

NATIONAL RADIO ASTRONOMY OBSERVATORY

MEMORANDUM

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From: W. Brundage *WDB*

Subj: Draft Specifications for a Proposed RFI-Cancelling Pulsar Spectrometer

These draft specifications were discussed on 3 September 1981 by J. Taylor, M. Damashek, R. Fisher and W. Brundage. -I hope I correctly cover the important topics.

Time resolution:

0.1 to 2 millisec  $\Delta\tau$ .  
 $\mu$ s resolution is useful only at Arecibo.

Total instantaneous bandwidth:

20 to 30 MHz is necessary.

Up to 100 MHz useful, but only if front-end does not overload or produce detectable intermodulation products.

Frequency resolution:

10 to 100 kHz  $\Delta f$ .

Channel-to-channel isolation:

20 to 30 dB center to center of adjacent channel.  
40 to 60 dB center to center of  $\pm 2$ ,  $\pm 3$ , ... channels.

Dynamic range:

$\geq 30$  dB pre-detection.  
 $\geq 10$  dB post-detection.

Dual polarization:

Split into 2 banks for 2 polarizations.

Sum identical frequencies in 2 polarizations.

De-dispersion:

0 to N ( $\Delta\tau$ ) both non-inverted and inverted frequency spectrum,  
where N ( $\Delta\tau$ ) = ? ...

Dispersion searching:

Data tap for sum of 8  $\Delta f$  to 16  $\Delta f$  after impulse blanking and  
after spectral (channel) blanking.

Impulse blanking:

Each channel blanks time-domain impulse RFI by selectable criteria  
which do not blank pulsar.

Spectral blanking:

Each channel blanks "continuous" spectral feature by comparison to  
adjacent channels per selectable criteria which do not blank desired  
spectral lines.

Amplitude calibration:

Pulsed noise calibration controlled by spectrometer.

Input IF frequency range:

50-500 MHz.

Output:

Direct to Modcomp for direct tape writing and/or further processing.

Possible implementation:

Filter bank; 256 x 100 kHz/2 (128 x 100 kHz).

Time-domain signal-micro-processor on each channel.

Mini-computer spectral/time-domain/control processor;  
equivalent/compatible to Modcomp II.

WDB/cjd