

## Crossmodulation in Callisto systems caused by strong FM-tansmitters

### **Problem:**

Strong FM-transmitters produce harmonics in preamplifier stages and even in Callisto receiver. In special cases one can see even 4 harmonic bands, see figure 1.

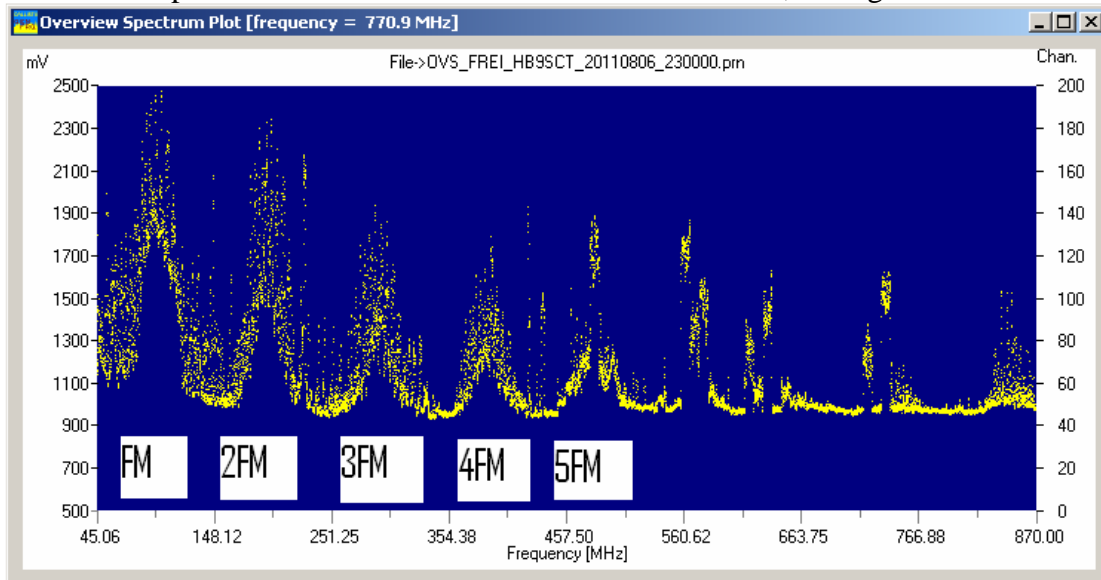


Fig. 1: 4 harmonics caused by strong FM-band at the observatory of HB9SCT

### **Possible solutions:**

- insert a high pass filter of  $> 110$  MHz
- insert a band pass filter of about 110 MHz – 870 MHz
- insert a FM reject filter (trap)

A trap can be built with standard SMA-components very easily. We simply construct a quarter wavelength trap which suppresses frequencies below 200 MHz, see figure 2.

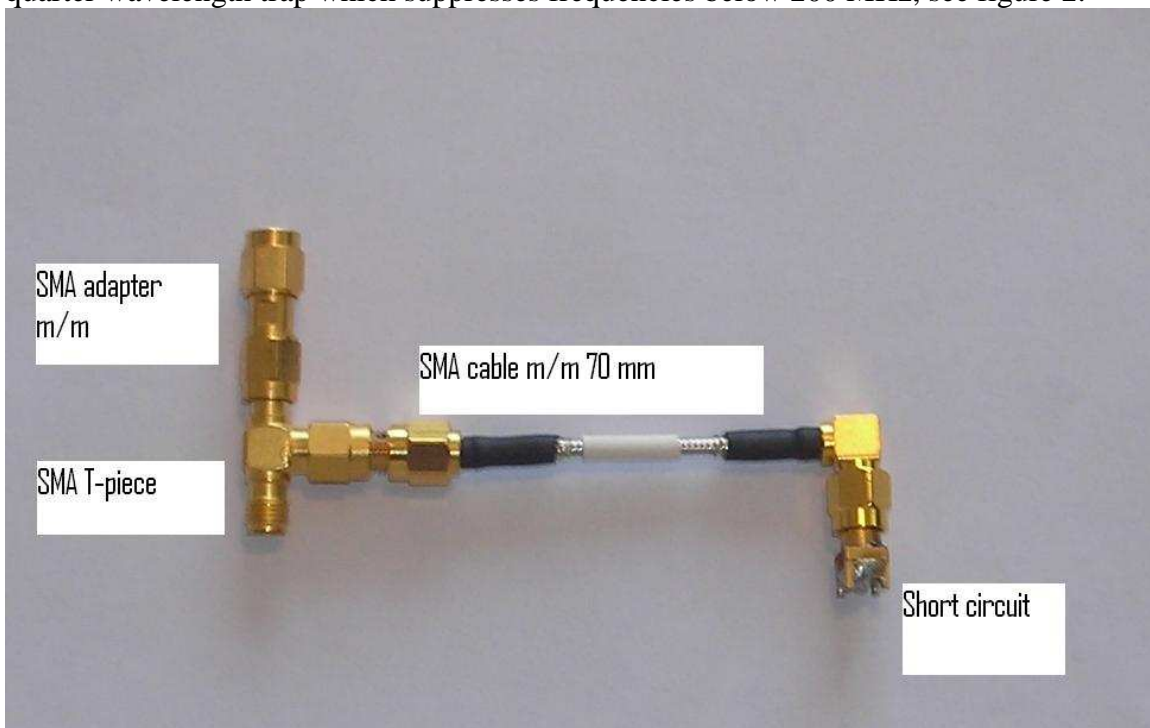


Fig. 2: FM trap made of SMA parts (T-piece, adapter m/m, cable and short circuit)

## Results:

In the trap shown in figure 2 we get traps at multiple frequencies of the basic trap. This is not a real problem since Callisto can only observe up to 870 MHz.

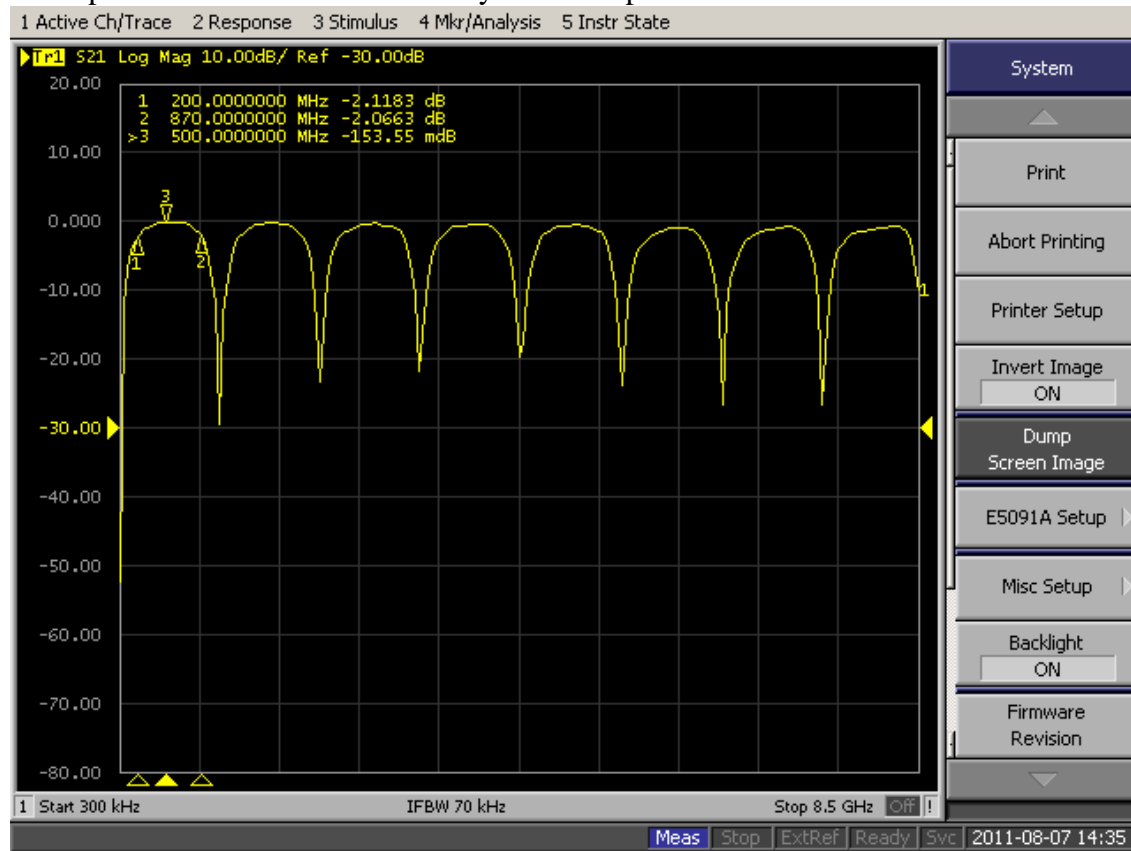


Fig 3: S21 plot of the FM-trap with band pass characteristics from 200 MHz – 870 MHz.

After insertion of the trap close to the input of the Mini-Circuits preamplifier we get the following spectral overview, see figure 4.

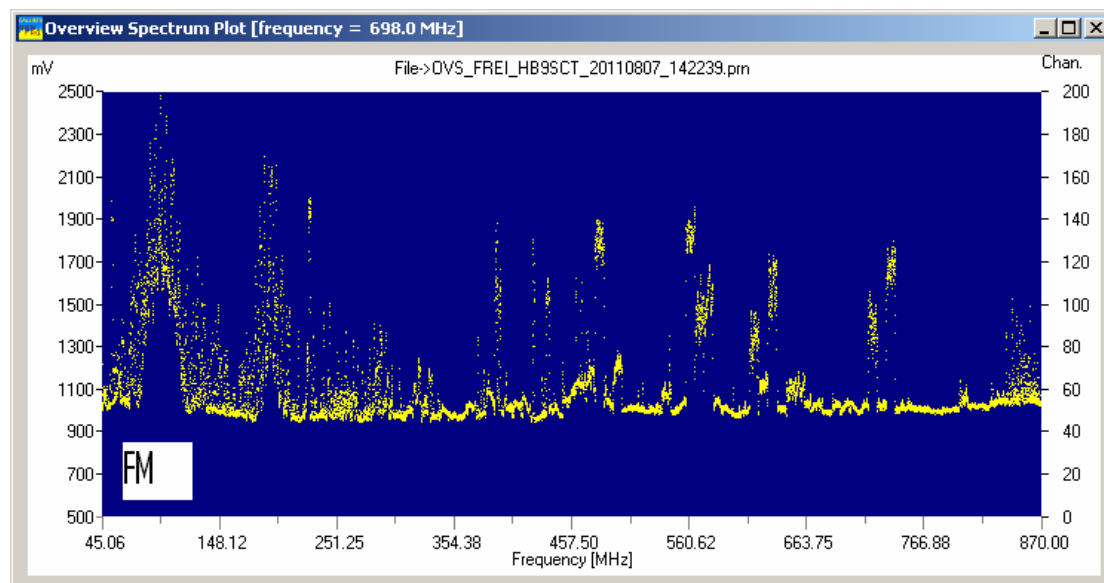


Fig. 4: spectral overview with trap inserted. Even with higher receive gain we don't get cross modulation. Please compare with figure 1. Observation range is now reduced to ~200 MHz – 870 MHz.