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To: RFI Group

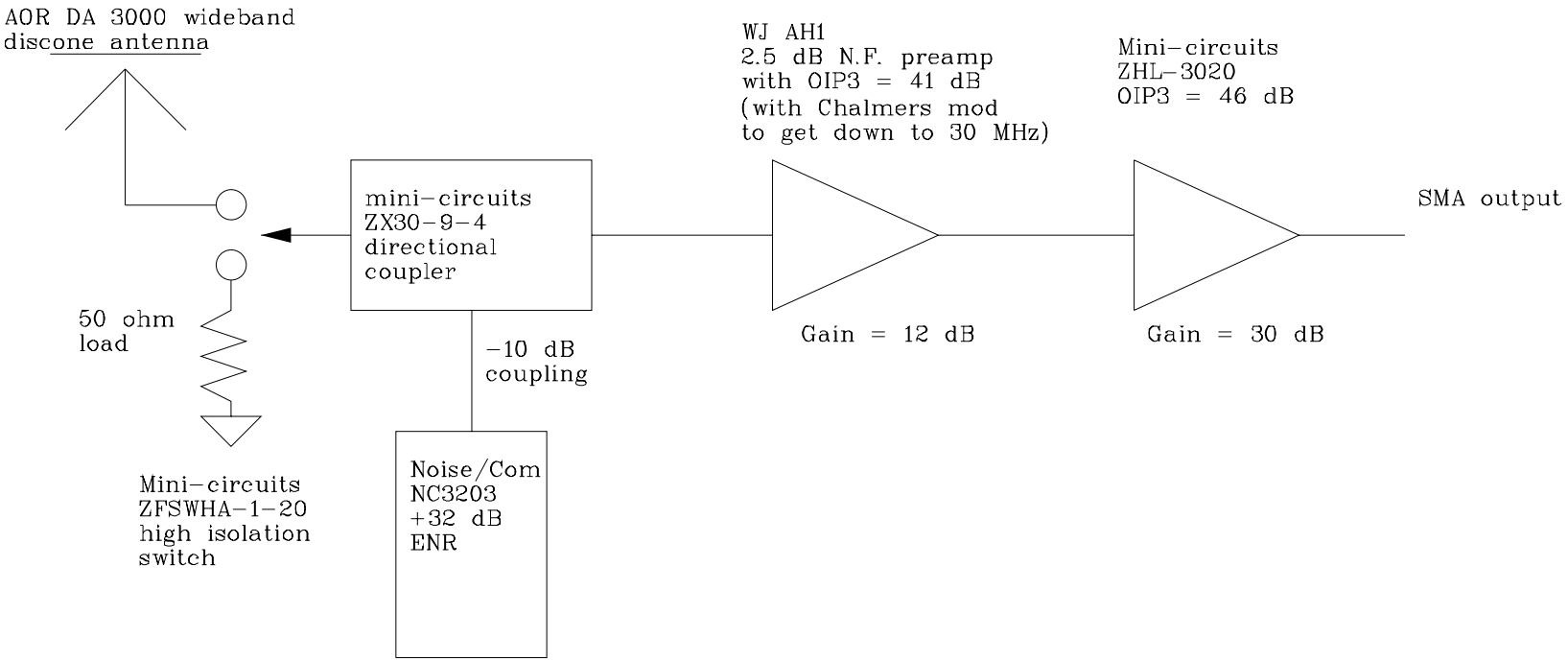
From: Alan E.E. Rogers

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.

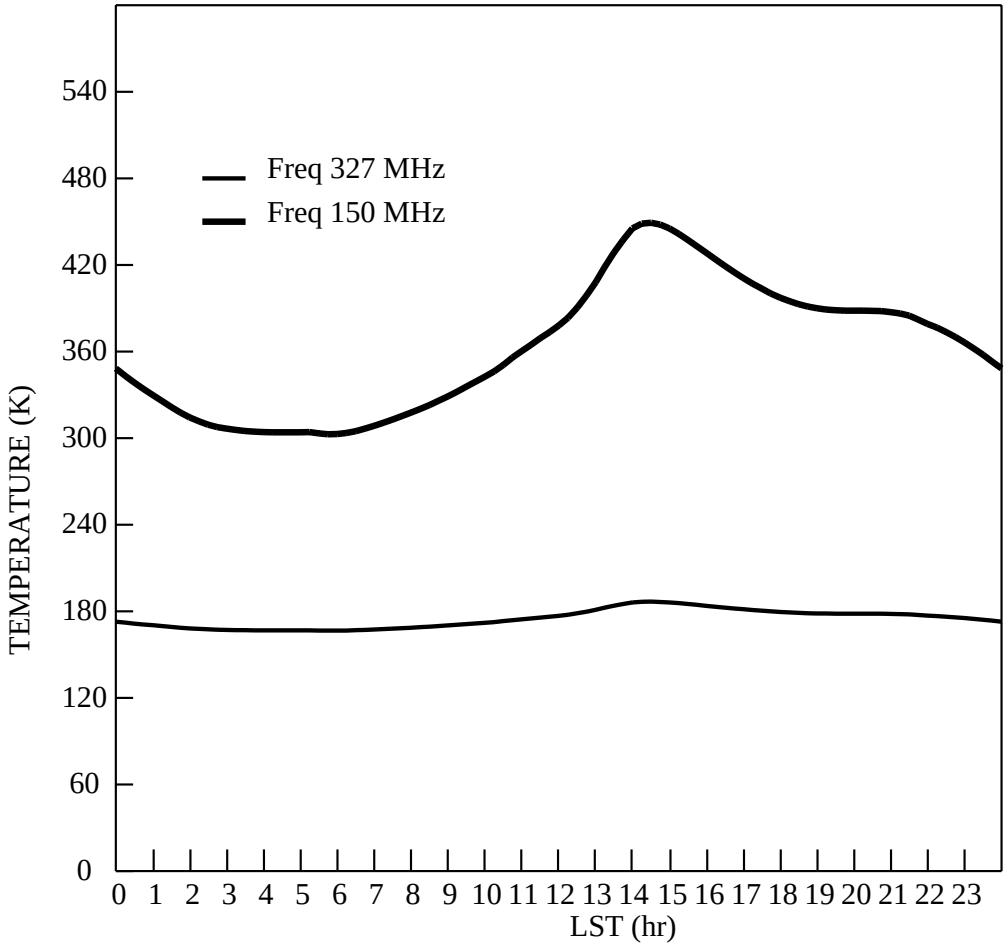
A good test of how well we are doing might be to measure the antenna temperature in the 150 MHz radio astronomy band. I show the expected antenna temperature for a vertical dipole (without ground plane) in Figure 2. I would expect that there will be even more variation of temperature with LST using patterns 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
J. Salah
D. Smythe



RFI monitor preamp and calibrator

AEER precal 18 Aug 04


Freq 327 MHz
Freq 150 MHz
TEMPERATURE (K)
0
60
120
180
240
300
360
420
480
540
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
LST (hr)