



PROPERTIES OF ANTHROPOGENIC SEISMIC NOISE IN LIVINGSTON

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LSC Meeting @ Hanford August 16, 2001

Issues

- Spiky seismic noise 1 - 3 Hz band

related to human activity

coincident with transmission peak in test mass isolation stack

precludes interferometer lock during work day

Rayleigh surface waves: vertical/horizontal = 1.5/1, 200 - 300 meters/sec

worst at y end, appears as wide band noise through narrow band filter

- Most likely growing with epoch, tracking population

1988 LSU survey: not evident

1995 Rohay study: about 1/2 as large and 1/2 rate of today

need to include margin in fix

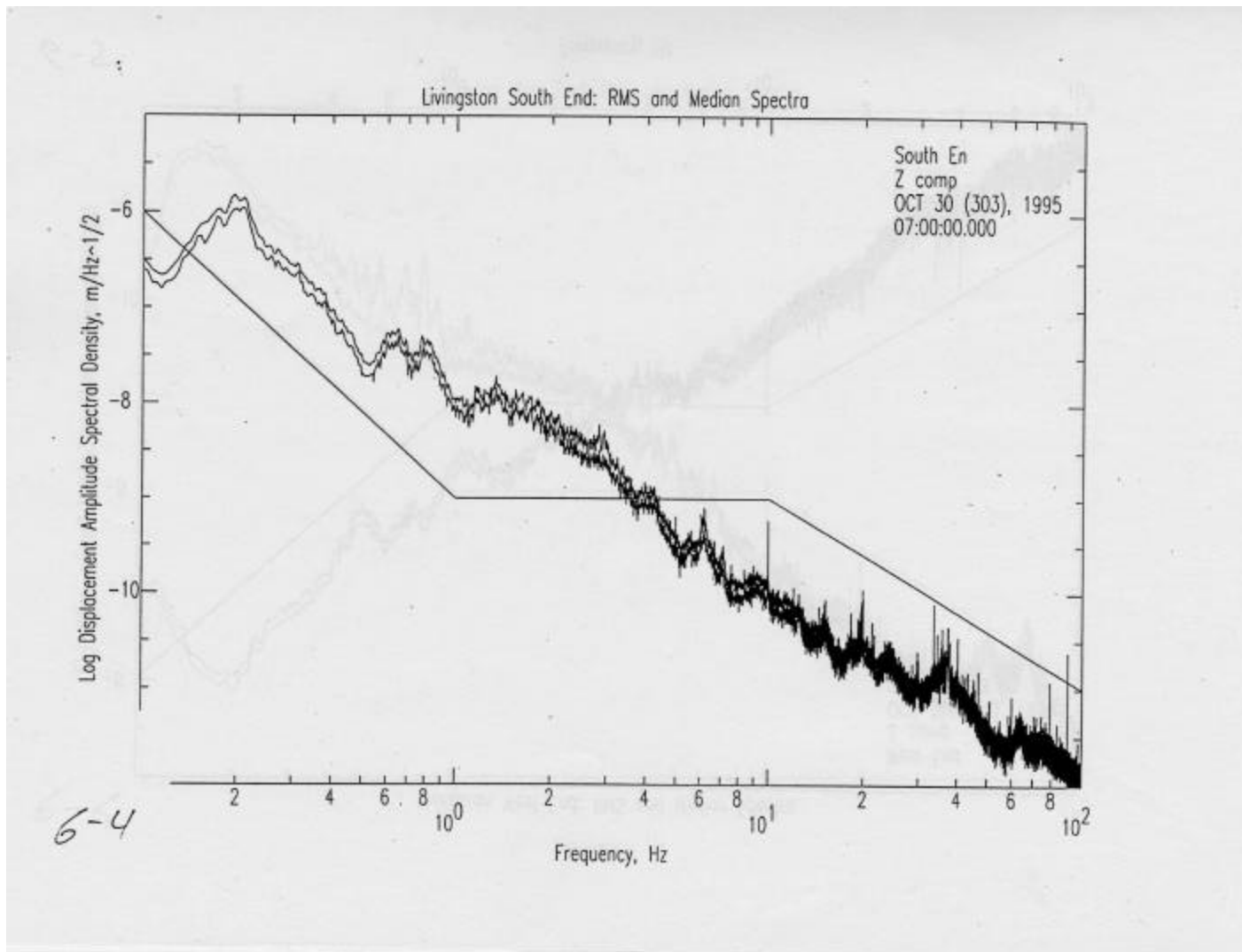
- Strategy to deal with the noise

higher peak current controller: short term, adds noise

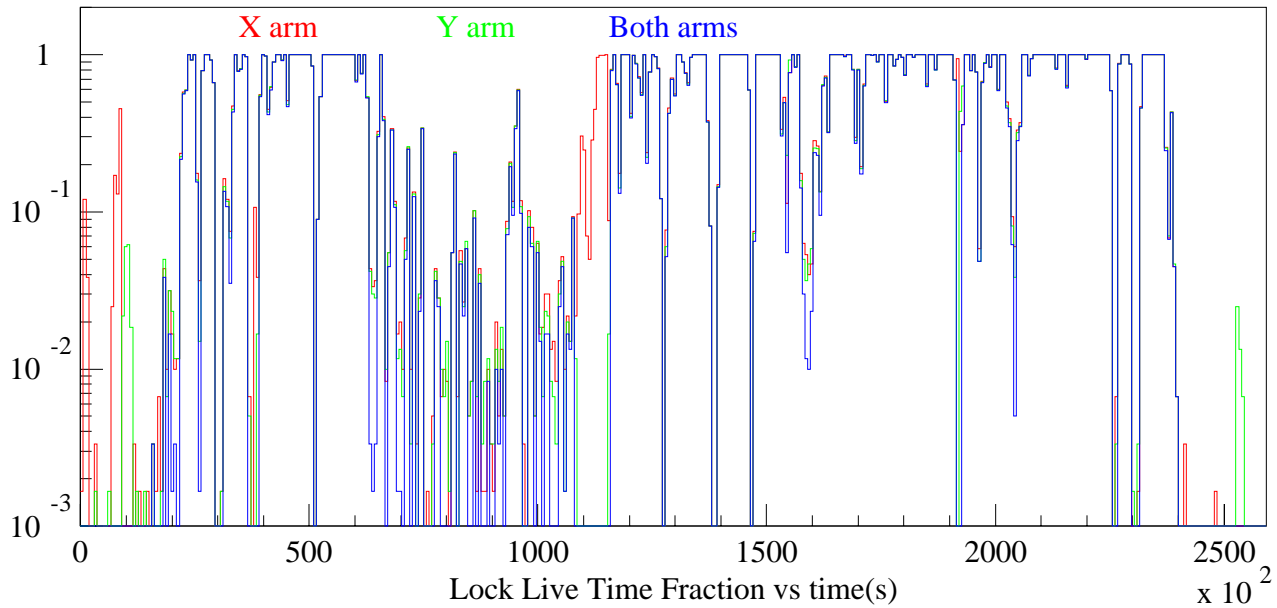
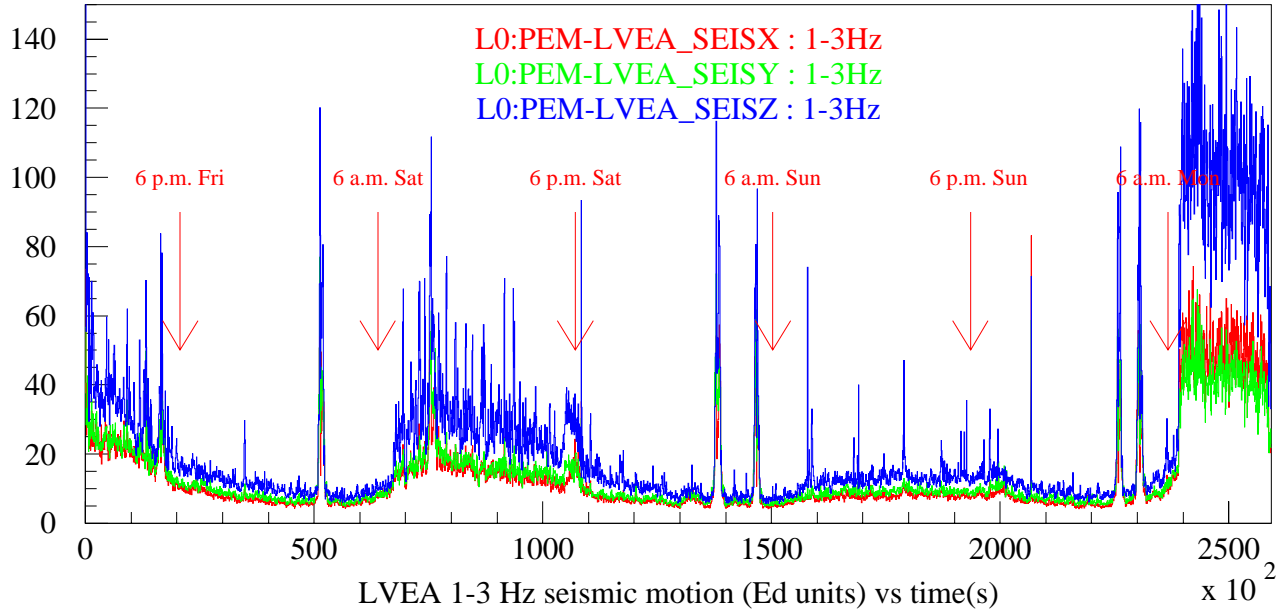
active external isolation: short study, feedback, feed forward.....

need to be installed before reaching design sensitivity - 1 year

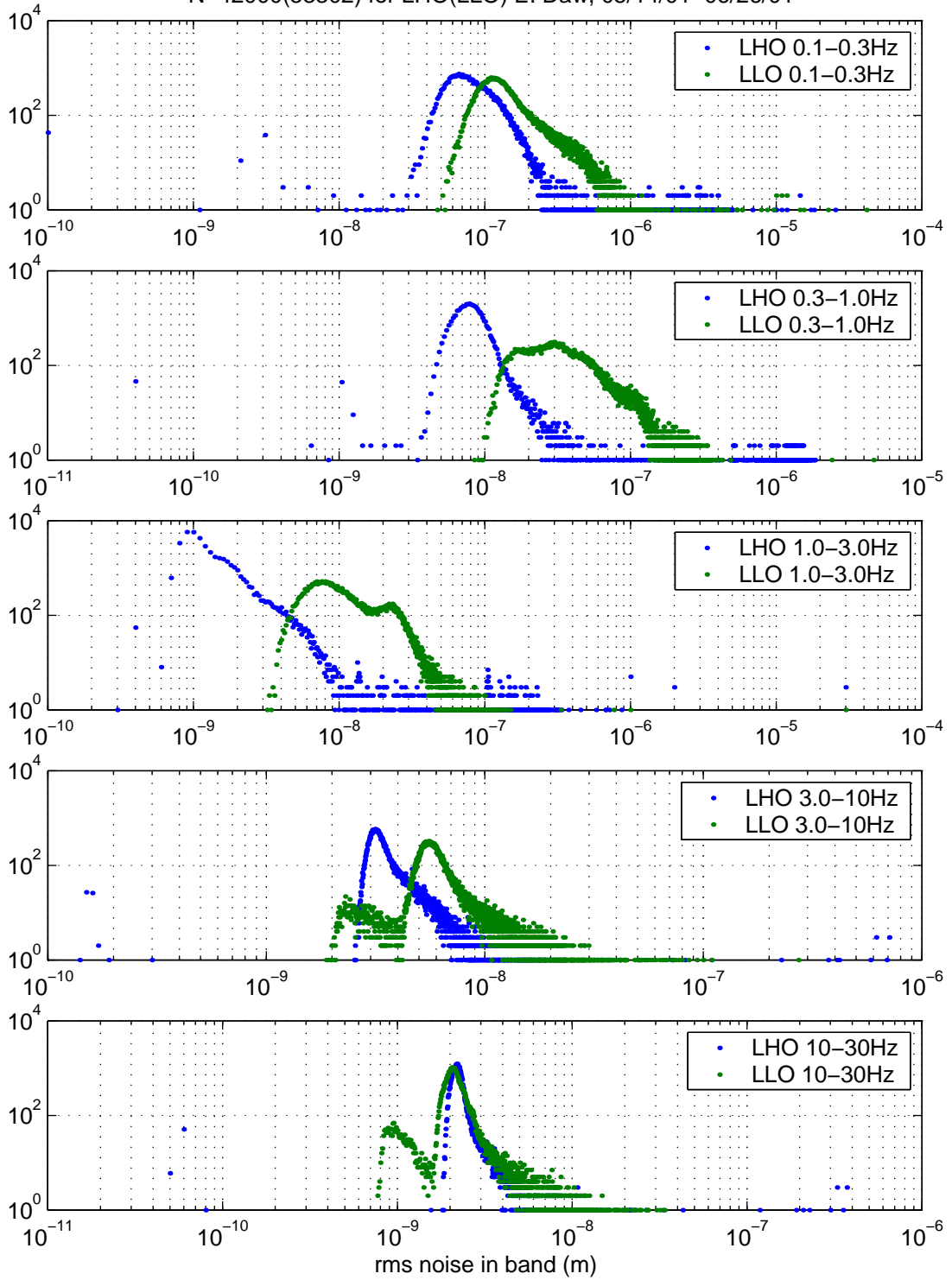
Initial Seismic Measurements Prior to Construction



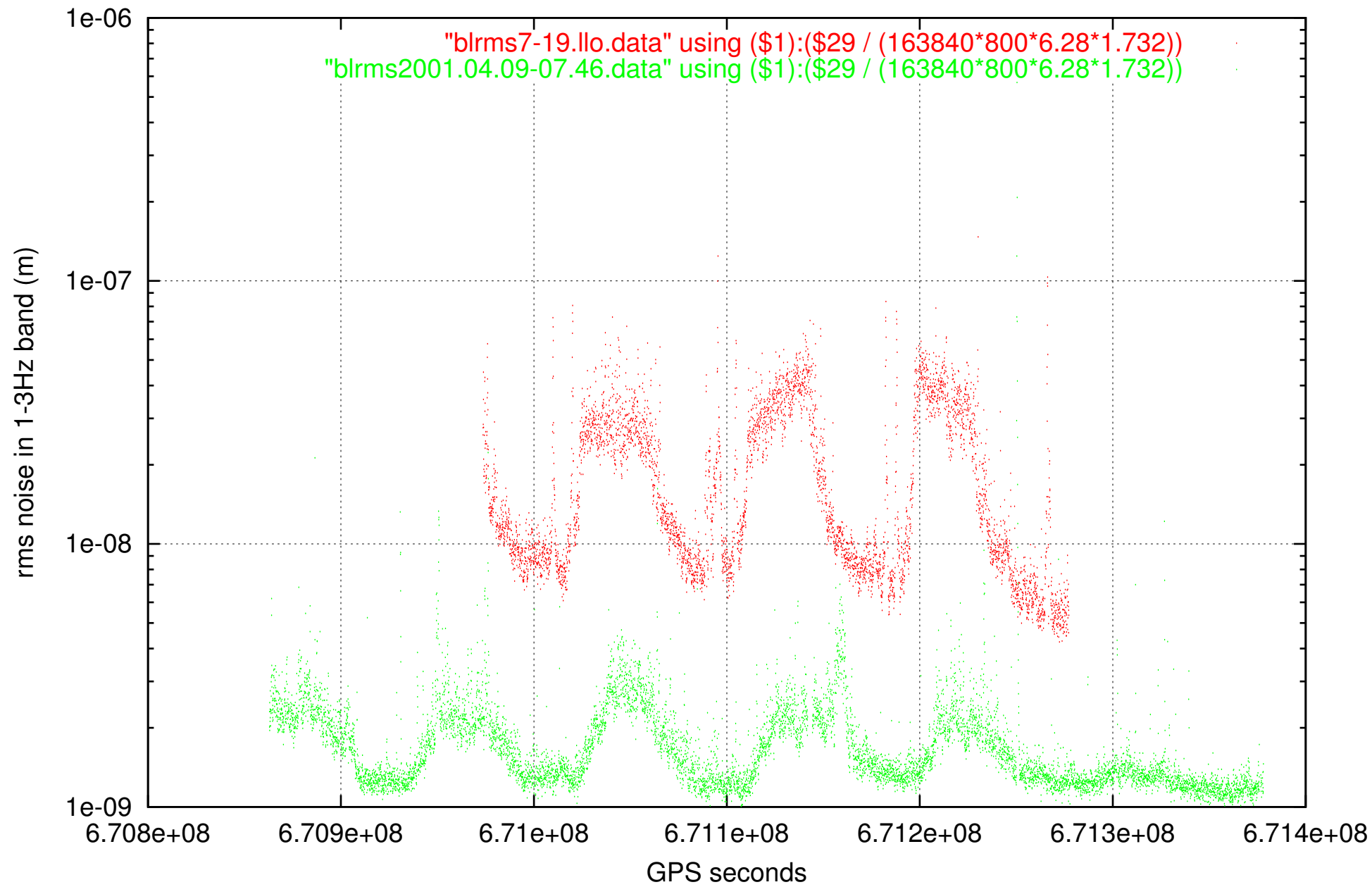
72 hours of E4 from GPS = 673636586 (Fri May 11, 12:16 p.m. CDT)



Histograms of band limited rms noise in 5 frequency bands.
N=42000(53302) for LHO(LLO) E. Daw, 05/14/01-06/26/01



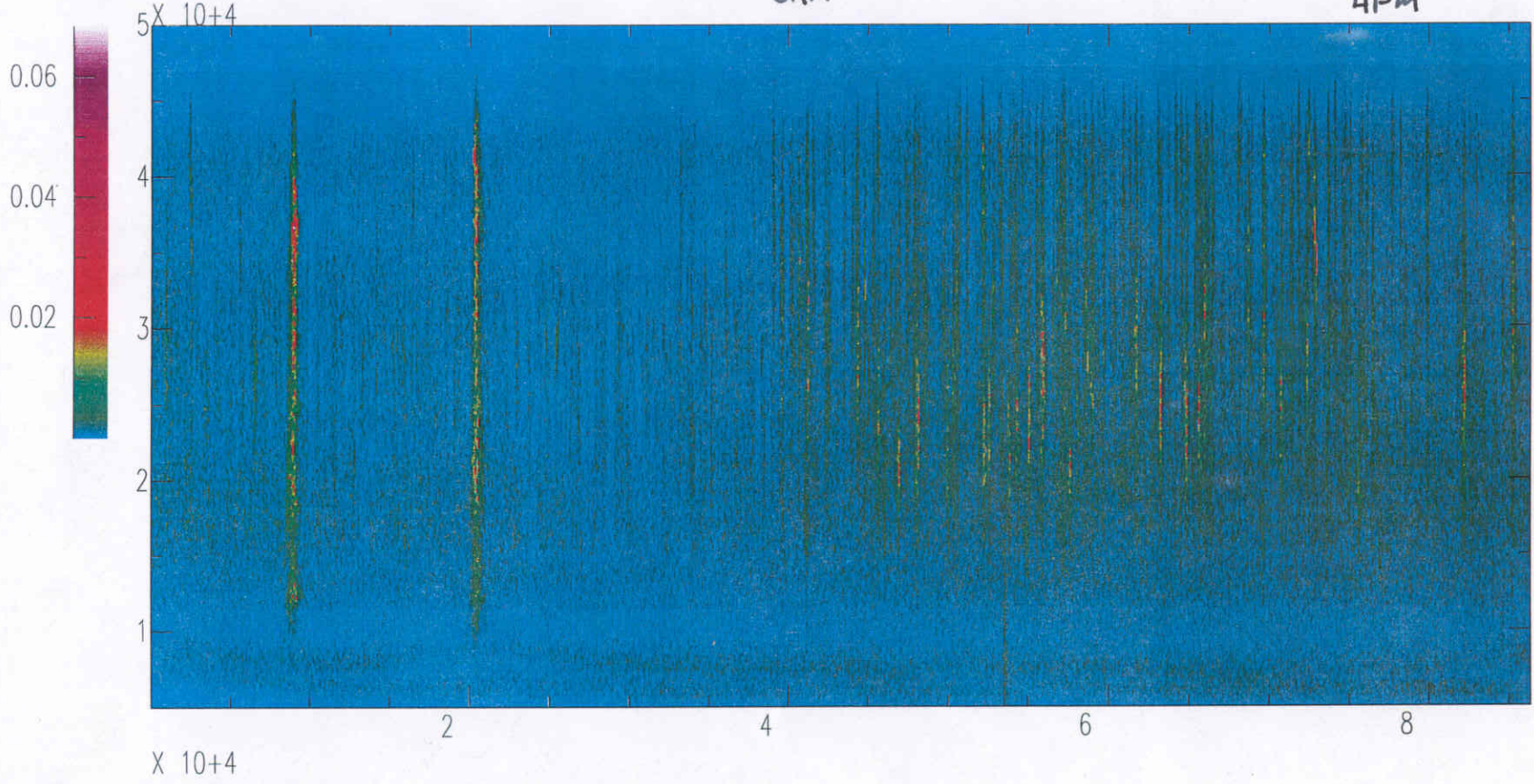
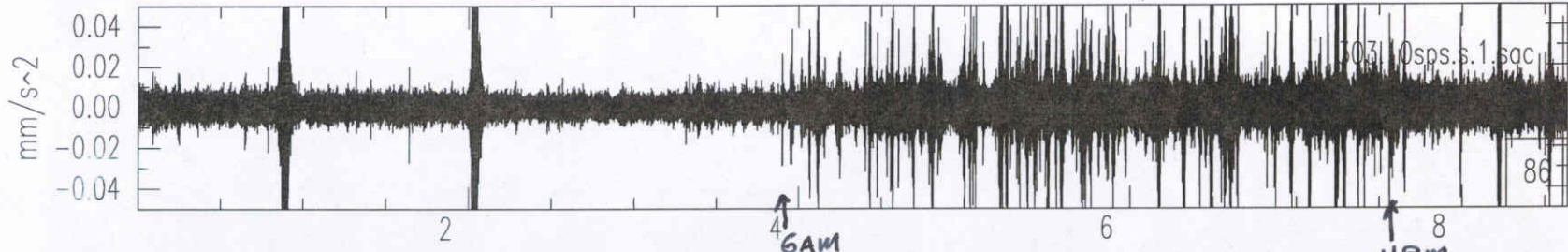
red=livingston, green=hanford



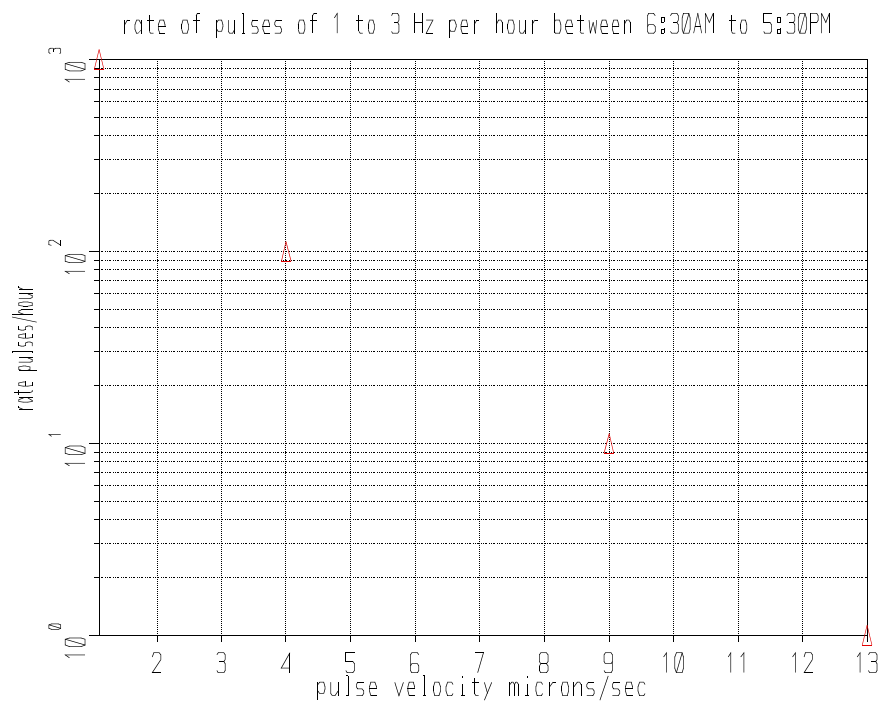
GMT

MONDAY

Livingston South End Vertical OCT30(303),1995 00:00:00.000

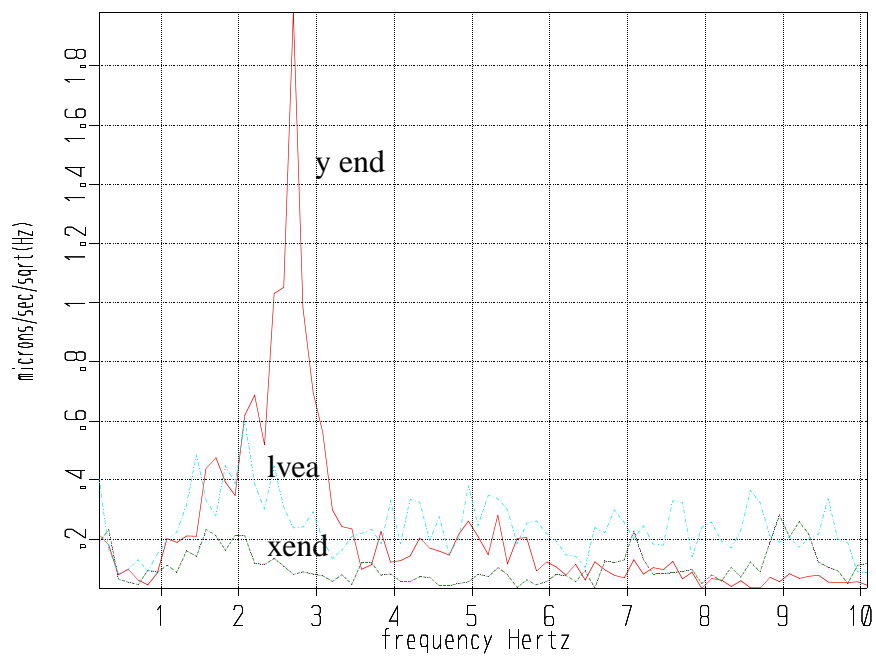


ALAN ROHAY DATA

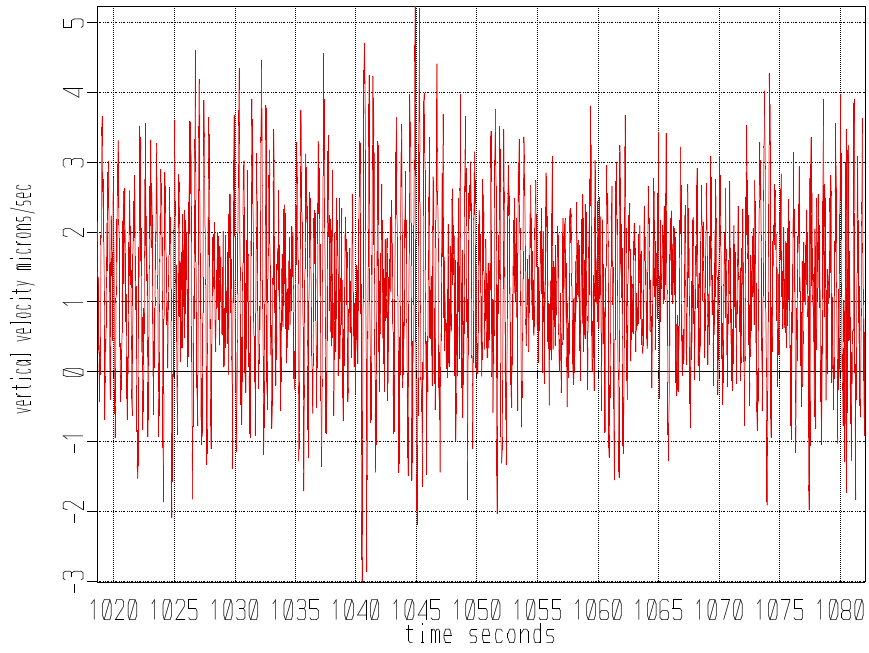


Vertical velocity at the y end station

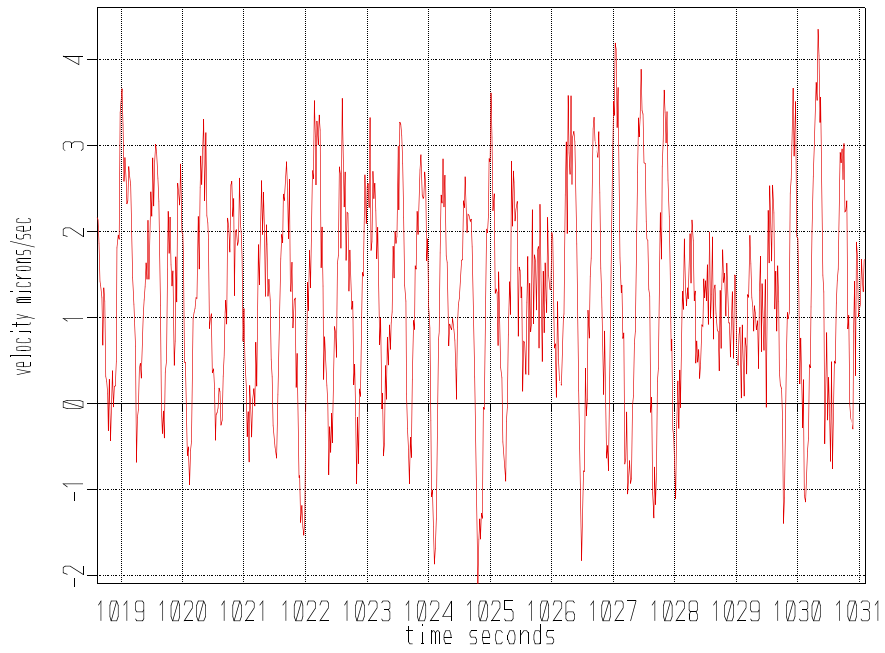
vertical velocity spectra: y end, x end and lvea

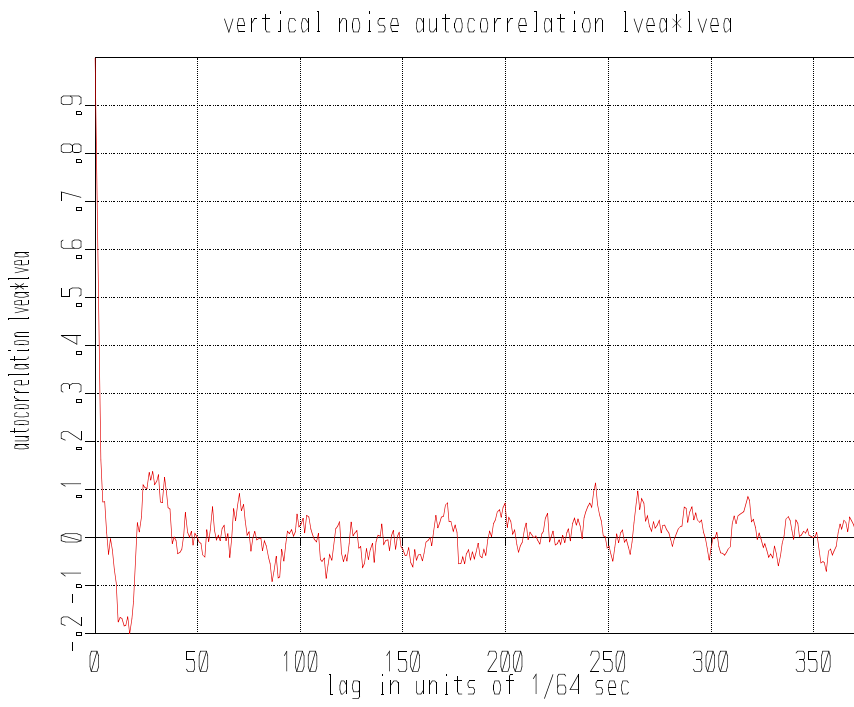
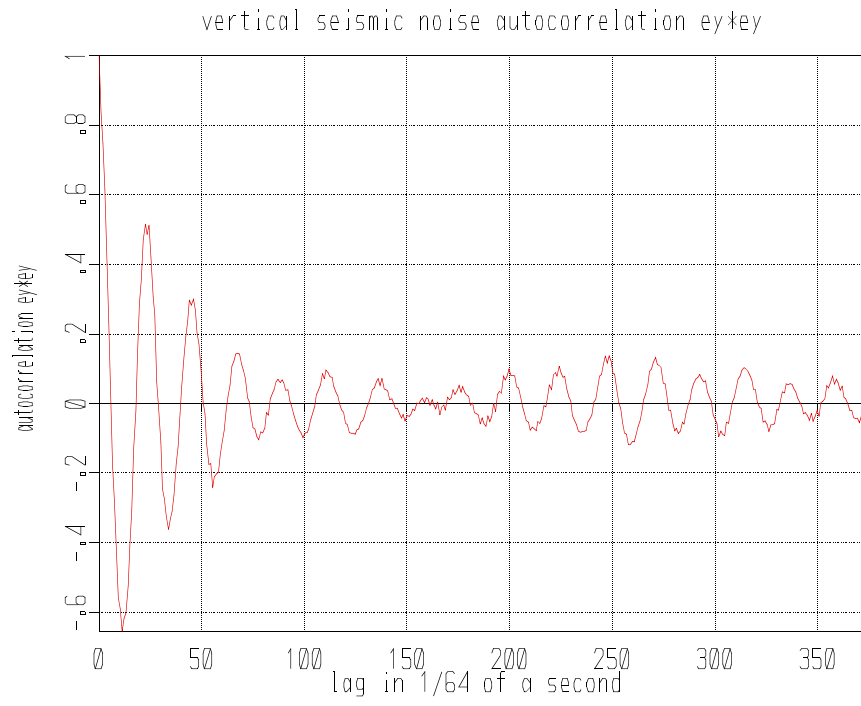


y end vertical velocity vs time

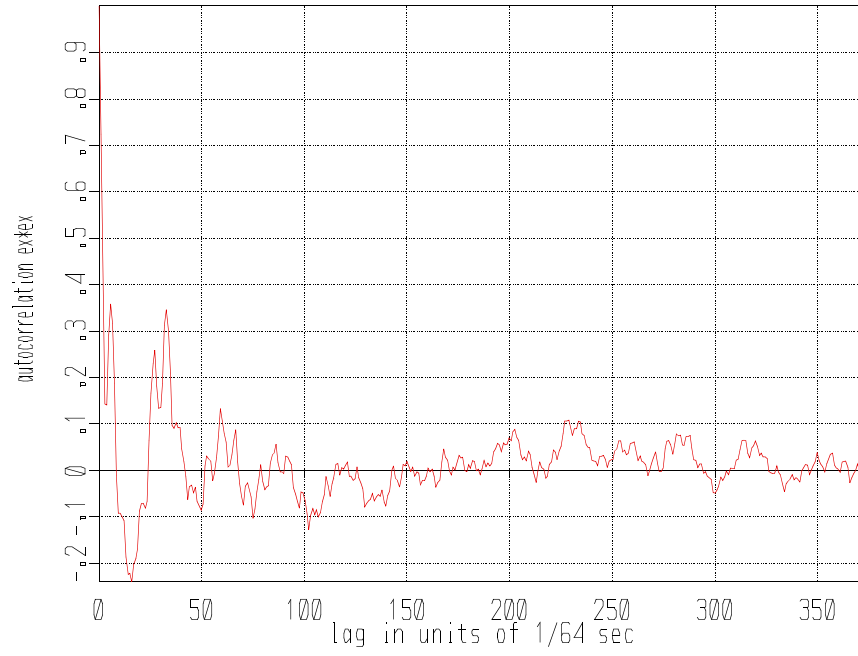


y end vertical velocity vs time

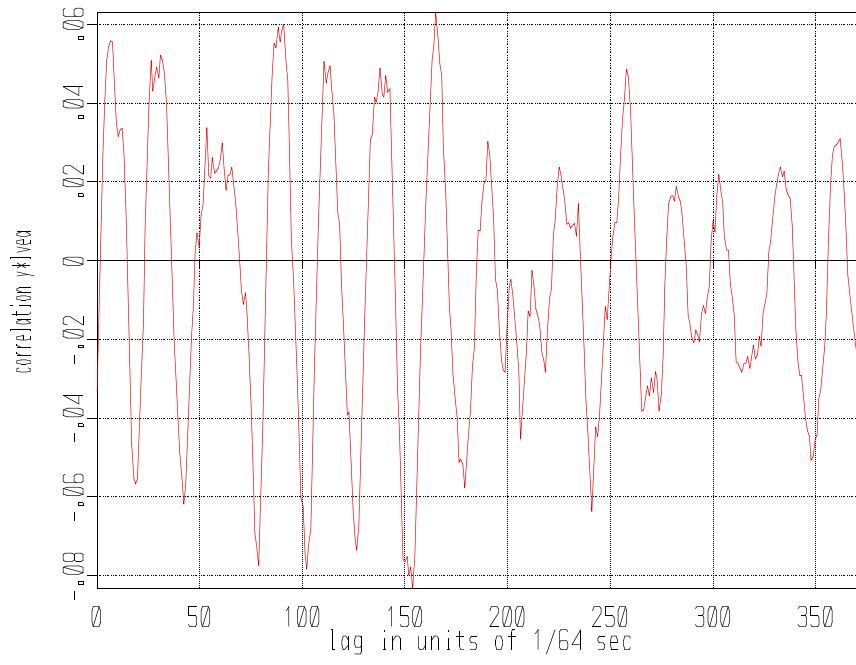




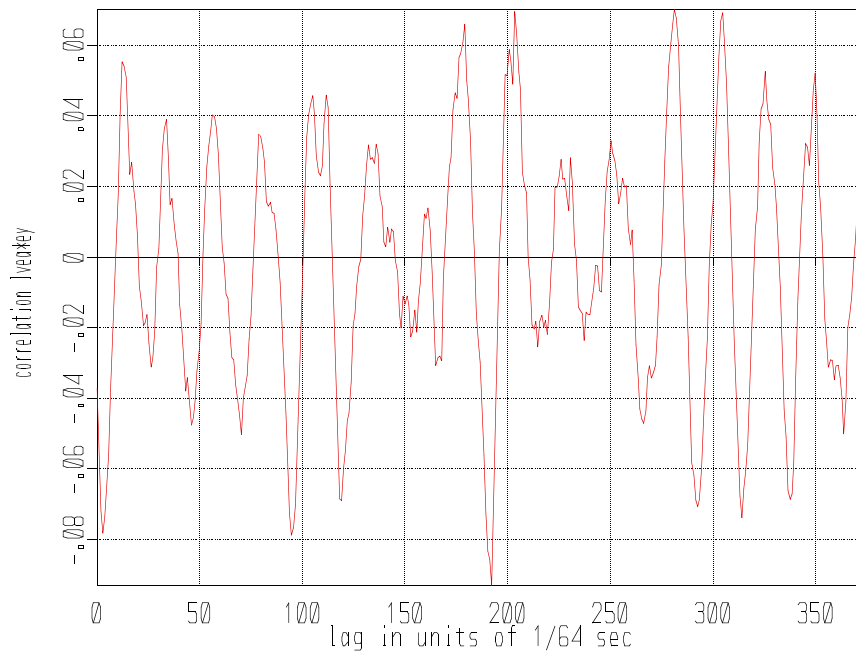
vertical noise autocorrelation exlex



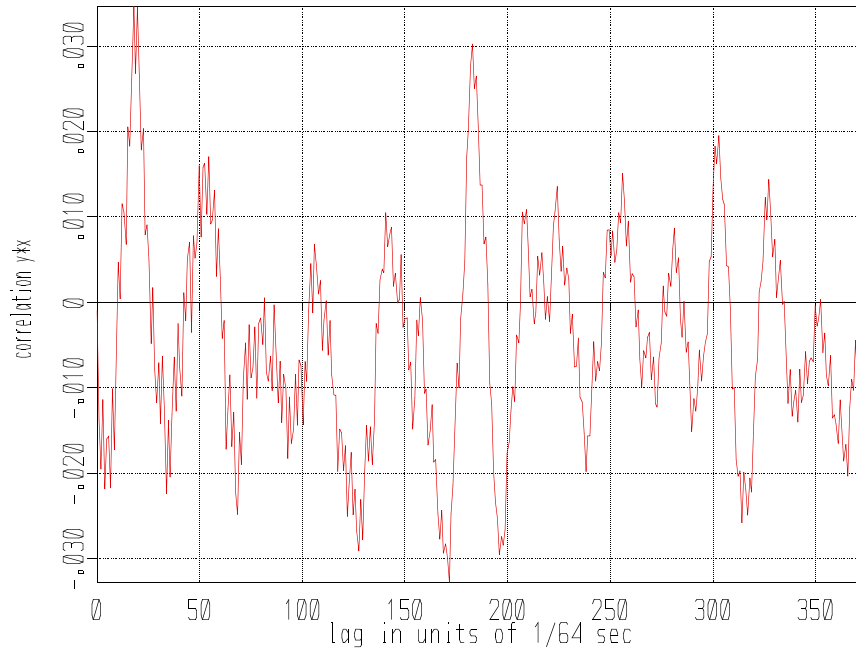
vertical noise correlation y+lvea



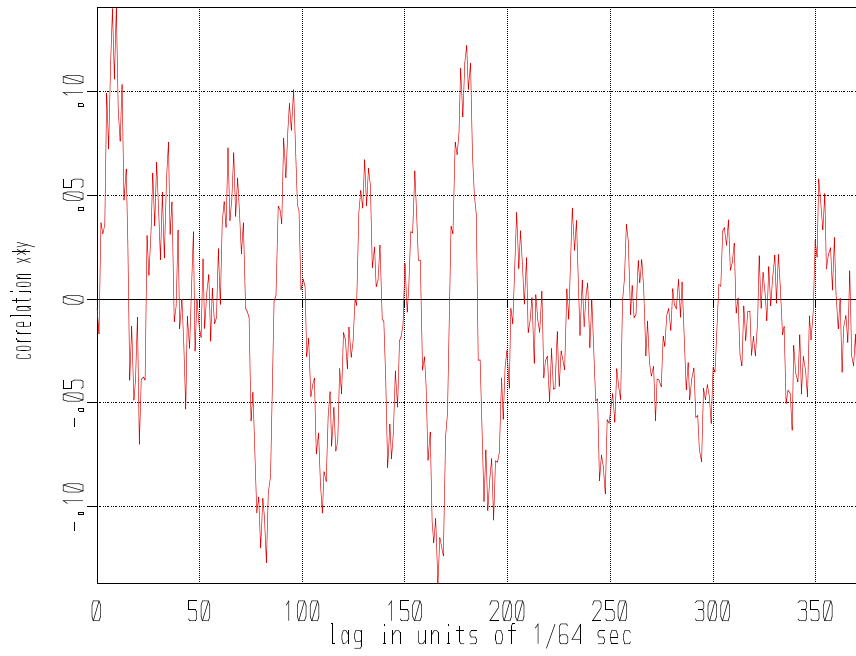
vertical noise correlation lveaxey



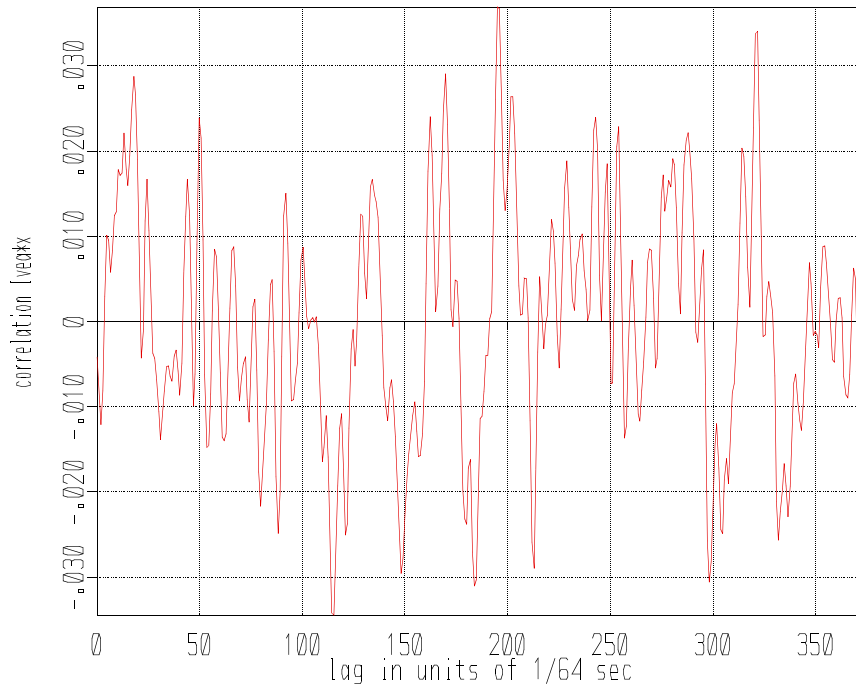
vertical noise correlation y*x



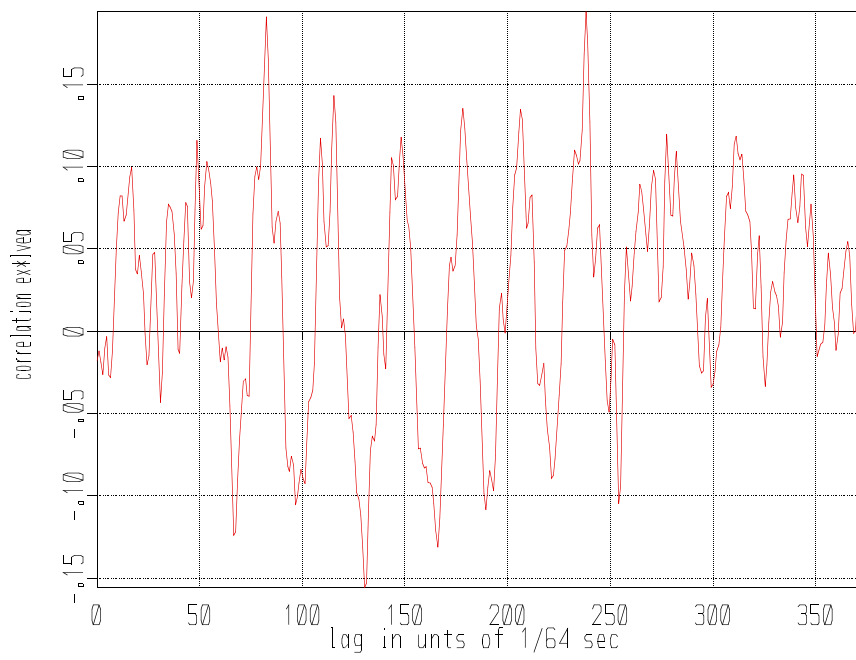
vertical noise correlation x*y



vertical noise correlation lveax



vertical correlation exlvea



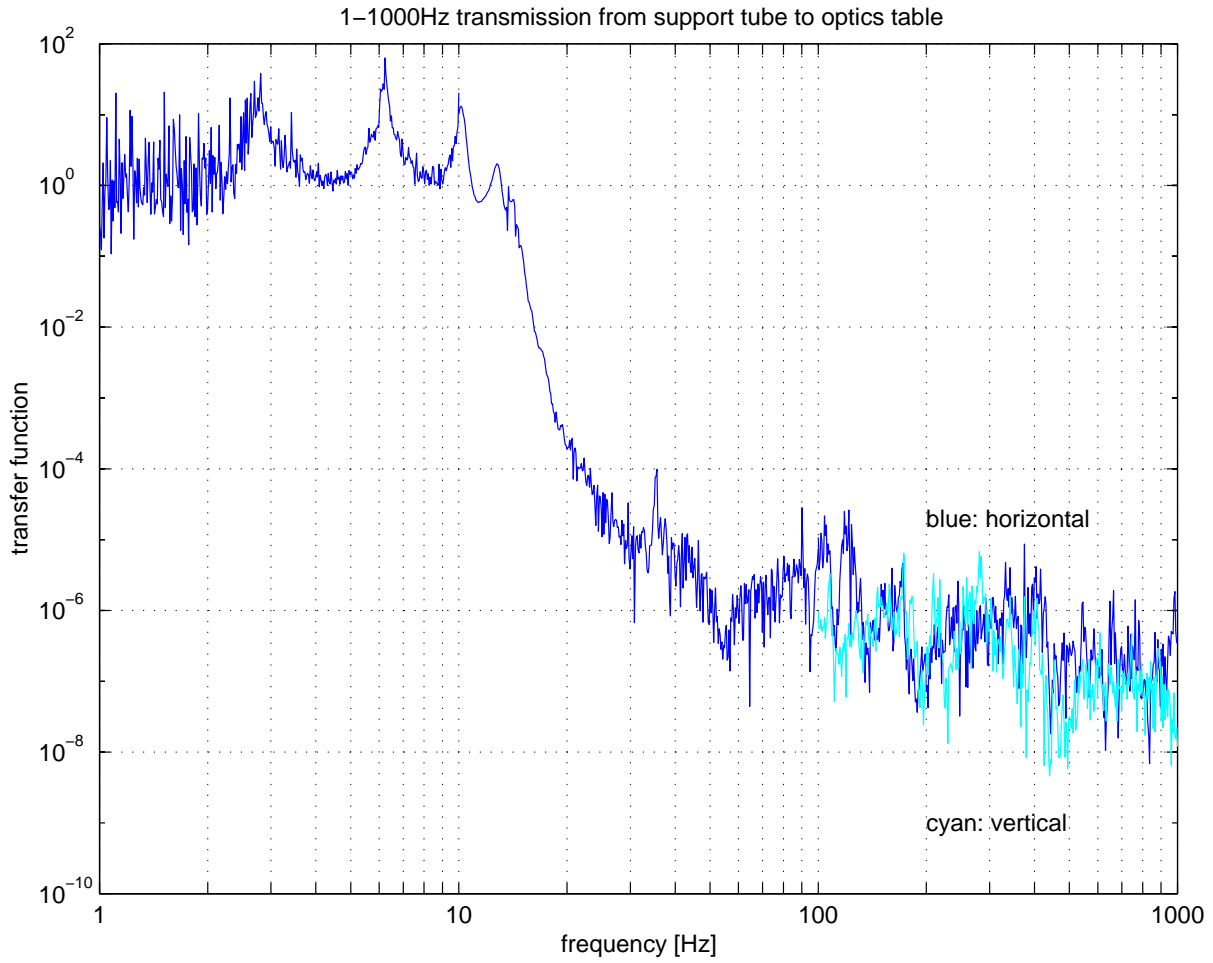


Figure 4.1: Transmission from support tube to optics table of BSC 3. Horizontal and vertical refer to shaker motion (driving force), acceleration was measured vertically off-axis on the optical table (referring to the usual notation, components are T_{zz} and T_{zx} for vertical-vertical (blue) and horizontal-vertical (cyan), respectively).

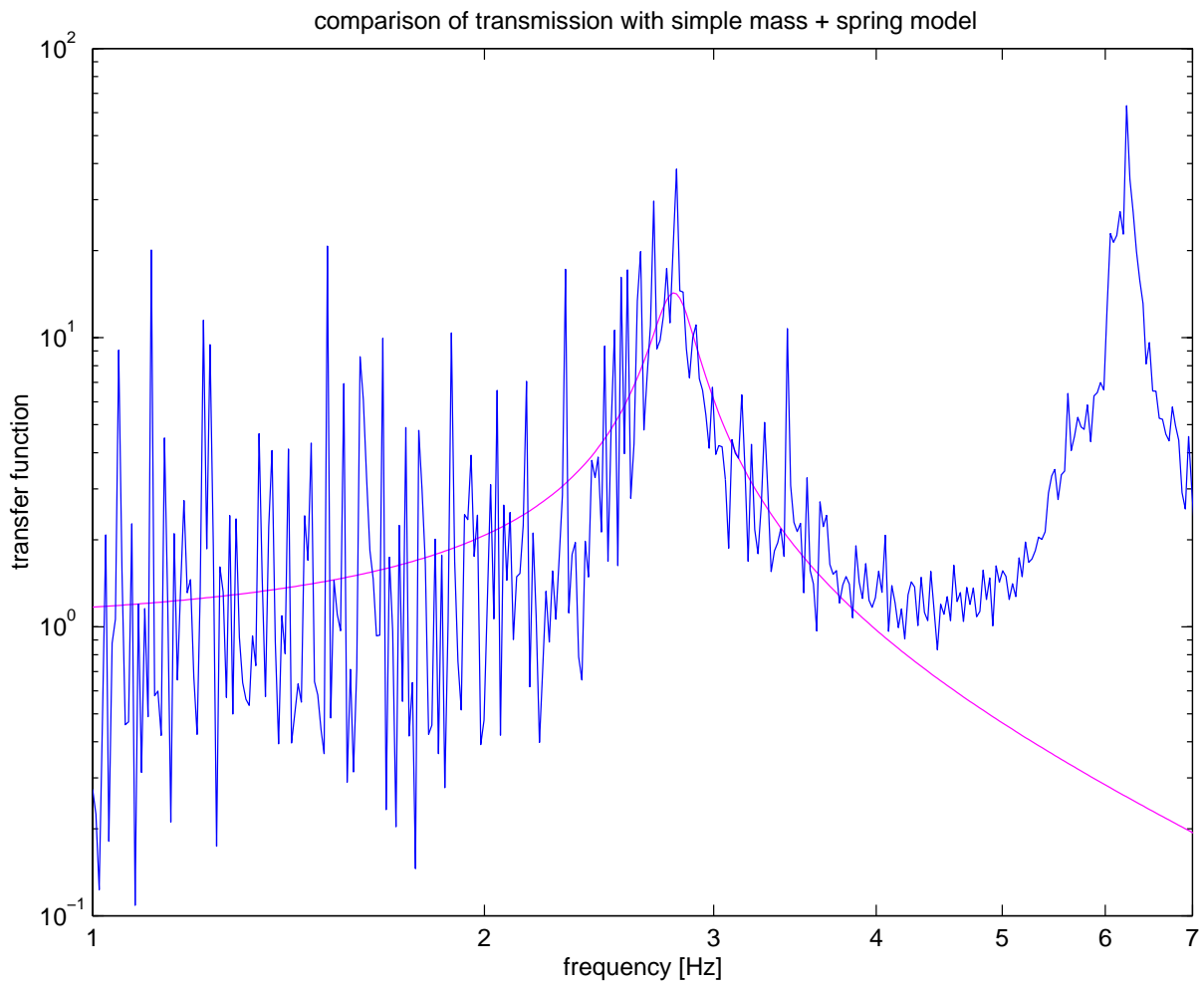
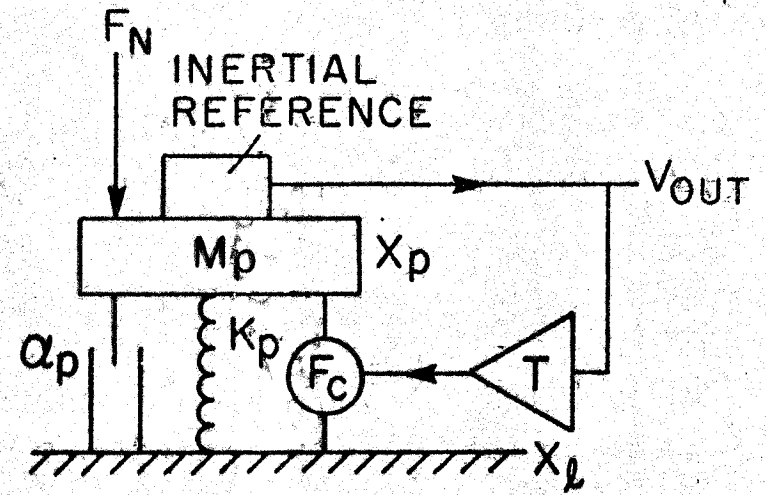
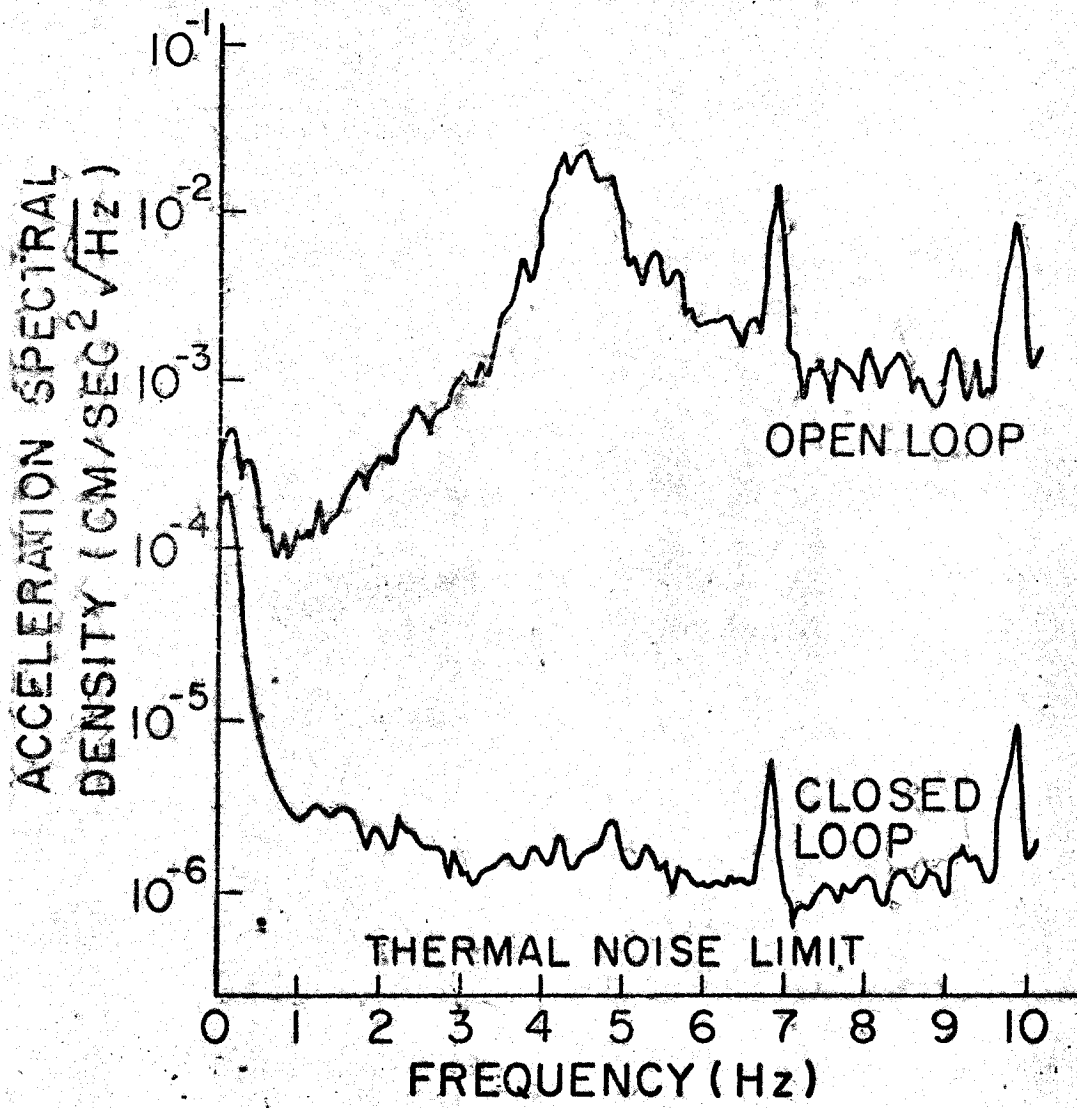
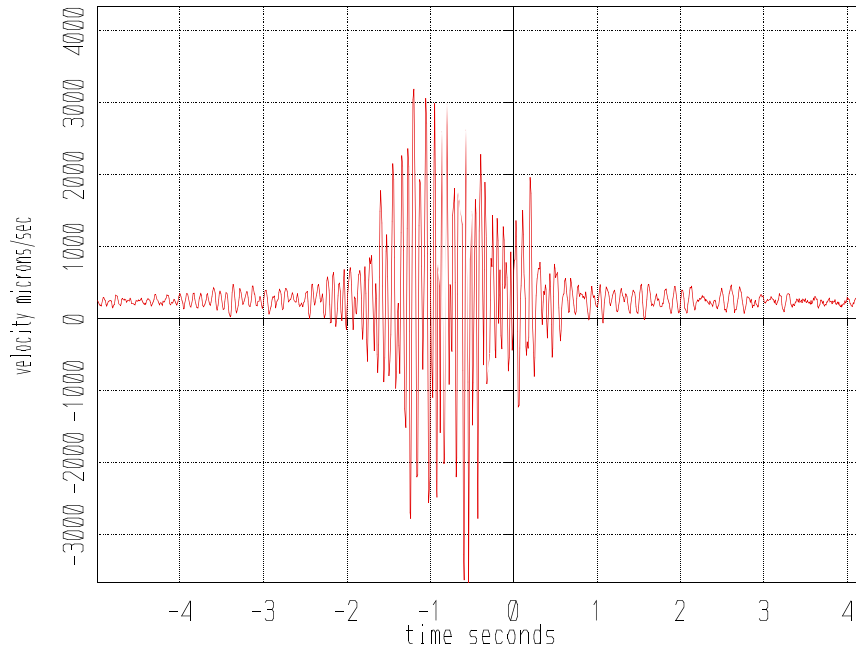


Figure 4.5: The model with $Q = 5$ is shown alone, now with the wings of the resonance peak included.



P. SAULSON

truck on rt 63



amplitude spectrum of truck on rt63

