



optimale Kurzwellen-Antennen

computer-designed / computer-optimiert

entwickelt von Funkamateuren für Funkamateure

optimum short-wave antennas

computer-designed / computer-optimized

developed by hams for hams

O B 3 – 30

3 Element full sized Yagi 30m

!!! Quality made in Germany !!!

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1. Introduction

The OB3-30 is an extremely high performing 3el Yagi antenna for the 30m band.

OptiBeam shortwave antennas are designed and optimised by support of modern techniques such as computerised antenna simulation and are finally adjusted by extensive tests in practice.

The Yagi consists of the driven element, the reflector and one director.

This Yagi is a so called 25 Ohm design.

Typical for such a design is that the driven element is located considerably closer to reflector than to the director.

By this specific 25 Ohm technique and the computer designed and carefully chosen lengths and positions of all three elements excellent gain, very high f/b and perfect SWR are achieved.

In the following table the essential electrical and mechanical data can be seen:

Bands	30m
Gain (dbd)*	5,8
Gain (dbi)**	12,9
F/B (db)	33
SWR:	
10,00 - 10,13 - 10,15	1,1 - 1,0 - 1,1
Impedance (Ohm)	25
Elements	3
Max. element length (m)	15,54
Boom length (m)	9,93
Turning radius	8,52
Weight (kg)	54
Windload at 130 km/h	884 N / 1,10 m ² / 11,9 feet ²

- * = average gain over a dipole in free space
gain of monobanders for comparison; 2-element Yagi: 4 dbd, 3-element Yagi: 5-6 dbd
 ** = average gain at 20m above ground

2. Assembly

The included schematic diagram is needed for the assembly and the following information is given:

- > type of element (R = Reflector, S = Driver, D = Director) and the position on the boom
- > measurements of the element sections (length and diameter)
- > lengths of the element halves
- > distances between the elements.

The lengths are given in m (meters) and the diameters are given in mm (millimeters).

2.1 Sorting the parts

The antenna to a high amount consists of already pre assembled parts.

All parts of the antenna are marked.

For faster and easier assembly it is recommended to sort the parts per element, i.e. for the driver, the reflector and the director.

2.2 Assembly of the boom

The square boom consists of three sections of equal lengths.

The sections are connected by 8 coupler pieces in total (four pieces per junction).

For each coupling piece 4 screws are needed.

The screws have to be tightened finally not before the parts of the boom really **fit** to each other perfectly. They have to be tightened **very solidly**.

To avoid unnecessary working steps later on, before connecting the boom sections, it is recommended to slide the boom to mast plate (totally pre assembled finished part, see fig. 2.8 and picture page) over the centre section and to screw it at the marked position.

2.3 Element-Platforms

For the element-to-boom brackets 4-cornered angle profiles in a length of 500 mm are used. The insulation and solid fixing of the elements is realised by 4 special UV stabilised tube holders, mounted on each of the platforms.

The three element centre sections ($d = 40\text{mm}$) are already inserted into the platforms (see picture on picture page).

The element centre sections fixed on the platforms have to be mounted at the **underside** of the boom at the marked positions.

The plates are attached to the boom by 2 square brackets (already inserted into the platform by us) which embrace the boom from the top and 4 self securing nuts (see picture page). When finally tightening the square brackets pay attention that the elements are **parallel** to each other.

The square boom makes a straightening of the elements unnecessary in the vertical plane.

For the tightening procedure use the included special tool (nut driver M10/13).

In case the antenna cannot be reached easily while assembling naturally the elements can be assembled completely and then be mounted below the boom in one piece.

2.4 Screw connections of the element sections

While assembling the element sections the following segments have to be inserted into the previous segments with their side which has two drill-holes **equal in size**. The tubes have to be put in until the drill-holes of both segments overlap perfectly. The enlarged drill hole of the previous segment has to point **upwards**.

Then the corresponding ss screws have to be pushed through **from the side of the enlarged drill-hole** of the previous segment.

There are **screws of two different diameters** (6mm and 4mm) and of different lengths.

The longer **6mm screws** are used for the 40/35mm, the shorter ones are used for the 35/30mm and the 30/25mm transition (please orientate by the included schematic diagram of the antenna).

The **4mm screws** have to be used as follows: 25/20mm transition = longest screw, 20/16mm transition = second longest screw, 16/12mm transition = shortest screw.

On the opposite side the washers have to be inserted and the self securing nuts have to be screwed on and **tightened solidly** (hold the screw heads with the included special screw-driver against turning, depending on the screw diameter use the thicker or thinner screw-driver, do it carefully, don't break the screws, the screw heads dive into the enlarged drill-hole, see picture page). This method results in an extremely solid mechanical connection and rattle sounds inside the segment overlaps are totally avoided.

By this way of assembling the required lengths of the sections and the element halves are achieved automatically.

While mounting the elements pay attention that all screw heads show **upwards**.

Keep in mind that the elements hang below the boom. Therefore the screw heads have to be on the same side of the elements where the element plates are located at.

2.5 Assembly of the element sections

Into the element centre section, already mounted to the element platform, you have to slide the 35mm section, and into that the 30mm one (please orientate by the included schematic diagram of the antenna).

Before the following 25mm section is inserted into the 30mm segment (this counts for all six element halves) slide the **ring insulator** (see picture on picture page) -which represents the outer fastening of the centre element truss (see fig. 2.6)- over the 25mm tube. We have already fixed the centre truss rope to the two ring insulators by means of a special loop. Pay attention that the ring insulator is slid over the segment in a way that the truss rope which comes out of the smaller hole leads **towards the centre of the element**.

When the two ring insulators are slid over on the left and the right half of the driver, the reflector and the director element the **centre element truss rope** will hang slack below the elements for the moment.

Do not remove the centre insulator which is already inserted into the truss rope.

You now have to insert the 20mm segments into the 25mm sections.

The 20mm segments are followed by the 16mm ones and they by the 12mm tips.

Concerning the 12mm tips of the driven element the **middle one** of the three drill-holes has to be chosen (regarding tuning facilities, see fig. 4).

2.6 Installation of the centre element truss

Due to reasons regarding stability and optic all three elements are trussed in the centre by means of a little truss mast and a corresponding truss rope (see picture on picture page).

The pre assembled **truss mast** is mounted on a little right angle platform. A square bolt is already inserted into this little platform. This right angle platform has to be placed straight in front or behind the corresponding element and has to be fixed solidly onto the boom.

The centre element truss rope already hangs slack below the element since it was already fixed to the outer element parts by means of the two ring insulators in the moment of the element assembly (see fig. 2.5).

In the centre of the rope we have already fixed an insulator by means of a special double loop. This insulator now simply has to be inserted **on top** of the truss mast.

The ends of the truss rope are fixed to the ring insulators by means of a special loop (see picture on picture page). This loop means a continuous exact fastening and simultaneously delivers the possibility for an adjustment of the truss rope at any time.

The element now can be brought into the horizontal position (no sag) by tightening the rope on both sides at the ring insulators. For convenience we recommend to first remove the insulator from the truss mast so that the rope is slack again. Now the loop can easily be pushed through the hole of the ring insulator and the rope can be pulled as much as needed. Then the loop has to be fixed again and the insulator has to be reinserted into the top of the truss mast.

Long remaining rests of the rope can either be cut off or somehow fixed at the main rope.

Important: Pay attention that the **hole in the ring insulator where the rope is fixed** points upwards when the rope is under tension.

In case the centre insulator might not be exactly in the middle the double loop can be loosened as well and a fine adjustment can be done.

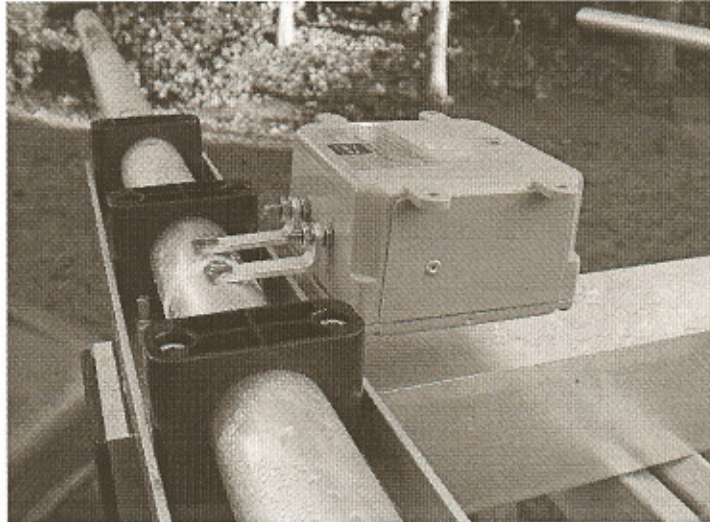
2.7 Installation of the balun

The antenna is fed through a high quality 2:1 balun.

The balun has to be connected to the driven element (S30). We have already assembled two right angle aluminium straps to the balun. They have to be slid over the driver screws, followed by a washer, and then screwed onto the element.

Furthermore it is recommended to additionally secure the balun box to the boom with a tie wrap.

The entire installation can be seen on the following picture (for demonstration element just turned around here).



2.8 Installation of the boom to mast plate

The boom to mast plate is a completely pre assembled part (see picture page) with four horizontal square-bolts, embracing the boom, and four vertical U-bolts, embracing the mast.

The boom to mast plate should have already been slid onto the centre boom section up to about 4.20 meters from the rear (see marking on the boom) in the moment of the boom assembly (see fig. 2.2).

It now should be fixed solidly, if not already done before.

2.9 Installation of the boom truss

The boom of the antenna mounted to the mast has to be trussed by two included stainless steel ropes of 4mm in diameter. The **shorter** rope leads to the **rear** (reflector side), the **longer** one to the **front** (director side).

A turn buckle is inserted into each steel rope at one side and a square bracket with a transverse strap at the other side.

These transverse straps with the outer ends of the boom truss fixed to them have to be mounted to the front and to the back of the boom in a way that the centre piece of the boom truss is **exactly centred above the boom to mast plate** and can later be slid upwards the mast by **about 80 cm**.

The square brackets have to be mounted to the boom with their shanks showing **upwards** so that the transverse straps can be slid over them from the top.

Fix the transverse straps onto the boom with two nuts each by turning the nuts onto the shanks of the square brackets solidly.

At the final installation the centre piece of the boom truss has to be slid up the mast by about 80 cm until the boom truss is slightly pre tensioned (not slack any more).

By the use of the turn buckles which should be turned out to about 2/3 of their lengths the truss ropes have to be solidly tensioned until the boom is stable in the **exact horizontal position**.

The entire installation can be seen on the picture pages.

3. Connection of coax cable

The feeding of the antenna is done by 50 Ohm coax cable.

The coax cable has to be connected to the balun at the feed point. For the connection a PL-259 connector is required. The connector should be **sealed** against water entry.

4. Adjustment of the antenna

An adjustment of the antenna is not necessary if the given dimensions are exactly observed.

By some influences of the direct surroundings it may happen that the resonance of the antenna (= point of best SWR) shifts slightly.

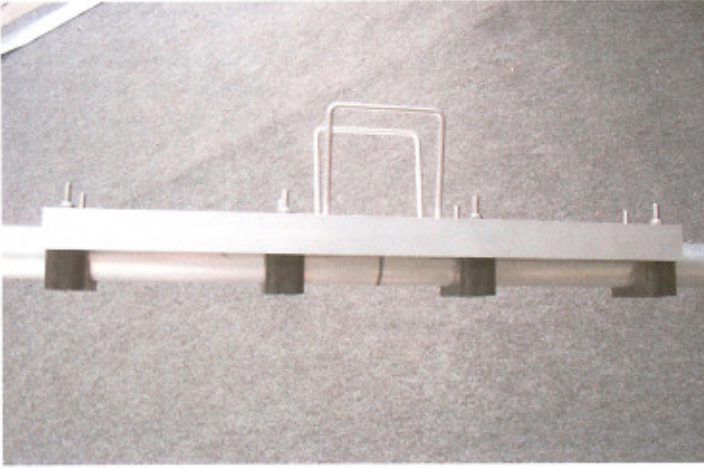
By minimum changes of the driver length (=shortening or lengthening of the outer 12mm sections) the resonant frequency can be shifted to the desired point.

By a slight decrease of the lengths of both element halves (put outer section in to the last drill-hole) on both elements the resonant frequency will be shifted upwards, by an increase (pull final section out to the first drill-hole) it will be shifted downwards.

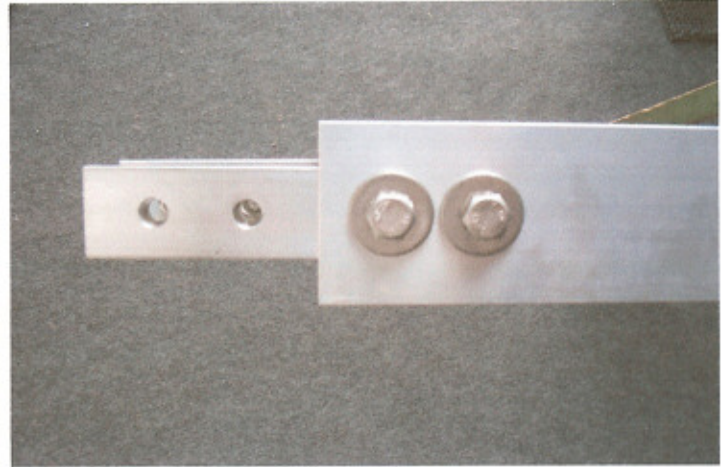
5. Position of the antenna at strong winds

At strong winds the antenna should be placed in a way that the tips of the elements **show straight into the wind** which means that the boom stands broadside to it.

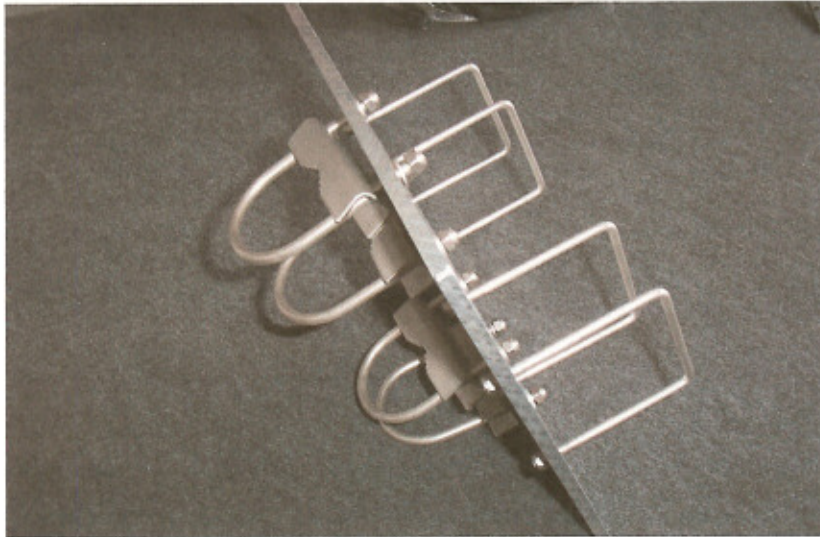
Hereby physical stress to the elements is avoided and their duration is enlarged.



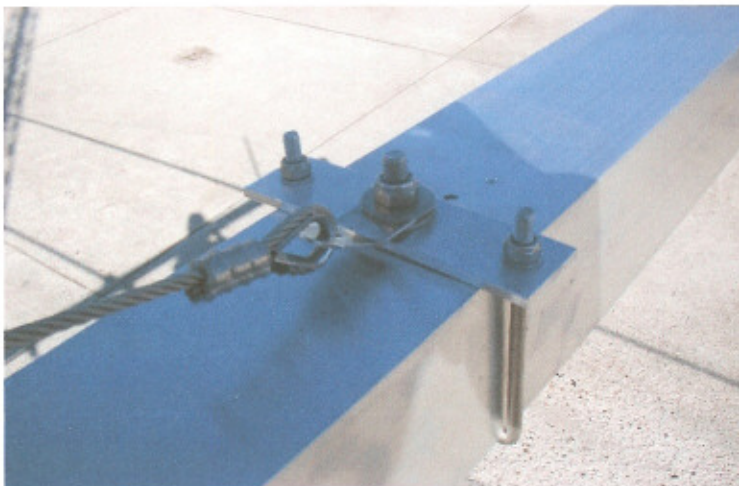
Element-Plattform mit Element-Mittelteil
element platform with element centre section



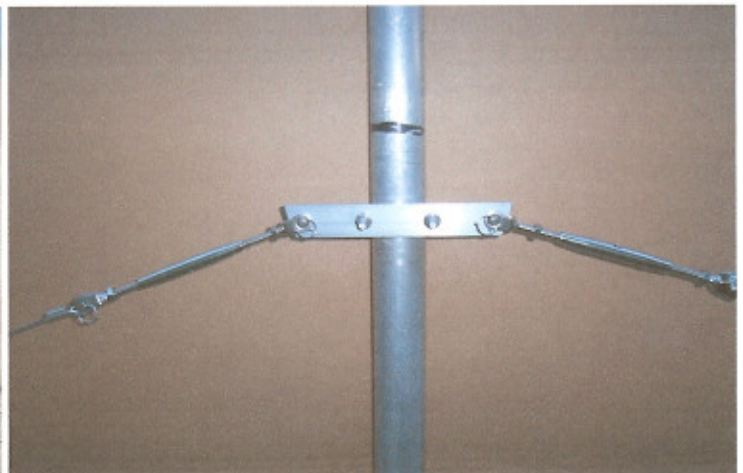
Boom Segment mit zwei eingesetzten Boom-Kopplungen
boom segment with inserted boom coupler



Boom Masthalterung mit eingesetzten U- und Vierkant-Bügeln
boom to mast plate with inserted U-bolts and square brackets



Äussere Befestigung Boomabspannung
outer fixation boom truss



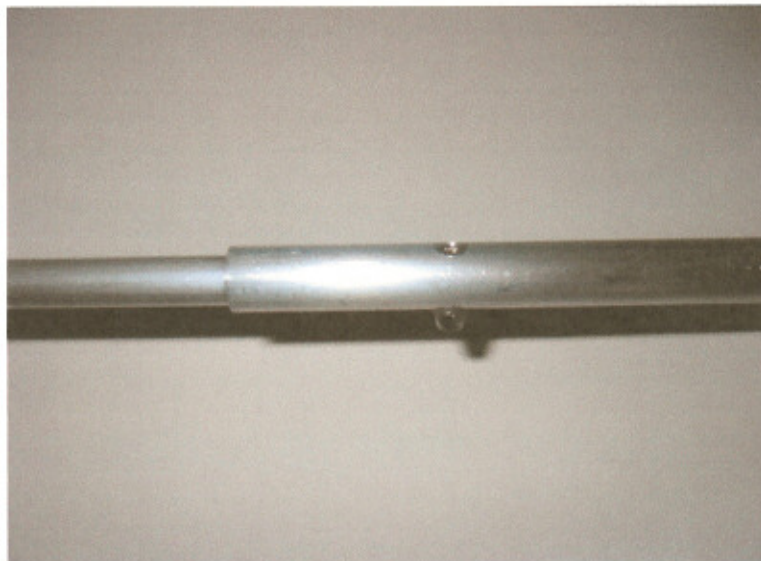
Zentrale Befestigung Boomabspannung
centre fixation boom truss



Spannturm der Zentralen Element-Abspannung
truss tower of the centre element truss



Äussere Element-Abspannung mit Ring-Isolator und Schlaufe
outer element truss with insulator ring and special loop



Detail-Ansicht Element-Übergang mit Schrauben-Senkopf-Technik
close up view of element transition with screw head dive in technique