Short construction manual for 12.5 Ohm, 28 Ohm and 50 Ohm design 70 MHz and 50 MHz DK7ZB yagis

Source: http://www.nuxcom.de/pdf/nuxcom-construction-manual-4-6.pdf

You receive all parts you need for assembling the antenna. The material is not handled in any way, it will be all your work. Not included in delivery is a mast clamp and a boom support. Last one is recommended especially for long antennas. Mast clamps and material for a support are available as accessory in the shop.

This manual is only a recommendation on how you can build up a working antenna with the delivered parts. Individual adjustments are possible. In all cases the customer is responsible for the proper function of the antenna.

All lengths and measurements at DK7ZB antennas have to be followed exactly, or you will not have the predicted results.

Handling of the boom rod:

If the boom rod is split, mount the boom connector first to have the full length of the antenna. Then mark the points for element mounting according the dimensions table. Leave 10mm space to the ends of the rod. If your antenna is prepared for pre-mast-mounting, the boom is 20cm longer. Therefore the first element would be mounted at point “21cm” (20 + 1 cm). Now mark continuously the points for all elements. Don’t measure from element to element, use a folding rule to mark all points continuously related to the starting point. When you have marked all points, you can disassemble the boom for further work.

Mounting reflector and directors:

Picture 1: First we fix the big element clamp to the boom with a screw M4x35 and a flat washer and nut on the lower side. On **picture 2** we can see the final mounting. The element is split into two parts and each halve is being connected to the element clamp with an M4x30 screw (plus flat washer on the top and a nut on the bottom). For electrical contact and better stability we use an aluminium strip to fix the rods.

Calculating the correct length for the element rods:

In the enclosed sheets with your antenna dimensions you see always the total element lengths from tip to tip. Because our way of element mounting we have a break in the middle so we need to include this into our calculations. In the following example we assume that the element length is 3000 mm. The element will be split in two parts and we will see each half itself. Therefore one half is 1500 mm. Now we calculate the break in the middle out of this length, it is total 10 mm, so we deduct 5 mm from each halve and get a length of 1495 mm per half. Drill the fixing hole (4,5mm) for the screw in 46 mm distance from the end of the tubes.

We recommend sealing the ends of the tubes (inner and outer end) with some silicone or hot glue. For the outer ends you can use also pipe caps which are available in our online shop.

Construction of the dipole:

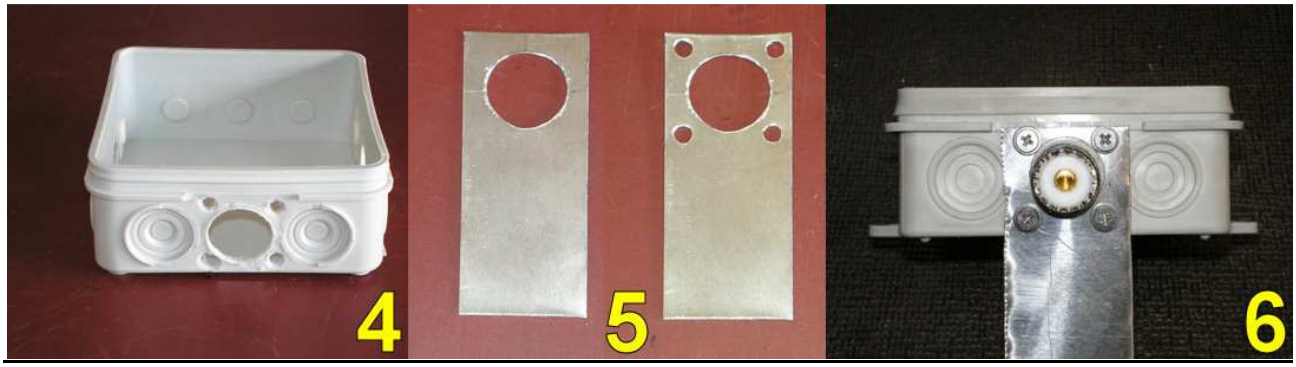
Picture 3: First we build up the radiator. We start similar as we would mount a director and connect a big element clamp on the boom. A special dipole connector is being used at same time as insulator between the two radiator tubes and together with the element clamp as support for the radiator. Use the M4x50 mm screw to fix the dipole connector and the element clamp to the boom.

Calculating the length of the radiator tubes

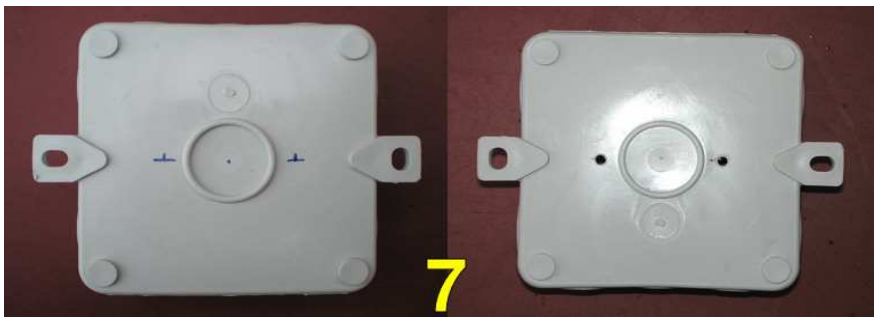
The break in the middle between the radiator tubes is automatically 20 mm when they are pushed in as far as they will go (important!). The given radiator length in the dimension sheet is also given from tip to tip, so we have to deduct this break from the total length. For example if you have a given length of 2900 mm, we deduct 20 mm (= 2880) and divide it by two and get a length of 1440 mm per radiator tube.

Now drill the holes through the pre drilled holes in the dipole connector for the fixing screws (outer end, drill with 4.5mm) and for the contact screws (inner holes, drill with 3.5 mm).

Handling of the connection box

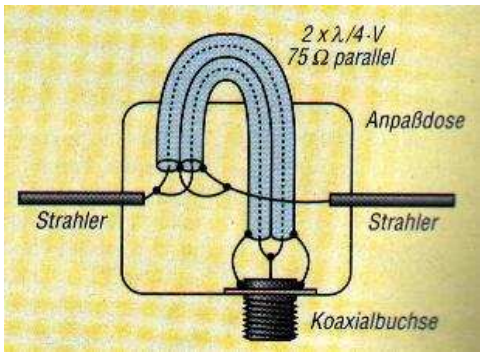


Picture 4: Cut a hole on one side of the box without a lug. Apply the coax socket in the hole, mark the mounting holes and drill them with 3.5mm carefully. **Picture 5:** Drill a 16mm hole in the grounding plate and apply the coax socket - mark and drill (3.5mm) the mounting holes like before. Cut all overlaying edges at the box. **Picture 6:** Attach the coax socket and the grounding plate with the provided M3x12mm screws (including one flat washer) to the box. After that fold the plate in about 26mm distance from the box in a 90 degrees angle away from the box. You can cut the plate about 10mm after the bend and drill a hole in the end what will be a fixation of the box to the boom (no picture). The second fixation will be with the contact screws on the radiator rods.



Picture 7: Mark and drill two holes on the bottom of the box for the contact screws (3mm holes). The distance between the two holes is 35 mm or 17.5 mm from the middle of the box. These holes are used for the 3,9 x 16 mm contact screws from the connection box to the radiator tubes. If you are building up a 28 Ohm or 12.5 Ohm Yagi, you can make the holes in the middle of the box. If you are building a 50 Ohm type yagi, you need more space for the choke, so make these holes at the end of the box near the wall opposite to the coax socket (see also picture 12).

The choke (DK7ZB match) for the 28 Ohm and 12.5 Ohm antenna types



The choke needs a length of lambda/4 multiplied with the shortening factor "V" of the cable. Only the fully shielded length of the cable counts to the total length, soldering lugs do not count to the length and should be as short as possible. It could make problems if the solder lugs on the radiator side are too long, because they would "stretch" the dipole some millimetres and you could get mismatching in the system.

28 Ohm antennas have two parallel 75 Ohm cables; 12.5 Ohm antennas have two parallel 50 Ohm cables.

	Lambda/4	**V = 0,66** PE -cables RG59, RG58	**V = 0,70** PTFE - cables RG179, RG188	**V = 0,83** PE –foam cables Aircell 7
50,150 MHz	149,6 cm	98,7 cm	104,7 cm	124,1 cm
70,250 MHz	106,8 cm	70,5 cm	74,7 cm	88,6 cm

Assembly

Picture 9: On the one end solder the 4mm cable shoes to the ends and connect the choke with the 3.9 x 16 mm screws to the radiator tubes. If you are using RG59 or RG58 you have to carry the choke outside of the box, make a coil outside the box and lead it back into the box.

Picture 10: In the inner it will be soldered to the coax socket. The inner conductors to the inner contact and the outer conductors to a 3mm cable shoe, which will be connected to one M3x12 screw at the coax socket. **Picture 11:** If you are using RG179 or RG188 PTFE cable, you can wind it to a coil and leave it completely in the box as shown in the picture.

Choke for antennas in 50 Ohm design

Picture 12: In fact this isn't really a choke, it's only a coil for suppression of the sheath current. 50 Ohm systems do not need a transformation. The choke has about 10 windings of thin coax cable on a 25 mm diameter PVC tube. The number of windings is uncritical, but it should have at last 7 windings for good suppression. Solder one end to the coax socket - connect the outer conductor with a 3mm cable shoe to the M3x12 screw. Solder the other end to the two 4mm cable shoes and fix them with the 3.9 x 16 mm contact screws to the radiator tubes. Now your antenna should be ready.

Last workings and fine tuning:

Mount all elements and the dipole to the boom, your antenna is ready. Use an (optional) mast clamp to connect the antenna to a mast and do some testing (the antenna height over ground should be at least 4 meters). If it works well, you can seal all vents in the box with silicone or hot glue. Some professionals fill the box with epoxy resin to protect it completely. If you don't fill it, leave a small hole in the box on the future bottom side of the box, so that condensed water can flow out. There are pipe caps for the boom included in the set to close the rod.

There shouldn't be any need for fine tuning in 50 Ohm and 28 Ohm systems. But 12.5 systems have a small bandwidth and are very sensible against the surrounding, so you could optimize the SWR with the length of the dipole. If the best SWR is below your preferred frequency, your radiator is too long. Try to shorten it in 1-2 mm steps. If your best SWR is above the preferred frequency, then your radiator is too short. Please check first if you can live with this mismatching, because making the radiator longer is a problem. Check also if your element lengths and distances are ok. It is better to leave the dipole tubes some millimetres longer before cutting to length.

If you need more help, so please contact us or use our support forum at http://forum.nuxcom.de.

If you have critic or suggestions regarding this manual, please contact us:

Attila Kocis Kommunikationstechnik
Lenzenweg 2
D-96450 Coburg
GERMANY
Fax: +49 9561 3551883
E-Mail: nuxcom@nuxcom.de

Disclaimer:

Drilling, cutting and other technical work have to be done carefully and can hurt you. We are not responsible for any accidents which result in following our instructions in the manual. Please be careful.