

VLBA ACQUISITION MEMO #148

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To: VLBA Data Acquisition Group
From: Alan E.E. Rogers
Subject: Some added notes to the BBC 0.5-1.0 GHz Oscillator

1] Microwave resistors

R21, R18 and the 20 ohm resistor in series with the output should be carbon composition or microwave resistors. Film resistors which have resonances in the microwave region (2-8 GHz) may produce parasitics.

2] Difficulty in reaching 500 MHz

If there is difficulty in reaching 500 MHz or the output level at 500 MHz is less than -14 dBm, the following steps should improve the performance.

- a) Increase the FET bias current by reducing R18 from 3.6 to 2.7 K.
- b) Increase the copper tape area connected to the FET gate.
- c) Check the location of the 4C4 core and move it towards the FET or even add another core on the other side of the gate lead.

Items b and c improve the low pass filter action formed by the capacitance of the tape and the loss of the ferrite. The filter is needed to suppress parasitic oscillations which can occur in the 4-8 GHz range.

3] Improved noise performance

Moving the 200 pF source coupling capacitor towards the "cold" end of the tank circuit (i.e., towards the 20 ohm output resistor) will reduce the noise in the oscillator by raising the loaded Q. However, the parasitic suppression improvements given above become even more important when the coupling capacitor is moved down.

The attached drawing, OSC3lay.dwg, shows the increased copper tape area, new location for the 200 pF and better location for the 200 pF capacitor.

A theoretical study (using compact or other microwave circuit analysis software) is needed to gain a better understanding of the spurious modes of oscillation.

