

VLA-VLBA Interference Protection Memo #37

VLBA-PT Station Building Shielding Test Report

Dan Mertely, Charlie Barham
20090602

Abstract

Measurements of the VLBA-PT station building shielding from 3 rooms at 4 frequencies are described and compared to the 1987 test results documented in VLBA Test Memo #596.

1. Test Results Summary

The VLBA-PT station building shielding from room 100 (the Site Technicians' work room), in the direction of the VLBA antenna, varied from around 10 dB at 100 MHz to around 37 dB at 900 MHz. The room 103 shielding (the future DBE room) varied from around 20 dB at 100 MHz to around 40 dB at 900 MHz. The room 104 shielding (the LO/IF/MASER room) varied from around 18 dB at 100 MHz to around 30 dB at 900 MHz

The results from these tests were significantly poorer (typically 20-30 dB worse) than those obtained by Oty, et. al. in 1987 (as documented in VLBA Array Memo # 596).

2. Test Description

The 2009 test procedure closely followed that of Jim Oty as documented in VLBA Array Memo #596, in order to allow for results comparison. An "omni-directional" transmitting (TX) antenna was placed near the center of each of the 3 rooms tested. A synthesizer was used as a CW transmit test signal, set to 100, then 300, then 600, then 900 MHz. The 50 foot distance from the TX antenna to each of the proposed receiving positions was measured-off, and a directional receiving (RX) antenna and spectrum analyzer were set-up to record power levels at each of the 3 frequencies. At the initial test position (330 degrees), an initial calibration test with the Station Building door open was performed. All other measurements were made with the door closed. The calibration power level was taken with the TX and RX antennas in line-of-site (LOS) of each other. Shielding values were derived by subtracting the initial open-door cal power taken at all 4 frequencies from the recorded power levels for each of the other receiving positions.

The RX antenna used was a commercial, 200 – 1000 MHz conical log spiral, mounted at 4 feet above the ground on a non-metallic tripod. The TX antenna used was a commercial, 30 – 900 MHz wire discone antenna mounted 4 feet above the Station Building floor on a non-metallic tripod in each of the 3 rooms tested. The following standard cables were used for the test:

9 ft Tensolite 0.25 inch diameter: RX antenna to spectrum analyzer receiver.
7.7 ft Tensolite 0.25 inch diameter: TX antenna to synthesizer transmitter.

The receiver used was the LOIF, "D-rack room" Agilent ESA4407B spectrum analyzer. The transmitter used was a surplus, Rhode & Swartz SML02 synthesizer.

3. Data Collected

Hand recorded power levels at all 4 frequencies at each of the RX and TX positions.

The emissions test data files, the spreadsheet analysis of the files, and this test report file are located at: <\\filehost\evla\techdocs\RFI\pt-sb-shielding\20090602>.

4. Data Analysis

For each of the 3 rooms tested, and each of the RX positions, Shielding values were derived by subtracting the initial open-door calibration power taken at all 4 frequencies from the recorded power levels for each of the other receiving positions.

5. Detailed Data Presentation

The test diagram, taken from VLBA Array Memo #596 is presented as **Figure 1**.

The VLBA-PT station building shielding from room 100 (the Site Technicians' work room), in the direction of each of the RX positions is presented in **Figure 2**. The 1987 results are displayed in **Figure 3**.

The VLBA-PT station building shielding from room 103 (the future DBE room), in the direction of each of the RX positions is presented in **Figure 4**. The 1987 results are displayed in **Figure 5**.

The VLBA-PT station building shielding from room 104 (the LO/IF/MASER room), in the direction of each of the RX positions is presented in **Figure 6**. The 1987 results are displayed in **Figure 7**.

Chart Descriptions:

Figure 1: Test diagram, taken from VLBA Array Memo #596.

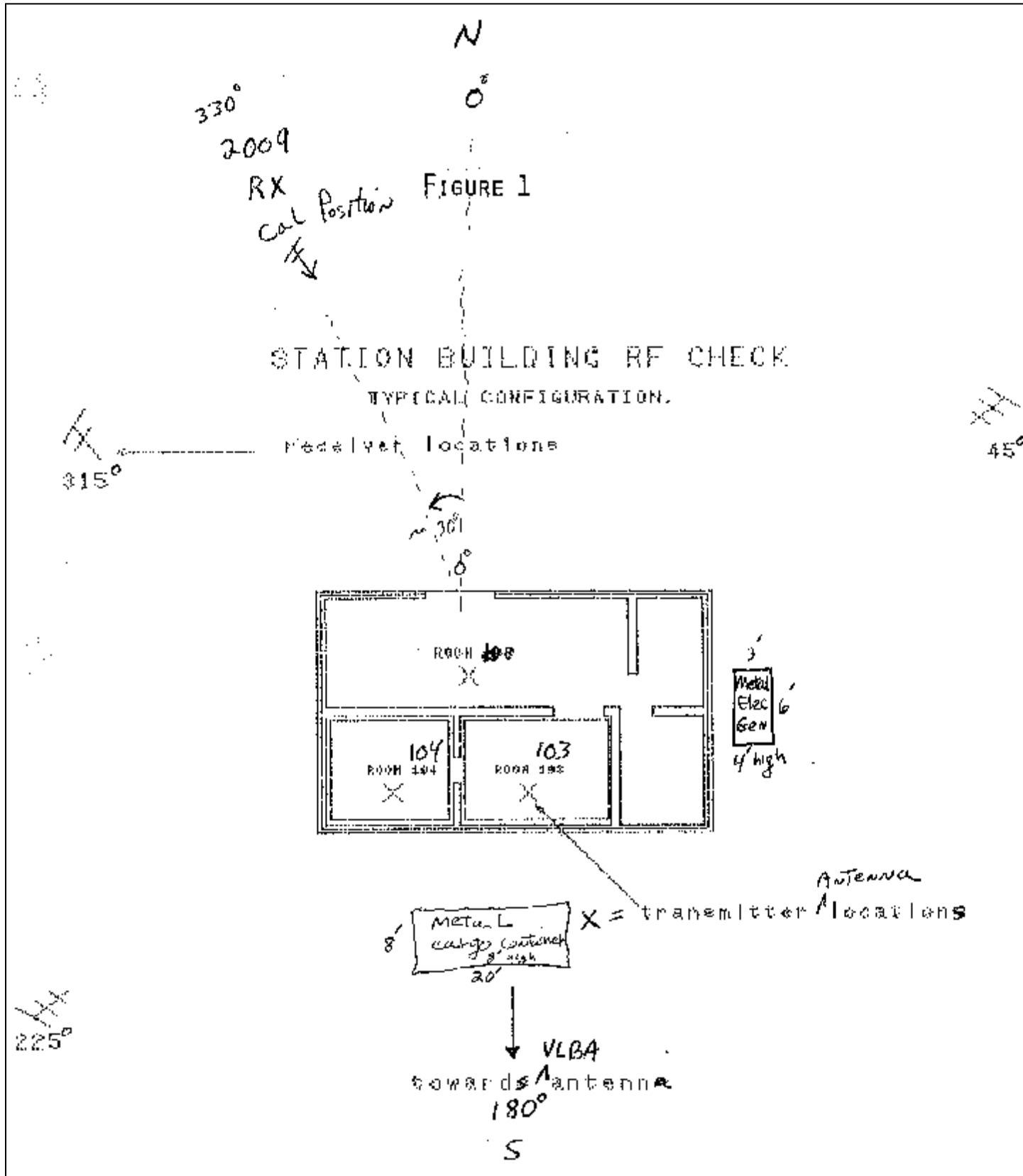


Figure 2: The VLBA-PT shielding from room 100 (the Site Technicians' work room), in the direction of each of the RX positions.

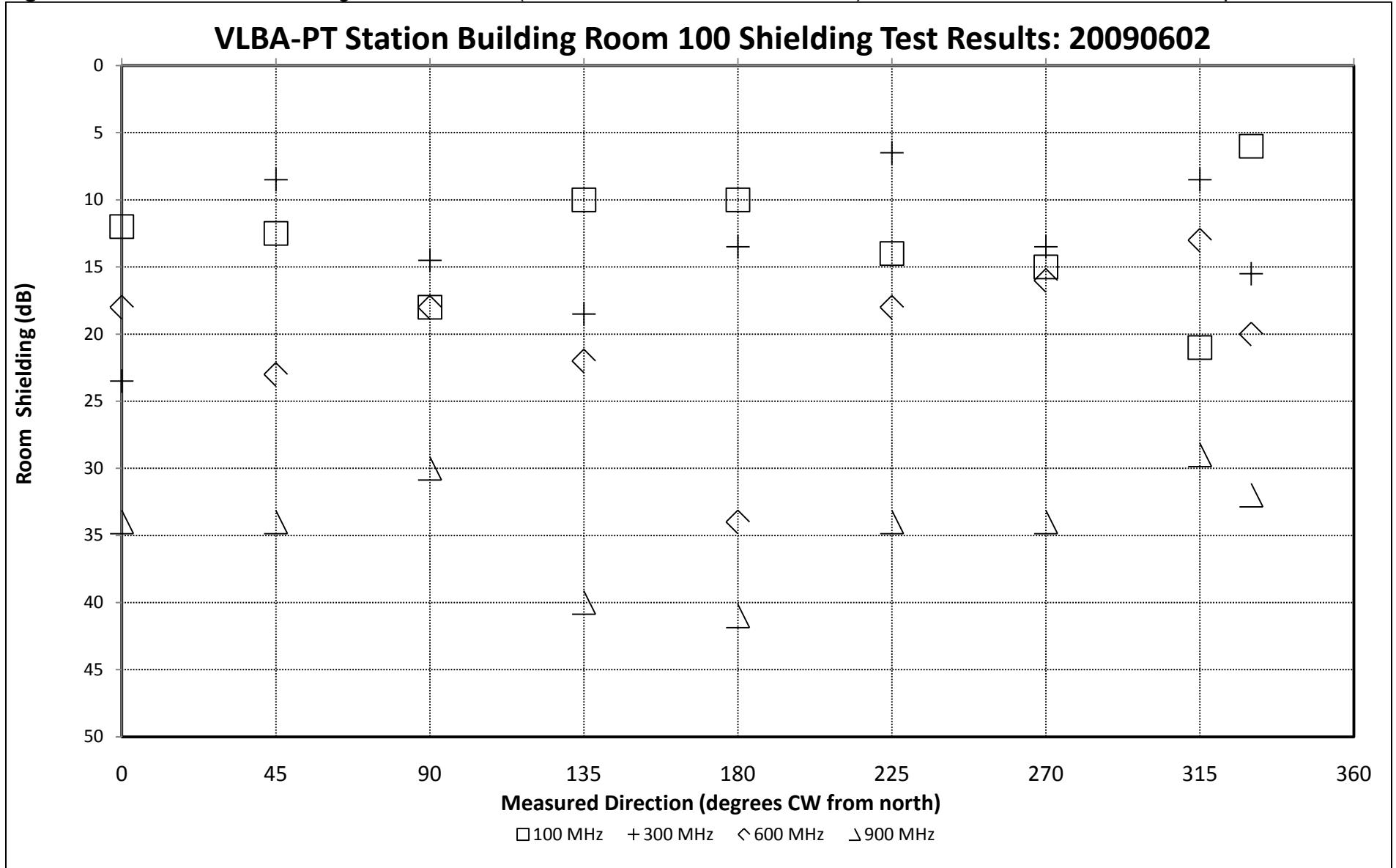


Figure 3: The 1987 Room 100 results.

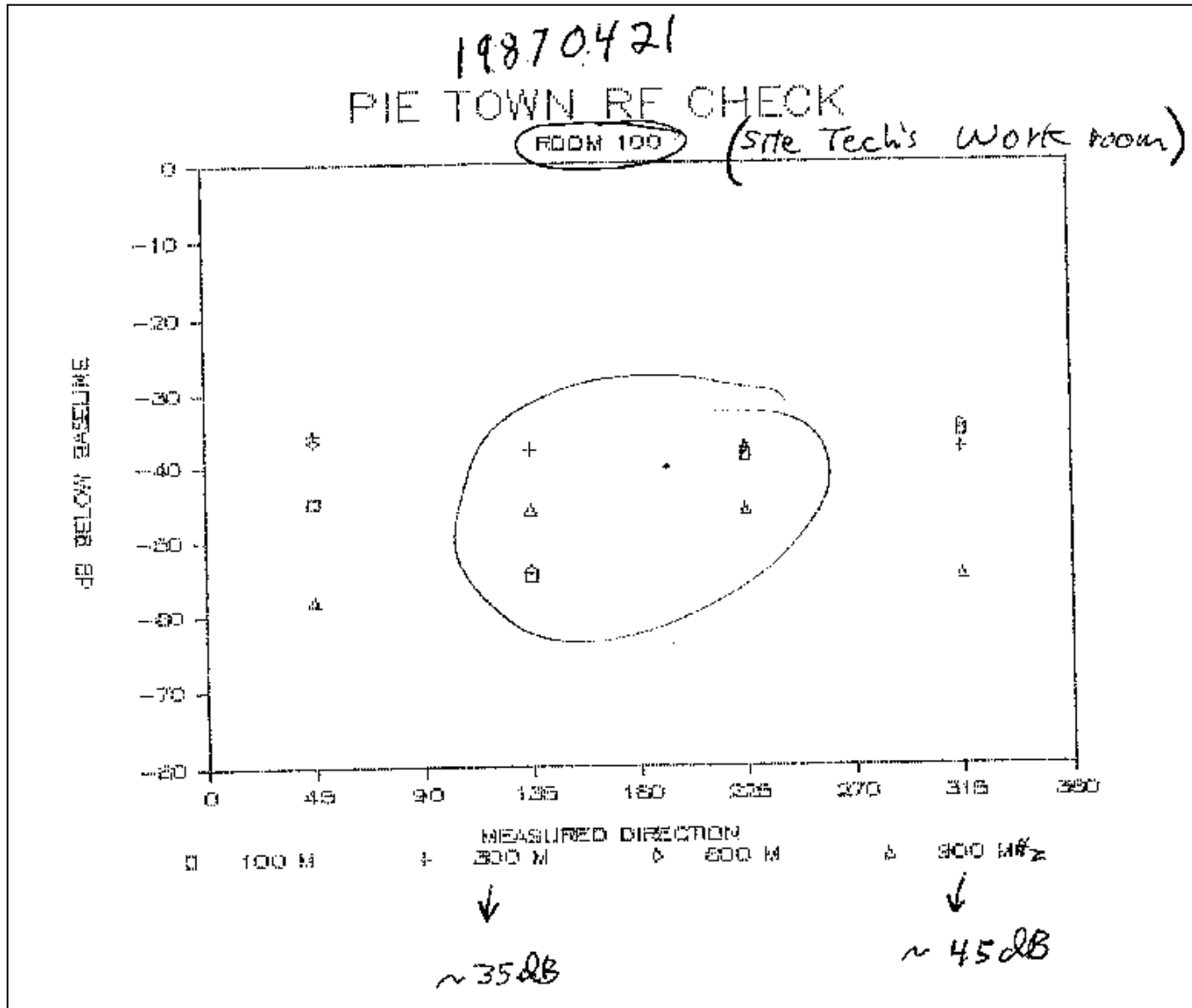


Figure 4: The VLBA-PT shielding from room 103 (the DBE/Recorder room), in the direction of each of the RX positions.

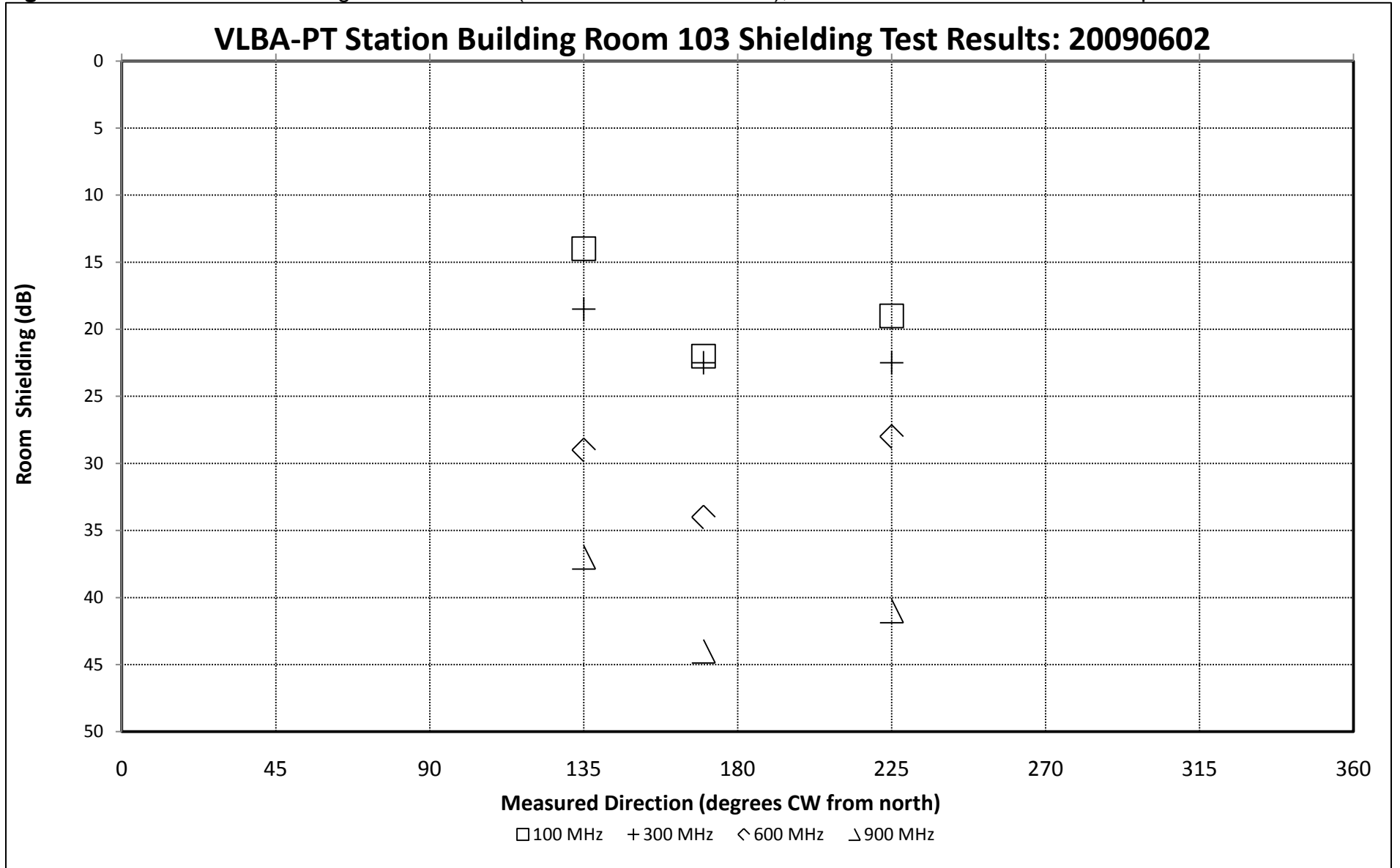


Figure 5: The 1987 Room 103 results.

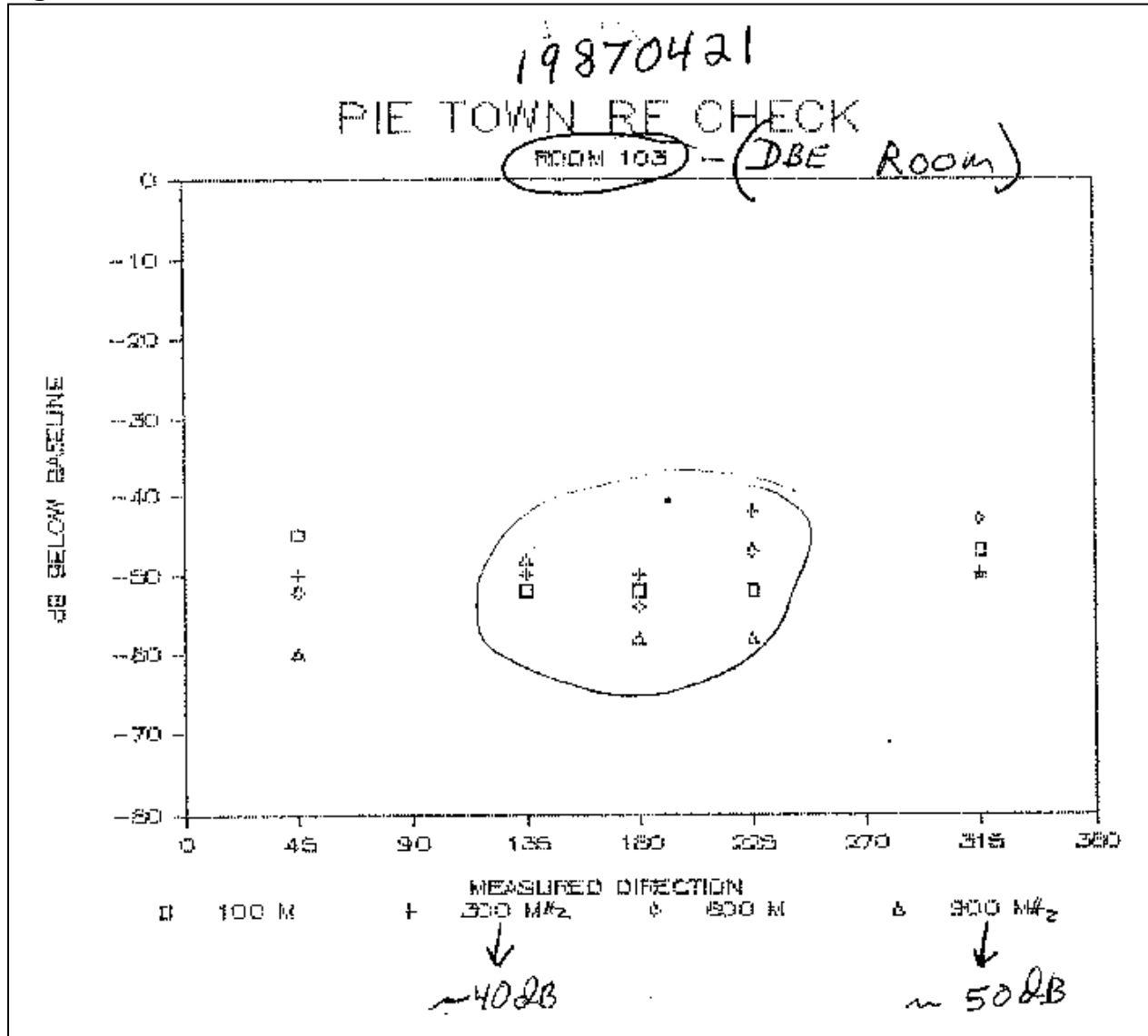


Figure 6: The shielding from room 104 (the LO/IF/MASER room), in the direction of each of the RX positions.

