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To: RFI Group
From: Alan E.E. Rogers

Subject: Development of sensitive compact RFI/EOR monitor

In my opinion there is a need to develop a sensitive spectrum monitor to evaluate the interference threats to Radio Astronomy and potential sites for new instruments. Current RFI measurements are not sensitive enough to completely evaluate currently proposed sites. A sensitive portable monitor could be made to rapidly evaluate the RFI in the 80 to 250 MHz region considered important for EOR observations. In addition the monitor could be used to measure the EOR “Global step” or to set limits on its existence. I propose a monitor that would fit in a 23”×20”×8” case weighing under 50 lbs for easy transport as checked baggage.

The monitor whose concept is shown in Figure 1 would consist of the following:

- 1] Broadband “Fourpoint” (Suh et al.) antenna made of parts which can be bolted together on site.
- 2] Active LNA for antenna and output balun.
- 3] Post amplifier and filter
- 4] Direct sample FPGA spectrometer with 100 ms
- 5] RFI shielded box for electronics, laptop and batteries.

Proposed specification

Frequency coverage	80-250 MHz
Spectral efficiency	> 90%
Frequency resolution	1 kHz
Smoothness of response	< 1 mK after removal of 7 th order polynomial
Receiver noise	< 30 K (Sky noise dominant)
Antenna response at horizon with antenna on ground pointed at zenith	< -20 dBi
Antenna response at horizon with antenna pointed at horizon	> 5 dBi

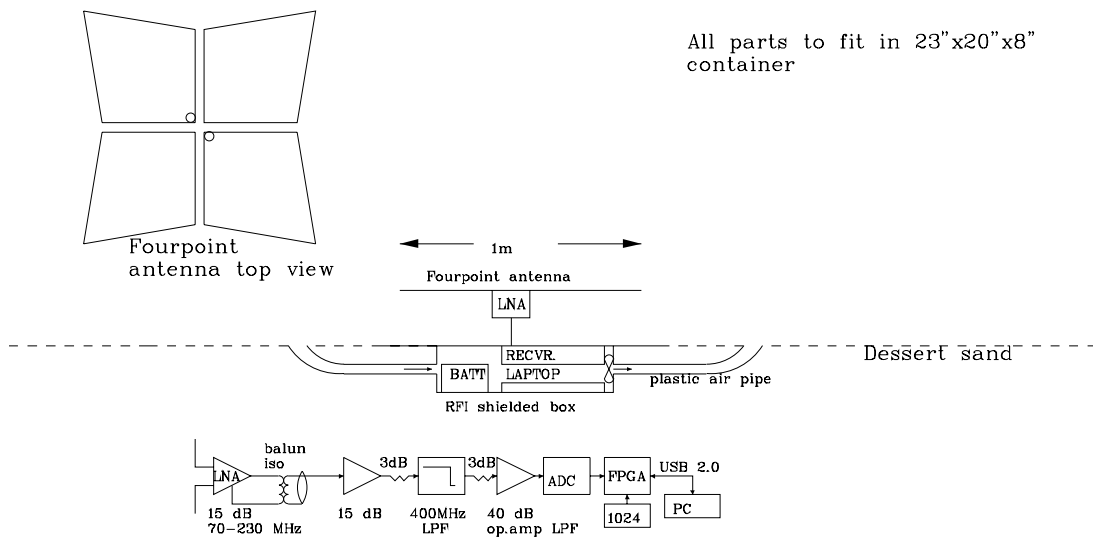
Size All parts to fit in a 23”×20”×8” case

Field assembly time <30 min

Operation time > 12 hr
 On single charge (no limit if power and fiber available)
 Battery recharge < 1 hr

References

Seong-Youp sub. Et al, IEEE Antennas and Propagation Symposium 2005, pt-2A, p487-90. vol. 2A.



All parts to fit in 23"x20"x8" container

- Notes: 1] 0.6m x 0.1m dipole 0.2m over ground or fourpoint antenna
 2] Antenna is on ground to avoid ground reflections and minimize antenna response at horizon
 3] All structures from which reflections could originate are either very close or very distant and small in angular size in order to avoid any instrumental response which changes rapidly with frequency.

Compact RFI & EOR recvr.
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