

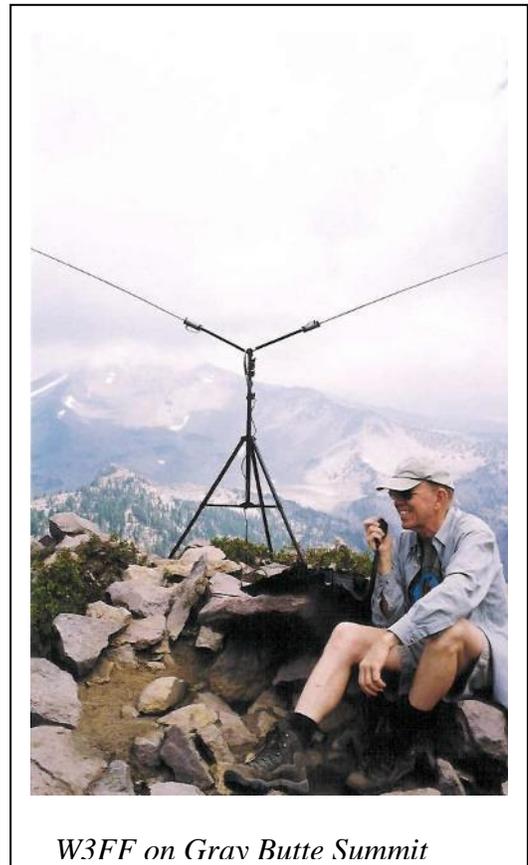
Understanding the Buddipole Antenna

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A bit of History

Around the beginning of the 21st century a US radio ham and keen experimenter Budd Drummond W3FF created a new portable antenna concept from his backyard workshop. This antenna, a compact, rotatable dipole became referred to the local ham community as the Buddipole, the name being based on Budd's name and the word 'dipole'.

A short time following, Budd and his son Chris made the decision to commercialize the Buddipole in the form of an easily transportable package. This antenna range has now grown to become one of the world's most popular portable antenna systems.



My first sighting of a Buddipole was at the Mt Gambier Hamfest back in June 2002. I met up with a ham who had purchased a Buddipole on a recent visit to the US.

He showed me this glorious device consisting of a black anodized aluminum tripod supporting a telescopic mast fitted with coils, tee section, cables and shiny chrome whips. From my perspective it became an instant love affair. I badgered both Budd and Chris using both email and phone to allow us access to the Buddipole as the local VK & ZL representative/dealer.

What is It?

The basic Buddipole is a kit of coils, rods, telescopic whips, coaxial cable feeders packaged with several other components in convenient carry bags that allows the user to construct a variety of antenna that are capable of operating from the 40M HF bands up to and including the 2M VHF band.

Antenna's can be configured as a vertical, flat dipole, sloping dipole, vee dipole's and more. The more ambitious have even been known to construct multiple element beam antennas for operation on the 10M and 6M bands.

Let's look at the various Buddipole offerings. You will see each unit differs in terms of versatility and transportability.

The Standard Buddipole is packaged in a thermoplastic cylinder of 100mm diameter and 680mm long. It includes --

- Two anodized aluminum arms
- Two telescopic whips
- Two multiband coils with coil taps
- VersaTee mast fitting
- Choke balun with 7.6M of feeder
- User Antenna Operating Manual.



The Standard Buddipole

There is no mast or tripod in this kit.

The Buddipole Deluxe Package is packaged in custom padded codura nylon carrying bag and includes all of the above plus the following –



- Tripod with extendable legs and locking base
- Portable Mast – extends to 2.9M
- Rotating Arm Kit (RAK)
- Extra telescopic whip
- Three extra coil clips

The Buddipole Deluxe Package

The Buddipole Deluxe Package Long Version is also packaged in a custom padded codura nylon and includes all of the deluxe package components with the following variations--

- Telescopic Mast length now 5.48M
- Mast Guy kit Included
- Feeder length now 15M
- Carrying Bag length now just over 1M

The Mini Buddipole is a variation on the Standard Buddipole. It is packaged in a small padded codura nylon carrying bag. The major differences being –

- Accessory arms are 11”(279.4mm) instead of 22”(558.8mm)
- There are four accessory arms instead of two
- The carrying bag is only 13” (330mm) in length



The Mini Buddipole

The Buddistick Deluxe Package is a variation on the Mini Buddipole in that it is designed as a portable vertical. It is packaged in the same small bag as the Mini Buddipole. It includes the following –



- Two 11”() accessory arms
- Two telescopic whips
- Two coil clips
- One coil
- Mounting kit
- Vertical antenna clamp
- Counterpoise wire
- User Manual

The Buddistick Deluxe

The Buddistick is essentially one half of a Buddipole dipole that mounts on a custom clamp that can be fitted to a park table top or similar fixture.

Most Buddipole components are interconnected using a short 3/8 x 24TPI threaded section. For example each coil has a male thread at the driven or input side and a female connector on the load or output side. We are conscious that these thread sizes are not common in VK but if you are inclined to do your own thing you will find suitable taps and dies are readily available in the more professional tool suppliers. I know people will shout at me but I like to refer to the Buddipole range as Antenna Meccano!

Mast Options

You may select the Standard Buddipole or Mini Buddipole for portability. You then have the dilemma of how do you support the antenna. There are a couple of options –

Buddipole offer two versions of Shock Cord Masts that mate with the VersaTee. The shorter mast is 330mm when collapsed and 2.4M when extended. Alternatively the longer mast is 580mm when collapsed and 3.3M when extended. The short version will conveniently fit inside the Mini Buddipole carrying bag.



*Center Tee
Adapter*

Another option is to use the common Painters Pole, available from most hardware stores. There is a Center Tee Adapter that matches the VersaTee mast thread to a painters pole thread.

Don't forget a few lengths of cord or light rope for guying the mast when on that mountain top in a force 10 wind.

Principles of Operation

The Buddipole range consists of Short Loaded Dipoles and Verticals. In all cases the feed point impedance at resonance is very low. Expect less than 12 ohms on the 40M band. This becomes a real issue when trying to couple the antenna to a 50 ohm feeder. Budd Drummond solved the problem by re-locating the feed to a point along the antenna where the impedance is close to 50 ohms. If you recall from your antenna theory the impedance increases as you move towards the end of the antenna.

If you study the two coils supplied with the Buddipole (*Red and Black*) you will notice the coil with the red tap lead has a few more turns than on the back coil. This increases the loading on the side of the red coil. The true electrical null is no longer at the physical center of the antenna. By judicious adjustment of each of the telescopic whip lengths and coil tap points you will establish the required point of resonance with an impedance close to 50 ohms at the Versatee terminals. A Choke Balun is provided to minimize any stray currents on the outside of the feed line.

These are the normal caveats that accompany any short loaded antenna. The major issues being the narrow bandwidths and low feed point impedance's. The severity of these effects tend to diminish as frequency increases. You will also notice the amount of loading required reduces with frequency.

Buddipole Options

All the components used in your Buddipole antenna may be purchased individually or as part of one of the packages.

A range of additional options are also available that can be used to improve and extend the capabilities of your Buddipole

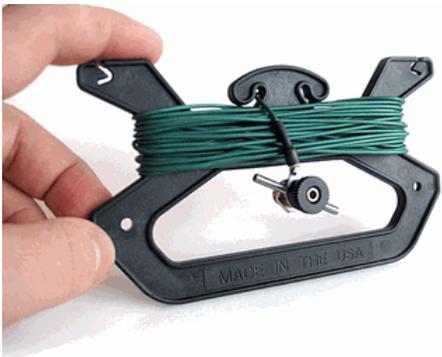
- Knurled Sleeve Whip Protectors (fitted over the thread end of a telescopic whip)
- Extended Telescopic Whips (2.78M when extended)
- Low Band Coils (for 80M operation)
- Mini Coils (for higher frequency use)
- Military style Shock Cord Whips
- Adjustable Shock Cord Whips
- Folding Capacity Hat for top loading
- Wire Assembly (Used for counterpoise or NVIS operation)
- 6M Yagi Kit
- Custom Coaxial Feedlines



Knurled Whip Sleeves



Low Band Coil



Wire Assembly



Mini Coil



6M Yagi Kit

General Performance

How well does it perform? A fair question and I will do my best to provide an un-biased answer.

Firstly, this is a short loaded antenna and the caveats normally attached to similar devices are most certainly present! As the operational frequency is increased the bandwidth increases as the amount of loading required is also reduced. The key to performance is keeping the antenna tuned to the frequency you are using.

I relate to one afternoon. We regularly participate in a net that operates on the lower part of the 40M band from a caravan we leave on a friends property located in the small township of Dargo around 53Km NNW of the city of Bairnsdale. The regular caravan antenna is a 12M fibreglass mast with a thin wire wrapped in a slow spiral fashion from the top down to the base. Essentially we have a 12M vertical. This wire is matched with a SG-230 auto Tuner with about a dozen 10M ground radials forming a counterpoise. While not really relevant the transceiver was a Kenwood 480 HX.

During this particular afternoon I had been experimenting with various Buddipole dipole configurations so I tuned the Buddipole to the net frequency and connected same to the transceivers second antenna port. The antenna configuration as follows –

- Frequency 7060 KHz
- Power 200W PEP
- Center-- VersaTee with TRSB set to 4:1
- A single 22" accessory arm per side
- A low band coil on each side with 34 turns
- A telescopic whip on each side extended to 2.36M
- Tripod and 18' mast (fully extended)
- Configuration – Flat top dipole
- Element direction East/West

With A/B switching tests the Buddipole out-performed the vertical by a minimum of 1 S point (6dB) into the following areas -- VK1, VK3 (Melbourne area and Mildura) VK5 and VK7 (Hobart). Net control in VK1 gave us the 'Top of the Pile' for that session. This test has been repeated on a few occasions with similar results.

It is important to note that for these tests we were using the longer whips and the Buddipole was tuned very close to the exact operating frequency. The bandwidth is quite narrow and moving 30KHz up or down the band would require the antenna to be re-adjusted to maintain the same performance.

Apart from the TRSB there were no other tuning or matching devices in the feed system. The antenna was resonant!

Buddipole on the 80M Band

Yes, we can use the Buddipole on 80M. For a dipole you will need two Long Whips and a pair of Low Band Coils. I used this configuration on a Buddipole Deluxe (Shorter Mast). The lowest achievable frequency is just over 3.45MHz. The useable bandwidth is quite narrow (around 12KHz) so careful tuning is needed. The antenna is just over 7 meters span so guying and support is critical.

A more practical solution is to configure it as a loaded vertical. This can be done by fitting one half of the dipole into the top hole of the VersaTee and attaching a pair of Wire assemblies to the two side holes as a counterpoise. In this configuration you should connect the red lead of the TRSB to the blue terminal on the VersaTee.

Another interesting alternative is to use one of the Shock Cord Whips as part of the vertical element. Adding the Folding Capacity Hat to the top of the whip will electrically increase the length thus reducing the amount of loading coil inductance needed bring the antenna to resonance. With a suitable counterpoise this configuration should have result in quite a low radiation angle. With the right conditions this can provide surprisingly good results.

NVIS Operation

NVIS or Near Vertical Incidence Sky wave is a propagation mode commonly used for relatively short haul HF communication. Usable distances are generally up to a 600 to 700Km from the transmitter site. The signal is radiated upwards then being reflected back by the ionosphere's F layer. Lower frequencies 1 to 4 MHz are favored at night with 5 to 9MHz for daytime use.

As low frequency dipoles in close proximity to ground tend to have quite a high radiation angle the Buddipole range can be easily used as NVIS antenna. I actually think one would be amazed on just how many lower band HF contacts are actually using NVIS mode. If you would like to experiment with a dedicated NVIS antenna on the 80 or 40M bands consider setting up a Buddipole dipole without coils and telescopic whips. The whips are replaced with two wire or counterpoise assemblies. Extend both wires out in a V style as you would with an inverted V. Equally adjust the length of each wire to bring the antenna to resonance. If you don't have room for a full length dipole consider inserting loading coils between the accessory arms and the wires.

The VersaTee and Rotating Arm Kits

All Buddipole units include a clever device called the Versatee. This device is used as a center section for all dipole configurations while also providing a convenient support mast attachment point. A ½" NTP threaded hole in the bottom is for the support mast. There are three female 3/8 x 24TPI threaded mounting points, one at the top and one at each side. Three colored terminal posts allow electrical



The VersaTee



Rotating Arm Kit

connection to each mounting point, the red and blue terminals connect to the side mounting points and the blue terminal connects to the top.

A circular pattern of locating pin holes around each side mounting hole are used with the rotating arm kits (RAK). These can be used to alter the angle of each dipole element in 22.5 degree steps. The RAK is essential if you need to form vee dipoles, sloping dipoles or other angular configurations.

Triple Ratio Switchable Balun (TRSB)

Getting the closest possible match between the antenna feed point and the transmission line is essential for effective operation. Buddipole developed the TRSB as a solution to matching problems.

The TRSB provides RF isolation for both balanced and unbalanced antennas. It also has some impedance matching capability within the range of 9 to 75 ohms. A three position switch allows easy selection between 50:50 (1:1), 50:25 (2:1) and 50:12 (4:1) ohm configurations. The TRSB can be used in several situations. You don't need to be a Buddipole user to keep a TRSB in your antenna kit.

A major advantage when using the TRSB is being able to set up a dipole antenna in a symmetrical manner, this means having the feed point at the true center. Consider a loaded 40M dipole, you would expect the center feed point impedance at resonance to be around 12 ohms. Using a TRSB switched to the 1:4 mode the antenna will now present an impedance of 48 ohms to the feed line. The VSWR becomes almost negligible.



Things to Carry in your Buddipole Kit

There are a few useful bits you should consider having in your Buddipole 'Go' bag. The first being a simple notebook and tape measure. It can be worthwhile to record details of an antenna like whip length, number of active turns on each coil, element angle and TRSB selection.

Other useful tools should include pliers, some hex (allen) keys. On occasions something will come loose, of course always at a most inconvenient moment. (Murphy is included in all Buddipole kits at no additional charge)

Some form of mast guying is essential. We have firsthand experience of masts falling. The antenna always meets the ground in a manner as to cause the most damage.

Carrying extra coaxial cable plus a few adapters is worthwhile. Don't forget to include a few lengths of cord for tying things down.

Finally consider purchasing a graphical antenna analyzer. Antenna tuning is so much easier with one of these. The impedance and VSWR plots are presented on a small LCD in real time. We use the YouKits FG-01. We are somewhat biased because we also sell it.



FG-01 Antenna Analyzer

Do's and Dont's

Firstly and most important – Always check for power lines before raising your Buddipole

Buddipole antenna components have been constructed from quality materials and have been designed to provide a long and useful working life if appropriately treated. A small amount of preventive maintenance and precautionary measures are needed to keep it in top condition.

Always use a guy kit, even on a calm day. Masts will fall and unfortunately a broken whip or damaged coil is more often the result.

Don't rely on a shack based antenna tuner to correct for large resonance or matching errors. It may well make the transmitter happy but the performance will be disappointing.

The Buddipole antenna range has been designed for portable use and is not really suitable for longer term installations. It is fine to leave an antenna up for a few days but be certain to clean and remove any moisture from the components before putting it into storage.

Be careful when using higher power levels. The Buddipole antenna power rating is 250W. Always keep the coil clip nuts firm and tight, not over tight as you can damage the coil. I have cooked a coil by having a loose coil clip using 200W PEP. Also be aware of EMC limitations with proximity to people and pets.

Need More Help

A heap of information is available from the manufacturers. Have a look at the Buddipole web site www.buddipole.com