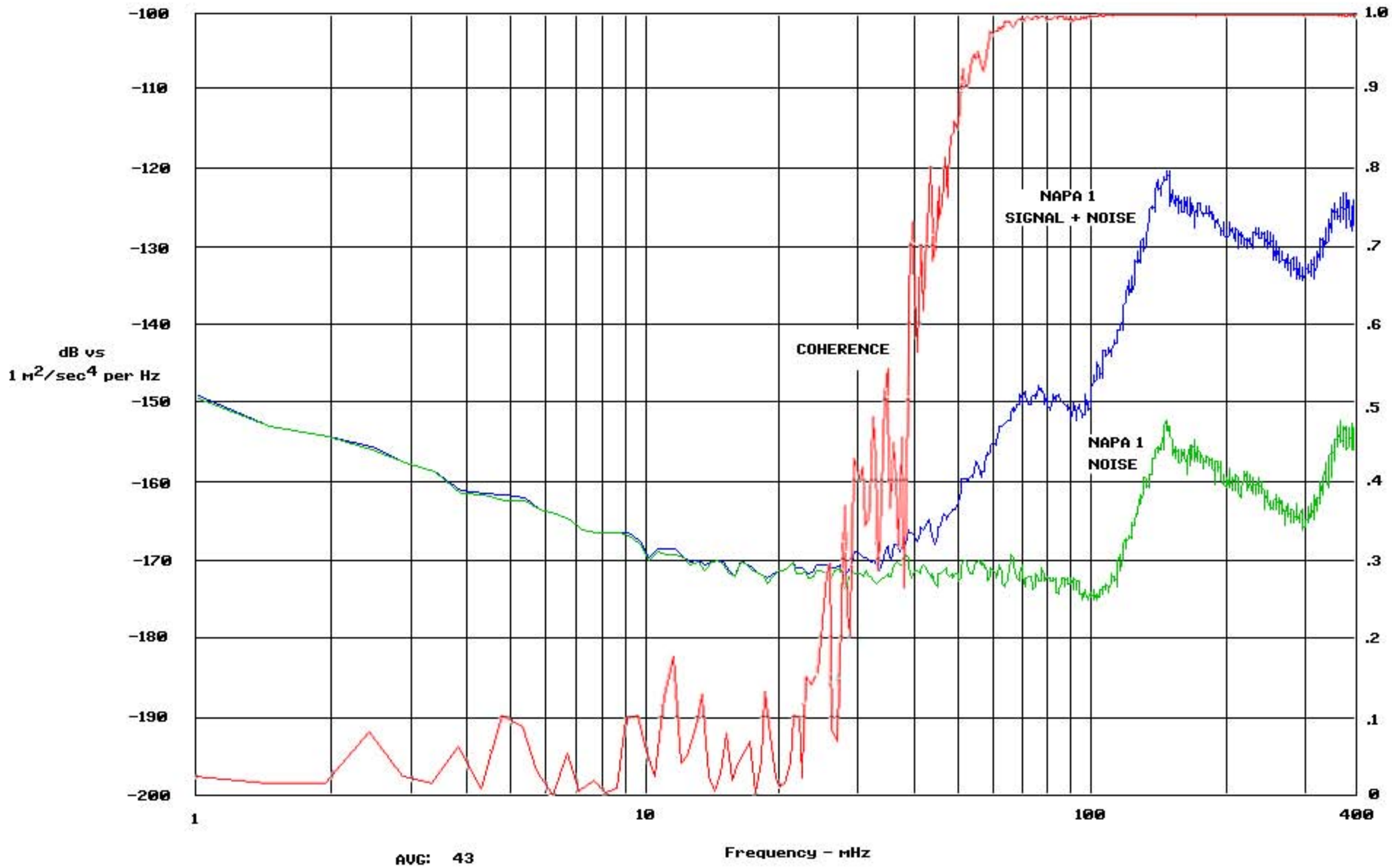
NAPA 1 NOISE COHERENCE TECHNIQUE

dB vs 1 m^2/sec^4 per Hz

Date: 10-03-11 Time: 07:56:00 PM

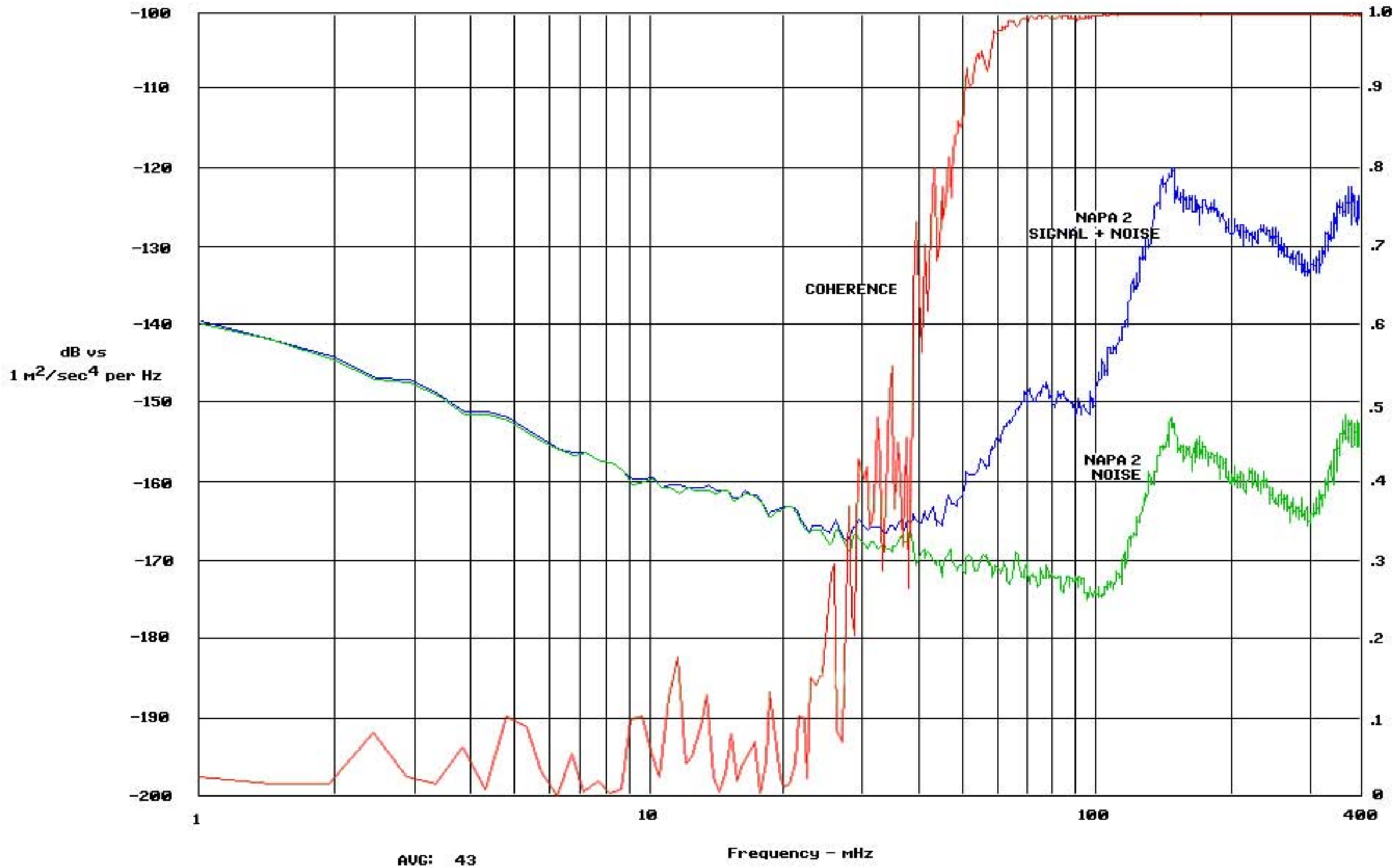


AVG: 43

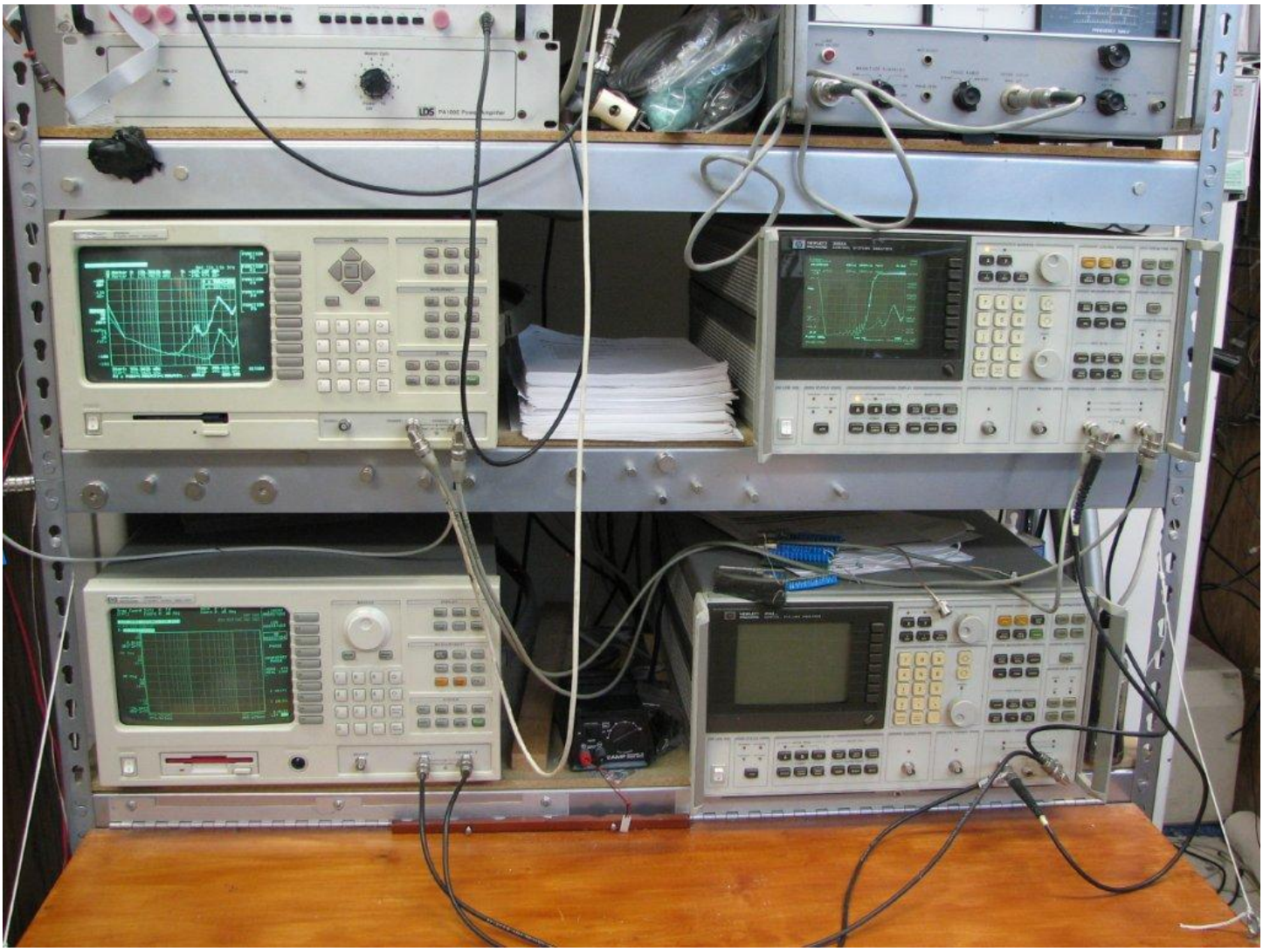
NAPA 2 NOISE COHERENCE TECHNIQUE

dB vs 1 m^2/sec^4 per Hz

Date: 10-03-11 Time: 07:56:00 PM



AVG: 43


LDS

Constants and formulas used in 35660 noise measurements of prototype seismometers Napa1 and Napa2
31 Sept., 2011

Input #1 connected to Napa2 output
Input #2 connected to Napa1 output

PSD_1 = Power Spectral Density of voltage at input #1 V^2/Hz
PSD_2 = Power Spectral Density of voltage at input #2 V^2/Hz

COH = Coherence, γ^2, between inputs 1 and 2

K1 = 1
K2 = $K_g = 1.25*10^6$ Vs/m Generator constant
K3 = $\omega_0 = 2\pi * 0.02 = 0.12566\ sec^{-1}$ 50-second low corner
K4 = $2\zeta = 1.414$ 0.707 of critical damping

Deconvolution factor
2 poles at 0, 2 zeros at ω_0, damping = ζ
$F1 = (\omega_0 / j\omega)^2 + 2\zeta * \omega_0 / j\omega + 1$
F1 = (K3/JOM)*(K3/JOM)+(K3*K4/JOM)+K1

Plot
Acceleration PSD of deconvolved Napa1 (signal+noise)
$F2 = PSD_2 * (j\omega/K_g)^2 * F1 * F1$
F2 = PSD2*(JOM/K2*JOM/K2)*F1*F1

Plot
Acceleration PSD of deconvolved Napa1 noise
$F4 = (1 - \gamma^2) * PSD_2$
F4 = (K1-COH)*F2

or:

Plot
Acceleration PSD of deconvolved Napa2 (signal+noise)
$F3 = PSD_1 * (j\omega/K_g)^2 * F1 * F1$
F3 = PSD1*(JOM/K2*JOM/K2)*F1*F1

Plot
Acceleration PSD of deconvolved Napa2 noise
$F5 = (1 - \gamma^2) * PSD_1$
F5 = (K1-COH)*F3