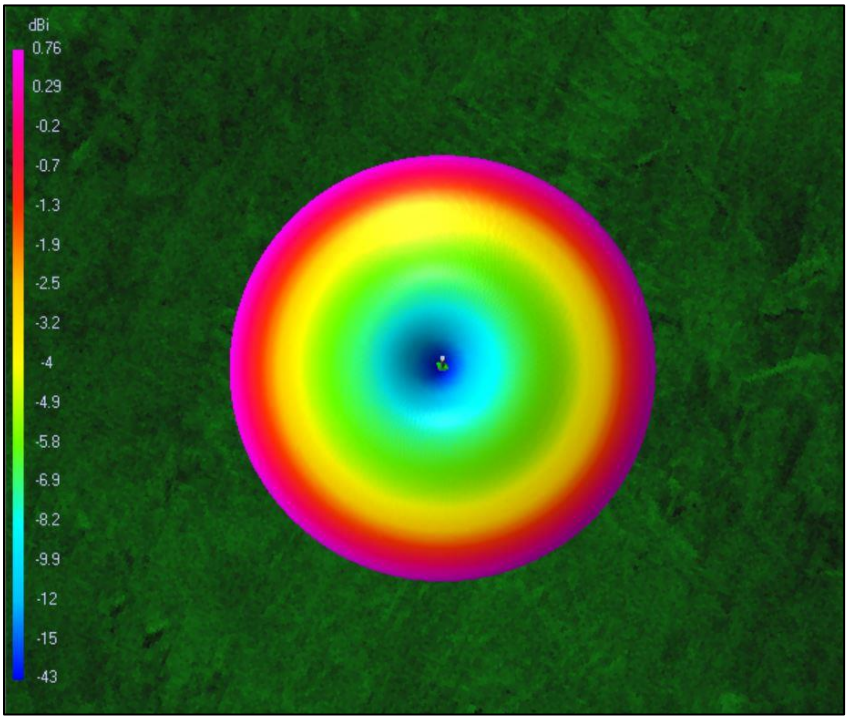
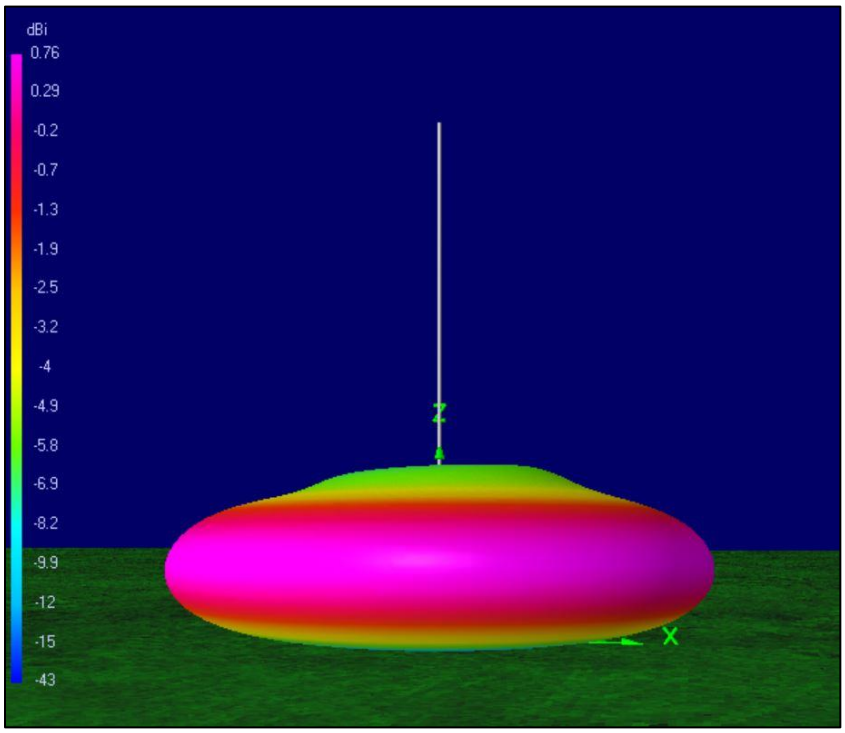
4NEC2 Computer Model Graphics Showing the Colorful 3D Radiation Patterns as seen from Above and the Side for 15M (21.350 MHz). The strong **purple** and **red** edges of the pattern highlight the low angle radiation of the antenna. Looking at the side radiation pattern in the bottom graphic, there is a very *slight* bump in **green** radiation at the top right side up from the counterpoise wire. While the counterpoise *does not* increase forward radiation in its direction, the model indicates that it does *slightly* reflect transmitted electromagnetic waves upward.





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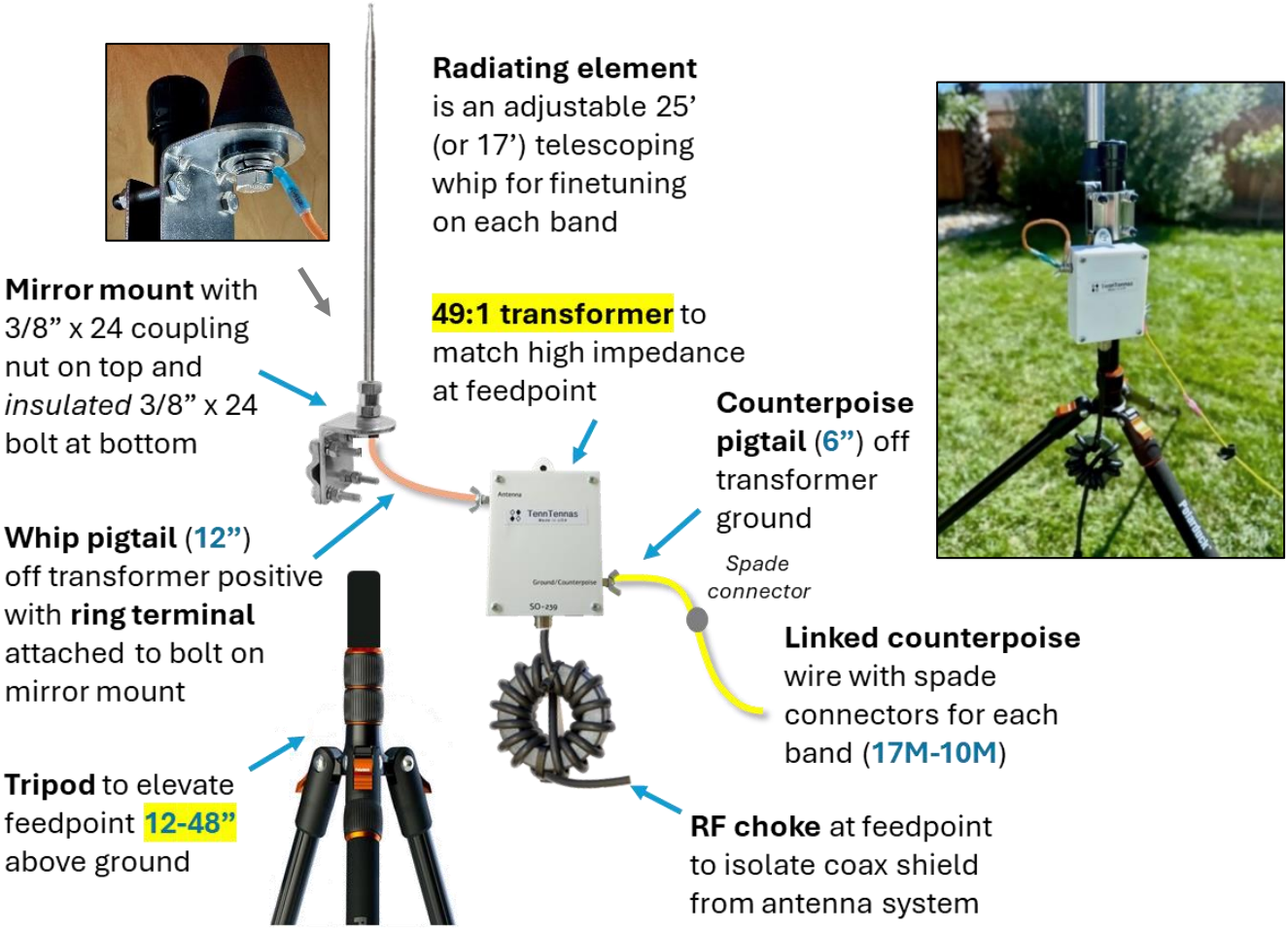
A Simplified Picture of the Dominator Halfwave Vertical Antenna System



The **telescoping whip** is the primary halfwave radiator screwed into the mirror mount which is attached to the tripod tube. The TennTennas™ **49:1 transformer** is attached to the **mirror mount** using one of its four bolts. There is a 12" wire pigtail (orange 14-gauge) attached to the positive wing nut and a 6" wire pigtail (yellow 18-gauge) attached to the transformer negative wing nut. Make sure the whip is *isolated* from mirror mount and tripod by using **non-conductive washers or gaskets**. Additionally, make sure the wire from the transformer positive to the base of the whip is also *isolated* from the mirror mount.

The 12" wire **whip pigtail** connects from a **bolt** at the base of the mirror mount to the transformer wing nut. A 6" wire **counterpoise pigtail** connects the transformer ground to the **linked counterpoise** wire with a spade connector. This allows quick extension of the counterpoise band segments.

The **elevated feedpoint** (3-4') at the top of the **tripod** helps alleviate ground distortion of the halfwave resonance and radiation pattern. The *required* **RF choke** at the transformer SO-239 input connector isolates the coax shield from the antenna system preventing it from becoming a *second counterpoise*.

Never use the coax shield as a counterpoise for the Dominator antenna. The linked counterpoise wire off the transformer ground terminal should be the only counterpoise used for this antenna.

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Telescoping Whip Radiator and Counterpoise Lengths

To allow the antenna to resonate as a halfwave on 4 bands *one-band-at-a-time* with the 25' telescoping whip, there is a 12" pigtail off the transformer positive connecting it to the base of the whip for 17M-10M. **This also extends the whip length one foot longer**. The whip pigtail does not carry a lot of current (at this point in the radiator) so the radiation pattern is not impacted. When using the 17' whip, the same 12" pigtail provides coverage for 12M-10M only.

Configuring the Telescoping Whip and Counterpoise for Each Band.

		25' Chameleon Whip						
		Radiator				Counterpoise		
Band	Target Freq. (MHz)	Whip Pigtail	Whip Length	Whip Config.	Total Length	CP Pigtail	Incremental CP Segment	Total Length
17M	18.140	1' 0"	22' 2"	11 sec + 11"	**23' 2"**	---	2' 7"	**17' 2"**
15M	21.350	1' 0"	18' 0"	9 sec + 9"	**19' 0"**	---	2' 1"	**14' 7"**
12M	24.940	1' 0"	15' 7"	7 sec + 16"	**16' 7"**	---	1' 6"	**12' 6"**
10M	28.400	1' 0"	13' 9"	6 sec + 15"	**14' 9"**	6"	10' 6"	**11' 0"**

		17' Chameleon Whip						
		Radiator				Counterpoise		
Band	Target Freq. (MHz)	Whip Pigtail	Whip Length	Whip Config.	Total Length	CP Pigtail	Incremental CP Segment	Total Length
12M	24.940	1' 0"	15' 7"	8 sec + 3"	**16' 7"**	---	1' 6"	**12' 6"**
10M	28.400	1' 0"	13' 9"	7 sec + 0"	**14' 9"**	6"	10' 6"	**11' 0"**

In the charts above, the *Total Radiator Length* is equal to the 12" *Whip Pigtail* off the transformer positive *plus* the adjusted *Whip Length*. The *Whip Configuration* shows approximately how many sections above the base section are exposed.

For example, to operate on 12M, extend the 25' whip 7 sections plus 16" of the next section from the *top* to begin measuring SWR. Or if using the 17' whip, extend it 8 sections plus 3" of the next section. As mentioned, **every installation will vary depending on the ground type and near-field surroundings**. Use your antenna analyzer to adjust the whip to resonance of the band you would like to operate on.

The *Total Counterpoise* (CP) length is equal to the transformer ground 6" *Counterpoise Pigtail* plus an *Incremental Counterpoise Wire Segment* to optimize the counterpoise for that band. The incremental segment is attached via spade connector to the previous segment. This counterpoise wire drops down from the transformer at roughly a *30-45-degree angle* and then *runs along the ground* perpendicular to the telescoping whip. It is advisable to keep the counterpoise away from the coax, ideally *perpendicular*.

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Linked Counterpoise Wire using the TennTennas™ 49:1 Transformer

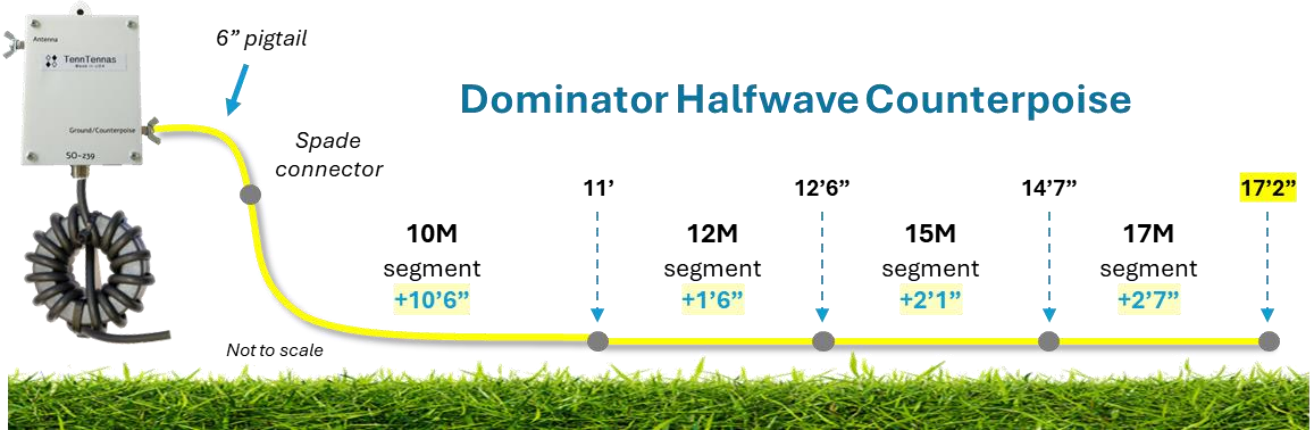
Through modeling and experimentation, I discovered there are **three important keys** that make the Dominator a very *effective* and *efficient* halfwave antenna:

1) **Elevating the transformer and feedpoint** off the ground by at least 12” to alleviate ground effects that distort the low angle radiation pattern and transmitted energy. This requires a good tripod with a broad footprint to provide physical stability.
2) **Inserting an RF choke at the feedpoint** to isolate the coax from the antenna system to prevent common mode currents (CMC) and radio frequency interference (RFI). Using the coax as a counterpoise could also lead to unpredictable radiation and high SWR.
3) **Attaching a linked counterpoise wire** which works in conjunction with the telescoping whip for low SWR at resonance. Use the whip as your tuning variable, the counterpoise length is constant.

For users of a traditional *multiband* end-fed halfwave antenna (EFHW), the rule-of-thumb is that a counterpoise wire is required off the 49:1 transformer ground and should be at least **5% of the longest wavelength** of operation. Extensive experimentation with the Dominator yielded that the length required is *greater than 5%* to provide optimal performance.

In the case of the Dominator, I found that a counterpoise wire of *roughly* a **third wavelength** performed exceptionally well in conjunction with the telescoping whip for the *single band* of operation. In fact, the longer counterpoise wire actually *lowers* the overall antenna system resonance which facilitates a *shorter length* of telescoping whip. This radiator/counterpoise combination allows the 25’ telescoping whip to resonate broadly on the 17M-10M bands.

If you plan to use the **TennTennas™ 49:1 transformer**, you should cut your counterpoise wires as shown below. If you use a different transformer, the counterpoise lengths *will likely* differ. Start with the 6” pigtail with the 10M segment first. When you determine the appropriate length required for resonance on 10M, cut the next 12M segment, and so on. Once you cut these lengths, *do not change them, they should remain constant*. Use the 25’ or 17’ telescoping whip as your *tuning variable* in the field for minimum SWR.



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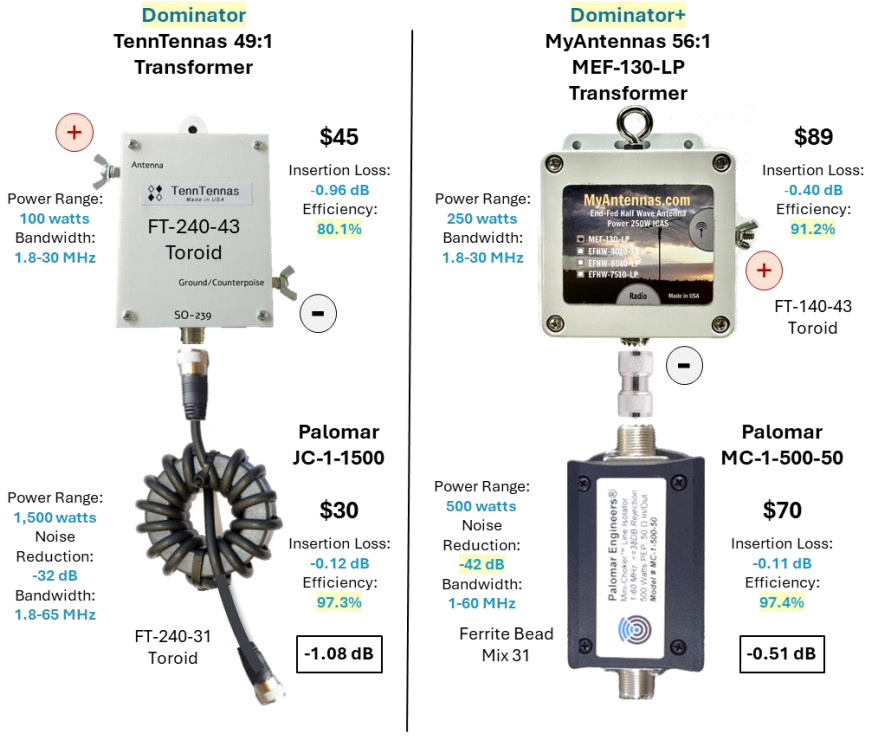
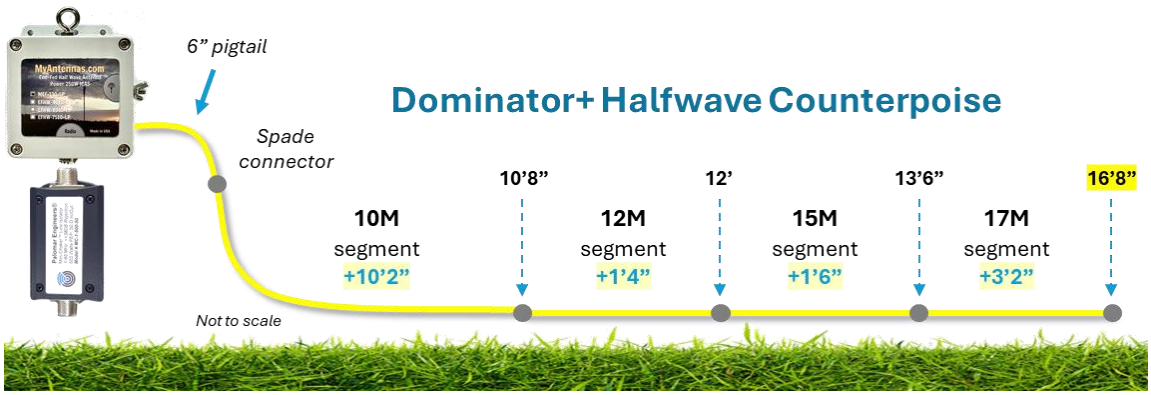
Higher Efficiency with a MyAntennas™ 56:1 Transformer

A typical 49:1 transformer is *not* the most efficient component. While the TennTennas™ is well-made, it does have an insertion loss of **-0.96 dB** which equates to **80.1%** efficiency. If you want to increase the overall efficiency and bandwidth, exchange it with a **MyAntennas™ 56:1 transformer** with only **-0.40 dB** insertion loss, or **91.2%** efficiency. It can be paired with a more efficient RF Choke, **Palomar™ MC-1-500-50**, which has an insertion loss of **-0.11 dB**, or **97.4%** efficiency. I call this the **Dominator+ Vertical Halfwave**, and it is the version of the antenna I prefer and use exclusively.



Linked Counterpoise Wire for the Dominator+

If you use the **MyAntennas™ 56:1 transformer** for the **Dominator+** *higher efficiency* halfwave, the counterpoise lengths will be *slightly shorter* than the 49:1 transformer. This 56:1 transformer is looking for a **2,800 Ω** impedance match (**56 x 50Ω**) which is *further down* the radiator and, hence, *slightly* less counterpoise wire is required. This transformer does *not* have a ground terminal, so connect the 6” pigtail to one of the SO-239 screws at the bottom using a ring terminal on the 18-gauge wire.



Mounting the Telescoping Whip and Transformer to the Tripod

What makes the Dominator halfwave antenna so easy to pack and deploy is that both the telescoping whip base *and* the transformer are ***already mounted on the tripod***.

Using one of the two lower bolts on the mirror mount, use another long bolt and spacer to keep the transformer slightly away from the tripod upper tube. Secure it tightly so that it does not move easily. Keep both the **12" whip pigtail** and the **6" counterpoise pigtail** attached to the transformer. Once you are in the field, you will just need to extend and spread the tripod legs so that the antenna is physically stable and then attach the telescoping whip and counterpoise wire segment for the band.

A **very stable tripod** is especially important when using the Chameleon™ 25' telescoping whip due to its longer extension over the 17' whip. It can very easily topple over and damage the whip with unexpected wind gusts. This is one of the reasons I like the Polarduck™ 78" tripod so much.

Spread and extend the tripod legs so that the feedpoint is roughly 3-4' above ground level. With the Polarduck™ tripod, **there is no center plate to limit the leg spread** so it can be very stable with a wide span. The legs should be fully extended to 53" each, and the angle between them is approximately 100° (middle position).

In case there is some excessive wind when the whip is extended, I also recommend using an 8" garden staple on each leg. Insert these at a *perpendicular* angle near the base of the leg into the ground.

Alternatively, use the *built-in hook* at the base of the upper Polarduck™ tripod telescoping tube with a weight or bungee cord secured to the ground with a garden stapes. Either way, your tripod will be reasonably secure in windy conditions while only the whip will be waving in the breeze.

Finetuning the Antenna in the Field

You can easily and quickly finetune the Dominator halfwave antenna to resonance with an antenna analyzer by adjusting the length of the whip once the linked counterpoise is laid out on the ground. Since every portable deployment will have different ground types and near-field surroundings, I recommend you remember *generally* where to extend the whip initially for a particular band and then make whip adjustments from there.

In some environments, it may be tough to get the low SWR you want. Remember, any SWR at or below **1.50:1** is fine – your antenna is **96% efficient** with that SWR! But if you are having trouble, try reducing the elevation of the feedpoint by shortening the tripod legs. This will not only lower the feedpoint, but it will lay more counterpoise on the ground and may help tune the antenna. This is fine even if the droop angle off the unun ground terminal is 30° or less. Because of the resonant characteristics and broad bandwidth of the Dominator, you should ***not* require an external antenna tuner** at your rig or at the antenna base, reducing any potential insertion losses caused by these components and saving on packing.

Field SWR Measurements of the Antenna for each Band. The broad bandwidth of the Dominator halfwave antenna allows you to operate across the entire 10M band including the AM/FM/Repeater portions above 29 MHz. The antenna is also <1.10 SWR across the 12M, 15M, and 17M bands.

17M Band

15M Band

12M Band

10M Band

Packing the Antenna and Its Components

Not only is the Dominator antenna a very effective and efficient *one-band-at-a-time* halfwave antenna, but it is also very *lightweight* and *compact* to carry for portable operations. The entire antenna system is made up of 4 components: telescoping whip, tripod/transformer assembly, accessories bag for the linked counterpoise and, of course, a RigExpert™ Stick analyzer.

For my POTA *picnic table* activations, I use a 36" Neewer™ photographer bag available on Amazon to carry the entire antenna system. For *backpack* activations, I remove the components from this bag and easily fit them in my pack with lots of room to spare. The telescoping whip and Polarduck™ tripod slide into the side pocket (it folds up to just 30"), while the accessories bag and antenna analyzer fit inside a zippered pouch. This makes the Dominator a great antenna for both QRO and even remote QRP operations. However, I also have a *specialized backpack version* of the antenna detailed in the next section. This alternative configuration makes the antenna extremely portable!

The entire Dominator halfwave antenna system fits easily in this typical 36" photographer bag.

When opened, the tripod, telescoping whip and all accessories are very accessible.

All the antenna accessories are stored in a clear plastic toiletry bag. I always carry a RigExpert!

Each counterpoise segment is clearly labeled with a Brother™ label maker folded over on itself.

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Backpack Portable Version

The Dominator+ has been a fantastic portable antenna system for my picnic table POTA activations, running QRO 100 watts.

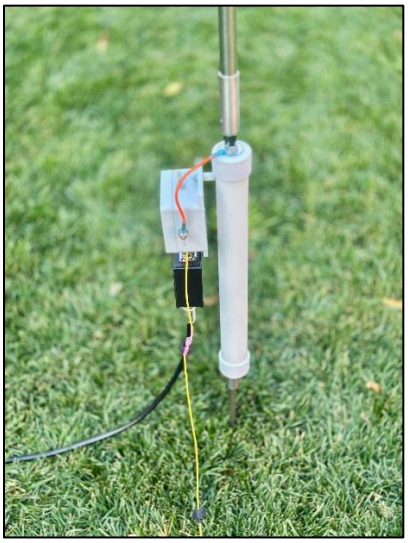
However, a couple years ago, I purchased the **ICOM IC-705** QRP transceiver with the **ICOM backpack** for ultra-portable operations. The IC-705 and backpack have been a great *catalyst* for me to explore more remote park sites and learn to appreciate the *wonderful world* of QRP 10 watts SSB.

To redesign the Dominator+ for more portability, I developed some modifications of the antenna system to facilitate a compact version that will easily fit in the *side pocket* of the ICOM backpack without sacrificing performance.

The side pocket easily carries the **MyAntennas™** 56:1 unun and **Palomar™** choke mounted on a 16" (1-1/4" O.D.) PVC tube, the **Chameleon™** 25' whip and ground spike. Depending on the ground conditions of the deployment site, the **WRC™** Megapod small tripod can be used instead of the ground spike. Additionally, I carry a **Comet™** Antenna SBB-2 black mobile antenna for 2M/70 cm band coverage on the IC-705. The Comet™ is a well-designed compact 18" dual-band antenna that operates as a quarterwave for 2M (+2.15 dBi) and a 5/8-wave antenna for 70 cm (+3.8 dBi). It can handle up to 60 watts. In the front zippered compartment of the backpack, I carry the linked counterpoise wire, my **RigExpert™** Stick and 25' of **Messi & Paoloni™** Airborne 5 coax cable.

The ICOM™ backpack side pocket easily holds the Chameleon™ 25' whip and ground spike. I mount the Palomar™ 4:1 unun and choke on a 16" (1-1/4: O.D.) PVC tube which slides in the side pocket.

The Dominator+ backpack version is so compact and works so well, I am now using it at picnic table activations, too. As long as the feedpoint is at least 12" off the ground, it performs well in the field.



The MyAntennas™ 56:1 unun is mounted to the PVC tube with a spacer and includes a 6" orange whip pigtail to a 3/8"-24 coupler nut on the top cap. The Palomar™ choke attaches securely to the unun with a PL-259 barrel connector.

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Chameleon™ Telescoping Whips, TennTennas™ and MyAntennas™ Transformers

The Chameleon™ 25' whip is the key to the Dominator operating as a halfwave *one-band-at-a-time* on four bands, 17M-10M. Alternatively, the Chameleon™ 17' whip effectively operates on two bands, 12M-10M. I recommend these whips for their excellent build quality and durability in the field. Of course, you can use any whip you already have on hand. I measured each of the whip sections and created these tables.

Chameleon Whip 25' (CHA SS25) $100

Section from Top	Section Length (in)	Radiation Length (Bottom + Exposed Sections Above)			
		Inches	Feet	Ft-In	Meters
1	22.00	45.25	3.77	3' 9"	1.15
2	21.00	66.25	5.52	5' 6"	1.68
3	21.00	87.25	7.27	7' 3"	2.22
4	21.00	108.25	9.02	9' 0"	2.75
5	21.00	129.25	10.77	10' 9"	3.28
6	21.00	150.25	12.52	12' 6"	3.82
7	21.00	171.25	14.27	14' 3"	4.35
8	21.00	192.25	16.02	16' 0"	4.88
9	21.00	213.25	17.77	17' 9"	5.42
10	21.00	234.25	19.52	19' 6"	5.95
11	21.00	255.25	21.27	21' 3"	6.49
12	21.25	276.50	23.04	23' 1"	7.02
13	21.25	**297.75**	**24.81**	**24' 10"**	**7.56**
Bottom	**23.25**				

Total	**297.75**	**Inches**
	24.81	**Feet**
	7.56	**Meters**

Chameleon Whip 17' (CHA SS17) $70

Section from Top	Section Length (in)	Radiation Length (Bottom + Exposed Sections Above)			
		Inches	Feet	Ft-In	Meters
1	21.500	43.50	3.625	3' 8"	1.11
2	20.250	63.75	5.313	5' 4"	1.62
3	20.250	84.00	7.000	7' 0"	2.13
4	20.125	104.13	8.677	8' 8"	2.65
5	20.125	124.25	10.354	10' 4"	3.16
6	20.125	144.38	12.031	12' 0"	3.67
7	20.125	164.50	13.708	13' 9"	4.18
8	19.875	184.38	15.365	15' 4"	4.68
9	20.125	**204.50**	**17.042**	**17' 1"**	**5.20**
Bottom	**22.000**				

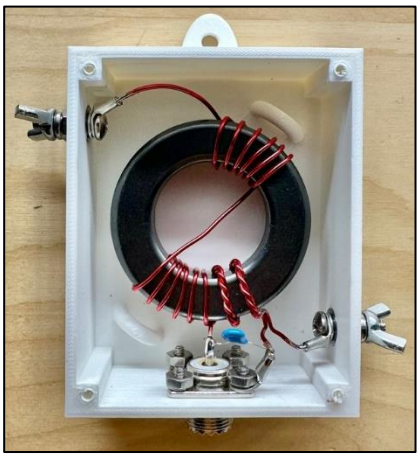
Total	**204.50**	**Inches**
	17.04	**Feet**
	5.20	**Meters**

SWR Efficiency:

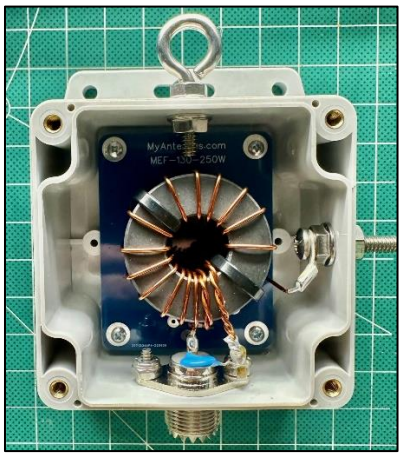
- 1.10:1 = 99.8%
- 1.20:1 = 99.2%
- 1.30:1 = 98.3%
- 1.40:1 = 97.2%
- 1.50:1 = 96.0%

The **TennTennas™ 49:1 transformers** are designed by Walt Beaton NE4TN and handmade in Mt. Carmel, Tennessee. They are sold exclusively on eBay and are shipped promptly. There are 3 versions: 100+W, 80W and 25W.

The **MyAntennas™ 56:1 transformers** are expertly designed by Danny Horvat N4EXA and manufactured in Zephyrhills, Florida. They are sold via their product website and are shipped at reasonable cost around the world.



TennTennas™ 49:1 transformer uses a ½" thick FT-240-43 toroid.



MyAntennas™ 56:1 transformer uses a 1" thick FT-140-43 toroid .

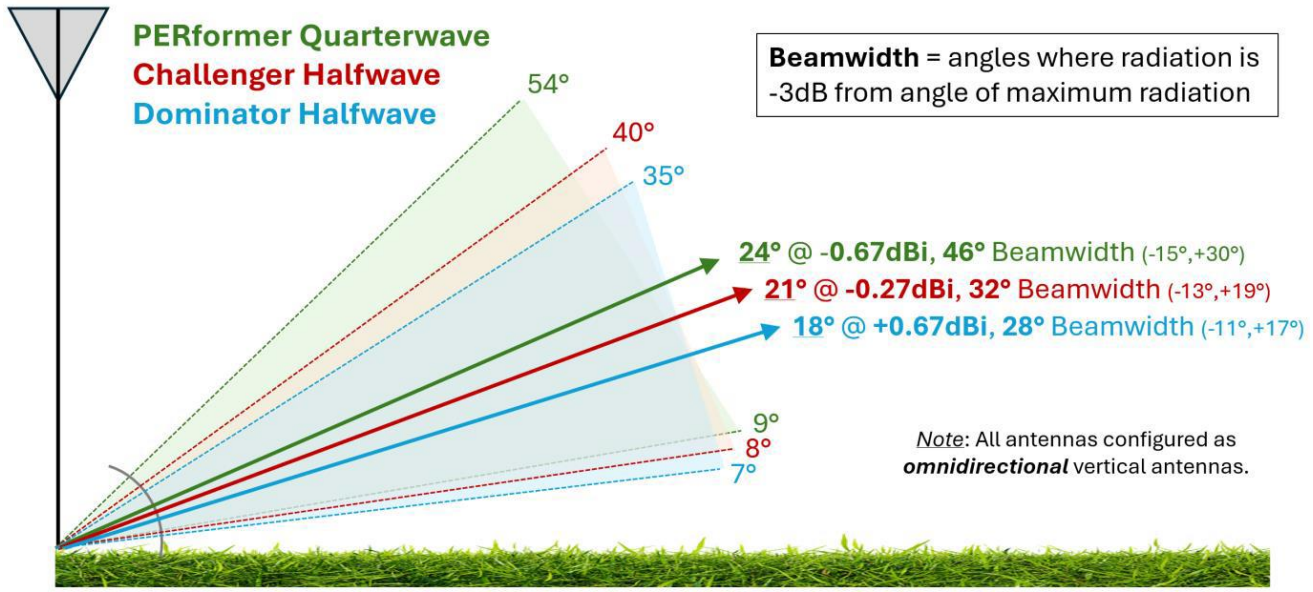
Dominator Halfwave Antenna by KJ6ER

Comparing the PERformer Quarterwave, Challenger Halfwave and Dominator Halfwave Antennas

I designed three portable vertical antennas because each has their own **best use case**. The **PERformer** quarterwave is optimal for *regional* to *continental* coverage, the **Challenger** off center-fed halfwave is optimal for *continental* to *global* coverage, while the **Dominator** end-fed halfwave vertical is optimal for *cross-continental* and *global DX* coverage. All antennas provide high structural antenna efficiency.

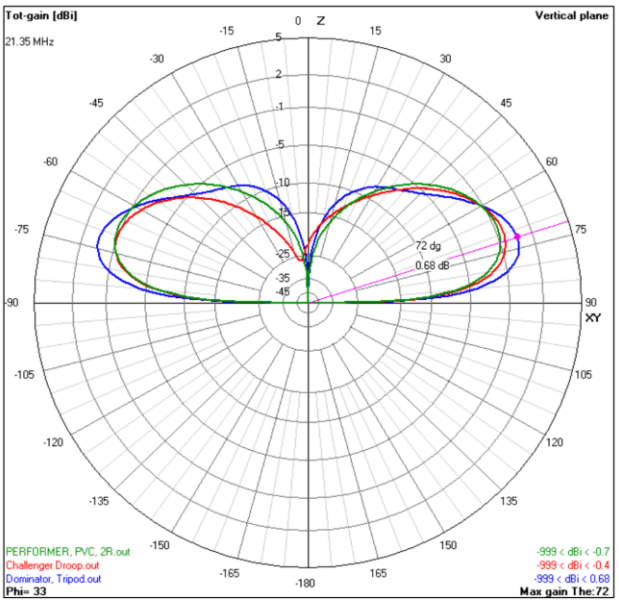
Specifications	PERformer	Challenger	Dominator
Vertical Wavelength	• **Quarterwave**	• **Halfwave**	• **Halfwave**
Antenna Configuration	• Omni/Directional • 2 Elevated Tuned Linked Radials 90/180° apart	• Omnidirectional • 1 Linked Counterpoise, ~10% λ per band	• Omnidirectional • 1 Linked Counterpoise, ~33% λ per band
Band Coverage	• **40M-6M**	• **20M-6M**	• **17M-10M**
Structural Efficiency	• 90.8%	• 94.3%	• 99.5%
50Ω Impedance Match	• ---	• **4:1 Unun** *Off-Center Fed*	• **49/56:1 Xformer** *End-Fed*
Key Component Loss	• -0.12 dB *(toroid choke only)*	• -0.46 *to* -0.35 dB	• -1.08 *to* -0.51 dB
Peak Radiation	• **-0.67 dBi / +0.41 dBi**	• **-0.27 dBi**	• **+0.67 dBi**
Angle of Peak Radiation (-3 dB BW)	• **24°** (9° *to* 54°)	• **21°** (8° *to* 40°)	• **18°** (7° *to* 35°)
-3.00 dB Beamwidth	• **46°** (-15°, +30°)	• **32°** (-13°, +19°)	• **28°** (-11°,+17°)
Primary Reach	• Regional, Continental	• Continental, Global	• Global

The *primary reach* of these three antennas results from **angle of peak radiation**, **strength of peak radiation**, and the **-3 dB radiation beamwidth**. The graphic below demonstrates how unique each of the antennas are in these characteristics. The **Challenger** peak radiation of **-0.27 dBi** is at an angle ***3° lower*** than the **PERformer**, while the **Dominator** peak radiation of **+0.67 dBi** is at an angle ***3° lower*** than the **Challenger**! Among all three antennas, the **Dominator** has the most concentrated and narrowest -3 dB beamwidth of only ***28°*** radiating at ***18°*** above the horizon for fantastic DX when the conditions are right.

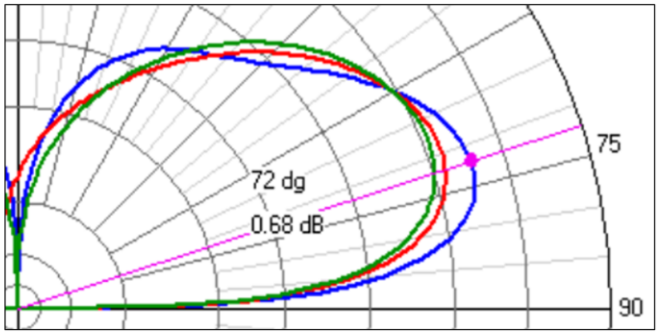


Dominator Halfwave Antenna by KJ6ER

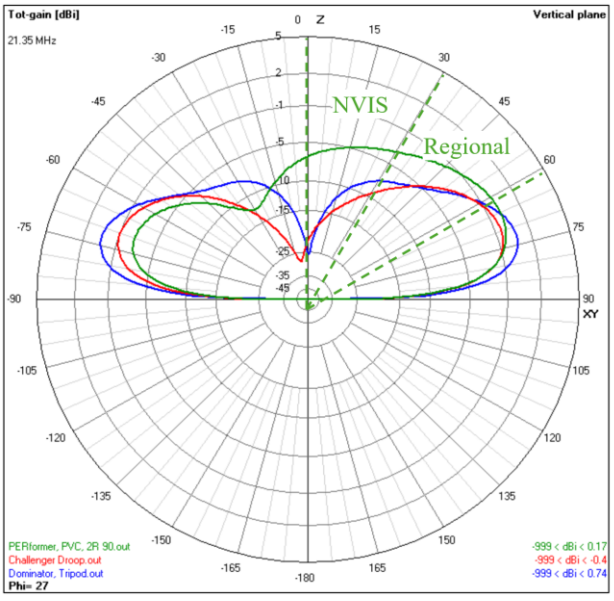
When looking at the *far field* *omnidirectional* *radiation patterns* of all three antennas overlayed, the **Dominator** provides the strongest radiation **below 30°** off the horizon, while the **PERformer** provides the strongest radiation **between 30° and 60°** off the horizon for regional coverage. The **Challenger** fits perfectly in between the other two antennas with the most **balanced** *omnidirectional* radiation.



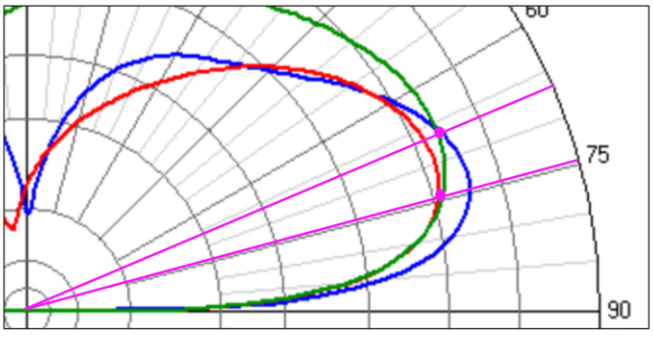
- Looking at the ***far field*** **radiation patterns** of all three antennas on **15M** (21.350 MHz): **PERformer** quarterwave, **Challenger** halfwave and **Dominator** halfwave.
- Comparing **radiated gain** at **18°** off the horizon: **Dominator: +0.68 dBi**, **Challenger: -0.32 dBi**, **PERformer: -1.00 dBi**.



When looking at the *far field radiation patterns* with the **PERformer** in its **directional** configuration, note how its radiation exceeds the **Challenger** at **16°** off the horizon and ultimately exceeds the **Dominator** at **23°** degrees off the horizon. This is what makes the **directional PERformer** so popular among portable POTA operators! As expected, in that *directional* configuration, both the *omnidirectional* **Challenger** and **Dominator** significantly exceed the **PERformer** radiation on the backside. As mentioned earlier, each antenna has its own **best use case** and is very effective based upon the communication goals.



- Looking at the ***far field*** **radiation patterns** of all three antennas on **15M** (21.350 MHz): **PERformer** Directional Radial Span, **Challenger** halfwave and **Dominator** halfwave.
- Comparing **radiated gain, PERformer** *exceeds* **Challenger** @ **16°** off the horizon and *exceeds* **Dominator** @ **23°** off the horizon.



Final Comments

The Dominator is a *DX-ready* halfwave vertical antenna and I strongly encourage you to try it in the field. This is not a *typical* multiband EFHW antenna because it is halfwave resonant on *each* of the bands *one-band-at-a-time* by adjusting the telescoping whip and linked counterpoise wire to resonance. This provides peak RF current at the midpoint of the radiating element.

As with my **PERformer quarterwave** and **Challenger halfwave vertical antennas**, this antenna deploys very fast. I can get the Dominator up and running with the linked counterpoise wire in a couple minutes. And when it is time to leave, the antenna is fast and easy to pack up. For me, a key feature of a portable antenna is not only its performance, but the *elegance* of its design and deployment.

As I mentioned earlier, each of my vertical antennas has its own **best use case**. Depending upon the operational objective, I always have these antennas ready to deploy. You may want to consider building all three antennas and keeping them ready in your *portable antenna portfolio*.

All Three Antennas	PERformer Quarterwave (40M-6M)	Challenger OCF Halfwave (20M-6M)	Dominator EF Halfwave (17M-10M)
• 90%+ structural efficiency • Less than 5 minutes deployment • Easy to pack and transport	• 40M resonance unlike other two antennas • Directional option with 3 dB+ f-to-b • Best antenna for 30°-60° *regional* coverage	• 94%+ highest radiation efficiency • 20M and 6M halfwave resonance • Best antenna for *balanced* coverage	• 18° lowest angle of radiation • Strongest maximum radiation of +0.67 dBi • Best antenna for 5°-20° *global* coverage

The **Dominator** could also be used at your home QTH, especially in a neighborhood with antenna restrictions. Keep in mind, you will have to adjust the telescoping whip and the linked counterpoise wire for the band of operation. For an HOA, the advantages of the Dominator are that it is fast and easy to deploy when you want to use it. Then you can take it down quickly until you want to operate again.

One of my favorite parts of HAM radio is experimentation – especially with portable antennas. Give it a try and have some fun!

Please let me know if you have any questions, I'd be happy to help, 73! 😊

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