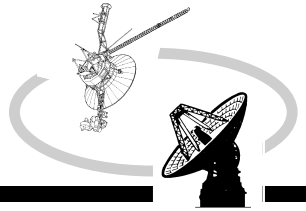
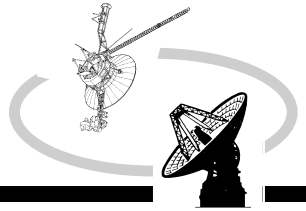
W-band Assessment
Agenda



- **W-band receiver status (Seiffert)**
- **Phase-stable 75 GHz downconverter status (Teitelbaum, Bagri)**
- **Blind pointing model development (Richter, Rochblatt)**
- **Initial observing campaign (all)**
- **TMO Progress Report status (all)**

W-band Assessment
Downconverter Design

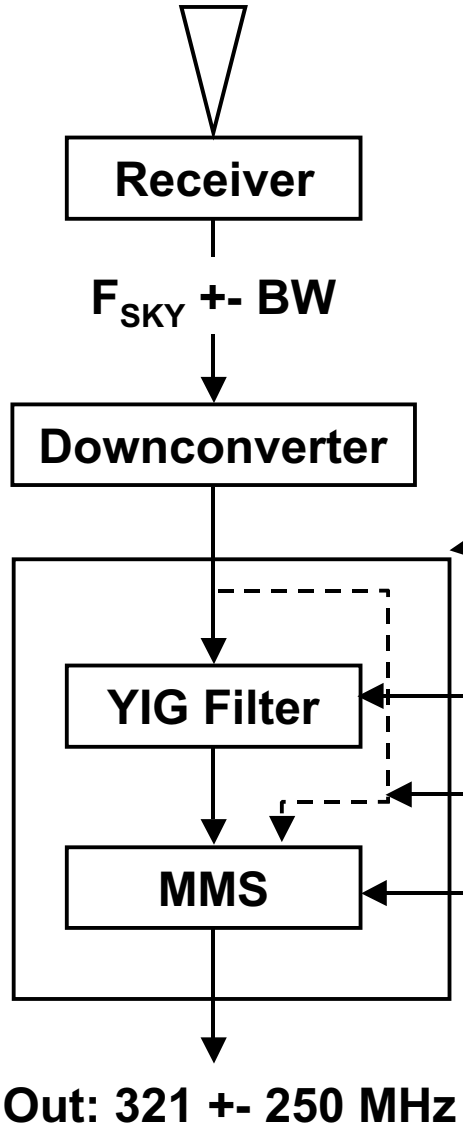


- **Accelerate development of phase-stable 75 GHz first stage downconverter by leveraging existing design that has detected fringes at Ka-band**
- **Based on considerations of integrated noise power and concerns about inadequate fall-off of the Ka-band design at high offset frequencies, we extended the phase noise specification for the 75 GHz W-band DC as follows:**

Residual Phase Noise	**-63 dBc/Hz at 1 Hz offset**
	-73 dBc/Hz at 10 Hz
	-83 dBc/Hz at 100 Hz
	-90 dBc/Hz at 1 kHz
	-100 dBc/Hz at 10 kHz
	-110 dBc/Hz at 100 kHz
	-120 dBc/Hz at 1 MHz offset and beyond

- **Technical requirements have been communicated to Conrad Foster and Miteq to cost the job**
  - **If affordable, consider building two**
- **Alternative approach is to generate 18.75 GHz with DSS-13 resident Wiltron synthesizer, locked to station 100 MHz, then x4 multiply**
  - **Wiltron brought to JPL for phase noise measurement at Section335 FTS lab**

W-band Assessment
Downconverter Design (Cont'd)



- F_{SKY} +- BW = 90 +- 6 GHz (+- 10 GHz)
  - VLBI at 86 GHz with 500 MHz instantaneous bandwidth
  - 3 mm spectroscopy, tunable over 12 GHz (20 GHz, but with degradation of noise temperature at high end)
- Downconverter frequency = 75 GHz
  - VLBI and 3mm within tuning range of YIG filter, MMS
  - Can existing Ka-band design be applied with 18.75 GHz synthesizer in place of 7.925 GHz, with similar phase noise characteristics? Good enough?

Existing Equipment

YIG Tuning Range: 8 - 26.5 GHz

YIG can be bypassed

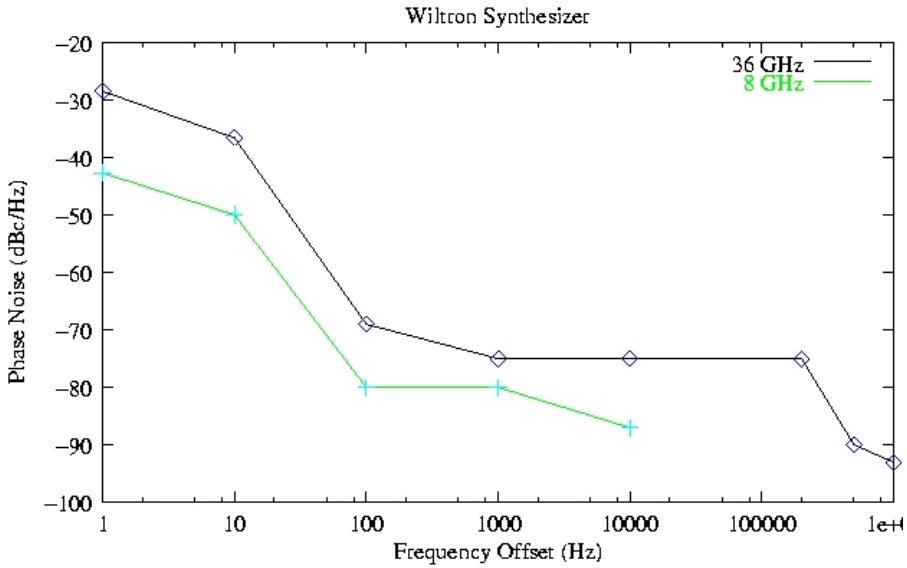
MMS Tuning Range: 1 - 26.5 GHz

- Downconverter technical issues raised
  - ~18 GHz synthesizer falls in heart of tuning range of second LO stage (MMS,YIG)
  - Is YIG filter phase stability a problem for VLBI

W-band Assessment
Downconverter Design (Cont'd)

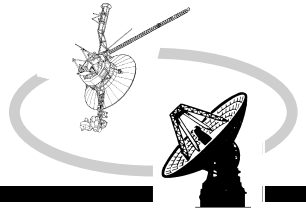
- **Wiltron measurement results**

Offset freq	Noise at 8 GHz	Noise at 36 GHz
1 Hz	-42.7dBc	-28.5 dBc
10dB higher spurious at 0.65 Hz ?		
10	-50	-36.6
100	-80	-69
1000	-80	-75
10,000	-87	-75



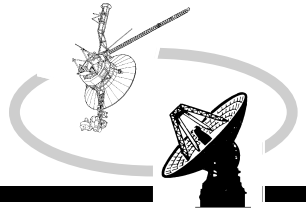
- **The phase noise seems to remain flat out to about 200 kHz and probably beyond.**
- **Integrated phase noise at 75 GHz due to flat phase noise spectrum beyond 10 kHz seems to be problematic. If it continues beyond 100 kHz, then this source seems unusable for the local oscillator for interferometry**
- **Phase noise at 36 GHz is about -75 dBc/Hz at 200 kHz offset, rolls down to about -90 dBc/Hz at about 500 kHz and drops off by another 3 dB at about 1 MHz offset. This will give an over all signal to phase noise power ratio of about 10 dB at 75 GHz. Marginal but OK to start observing. For long range we should look for another source with less phase noise than this. Further, once we get another source for local oscillator we can use this (with a suitable multiplier) for phase calibration.**

W-band Assessment
Initial Observing Campaign



- **Cultivate an observing team**
  - **Seiffert, Bagri, Teitelbaum, Jones, Kuiper, …**
- **Initial DSS-13 commitment - one prime shift pass per week**
  - **After Mike S "blesses" the receiver**
  - **Usage to be coordinated by observing team**
- **Additional observing time can be requested by anyone**
  - **Requestor is responsible for observation**

W-band Assessment
TMO Progress Report Status



- **Submission deadline for next issue: March 1, 2002**
- **Most material in hand**
  - **Bill Imbriale's work on feed gain and placement?**
- **First draft by February 11, 2002**
  - **In time for feedback at next scheduled monthly meeting on 2/14/2002**
- **Final draft out to team by February 22, 2002**