

XR 6 11 Element 6 Band Yagi

20/17/15/12/10/6M

Model: XR6-MKII - Z08564-0003



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Antenna Overview

The XR6 is a unique multi-band HF & 6m directional beam Yagi antenna. Some of the features which make this antenna unique include the following:

Full-sized 5 band HF Yagi + 6m

The XR6 is the only 5 band HF and 6m Yagi available with full-sized elements in each band, although this makes the XR6 some 11m (37') wide, the optimisation for extended bandwidth means the elements are close spaced meaning the boom is only 3.5m (12') long.

Interlaced elements for each band with no more than 3 bands

The more bands that are interlaced on a given boom, the more compromised the performance becomes. With this in mind, the XR6 was optimised with no more than 3 bands interlaced at any one position on the boom. The antenna has at least two active elements per band. On the 20/17/15 metre bands a more traditional reflector and driven element arrangement is used. 12/10/6 use a driven element and director arrangement and are placed at the front of the boom in order the larger elements of 20/17/15 (at the back of the boom) provide some directive properties to them too.

There is just a single dedicated element for 12m. however, the driven element for 10m provides the director in this case. 10m is also enhanced as a result of being able to use the 12m element as a reflector and therefore, there are three active elements on the 10m band.

On the 6m band there are 2 elements although both are parasitically coupled (no physical electrical connection to the coax or other elements).

SDR-friendly Yagi

Unlike 'active' dynamic antennas, the XR6 can be used on ALL BANDS AT ONCE. This means if using a radio such as a Flex 6700 which can have up to 8 operation receivers, 6 receiver slots on 6 bands can be used at the same time on the XR6.

Wet Weather Stable

Being optimised with close-spacing and wide bandwidth the XR6 provides stable operation within wet weather.

Computer optimised Electromagnetic and mechanical design

In addition to using computer optimisation for the electromagnetic design, the XR6 has been mechanically optimised by computer too, to ensure long-term survival. Elements all taper quickly with the center sections of the 20m elements being 35mm in diameter in the middle and 13mm at the tips.

Check your Parts and Read the Manual!

Before doing anything else, check the parts list in the back of this manual against what you have received and read the construction information fully before attempting to build this antenna. This will ensure your construction will be trouble-free and you will spend less time building the antenna too.

Boom Construction

The boom is constructed of 50mm diameter square tube (2mm wall thickness) in several sections. A round joining tube is supplied and should be fitted as per the picture below.

Insert the M6 bolts into the holes and all the way through the boom secure on the opposite side with an M6 nut and washer. It is advised that you insert the joining tube into one section of outer boom, fully secure with the M6 bolts and then add the next piece of boom (also marked 'A' in order the boom join now shows 'A-A' as in the below picture) and duplicate the finalisation process with M6 bolts.

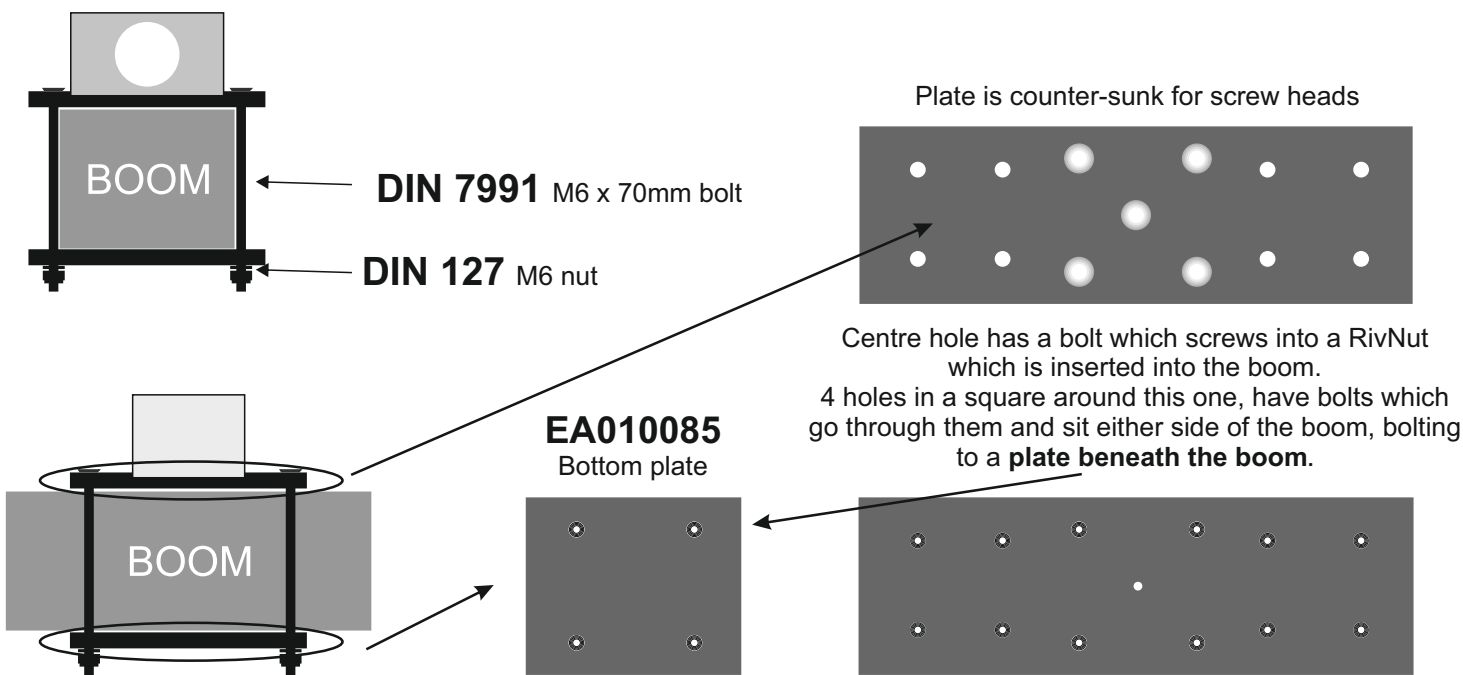
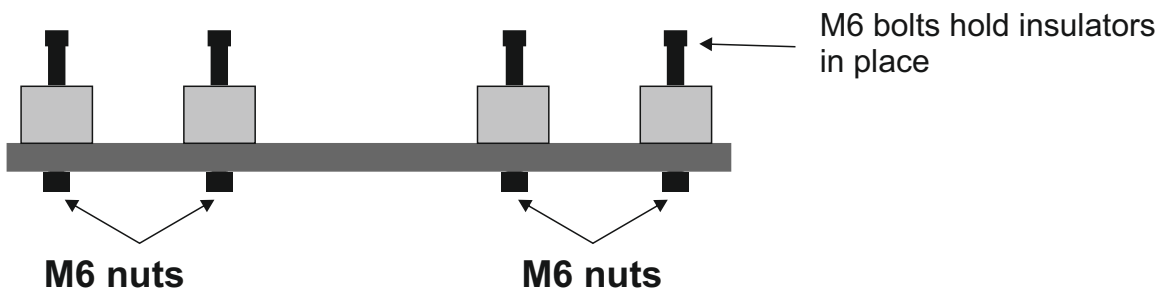
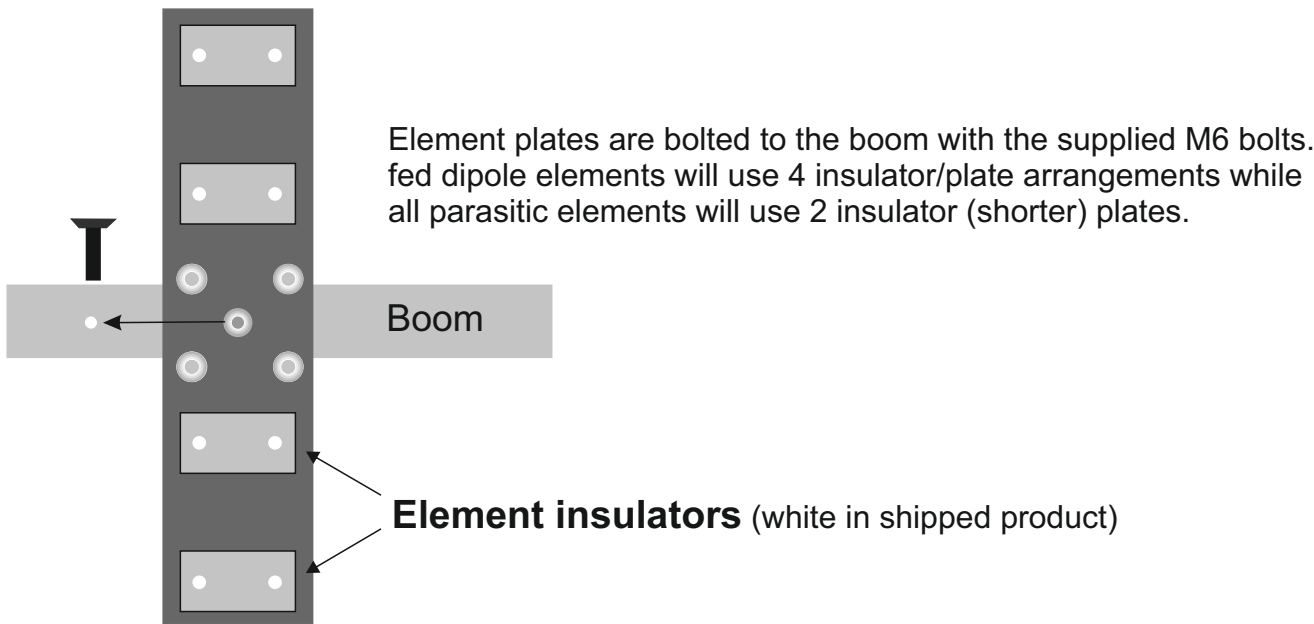
DO NOT over-tighten the bolts and always oil or grease all hardware before joining to prevent galling. Over-tightening could weaken the join and lead to a shorter life length of your antenna boom.

Below is one section of the XR 3 boom with the square joining tube inserted. The second square section of boom should be slid onto the joiner and both sides bolted as shown in the photo below.

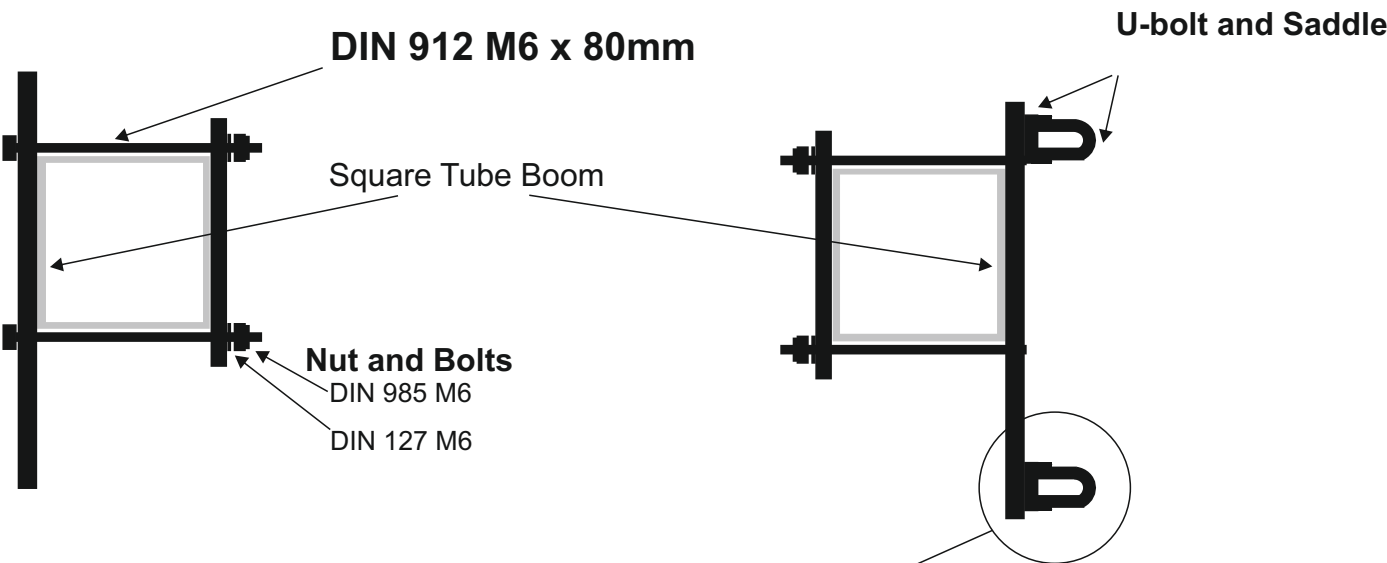
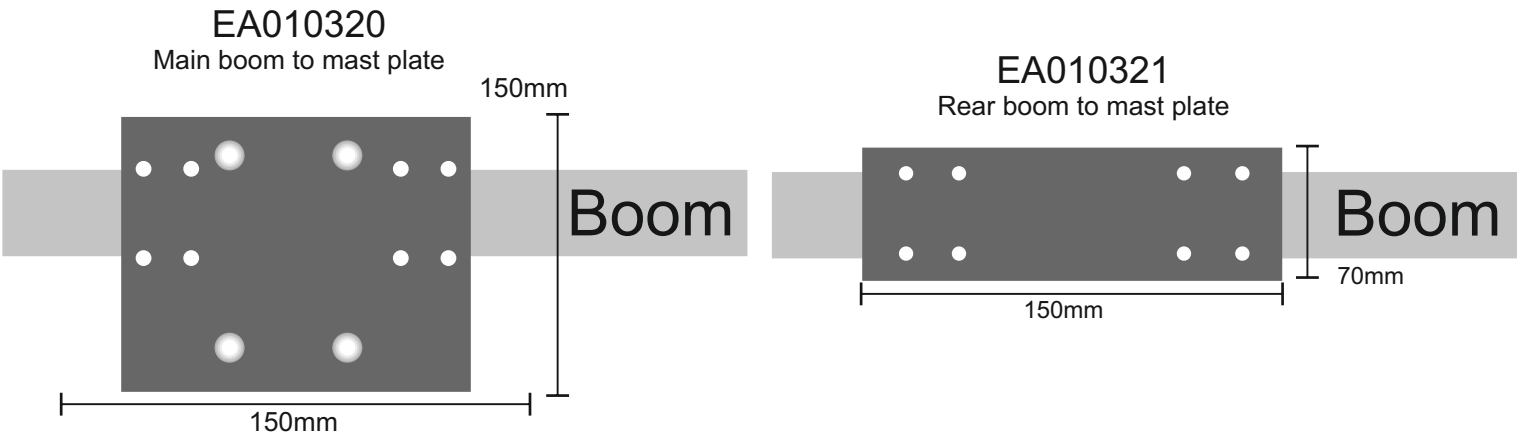
Boom Joining Tube



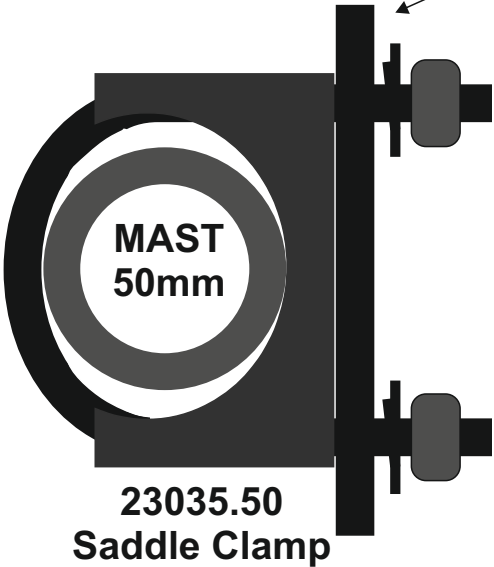
Boom to Element Plate Mounting



Boom to Mast Plate Mounting



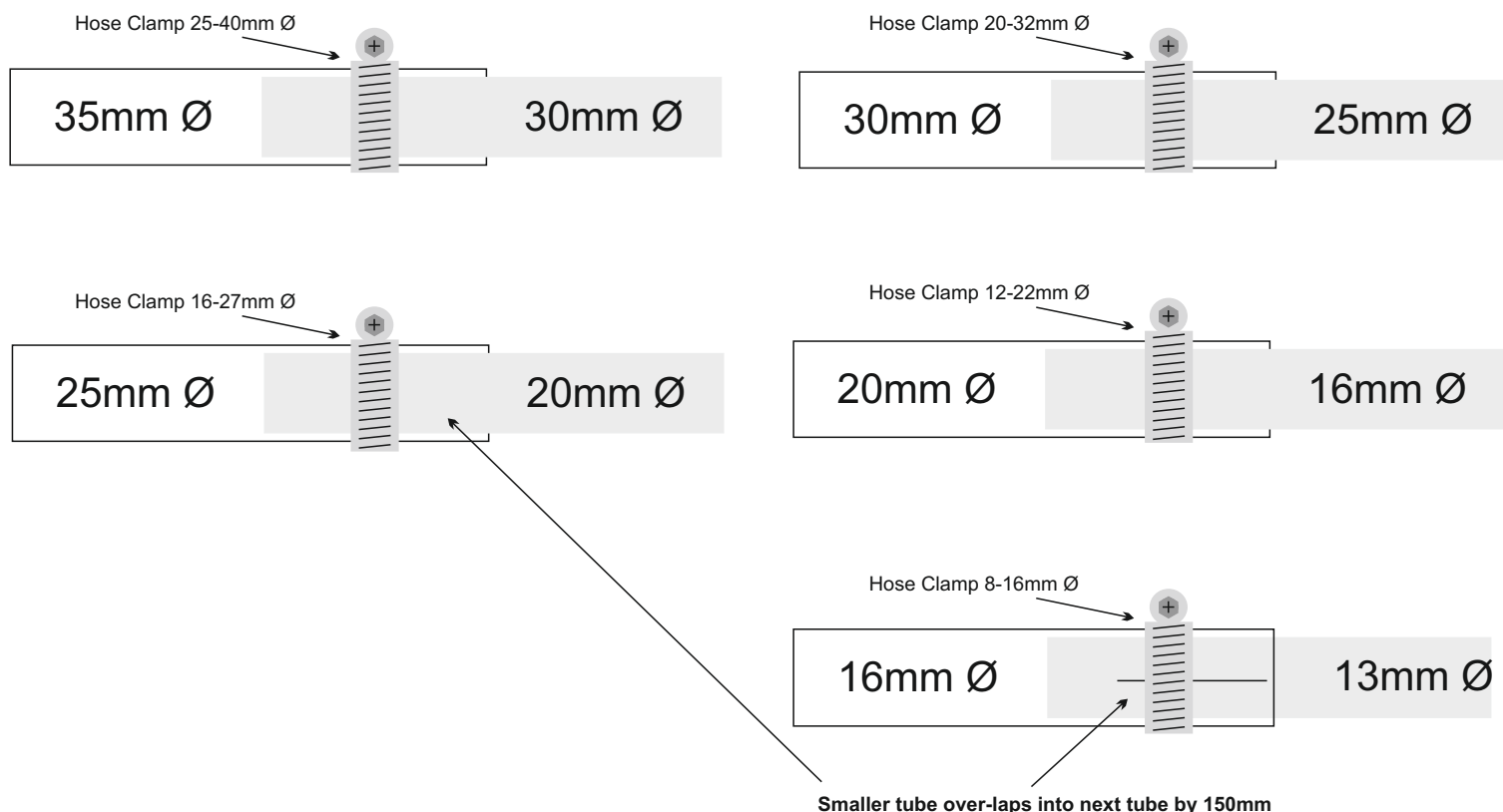
A-0163
50mm
U-bolt



Boom to Mast Plate Photos



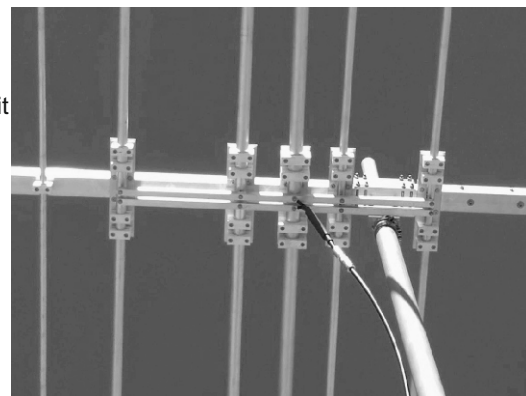
All Element held in place with hose clamps to ensure a constant contact patch around each join.



Parallel Feed line fitment

The XR 6 is feed at the 20m dipole centre. However, a pair of parallel square tubes sit on top of the 5 sets of feed point terminals and are bolted to them. This ensures that the one, single feed line connected to the antenna will feed all 5 bands.

The 6m band elements are both parasitically coupled so there is no physical connection to the feed line at all



Final element tip adjustment

On most bands the XR6 will cover the majority if not all of the 6 bands it covers. However, as with most HF Yagis, proximity to ground, ground type along with nearby objects and antennas, may vary the point at which the antenna dips (lowest SWR). Therefore, the tips of each element on each band can be adjusted in order that you can fine-tune your antenna for your working requirements.

Adjust the driven element of a given band for lowest SWR wherever that be another part of the band to what you prefer. If the point of lowest SWR is not in the band section you desire, adjust BOTH band elements by the same amount to move the dip to the desired point and then re-adjust the driven element for lowest SWR dip.

For example, if after adjusting the 20m driven element for lowest SWR, the lowest point of SWR is 14.300MHz, then BOTH the 20m reflector and driven element need to be made larger by the same amount. If you wanted your antenna at 14.100, add 10mm to each tip end on the reflector and director 20mm to the total length of each element) and check SWR again. adjust the driven element in and out a few mm to establish the final lowest dip and make adjustments accordingly. If the antenna dips on 13.9MHz rather than 14.1MHz then the reverse would need to be applied, removing 10mm from each tip (20mm total from each element overall length).

The above examples are extremes and it is unlikely you will see the variants suggested above. Also note that 20m, 17m and 15m have a reflector and driven element. 10m uses a driven element and director while 12m has 1 driver and uses the 10m elements as directors. Both 6m elements are stand alone passively coupled types.

Note also that any fine-tune adjustments to each band should be done in this order - 20m, 17m, 15m, 12m, 10m then 6m.

Element Layout on the boom (Not to scale)

20m Reflector

17m Reflector

15m Reflector

12m Driven

10m Driven

20m Driven

17m Driven

15m Driven

6m Driven

10m Director

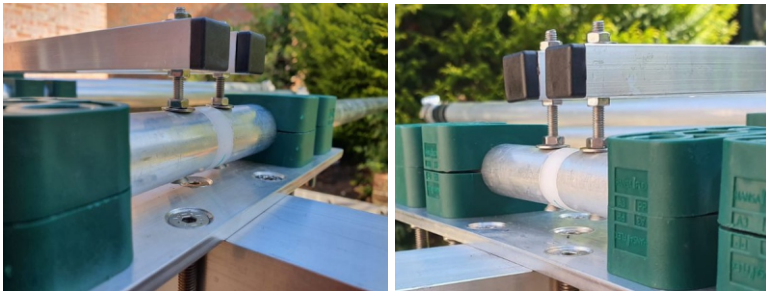
6m Director

Drop coax/balun 90 degrees away
from feed point

Twin feedline connecting
all driven elements (not 6m)

Feed point at 20m element

Perspex spacers held to elements
with cable-ties



These parallel feed lines are made from square aluminium tubing and are drilled to sit on top of each feed point. Due to the variation in size of each of the driven elements, the feed lines will not sit flat on the boom and will need to be fastened as per the photo (left).

Antenna Build Notes:

This drawing is NOT TO SCALE and the majority of elements in the drawing are far more widely spaced than on the built antenna. This is in order to make the drawing clear for the constructor.

This antenna is better hung 'upside down' with all insulators and feedline facing towards ground. This will allow for easy coaxial connection to the feed point and routing away from the antenna, towards and down the supporting mast.

Element plates on antenna are NOT the same size as indicated in the drawing above, again this is presented this way for clarity. the correct sized element plates for each band (and their respective size) can be found in the parts list at the rear of this manual.

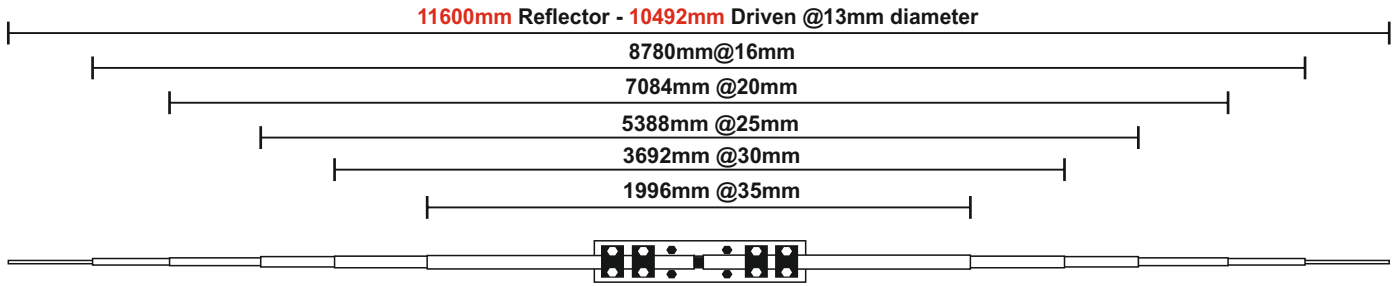
See photos on page 10 of a mounted antenna for the 'ideal' boom to mast plate mounting position and choke/1:1 balun/coax feedline routing.

Typically element placed on driven elements have four insulators, parasitic element plate holders have two while the 6M elements are held in place on the boom with one insulator and no plate.

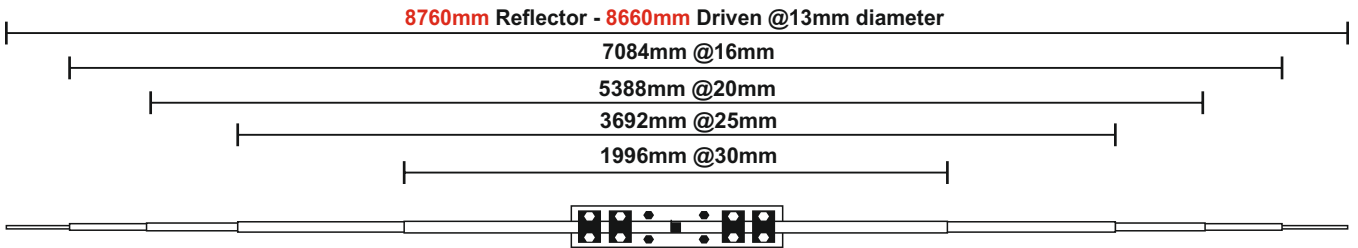
For help and assistance: support@innovantennas.com

Element Sizes & Taper

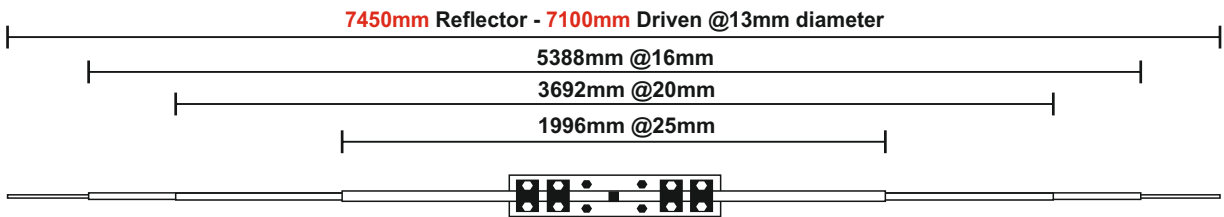
20m



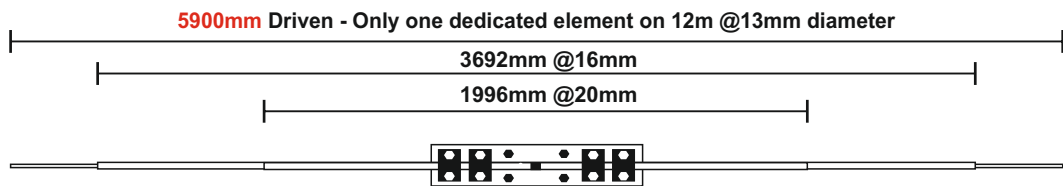
17m



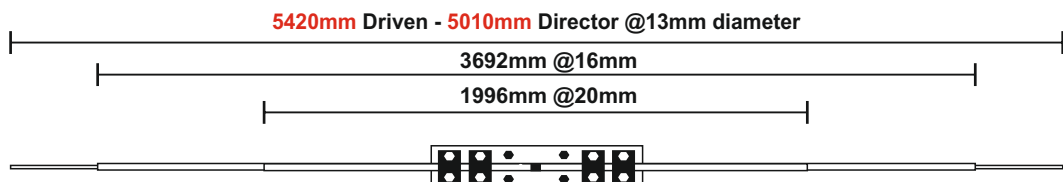
15m



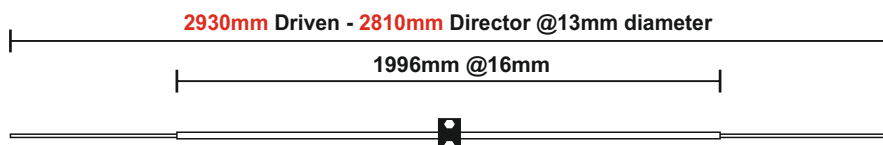
12m



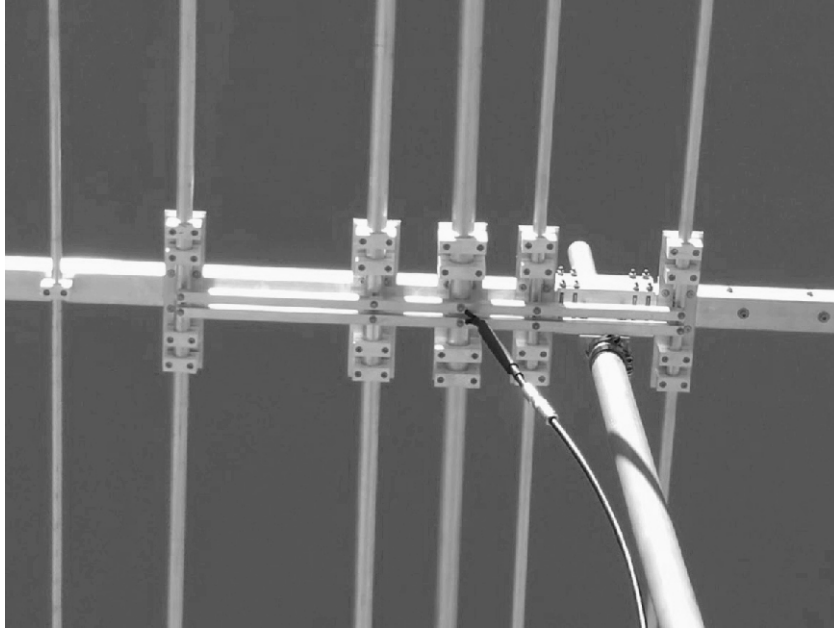
10m



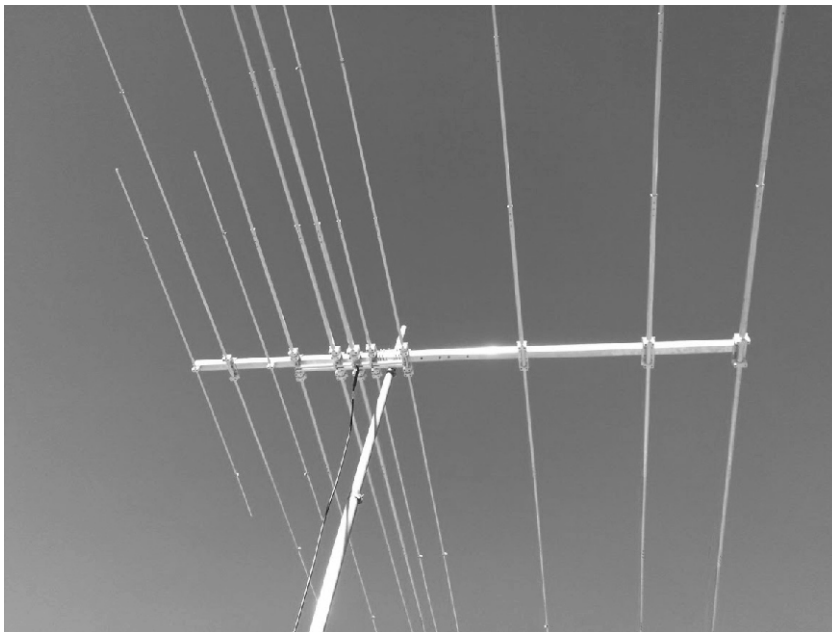
6m



Installation Photos



The twin feedlines of the XR 6 can be clearly seen above with the coax cable directly connected and running down the mast away from the antenna.



Panned view of the feed arrangement on the XR6 with all elements in place on the boom

KARTON #1



PACKING LIST BAG #1

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
A-0163		U-BOLT	M8 x 50mm	2
23035.50		SADDLE CLAMP	50mm	2
S127-98		DIN 127 WASHER	M8	4
S934-98		DIN 934 NUT	M8	4
S7991-9630		Flat Head DIN 7991 Screw	M6x30mm	9
P0100026		Hose Clamp	25-40mm	4
P0100025		Hose Clamp	20-32mm	8
P0100023		Hose Clamp	16-27mm	12
P0100024		Hose Clamp	12-22mm	18
P0100033		Hose Clamp	10-16mm	22

KARTON #1



BAG #2

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
S912-9670		Allen DIN 912 Screw	M6x70mm	12
S912-9650		Allen DIN 912 Screw	M6x50mm	12
S912-9645		Allen DIN 912 Screw	M6x45mm	48
S985-906		DIN 985 NUT	M6	72
S7991-9470		Flat Head DIN 7991 Screw	M4x70mm	10
S125-94		Washer DIN 125	M4	10
S9021-94		Washer DIN 9021	M4	20
S934-94		DIN 934 NUT	M4	30

KARTON #1



BAG #3

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
S7380-9660		Allen DIN 7380 Screw	M6X60mm	8
S9021-96		DIN 9021	M6	8
S985-906		DIN 985 NUT	M6	8

KARTON #1



BAG #4

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
EAHYP035		Plastic Blocks	35mm Ø	6
EAHYP030		Plastic Blocks	30mm Ø	6
EAHYP025		Plastic Blocks	25mm Ø	6
EAHYP020		Plastic Blocks	20mm Ø	16
EAHYP016		Plastic Blocks	16mm Ø	2
P0900024		Element Cap	13mm	22

KARTON #1



BAG #5

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
EA010085		Bottom of Element clamps	70 x 50 x 6mm	9
S7991-9670		Flat Head DIN 7991 Screw	70x6mm	36
S127-96		Lock washer DIN 127	M6	36
S985-906		DIN 985 NUT	M6	36

KARTON #1



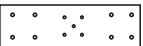
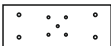
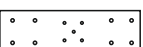
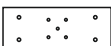
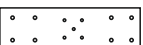
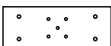
BAG #6

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
S912-9680		Allen DIN 912 Screw	80x6mm	8
S127-96		Lock washer DIN 127	M6	8
S985-906		DIN 985 NUT	M6	8

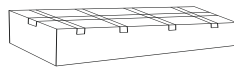
KARTON #1



SPARE PARTS

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
EA010261		14 MHz. Elements plates DRIVEN	250 x 70 x 5mm	1
EA010267		14 MHz. Elements plates REFLECTOR	200 x 70 x 5mm	1
EA010258		18 MHz. Elements plates DRIVEN	250 x 70 x 5mm	1
EA010264		18 MHz. Elements plates REFLECTOR/D1	200 x 70 x 5mm	1
EA010252		21/24/28 MHz. Elements plates DRIVEN	250 x 60 x 5mm	3
EA010255		21/24/28 MHz. Elements plates REFLECTOR/D1	200 x 60 x 5mm	2
EA010320		Boom to Mast Plate	150 x 150 x 10mm	1
EA010321		Rear of boom to mast plate	150 x 70 x 8mm	1
EA010322		POLYCARBONATE Element Spacer (with cable ties)	375 x 50 x 3mm 339 x 50 x 3mm	2

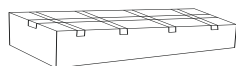
KARTON #2



SPARE PARTS

PART #	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
XR6 A-A		BOOM A	1755,0mm x 50mm	1
XR6 A-B		BOOM B	1755,0mm x 50mm	1
EA0140045.IN		BOOM JOINT	400mm x 45mm	1
XR6 20#1		20m Centrall part	1996,0mm x 35mm Ø	1
XR6 20#1A		DE 20m Central part	1996,0mm x 35mm Ø	1
XR6 20#2		20m 2nd PART	998,0mm x 30mm Ø	4
XR6 20#3		20m 3rd PART	998,0mm x 25mm Ø	4
XR6 20#4		20m 4th PART	998,0mm x 20mm Ø	4
XR6 20#5		20m 5th PART	998,0mm x 16mm Ø	4
XR6 20#6R		20m 5th REFLECTOR TIPS	1560,0mm x 13mm Ø	2
XR6 20#6D		20m 5th DRIVEN TIPS	1060,0mm x 13mm Ø	2
XR6 17#1		17m Centrall part	1996,0mm x 30mm Ø	1
XR6 17#1A		DE 17m Central part	1996,0mm x 30mm Ø	1
XR6 17#2		17m 2nd PART	998,0mm x 25mm Ø	4
XR6 17#3		17m 3rd PART	998,0mm x 20mm Ø	4
XR6 17#4		17m 4th PART	998,0mm x 16mm Ø	4
XR6 17#1R		17m Reflector end	988,0mm x 13mm Ø	2
XR6 17#1D		17m Driven end	938,0mm x 13mm Ø	2

KARTON #2



SPARE PARTS

PIEZA N°	PART IMAGE	DESCRIPTION	SIZES	QUANTITY
XR6 15#1		15m Centrall part	1996,0mm x 25mm Ø	1
XR6 15#1A		DE 15m Central part	1996,0mm x 25mm Ø	1
XR6 15#2		15m 2nd PART	998,0mm x 20mm Ø	4
XR6 15#3		15m 3rd PART	998,0mm x 16mm Ø	4
XR6 10#1		10m Centrall part	1996,0mm x 20mm Ø	1
XR6 10/12#1A		DE 10/12m Central part	1996,0mm x 20mm Ø	2
XR6 10/12#2		10/12m 3rd PART	998,0mm x 16mm Ø	6
XR6 15#4R		15m REFLECTOR Final part	1181,0mm x 13mm Ø	2
XR6 15#4D		15m DRIVEN Final part	1006,0mm x 13mm Ø	2
XR6 10#3R		10m REFLECTOR Final part	1014,0mm x 13mm Ø	2
XR6 10#3D		10m DRIVEN Final part	854,0mm x 13mm Ø	2
XR6 12#3D		12m DRIVEN Final part	1264,0mm x 13mm Ø	2
XR6 6#1		6m Centrall part	1996,0mm x 16mm Ø	2
XR6 6#D1		6m DIRECTOR 1 Final part	617,0mm x 13mm Ø	2
XR6 6#D2		6m DIRECTOR 2 Final part	557,0mm x 13mm Ø	2
EA010314		Feed lines (over feed point terminals)	770 x 15 x 15mm	1