

145MHz/435MHz QFH/Quadrifilar-Helix 衛星天線製作與量測

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BV20L 蔡耀斌

中華民國100年9月18日



145MHz/435MHz QFH衛星天線完成圖



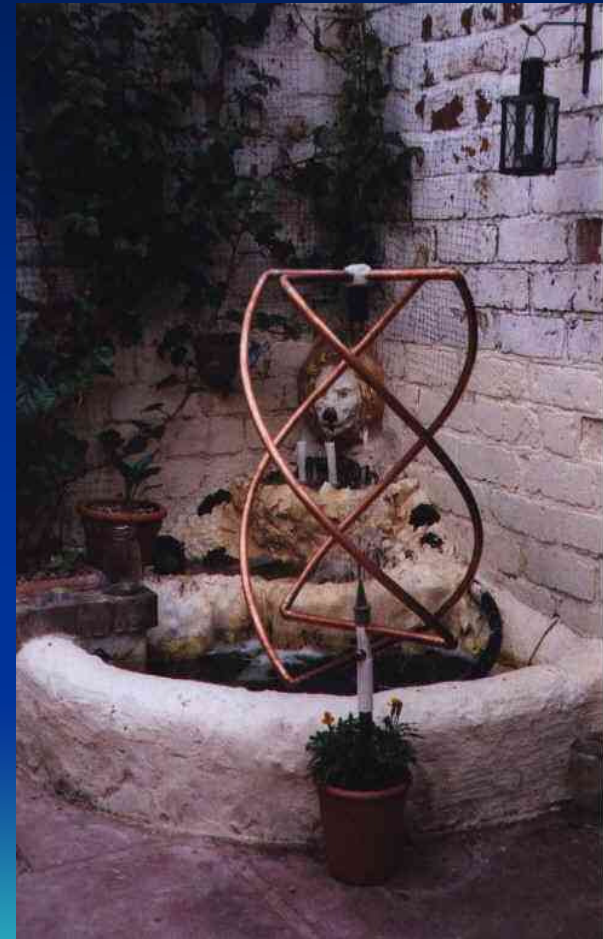
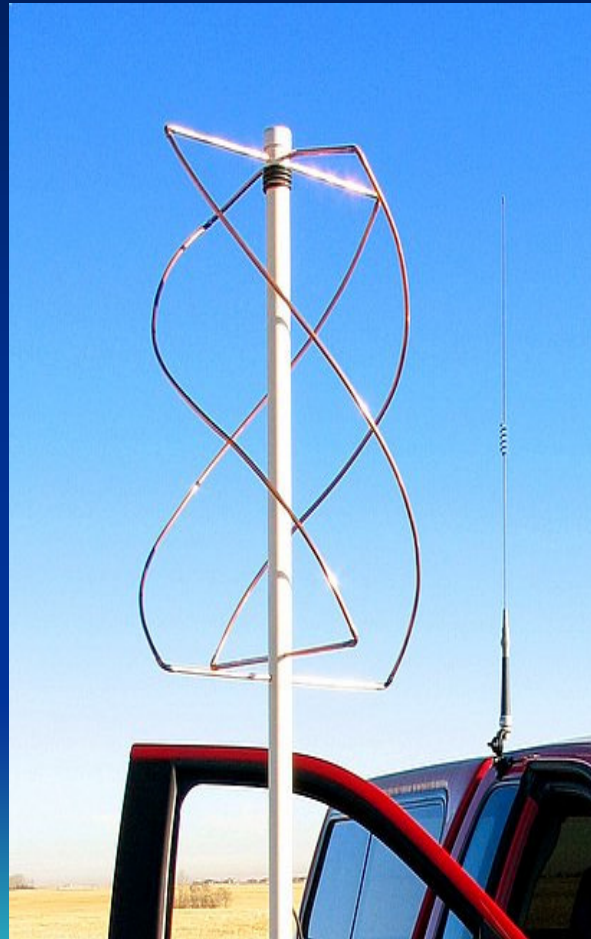
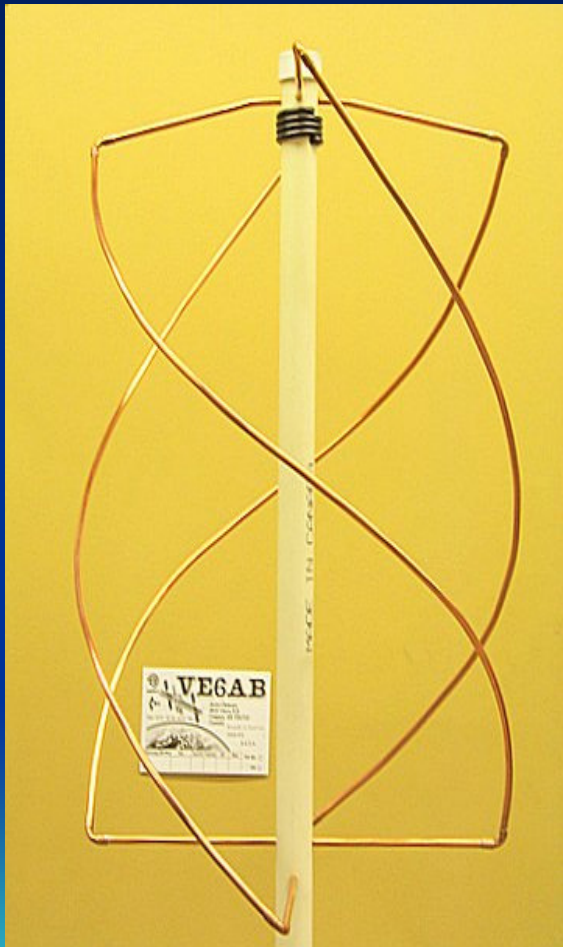
145MHz/435MHz QFH衛星天線完成圖



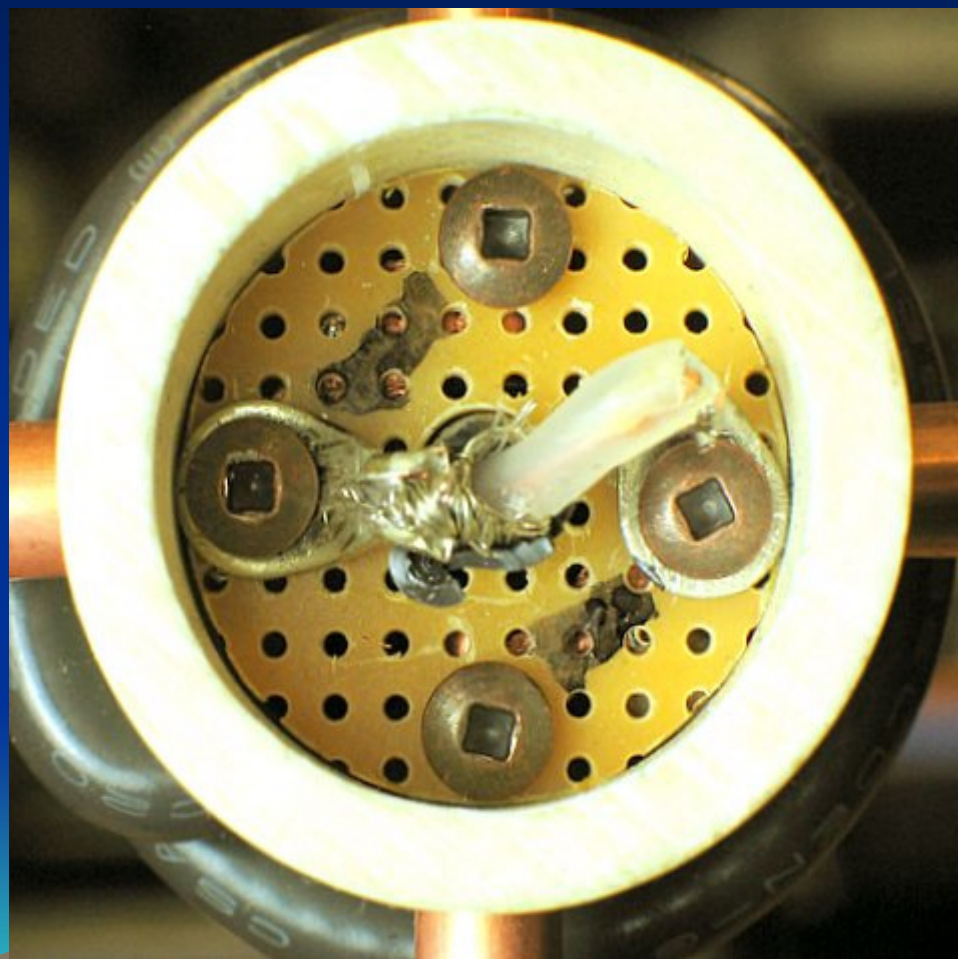
相關的研究製作(一)



相關的研究製作(二)



相關的研究製作(三)



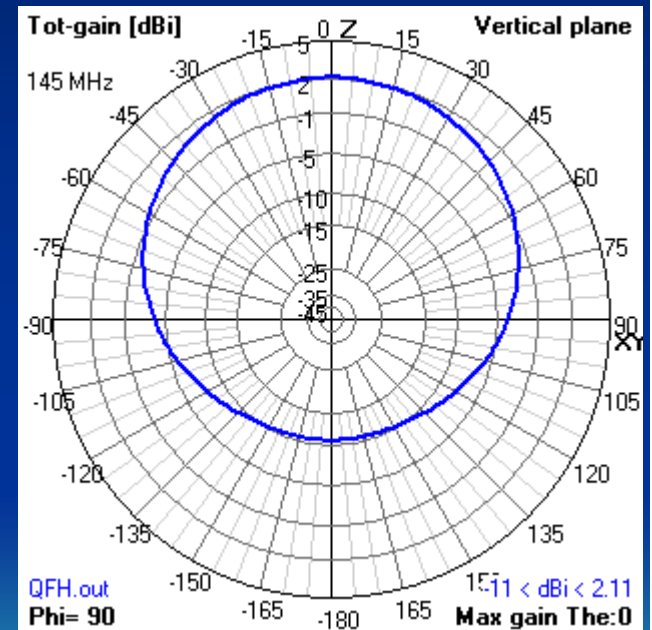
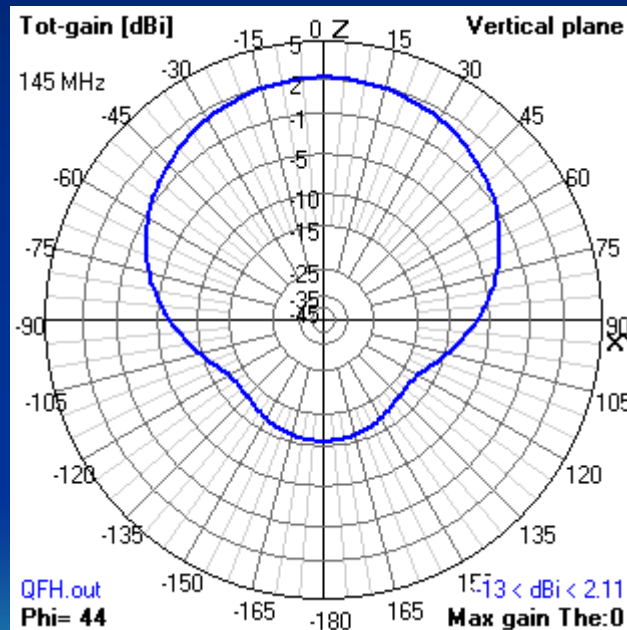
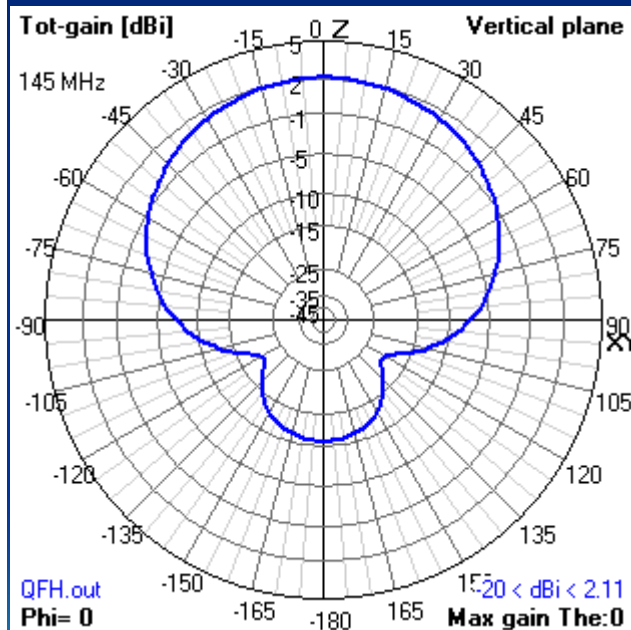
相關的研究製作(四)

- <http://www.nationalrf.com/satellite-tenna.htm>
- <http://www.g4ilo.com/qfh.html>
- http://va6bc.no-ip.com/jerry_pix/Quadrifilar-helix/quadrifilar_helix_antenna.htm
- <http://jcoppens.com/ant/qfh/calc.en.php>
- http://www.aribra.it/autocostruzione/qfh/index_e.php
- <http://speakyssb.blogspot.com/2008/09/qfh-quadrifilar-helix-antenna.html>
- <http://www.askrlc.co.uk/>
- <http://www.frars.org.uk/cgi-bin/render.pl?parameter=&pageid=1154>
- <http://www.geo-web.org.uk/shop.html>
-

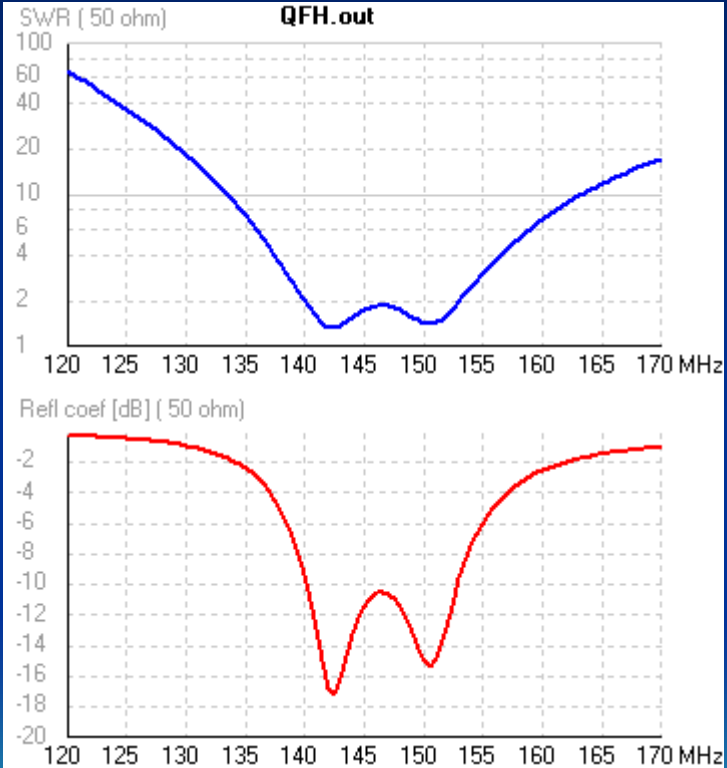
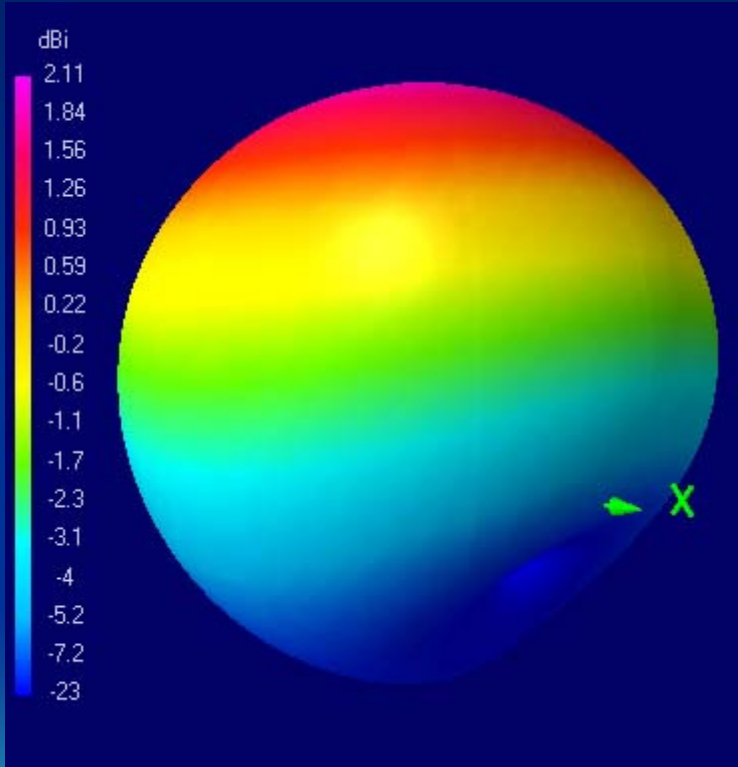


ARI

http://www.aribra.it/autocostruzione/qfh/index_e.php

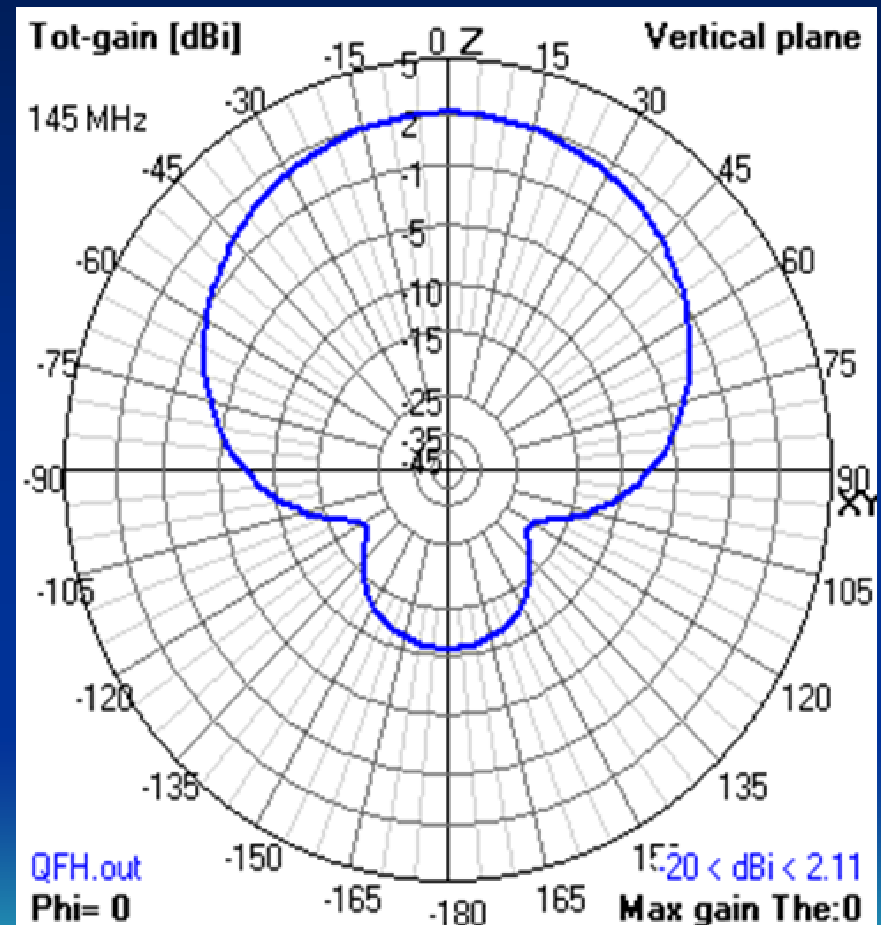


3D view of the radiation pattern and VSWR and return loss behaviours



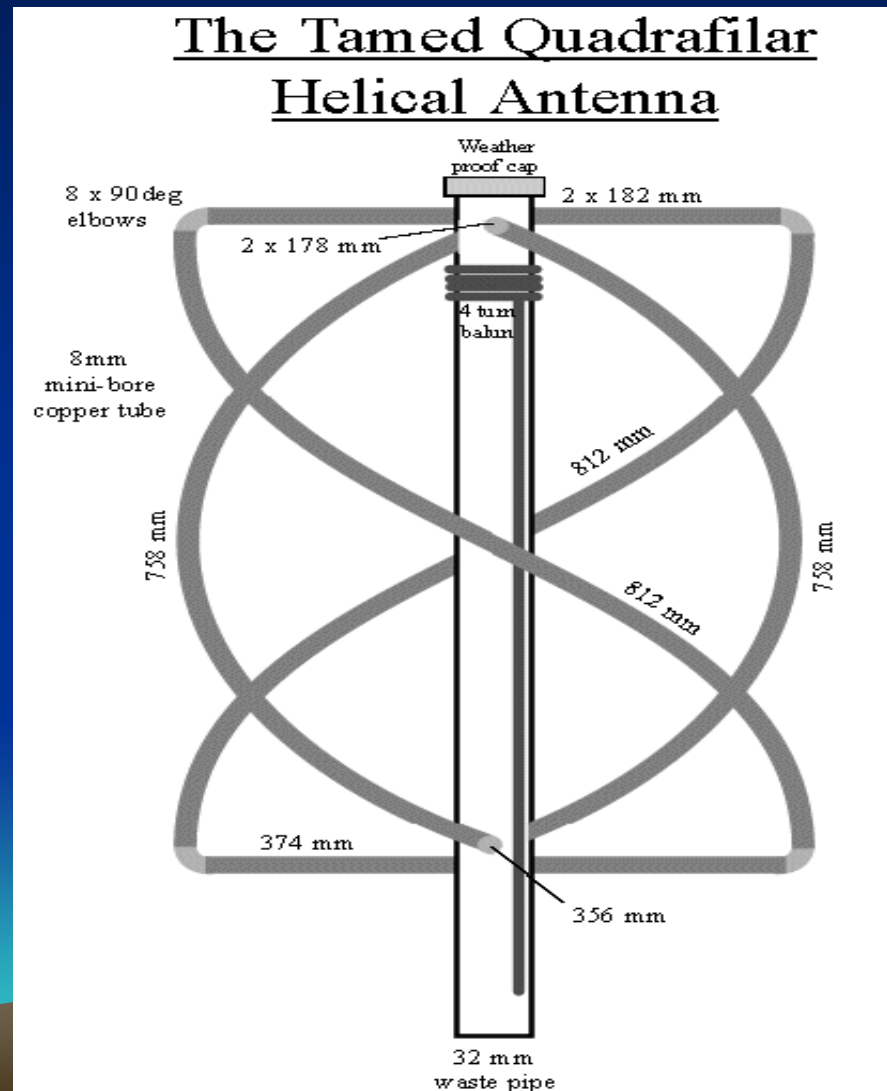
天線特性與規格

- Gain > 2.1 dBi
- 耐入力 > 150 W
- 雙工器 MAX 70W
- 波柱寬 約60度



天線尺寸

<http://jcoppens.com/ant/qfh/calc.en.php>



天線尺寸

<http://jcoppens.com/ant/qfh/calc.en.php>

Antennas/
Antennas

Quadrifilar helicoidal

Home
Antennas
QFH
Calculator

Language:
Español
Deutsch

QFH
Introduction
Matching
Calculator
Simulations
Dimensions
Groundplane
Pictures

Input the data

Thanks to suggestions of Kevin and Barry Fittler, and the insistence of many others, I've finally made a bit of time to do 'repair work' on the calculator. Please report problems, if any.

Design frequency	145.9 MHz
Number of turns (twist)	0.5
Length of one turn	1 wavelengths
Bending radius	15 mm
Conductor diameter	7 mm (optimum: 19.3 mm)
Width/height ratio	0.44

Calculate

10% 49%

下午 07:52
2011/9/17

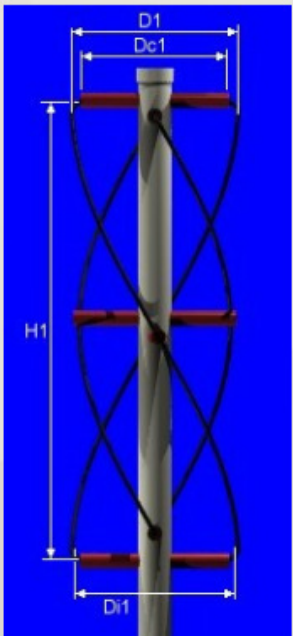
天線尺寸

<http://jcoppens.com/ant/qfh/calc.en.php>

Related: [Simple helicoidal](#)

Results

Wavelength	2056.2 mm
Compensated wavelength	2202.1 mm
Bending correction	6.4 mm



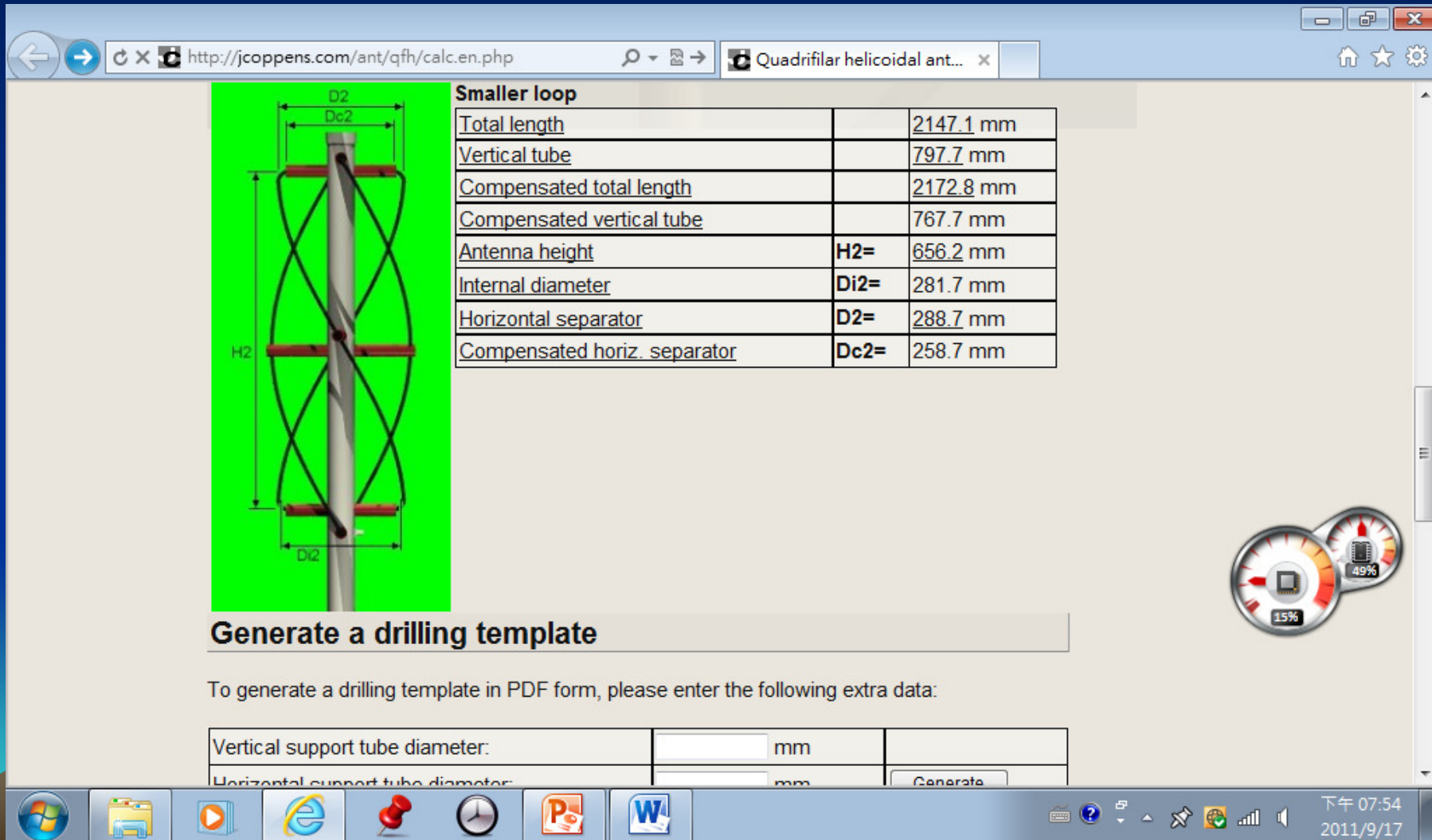
Larger loop

Total length	2259.4 mm
Vertical separator	838.9 mm
Total compensated length	2285.2 mm
Compensated vertical separation	808.9 mm
Antenna height	H1= 690.1 mm
Internal diameter	Di1= 296.6 mm
Horizontal separator	D1= 303.6 mm
Compensated horiz. separation	Dc1= 273.6 mm

System tray: 15% CPU, 50% Memory, 下午 07:53, 2011/9/17

天線尺寸

<http://jcoppens.com/ant/qfh/calc.en.php>



Smaller loop

Total length		2147.1 mm
Vertical tube		797.7 mm
Compensated total length		2172.8 mm
Compensated vertical tube		767.7 mm
Antenna height	H2=	656.2 mm
Internal diameter	Di2=	281.7 mm
Horizontal separator	D2=	288.7 mm
Compensated horiz. separator	Dc2=	258.7 mm

Generate a drilling template

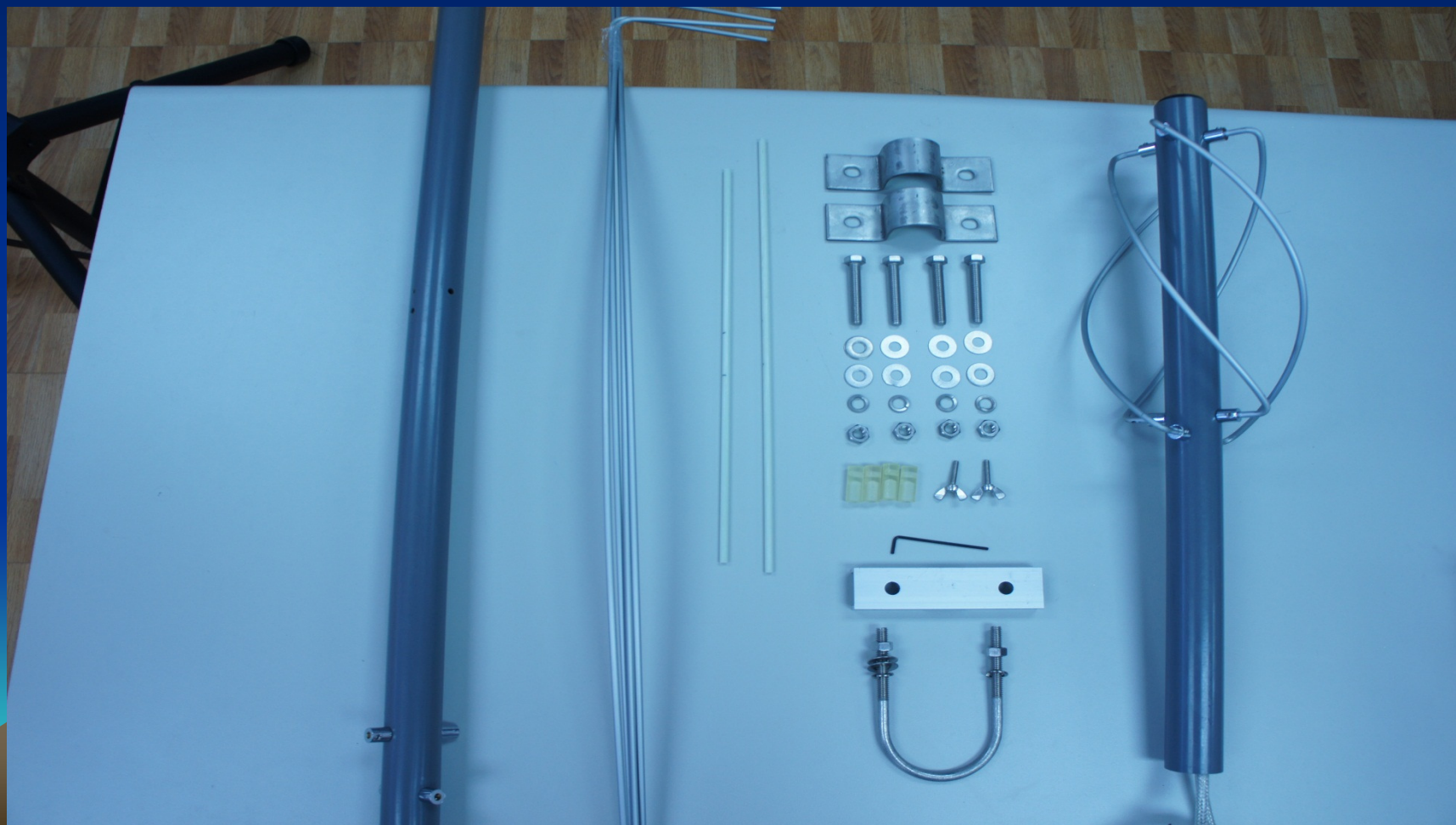
To generate a drilling template in PDF form, please enter the following extra data:

Vertical support tube diameter:	<input type="text"/>	mm	
Horizontal support tube diameter:	<input type="text"/>	mm	<input type="button" value="Generate"/>

System tray: 15%, 49%, 下午 07:54 2011/9/17

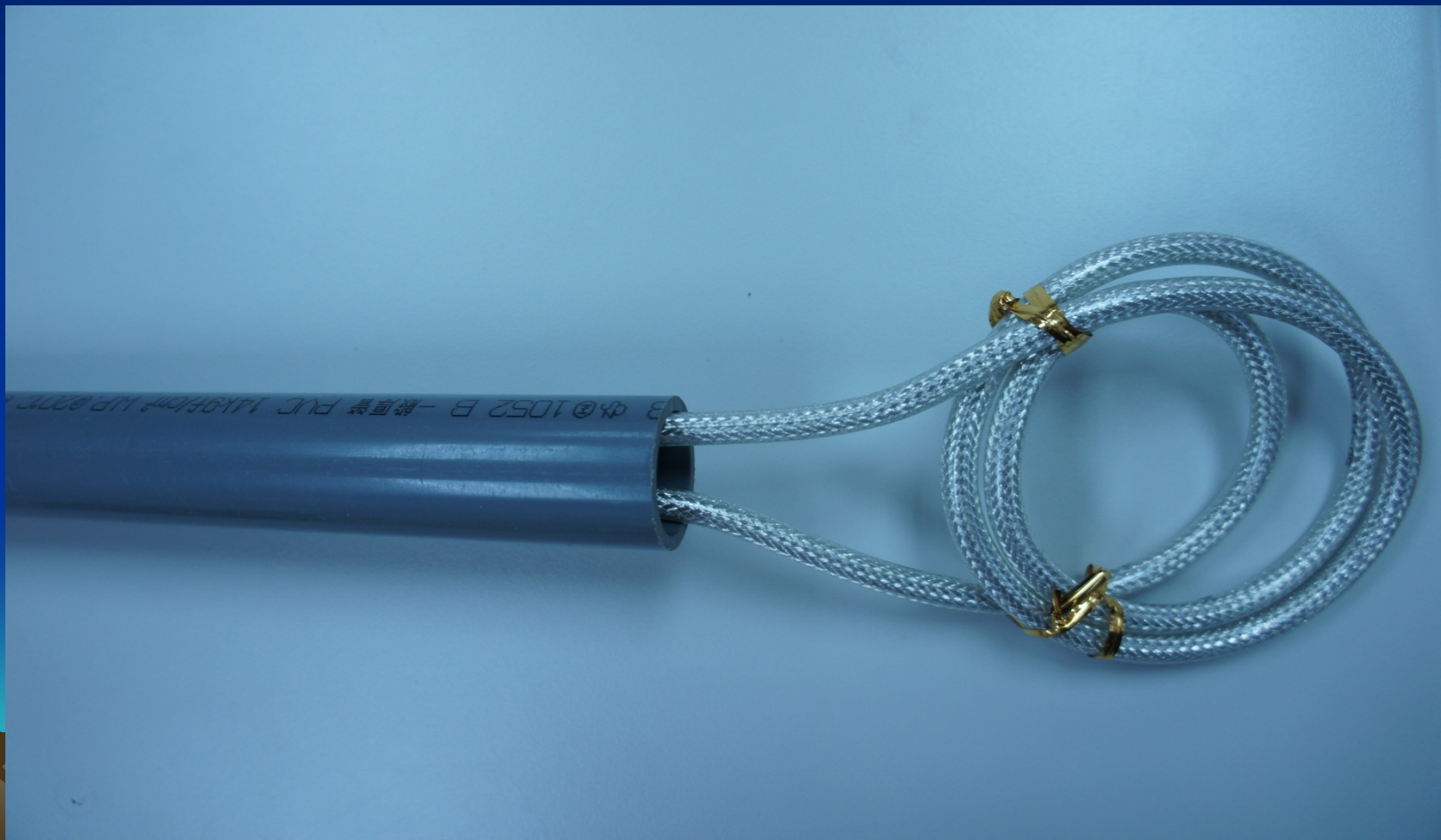
天線組裝

● VHF天線需組裝, UHF天線已組裝完成



天線組裝

- 天線之電纜線已組裝完成



天線組裝

- 天線之螺旋單元固定螺絲已組裝完成
- 僅需使用六角螺絲板手固定螺旋單元



天線組裝

- 螺旋單元玻纖固定棒有長短(短在上)
- 需配合橡膠固定頭使用,再用螺絲固定



天線組裝



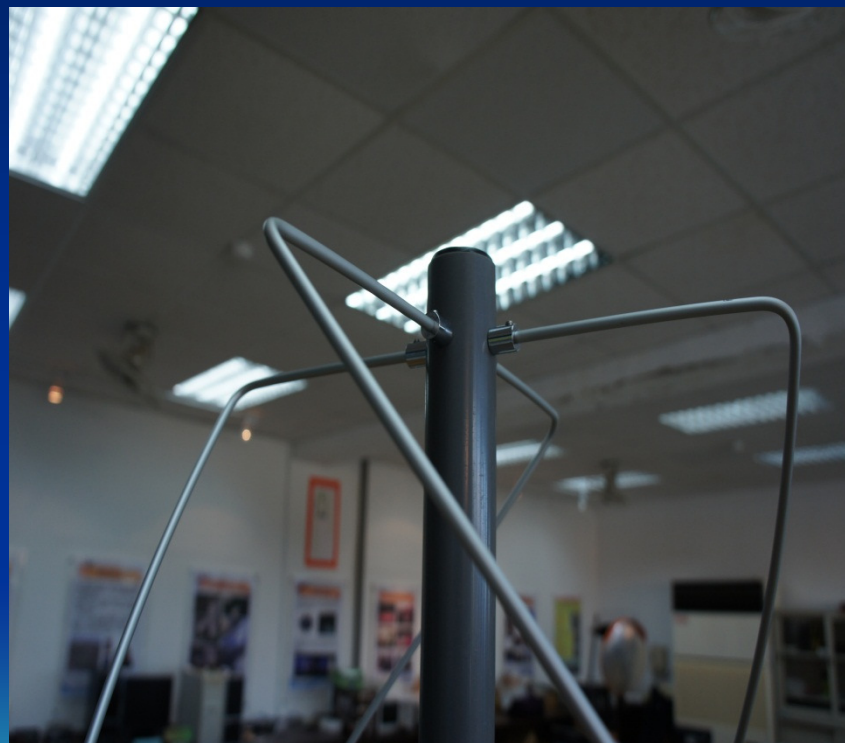
天線組裝

- 天線螺旋單元有長短之分(需注意)



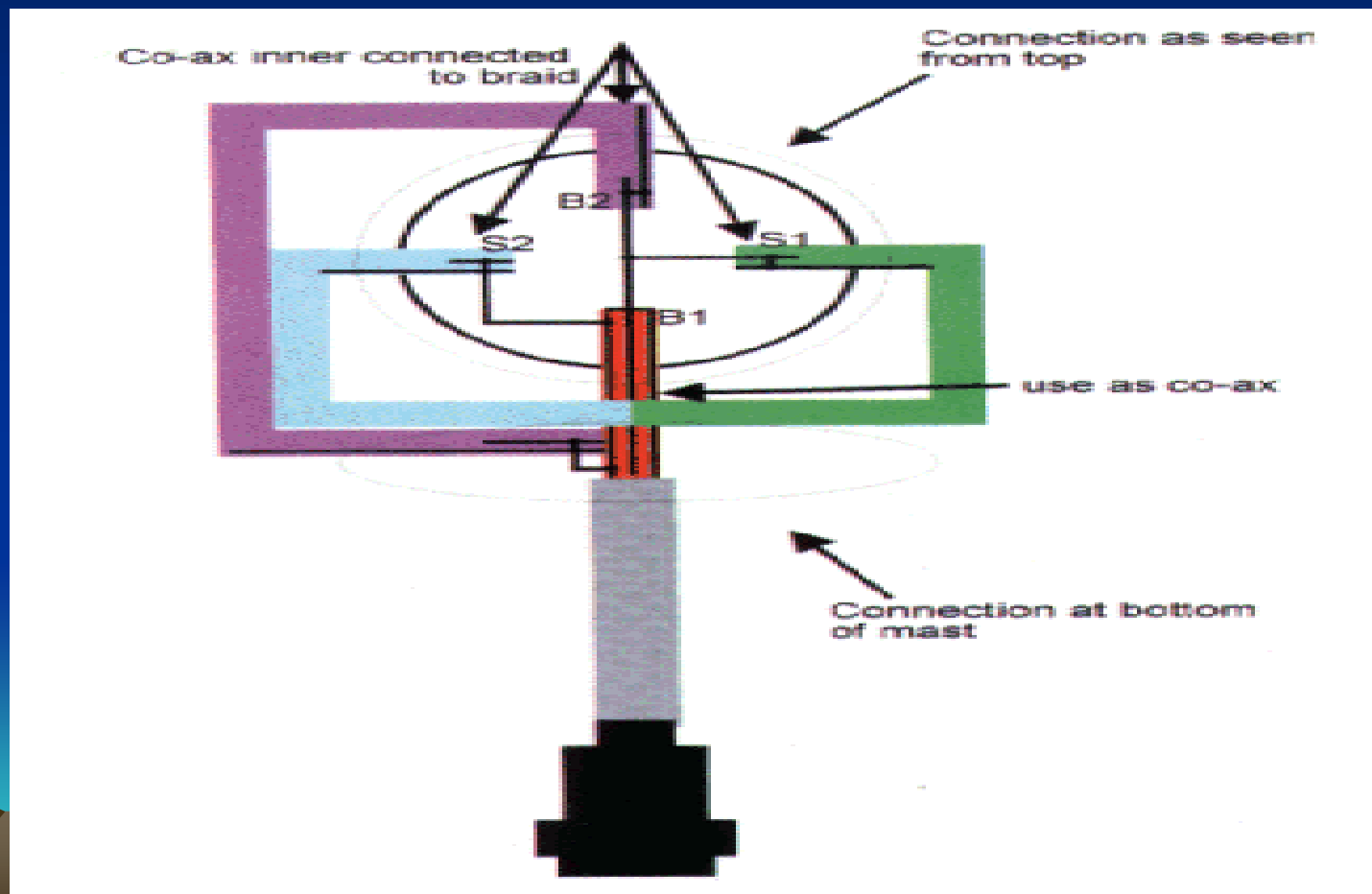
天線組裝

●天線饋電處螺旋單元完成圖



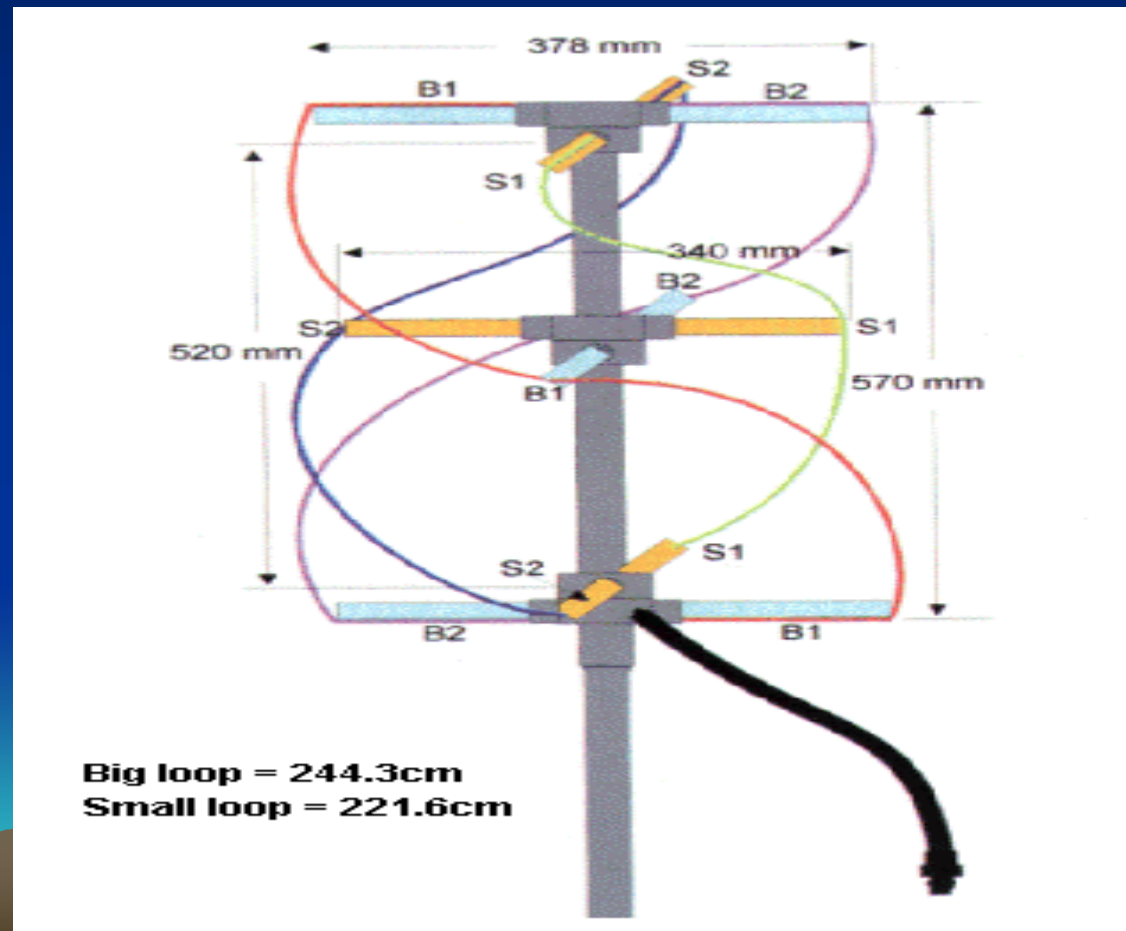
天線組裝

● 天線四螺旋單元饋電處連接圖



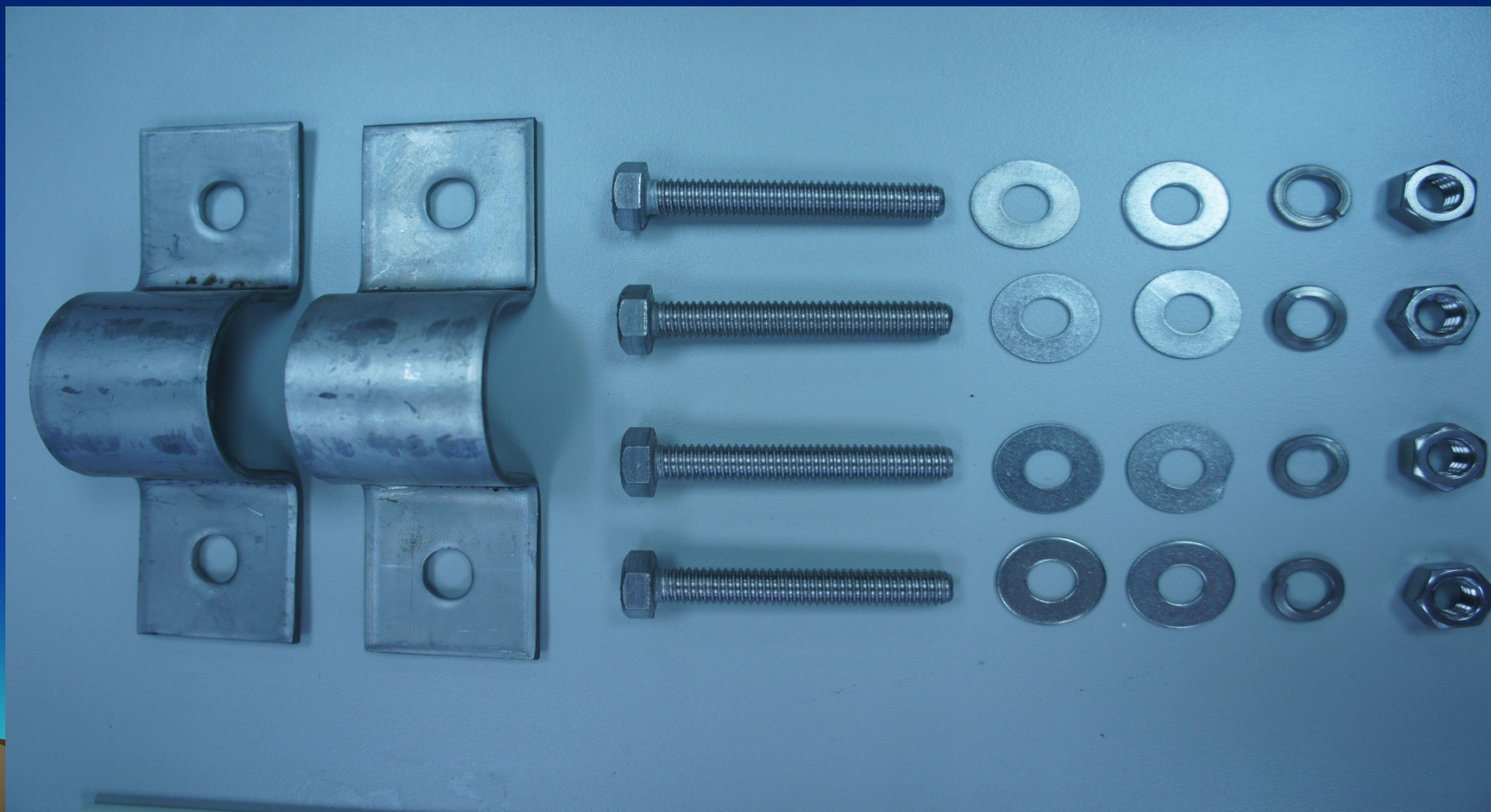
天線組裝

● 天線四螺旋單元組裝圖



天線組裝

● 天線支撐桿固定夾具及螺絲



天線組裝

- 天線支撐桿固定夾具及螺絲



天線組裝

● 整組天線之固定夾具及螺絲

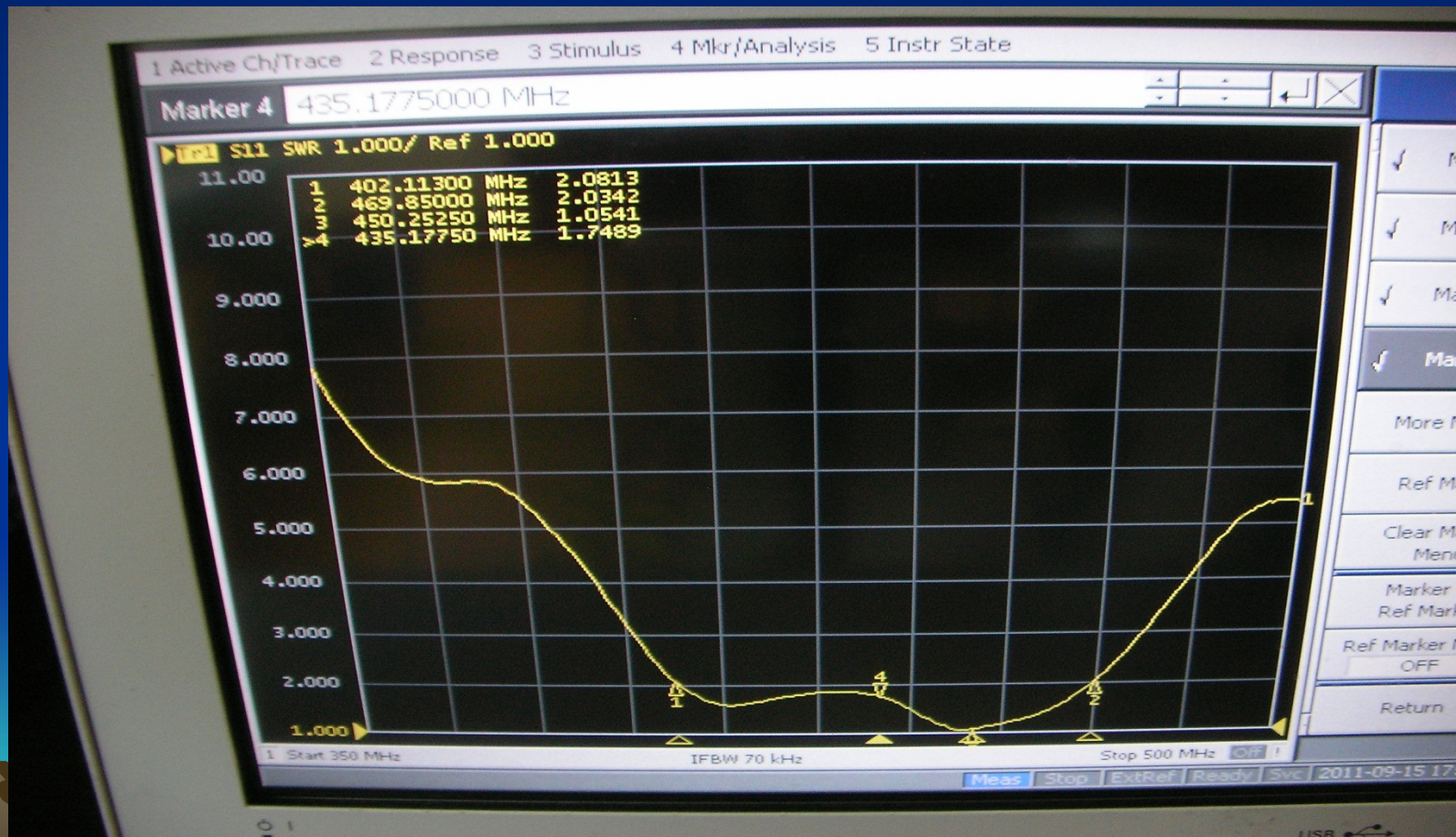


天線組裝順序

- 將四個橡膠固定頭小心並慢慢旋轉，導入四條天線螺旋單元之中間
- 將四條天線螺旋單元依序鎖入天線饋電處接頭，並用六角螺絲扳手鎖緊(注意單元長短與保持適當斜度)
- 將玻纖固定桿插入天線支撐桿並用螺絲固定(注意玻纖桿長短)
- 將四條天線螺旋單元依序插入支撐桿下端固定處，並上中下整組天線適度調整後將螺絲鎖緊
- 再將兩支天線分別鎖在橫桿上(距離適度調整)
- 大功告成!!!

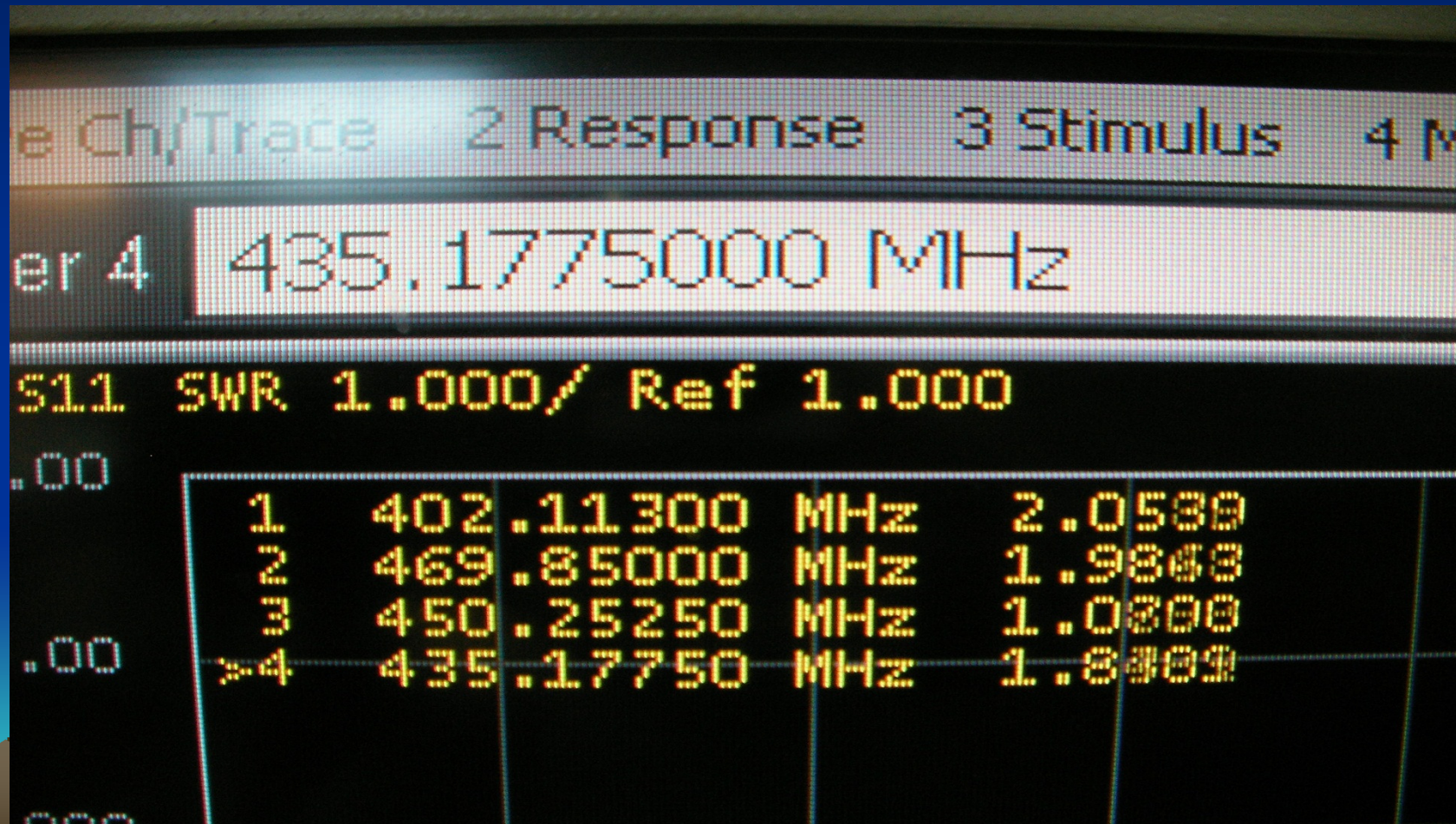
天線量測

● 使用網路分析儀量測



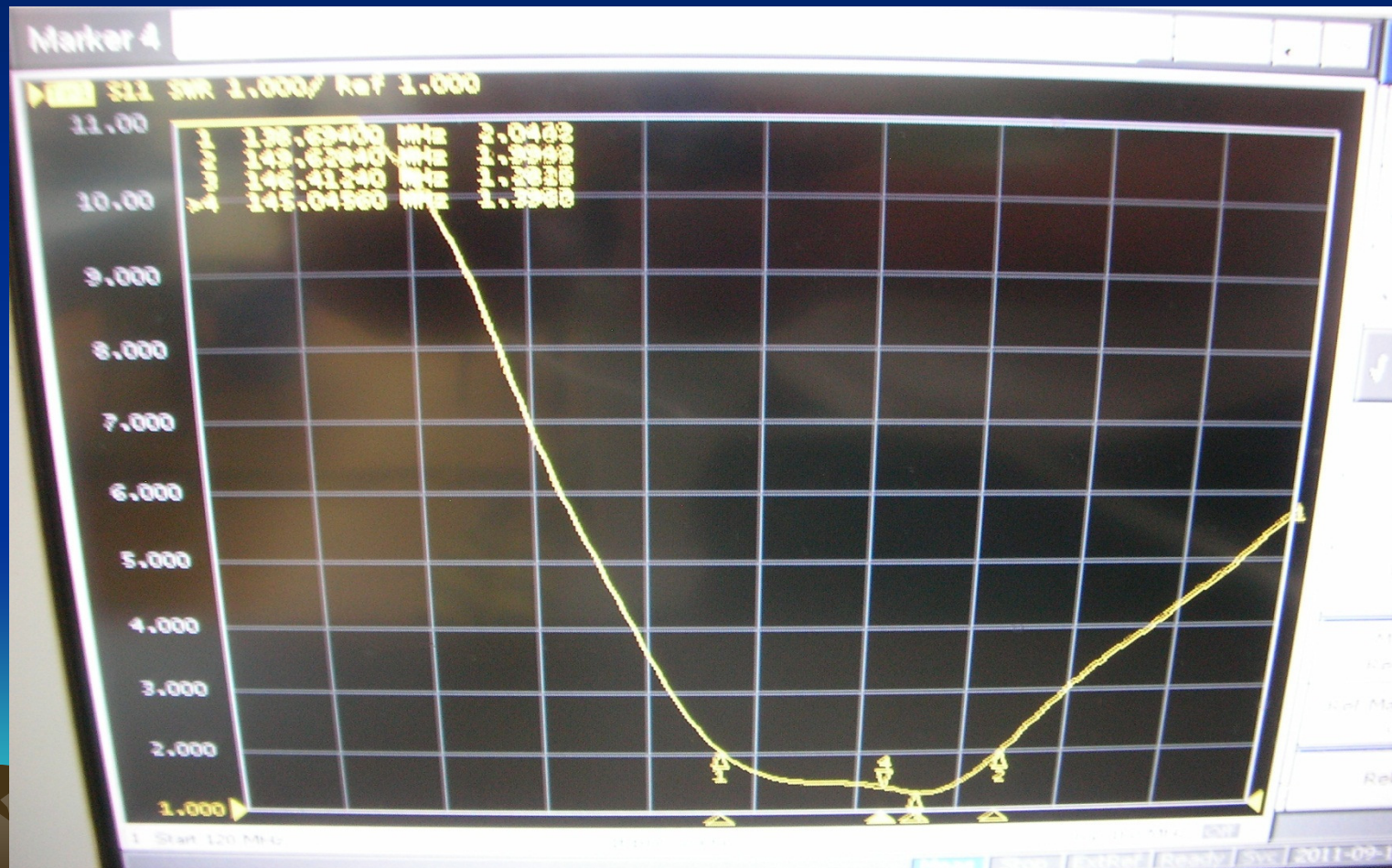
天線量測

● 使用網路分析儀量測



天線量測

● 使用網路分析儀量測



天線量測

- 使用網路分析儀量測



天線量測

● 使用簡易天線分析儀 MFJ-269B 量測(435MHz)



天線量測

- 使用簡易天線分析儀 MFJ-269B 量測(145MHz)



天線量測

- 使用簡易天線分析儀 MFJ-269B 量測(137MHz)



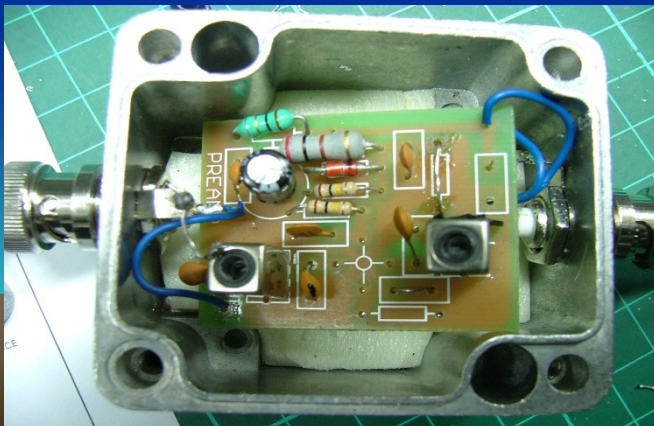
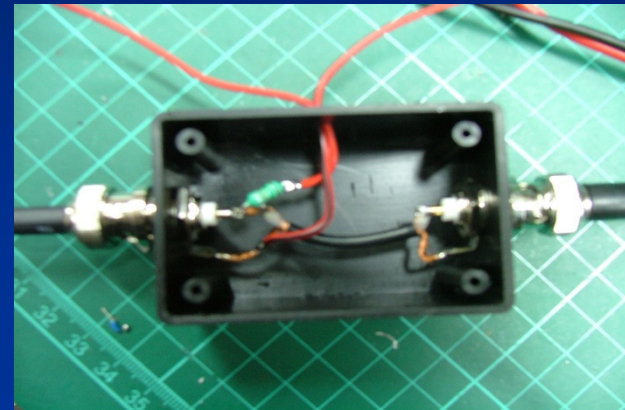
改進天線SWR之建議

- 在室外空曠地量測
- 增加整組天線之高度
- 加大兩組天線之距離
- 個別加長天線支撐桿之高度(即加大天線本體與金屬橫桿之距離)
- 使用TUNER
- 改變天線螺旋單元之長度
- 降低發射功率(無助SWR改進,但保護TX)

回顧CTARL衛星通訊研習

● 2006.11.11~11.12

● 2010.12.12



謝謝聆聽 敬請指教!!

