

NATIONAL RADIO ASTRONOMY OBSERVATORY

MEMORANDUM

January 15, 1982

To: J. Granlund
Pulsar Spectrometer File

From: W. Brundage *WDB*

Subj: Interference Characteristics

A description of RFI characteristics which will affect the performance of any pulsar spectrometer may help your study. A digital FFT type spectrometer will have to handle RFI without disturbing:

1. The non-interfered portion of the frequency spectrum in the case of discrete frequency (narrow-band) RFI.
2. The non-interfered portion of the time-domain in the case of wide-band pulsed RFI.

The dominant parameters to be determined appear to be:

1. The minimum number of bits required at each FFT stage, and
2. The minimum required speed of each FFT stage

which are necessary to achieve the spectrometer specifications under three conditions:

1. No RFI is present.
2. Any of the types of RFI are present, and
3. Two types of RFI are present.

The tentative spectrometer specifications are in Rich Lacasse's memo of November 16, 1981, which is attached.

It would be helpful also to investigate methods to detect and blank RFI.

WDB/cjd

Enclosures

Narrow-Band RFI Specs
Radar RFI Specs
Wide-band RFI Specs
R. Lacasse memo of 11/16/81

Copies to:

M. Balister
R. Lacasse
R. Fisher

CHARACTERISTICS: NARROW-BAND RFI

Sources	Intermittent voice and telemetry (rare) communications, oscillating TV boosters.
Center frequency	Equally probably anywhere within the spectrometer pass-band.
Bandwidth	1 Hz to 100 kHz, depending on modulation.
Time duration	0.5 to 200+ sec.
Time duty cycle	1 to 90%.
Power ratio of RFI to system noise	0 to 50+ dB in 100 kHz noise bandwidth.

CHARACTERISTICS: RADAR RFI

Sources	Aircraft, fixed, Pave-Paws OHR, etc.
Pulse period	1 ms to 100 ms.
Pulse width	1 μ s to 1 ms.
Bandwidth	5 MHz to 15 MHz.
Duration of RFI	1 s to hours; usually minutes.
Power ratio of RFI to system noise	0 to 50 dB in 100 kHz noise bandwidth.

CHARACTERISTICS: WIDE-BAND RFI (bandwidth > 30 MHz)

Pulse burst RFI

Sources	Power line, AC relay arc.
Period of pulse bursts	8.33 millisec.
Number of pulses in each burst	1 to ~ 50 pulses.
Duration of each pulse within each burst	10 μ s to 6 ms.
Duration of each burst	10 μ s to 6 ms.
Duration of RFI	6 ms to hours.
Power ratio of RFI to system noise	0 to 50 dB in 100 kHz noise bandwidth.

Single pulse RFI

Sources	Ignition, electric fence, DC arcs.
Period of pulses	20 ms to ∞ ; variable to random.
Duration of pulse	10 μ s to 1 ms.
Duration of RFI	10 μ s to hours.
Power ratio of RFI to system noise	0 to 50 dB in 100 kHz noise bandwidth.