

RFI TIGHT MODULES AND ENCLOSURES FOR THE EVLA PROJECT

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The EVLA Project expands the operating range of the present VLA receivers to cover frequencies from 1 to 50 GHz. This enhancement increases the antenna's susceptibility to internal and external Radio Frequency Interference (RFI). Also, the baseline plan moves the samplers, the digital transmission system, and the monitor and control ethernet switches into the vertex room of each antenna. These requirements necessitate the use of RFI-tight enclosures for all analog and digital electronics.

Astronomical data will be sampled using four sets of 4-GHz and 1-GHz digital samplers. These samplers will provide high-speed parallel data to the Digital Transmission System (DTS) operating at 10 Gigabits/second. The digital clock rates and signal levels present a strong interference source. Successful shielding was obtained by building a double wall aluminum enclosure. Each set of samplers and DTS circuit cards are placed in a 10" x 6" x 20" module enclosure. This enclosure has ½-inch thick brass honeycomb air filters on the top and bottom. Four of these module-enclosures are placed in an RFI tight bin. The bin also has multiple 1-inch thick brass honeycomb air filters on the top and bottom. Two-inch thick RFI absorbing foam sheets line the bin, and RFI gaskets are used between the modules and the bin. The resulting enclosure provides over 90dB of shielding from 0.2 GHz to 20 GHz, and provides refrigerated airflow through each module.

The monitor and control enclosure-shielding requirement is less demanding since the selected commercial ethernet switch clock rate is lower. Preliminary test data indicates the switches radiate from 0.5 to 6 GHz. Additionally, fifty fiber pairs are required to interconnect the switches to the antenna modules. Although the optical connectors can be installed and polished in the field, it would be preferable to use pre-manufactured cables. To accommodate the fiber-optic cables, ten ½" diameter by 12" long wave-guides were installed in the top of the enclosure. Honeycomb air filters, RFI foam and gaskets are used in this enclosure. This enclosure provides over 90 dB of shielding from 0.1 to 8 GHz.

Performance details of these enclosures will be presented during the presentation, along with cost information.