DEUTERIUM ARRAY MEMO #037

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To: Deuterium Array Group

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Subject: Performance of dual polarization 5×5 station array

1] Configuration

The array is located in the field west of the Westford antenna and is pointing at the zenith. The upper dipoles are connected to computer d00a and are oriented NW-SE while the lower dipoles are connected to computer d00b and are oriented NE-SW.

2] Motherboard temperatures

The box is cooled with 2 upper fans and a large high velocity fan (5000 cfm) underneath the box. Typical temperatures are as follows

Computer	Motherboard	CPU	Ambient	Conditions
d00a	48	68	30	Summer day
d00b	48	*	30	"
d00a	35	60	20	Summer night
d00b	35	*	20	"
*sensor not working				

3] Phasing on the Sun

Both polarizations were phased on the Sun. Typical values for the normalized beam powers at the Sun's maximum elevation (on 3 Aug 03) were 6 for each polarization.

4] System temperature

The system temperatures were obtained by observing the total power of the phased-up boresight beam (zenith beam) vs sidereal time. The total power is compared with the sky model using a least squares fit to determine the receiver noise. The power peaks at the transit of Cygnus. Typical results are as follows.

	Observed		model			
Computer	T_{max}	T_{min}	T_{max}	T_{min}	Estimated receiver	Data
d00a	150	75	112	30	31	3 Aug 03
d00b	165	85	112	30	44	3 Aug 03

5] Pulsar 0329+56

The pulsar 0329+56 is observed each day. It provides a check on the phasing and a measure of the frequency error of the internal 40 MHz crystal oscillator. Typical results are as follows:

Computer	Data	Average power	Frequency error
d00a	01 Aug 03	6.7e-03	-6e -6
d00b	01 Aug 03	5.0e-03	-6e -6

6] RFI leakage from receiver box

Channels 22 and 23 of d00b are connected to an active antenna placed about 1 foot below the receiver box. Typical receiver leakage as follows:

Channel	Frequency	Leakage	Data
22	327.456	1e-02	3 Aug 03
23	327.456	1e-02	3 Aug 03

7] RFI

After filtering the data to remove transient events the only RFI source which shows up in long integrations (approx. 100 days effective) of the sum of all 24 channels is a signal at 327.308 MHz which may originate at Westford since it is also present in the RFI monitor yagi pointed at Westford. The level is about 2e-4. There is no hint of this signal in the zenith pointing beam, but the integrations are not long enough to reach levels below about 1e-3.