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To: Larry D'Addario/VLBA Acquisition Group
From: Alan E.E. Rogers
Subject: Reasons for not separating the Formatter from the IF to baseband conversion electronics

It has been argued that analog and digital electronics should be in separate racks but, if certain precautions are taken analog and digital electronics can certainly be placed in the same rack. If we assume that the following:

1) All sensitive analog electronics are packaged in shielded R. F. boxes (sub-modules) with good quality filter feed-thrus for power and control lines.

2) Power supply voltages for analog electronics are well filtered from digital signals and power supply switching signals by the judicious use of filters and in some case "on board" regulation.

3) Modules which are mostly analog (i.e. baseband converters) are packed in VLA shielded modules.

4) Digital electronics is packed in a separately shielded section with filtered power lines to minimize the RFI leaking out.

5) Rack is divided into analog bins (VLA bins) and digital sections.

6) Rack back-plane wiring is arranged with the following precautions:

a) Power to each module is derived directly from source with individual wires (i.e. wires are not run in string from one module to another so that a heavy power consumer might influence the voltage seen by another module in the string).

b) I.F. and video coax cables are routed away from wiring which carries high level signals.

Then I don't expect we will experience any problems with contamination of the I.F. or video with digital or power supply switching signals. If we put

the baseband converters and Formatter in the same rack we will preserve the simple interfaces given in the project book - if not, we will have to either cable 16 video signals to the A/Ds or cable 32 high speed digital outputs from the A/Ds to the formatter as well as feeding the sampling signal in the opposite direction. In the first case we are likely to encounter the following problems:

- 1) Pick-up of 60 Hz and harmonics.
- 2) Pick-up of noise is especially bad in the video frequency range 1 KHz - 8 MHz.
- 3) Bulky cabling and connectors (16 twinex, SMA, BNC or triax connectors at each end?).

In the second case we have the following problems:

- 1) Cable lengths will effect the correct clocking of signals into the formatter.
- 2) A strong, fast risetime signal - namely the sample clock will have to be transmitted from one rack to another.
- 3) If balanced signals are used at least 64 wires will be needed.