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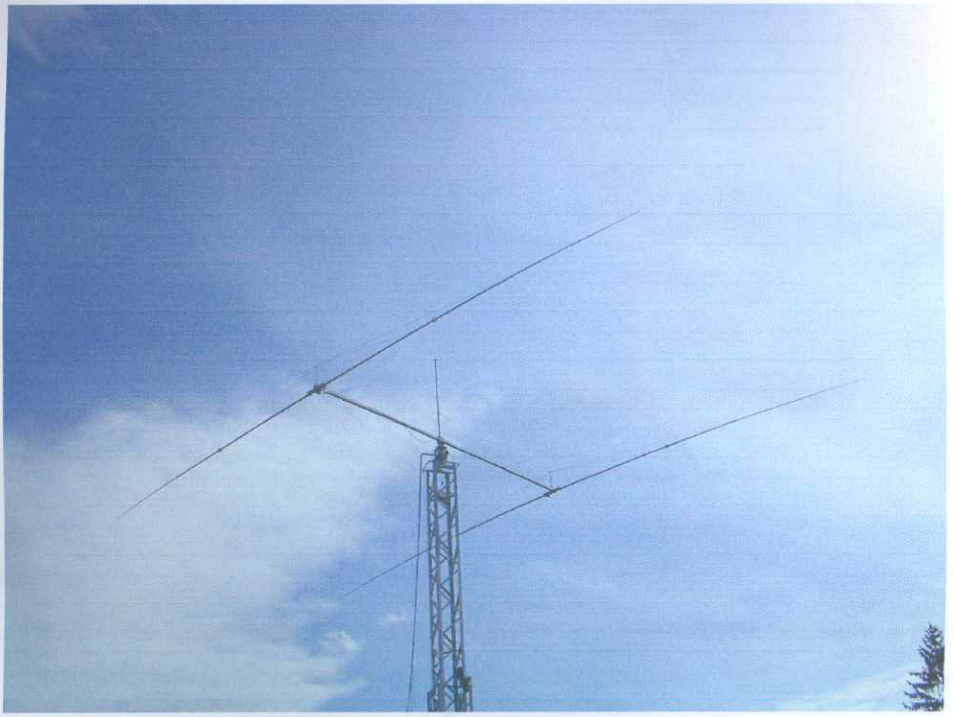

OB 2-80+

2 Element Yagi 80m (SSB / CW)

!!! Quality made in Germany !!!

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1. Introduction

The OB2-80 is a high performing 2el Yagi antenna for the 80m band.
A specialty of this Yagi is that it can be switched between SSB and CW operation by means of a relays function.

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.

To reduce the rather big wing span of an 80m element high Q coils (no traps), carefully fabricated by OptiBeam, are used. Hereby achieved is an almost loss free shortening of the element lengths.
So a gain is realised which is very close to that of a considerably larger full size Yagi and the power capability is principally unlimited.

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

Bands	80m
Gain (dBd)*	3,8
Gain (dBi)**	10,2
F/B (db)	18
SWR: **3,770 - 3,790 - 3,820** **3,500 - 3,515 - 3,550**	 1,7 - 1,1 - 1,7 1,7 - 1,1 - 1,7
Impedance (Ohm)	50
Elements	2
Max. element length (m)	23,12
Boom length (m)	11,00
Turning radius	12,60
Weight (kg)	80
Wind load at 130 km/h	1.246 N / 1,55 m² / 16,8 feet²

* = 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 30m 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) 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 (millimetres).

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 for reflector and driver.

2.2 Assembly of boom

The square boom consists of four parts which have to be connected by 12 coupling pieces in total.
For each coupling piece 4 screws are needed.
Pay attention that the outer boom segments will be coupled to the inner segments in a way that the inscriptions and the inserted screws for the fixing of the boom truss point upwards.

It is recommended to slide the boom to mast plate (totally pre assembled finished part, see fig. 2.8 and picture page) over the third section (seen from the rear) before connecting the boom sections and to fix it **directly behind the coupler screws.**
Hereby avoided are unnecessary working steps later on.

Furthermore the boom truss should be installed at this moment as well.
The **longer** steel rope has to lead towards the **rear** (reflector side), the **shorter** one to the **front** (driver side). Each of the two unused 6mm loops have to be slid over the corresponding screws which are already inserted into the outer boom sections, in between the two big washers. Then the nuts have to be tightened solidly (see fig. 2.9 and the photo on the picture page).

The coupler 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.

The OB2-80 is a heavy antenna which means a lot of load on the boom as well.
Therefore the installation of the boom to the mast and the mounting of the boom truss to the mast to stabilise the boom should be done before lifting the antenna up, if possible.

2.3 Element-Platforms

For the element-to-boom brackets 4-cornered U-shaped plates are used, 700 mm long. The insulation and solid fixing of the elements is realised by 4 special UV stabilised tube holders, mounted on each of the platforms.
The driver and reflector middle section (d = 60mm) is already inserted into the platforms (see picture on picture page).

On each platform you also find the already installed loading coil which electrically lengthens the element for CW operation and which is brought in function by a relay switch.
Furthermore you find the relay box installed below the element middle section.

The elements fixed on the platforms have to be mounted at the **underside** of the boom in a way that the outer edge of the platform is located 1 cm in front of the tip of the boom (installation in between the two drawn lines).
Pay attention that you mount the platforms to the boom in a way that the CW loading coils will be located on **opposite sides of the boom** (of the element centres). Hereby achieved will be a perfect symmetry in spite of the loading coils being slightly off the element centres.

The platforms 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 in the vertical plane unnecessary.
For the tightening procedure use the included special tool (nut driver M10/13).
When tightening the U-bolts of the platforms install the element truss mast simultaneously (see fig. 2.7).

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

2.4.1 SEGMENT TRANSITIONS 60/55, 55/50, 50/45, 45/40 AND 40/35mm

To achieve a special stability the sections on the first five transitions have an overlap of 50 cm. In addition they are double drilled crosswise.
While assembling the element sections the following segments have to be inserted into the previous segments until the drill holes overlap perfectly. The outer drill hole will be in the vertical position.
Then the 8mm ss screws (the thickest ones) have to be pushed through the drill holes in a way that the screw heads of the outer screws point upwards.
On the opposite side the washers have to be slid over the screw shaft and the self securing nuts have to be screwed on and **tightened solidly** (hold the screw heads with the included tool).

Principally there are **screws of two different lengths** (70 and 55 mm).
The **longer** ones are used to connect the segments 60/55mm and 55/50mm.
The **shorter ones** are used to connect the segments 50/45, 45/40 and 40/35 mm (please orientate by the included schematic diagram of the antenna).
Regarding the transition 50/45mm the 55mm long screw has to be used only on the inner horizontal located drill hole.
Concerning the **outer vertical located 50/45mm drill hole** use one of the included extra long screws (this counts for all four element halves). Here the **vertical insulator ring** of the inner element truss will later be fixed.
In controversy to the above explanation this screw connection has to be realised in a way that the screw shaft points upwards because here the insulator ring of the inner element truss will be slid on (see fig. 2.5 and 2.7).

2.4.2 SEGMENT TRANSITIONS 35/30, 30/25, 25/20, 20/16 AND 16/12 mm

On the following five segment transitions the segments have an overlap of 10 cm and they are drilled to each other one time vertically.
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** (= from the top) 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 35/30 mm transition, the shorter ones are used for the 30/25 mm 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 slid over the screw shaft 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

We start with the already pre assembled middle section (d = 60mm) which is already fixed onto the element platform.
The following five cross drilled segments (= 55, 50, 45, 40 and 35mm) have to be connected like described at fig 2.4.1.
As already explained pay attention on the outer 50/45 mm transition that the included special longest screw will be used and that the screw shaft points upwards.

The 45mm segment is the one with the main coil, the coil is already inserted into this segment (see picture on picture page).
When inserting this segment into the previous one pay attention that the screw connections of the coil point downwards (see picture on picture page).
After fixing this segment the **ring insulator of the inner element truss rope** (horizontal ring) can be mounted. The truss rope is already fixed to the two corresponding ring insulators by means of a special loop.
The insulator ring has to be inserted in a way that it points upwards towards the element centre (see fig. 2.7 and the photo on the picture page). The insulator ring has to be fixed with a second screw.
When the two ring insulators are mounted on the left and the right side of the driver and reflector the **inner element truss rope** will hang slack below the element for the moment.

Into the 45mm segment the 40mm segment has to be inserted and into this the 35mm one (please orientate by the included schematic diagram of the antenna).
Starting with the 35mm segment, as already explained, pay attention that the **enlarged drill holes** of all the following segments point **upwards**.

Before the following 30mm section is inserted into the 35mm segment (this counts for all four element halves) slide the **vertical ring insulator** (see picture on picture page) -which represents the outer fastening of the **outer element truss rope** (see fig. 2.7)- over the 30mm tube. We have already fixed the 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 and the reflector the truss rope will hang slack below the element for the moment.

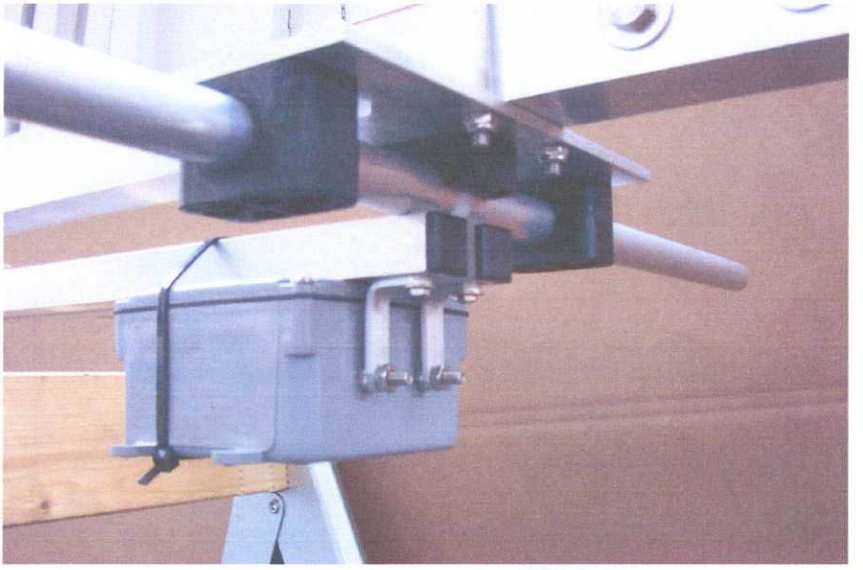
You now have to insert the 25mm segments into the 30mm sections and the 20mm ones into the 20mm sections, followed by the 16mm ones.
Finally the 12mm tips have to be inserted. These 12mm end tubes have three drill holes (counts for driver and reflector). The **middle one** of the three drill-holes has to be chosen (regarding tuning facilities, see fig. 4).

2.6 Installation of the balun

The OB2-80 is fed through a high quality 2 : 1 balun.

Mount the balun at the driven element. The balun has two right angle aluminium connection straps which have to be inserted on the driver screws under the big washers each. They have to be tightened to the element by means of the two driver screws.
Furthermore the balun has to be tightened to the boom by means of the included tie wrap.

The entire assembly can be seen on the picture pages and on the picture below (just with the difference that the OB2-80 has no phase line tubes).



2.7 Installation of the inner and outer element truss

Due to reasons regarding stability and optic the driver and reflector are trussed in the centre by means of a little truss mast and two truss ropes each, i.e. the **inner and outer truss rope** (see pictures on picture page).
The pre assembled **truss mast** is fixed to two little right angle platforms. These right angle platforms have to be slid below the square bolts of the element platforms. By fixing the platforms to the boom the truss masts will be fixed solidly as well (see picture on picture page).

Both element truss ropes hang slack below the elements as they were already fixed to the elements by means of their corresponding ring insulators in the moment of the element assembly (see fig. 2.5).

In the centre of the ropes 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 ropes are fixed to the ring insulators by means of a special loop as well (see picture on picture page). This loop means a continuous exact fastening and simultaneously delivers the possibility for an adjustment of the truss ropes at any time.
The element now can be brought into the horizontal position (no sag) by tightening the ropes on both sides at the ring insulators. For convenience we recommend to first remove the insulator from the truss mast so that the ropes are slack again. Now the loops of the ropes can easily be pushed through the corresponding hole of the ring insulator and the rope can be pulled as much as needed for the adjustment. Then the loop has to be fixed again and the centre insulator has to be reinserted into the top of the truss mast.
Long remaining rests of the ropes can either be cut off or somehow fixed at the main ropes.

Important: When the ropes are under tension make sure that the ring insulators of the inner truss ropes **point upwards towards the element centres** and that the ring insulators of the outer truss ropes sit on the element in a way that the hole in the ring insulator where the rope is fixed **points upwards**.

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 which embrace the boom and four vertical U-bolts (depending on the corresponding installation 54mm, 65mm or 75mm) which embrace the mast.
The boom to mast plate should have already been slid onto the third boom section (seen from the rear) in the moment of the boom assembly (see fig. 2.2).
If not already done it now should be tightened directly behind **the coupler screws**.

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 **longer** rope leads to the **rear** (reflector side), the **shorter** one to the **front** (driver side).
A turn buckle is inserted into each steel rope at one side and a steel loop for the fixation to the boom at the other side.
Each of these loops should have already been fixed to the corresponding screw on the outer boom segments in the moment of the boom assembly (see fig. 2.2 and picture on picture page).

The two turn buckles, turned out by about 2/3 of their lengths, are already connected by us to the centre piece of the boom truss. Fasten this centre piece by means of the corresponding U-bolt to the mast and push it up about one meter until the truss ropes are pre tensioned. Then fix it solidly.

Finally the steel ropes have to be tightened by means of the turn buckles until the boom is stable in the horizontal **without any sag**.

The entire installation can be seen on the picture pages.

2.10 Connection of the relay boxes

By means of the installed relay boxes the OB2-80+ alternatively can be operated in the SSB-DX or CW-DX frequency range.
As already explained in chapter 2.3 the CW loading coils, mounted to the element platforms, alternatively can be switched into function or short cut by the relays which are installed below the elements.

Both, the driver and the reflector, are split by an insulator 210mm out of the element centre.
The relay box is attached to this split insulator.
As well the relay box is connected by two pins to the loading coil, at one side fix and at the other side with an **adjustment feature** (regarding tuning facilities, see fig. 4).

Both relay boxes have to be **connected with each other** by a common twin lead which has to be attached to the pins which are labelled with "12V DC".
A second twin lead which delivers 12 Volts from a source in the shack has to be connected to one of the relay boxes. The relay connected to the ground source delivers current into the other relay through the twin lead connection between them.

The twin lead coming from the antenna has to be connected to the delivered **switch box** inside the shack. This switch box has to be connected to a 12 Volt source (range of 12 to about 19 Volts acceptable).
By means of the switch on this box you can choose between the **positions "SSB" and "CW"**.
The position "SSB" represents the current less mode, i.e. the relays on the antenna are closed and the CW loading coils are short cut.
In the position "CW" 12 Volts from the source are delivered into the relays, i.e. they are opened, the CW loading coils are in function and the elements are lengthened correspondingly.

If the **antenna is not used** keep the switch box in the "SSB" position as this way the relays are not under current all the time.

Attention: never switch while transmitting, only do so in the receive mode!!!

3. Connection of coax cable

The feeding of the antenna has to be done by 50 Ohm coax cable.
For connection a PL-259 connector is required which has to be screwed on to the balun housing. 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 and due to different heights it may happen that the resonance of the antenna (= point of best SWR) shifts slightly.

4.1 Adjustment in the SSB frequency range

By minimum changes of the **tip lengths** on the driver and reflector (=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 (push outer section in to the last drill-hole) the resonant frequency will be shifted upwards, by an increase (pull final section out to the first drill-hole) it will be shifted downwards.

The adjustment should be done in a way that the driver length would be changed first (shortened or lengthened).
In case that this action would not lead to a satisfying result the reflector length had to be changed correspondingly (shortened or lengthened).

Attention: Changes in the SSB frequency range will automatically result in a shift of the resonance point in the CW frequency range.
So in case changes on the element tip lengths are done adjustments have to be made for the CW mode as well even though the frequency coverage was perfect before.

4.2 Adjustment in the CW frequency range

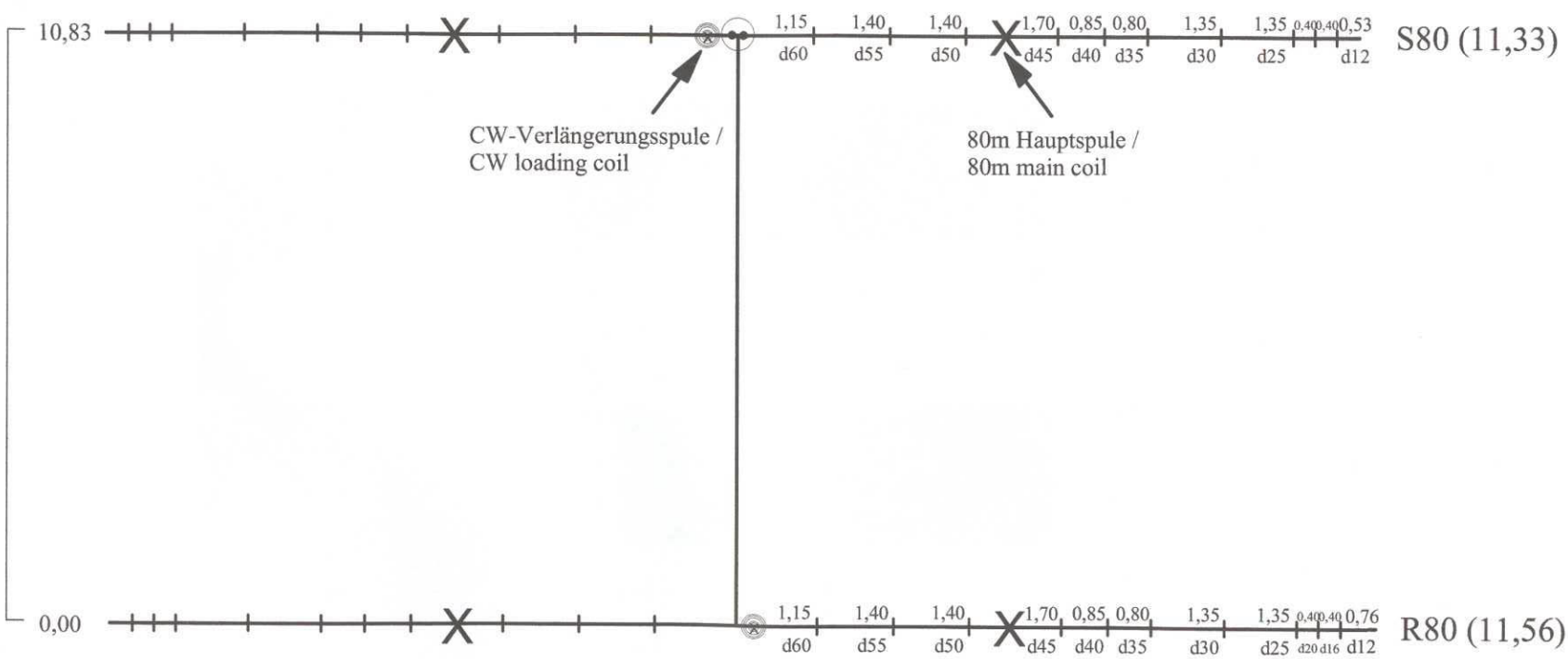
As already explained in chapter 2.10 the CW loading coil is connected to two pins of the relais box, and one side of this connection is adjustable.
The corresponding 2mm steel rope coming from the relay box is connected to a little **steel piece** which is slid over the coil wire and screwed onto it (see picture on picture page).
By loosening the nut which fixes the steel wire to the little steel piece the screw which fixes the steel piece to the coil wire can be loosened as well and the position of the steel piece on the coil wire can be changed.
By moving the steel piece on the winding more to the end of the coil the inductivity will be increased and the resonance point will be shifted downwards, by moving it more towards the centre of the coil the inductivity will be reduced and the resonance point will shift upwards.
Such a fine tuning is sensitive, and it has to be done on both elements by the same amount.

Important: the antenna is already optimally tuned for both frequency ranges. Changes should only be done if they are absolutely necessary.

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.

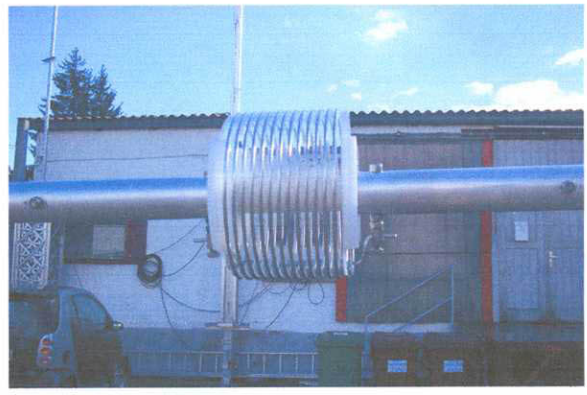
OptiBeam OB2-80 +



alle Längenmaße in m; alle Durchmesser in mm /
all lengths in m, all diametres in mm

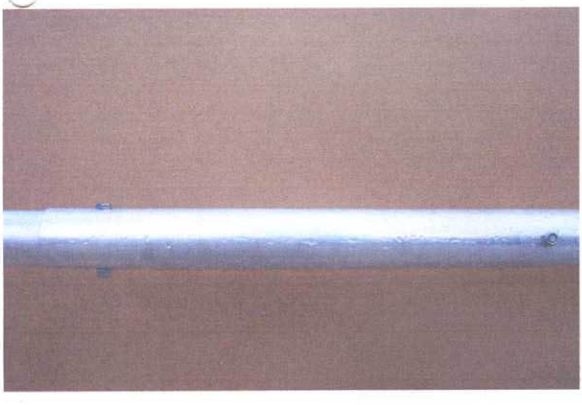
80m U-Profil Elementplatform mit 1 : 2 Balun

80m U-platform with 1 : 2 balun



80m Spule eingesetzt in Element

80m coil inserted in element



kreuzverbohrte Elementsegmente 60 bis 40mm

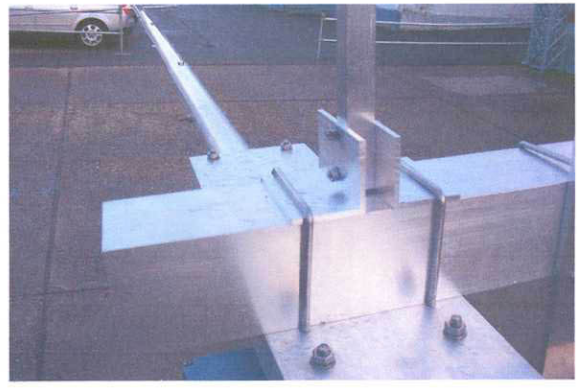
cross drilled element sections 60 to 40mm

Elementübergänge 35 bis 12mm

element transitions 35 to 12mm

zentrale Doppel-Elementabspannung OB2-80

centre double element truss OB2-80



Elementspannturm OB2-80

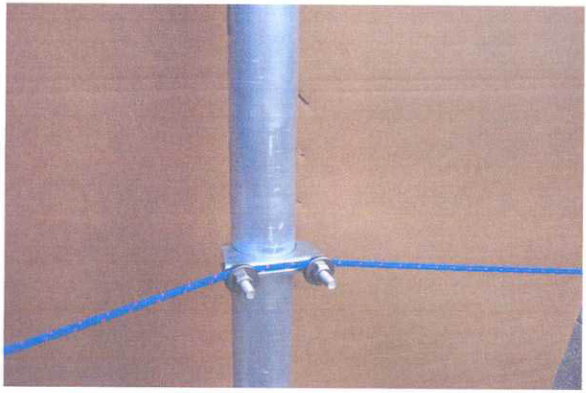
element truss tower OB2-80

Elementaußenabspannung OB1-80 u. OB2-80

outer Element truss OB1-80 and OB2-80

innere Elementabspannung OB2-80

inner element truss OB2-80

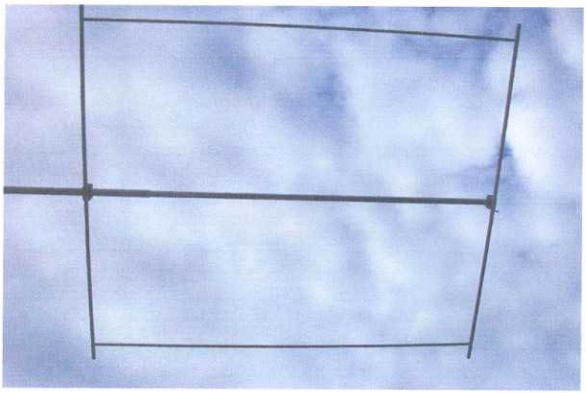


zentrale Elementabspannung OB1-80

centre element truss OB1-80

äussere leitende Befestigung Endloading OB1-80

outer conductive fixation of endloading OB1-80



Endloading OB1-80

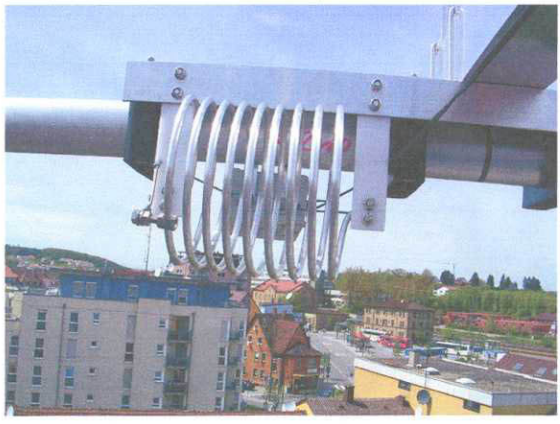
endloading OB1-80

innere isolierte Befestigung Endloading OB1-80

inner insulated fixation of endloading OB1-80

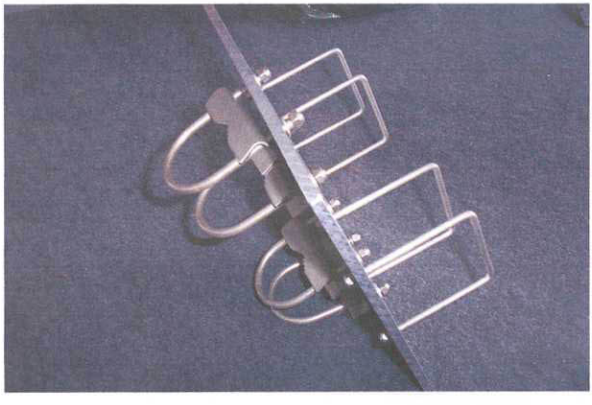
Relaisbox CW-Umschaltung u. Ladespule OB2-80

relay box for CW switch and loading coil OB2-80



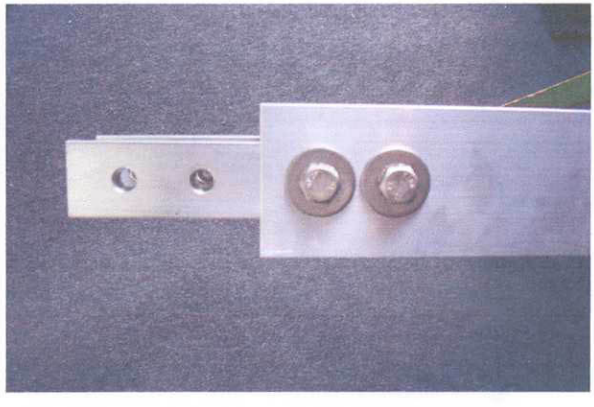
CW-Ladespule mit flexiblem Abgriff OB2-80

CW loading coil with adjustable connection OB2-80



Boom-Masthalterungs-Platte OB2-80

boom to mast plate OB2-80

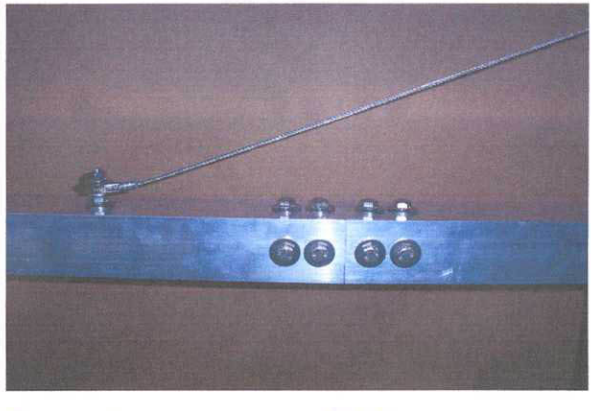


Boomkoppler OB2-80 (2 von 4 Stück)

boom couplers OB2-80 (2 of 4 pieces)

Zentrale Boomabspannung OB2-80

centre boom truss OB2-80



Äussere Boomabspannung OB2-80

outer boom truss OB2-80