PORTABLE ANTENNAS & GEAR

Ryan Rager – AF4O

March 2025

Washburn Point, Yosemite NP, elev. ~7100ft – July 2024

AGENDA

- Scope & Assumptions
- Portable Gear Overview
- Portable Antennas Review
- Links & Info

SCOPE & ASSUMPTIONS

- ✓ **Not** a deep dive on how to operate and tune each type of antenna
- ✓ **Not** meant to be an exhaustive list of antenna types or gear options
- ✓ Will not cover radios or power sources
- ✓ Will be about general types & gear used in a portable configuration in the field with Pros, Cons, Tips & Tricks
- ✓ Assumes you will primarily be operating 50-100w
- ✓ Assumes the operator has proper permission to deploy the type of antenna at any given site & operate safely

MOUNTS, MASTS & SUPPORT GEAR

- Base Mounts
- Masts & Supports
- Line / Rope / Quick Connects
- Safety Gear & Visibility

BASE MOUNT OPTIONS

- Drive Over Mount
- Trailer Hitch Mount
- Ground Spike Mount
- Tripod Mounts

DRIVE OVER MAST MOUNT

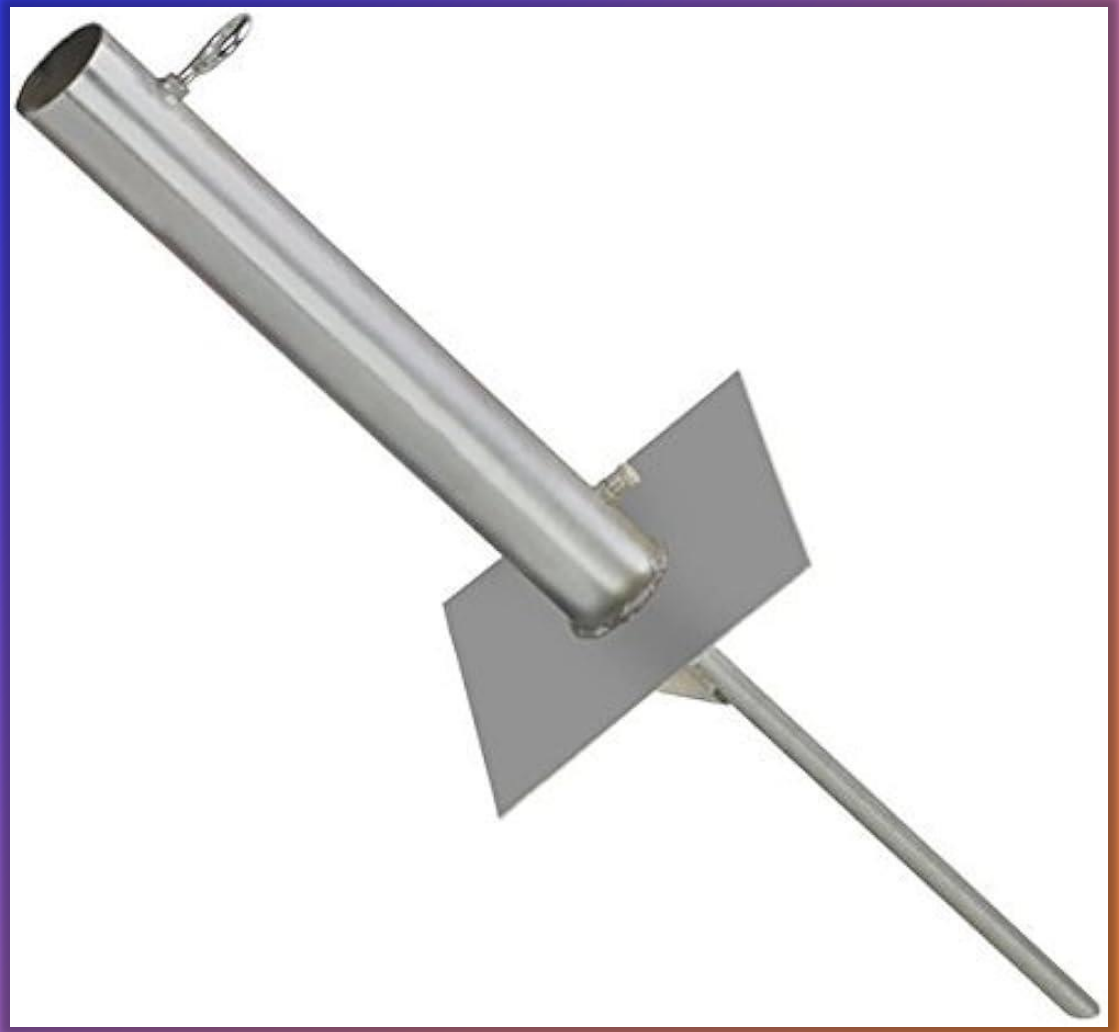
- **Types**
  - Amazon, eBay, swap meets, etc.
  - Homebrew
- **Pros**
  - Very sturdy mount for tall masts
  - Plate and barrel usually disconnect for easier storage
- **Cons**
  - Requires that you don’t need to move your vehicle while mast is deployed
  - If using a vertical wire antenna, the vehicle may interact with signal if mast isn’t tall enough
  - Angle of mast will depend on the level of ground where you park

TRAILER HITCH MAST MOUNT

- **Types**
  - Amazon, eBay, swap meets, etc.
  - Homebrew
- **Pros**
  - Once placed in the hitch, you don't have to reposition the vehicle like with a drive over mount
- **Cons**
  - Can be wobbly if not a snug fit in the receiver
  - Can hinder opening tailgate / hatchback if not sized properly
  - Angle of mast will depend on the level of ground where you park

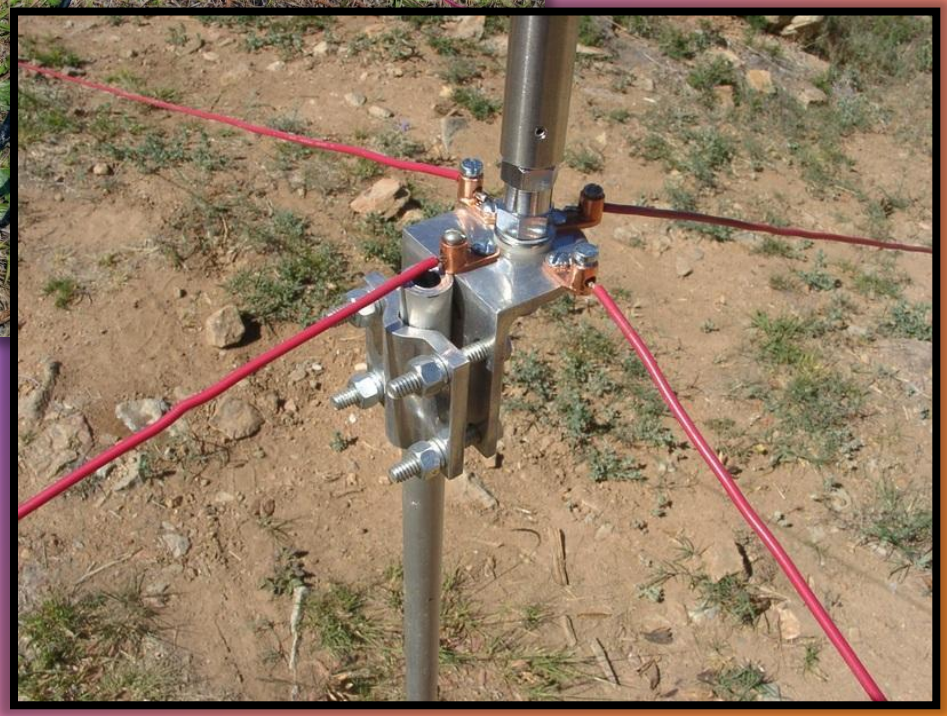
GROUND SPIKE MAST MOUNT

- **Types**
  - Amazon, eBay, swap meets, etc
  - Homebrew
- **Pros**
  - No vehicle required for mounting; allowing you to operate away from vehicle
- **Cons**
  - Requires proper ground type to get spike into for support
  - May require additional support or guying of mast depending on configuration



GROUND SPIKE ANTENNA MOUNT

- **Types**
  - Chameleon, MFJ, etc.
  - Homebrew (partial grounding rod)
- **Pros**
  - Simple and quick deployment
- **Cons**
  - Not feasible if your location does NOT allow protrusions into ground
    - *Some historic sites don't allow this*
  - Not feasible if you do NOT have proper ground composition to support antenna wind load
  - Not feasible if you are at a parking lot or very rocky ground



TRIPOD ANTENNA MOUNT

- **Types**
  - Amazon, eBay, swap meets
  - Wolf River Coil “Mega Pod”
  - Homebrew

- **Pros**
  - Great alternative if ground spikes are not an option
  - Can be adapted many ways for various configurations

- **Cons**
  - Can take up more space when transporting
  - More gear to transport, store, maintain, etc.

Carlsbad Caverns NP, NM; elev. ~4400ft – July 2024

TRIPOD MAST MOUNT

- **Types**
  - Amazon, TN07, MFJ, eBay, swap meets
  - Homebrew
- **Pros**
  - Allows various mast styles to be supported in field without a vehicle
  - Typically, with feet well staked (or counterweights used), no additional guying support needed
- **Cons**
  - Can get large and bulky
  - More gear to transport and deploy

MASTS & SUPPORTS

- Push Up Masts
- Walk Up Masts
- Alternative Mounting Options
- Guying & Support Gear
- Safety & Visibility Gear

PUSH UP MASTS

- **Types**
  - MaxGain (fiberglass)
  - DX Engineering (carbon fiber)
  - Chameleon (aluminum mast)
  - Rohn (galvanized mast)

- **Not meant to be a ‘walk up’ mast, always push up each section at a time vertically and clamp tightly**

- **Pros**
  - Heavy duty masts that can support small beams and similar sized gear when properly guyed
- **Cons**
  - Typically, requires guying to properly support the mast
  - Still fairly large when collapsed

WALK UP MASTS

- **Friction grips, typically no clamps**
- **Types**
  - SpiderBeam; 7m – 26m
  - DX Commander mast; 7m, 9m,12.5m & 18m
  - GigaParts “POTA CF” series; 20ft & 33ft
  - SOTABeams
- **Pros**
  - Very lightweight and flexible
  - Very simple to setup and deploy
  - Pack away very nicely
- **Cons**
  - Not meant for small beam antennas and similar gear

7m = 23ft	**18m = 59ft**
9m = 29ft	**22m = 72ft**
12.5m = 41ft	**26m = 85ft**

Guadalupe Mountains NP, TX; elev. ~5700ft – July 2024

ALT MOUNT & ATTACH OPTIONS

Alternative considerations:

- Stainless steel hose clamp with finger loops for quick, simple guying support
- PVC end cap with 5-6in stainless bolt mounted through for mast footer
- **IF** it's safe/ok to make a hole in the ground, a cordless drill and small auger bit can bore a 12-18in deep hole for a mast to sit in
- Use heavy duty bungee cords and strap both ends of the bottom section of the mast to a fence post, small tree, park bench, picnic table, etc.

GUYING & SUPPORT GEAR

- **Types**
  - Chameleon, Amazon, swap meets
  - DX Engineering
  - Homebrew

- **Tips & Tricks**
  - Guy ring kits for various sized masts or vertical antennas
  - Quick adjust guy lines easier for setup
  - Ground stakes assume you have usable ground
  - Use marker flags, small cones and/or caution tape to mark guy lines and stakes

SAFETY & VISIBILITY GEAR

- **Types**
  - Marker flags (bundles)
  - Safety cones; large or small
  - Caution tape
  - High visibility color lines
- **Sources**
  - Amazon, Home Depot, eBay
- **Tips & Tricks**
  - Always people will do the dumbest things
  - When operating, keep your head on a swivel
  - Anticipate the worst case scenario, hope for the best ☺

SUPPORT LINE & CONNECTS

- **Paracord**
- **Engineered Line**
- **Throw Bag & Line**
- **Cleats & Quick Connects**

PARACORD

- **Options**
  - Amazon, Home Depot, online specialty stores, etc.
  - Also called:
    - 7 strand line
    - 550 Cord
- **Singe the ends after cutting line to keep from fraying**
- **Pros**
  - Less expensive per foot than typical engineered line
- **Cons**
  - Sheathing can get worn and frayed over time, makes undoing big knots difficult and frustrating if not properly stored each time

ENGINEERED LINE

- **Examples**
  - Mastrant; 2mm – 4mm
  - Phillystran

- **Pros**
  - Much stronger than paracord for higher tension loads
  - Will last much longer than paracord
  - Higher breaking strength than small steel cable
  - Non-conductive to mast/antenna being supported

- **Cons**
  - More expensive per foot than typical paracord
  - A bit of overkill for a quick portable operations

THROW BAG & ARBORIST LINE

- **Options**
  - Various length and weight of line
  - Not all arborist line quality is the same
  - Varying throw bag weights
- **Pros**
  - Typically, is lighter and ‘slides’ over branches much easier than paracord
- **Cons**
  - Costs a bit more than cheap paracord

Ryan AF4O going for gold and a new world record! April 2024

CLEATS, BLOCKS & QUICK CLIPS

- **Types**
  - Cam Cleats
  - Bullet or Cheek blocks
  - Carabiners
    - Metal or Nylon
    - Single or Double Clip
- **Tips & Tricks**
  - Cam cleats are helpful for solo setups and being able to quickly adjust guy tension as needed
  - Cheek or Bullet blocks are helpful to raise and lower a wire (or change out a wire antenna) without collapsing an entire mast over and over.
  - Double clip carabiner helpful for connecting wires to top of walk-up masts

COAX & GEAR

- Coax Options
- Coax Gear

COAX OPTIONS

- Types
- Connectors
- Other Considerations

COAX TYPES

Common types:

- **RG-58**
- **RG-8X**
- **LMR-240UF**
- **LMR-195**
- **RG-213U**
- **RG-400**
- **POTA-Flex 6**
- **POTA-Flex 7**

Go for best quality that is within your budget.

COAX CONNECTORS

- Common types:
  - BNC
  - PL-259

- Less common types:
  - SMA
  - N Connector

- Custom adapted jumpers
  - ABR Ind. custom cable builder webpage
  - *https://abrind.com/shop/cable-builder/amateur-radio-coax-builder/*
  - 10% discount code: K8MRD10

COAX CONSIDERATIONS

- **Length**
  - Just long enough to get the job done
  - Long enough if a certain type of antenna requires a minimum length of coax
- **Flexibility**
  - The more flexible the better!
- **Visibility**
  - High vis color sheathing is highly recommended for safety
  - White, orange, yellow, light green, etc.
  - Black coax blends right into the ground too easy
  - Use small ground flags, caution tape or cones

COAX GEAR

- Adapters
- Antenna Analyzer
- Chokes
- Cable Management

COAX ADAPTERS

- **Types**
  - Individual pieces
  - Adapter bundles
  - Adapter kits
- **Pros**
  - Can be an operational ‘life saver’ to have in the field
- **Cons**
  - Extra gear to buy and transport, yet minimal in weight/size and ‘invaluable’ to have

ANTENNA ANALYZER

- **Types**
  - RigExpert
  - Chameleon
  - Comet
  - Nano VNA

- **Pros**
  - Allows you to tune a given antenna system
  - It’s almost a hard requirement to have one for portable operations

- **Cons**
  - Extra gear to buy and transport
  - Ask a club member to borrow vs buying a new one

COMMON MODE CHOKES

- **Types**
  - Inline
  - Torroids
  - Snap on Ferrites
  - Jumper
  - Homebrew

- **Pros**
  - Keeps stray RFI and common mode noise out of radio

- **Cons**
  - Extra gear to purchase and transport

COAX MANAGEMENT

- Circular Cable Winders
- Velcro Strap with Grommet
- Reusable Zip Ties

WIRE MANAGEMENT

- Flat winder board
- Reel type winder
- Chalk Line Winder

COAX GROUNDING

- Just Kidding ☺

PORTABLE ANTENNA TYPES

- Vertical Antennas
- Wire Antennas
- Mobile Adaptations
- Hybrid / Complex Antennas

VERTICAL ANTENNAS

- **Tuned Vertical Whip**
- **Multiband Vertical Whip**
- **Multiband Vertical Wire**

TUNED VERTICAL WHIP

- **Types**
  - Chameleon (17ft & 25ft)
  - MFJ
  - Alpha (17ft & 34ft)

- **10m – 20m ¼ wavelength; 40m with optional coil**
- **Ground spike, mag mount or tripod mount**
- **Don’t forget an isolator & ground plane solution!**
- **Pros**
  - Once tuned for resonance, no tuner needed
- **Cons**
  - Requires having an antenna analyzer on hand to fine tune antenna each time

TUNED VERTICAL W/ BASE COIL

- **Types**
  - Wolf River Coil
  - Super Antenna
  - Chameleon
  - Homebrew
- **Tapped base coil w/ telescoping whip**
- **Don’t forget an isolator & ground plane solution!**
- **10m – 40m with proper coil and vertical length**
  - 80m possible with some models
- **Pros**
    - Once tuned for resonance, no tuner needed
- **Cons**
    - Requires having an antenna analyzer on hand to fine tune antenna each time

TUNED VERTICAL W/ CENTER COIL

- **Types**
  - Chelegance JPC-12
  - Buddistick Pro

- **Tapped center coil w/ telescoping whip**
- **Ground spike, mag mount or tripod mount**
- **Don’t forget an isolator & ground plane solution!**
- **6m – 40m**
- **Pros**
  - Once tuned for resonance, no tuner needed
  - Very portable and quick to deploy
- **Cons**
  - Highly recommended having an antenna analyzer on hand to fine tune antenna for band changes

MULTIBAND VERTICAL WHIP

- **Types**
  - Chameleon MPAS (17ft & 25ft)
  - Chelegance MC-750
  - Homebrew

- **Telescoping vertical whip on matching unit**
- **Set vertical element to full length and leave it regardless of band**
- **Ground spike, mag mount or tripod mount**
- **Pros**
  - Typically, you do not have to mess with the antenna config when changing bands
- **Cons**
  - Not typically resonant, does require a tuner for best performance

MULTIBAND VERTICAL WIRE

- **Rybakov**
  - Radials & choke at feedpoint
  - ~25ft overall; 4:1 unun
  - 40m – 10m; Requires a tuner

- **29ft ‘random’ vertical**
  - 29’ end-fed wire with 9:1 unun
  - 16.5ft counterpoise; tuner for best perf
  - 40m – 10m; choke at feedpoint

- **20-10 Halfwave vertical**
  - ~31ft end fed wire; 49:1 unun
  - 3.2ft counterpoise; choke at feedpoint
  - Resonant on 10m and 20m once tuned

Washburn Point, Yosemite NP, elev. ~7100ft – July 2024

WIRE ANTENNAS

- End Fed
- Center Fed
- Off Center Fed

END FED ANTENNAS

- **Types**
  - Half Wave; w/ 49:1
  - Random Wire; various lengths w/ 9:1

- **Configurations**
  - Sloper
  - Flat Top
  - Inverted V
  - Vertical

- **Typically, easiest of wire antennas to deploy quickly**
- **When tuned properly, they are resonant on multiple bands**

Sam Houston Jones SP; Lake Charles, La – July 2024

CENTER FED ANTENNAS

- **Types**
  - Resonant Halfwave Dipole
  - G5RV (or similar)
  - EFHW – Dipole hybrid
  - Homebrew

- **Configurations**
  - Flat Top
  - Sloper
  - Inverted V
  - Vertical

- **No tuner needed if resonant for band(s) you intend to work**
- **Monoband usage**

OFF CENTER FED ANTENNAS

- **Types / Brands**
  - Chameleon *(50w SSB)*
  - Buckmaster
  - MyAntennas
  - Homebrew

- **Configurations**
  - Sloper
  - Flat Top
  - Inverted V

- **Typically, near-resonant on multiple bands**
- **Some types/brands may need a tuner for best performance**

MOBILE ANTENNA ADAPTATIONS

- Tarheel Antenna
- Yaesu ATAS Antenna
- Hamsticks
- Hustler Resonators

TARHEEL ANTENNA

- **Notes**
  - Vertical, screwdriver type antenna
  - Requires a controller to raise/lower antenna
    - *basic controller comes with new antennas*
  - 6m – 80m *(depending on model)*
  - 100+w SSB, rating varies on model
  - 2 factory whip length options, 17ft SS whip can be also be used
  - Can be used on vehicle with mag mount
- **Don’t forget a ground plane solution!**
- **Pros**
  - Can be used from/with your existing mobile install (if applicable)
- **Cons**
  - Control switch requires 12v power source, but typically comes wired with powerpole connectors

ATAS 120 ANTENNA

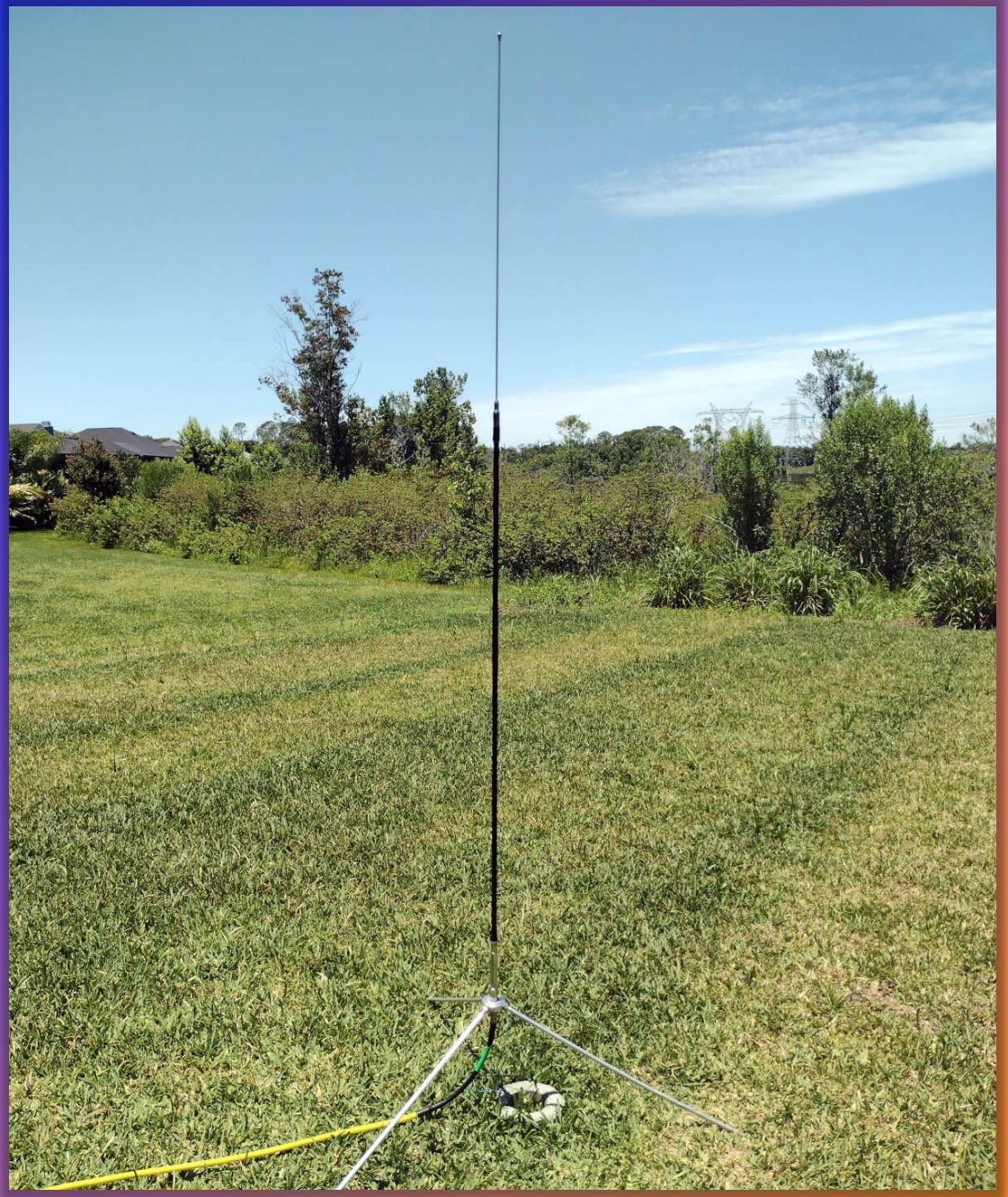
- **Notes**
  - Yaesu (brand) only
  - Vertical, screwdriver style antenna
  - 70cm - 40m; 120w SSB
  - Can be used on vehicle with mag mount
- **Don’t forget a ground plane solution!**
- **Pros**
  - If using an ATAS-supported Yaesu radio, ***you only need the coax*** from radio to antenna and all tuning is automatic
    - i.e. FT-891, FT-710, FT-991a, FT-897
- **Cons**
  - If not using a Yaesu radio, there’s no convenience gain

HAMSTICKS

- **Types**
  - Hamsticks; full sized and minis
  - Shark Sticks
  - MFJ
  - 6m – 80m; power rating varies
- **Don’t forget a ground plane solution!**
  - *WRC Mega-Tripod used in pic*

- **Pros**
  - Stores away quickly and easy to transport
  - Deploys very quickly (once tuned)
  - Can be used on vehicle with mag mount

- **Cons**
  - Monoband use per hamstick
  - Very high Q; requires careful tuning



HUSTLER RESONATORS

- **Types**
  - Hustler Resonators (brand)
  - One resonator per band, including WARC bands
  - 400w SSB standard resonators
  - 1kw SSB super resonators
- **Mounts**
  - 4 models of vertical masts; all use 3/8x24 mount
  - MO-1 thru MO-4; MO-3 being a fixed, white 54in base vertical (shown in top pic)
  - All 4 mast models are resonant on 6m
  - Multiband Adapter mount (shown in bottom pic)
  - Can be used on vehicle with mag mount

- **Good reuse of antennas you may already own or can get cheap at a swap meet**
- **Don’t forget a ground plane solution!**

HYBRID / COMPLEX ANTENNAS

- Mag Loops
- Vertical Loops
- “Toy Box” Vertical
- Hamstick Dipole
- Buddipole
- Buddihex
- POTA Performer
- POTA Challenger
- POTA Dominator

MAG LOOP ANTENNAS

- **Notes**
  - Receive Only models
  - Tx & Rx models
  - typically, rated for 10m – 80m
  - Pay attention to the rated power limit!

- **Pros**
  - Small footprint, great for limited space operation
  - Quick, easy setup
  - High operating bandwidth
  - Null out noise by turning the disc 90deg to source

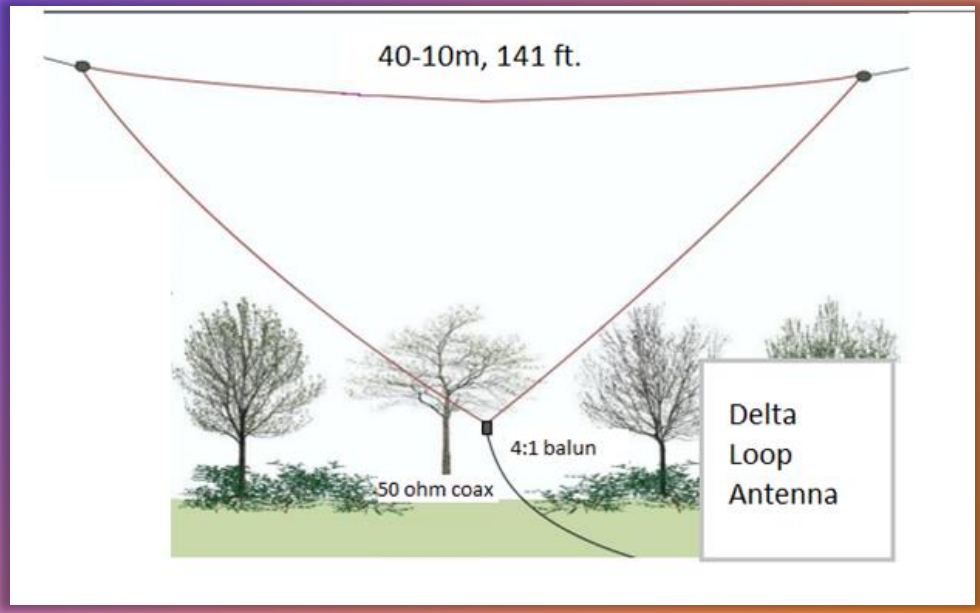
- **Cons**
  - Very high Q
  - Requires diligent, manual tuning or extra gear to auto tune the antenna

VERTICAL LOOP ANTENNA

- **Types**
  - CHA Tactical Delta Loop; 6m – 80m
  - Ground mounted or elevated (best perf.)
  - Homebrew; long wire and 4:1 balun

- **Pros**
  - Quick, easy setup
  - High operating bandwidth with tuner
  - Can be more RF quiet than a wire or vertical

- **Cons**
  - Typically requires a tuner for best performance
  - Takes up a large footprint



ULTRA PORTABLE VERTICAL

- **Adjustable vertical whip antenna with tapped coil or coil extension**
- **Mount on small tripod or mag mount**
- **Don't forget a ground plane solution!**

- **Types**
  - Comet HFJ-350M; 6m – 160m*
  - Gabil GRA-7350TC; 6m – 80m

- **Pros**
  - Super compact, ultra-portable antenna
- **Cons**
  - Highly compromised with short length
  - High Q, can require lots of tweaking to get tuning dialed in just right

HAMSTICK DIPOLE

- **Two opposing, tuned hamstick elements**
- **Center fed and approx. ½ wavelength above ground**

- **Types**
  - MFJ mount
  - Homebrew

- **Pros**
  - Simple to store and deploy
  - Lightweight; easy to deploy on small mast

- **Cons**
  - Monoband only
  - High Q, can require lots of tweaking to get tuning dialed in just right

BUDDIPOLE

- **Two opposing, adjustable element dipole with tapped coils**
- **Center fed and approx. ½ wavelength above ground**
- **Types**
  - Buddipole (brand); 2m – 40m
  - Homebrew
- **Pros**
  - Multiband capable with proper tuning
  - Can be used in vertical config (single element) with some additional gear
- **Cons**
  - Getting the tuning and performance down in the field is kind of an art

Jack N4KIN, Honeymoon Island SP, elev. ~7ft – Jan 2024

BUDDIHEX

- **6 band, resonant hexbeam antenna with gain and directivity**
- **Rated for full legal limit power**
- **Fully assembled weighs just over 9lbs.**

- **Types**
  - Buddipole (brand); 6m – 20m
- **Pros**
  - Multiband resonant, no tuner needed
  - Packs away nicely in a travel bag
- **Cons**
  - Deploying solo in the field is kind of an art, but can be done.
  - At least a 90 day waitlist currently

POTA PERFORMER

- **Elevated ¼ wave vertical element**
  - 17ft stainless steel whip, adjust height to tune as needed
  - 40m coil is optional
- **Ideal for regional and continental operations**
- **Homebrew only, no retail option**
- **6m – 20m; 40m with add-on coil**
- **Dual, tuned elevated radials**
  - Tune radials with linked sections
  - Radials pointed at 90deg to each other add a bit of directionality and slight gain

KJ6ER Antennas

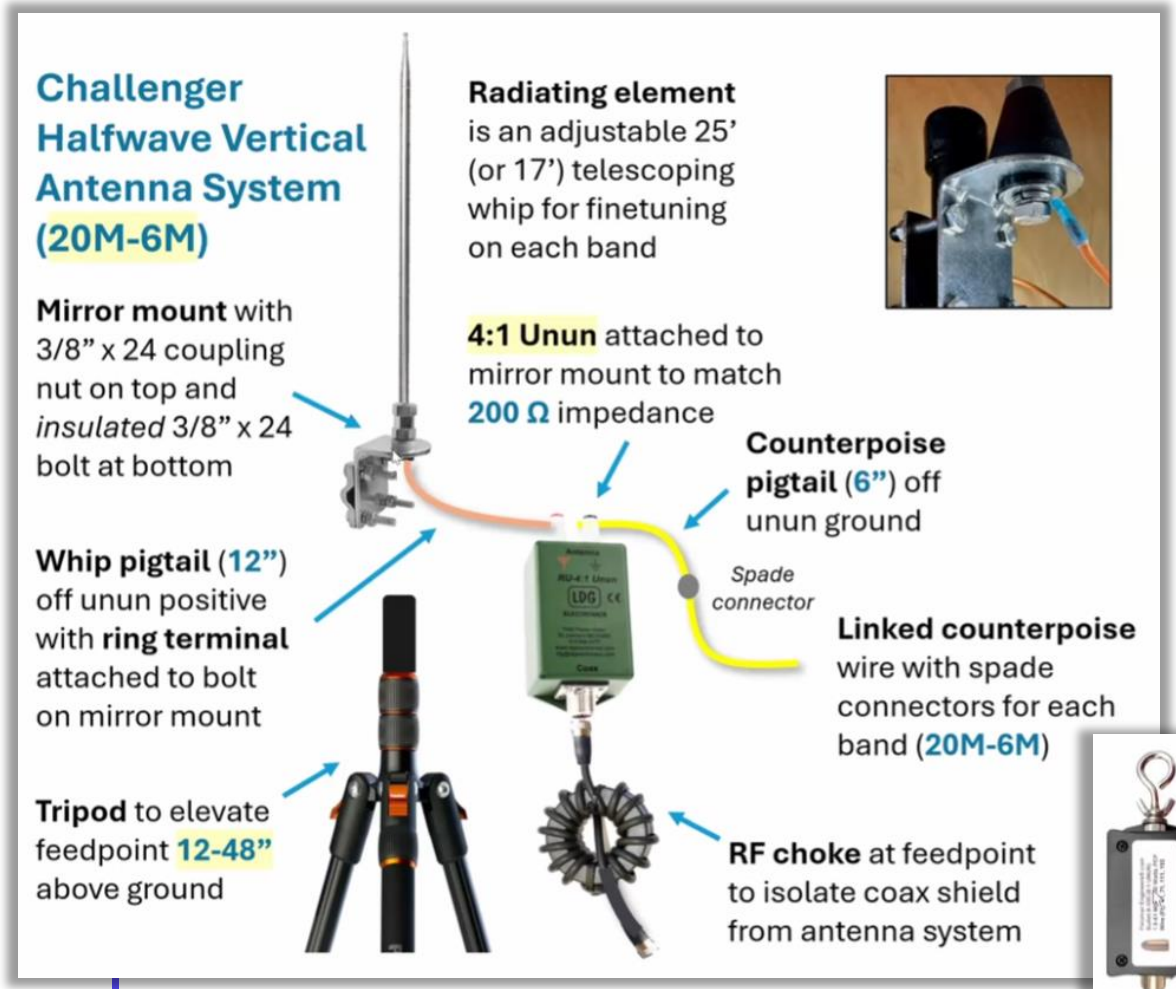
➢ https://drive.google.com/file/d/1LwSbXXeovjJdT8ijpOi-9FYR--nNsxgD/view?pli=1

POTA PERFORMER (CONT.)

KJ6ER Antennas

- **Tips & Tricks**
  - Build the elevated radials out of a linked system for ease of changing bands
- **Pros**
  - Slight directionality and gain
  - Currently one of the top reviewed portable antennas
- **Cons**
  - Can take a lot of effort to get tuned and dialed in initially
  - Takes up a large footprint with radials

POTA CHALLENGER

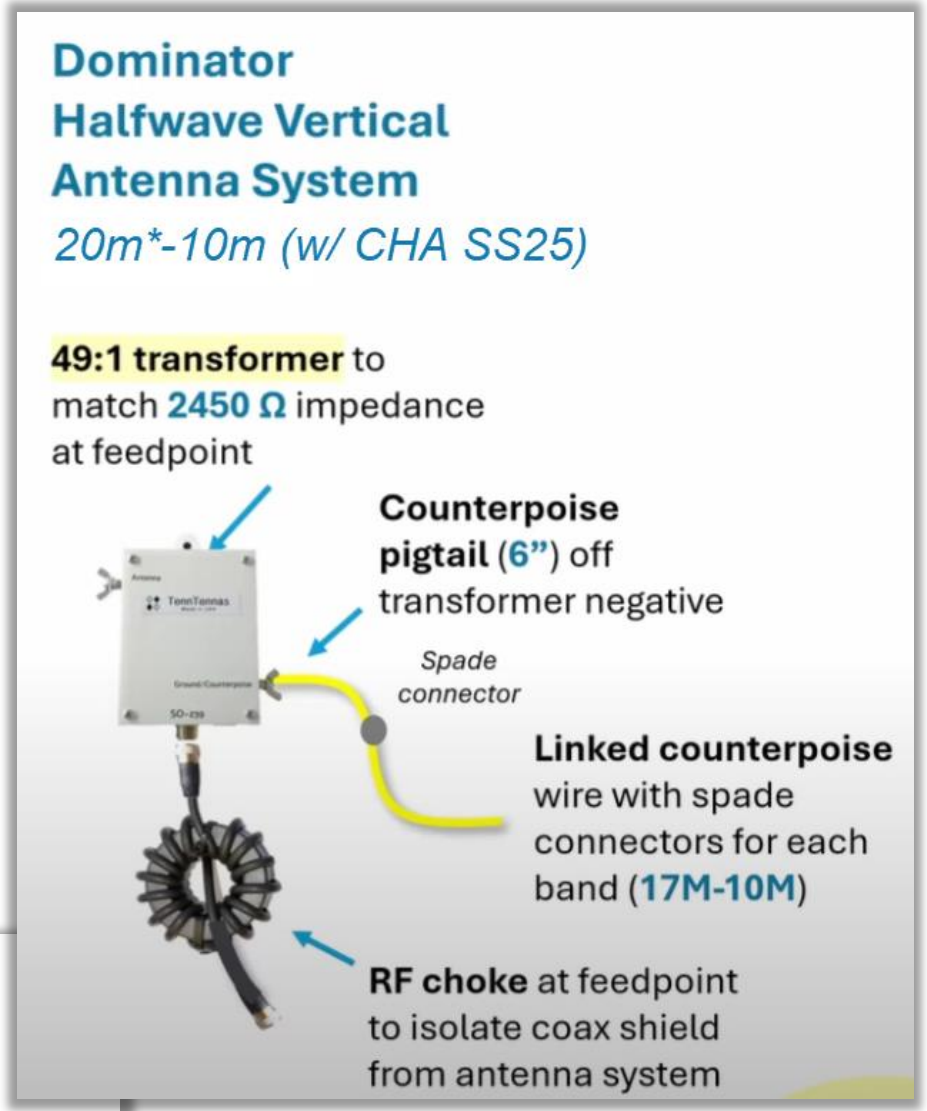


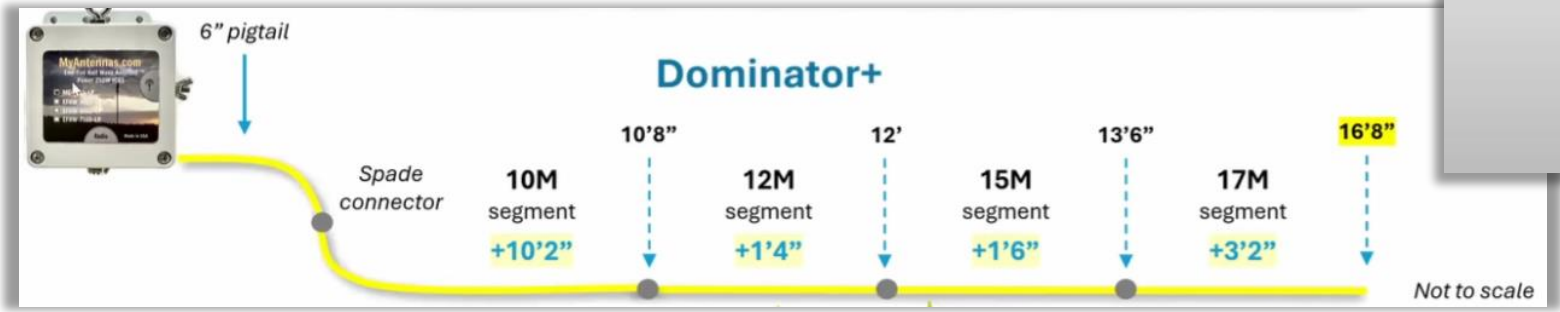
- **Portable, elevated, resonant Off Center fed halfwave vertical antenna (w/ 4:1 unun) for 20m – 6m**
- **Tips & Tricks**
  - Build the tuned counterpoise out of a linked system for ease of changing bands
  - Counterpoise does not have to be elevated
- **Cons**
  - Can take a bit of effort to get tuned and dialed in initially

POTA DOMINATOR

KJ6ER Antennas

- **POTA Dominator is a portable, elevated, resonant End Fed halfwave vertical antenna (w/ 49 or 56:1 unun) for 17m – 10m with CHA 25ft vertical whip**
  - **Can work on 20m with ~3ft jumper to balun; might need a tuner for ideal matching**
- **Tips & Tricks**
  - Build the tuned counterpoise out of a linked system for ease of changing bands
  - Counterpoise does not have to be elevated
- **Pros**
  - Very low take off angle, ideal for DX style operating
- **Cons**
  - Can take a bit of effort to get tuned and dialed in initially

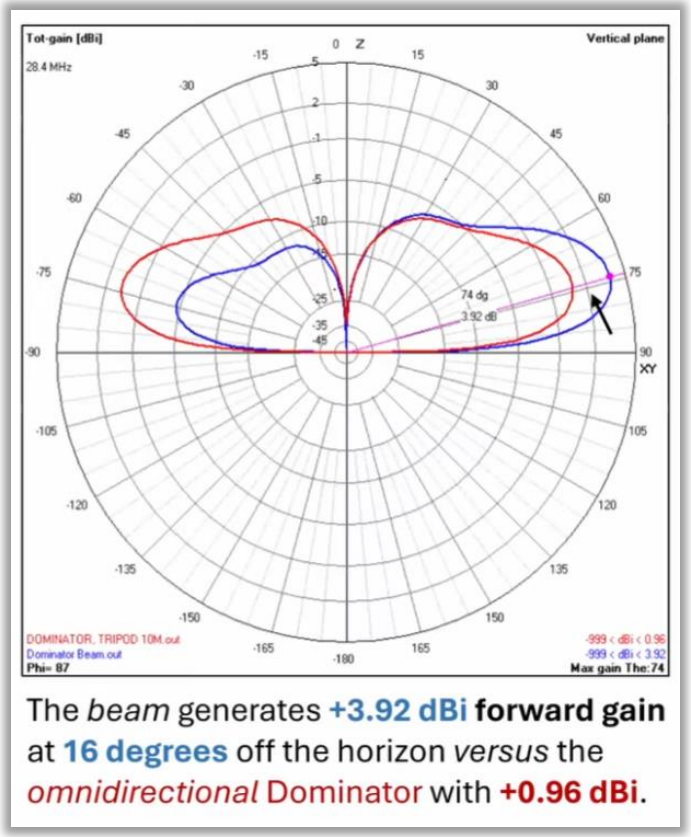




- But wait…
- There’s more!!

POTA DOMINATOR BEAM

- **Dominator Beam is a portable, resonant halfwave vertical BEAM antenna with a parasitic director!**
- **Tips & Tricks**
  - Build the tuned counterpoise out of a linked system for ease of changing bands
  - Parasitic director element is placed inline with driven element to create a beam
- **Pros**
  - ~3.9dBi gain @ 16deg to horizon
  - Currently one of the top reviewed portable antennas
- **Cons**
  - Can take a bit of effort to get tuned and dialed in initially



The *beam* generates **+3.92 dBi forward gain** at **16 degrees** off the horizon *versus* the *omnidirectional* Dominator with **+0.96 dBi**.

KJ6ER Antennas

Dominator 2-Element Vertical Beam for 10M pointed east at **US-3473** in California. **Parasitic director** creates up to **+4 dB gain** across four bands: 17M-10M.

KJ6ER POTA ANTENNAS

Comparing PERformer, Challenger and Dominator Antennas

Specifications	PERformer	Challenger	Dominator	Dominator Beam
Vertical Wavelength	• **Quarterwave**	• **Halfwave**	• **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	• Directional • 2-Element Vertical Beam with Parasitic Director
Band Coverage	• **40M-6M**	• **20M-6M**	• **17M-10M**	• **17M-10M**
Structural Efficiency	• 90.8%	• 94.3%	• 99.5%	• 99.5%
50Ω Impedance Match	• ---	• **4:1 Unun** *Off-Center Fed*	• **49/56:1 Xformer** *End-Fed*	• **49/56:1 Xformer** *End-Fed*
Key Component Loss	• -0.12 dB *(toroid choke)*	• -0.46 *to* -0.35 dB	• -1.08 *to* -0.51 dB	• -1.08 *to* -0.51 dB
Peak Radiation	• **-0.67 dBi / +0.41 dBi**	• **-0.27 dBi**	• **+0.67 dBi**	• **+3.58 dBi**
Angle of Peak Radiation (with -3 dB Beamwidth)	• **24°** (9° *to* 54°)	• **21°** (8° *to* 40°)	• **18°** (7° *to* 35°)	• **16°** (7° *to* 31°)
-3.00 dB Beamwidth	• **46°** (-15°, +30°)	• **32°** (-13°, +19°)	• **28°** (-11°,+17°)	• **24°** (-9°,+15°)
Primary Reach	• Regional, Continental	• Continental, Global	• Global	• Global

LINKS & INFO

Salty Walt K4OGO with Coastal Waves & Wires

- https://www.youtube.com/@COASTALWAVESWIRES

Michael with KB9VBR Antennas

- https://www.youtube.com/@KB9VBRAntennas

Bob of HOA Ham (local ham in Highland Lakes area)

- https://www.youtube.com/@HOAHamRadio
- *His content is geared towards "HOA Friendly" gear reviews, but the content in many of his videos are very helpful for building/deploying portable antennas*

KJ6ER - POTA Performer, Challenger & Dominator Antennas

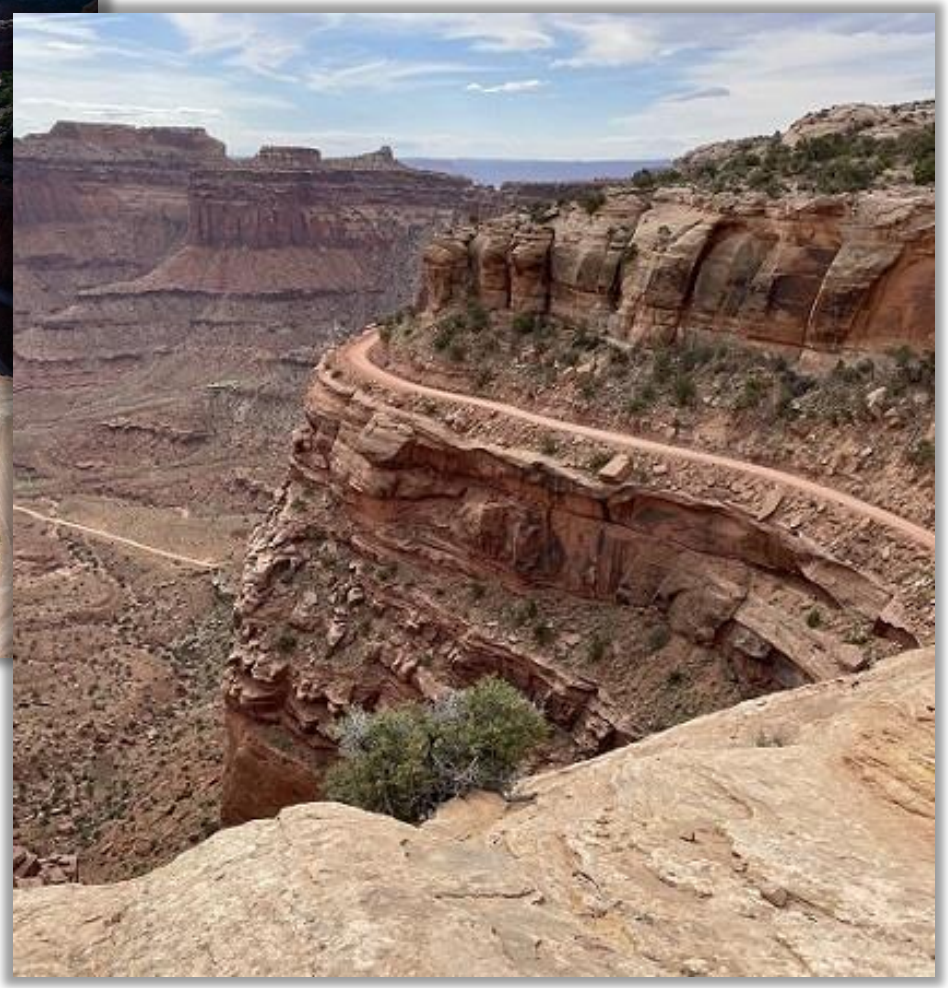
- https://https://www.youtube.com/watch?v=OP2cPZRyzwA&list=WL&index=4&ab_channel=GraniteStateAmateurRadioAssociation

GET OUT THERE & GET ON THE AIR!

Thank You and 73

Shafer Trail, Canyonlands NP, Utah – July 2024

SHAFER TRAIL, CANYONLANDS NATIONAL PARK



MOAB, UTAH