

2 Meter Backpack Quad Antenna, by Dave KG0ZZ

This 2 meter 3 element cubical quad antenna is small, lightweight and portable. A backpack antenna that is easy to put together in just minutes and parts store inside the boom making it ready for travel or storage. Three element quad antennas typically have about 2 dB more gain than a comparable size yagi and should rival the performance of a five element yagi antenna.

Web site: http://www.amateurradio.bz/2m_backpack_quad_antenna.html



Parts

- 1-1/4" (40 mm) or 1-1/2" (50 mm) PVC pipe, 30-7/8" (78.4 cm) long.
- 2 each 1-1/4" (40 mm) or 1-1/2" (50 mm) PVC pipe caps.
- 3 each 5' (1.5 m) lengths of 1/4" (7 mm) fiberglass rods.
- 2 each #6 x 32 x 3/8" (10 mm) Machine screws.
- 2 each #6 x 32 nuts.
- 2 each #6 Split or internal tooth lock washers.
- 6 each #6 Crimp-on ring connectors.
- 2 each uninsulated crimp-on butt end connectors.
- 3/8" O.D. x 1/4" I.D. (7 mm I.D.) x 1' (25 cm) Clear vinyl tubing.
- 12 each 1/4" (7 mm) Plastic kite nocks. Video http://youtu.be/kojw_-z39z0
- 1 Piece of .080 weed trimmer string, 2" (50 mm) long.
- At least 21' (6.4 m) of 14 gauge stranded copper antenna wire.
- Mast mount clamp and hardware.

Construction

In building this antenna for the first time I found that a large metal mounting bracket would not work well with the antenna. A large piece of metal or a metal boom tends to cause a slight problem with SWRs especially if the antenna is designed to be built with a non-conductive boom. If mounting the antenna to a metal mast a section of about four feet of PVC pipe, with a wood stiffener placed inside, should probably be added to the top of the mast to mount the antenna. The antenna builder should also be aware that this is an ungrounded antenna and that care should be taken.

I used the standard cubical quad formulas and used 146 MHz to calculate the lengths of the wire elements but the antenna came out instead resonate closer to 147 MHz. Please keep this in mind if you would like to build the antenna for a lower frequency. The formulas used for calculating the antenna element and spreader lengths are discussed in the video, <http://youtu.be/BrVgcvqwnq>.

The boom needed to be large enough to fit the parts inside but also needed to be small enough to still fit the U-bolts. I decided to use a 1-1/4" PVC thick wall pipe for the boom. Being 30-7/8" long it is just slightly longer than the reflector spreaders. If I were to remake the antenna I might next time choose 1-1/2" PVC thick wall pipe for the boom just for a little extra storage space inside. Fitting the spreaders and wire elements inside the boom was easy but trying to get a plastic zip-lock bag containing the small parts inside proved to be a bit challenging. After a couple of tries I did manage to get all the parts inside of the boom. I found it best to leave the vinyl tubing on the spreaders and put just the nocks in the plastic bag then place the parts inside the boom. For a four element backpack quad antenna use 1-1/2" PVC thick wall pipe.

After drilling the holes in the boom, if the spreaders are a tight fit then use a small round file to just slightly enlarge the holes. The clear vinyl tubing is used to help hold the spreaders in place. Also, the clear tubing should shrink in the sunlight for a tighter fit if using the antenna outdoors for fixed use.

Left over glue from stickers can be removed from the fiberglass rods using a paper towel dampened in paint thinner or mineral spirits. Cleaning the rods with a wet paper towel may also reduce the amount of loose fiberglass splinters that may otherwise end up in your hands.

Video Instructions

Watch the video below to learn how to build this antenna. <http://youtu.be/IAiilzV8Npl>

A New Set of Plans

The following two diagrams are different than those shown in the video. I have recalculated all of the element and spreader lengths in order to make the antenna more resonate in the center of the band. The measurements for the boom remain the same -- other than suggesting 1-1/2" PVC pipe for the boom. To see the results of the new measurements please watch the follow up video, <http://youtu.be/FwXq1zXkhHU>.

Revised Plans
Based on 145 MHz

Reflector 85-1/4" (216.5 cm)	Driven Element 83-3/16" (211.3 cm)	Director 80-11/16" (205 cm)
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14 Gauge stranded wire. Cut, mark and fold as shown below.

R: Allowing 1/8" (3 mm) for connector, L = 85-1/8" (216.2 cm).

↑	↑	↑	↑
10-19/32" (26.9 cm) (10-9/16"+)	31-29/32" (81 cm) (31-7/8"+)	53-7/32" (135.2 cm) (53-3/16"+)	74-17/32" (189.3 cm) (74-1/2"+)

DE Square Shape: Allowing 1-7/8" (4.8 cm) for insulator, L = 81-5/16" (206.5 cm).

↑	↑	↑	↑
9-15/32" (24 cm) (9-7/16"+)	30-1/4" (76.9 cm)	51-1/16" (129.7 cm)	71-55/64" (182.5 cm) (71-7/8"-)

DE Diamond Shape: Allowing 1-7/8" (4.8 cm) for insulator, L = 81-5/16" (206.5 cm).

↑	↑	↑
19-55/64" (50.4 cm) (19-7/8"-)	40-21/32" (103.3 cm) (40-5/8"+)	61-29/64" (156.1 cm) (61-7/16"+)

D1: Allowing 1/8" (3 mm) for connector, L = 80-9/16" (204.6 cm).

↑	↑	↑	↑
10-1/32" (25.5 cm) (10"+)	30-13/64" (76.7 cm) (30-3/16"+)	50-3/8" (127.9 cm)	70-17/32" (179.2 cm) (70-1/2"+)

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