QRP antenner

litt teori og praktiske aspekter

Haugaland Gruppe LA4C

Vlad Korostel LB8IG

06 april 2022

- Antenner basis info
- Dipole
- Vertical
- Delta Loop
- LW / ENDFED
- QRP - tuner
- Rigging

“QRP operation refers to transmitting at reduced power while attempting to maximize one's effective range”

Tekniske krav

- Effektiv - alle energien må transformeres i elektromagnetiske bølger , jord trenger ikke forvarming ;)
- Lav elektrisk tap
- Lav vekt og minimalistisk - QRP er assosieres med radioaktivitet på tur i naturen. Mobilitet!
- Minimal rigging tid
- Robust for bruk i vind og regn

Klassifisering

Alle antenner i forbindelse med amatørradio kan være enkelt klassifisert :

Single / Multiband (resonans / non-resonans)

Symmetriske / Asymmetriske

Directional / Omnidirectional

Effektivitet

Effektiviteten av qrp antenne kan beskrives av 2 parametrene :

- **Hvor mye energi transformeres i elektromagnetiske stråling *(GP har max 47%)***

- **Stråling diagram (husk QTH !)**

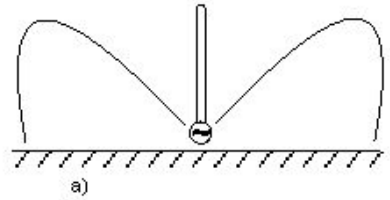
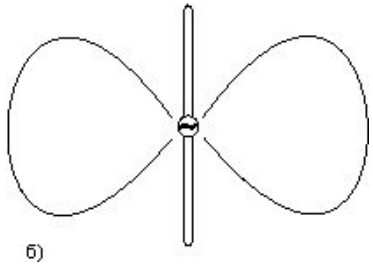
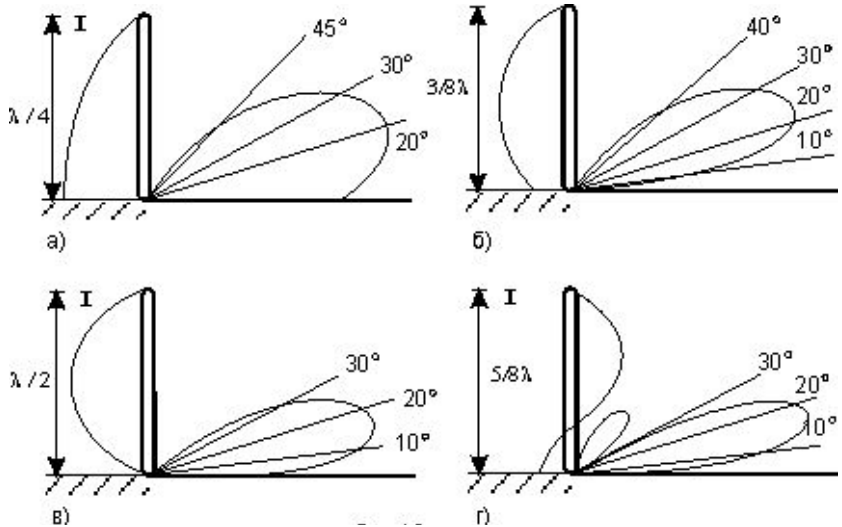


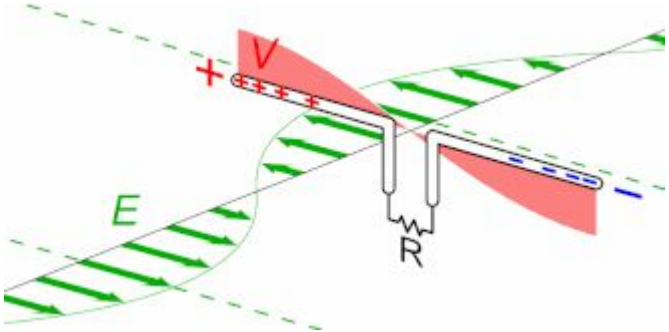
Рис.2

Поток мощности, излучаемый:
а) штырем;
б) диполем.





DIPOLE



Dipole er mest effektive antenne for QRP og kan bli realisert i praksis som :

Horisontal dipole

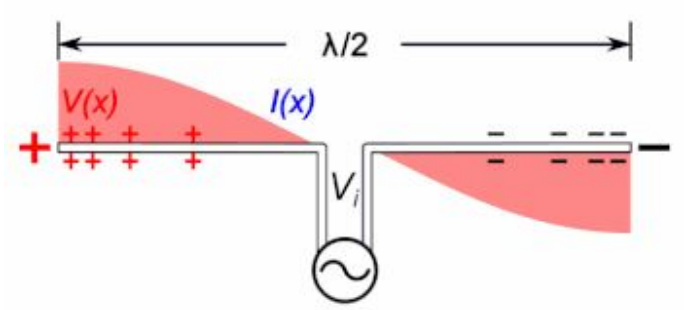
Vertikal dipole

“Sloper”

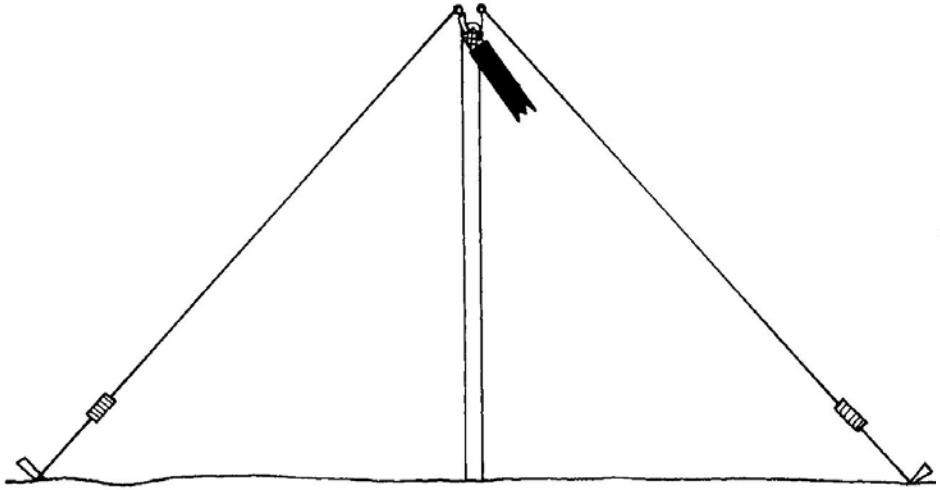
Inverted -Vee

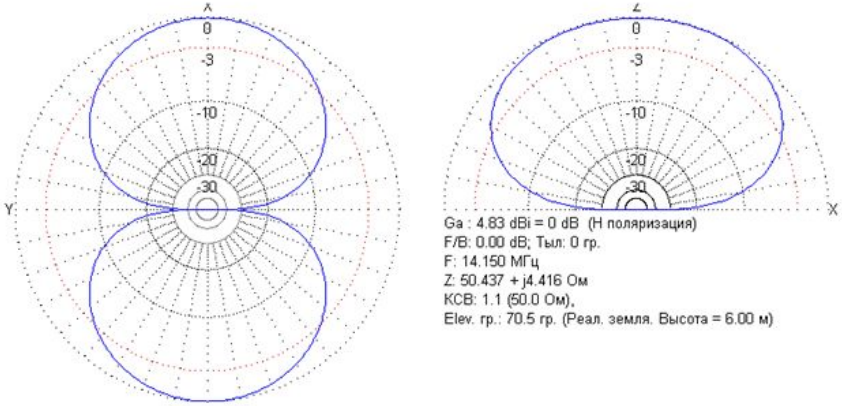
mulige konstruktive varianter :

Doublet / Fan-dipople / Link - Trap -dipople



Inverted Vee - praktisk felt dipole

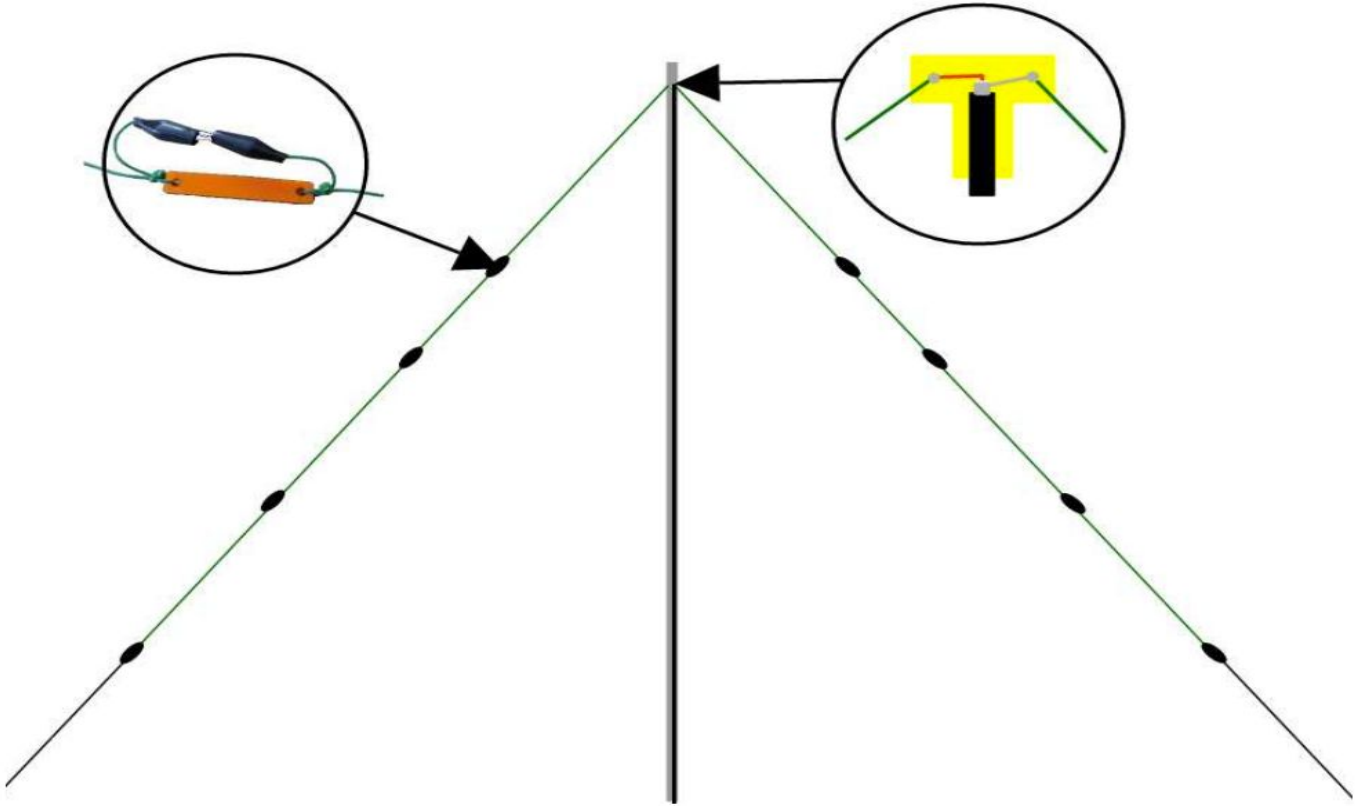




Диаграммы направленности антенны Inverted V

Lofoten , 2016

Link - Inverted Vee Dipole - multiband



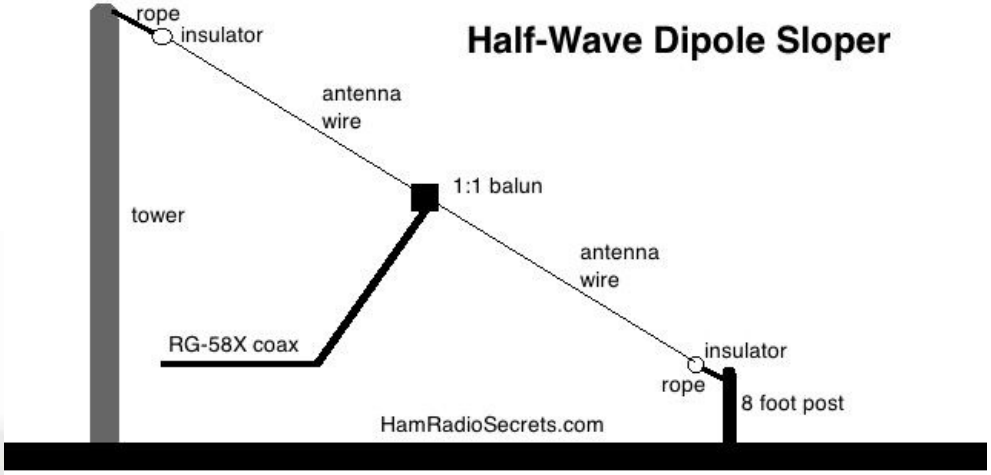
Bardun lengden kan justere vinkelen

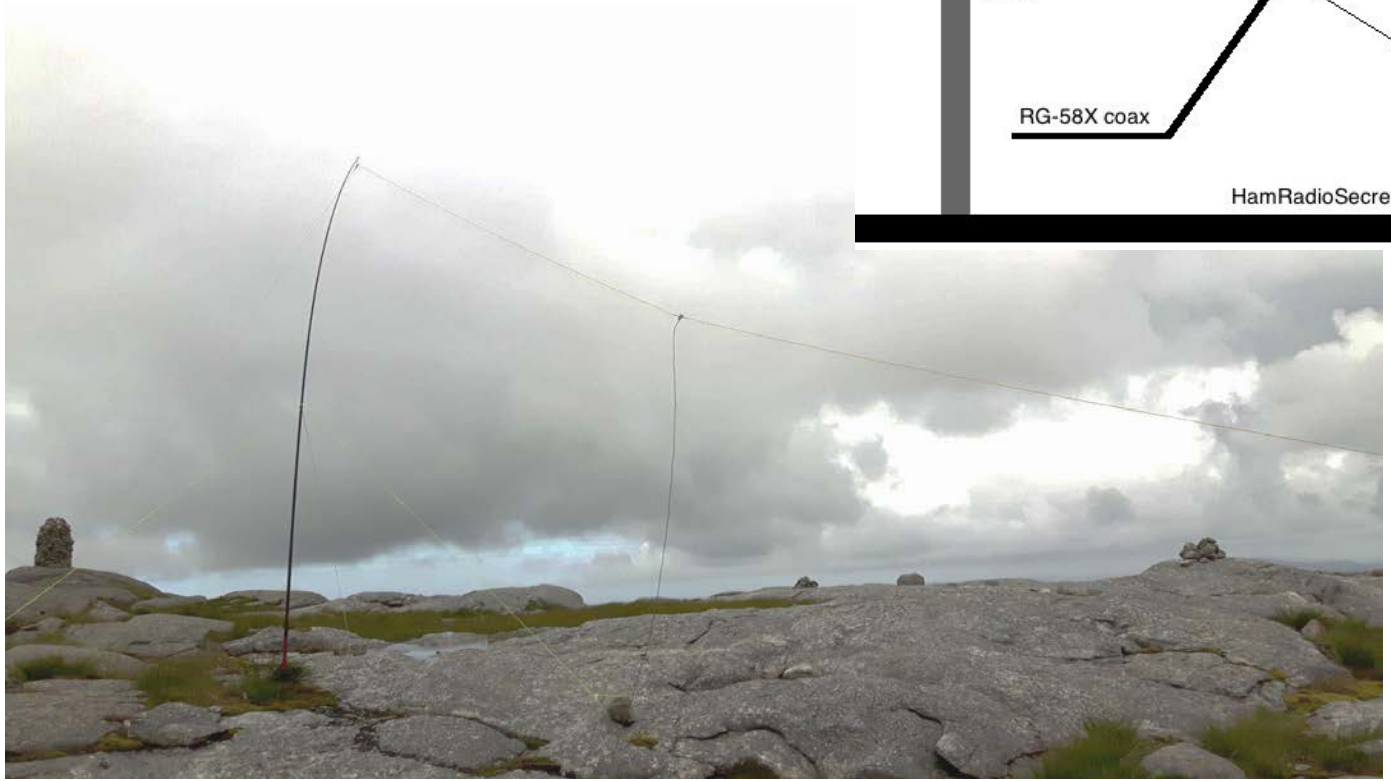
Link-dipole , Biltema mast 7m , Ferkingstad

“link” for dipole

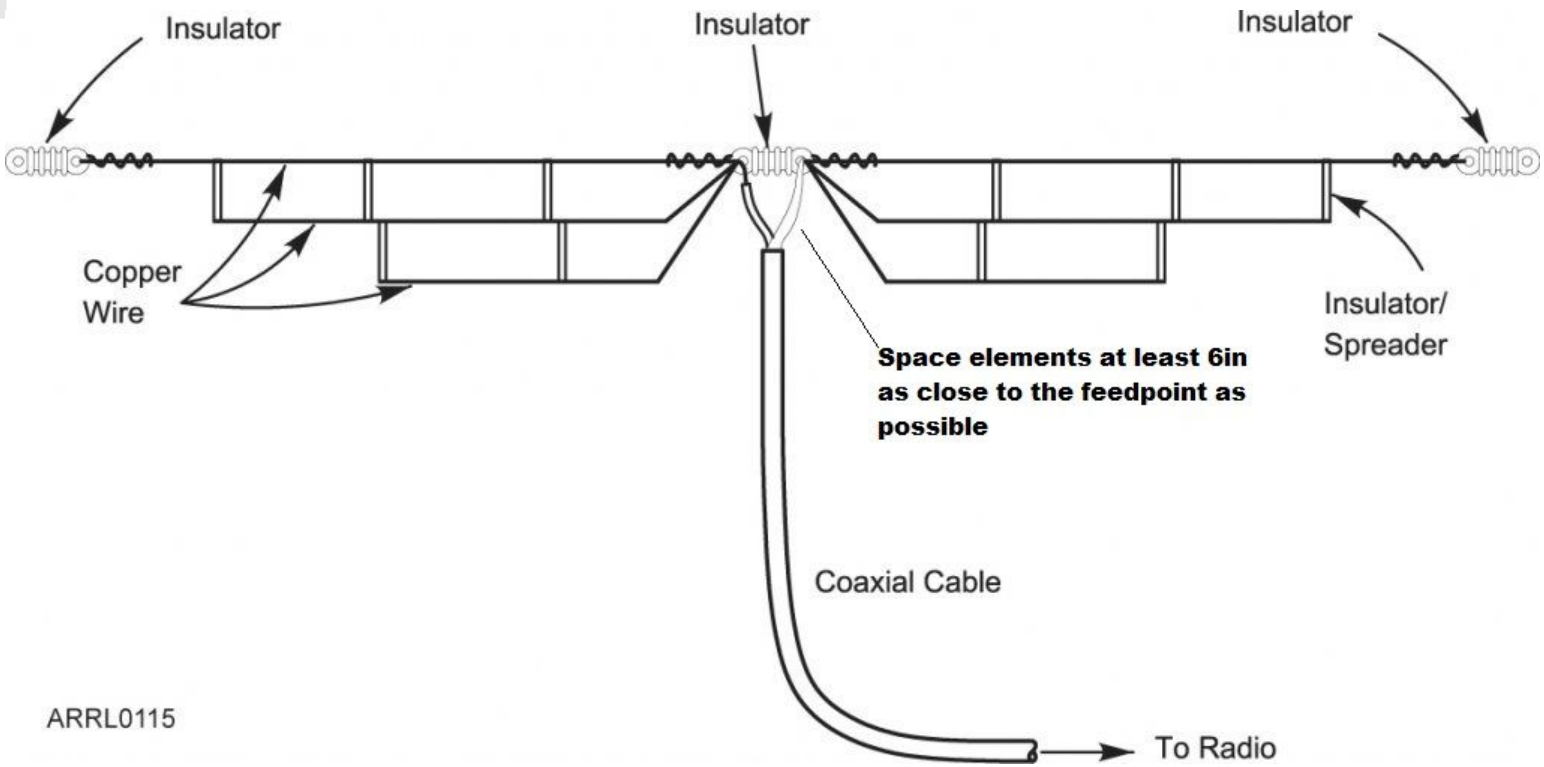
BILTEMA

Sloper -Dipole



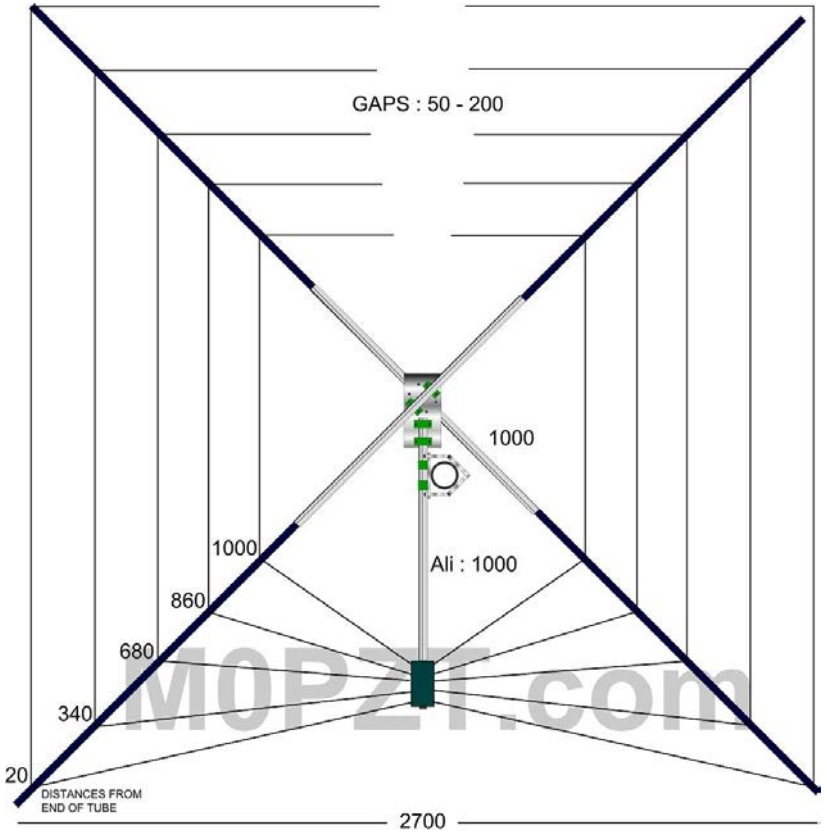


Fan- Dipole , multiband

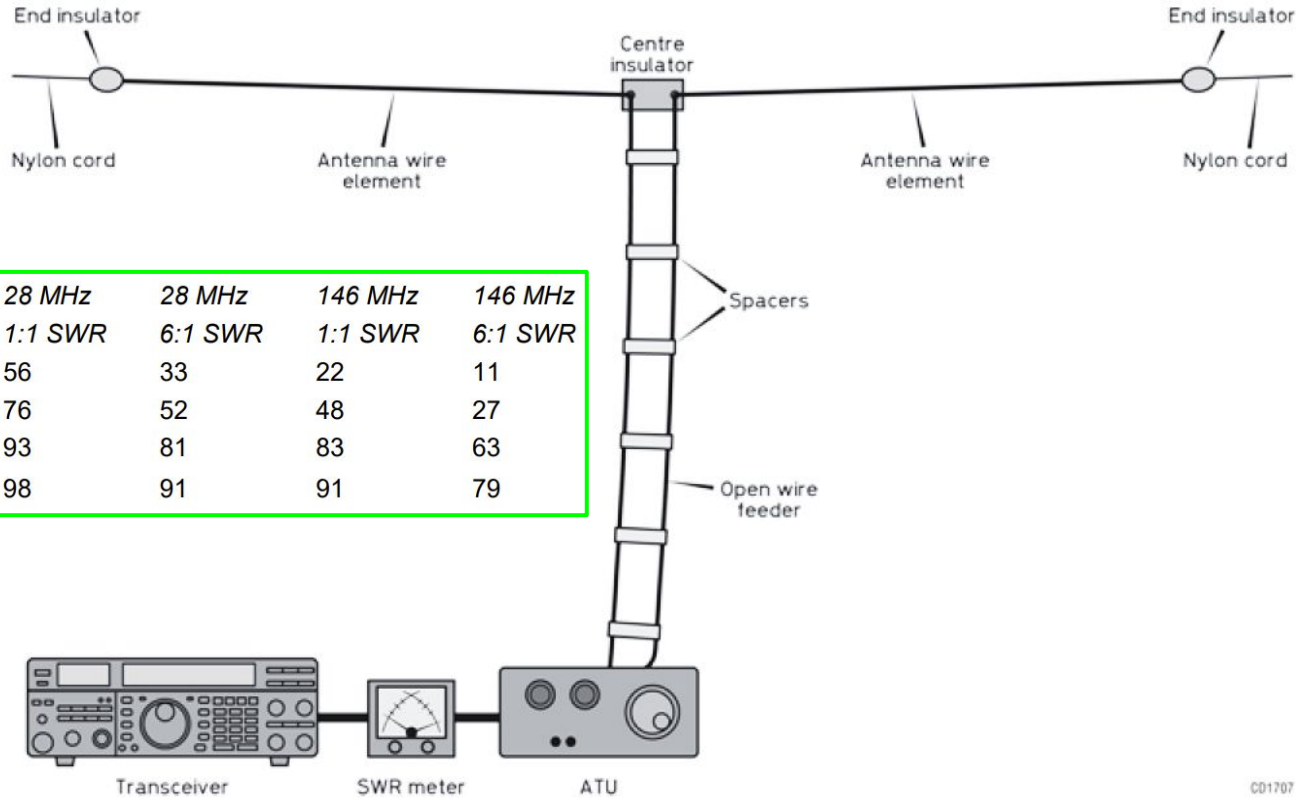


Fan-Dipole - i Ferkingstad

Cob-web

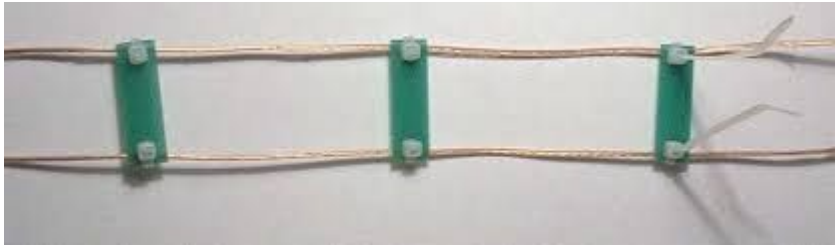

GAPS : 50 - 200
1000
1000
Ali : 1000
860
680
340
20
DISTANCES FROM
END OF TUBE
2700
M0PZT.com

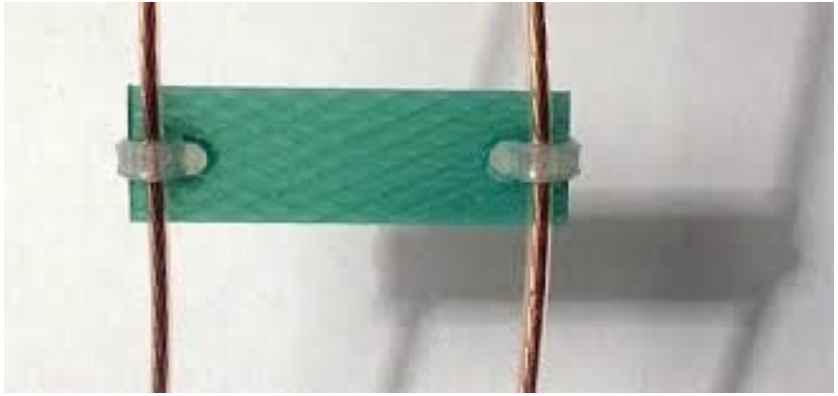
Doblet - multi band antenne



Transmission	*3.5 MHz*	*3.5 MHz*	*28 MHz*	*28 MHz*	*146 MHz*	*146 MHz*
Line Type	*1:1 SWR*	*6:1 SWR*	*1:1 SWR*	*6:1 SWR*	*1:1 SWR*	*6:1 SWR*
RG-58A	85	65	56	33	22	11
RG-8A	91	79	76	52	48	27
3/4-inch Hardline	98	93	93	81	83	63
450-Ω Ladder line	99	98	98	91	91	79

Vertikal - Doblet

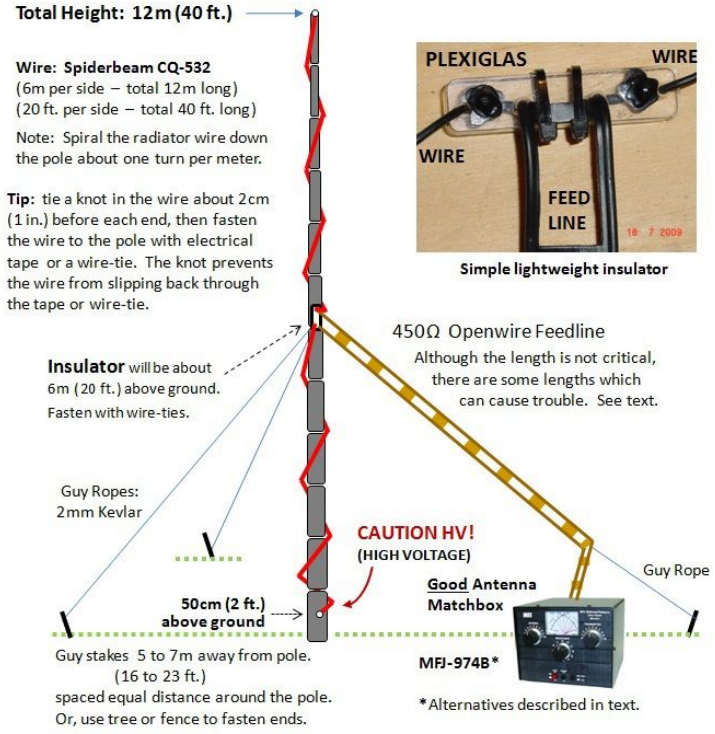




Multi-Band HF Vertical Dipole

On a Spiderbeam 12m HD Telescoping Fiberglass Pole

for: 80/40/30/20/17/15/12/10m

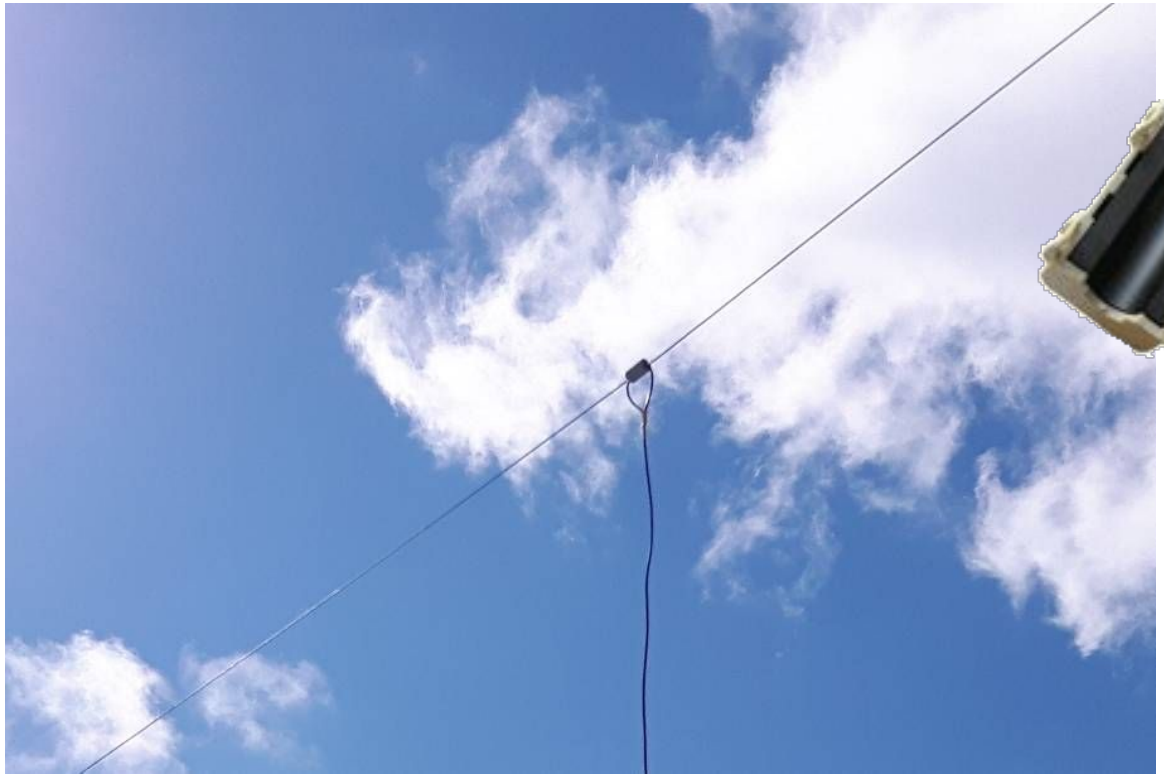


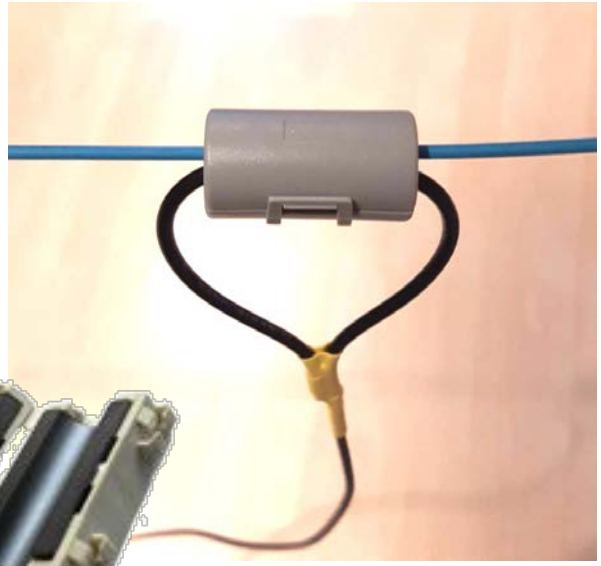
Spiraling the wire down the pole distributes its weight evenly around the pole and prevents it from flopping in the wind. Since the lower half of the pole is thicker (wider) than the upper half, the wire will end about 50cm above the ground.

IT IS IMPORTANT TO KEEP THE WIRE THIS DISTANCE FROM THE GROUND!

https://www.dj0ip.de/vertical-antennas

Ferrite coupling



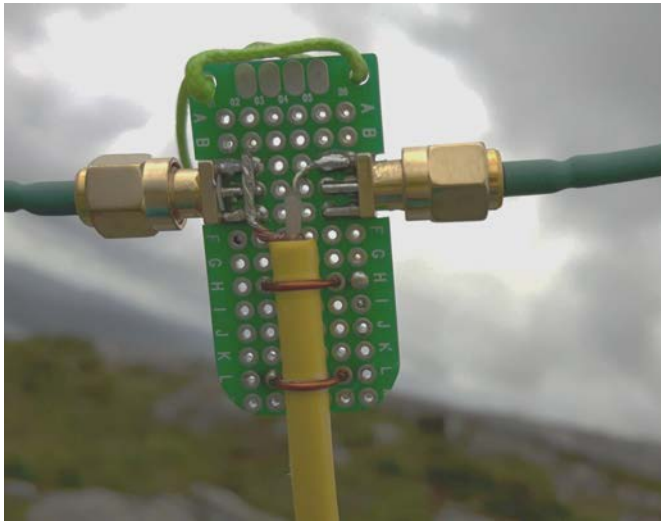


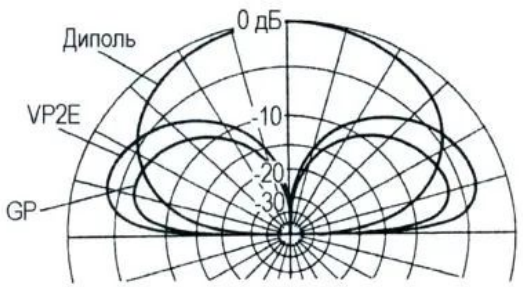
Ultralight Dipole

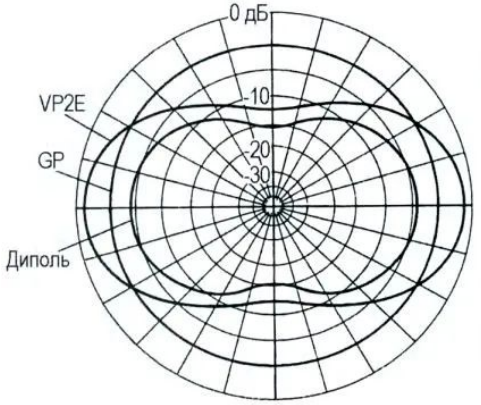
SMA -connector

AWG 18 -arms

LM174 coax + BNC







HB9SL VP2E Wire Antenna
20m version

4.1m

10.4m

6.3m

center support

4.2m
non-conducting mast

braid

center

50Ω coax TL

≠ ½ WL

insulator

insulator

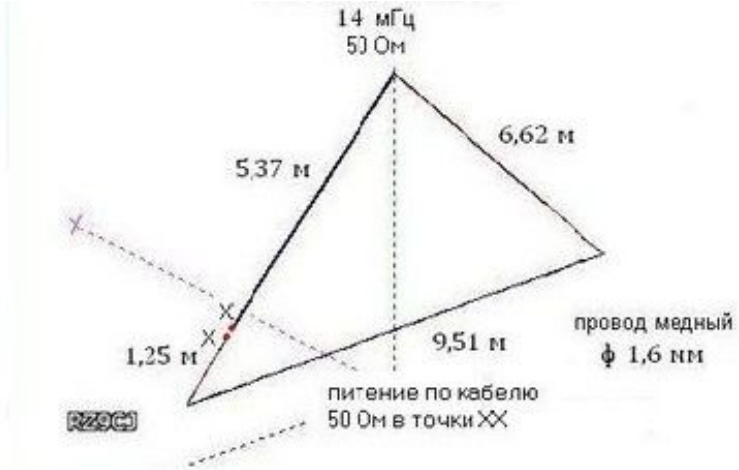
.6 m

end support

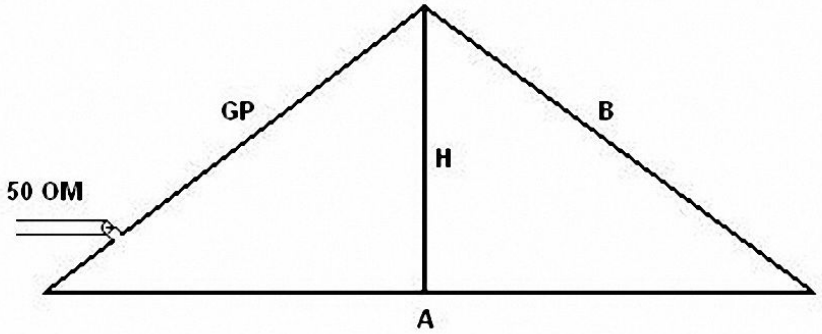
end support

.6 m

Vertical Delta Loop



Dimensjoner VDL



КВ и УКВ 11/2003, стр. 21. Рамочные антенны. Антенна Delta Loop с вертикальной поляризацией. А.Барский, VE3XAX.

F, Mhz ... 3.6 ..... 7.02 ..... 10.11 ..... 14.1 ..... 18.08 ..... 21.1

H, m .....14.35 ..... 6.75 ..... 4.48 ..... 3.09 ..... 2.34 ..... 1.97

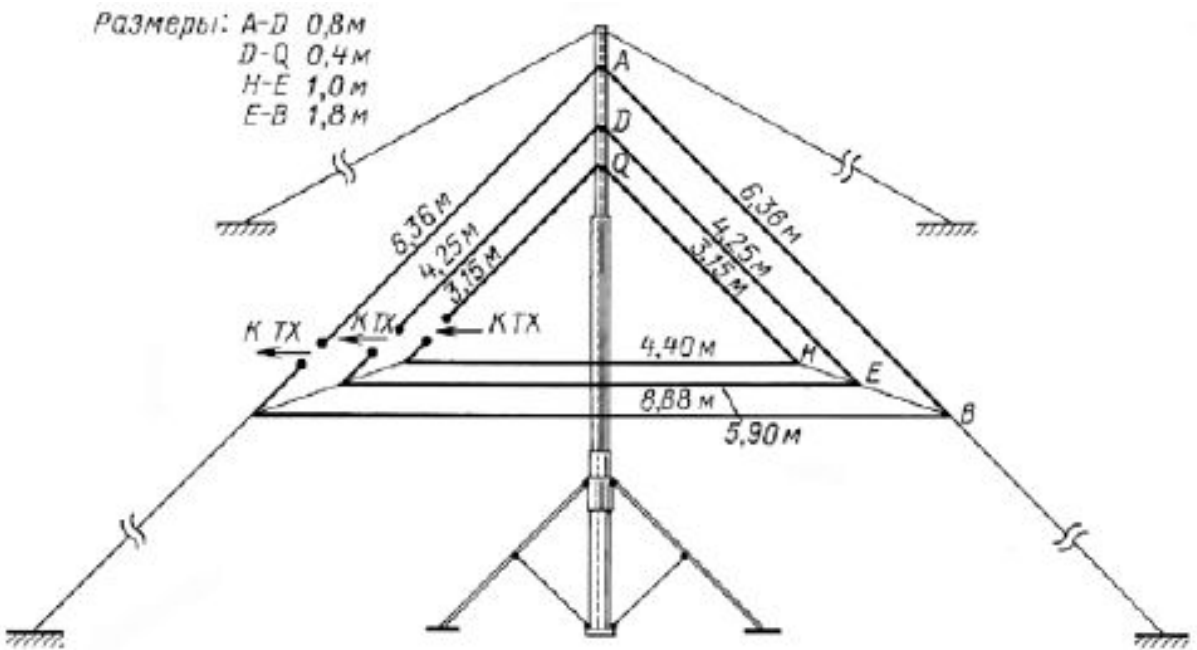
A, m .... 36.69 .... 19.22 .... 13.47 ..... 9.73 ..... 7.63 ..... 6.56

L, m ..... 83.28 .... 42.70 .... 29.65 ... 21.26 ..... 16.58 .... 14.21

B, m ..... 23.29 .... 11.74 ..... 8.09 ..... 5.76 ..... 4.48 ..... 3.83

GP,m .... 19.83 .... 10.17 ..... 7.06 ..... 5.06 ..... 3.95 ..... 3.38

Multiband VDL



UA1ZKI

Vertikal Antenner

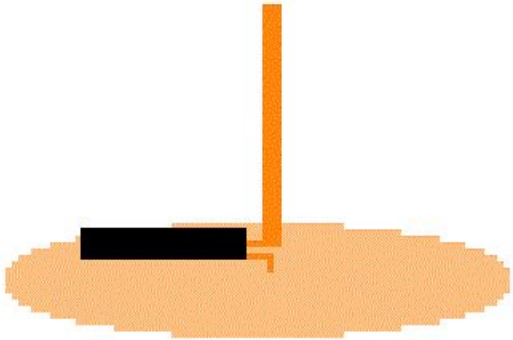
Omnidirectional, god for DX på stranden
Minimum effective lengden 1/4-lambda

Vertikal dipole

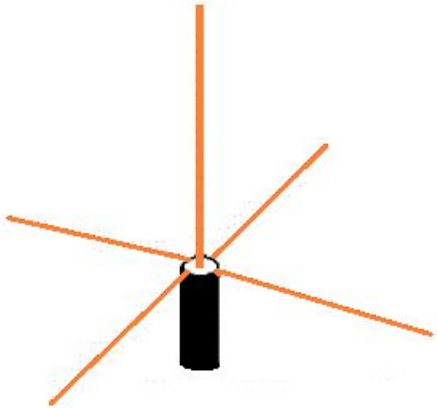
Ground plane

L- antenne

DIPOLE



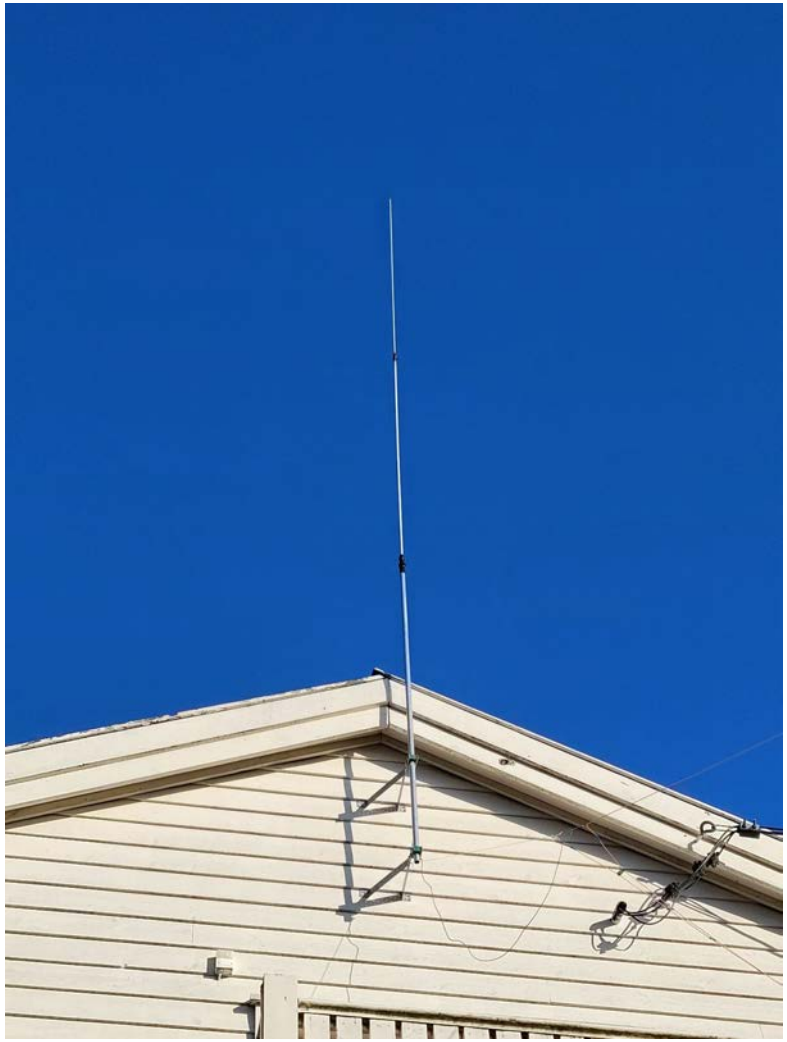
MONOPOLE WITH GROUND PLANE DISC



MONOPOLE WITH GROUND PLANE RADIALS

L-antenne = Vertikal + 1 Radial

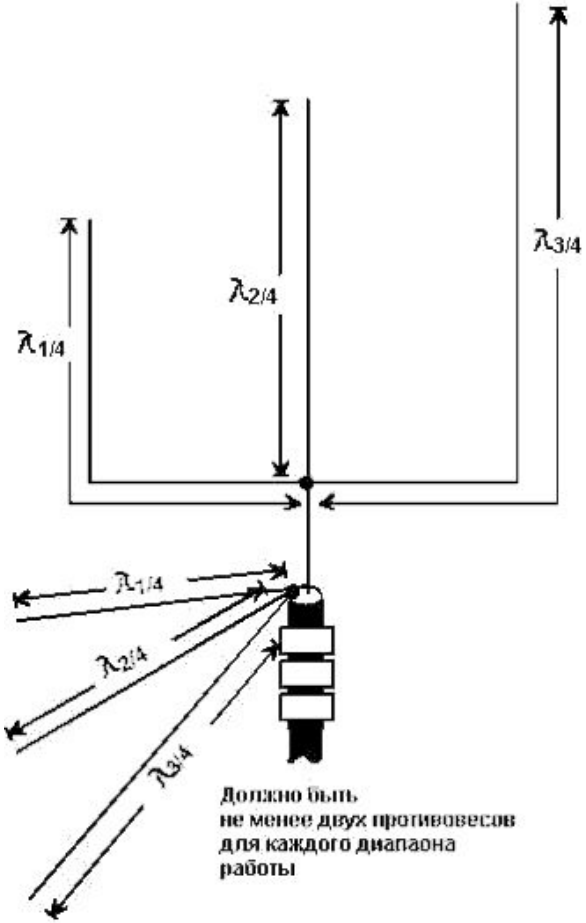
praktisk løsning for gå/sykkeltur



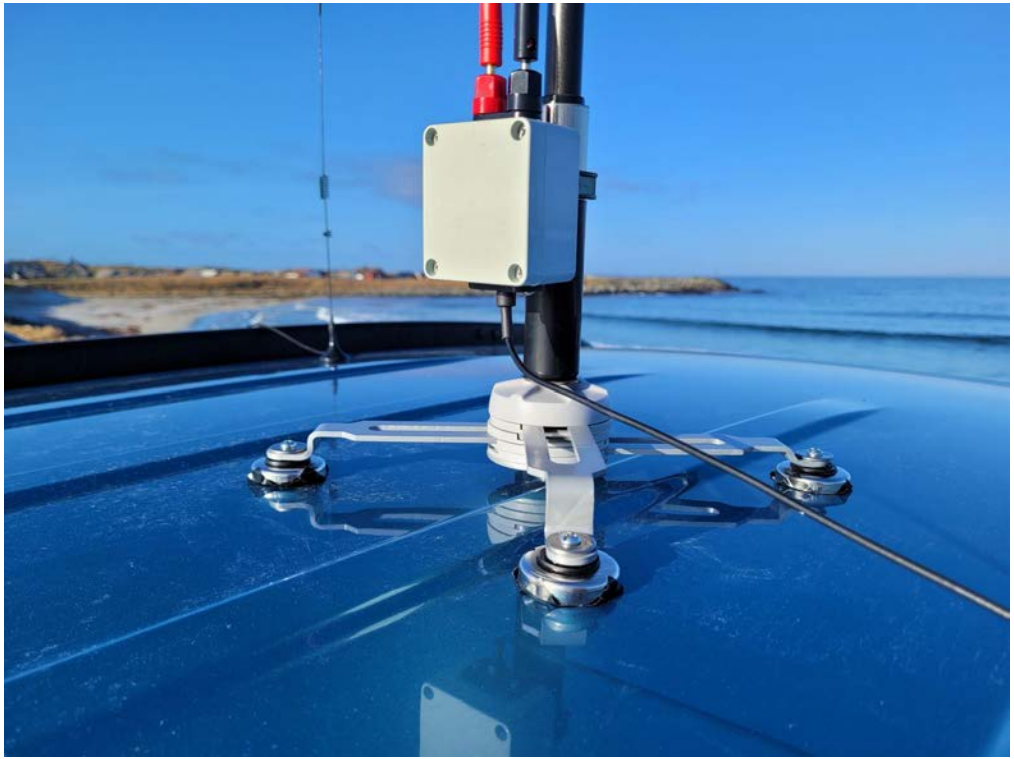
LB8IG shack antenne
40 - 6 m

“Gaffel”

“DX Commander” er en av mulige varianter

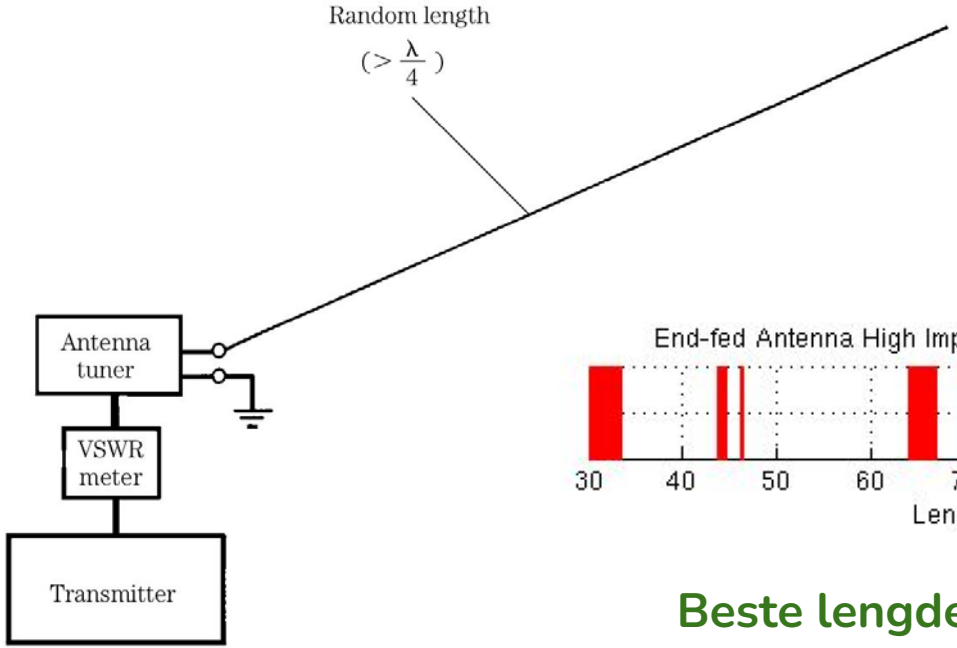


Mobile “shorty” for 20m

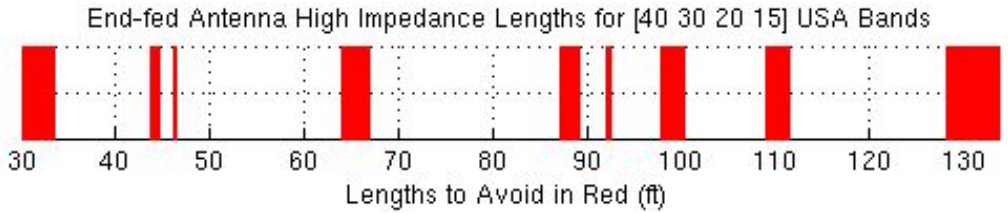


Long Wire / ENDFED/ EFHW / Fuch-antenne

Long-wire antennas require a length greater than a quarter-wavelength (λ/4) or half (λ/2) of the radio waves



+ enkel og billig
+ no coax
+ multiband
+ stealth antenne
- Må brukes TUNER



Beste lengden (ref VE3EED)

8,8m - 10,8m - 12,5m - 17,7m - 21,64m

Felt LW

JOSEF FUCHS IN WIEN.

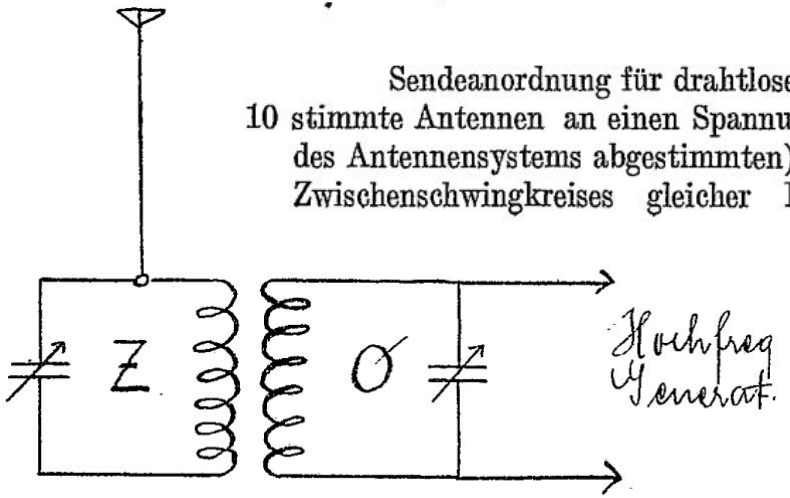
Sendeanordnung für drahtlose Telegraphie.

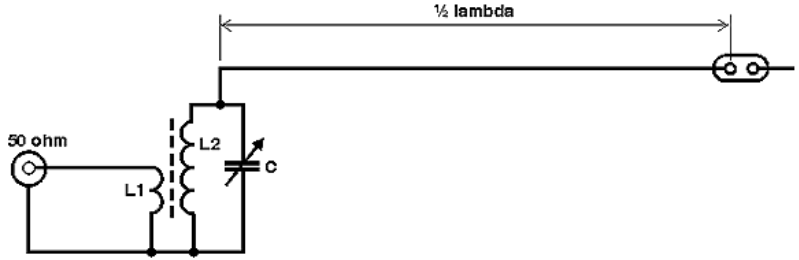
Angemeldet am 14. Juni 1927. — Beginn der Patentdauer: 15. März 1928.

Die Anordnung gemäß der Erfindung besteht aus dem Schwingungskreis des Hochfrequenzgenerators *O*, an den ein gleichdimensionierter Zwischenschwingkreis *Z* in einer der bekannten und wahlweise verwendeten Kopplungsarten (induktiv, kapazitiv, galvanisch) gekoppelt wird. An einen Spannungsbauch des Zwischenschwingkreises *Z* wird nun die Antenne direkt angeschlossen und sie absorbiert vom Zwischenkreis dann Energie und strahlt sie aus, wenn ihre Grund- oder harmonische Schwingung auf die Frequenz des Zwischenkreises *Z* und des Generatorkreises *O* abgestimmt ist. Die Antenne wird rein durch Spannung angestoßen. Die so beschriebene Anordnung weist kein Gegengewicht oder Erdung des Antennensystems auf.

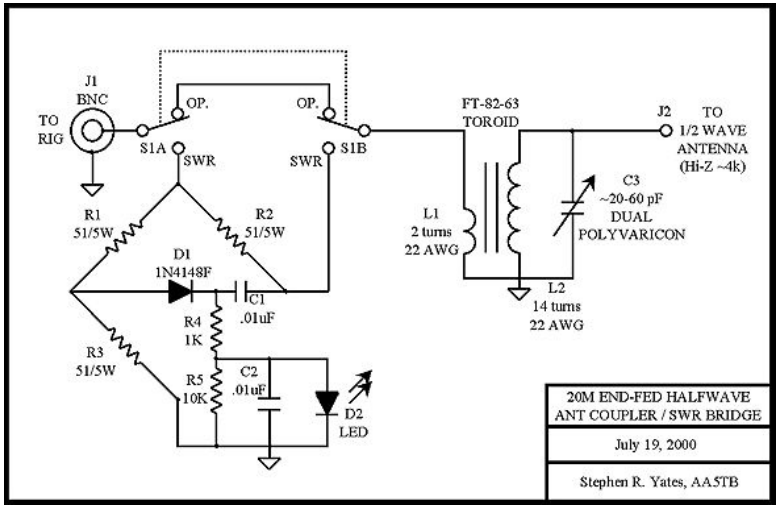
PATENT-ANSPRUCH:

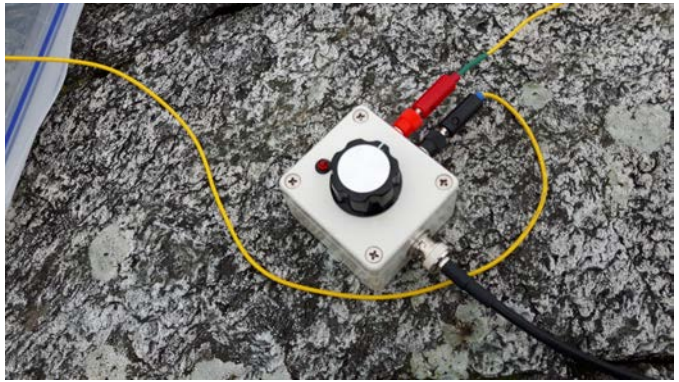
Sendeanordnung für drahtlose Telegraphie, dadurch gekennzeichnet, daß eine oder mehrere abgestimmte Antennen an einen Spannungsbauch eines mit dem (auf Grund- oder harmonische Schwingung des Antennensystems abgestimmten) Hochfrequenzgeneratorschwingkreise in bekannter Art gekoppelten Zwischenschwingkreises gleicher Dimensionierung einpolig direkt angeschlossen ist.

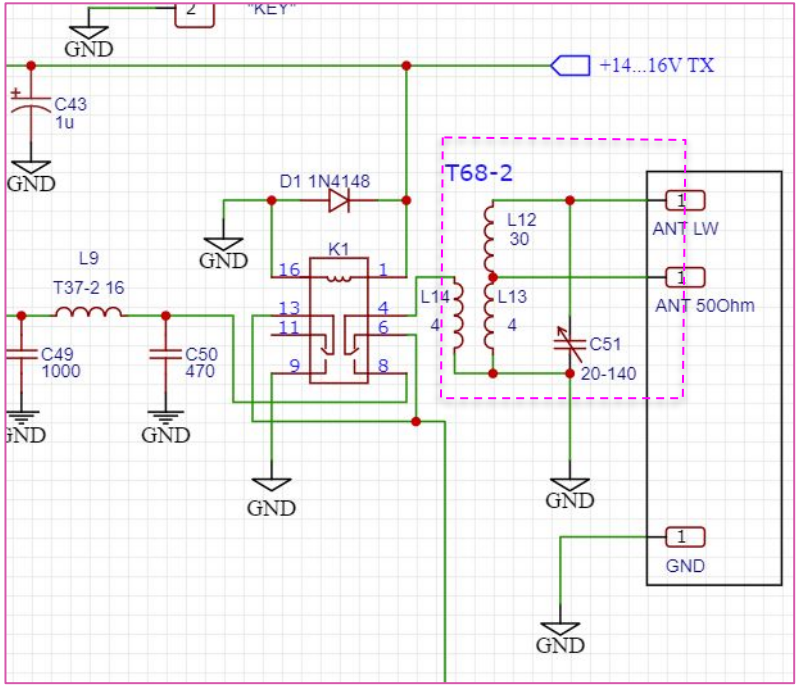


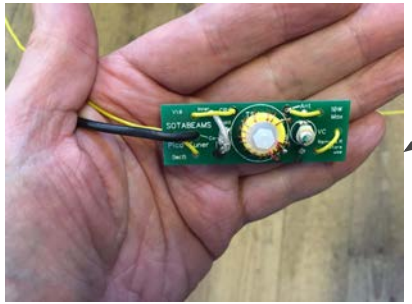


Fuch-antenne coupling





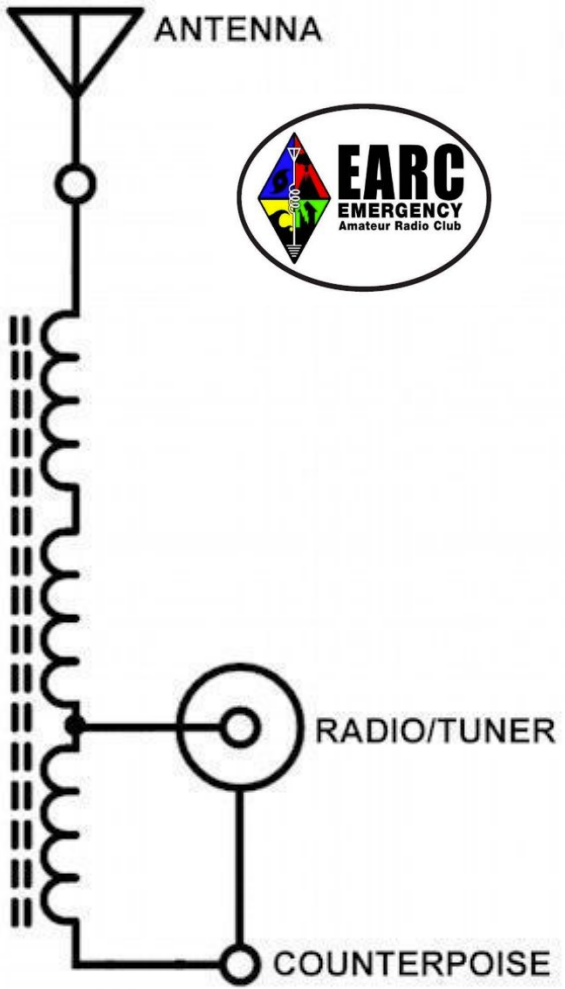




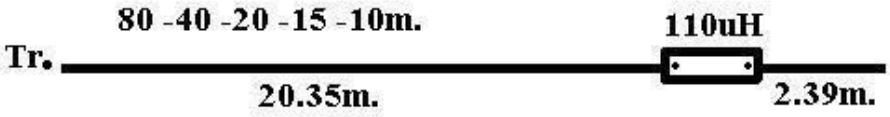
Picotuner av
SOTABEAMS

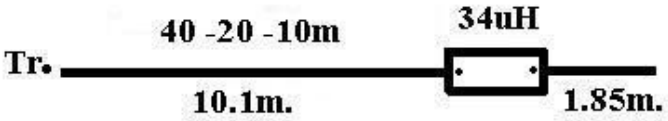
END FED / LW 6–40 Meter Multiband HF Antenna

SWR										
Lenght (m)	1.8 MHz	3.5 MHz	7.0 MHz	10 MHz	14 MHz	18 MHz	21 MHz	24 MHz	28 MHz	50 MHz
54	5.2	1.6	1.1	1.1	1.8	1.3	1.6	1.7	1.2	1.5
53	4.65	1.2	1.2	1.2	2.1	1.4	1.4	1.5	1.2	1.1
50	3.5	1.1-1.7	1.3	1.6-1.7	1.6-1.9	1.8-1.9	1.1-1.5	1.5	1.1-1.7	1.1-1.5
45	3.2	2.2-2.6	2.4	2.4	1.4-1.6	1.3-1.4	1.1-1.2	1.4-1.5	1.1-1.6	1.0-1.6
41.5	3.4	2.7-3.5	2.6	1.6-1.7	2.0-2.1	2	1.6-1.7	1.5	1.5-1.7	1.1-1.4
35	3.3	3.8-3.9	1.2-1.4	1.6-1.7	1.6	1.8	1.6-1.7	1.4	1.1-1.7	1.4-1.5
30	2.8	3.0-3.5	1.6-1.8	2.3	1.8-2.0	1.3-1.4	1.1-1.3	1.7	1.1-1.7	1.1-1.7
27	2.8	2.5-2.8	2.1-2.3	1.8-2.0	1.2-1.4	1.9	1.7-1.8	1.4	1.5-1.7	1.2-1.6
22	2.2	1.7-2.0	2.8-2.9	1.2	1.8-2.0	1.4	1.4-1.6	1.1	1.5-1.7	1.0-1.4
18	1.6	1.6	2.0-2.1	2	1.4-1.6	2	1.0-1.1	1.6-1.7	1.2-1.4	1.4-1.6
16.2	1.6	1.4	1.4-1.6	1.5-1.6	1.1-1.2	1.9	1.2-1.3	1.1	1.7-1.8	1.0-1.2
15	1.5	1.2-1.4	1.3-1.4	2.4	1.2-1.3	1.6	1.6-1.7	1.4	1.4-1.8	1.5-1.6
13.5	3	1.1-1.3	1.1	2.1	1.7-1.8	1.3	1.7-1.8	1.6	1.1-1.3	1.2
11	2.2	1.0-1.3	1.2	1.3	2.0-2.1	1.6	1.2	1.7	1.6	1.5-1.6
9	3	1.1-1.5	1.6-1.7	1.2	2.1	2	1.3-1.4	1.2	1.6-1.8	1.3-1.5
7.5	3.2	1.6-1.8	2.2-2.3	1.6	1.4	2.1	1.8	1.2-1.3	1.2-1.3	1.4-1.5
6.5	3.5	1.5-2.0	2.0-3-0	1.7	1.1	1.8	2	1.6	1.4-1.5	1.3

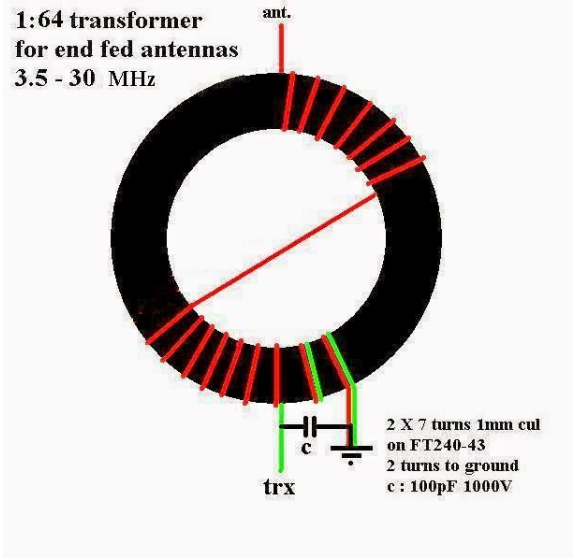


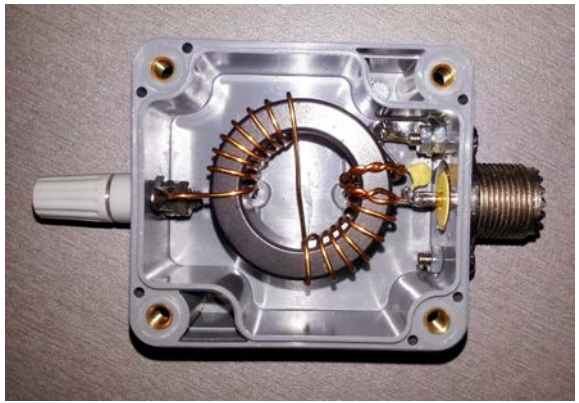
Multiband ENDFED





110uH coil : 260 turns 1mm. cul. 34uH coil : 90 turns 1mm. cul close wound on a 19mm pvc tube
start tuning the long wire on the high bands.



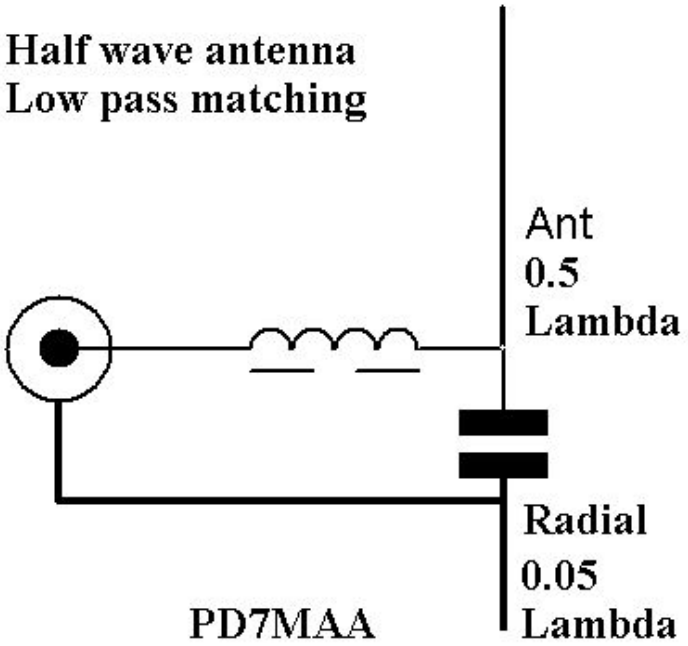


https://pa-11019.blogspot.com/

Halfwave - ENDFED

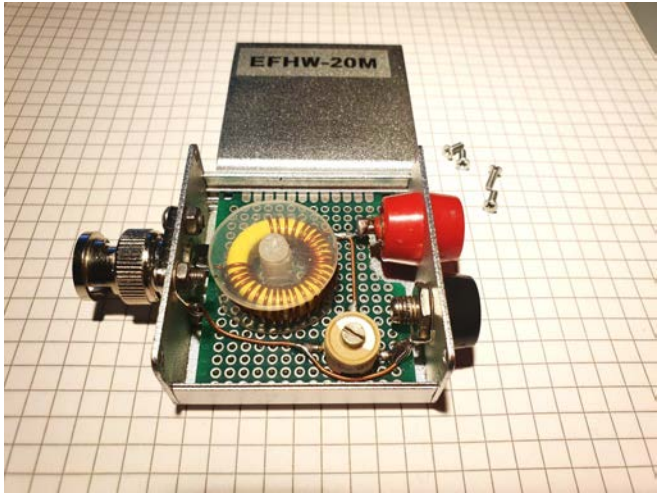
Impedance antenna 3300 Ohm Reactance coil 403 Ohm Reactance capacitor 409 Ohm
Impedance feedline 50 Ohm
Toroid used : T130-2 for 150 Watt pep with 1.2 mm magnet wire

Frequency	band (m)	coil (uH)	turns on T130-2 toroid	capacitor (pF)
70.250	4	0.9	6	5.6
50.110	6	1.3	11	7.8
28.500	10	2.2	14	13.7
27.125	11	2.4	15	14.4
24.965	12	2.6	15	15.6
21.300	15	3.0	17	18.3
18.144	17	3.6	18	21.5
14.200	20	4.5	20	27.4
10.125	30	6.4	24	38.4
7.100	40	9.0	29	54.8
3.600	80	17.8	40	108.0

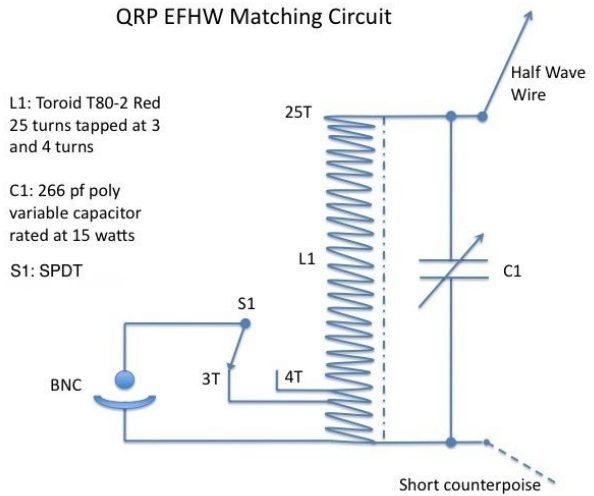


https://pa-11019.blogspot.com/

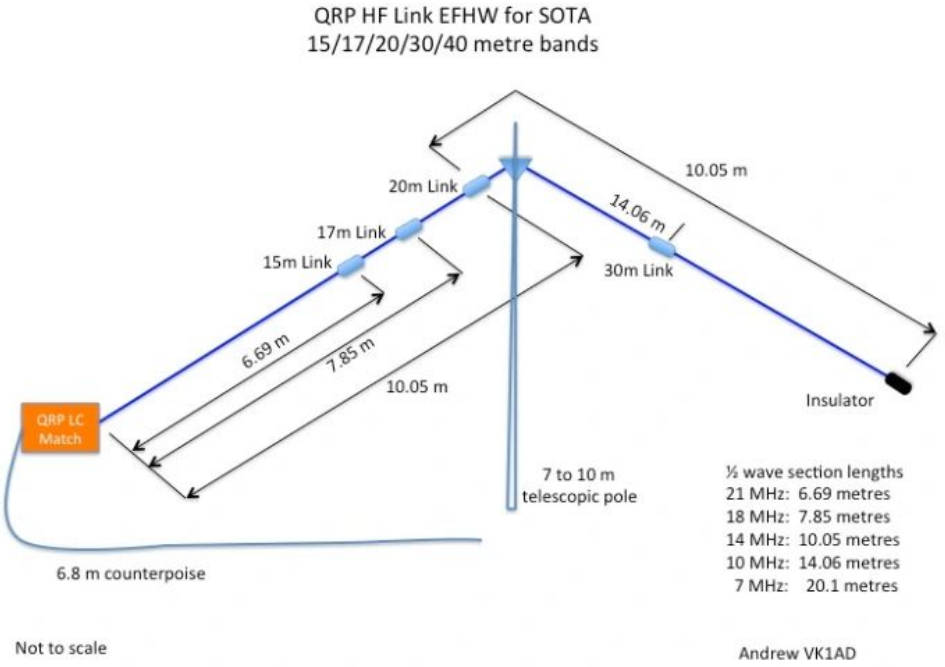
Sykkeltur QRP setup



Linked-EFHW



VK1NAM



Not to scale

Andrew VK1AD

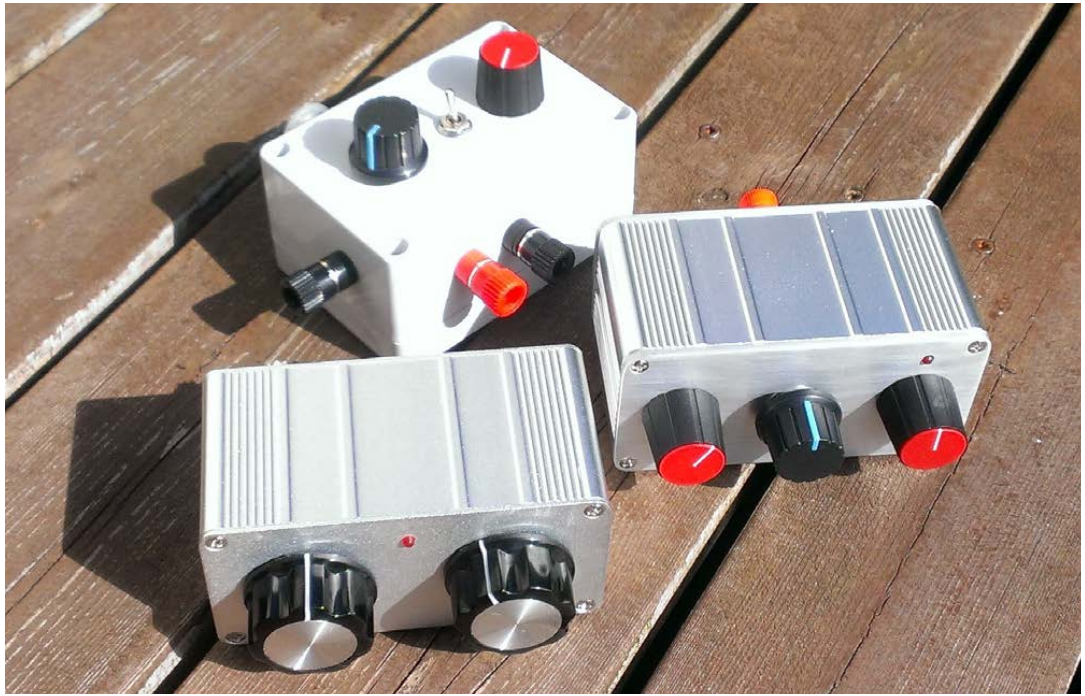
QRP-tuner

L-match

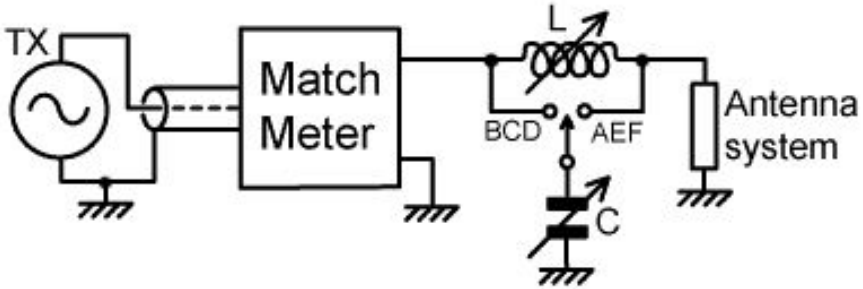
T-match

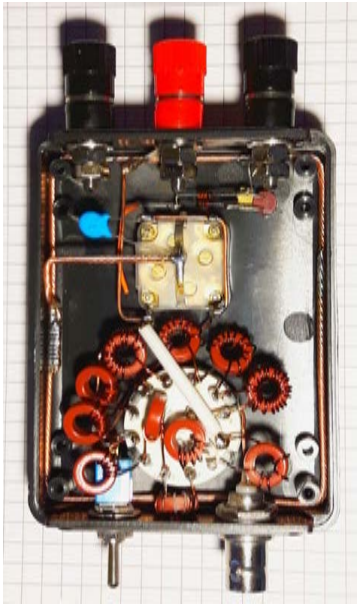
S-match

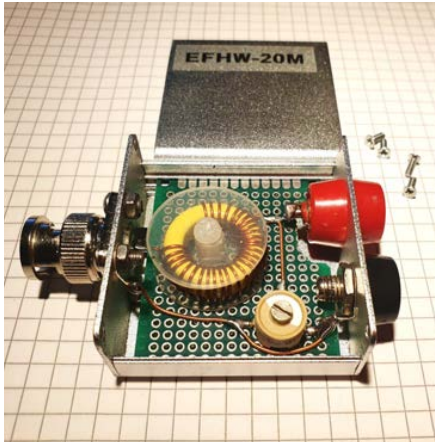
Z- match



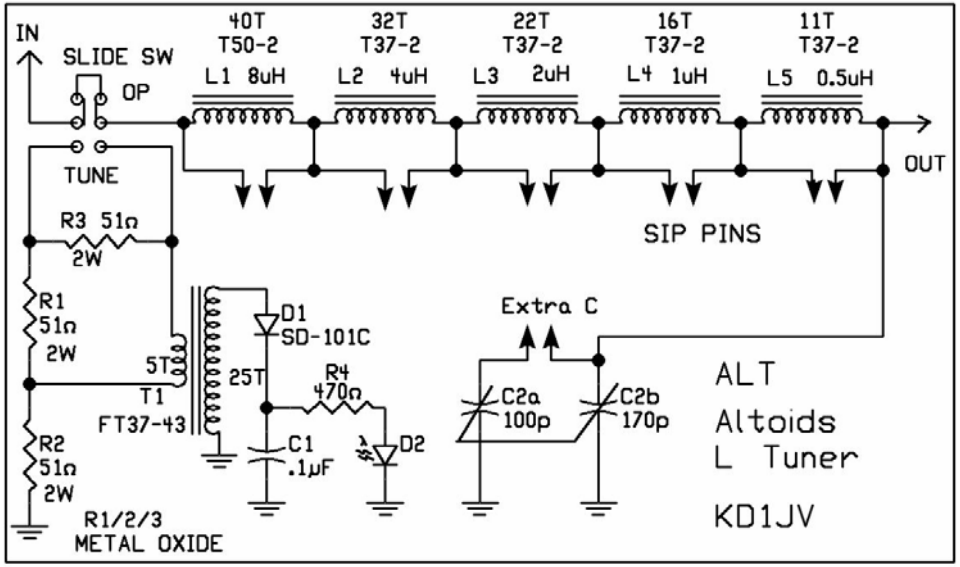
L-match

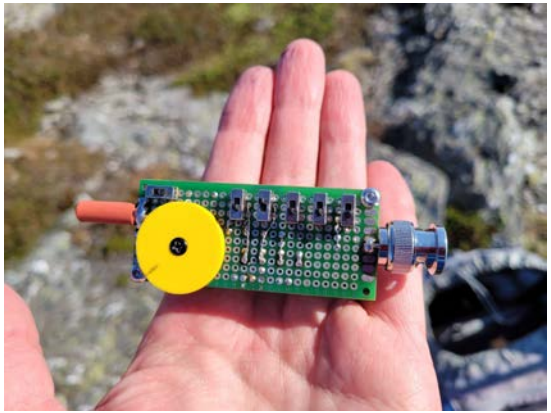




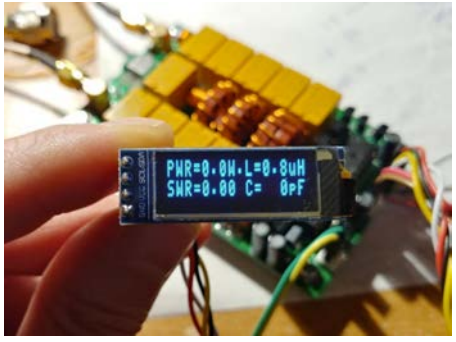


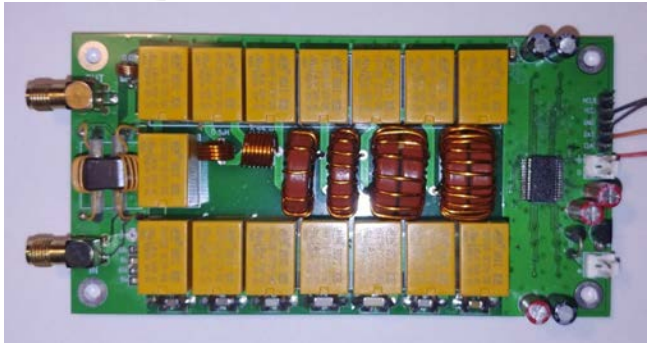
Altoids L-tuner

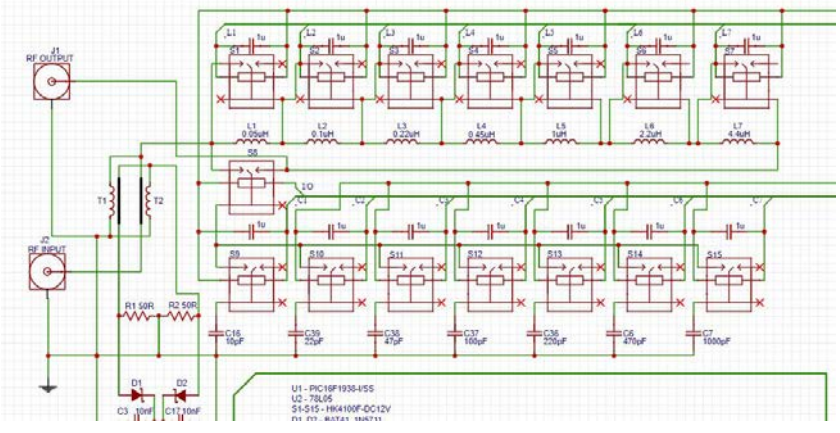




ATU-100 Extended N7DDC
L-tuner

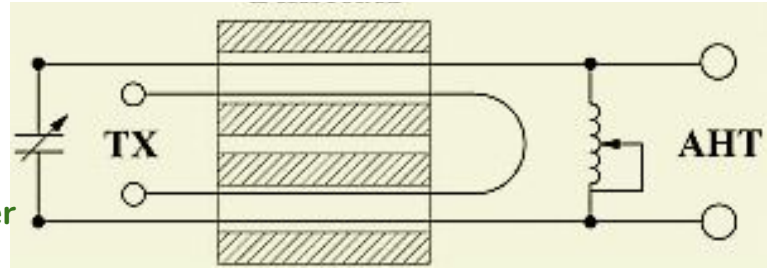


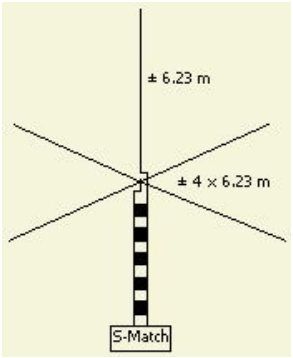


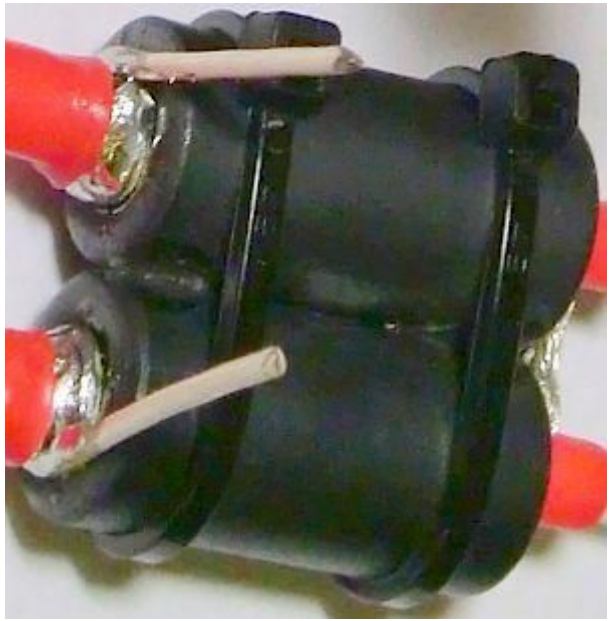


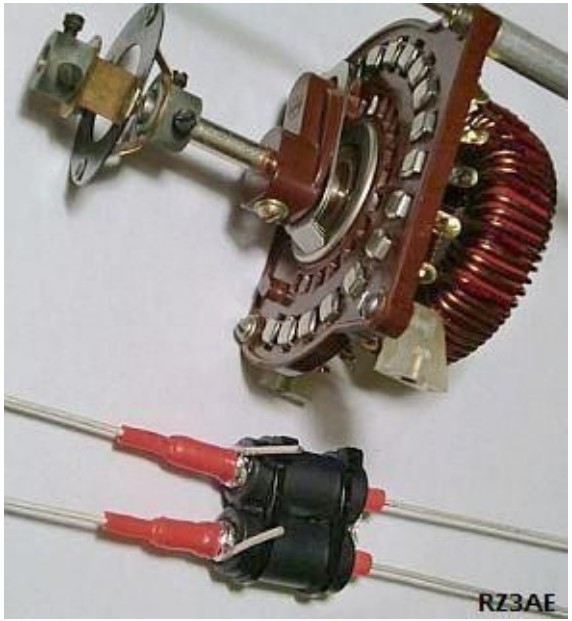
S-match

+ God for symmetriske antenner
+ 2 variabler
- skarp resonance
- trenges god ferrite



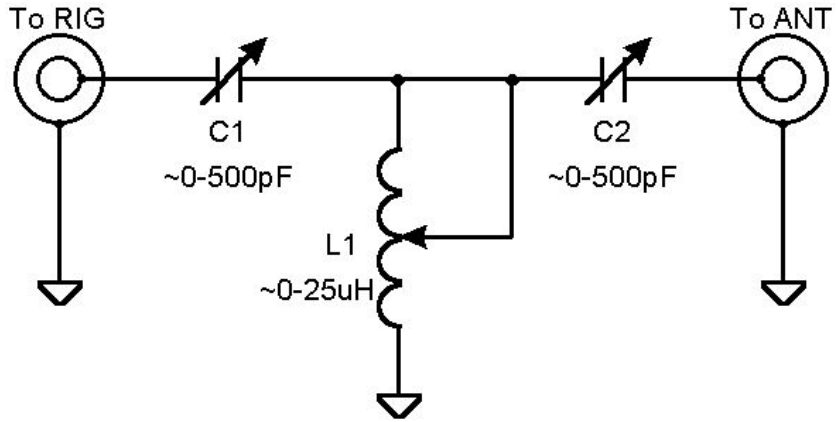


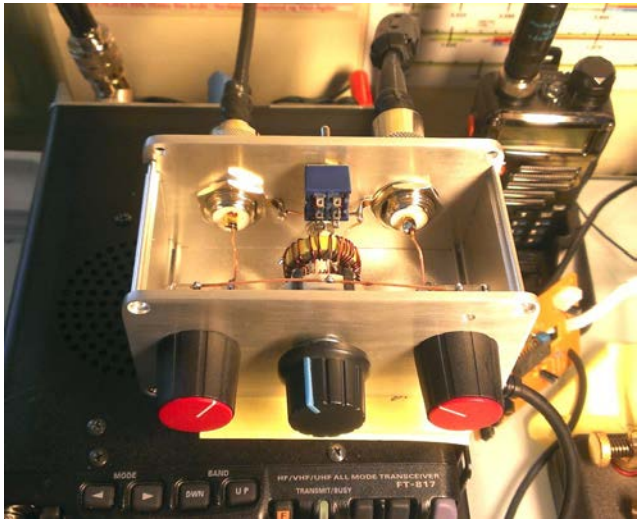




T-match

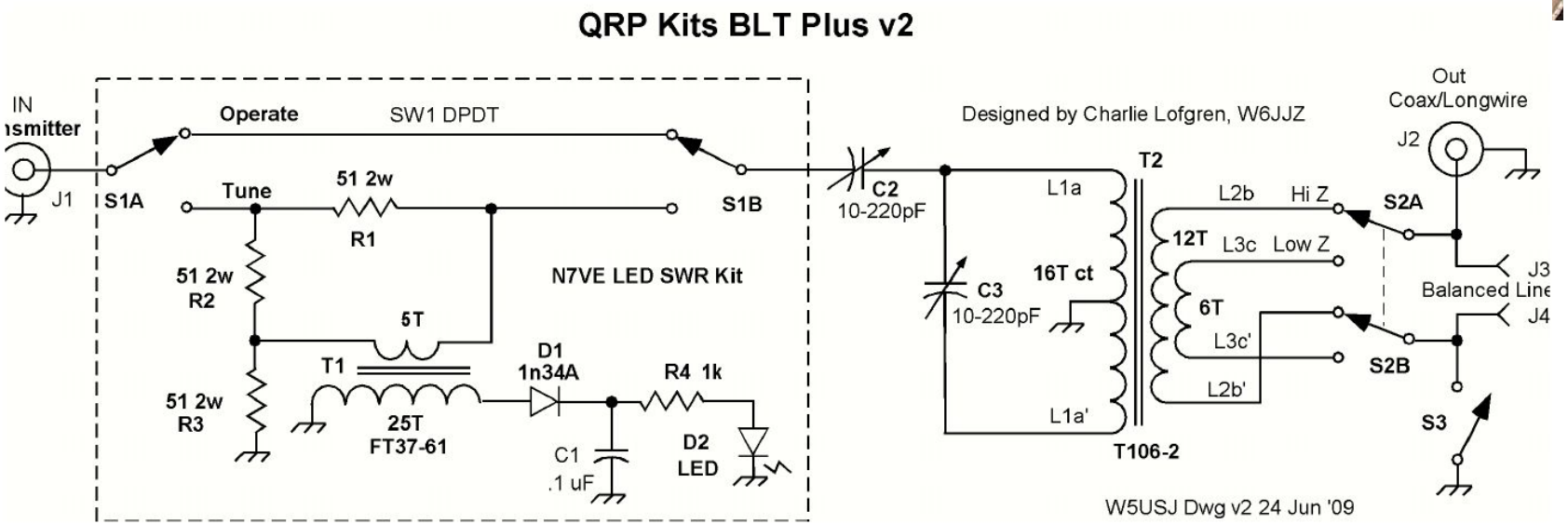
+ Maksimal dekning
- 3 variabler





Z-match

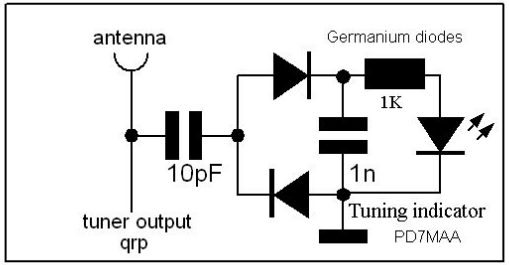
+ Balanced / unbalanced
+ 2 variabler
- 500pF capacitors trenges / 2 seksjoner

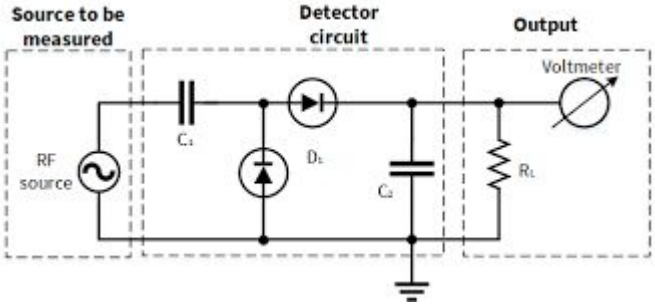


Måling / validering / kalibrering

- SWR -meter
- RF - indicator
- Antenne analysator

NANO-VNA

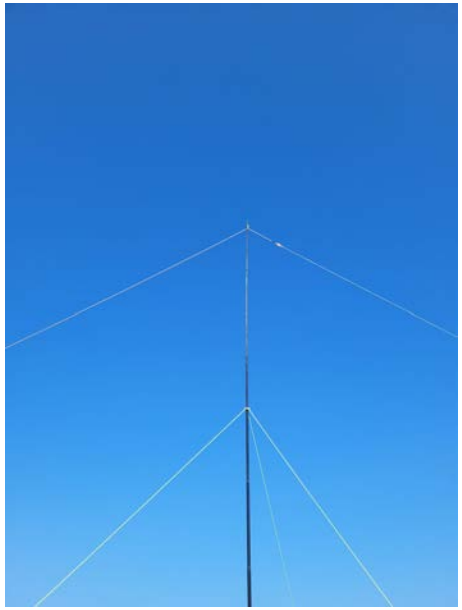




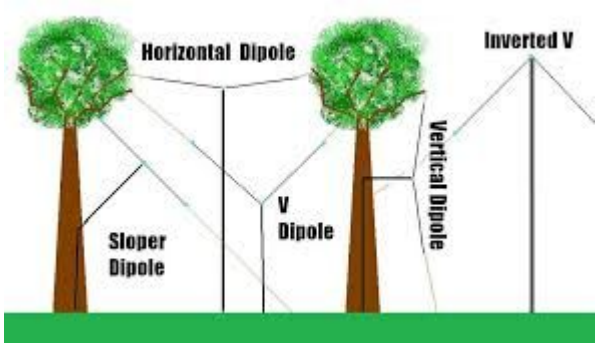
Rigging

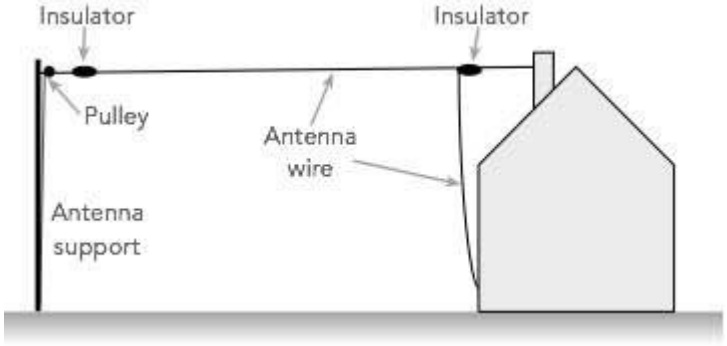
Avhengig av QTH :

- Stasjonert
- Portable → Skog / Strand / Fjell / Open-air



1. Mast / Tre
2. Mast bardun
3. Antenna bardun
4. Teltplugger
5. Throwing bag
6. Miscellaneous





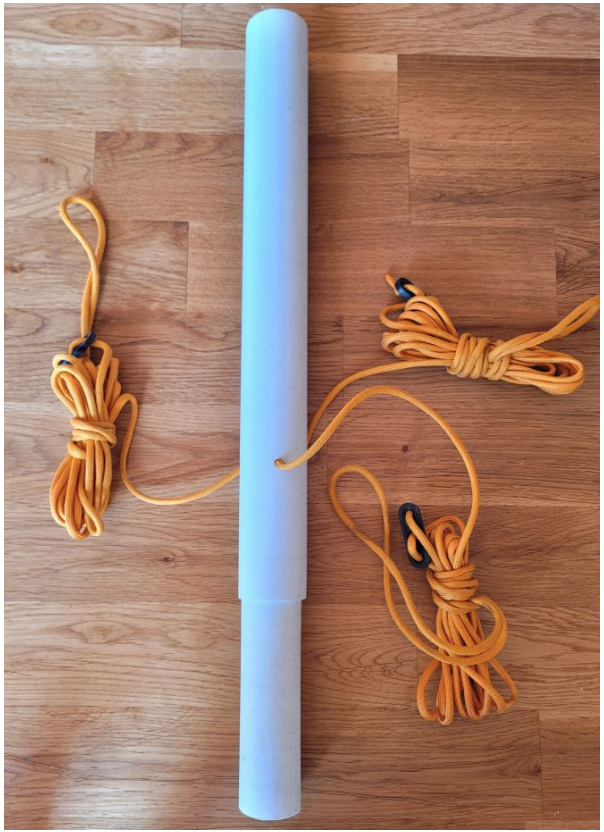
Mast

BILTEMA fiskestang er beste venn for LA / LB !

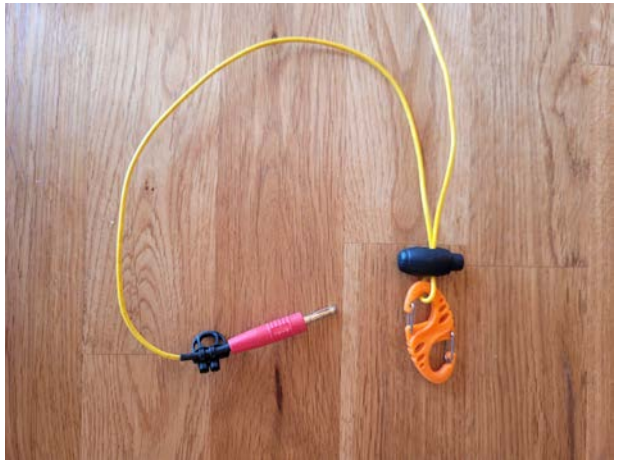
og SM / OH / OZ ;)

Sotabeams / Spiderbeam / DX-wire

Mast Barduner



Antenna bardun



Teltplugger

Throwing bag & Miscellaneous

MNI TNX es 72 es 73 !

de LB8IG /P / QRP