

VLA/VLBA Interference Memo No. 24

Tests of DW8 RFI Monitor

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Late on maintenance day, 27 June, 2002, I characterized the over- all gains and losses of the W8 monitor L-band tap-off signal path. This was done in order to determine the absolute power levels of DME RFI signals seen on the W8 monitor during previous tests where the 1200-1740 MHz band pass filter (BPF) was removed while the W8 spectrum analyzer (SA) swept from 1 to 2 GHz. Below is a record of the test procedure, results, and conclusions.

TEST PROCEDURE:

(All times in MDT)

At 1523 35 I reset the date on the w8monpc--it had gained 3 minutes since the previous week's tests.

The W8 SA was reset to:

Fc=1500 MHz Sp=100 MHz/div RBW=300 KHz VF=off Swp=50 mS/div (cal on) RL= -40 dBm

The observed average noise level (NL) of the F103 receiver bandpass was -73 dBm @ 1.2 GHz, and -79 dBm @ 1.8 GHz.

At 1551 I removed the L-band receiver RCP Helix and reconnected it to the output of a Gigatronics 610 signal generator (SG) brought to the vertex room of ant22. The SG was set to source -60 dBm (leveled), and was set to 1200 MHz. Power out was enabled at 1555 20.

At 1557 40 the BPF on the RCP side of the L-band signal path was by-passed. I then started manually stepping the SG up to 2 GHz, then back down to 1 GHz in 10 MHz steps until 1605. I stopped stepping the SG at that point, leaving the frequency setting at 1.1 GHz, with the output power level still at -60 dBm.

At 1608 I re-installed the BPF.

At 1610 I re-connected the RCP Helix to the RCP output of the F103 L-band receiver and exited the vertex room.

End of test.

TEST RESULTS:

From the W8mon data taken during the test, I created a 91 page postscript document (currently located at /home/electra2/w8mon/special2/plots/SATK_spectra_20020626_2228-2359.ps).

Each page of the document displays a 1 minute peak hold data file from the Tek 2712, W8mon SA during the time of the test.

Page 1, which is the plot labeled 2228 UTC (actual time was 2128 UTC, 1528 MDT) starts the sequence, and shows the full 1000-2000 MHz spectra of the L-band RCP output, with the power levels ranging from -70 dBm @ 1200 MHz, to -78 dBm at 1740 MHz. Outside of that range, the power levels drop drastically to the -90 dBm NL of the SA. In the bandpass, as well as in the lower bandpass skirt from 1100-1200 MHz, strong aeronautical distance measurement equipment (DME) and air traffic control radar beacon system (ATCRBS) signals are seen peaking at from -55 to -60 dBm.

Starting at page 26, the plot labeled 2254 UTC, the F103 bandpass went away, and only the NL of the SA is seen at around -90 dBm all the way from 1 to 2 GHz. This corresponds to the time I was connecting the SG to the Helix in the vertex room of ant22.

Pages 28-30 show the output of the SG (which was set to -60 dBm output) at 1200 MHz, at a power level of around -69 dBm.

Pages 31-37 show the stepped CW output of the SG from 1000 to around 1880 MHz, beyond which in frequency no signal is seen above the NL of the SA.

Power levels range from -67 dBm at 1 GHz, through the previously mentioned -69 dBm at 1200 MHz, to -73 dBm @ 1400 MHz, and -74 at 1600 MHz. The power level drops to around -75 MHz just before the roll-off of the 1740 +/-20 MHz notch filter at around 1720 MHz. At the notch, the power level drops to below the NL of the SA until around 1825 MHz, where power levels rise to a sub-peak of around -80 dBm at 1850 MHz. Beyond 1880 MHz the power levels are again below the NL of the SA at -90 dBm.

Pages 38 & 39 show a spike of level -68 dBm at 1100 MHz. This corresponds to the time that the SG was left at 1100 MHz while I disconnected the receiver RCP Helix cable from the SG, and re-connected the BPF.

The plots page 41 and beyond show the standard 1200-1740 MHz bandpass of the receiver superimposed on the response of the BPF and notch filters once again.

TEST CONCLUSIONS:

These data indicate that the W8mon system (which includes the following hardware components:

F103 RCP out to around 15 feet 3/8 Heliac to A-rack bulkhead,

10' 0.141 semi-rigid coax to a K&L filter, PN 1785/x40-0/0,

4" 0.141 semi-rigid coax to a Microwave Filter Co filter, PN 9097 BPF,

4" 0.141 semi-rigid coax to a Dir Coupler PN 4501-10N, 1 - 2 GHz,

10' of RG223 coax to the W8 amplifier module (in the A-rack) L-band input, and 1/2" Heliac run down the antenna and to the CB Tek2712 SA), has an average loss of around 12 dB across the non-filtered part of L-band, and a loss of around 8 dB in the 1100-1200 MHz DME region. These figures may be used to adjust the power levels seen in the data taken the previous maintenance day, where in-antenna tests of the 100 MBS and 1 GBS ELVA M&S LAN boxes were performed in ant22. During those tests, a number of spectra in the DME region were recorded with the 1200-1740 MHz BPF removed. The information from these 2 tests will be compared in a subsequent email to determine the actual, absolute power level of the DME signals at the input of the VLA L-band receiver feedhorn.

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