



Figure 1. Frequency Stability Test Set-up – Complete View

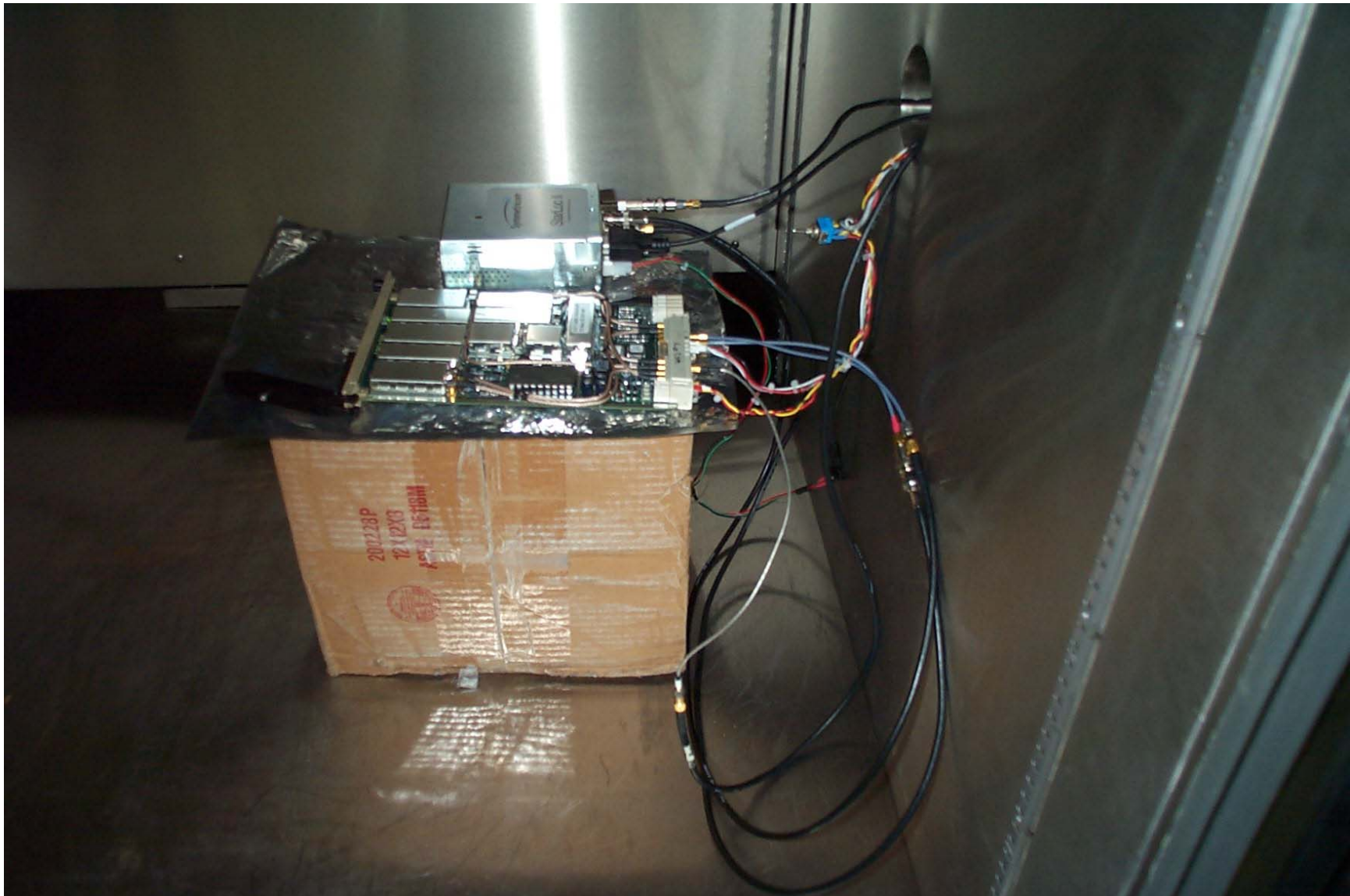


Figure 2. Frequency Stability Test Set-up – close-up of DUT

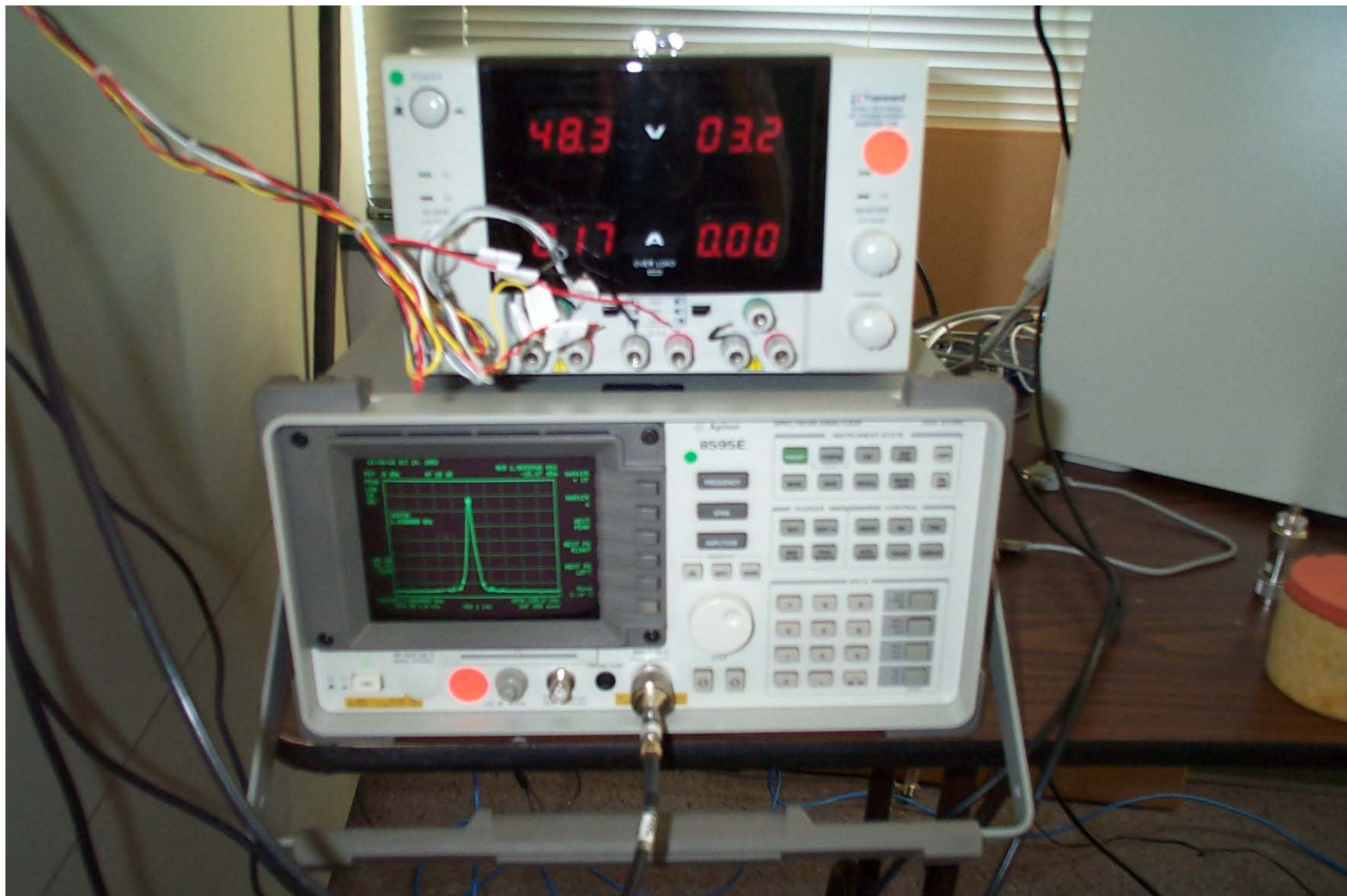


Figure 3. Frequency Stability Test Set-up – close-up of Test Equipment



Figure 4. Frequency Stability Test Set-up – temperature chamber door closed

Beamreach Base Station Frequency Stability Test

Date: 9/4/03 Tested by: Steve Lin

Test Description:

The frequency stability of the Beamreach base station is set by a GPS time/frequency standard. This unit provides a 10MHz output that has been locked to the frequency references onboard the GPS satellites. The local oscillators within the base station are then locked to this very stable reference frequency.

The frequency vs temperature stability of the Beamreach base station was measured by putting the LO reference and LO generation circuitry in a temperature chamber, running them over the temperature range and measuring the frequency of the LO output. The required components of the base station consisted of the GPS time/frequency standard and the LO module. A spectrum analyzer was used to measure the output frequency of the LO.

Hardware Tested:

LO module S/N 007; and Starloc II GPS module manufactured by Datum Corporation (now Symmetricom).

Test Results:

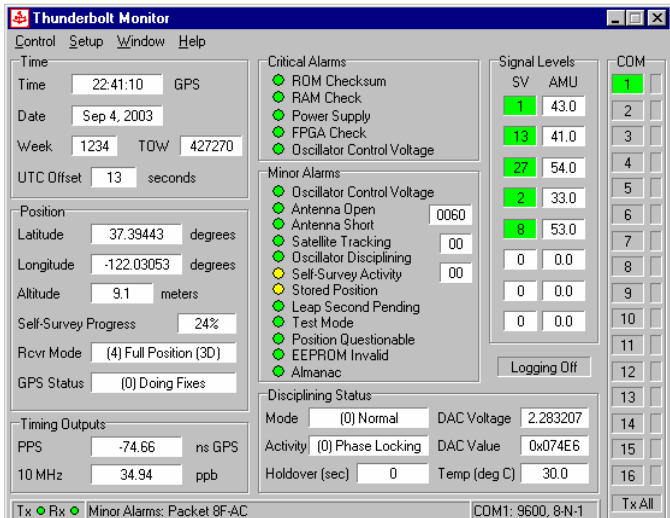
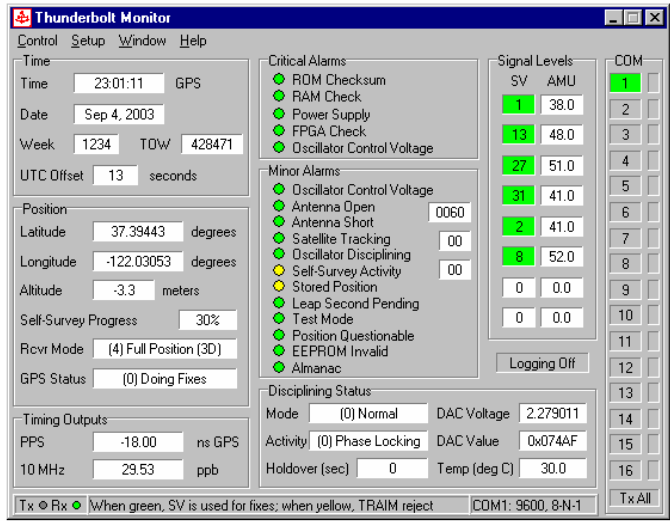
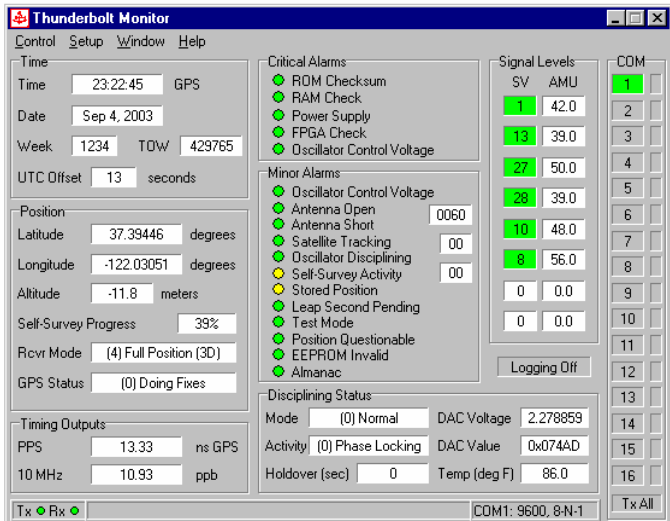
Temperature (deg C)	Measured LO Frequency (Hz)	Frequency Error (Hz)
-20	1,960,000,000	0
-10	1,959,999,994	-6
0	1,959,999,997	-3
10	1,959,999,994	-6
20	1,959,999,997	-3
30	1,959,999,997	-3
40	1,959,999,994	-6
50	1,959,999,994	-6
60	1,959,999,994	-6

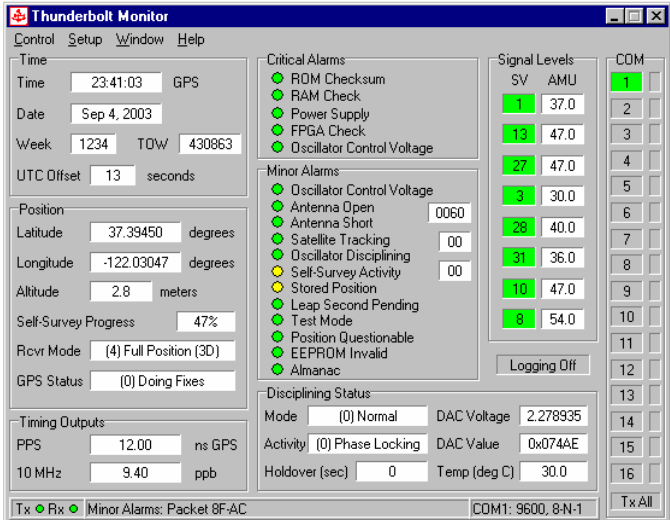
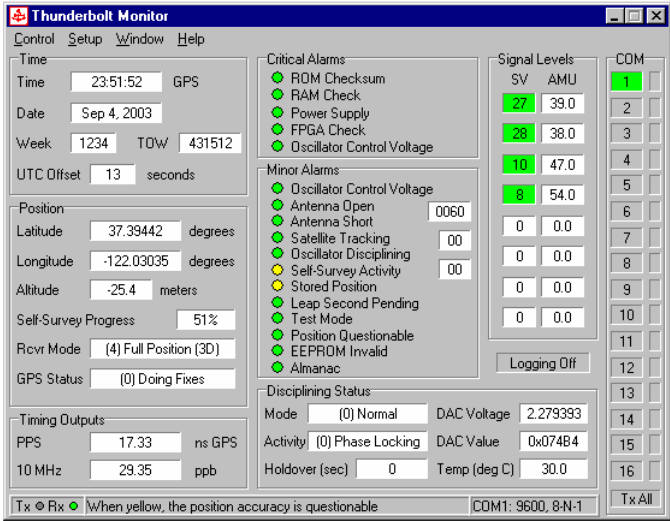
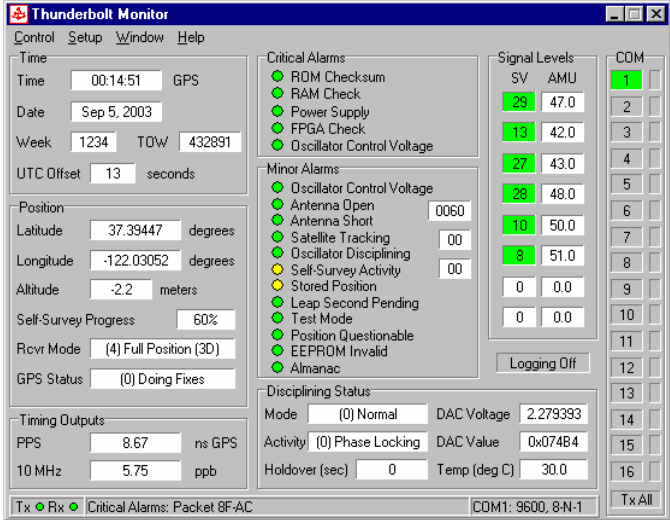
The LO was tuned to a center frequency of 1.96GHz.

The test data shows that the worst case frequency deviation was 6Hz. FCC part 27.54 states that the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation. The emission bandwidth is 3.75MHz within the 5MHz band resulting in 625kHz guard bands between the emissions and the band edges. The 6Hz frequency deviation over temperature is a very small number compared to the 625kHz guard band, ensuring that the FCC specification is met.

Test Data:

The complete set of test data, including the GPS unit status is given below.

Temp -20°C	Measured LO Frequency 1,960,000,000 Hz	GPS Unit Status 
-10°C	1,959,999,994 Hz	
0°C	1,959,999,997 Hz	

Temp	Measured LO Frequency	GPS Unit Status
10°C	1,959,999,994 Hz	
20°C	1,959,999,997 Hz	
30°C	1,959,999,997 Hz	

Temp	Measured LO Frequency	GPS Unit Status
40°C	1,959,999,994 Hz	
50°C	1,959,999,994 Hz	
60°C	1,959,999,994 Hz	