

**MASSACHUSETTS INSTITUTE OF TECHNOLOGY
HAYSTACK OBSERVATORY
WESTFORD, MASSACHUSETTS 01886**

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*Telephone: 978-692-4764
Fax: 781-981-0590*

To: RFI Group

From: Alan E.E. Rogers

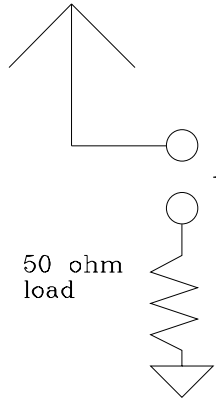
Subject: RFI monitor preamp and calibrator

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 of 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

AOR DA 3000 wideband
discone antenna



50 ohm
load

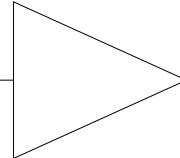
Mini-circuits
ZFSWHA-1-20
high isolation
switch

mini-circuits
ZX30-9-4
directional
coupler

-10 dB
coupling

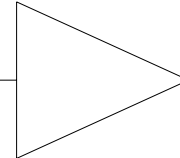
Noise/Com
NC3203
+32 dB
ENR

WJ AH1
2.5 dB N.F. preamp
with OIP3 = 41 dB
(with Chalmers mod
to get down to 30 MHz)



Gain = 12 dB

Mini-circuits
ZHL-3020
OIP3 = 46 dB



Gain = 30 dB

SMA output

RFI monitor
preamp and
calibrator

AEER precal 18 Aug 04

