SET UP FOR FREQUENCY STABILITY TESTS

Setup GPS(HP 10544a) – HP 70310 – HP 8924C – MV89A vs HP 5334

Reference clock

SMHU Sig Gen

HP 5334B Counter

10 MHz

Ch A

Scope

Gives a visual sanity check

Isolation Xfrm

Computer Sound Card

~ 1 KHz

~ 1 KHz

Running Spectrum Lab

5E-10 ΔF / Hz

SMHU

2000.001 MHz + 7 dBm

LO

W / J M1H

-10 to - 5 dBm

DBM Mixer

10 MHz

RF

20 - 25 dB amp

2000 MHz

- 30 dBm

HP 5254A Multiplier

10 MHz Clock Under Test

50Ω term & 30 KHz LPF

20 dB amp

2000 MHz
SET UP FOR FREQUENCY STABILITY TESTS

**Setup SMHU vs HP 5334**

- SMHU Sig Gen
  - 2000.001 MHz + 7 dBm
  - LO
  - 50Ω term & 30 kHz LPF
- HP 5334B Counter
  - 10 MHz
  - Ch A
- Scope
  - ~ 1 kHz
  - Gives a visual sanity check
- Reference clock
  - ~ 1 kHz
- DBM Mixer
  - ~ 1 kHz
  - RF
  - W / J M1H
- HP 5254A Multiplier
  - 2000 MHz - 30 dBm
  - 10 MHz
  - 10 MHz Clock Under Test
- Isolation Xfrm
  - ~ 1 KHz
  - Computer Sound Card
- Running Spectrum Lab
  - 5E-10 ΔF / Hz
- Computer
  - Sound Card
- Reference clock
  - ~ 1 KHz
  - ~ 1 KHz
  - ~ 1 KHz
- HP 5334B Counter
  - 10 MHz
SET UP FOR FREQUENCY STABILITY TESTS

Setup SMHU VS SMHU

- **SMHU Sig Gen**
  - 10 MHz
  - 2000.001 MHz + 7 dBm

- **SMHU Mixer**
  - LO
  - RF
  - 50Ω term & 30 KHz LPF
  - ~ 1 kHz

- **HP 5334B Counter**
  - Ch A
  - ~ 1 KHz

- **Scope**
  - Gives a visual sanity check

- **DBM**
  - W / J
  - M1H
  - -10 to - 5 dBm

- **Isolation Xfrm**
  - ~ 1 KHz

- **Computer Sound Card**
  - Running Spectrum Lab
  - 5E-10 ΔF / Hz

- **HP 5254A Multiplier**
  - 2000 MHz - 30 dBm

- **HP 5254A Counter**
  - 10 MHz

- **10 MHz Clock Under Test**
  - 20 - 25 dB amp
SMHU with HP 5334B as Reference Time Base

<table>
<thead>
<tr>
<th>Time (HMS)</th>
<th>Frequency Variation x 1E-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.22.05</td>
<td>-10.00000</td>
</tr>
<tr>
<td>16.23.05</td>
<td>-5.00000</td>
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<tr>
<td>16.24.05</td>
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<td>16.25.05</td>
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<tr>
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<tr>
<td>16.28.05</td>
<td>-5.00000</td>
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<tr>
<td>16.29.05</td>
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<td>16.30.05</td>
<td>5.00000</td>
</tr>
<tr>
<td>16.31.05</td>
<td>10.00000</td>
</tr>
</tbody>
</table>

Average Peak Freq: 1012.338
Peak to Peak Variation: 1.96E-10
Standard Deviat. = 4.28E-11
HP8924C with HP 5334B as Reference Time Base

**Freq Variation X 1e-11 DRIFT REMOVED**

Average Peak Freq = 1.48e+01
Peak to Peak Variation = 5.02e-11
Standard Deviation = 7.75e-12

HP8924C carrier is the most noisy at +/- 5 Hz

**50 dBc**

1 Hz / div
SET UP FOR SPECTRUM LAB

- Set frequency MIN / MAX around 1000 Hz as req'd with a 10 Hz span
- In OPTIONS select **FFT** and set size = 8192, decimate = 8, Hann filter.
  This gives FFT bin size of 122 mHz and 183 mHz noise bandwidth.
  Also set **Complex Internal Freq Shift** mode.
  Select Memory and set **Max FFT Bins in File** = 8192
- In OPTIONS select **Audio I/O** and set to 8 KHz.
- In FILES, select **Text File Export**. Select: **Export of Calculated Data**
  In File Contents set the **Peak_f(.........)** with the proper MIN/MAX freq.
  In File **Name and Activation**, enter file name, check **active** when ready to record.
  Uncheck: **Use Write Intervals**: 1.0 sec.
  The write interval will be set in OPTIONS, **Spectrum1, Waterfall Scroll Interval** = 300 mS by default.
- First try displaying the spectrum without recording. In START/STOP, set **START Sound Thread**.
- When ready to record, set **STOP Sound Thread** and activate the file, as above.
  Then start recording by setting START/STOP to **START Sound Thread**.
- The recorded file will appear in the Spectrum Lab directory.

Reference: SpecLabInfo.pdf on my web site