Construction manual for 50 MHz XL design yagi-kits

Source: http://www.nuxcom.de/pdf/nuxcom_construction-manual_6m-XL.pdf

Please check if all parts listed in the invoice are delivered with the kit. In the kits are all parts included for self-construction of your antenna, including a mast connection.

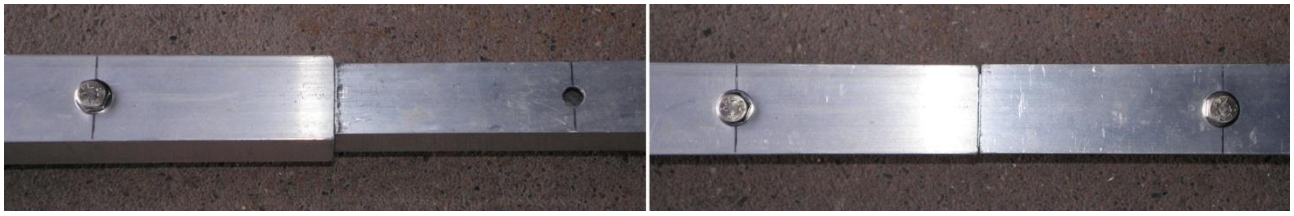
This manual is only a recommendation on how you can build up a working antenna with the delivered parts. Individual adjustments are possible. In all cases the customer is responsible for the proper function of the antenna.

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

Please consider that the given element lengths on the data sheet mean the visible length. The elements are tapered with 16mm rod in the middle and 12mm at the ends. The 12mm rods are pushed into the 16mm rods, so they have to be at least 3cm longer as given on the data sheet. For the reflector there are two 12mm rods included which are longer than 100cm and the two rods shorter than 100cm can be used for a director.

Handling of the boom rod:

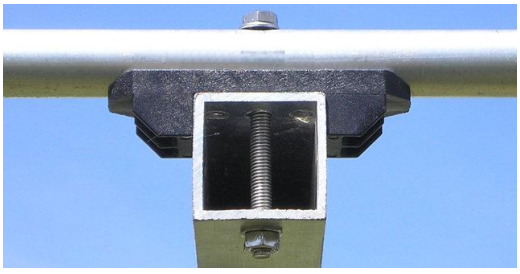
If the boom is split into more parts, assemble the boom first to get the full boom length. The connection of two boom halves is done by a 50cm long smaller tube (20x20mm at 25mm boom and 25x25mm at 30mm boom), which is pushed at half length into each boom part. To connect the rods use two hexagonal head screws S6X35 (25mm boom) or S6x40 (30mm boom).If the boom is 3-parted you will get material for 2 connections.



Please consider in which order the boom rods are connect together. An element should not be directly in the middle of the mast connection. We deliver some more boom material with some kits, then you may cut the boom if you want.

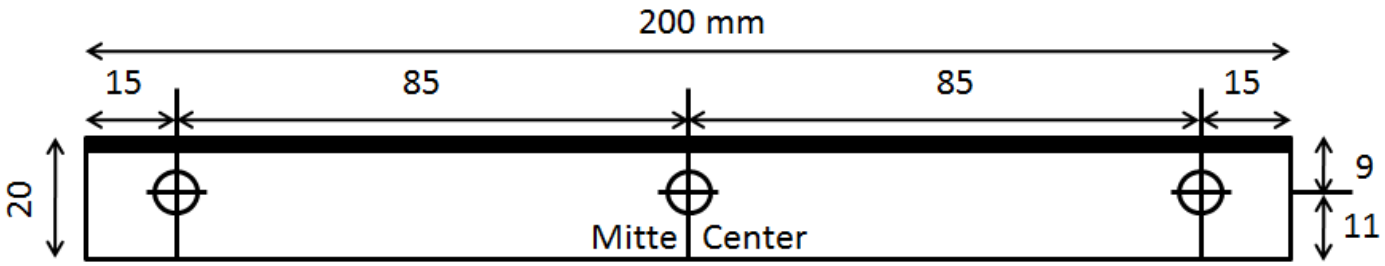
Now mark continuously the points for all elements. Keep about 15mm space to the ends of the boom, so that the pipe caps can be attached. Don't measure from element to element, use a folding rule to mark all points continuously related to the starting point. When you have marked all points, you can disassemble the boom for further work.

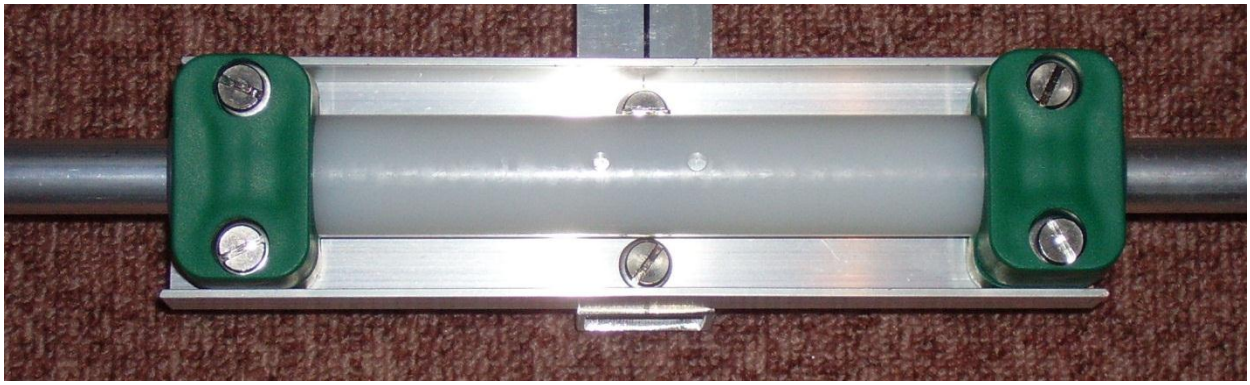
Mounting of reflector and directors:



Reflectors and directors are mounted with M5x50 or M5x55mm screws and an element clamp to the boom. Therefore the 16mm rod and the boom have to be drilled with a 5.5mm drill. The middle piece consist of a 100cm long 16mm round rod. The outer ends of the 16mm rod are cut in with about 3cm length. In the ends the 12mm rods are pushed in as long as you get the element length needed according to the data sheet. This method is called „tapering". You have to follow exact the data given in the data sheet, any change of the element length and tapering will need a recalculation of the antenna. The Rods are fastened with the 10-16mm hose clamps.

Construction of the dipole:



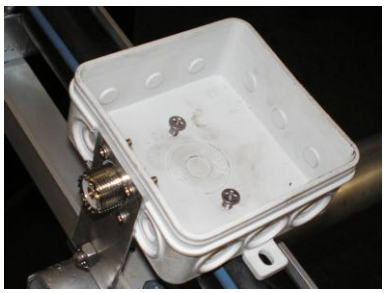


The dipole holder consists of two pieces of angled aluminium (20x20x2mm) with each 200mm length, which are mounted across the boom. 25mm plastic pipe clamps are attached at the ends. They are fastened with Z6x45mm screws (don't forget the flat washers!) to the aluminium brackets. The aluminium brackets are also mounted with Z6x45mm screws to the boom. The dipole connector will be clamped between the pipe clamps.

The radiator consists of two halves 16x1.5mm aluminium rod, each 50cm long. The outer ends are cut the same way as the other elements to attach the 12mm rods. Mark points through the holes in the dipole connector on the aluminium rod and drill 3,5mm holes for the contact screws. Later the choke will be connected here.

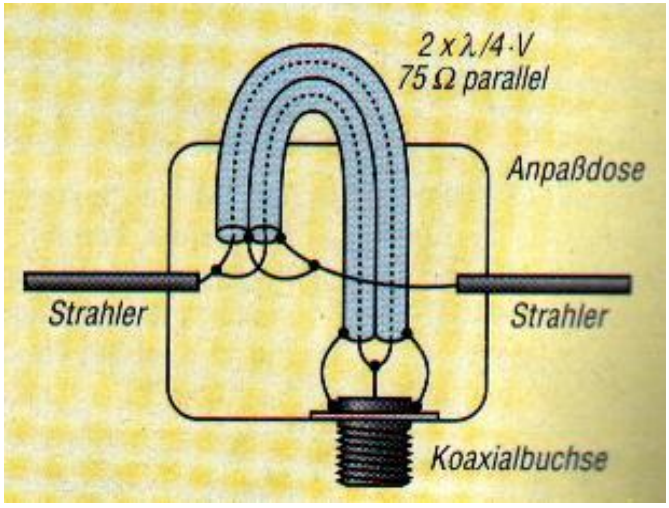
Making the connection box

We use an IP44 box originally used for electrical connections. Cut a hole in the middle of one side for the coax socket. The following sentence is only valid if you DO NOT use RG179 or RG188 PTFE cable and your antenna is a 12.5 or 28 Ohm type: At the opposite side cut also a hole into the wall to be able to lead the choke outside of the box and back. If you use thin RG179 or RG188 PTFE cable you can wind the cable up and store it completely in the box – you don't need an extra hole. Drill four holes into the box around the coax socket for the screws fixing the socket. You may use the coax socket as drill pattern. You may also drill a hole to the end of the grounding plate, where it will be connected to the boom.



Then you can mount the box on the dipole. Make the holes through the bottom of the box for the contact screws (distance of the holes is 20mm). Do not make the holes too big. For testing you may attach the screws now, but don't screw them to hard in now.

Choke for antennas in 28 or 12.5 ohm DK7ZB design:



The DK7ZB match matches the 28 or 12.5 ohm impedance of the dipole to 50 ohms you need for connecting your transceiver and feeding cable. The picture shows you the schematic of this match.

The choke has a length of lambda/4 multiplied with the velocity 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.

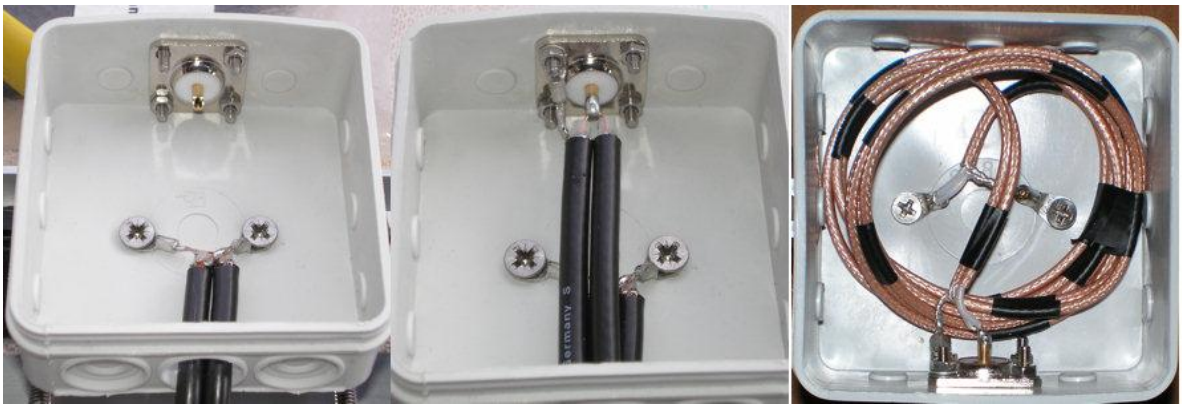
28 Ohm antennas have two parallel 75 Ohm cables; 12.5 Ohm antennas have two parallel 50 Ohm cables.

The given length in the following table shows only the fully shielded length of the cable, but without the solder lugs at the ends. In real I would recommend to cut the cable 5 or 6 cm longer than in the table.

	RG59 B/U 75 Ohm V = 0,66	RG179 PTFE 75 Ohm V = 0,7	RG58 50 Ohm V = 0,66	Aircell 5 50 Ohm V = 0,82	Aircell 7 50 Ohm V = 0,83
28 ohm match	0,99m	1,05m	X	X	X
12,5 ohm match	X	X	0,99m	1,23m	1,24m

For very high power operation you may also use other coaxial cables. You only have to know the velocity factor "V" of your cable to be able to calculate the correct length.

Mounting the 28ohm/12.5ohm choke into the box



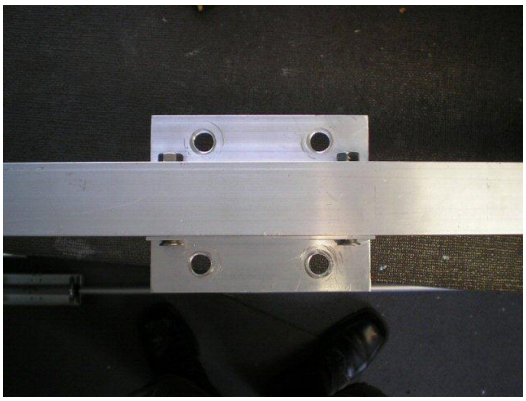
Now connect the one end to the dipole rods with the 4mm cable shoes and the self-tapping screws BS3.9x16. The other end will be connected to the coax socket. Solder the inner conductor to the middle contact, the shield with the 3mm cable shoe to one of the 3mm screws which hold the coax socket - this is the ground.

Now the box is nearly complete. The grounding plate should be curved 90° where it arrives at the boom and then connected with the M4x35mm screw to the boom

The choke for 50 ohm design antennas

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 least 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.

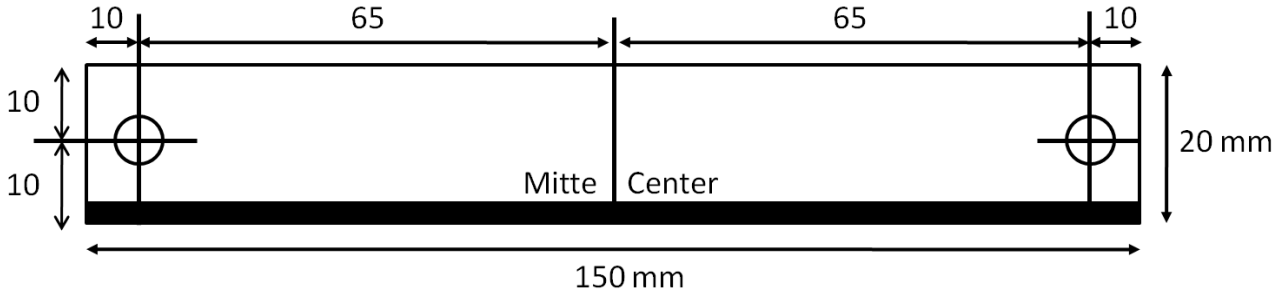
Making the mast connection:

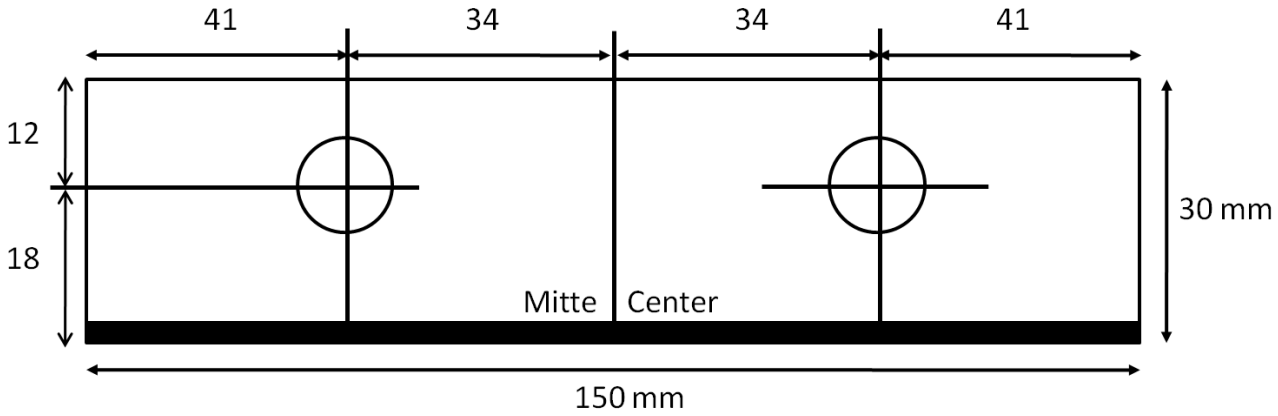


Find the balance point of the antenna first and make a marker on or near this point. There should be the middle of the mast clamp brackets too.

You have received and 30cm long aluminium L-profile (30x20x3mm) which has to be cut into two 15cm long parts. Make 9mm holes on the wide side for the pipe clamps, and 6,5mm holes for the fixation to the boom on the small side. The two brackets will be fixed with two screws M6x45 (plus nut and two flat washers) over and below the boom, with the small side looking to the boom and the wide side looking to the mast. Connect the two pipe clamps to the brackets and your mast connection is ready.

The delivered pipe clamps are for maximum 60mm mast diameter. You can purchase bigger ones if you have a thicker mast rod. The following measures are for the 60mm clamps:





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 small steps. If your best SWR is above the preferred frequency, then your radiator is too short. Check also if your element lengths and distances are ok.

Also the feeding cable can cause mismatching on certain lengths. Check also with different lengths.

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

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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.