DEUTERIUM ARRAY MEMO #016

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To: Deuterium Array Group

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Subject: Preliminary receiver gain settings and measurements

Preamp gain 25 dB
Analog receiver gain 72 dB (receiver input to A/D input)
GC digital gain 0.76 × ½ = -8dB (250 kHz BW) (see note 3)
FFT gain 32 = 30 dB (for sine wave)

Full scale rms analog output = 4 dBm
Full scale rms digital output = 22,000

Maximum in band signal into receiver for onset of FFT output saturation at 32,000 = -90 dBm

Receiver input	Equivalent preamp input	Signal	FFT output Notes 1,2	Comments
-90 dBm	-115 dBm	Sine	28,000	Sat. level
None		Receiver noise	82	Recvr. Noise
-86 dBm/250 kHz	1920 k	Noise	1325	Sim. Solar noise
-101 dBm/250 kHz	60 K	Noise	234	Galactic noise
-130 dBm	-155 dBm	Sine	300	

Total gain (including preamp) with respect to unit output from FFT is 205 dB.
1K input to preamp = (FFT output)^2 of 1000

Notes:
1] For sine wave FFT output is mostly in 1 channel (or 2 if not centered on a channel). For a sine wave the FFT output listed is peak. For noise the FFT output listed is the average of the 1024 fine spectral channels.
2] Average total power output ≈(av_FFT_output)^2×1024
3] Digital gain includes 6 dB digital mixer loss.

Image rejection receiver tuned to 327.4 MHz

Rejection dB	Input freq. MHz	IF freq
52	226.6	50.4
60	346.6	69.6
67	306.6	29.6

Other significant responses

Rejection dB	Input freq. MHz	IF MHz
85	287.4	10.4
90	266.6	10.4
>60	Outside 250 kHz bandpass.	Note 1
>90	Outside 50 MHz IF.	Note 2

Notes:
1] within 5 MHz of 327.4 but outside 250 kHz bandpass
2] more than 5 MHz from 327.4 MHz but away from listed images.

Spurious signal level

$< 6 \times 10^{-3}$ K referred to preamp input.

Temperature coefficient of frequency (due to change in VC×O with constant voltage)

≈ -70 Hz/°c at 327.4 MHz