



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 1 – 40

Rotary Dipol(e) 4 0m

!!! Quality made in Germany !!!

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1. Introduction

The OB1-40 is a shortened but highly effective rotary dipole for the 40m band.

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

A specialty of this antenna are the air coils (no traps) with a high Q which are carefully fabricated by OptiBeam. Hereby the element is shortened by about 30% without sacrificing neither efficiency nor bandwidth.

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

Bands	40m
Gain (dbd)*	0
Gain (dbi)**	7,2
F/B (db)	0
SWR Europe setting: 7,00 - 7,05 - 7,10	1,2 - 1,1 - 1,3
SWR USA setting: 7,00 - 7,16 - 7,30	1,7 - 1,1 - 1,7
Impedance (Ohm)	50
Elements	1
Max. element length (m)	14,60
Boom length (m)	0
Turning radius	7,30
Weight (kg)	11
Windload at 130 km/h	250 N / 0,31 m ² / 3,4 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:

- > measurements of the element sections (length and diameter)
- > lengths of the element halves.

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

2.1 Sorting the parts

To a high amount the antenna consists of already pre assembled parts.

All parts of the antenna are sorted.

For faster and easier assembly it is recommended to peacefully study the parts before.

2.2 Element-Platform

For the element-to-boom bracket a 4-cornered angle profile in a length of 500 mm is used. The insulation and solid fixing of the element is realised by 4 special UV stabilised tube holders, mounted on the platform.

The element middle section (d = 40mm) is already inserted into the platform (see picture on 3rd picture page).

For the standard direct 'mounting to a mast' an angle platform with two inserted U-bolts is mounted on top of the element platform (no extra picture included).

In case the OB1-40 should be mounted on the boom of another antenna the U-bolts are directly inserted into the platform (like on OB2-40M, see corresponding picture on 3rd picture page).

When finally tightening the U-bolts pay attention that the element is **parallel** in the vertical and horizontal plane. For the tightening procedure use the included special tool (nut driver M13) which fits exactly into the space between nut, plastic tube holder and platform edge.

2.3 Screw connection 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 transition, 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 = middle size 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 element sections 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**.

2.4 Assembly of the element sections

We start with the already pre assembled middle section (d = 40mm) which is already fixed onto the element platform.

The following segment is the one with the coil (already pre assembled) with a diameter of 35mm (see picture on 3rd picture page).

The next one following has a diameter of 30mm (please orientate by the included schematic diagram of the antenna).

Before the following 25mm section is inserted into the 30mm segment (this counts for both element halves) please slide the **ring insulator** (see picture on 3rd picture page) -which represents the outer fastening of the centre element truss (see fig. 2.5)- 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 side the **centre element truss rope** will hang slack below the element for the moment.

Do remove the inserted U-bolt from the truss rope for this installation step!

You now have to insert the short 20mm segment into the 25mm section. This 20mm segment has seven drill holes, one for the following 16mm element transition with an enlarged hole on top and six drill holes in the order of two **3-hole-rows**.

These hole rows are inscribed with 'Europe' and 'USA'.

The outer hole row **‘Europe’** represents the setting which mainly covers the frequency spectrum from 7.000 to 7.100 KHZ, i.e. the SWR is optimised in this frequency range.

The inner hole row **‘USA’** represents the US setting. It mainly covers the frequency spectrum between 7.150 and 7.300 KHZ regarding an optimum SWR. But the SWR is still fine in the CW portion so that the US ham can work this mode as well without the necessity of any adjustments on the element length.

The antenna is tuned by us in a way that with each setting the centre hole of the corresponding hole row has to be chosen (regarding tuning facilities, see fig. 4).

The 20mm segment is followed by the 16mm one, this followed by the outer 12mm segment.

Up to this point the antenna itself is assembled. Only missing is the stabilising element truss rope.

2.5 Installation of the centre element truss

Due to reasons regarding stability and optic the element is trussed in the centre by means of a truss facility (see picture on 3rd picture page for boom mounting).

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. 2.4).

Regarding the usual mounting to a mast now the corresponding (and for the moment removed) **U-bolt** has to be installed directly above the element platform, momentarily still moveable!

The element truss rope, still hanging below the element, has to be folded in shape of a little loop in the centre. This loop has to be slid over the shank of the U-bolt on which you find two already inserted big washers. Put the loop **in between** these two washers.

The ends of the truss rope are fixed to the ring insulators by means of a special loop (see picture on 3rd picture page). This loop means a continuous exact fastening and simultaneously delivers the possibility for an adjustment of the truss rope at any time.

This loop now can be pushed through the corresponding hole in the ring insulator. The truss rope can be pre tensioned slightly and the loop on the ring insulator can be fixed again.

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

Now you have to push the U-bolt upwards the mast until the element will be straight. Fix the U-bolt by means of the two nuts which are located directly at the cradle of the bolt.

The centre loop of the truss rope is still moveable over the shank of the U-bolt in between the two big washers. Take care that the truss rope is equally long on both sides (both element halves are equally straight) and finally fix it by means of the nut in front of the two big washers. The washers will fix the loop without hurting it.

You can adjust the truss rope at any time either by moving the U-bolt on the mast or by changing each half length of the truss on the two outer ring insulators.

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

Regarding the more seldom installation on a boom use the **truss mast** which will be included in this case. The truss mast is mounted on a little right angle platform. A ss U-bolt is already inserted into this little platform. This right angle platform has to be placed straight in front of the element and fixed solidly onto the boom.

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.

Like with the 'mounting to a mast solution' the ends of the truss rope are fixed to a ring insulator each by means of a special loop (see picture on 3rd 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.

3. Connection of coax cable

The feeding of the antenna is done by 50 Ohm coax cable.
For connection a PL-259 connector is required. The connector should be sealed against water entry.

Close to the feed point the cable should be winded to a choke coil with 5 to 6 turns of about 30 cm of diameter. Hereby the antenna is electrically balanced and unwanted radiation of the cable itself is prevented.

Instead of the choke coil a 1:1 balun can be used as well.

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 lengths of the 20mm sections the resonant frequency can be shifted to the desired point.

By a slight decrease of the lengths of both element halves (push the 20mm segment in to the last drill-hole of the corresponding 3-hole-row) the resonant frequency will be shifted upwards, by an increase (pull 20mm segment out to the first drill-hole of the corresponding 3-hole-row) it will be shifted downwards.

Normally these adjustments don't have to be done as the antenna does not react very sensitive against influences of the surroundings and the SWR curve is flat anyway.

5. Position of the antenna at strong winds

At strong winds the antenna should be placed in a way that one **tip** of the element **shows straight into the wind**.

Hereby physical stress to the element is avoided and its duration is enlarged.

Installation des EB-2-OB Baluns / Installing the EB-2-OB balun



Durch die Verwendung eines hochwertigen 1:1 50 Ohm Baluns am Speisepunkt, wie z.B. des mitgelieferten EB-2-OB, wird die Antenne elektrisch symmetriert und Eigenstrahlung des Koaxkabels wird unterbunden.

Installation

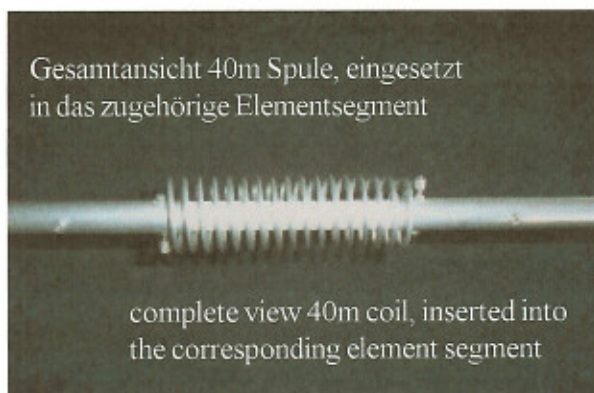
1. Zuerst sind die zwei Schrauben des Strahlerelementes zu entfernen, an dem die Antenne gespeist wird und die auch die Phasenleitungsrohre halten.
2. Der Balun läßt sich gut in der Spalte zwischen den beiden Phasenleitungsrohren befestigen. Er ist mit seinen beiden Anschlußkabeln und den vorher entfernten Strahlerschrauben am Strahler zu befestigen. Dabei sind die Anschlußösen jeweils zwischen zwei U-Scheiben zu schieben. Es spielt beim Anschluß keine Rolle, auf welcher Seite das weiße oder schwarze Balun-Anschlußkabel sitzt.
Lediglich wenn mehrerer Yagis in Phase betrieben werden, müssen die Anschlüsse gleichseitig angebracht werden.
3. Das Einschmieren der Balun-Anschlußringe mit einer Konduktionspaste kann den einwandfreien Kontakt zwischen Balun und Element dauerhaft fördern.
4. Der Balun ist mittels der drei Kabelbinder an der Unterseite der Phasenleitungsrohre zu befestigen. Das beigegefügte Halbschalenstück ist dabei im vorderen Drittel Richtung SO239 Anschluß zu plazieren, um einen Kontakt zwischen diesem und den Phasenleitungsrohren zu verhindern. Die Details gehen aus obigem Photo hervor.
5. Das Koaxkabel ist am SO239 Anschluß des Baluns zu befestigen und sollte hier gegen Wassereindringen geschützt werden (z.B. mit selbstverschweißendem Klebeband oder Silikon).

The antenna is electrically balanced and unwanted radiation of the coax cable itself is prevented by the use of a high quality 1:1 50 ohm balun, such as the EB-2-OB, at the feed point.

Installation

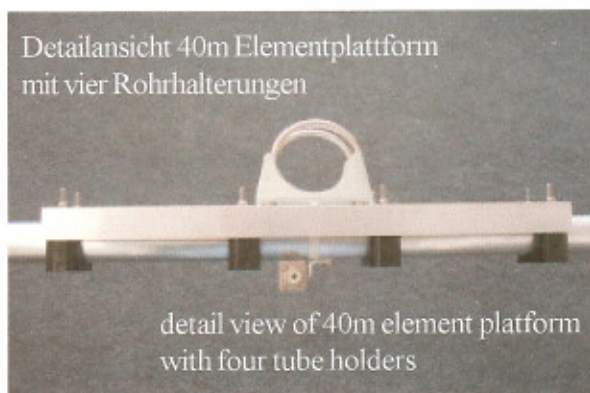
1. Un-screw the two bolts of the driven element where the source is located at and which hold the two square tube transmission lines.
2. The balun will mount below the phase line in the gap between the two phase line tubes close to the main driven element (= feed point). The black and white wire terminals should be attached to the two bolts removed earlier, one on each bolt and washer. **If you are phasing two or more beams them make sure you attach these wires exactly the same.** It does not matter where you put the black or white wires since these are balanced output wires from the balun.
3. You may want to put some anti-oxidant paste such as No-Alox, or Penetrox on the terminal connection before you tighten the bolts.
4. Use the three plastic ty-wraps to secure the balun to the transmission line, placing the half tube holder on the connector end as shown in the picture.
5. Attach your feedline jumper to the balun's SO239 connector and weather proof this connection to protect it from water.

Gesamtansicht 40m Spule, eingesetzt
 in das zugehörige Elementsegment



complete view 40m coil, inserted into
 the corresponding element segment

Detailansicht 40m Elementplattform
 mit vier Rohrhalterungen



detail view of 40m element platform
 with four tube holders

Zentralabspannung
 des 40m Elementes,
 Spannturm montiert
 auf Winkelplatte



centre element truss
 of the 40m element,
 truss tower
 mounted on right
 angle platform

mechanische isolierte Verbindung des
 Moxon-Elementteiles mit Moxon-
 Element-Travers-Abspannung



mechanical insulated connection of the
 Moxon element part with the below-
 Moxon-element-truss

Ringisolator für Außenbefestigung
 der zentralen und der Moxon-
 Element-Abspannung



Ringinsulator for the outer fastening of
 the centre and the below-Moxon-
 element-truss

Detailansicht Anschluß Entkopplungs-Stub



close up view connection of decoupling stub

Gesamtansicht 40m Spule,
 Entkopplungs-Stub und
 zentrale Elementabspannung



complete view of 40m coil, decoupling
 stub and centre element truss



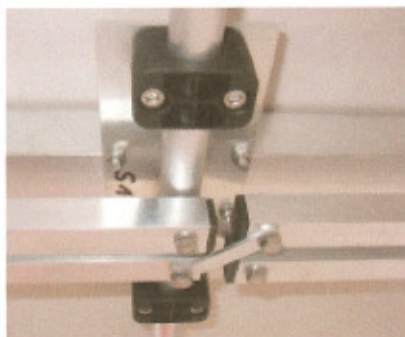
Boom-Masthalterung für kleinere Modelle /
 boom to mast mounting for smaller models



Boom-Masthalterung für mittlere Modelle /
 boom to mast mounting for medium size models



Boom-Masthalterung für große Modelle /
 boom to mast mounting for big models



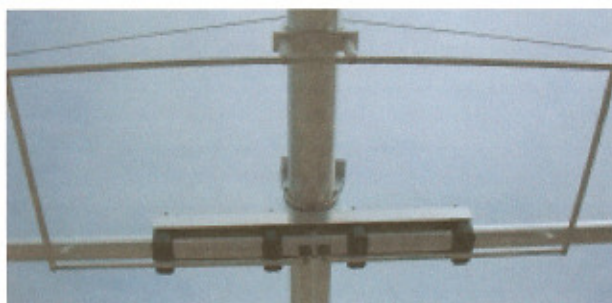
Seitenansicht Überkreuzung Phasenleitung bei Modell 9-5 u. 4-40 /
 side view crossing of phase line at model 9-5 and 4-40



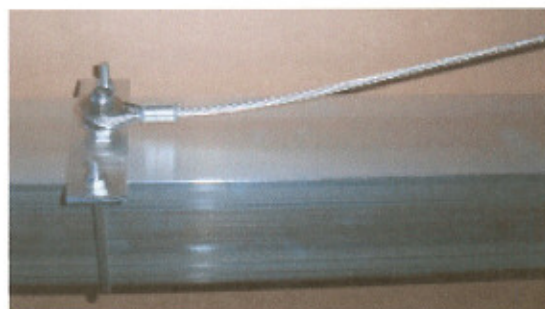
Ansicht zentrale und äußere Boomabspannung für OB11-3 /
 view centre and outer boom truss for OB11-3



Ansicht variable äußere Boomabspannung div. Modelle /
 view variable outer boom truss diverse models



Gesamtansicht Abschlußstüb mit Isolatoraufhängung an Boom bei diversen Modellen /
 total view termination stub with insulated fixing to the boom at diverse models

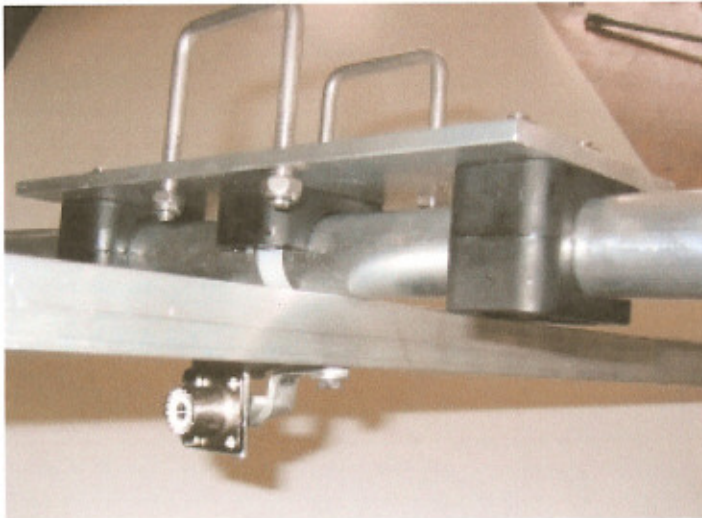


Äußere Seilabspannung für große Modelle, Rundboom dto. /
 outer boom truss for big models, round boom equivalent

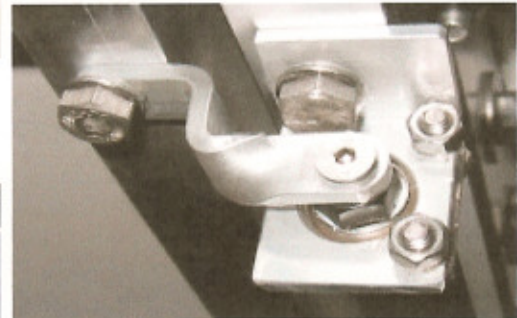


Zentrale Seilabspannung für Modelle über 6 Meter Boomlänge /
 centre boom truss for models over 6 meter boom length

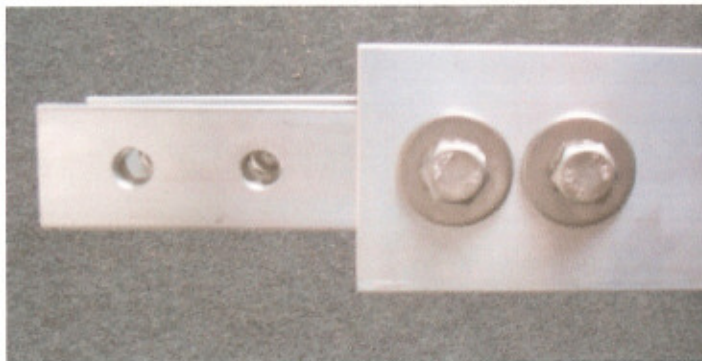




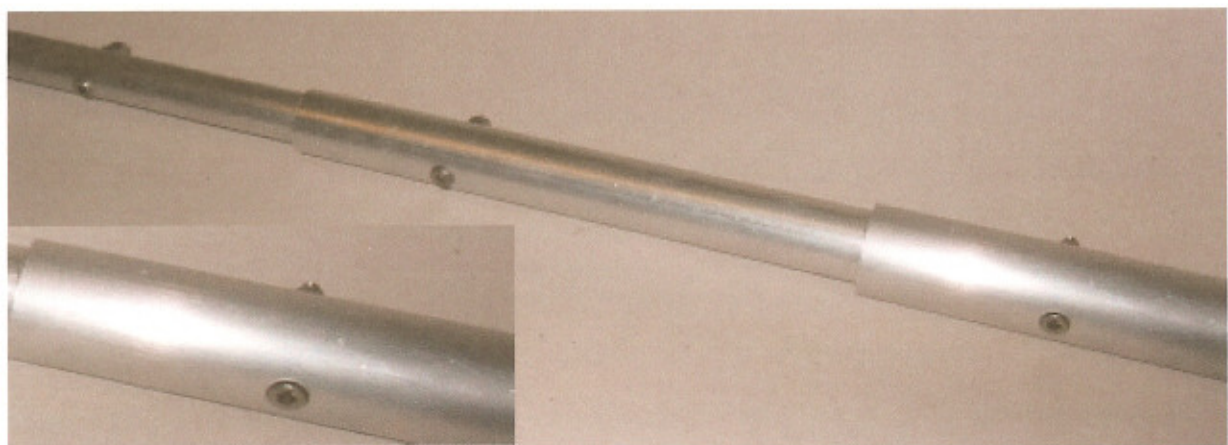
Ansicht Element-Plattform Strahlerelement
mit Phasenleitung und Mittenunterstützung /
view element platform driven element with
phaseline and centre support



Ansicht Koax-Anschlußbuchse SO239 mit Strahler-
element und Phasenleitung /
view coax connector SO239 with driven element
and phaseline



Ansicht Boomkopplung bei Vierkantboom /
view boom coupler at square boom



Detailansicht Elementübergänge / close up view element transitions