

Shielding Tests

On July 31, 2002 tests were conducted to determine the radio frequency shielding characteristics of 2 locations at the VLA site, particularly at L-band. The two locations tested were the operators' area in the control building and the ALMA trailer. The same test setup was used in both locations with only minor differences. A Gigatronics Model 610 signal generator with a ridged horn 1-10GHz antenna was used to transmit a CW signal in the middle of L-band at 1435 MHz within the area of interest. An HP 70000 series spectrum analyzer with a 1-10GHz conical log spiral antenna was used to detect the signal. A simple calibration was performed to determine the level at which the CW signal would be seen with 0dB shielding at the proper separation distances. Then, with the signal being generated at 1435 MHz inside of the operator's area and the ALMA trailer, the spectrum analyzer and conical antenna were used to detect the signal at various locations outside of the enclosed spaces. Great care was taken to ensure beam alignment during these tests, as both antennas are highly directional.

The tests done in the operator's area in the control building suggested that the shielding present was between 15-20dB for L-band. Around the doors, shielding was greatly improved (~5dB) simply by closing the door fully, as opposed to not latching the door. The door area remained to be the weakness of the shielding of the entire area even when closed. Around the windows with full screening and solid walls, shielding appeared to be the greatest.

The tests done at the ALMA trailer showed shielding of, at most, 15dB. Typical shielding by the building's walls was about 10dB, while the windows were nearly transparent to RF as expected. There were some portions of the trailer walls that gave as much as 15dB when not near windows, doors, and other openings. Also worth noting, there were portions of the windows which had wire screening installed. These gave as much as 5-10dB of apparent shielding when the effects of the other portions of the window opening were minimized by placing the Tx and Rx antennas directly on either side of the screened portion of the window.

The only tests that were conducted were in L-band. This was due to the high interest in L-band shielding for computers which tend to radiate strongly across the entire L-band frequency spectrum. Shielding near L-band should be similar with slightly less effectiveness in higher frequency bands. Further tests will need to be conducted to further quantify the overall RF shielding characteristics of these two areas.

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