

Please check the completeness of the delivered antenna kit with the parts list on the invoice. All parts needed for self construction should be in the kit, except a mast clamp and a boom support. They can be purchased separately if needed.

**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 of our antennas have to be followed exactly, otherwise 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. Please check the right order of the boom parts to avoid collisions between boom connector and elements. 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 15-20cm longer. In this case start the marking at the last director and go backwards. Never measure from element to element, use a folding rule to mark all points continuously related from the starting point. You will avoid that one measuring error will continue on the whole antenna. When you have marked all points, you can disassemble the boom for further work.

### **Mounting reflector and directors:**



Now you can drill a hole at the destined position for the parasitic elements (directors, reflector) on the boom, either 3.5 or 4.5mm, depending on the screw diameter. At the end you can mount your parasitic elements like shown in the picture.

### **Construction of the dipole:**

As connection box we use an IP54 electric branch box. The mounting differs from the antenna design (28 – 12.5 or 50 ohm design). Please read it carefully and ask us if you have further questions.

### **Handling of the connection box**

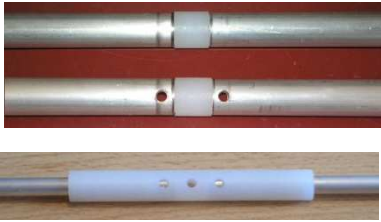
Generally there are two ways of mounting the dipole box on the boom. Either with two screws outside of the box or inside of the box. The advantage with mounting screws outside of the box is that you can dismantle your antenna easily without opening the box, which is good for portable antennas.



Cut the lug only on one side and cut the middle hole on same side. Cut all overlaying edges at the box so that the grounding plate can be attached flat to the box. Apply the coax socket backwards into the hole and use it as drill pattern for the 3mm holes used for the mounting screws. 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 90 degrees angle away from the box and drill a hole in the end what will be the first fixation of the box to the boom. The remained lug on the other side will be the second fixation to the boom.



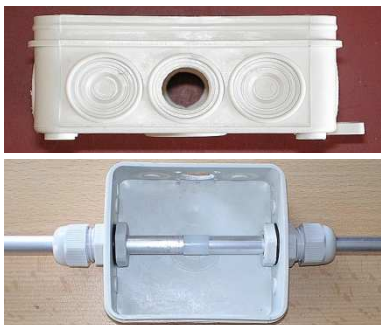
## Assembly of the radiator



Slip the two radiator rods over the dipole connector (maybe you have to burr the inner of the rod). If your antenna has an 6mm or 8mm radiator, the rods have to be stuck into the connector. Please check first if the delivered 6 or 8mm rods fit into the connector, there can be small deviations at the outer diameter. If one is too thick, use another tube.

**Important:** The given length of the radiator is always from end to end, including the break in the middle. You can let them a little bit longer for fine tuning at the end. For later connection of the choke drill two 3.5mm holes through the inner ends of the dipole. With an 6mm or 8mm radiator drill 2.5mm holes through the predrilled holes in the dipole connector.

Only for 28 Ohm or 12.5 Ohm yagi designs (50 ohm design see down)



Drill two holes through the side of the connection box, they will hold the radiator in place. Our 144 MHz antenna kits with 10mm radiator contain screwed cable glands. They may be used to stabilize the radiator in the box. They are not included in kits with 12mm radiator (they fit only for rods up to 10mm) and in 430 MHz sets (not needed due to the short wingspan of the radiator). If you use the cable glands, you need a 16mm hole in the box. If you use RG59 for the choke of your 432 MHz antenna you may move the radiator to another position in the box because RG59

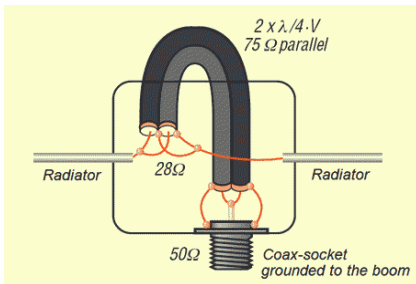
needs more space. Do not mount the radiator in the box for now, wait until the choke is soldered to the coax socket.

There are differences for 50 Ohm type antenna designs:

In 50 ohm design antennas you need more space for the choke (see picture), so you will have to move the radiator nearer to the wall of the box.



## The choke (DK7ZB match) for 28 ohm and 12.5 ohm antennas



The choke transforms the 28 or 12.5 ohms at the dipole to the 50 ohms needed for your coax and radio setup. It consists of two parallel 75 ohm (28 ohm design) or 50 ohm (12.5 ohm design) cables and should have a length of  $\lambda/4$  multiplied with the shortening factor "V" of the cable (see table). Only the fully shielded length of the cable counts to the total length, soldering lugs do not count to the length and must be as short as possible. Especially on 70cm it could make problems if the solder lugs on the radiator side are too long, because they would "stretch" the dipole some millimeters and you would get mismatching in the system. That's the reason why in many cases of homemade yagis the resonance frequency is below the predicted point. Before you cut the dipole rod, try to shorten the connections between choke and radiator. The shield of the choke will be grounded to the boom on the coax socket side with the grounding plate.

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	<b>Lambda/4</b>	<b>V = 0,66</b> PE cables RG59, RG58	<b>V = 0,70</b> PTFE cables RG179, RG188	<b>V = 0,83</b> PE foam cables Aircell 7
<b>144,3 MHz</b>	52,0 cm	34,3 cm	36,4 cm	43,2 cm
<b>432,2 MHz</b>	17,4 cm	11,5 cm	12,1 cm	14,4 cm

## Mounting of the choke in 28 and 12.5 ohm design antennas



Solder the inner conductor of the choke to the inner contact of the coax socket. The two shields will be split, one to the left and one to the right side. Don't forget to solder a connection between them on the cable side. Connect the two shields with the 3mm cable shoes or solder lugs to the coax socket with two of the M3x12mm screws. Please solder the cable shoes very good together with the shields so they have perfect contact.



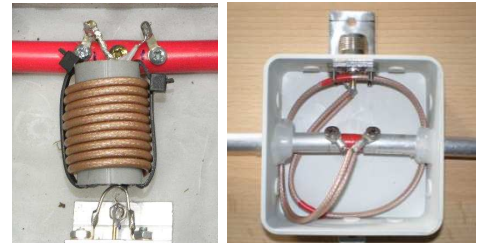
This double grounding prevents mismatch due to bad symmetry, especially on 70cm.

Now you can stick the radiator through the radiator holes and check that it is exactly horizontal. If not, try to cut the holes so that the rod is horizontal. Look out that the radiator is exactly in middle position so that it is exactly symmetrical. Then fix it, for example with insulating tape.



Take the other (unsoldered) side of the choke and solder the 4mm cable shoes to inner and outer conductor. Now you can connect the choke with the two self-tapping screws to the radiator. Please avoid here long connections to the dipole rod. Every millimeter will stretch your dipole!

If you use RG59 for 144 MHz antennas, you have to lead the choke outside the box and back. If you intend to bring more than 300 Watts of HF to the antenna, take a piece of insulated material (uncritical) of 2-3mm thickness between the cables and the boom, else the high voltage can cause a short circuit or arcing between screen and boom. If you use RG179, it will fit perfectly in your box. At 144 MHz antennas you can lay the RG179 choke into the box or wind it to a coil (see pictures). At 430 MHz antennas, both, RG59 and RG179, will fit into the box. With RG59 it could be a bit tricky, so you maybe have to try first with a better position for the radiator, because RG59 is relatively stiff.



## Choke for 50 Ohm design yagis

Because 50 ohm design antennas do not need a transformation, they can be fed with a simple coil containing 5-7 windings of 50 ohm coax cable (RG188 PTFE cable is delivered) on a 16mm PVC tube. The one end is connected to the coax socket, the other to the dipole rods. Please be here also careful to keep the connections between choke and radiator as short as possible. By the way, the length of the used cable is not critical, but you should have at least 5 windings. On the coax socket side the shield is grounded via the coax socket and grounding plate to the boom. You can see a picture of such a choke on page 2.

### **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 (use minimum 2 wavelengths height over ground). 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. For horizontal protection there are pipe caps for boom and dipole included in the kit, in 144 MHz yagis also for the other elements.

If it not works well, you can try fine tuning with the radiator length. On 70cm also the length of the feeding cable can have a transformation effect. This should not happen with 50 Ohm feeding, but we have 50 ohms only on the resonance frequency. Below and above this frequency the feeding is not 50 ohms and special cable lengths can cause transformation effects. Also the surrounding of the antenna can cause different feeding impedance and therefore mismatching.

Hint: Please check first all element lengths and distances. Also there should not be any short circuit between the two dipole halves.

### **Important information only for 430 MHz antennas:**

- The coax socket shows always backside to the reflector and the feeding cable goes over the reflector and should be lead under the boom towards the mast.

- Middle mounting of 430 MHz yagis on electro conductive masts could destroy your radiation pattern and should be avoided. The effect is lower with more distance of the mast to the radiator, so at shorter antennas the effect can be much bigger than at long yagi systems. 430 MHz antennas should always be mounted with a support (available as accessory) or at least with an L-profile over the top of the mast (elements over the top). If you're using non-conductive mast material, for example glass-fiber tubes, you can mount the antenna without any problems in the middle.

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### **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.