To: RFI Group  

From: Alan E.E. Rogers  

Subject: RFI monitor preamp and calibrator  

For an initial start I suggest we use pre-calibrated noise injection. I show a tentative block diagram in Figure 1. I have tried to find components which cover the 30-1500 MHz we proposed. The “off the shelf” amplifiers from Mini-circuits with very high IP3 only go to the 1 GHz but may be satisfactory for initial measurements. I notice that someone from Chalmers University has suggested the Watkins Johnson AH1 amplifier which has high IP3 and goes to 3 GHz – but can be unstable at low frequencies for which a fix is suggested at www.eta.chalmers.se/~upda/AH1preamp.html. The NI-5660 requires about 40 dB or preamp gain which makes the IP3 even more critical. We may want to try a Textronix RSA spectrum analyzer or Agilent spectrum analyzer to see how it performs for a comparison. The Textronix only needs about 20 dB of preamp gain, so that we might want to have the flexibility of replacing the ZHL-3010 with a ZHL-1010 for less gain.

A good test of how well we are doing might be to measure the antenna temperature in the 150 MHz radio astronomy band. I show the expected antenna temperature for a vertical dipole (without ground plane) in Figure 2. I would expect that there will be even more variation of temperature with LST using patterns for the discone along with a ground reflection model. These more complex sky model calculations can be made for improved accuracy.

xc: J. Carter  
    M. Derome  
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AOR DA 3000 wideband discone antenna

50 ohm load

Mini-circuits ZFSWHA-1-20 high isolation switch

-10 dB coupling

Noise/Com NC3263 +32 dB ENR

Mini-circuits ZX30-8-4 directional coupler

Gain = 12 dB

WJ AHL
2.5 dB N.F. preamp with OIP3 = 41 dB (with Chalmers mod to get down to 30 MHz)

Gain = 30 dB

Mini-circuits ZHL3020 OIP3 = 46 dB

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AEER precal 18 Aug 04