

## VLA/VLBA Interference Memo No. 27

### **Memorandum**

From: Chris Patscheck

Subject: L-Band Shielding Characteristics Of Several Areas of the VLA Site

Date: August 12, 2002

On August 7, 2002 a number of tests were conducted around the VLA central site in an effort to characterize the shielding of as many areas with possible RFI problems as possible. The results from these tests are valuable not only because they directly give the shielding of a number of areas at the VLA, but also because the measurements taken may be applied to similar areas elsewhere. L-band shielding measurements were taken at the following locations: the tech services building, the antenna barn, the ALMA web-cam and weather-station tower, the ALMA contractor trailer, the control room, the electronics room in the C.B., and the first floor of the C.B. From this list of shielding in given areas, the shielding of many other areas around the site may be extrapolated due to similarities in architecture. Additional tests are planned to characterize other unique areas at the VLA such as the pedestal room and the storage building. The results from the shielding tests are recorded below, all results are indicative of architectural shielding from the vantage point of active equipment in the areas listed.

#### **Tech Services Building:**

From inside of the machine shop, approximately 15dB of shielding was present. From in front of the offices to the North, approximately 25dB of shielding was seen, with nearly equivalent results from the vending area. The weakest point in terms of the shielding of this building were the double doors facing North with about 5dB shielding, and the windows with no apparent shielding. All equipment at normal locations (in an office or within the machine shop) within the building may be assumed to have 15dB of architectural shielding.

#### **AAB Building:**

With the large opening in the North face of the AAB, performing a shielding measurement for the AAB as a whole would be pointless. However, from within the offices at the AAB, approximately 20dB of shielding was found at L-band. This may seem a bit outrageous, but the small windows and metal shell of the building as well as screening of the windows may account for this large shielding effect.

#### **ALMA Tower:**

While shielding measurements were obviously not taken for the tower, a brief characterization was made of the tower's output. While the tower was not fully operational at the time of these measurements, this characterization may serve as a valuable reference to compare to the overall emissions of the tower when it is fully operational. Spurious emissions were found at 888MHz, 1.1GHz, and 688MHz.

**ALMA Contractor Trailer:**

Shielding measurements made at L-band for the contractor's trailer at the ATF indicated only 3dB of overall architectural shielding. This is about what was initially expected because of the all-wood trailer construction. Also, it is worth noting that while calibrated results were not found, some structured signals similar to those of other computers were seen while the contractor's computer and fax machine were turned on. The signals were not present with the devices turned off.

**Control Room (Op. Area):**

Further tests were performed to characterize the shielding at L-band of the operator's area in the control building, which seemed to agree with previous results. Shielding in this area tended to be about 15-20dB with the weakest areas being around the doors. Improvements of up to 5dB were still seen by latching the doors instead of letting the doors rest on the doorframe.

**Electronics Room (D-racks):**

The electronics room in which the D-racks currently reside showed no apparent architectural shielding. This is possibly due to the abundance of unscreened windows across the front portion of the room.

**Control Building (1<sup>st</sup> floor):**

The architectural shielding of the control building outside walls on the first floor showed less than 5dB of shielding. The doors in the rear of the building give almost 10dB of shielding when closed.

Further tests are currently being scheduled; the results will be published as soon as they become available. The results of all of these shielding tests will allow for the calculation of the impact, in terms of RFI, that any piece of equipment will have on the VLA during normal use. The shielding and known space loss values can be subtracted from the EIRP values gathered measurements done in the shielded chamber to give an absolute power estimate at any antenna in the array. These levels can then be compared directly to the harmful and/or detrimental levels given by the ITU handbook and the EVLA Hardware RFI Plan to determine necessary measures to reduce internally generated RFI problems.