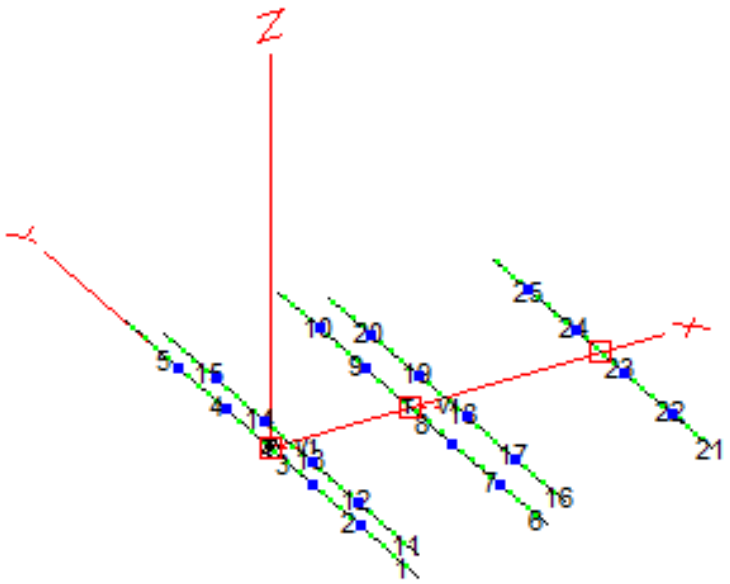

Model 233
Dualbander 12m, 10m
OH1TV

OVF Dualbander, Model 233

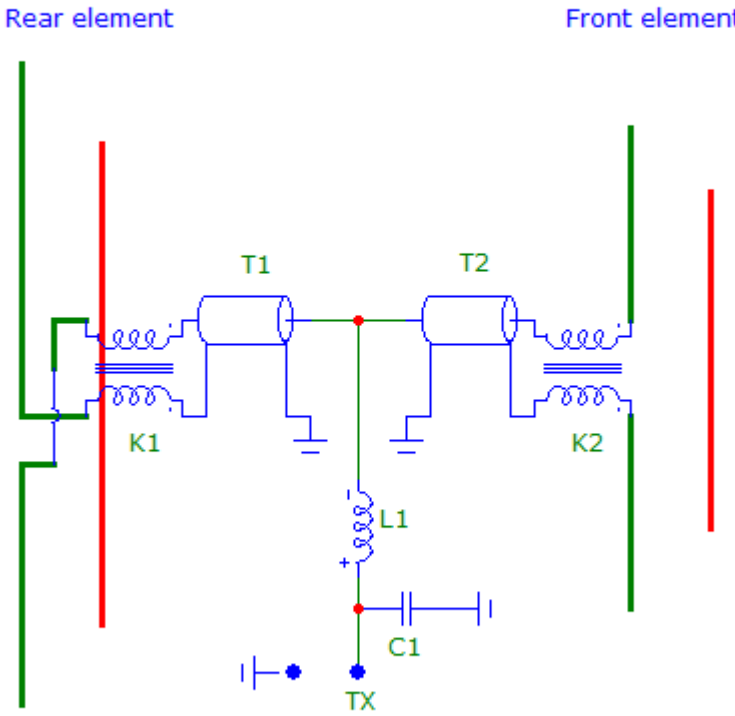


- Bands 12m and 10m
- 3 active elements on both bands
- Gain 8.2dBi
- F/B 20dB
- SWR < 1.5

- Boom length 420 cm
  - Max spacing 400cm

- 2 fed elements, the 12m elements
  - Equal length short cables from both driven elements via T-connector to L-match. Opposite cable polarity.
  - One parasitic el on 12m, coil loaded
  - 3 parasitic elements on 10m
- Switched L-match to 50 ohm for both bands
- Instant band change
- Monoband performance

The concept of Opposite Voltage Feed with short cables



K1 and K2 are current baluns. In practice ferrite beads on coax.

T1 and T2 are coax cable along the boom, equal in length,
as short as spacing allows.
The cables are included in modeling.

L1 and C1 illustate the L-match.
Impedance of the antenna itself is not 50 ohm.

Additional parasitic elelements may be added in front of OVF.

Another higher band elements can be fed
with open sleeve principle, red elements in the picture.

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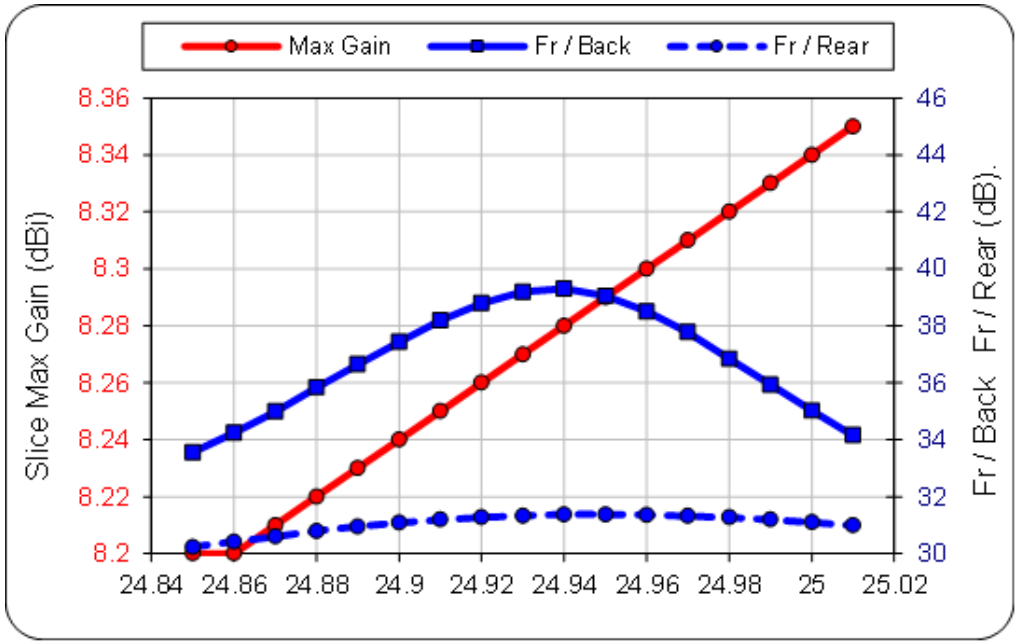
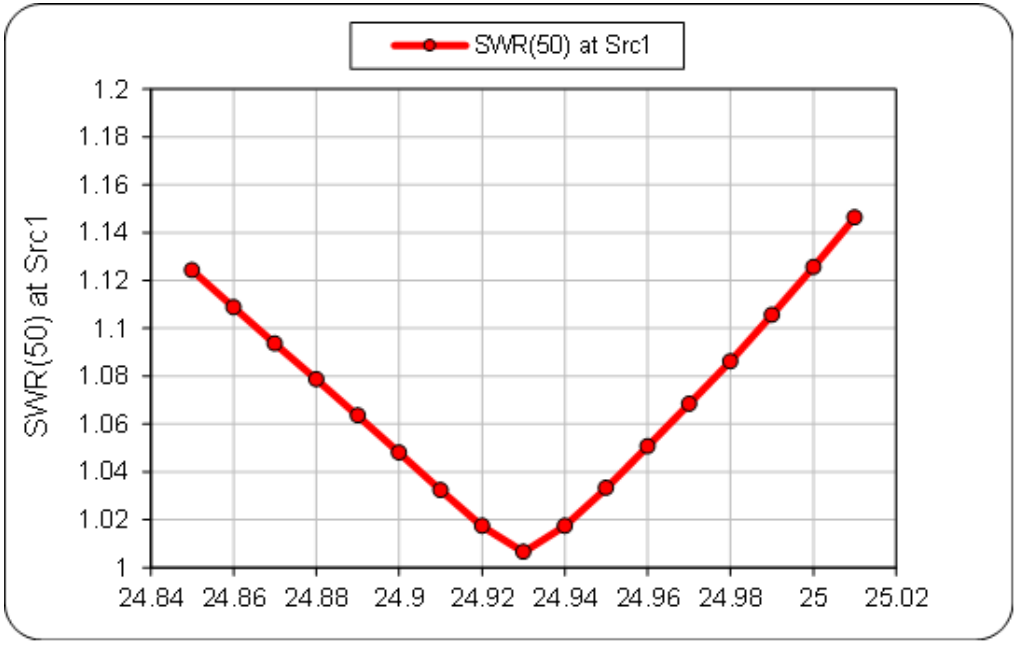
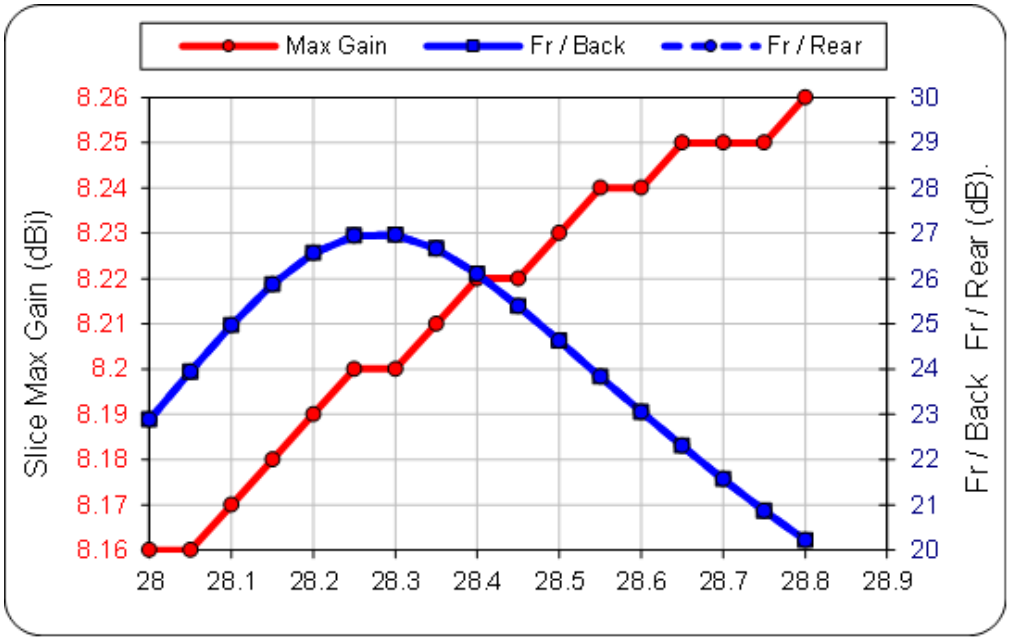
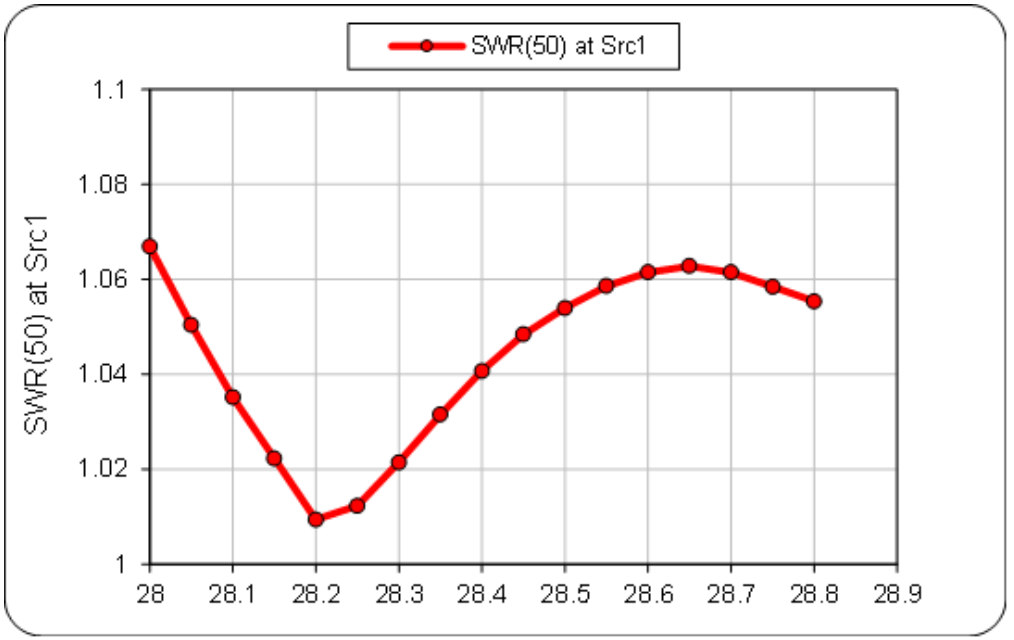
Modeled performance in free space, 12m





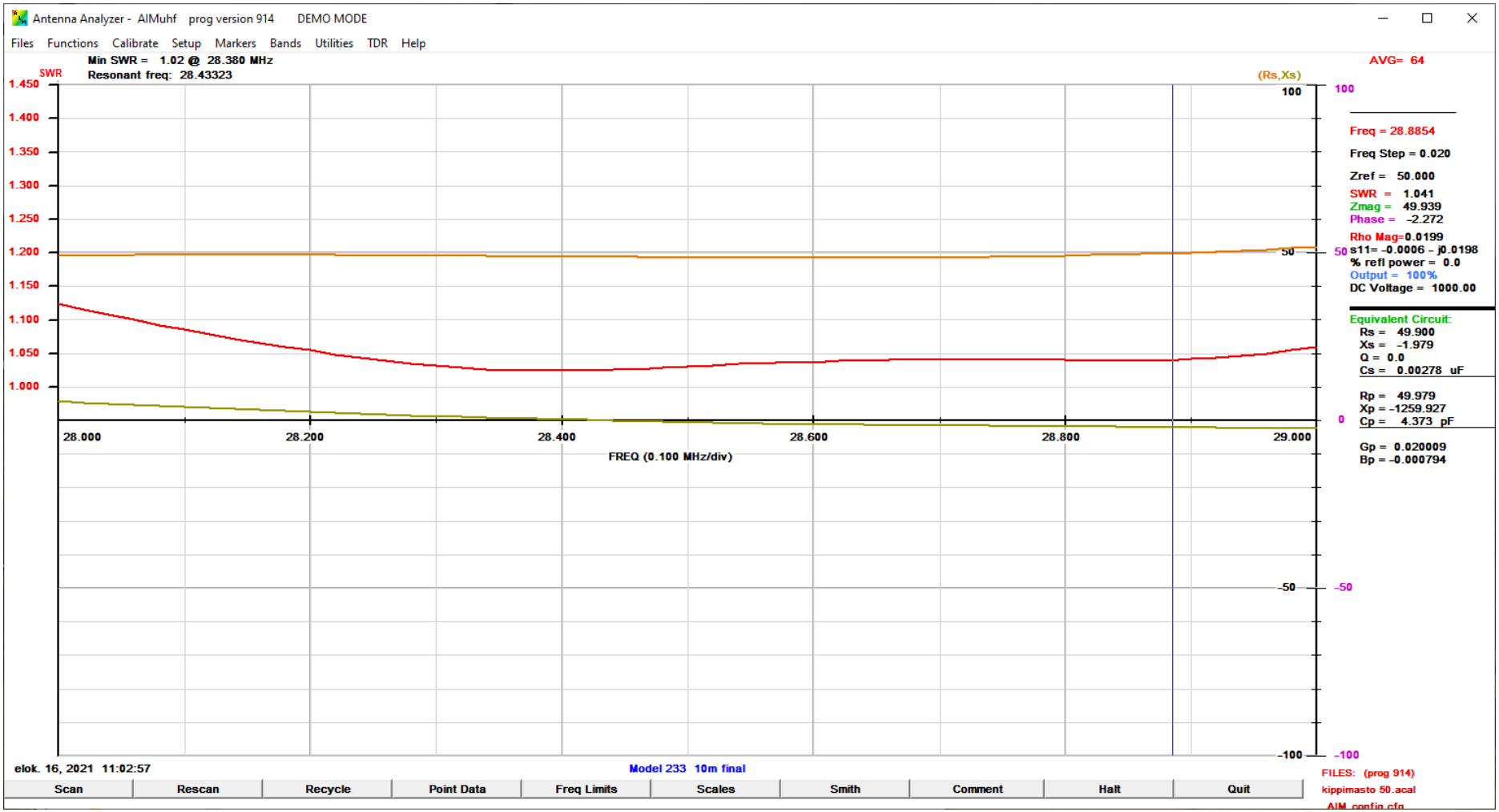
Modeled performance in free space, 10m





Measured input-impedance @ 12m, SWR=red

Measured input-impedance @ 10m, SWR=red



Dimensions

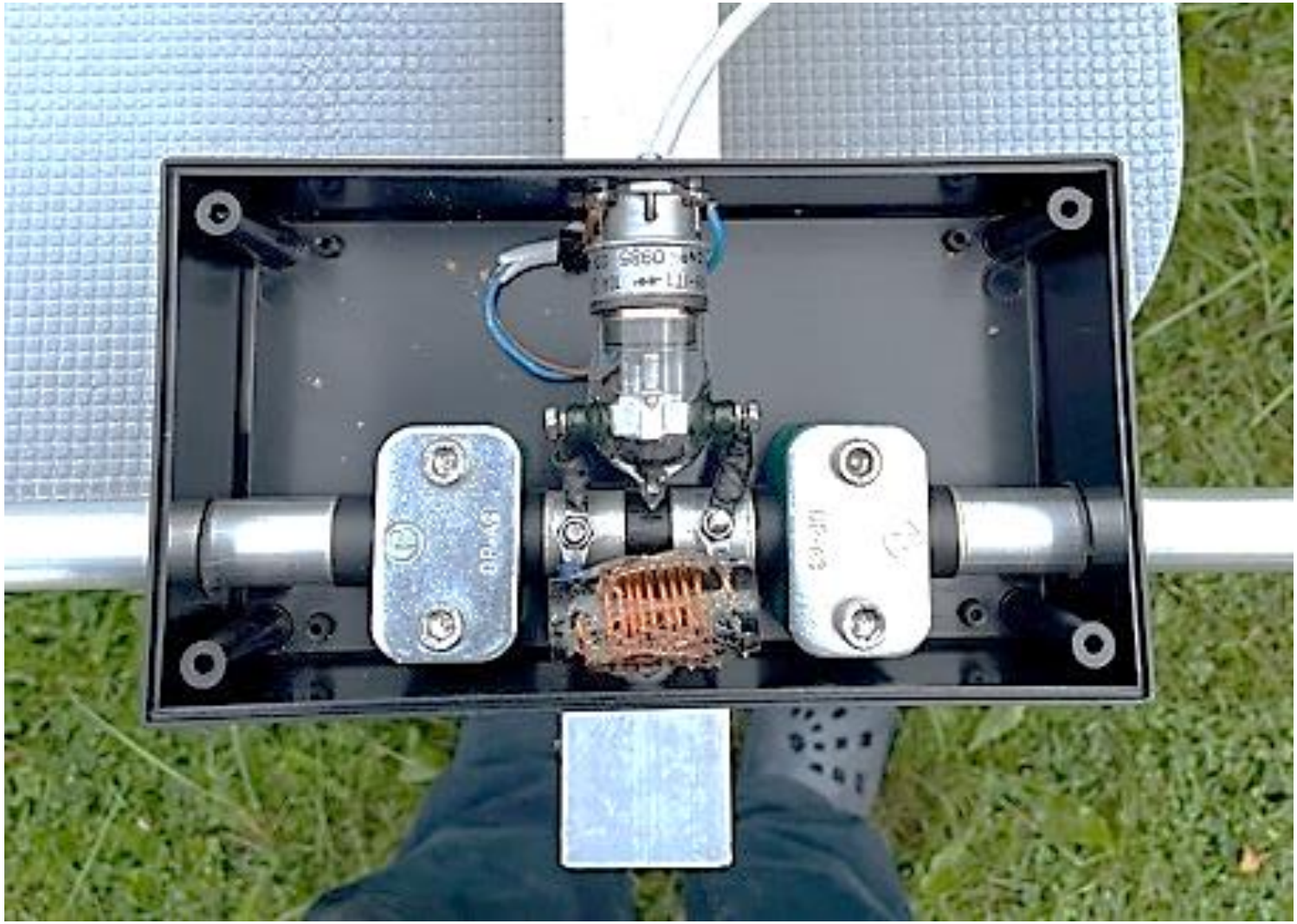
Origo of the coordinates is at the center of 12m rear element.

tube wall thicknesses are:
dia 19mm 1.5mm
dia 15mm 1mm
dia 12mm 1mm

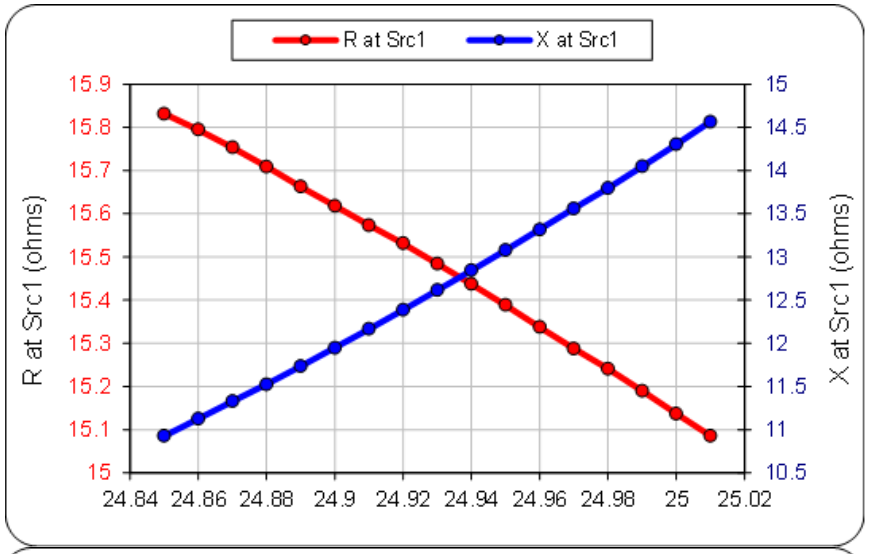
In tuning phase following additions to each dia 12mm tube was done:
12m rear +9mm
12m front + 8mm
10m rear +3mm
10m middle +3mm
10m front +3mm (used also on 12m)
These additions are not included in the table on the right.

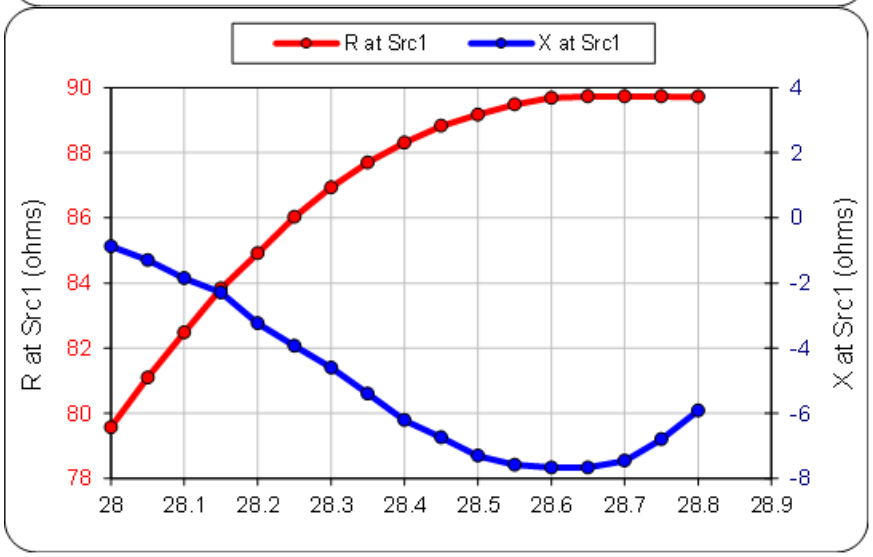
End 1			End 2			
X	Y	Z	X	Y	Z	Dia
12m rear						
0.000	-3.105	0.000	0.000	-1.900	0.000	12.000
0.000	-1.900	0.000	0.000	-0.900	0.000	15.000
0.000	-0.900	0.000	0.000	0.900	0.000	19.000
0.000	0.900	0.000	0.000	1.900	0.000	15.000
0.000	1.900	0.000	0.000	3.105	0.000	12.000
12m front						
1.700	-2.827	0.000	1.700	-1.900	0.000	12.000
1.700	-1.900	0.000	1.700	-0.900	0.000	15.000
1.700	-0.900	0.000	1.700	0.900	0.000	19.000
1.700	0.900	0.000	1.700	1.900	0.000	15.000
1.700	1.900	0.000	1.700	2.827	0.000	12.000
10m rear						
0.222	-2.674	0.000	0.222	-1.500	0.000	12.000
0.222	-1.500	0.000	0.222	-0.500	0.000	15.000
0.222	-0.500	0.000	0.222	0.500	0.000	19.000
0.222	0.500	0.000	0.222	1.500	0.000	15.000
0.222	1.500	0.000	0.222	2.674	0.000	12.000
10m mid						
2.106	-2.493	0.000	2.106	-1.500	0.000	12.000
2.106	-1.500	0.000	2.106	-0.500	0.000	15.000
2.106	-0.500	0.000	2.106	0.500	0.000	19.000
2.106	0.500	0.000	2.106	1.500	0.000	15.000
2.106	1.500	0.000	2.106	2.493	0.000	12.000
10m front						
4.000	-2.311	0.000	4.000	-1.500	0.000	12.000
4.000	-1.500	0.000	4.000	-0.500	0.000	15.000
4.000	-0.500	0.000	4.000	0.500	0.000	19.000
4.000	0.500	0.000	4.000	1.500	0.000	15.000
4.000	1.500	0.000	4.000	2.311	0.000	12.000

Front element, 12m coil and 10m shorting relay



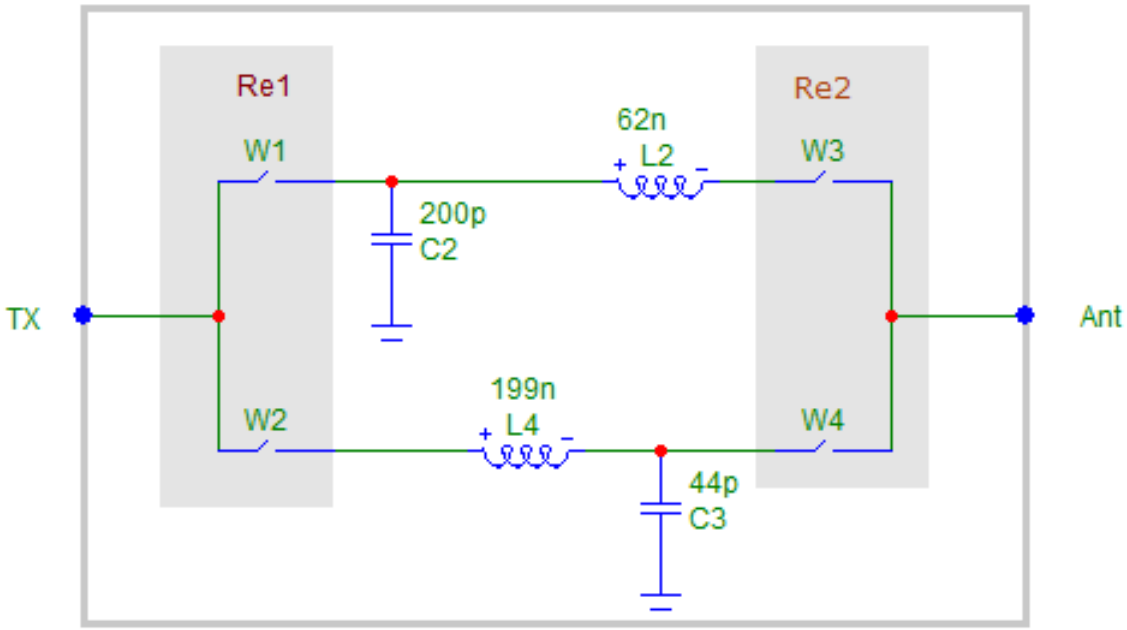
Tuning the elements





- The following procedure was used to align the elements: Impedance at the summing point, without the L-match-box, was measured with network analyzer. It was compared to the modeled impedance response of the same at 16m height (on the left). The reactive component of the impedance was a good marker in that.
- All elements were a bit short in the model. Corrections are shown on the Dimensions page. The differences are based on boom influence and segmentation error in the model, which both lead to more length, in this case 0.2-0.3%
- The L-match networks were designed based on these measurement results. Their purpose is to produce the conjugate impedance of the measured impedance on the band center frequency, when TX port terminated to a good 50 ohm resistance.

L-match for Model 233 - 12 10



Conjugate impedances based on built antenna
= tuning targets for the L-match, when TX-end terminated to 50 ohm.

12m: 14.44 - j 13.0 ohm @ 24930kHz
10m: 74.3 + j 8.3 ohm @ 28300kHz

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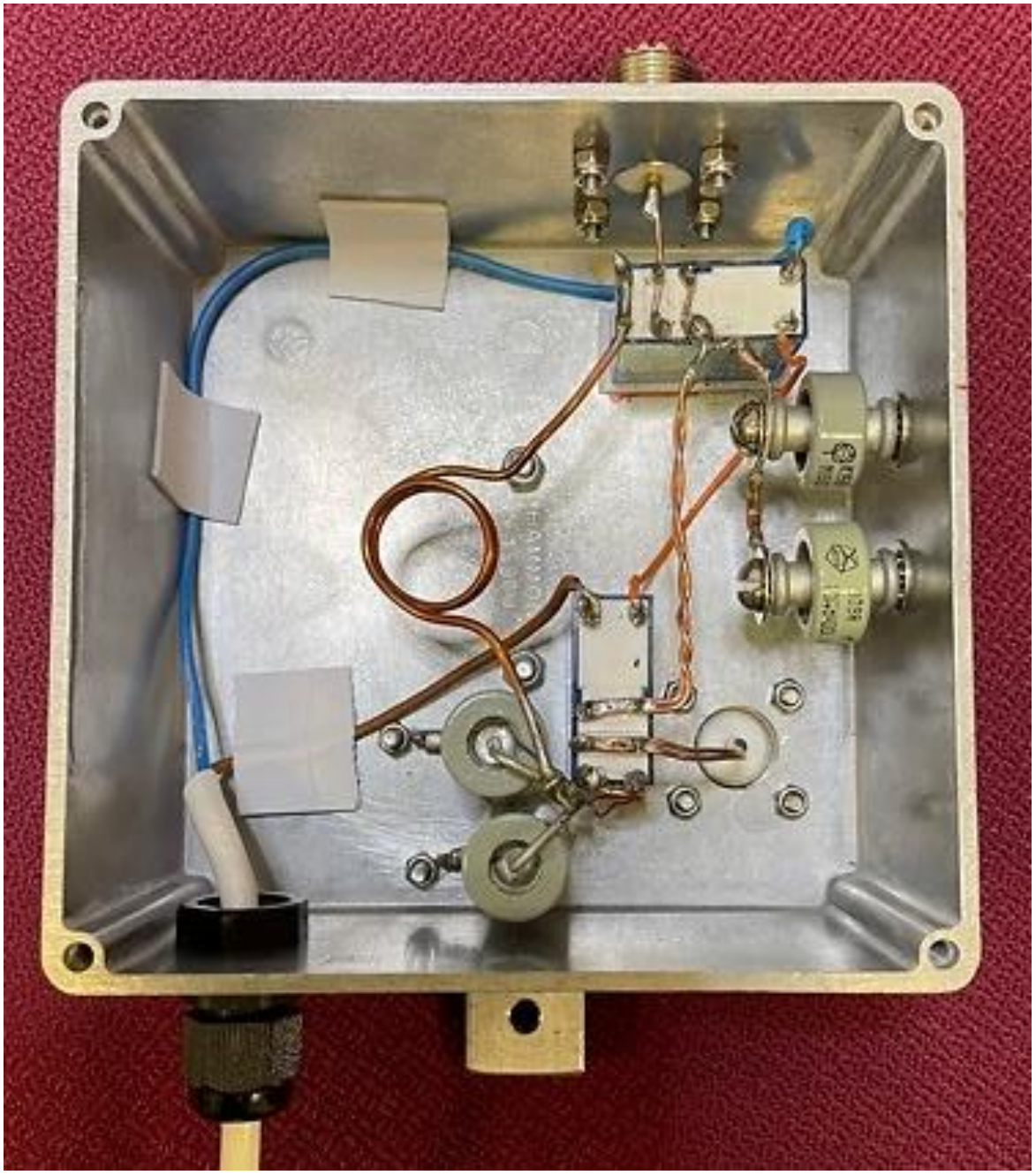
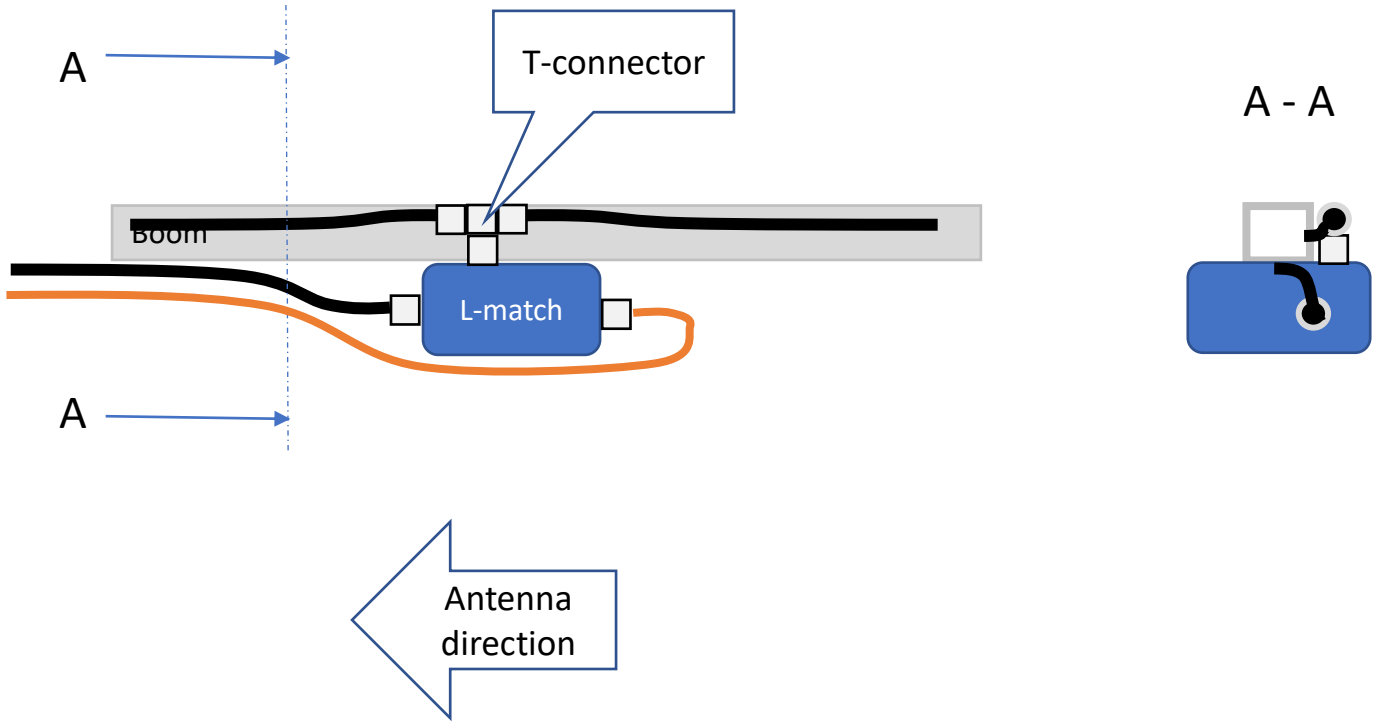
L-match

- The box is 120x120mm
- 2 relays SPDT 250V 16A
  - 12V coils in series for 24V
- Capacitors Russian
  - 2x100pF
  - 2x22pF
  - 10m coil 3 turns 1.5mm wire dia 18mm
  - 12m coil 2x1mm straight wire abt 70mm long
- Aligned to conjugate impedance of the antenna, 50 ohm termination at the TX port.



L-match installation

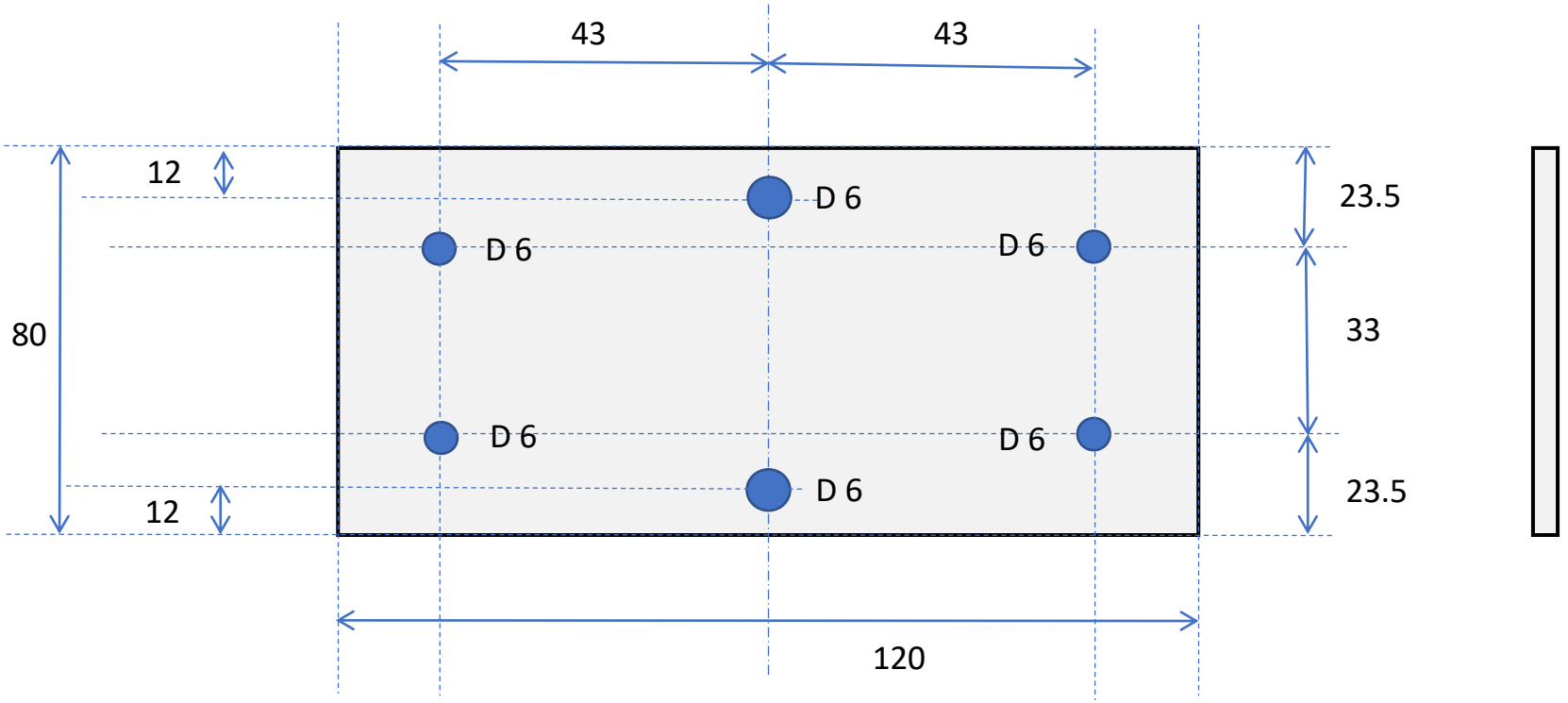


Construction

- For the boom square 40x40mm aluminum tube was used, 420cm long.
- Elements were installed on 120x80x5mm aluminum plates, using two Stauff clamps/element, see drawing.
- Element center isolators were made from dia 20mm POM plastics, see drawing.
- The front element is coil loaded on 12m. It is full size on 10m. Russian V1V relay is used to short the coil on 10m.
- Opposite Voltage Feed here means that the two full size elements on 12m are fed. Between the elements there is a T-connector to which two short cables come from those elements. Cable polarity is opposite on those elements. Current balun is added to both elements, see cable drawing.
- The joints of telescopic elements are made as follows: Joints are made tight by adding thin aluminum plate around the inner tube. Two Pop rivets are used to lock the joint. Then the joint is covered with heat-shrink tubing. (with glue). The lengths were made 0.5% over size by extending the dia 12mm sections and then shortened by cutting in the tuning phase.

Some components

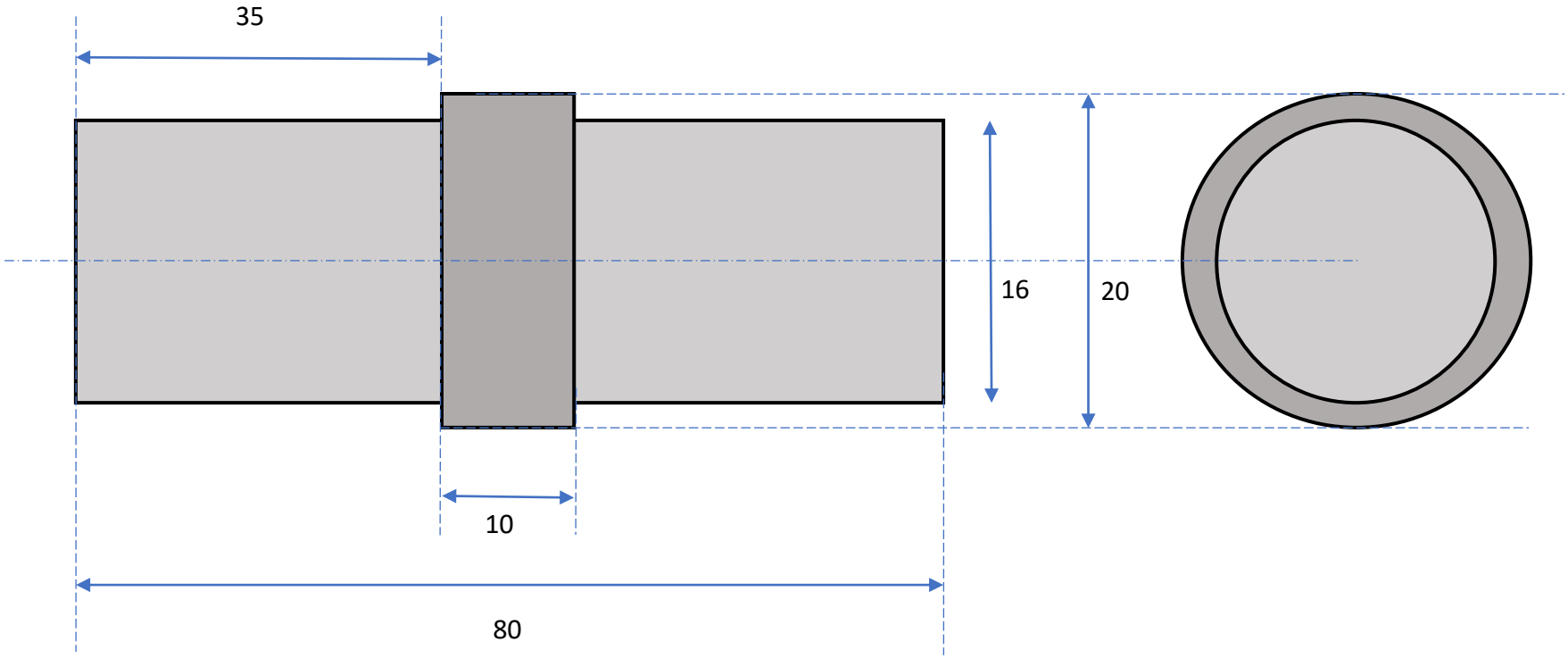
Element (dia 19mm) to boom mounting bracket
5 pcs needed



Material: Aluminum 80x120 x5, I-profile

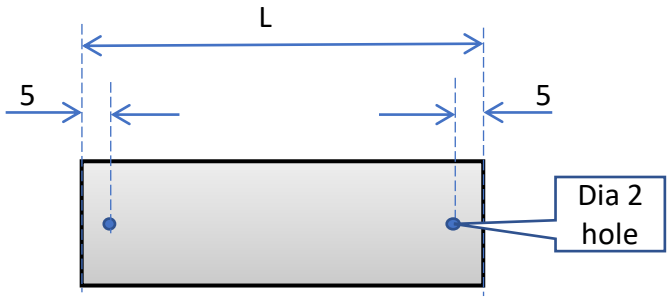
Screws for Stauffs 4pcs M6x60
Bracket to boom 2pcs M6x 70

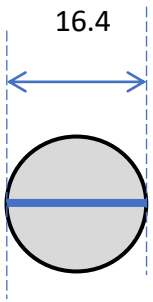
Element center isolator for 19mmm tube, 3 pcs needed



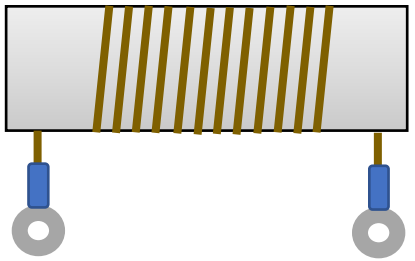
Material dia 20mm POM

Coil for the front element on 12m,



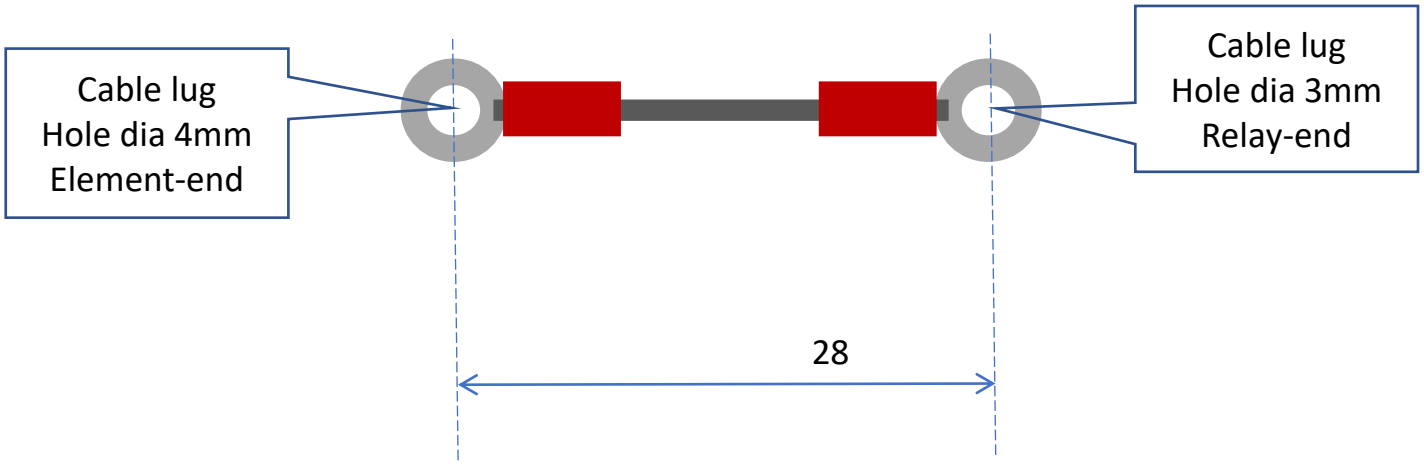


- Inductance value is 0.94uH
- 1.5mm emaled cu wire on dia 16.4mm POM form
  - 0.94uH = 10 turns, 28mm long, L=40mm POM
  - Q=abt 400



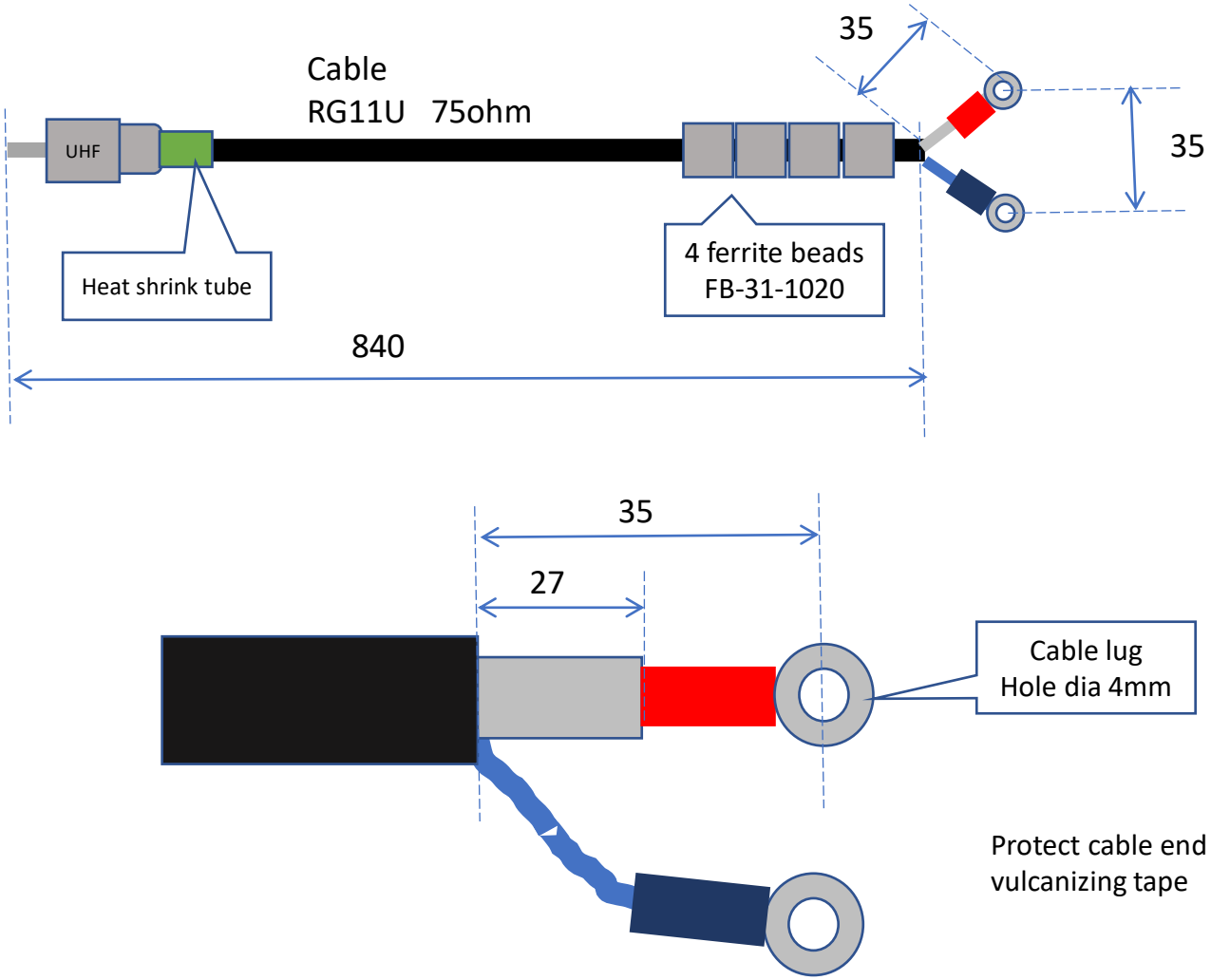
Number of turns is not correct in the picture →

Cable to relay at front element, 2 pcs needed

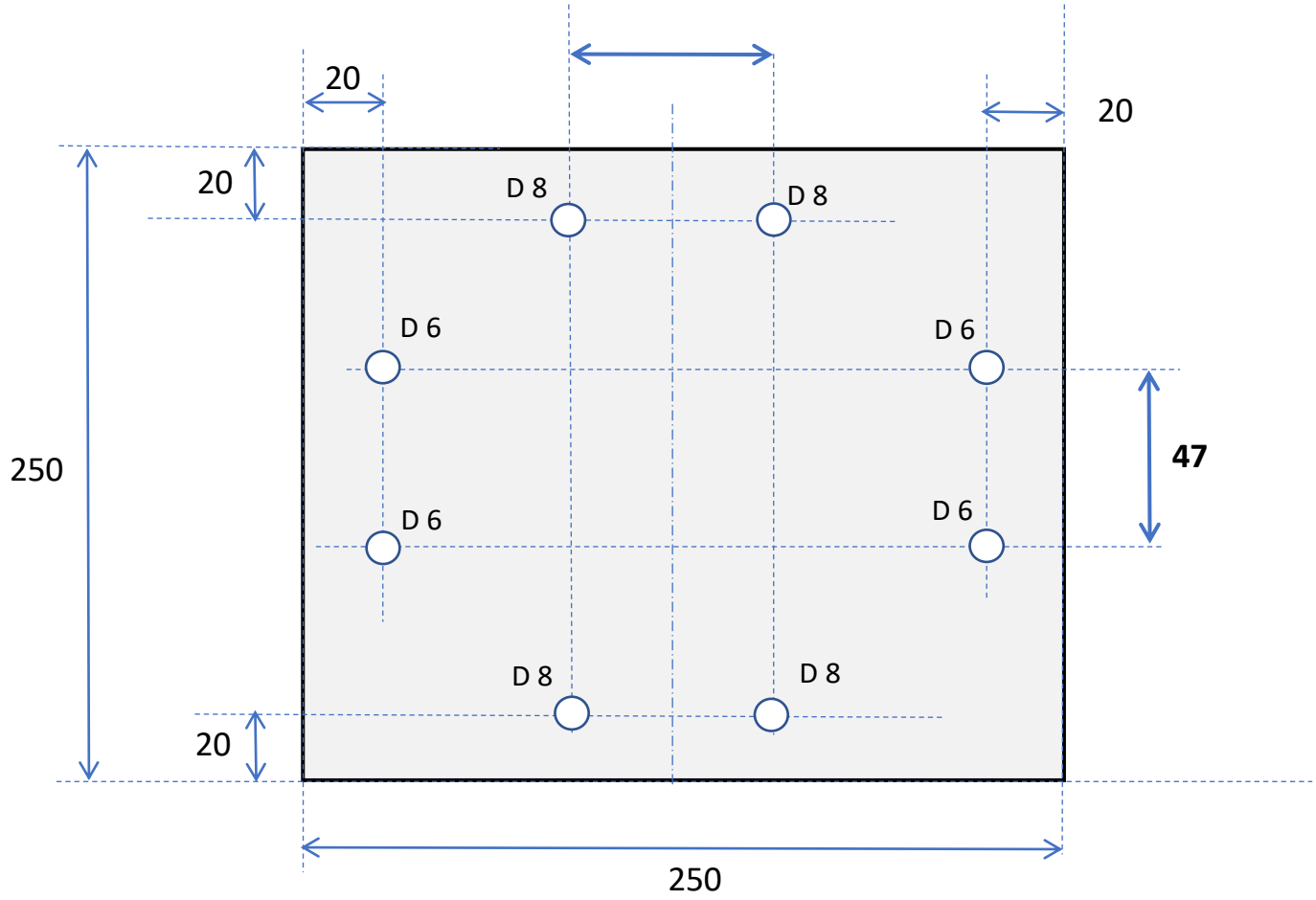


Shield of RG58 is used as cable here. It is thick and flexible
Cable lugs are just crimped, no soldering needed
Align lugs in 90 degree angle on the cable
Cable shall be covered with self vulcanizing tape
> Relay loop total inductance is 50nH

Feed cables for 12m elements, 2pcs



Boom to mast bracket



Material: Aluminum plate 6x250x250