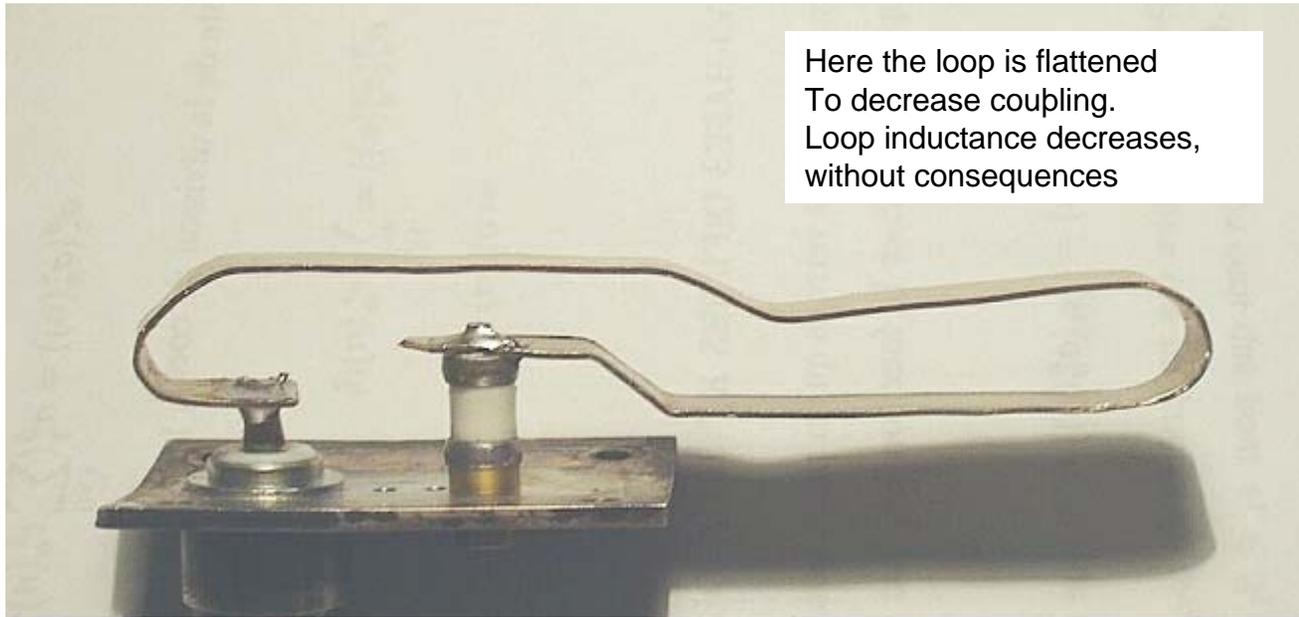


Tests on Various Duplexer Coupling Loops

J. Audet
VE2AZX

- 146 MHz Notch-Bandpass Cavities with 600 KHz TX-RX Separation.
- Loops uses a Series Capacitor
- Loop Shape must be modified to get the desired insertion loss at the bandpass frequency, when the loop cannot be rotated to change the coupling
- Loops Shapes were Tested for Insertion Loss at the Bandpass Frequency and Q factor
- Q Factor Measured Using the Excel file: Calc_Series_RLC.xls and by Using a Tee at the Connector and with the Cavity Cylinder Removed.

RX CAVITY



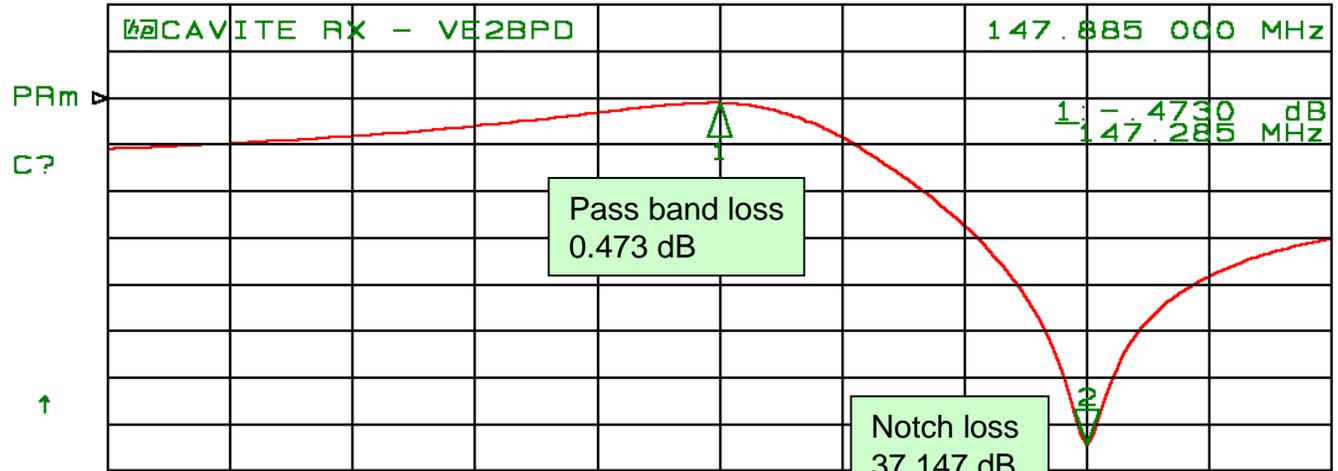
$L = 59.5 \text{ nH}$
 $C = 19.5 \text{ pF}$
 $Q = 396$

This coupling loop gives $\sim 0.5 \text{ dB}$ at the passband
and $-36 \text{ à } -37 \text{ dB}$ at the notch notch

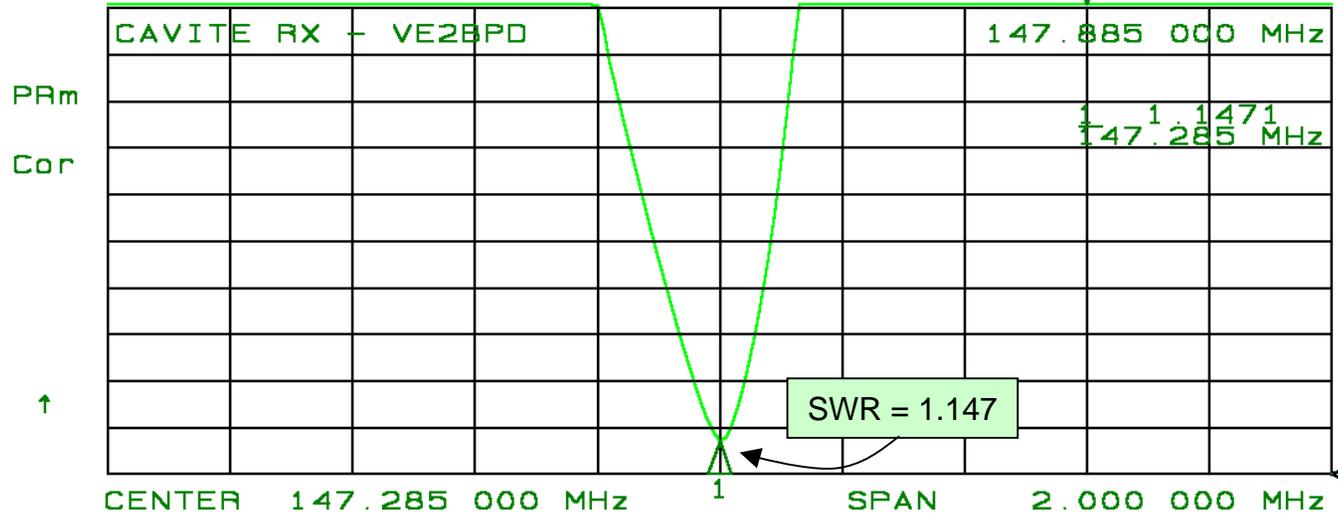
RX CAVITY

19 May 2003 19:32:00

CH1 S₂₁ log MAG 5 dB/ REF 0 dB 2: -37.147 dB

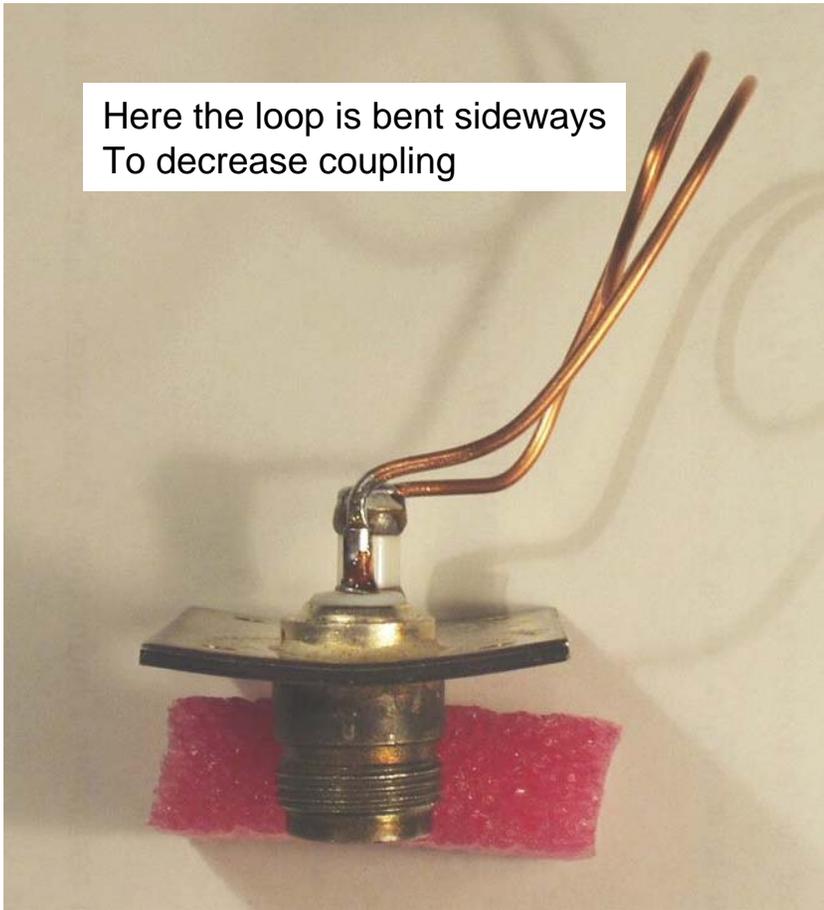


CH2 S₁₁ SWR 200 m / REF 1 2: 46.273

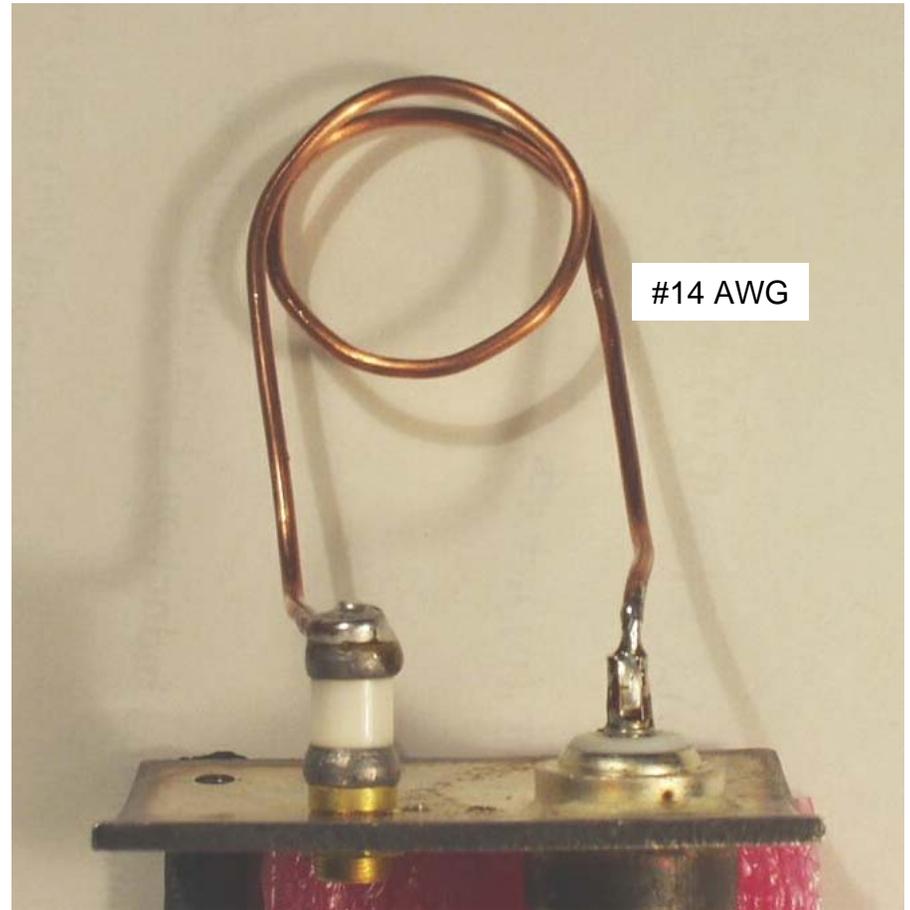


TX CAVITY - loop 1

Here the loop is bent sideways
To decrease coupling



#14 AWG



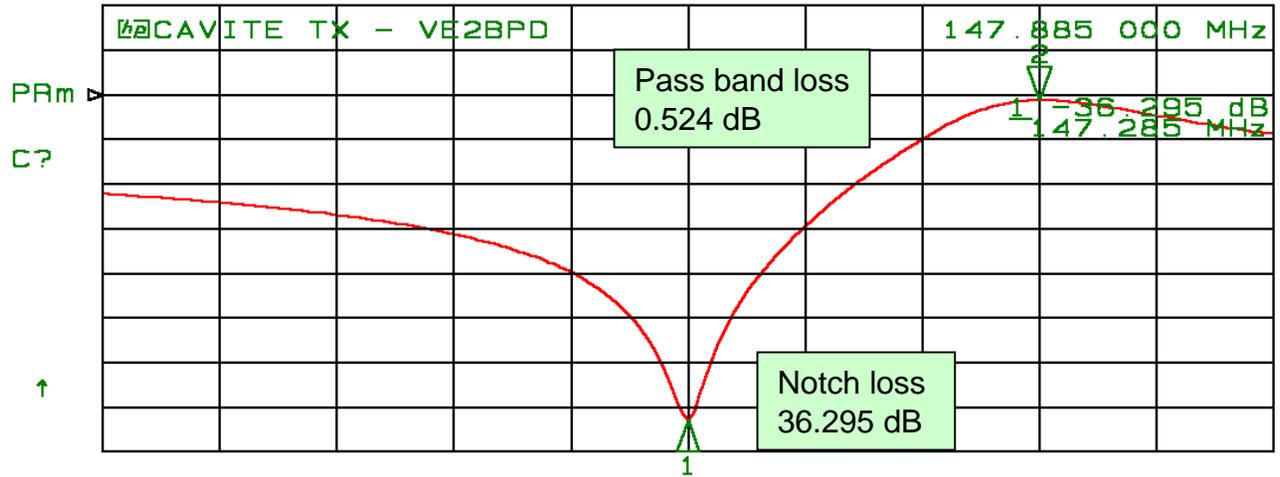
$L = 160.1 \text{ nH}$
 $C = 7.28 \text{ pF}$
 $Q = 707$
 $\text{ESR} = 0.21 \text{ ohms}$

Note the high Q here.

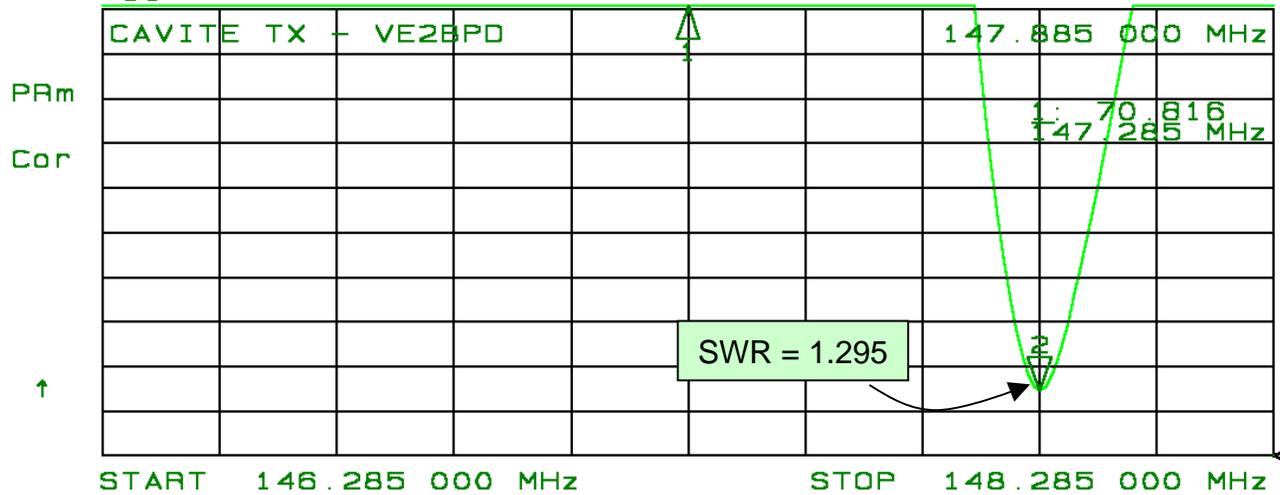
TX CAVITY - loop 1

19 May 2003 19:37:46

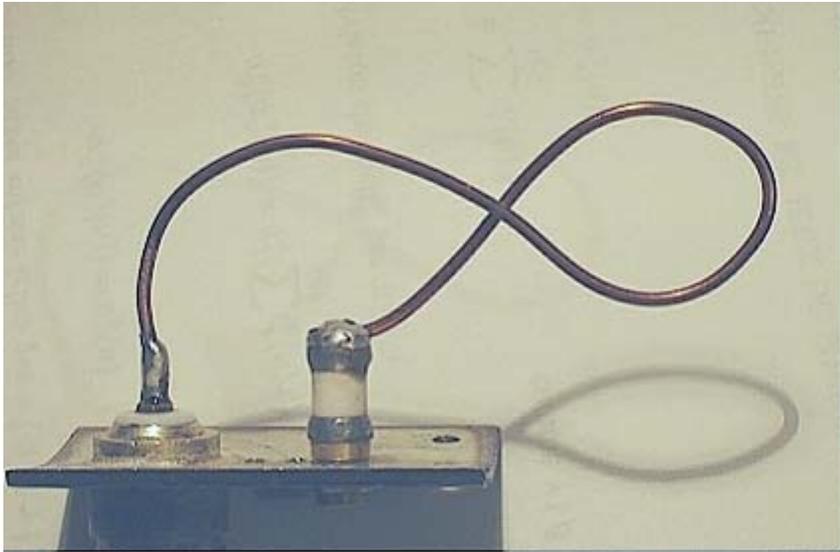
CH1 S₂₁ log MAG 5 dB/ REF 0 dB 2 -0.5240 dB



CH2 S₁₁ SWR 200 m / REF 1 2: 1.2951

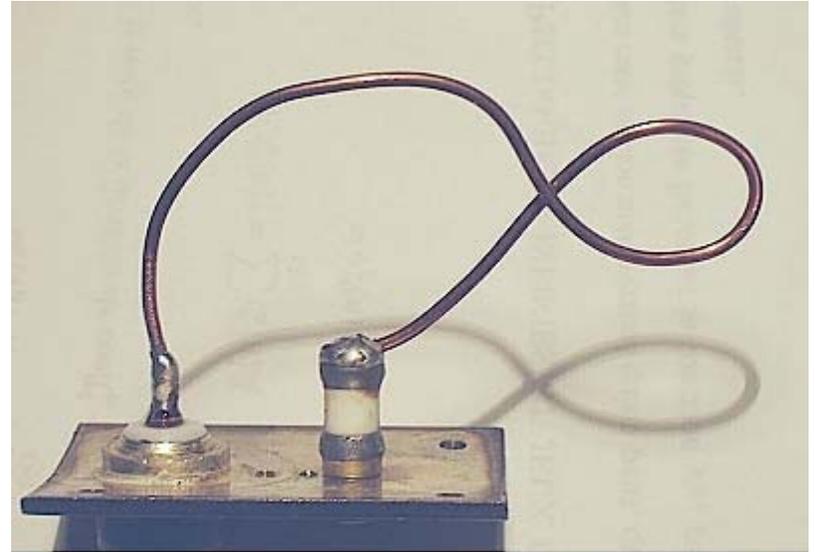


TX CAVITY - loop 2



5.2 dB passband loss
The coupling is weak since both loops have about the same area.

NOTE: This loop with an 8 shape allows control of the coupling by changing the area of each loop. The magnetic field in each loop has opposite directions and partly cancel each other, reducing the inductance and coupling



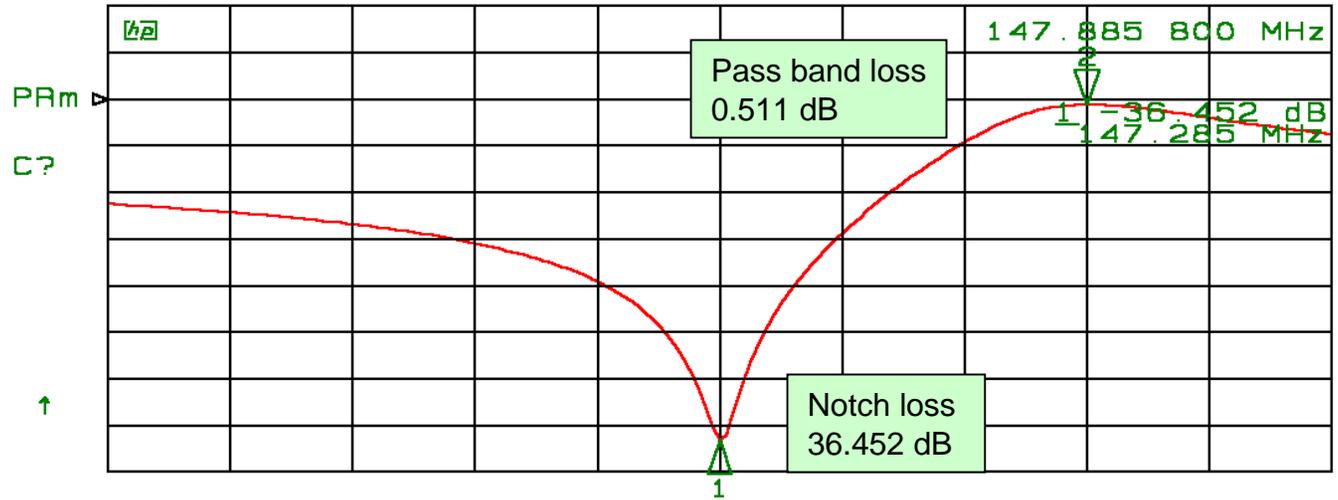
0.5 dB passband loss
This is the loop that was used.

$L = 103.2 \text{ nH}$
 $C = 11.3 \text{ pF}$
 $Q = 565$
 $\text{ESR} = 0.169 \text{ ohms}$

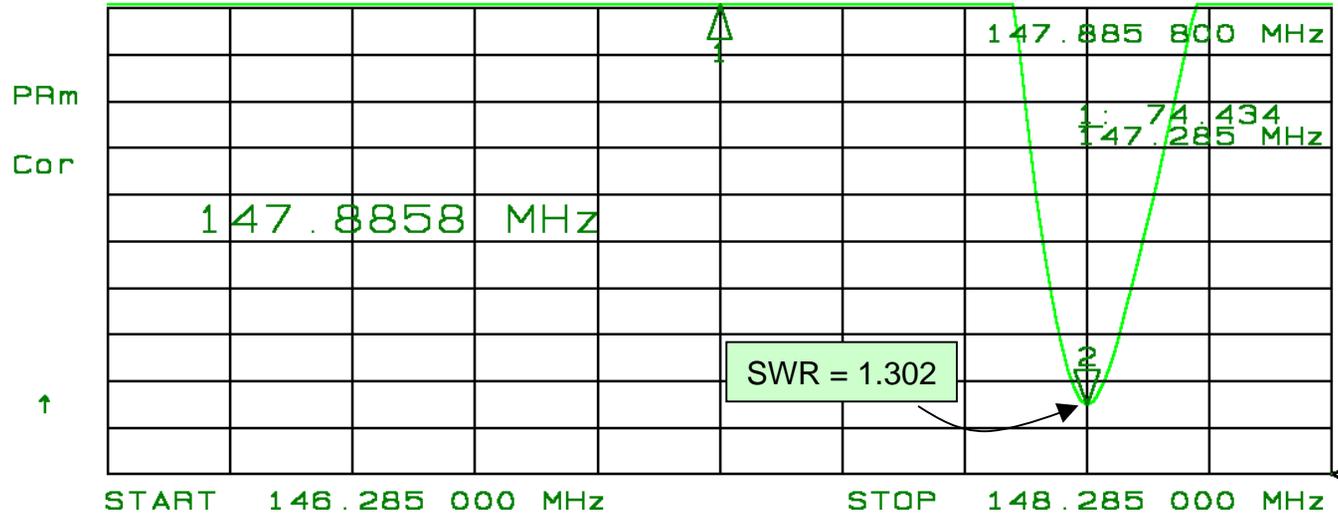
TX CAVITY - loop 2

21 May 2003 19:42:24

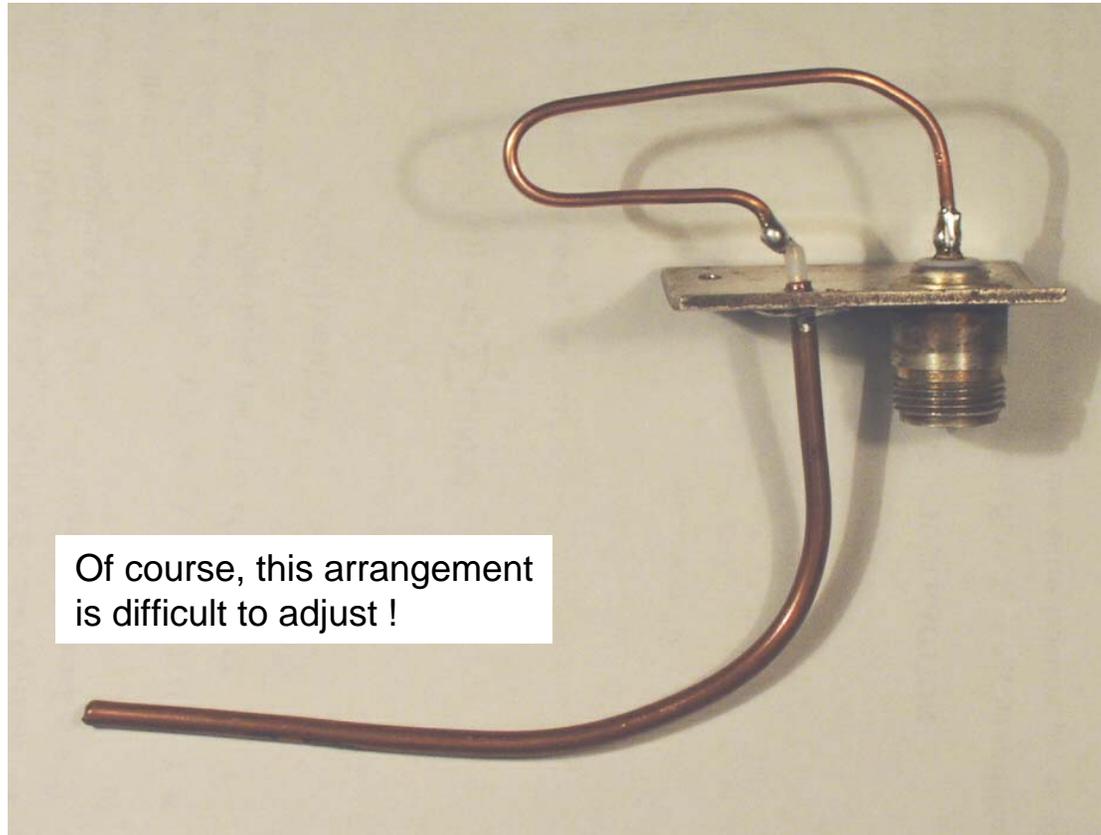
CH1 S₂₁ log MAG 5 dB/ REF 0 dB 2 -0.5111 dB



CH2 S₁₁ SWR 200 m / REF 1 2: 1.3023



RX CAVITY with semi-rigid coax for the capacitor



Note the lower Q here, but still OK.

$L = 85 \text{ nH}$
 $C = 16 \text{ pF}$
 $Q = 381$
 $\text{ESR} = 0.191 \text{ ohms}$

RX CAVITY with semi-rigid coax for the capacitor

21 May 2003 20:33:20

