

RESPONSE OF INFRASONIC MICROPHONE FIELD ARRAY TO A CONTROLLED SOURCE



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Components of Field Measurement System



Helmholtz resonator



Driver



Microphone

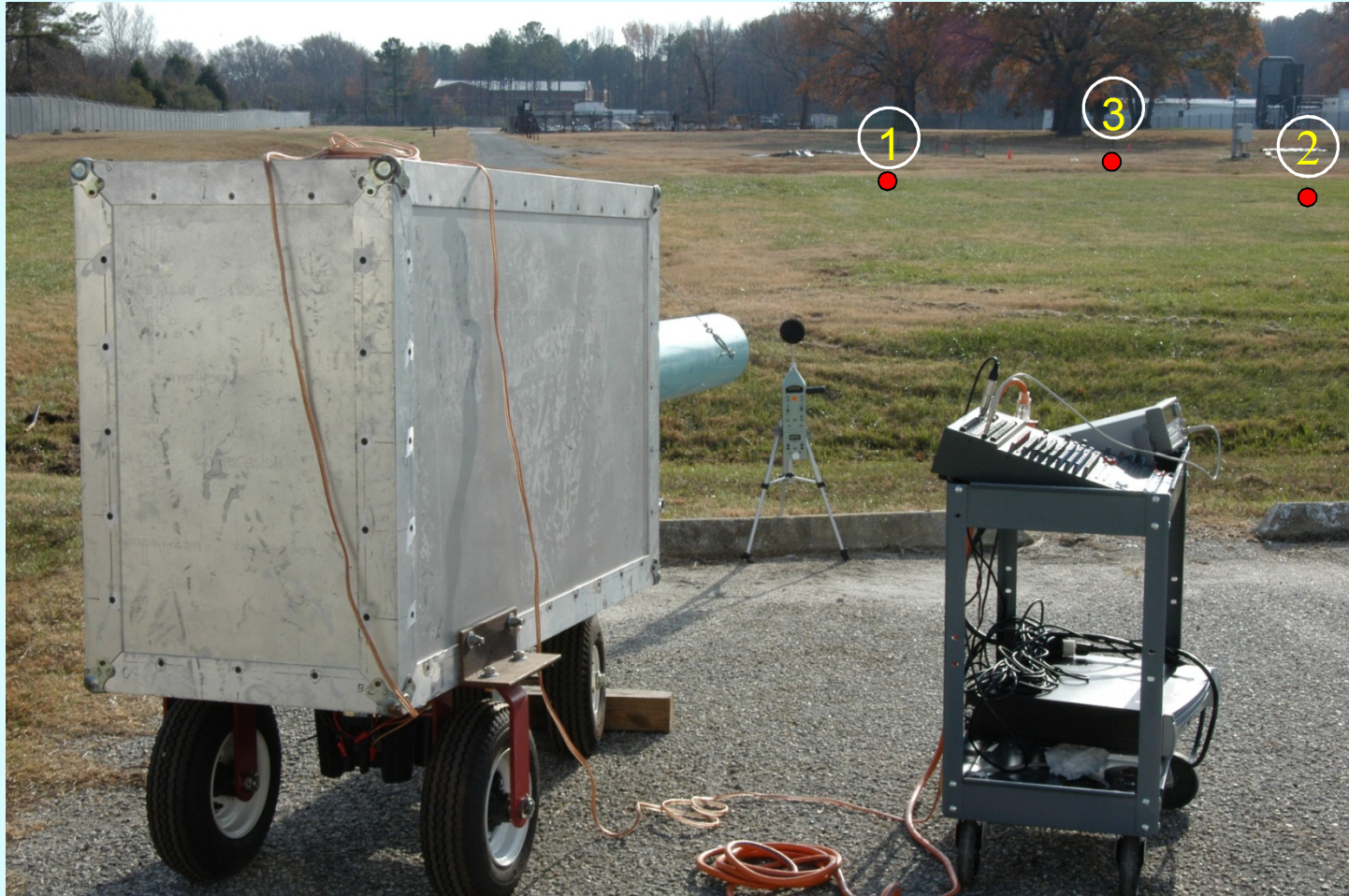


Windscreen

Helmholtz Resonator and Sound Level Meter



Resonator Looking into Field Array



Helmholtz Resonator

Dimensions

- Volume 0.77 m³
- Tube length 1.46 m
- Tube ID 0.1016 m

Performance

- Resonance frequency 8.780 Hz (design)
8.375 Hz (measured)
- SPL @ 1 m 101 dB
- Quality factor 11.1

Driver

Pioneer Premium TS-W5102SPL Subwoofer

- Max power 6000 W
- Continuous power 2500 W
- Frequency response 18-2000 Hz
- Cone resonance 30 Hz

Microphone

PCB 377M06 (3" Electret)

Microphone	Sensitivity	Distance to Source
	mV/Pa	m
1	577.7	88.39
2	523.9	86.26
3	710.7	114.60

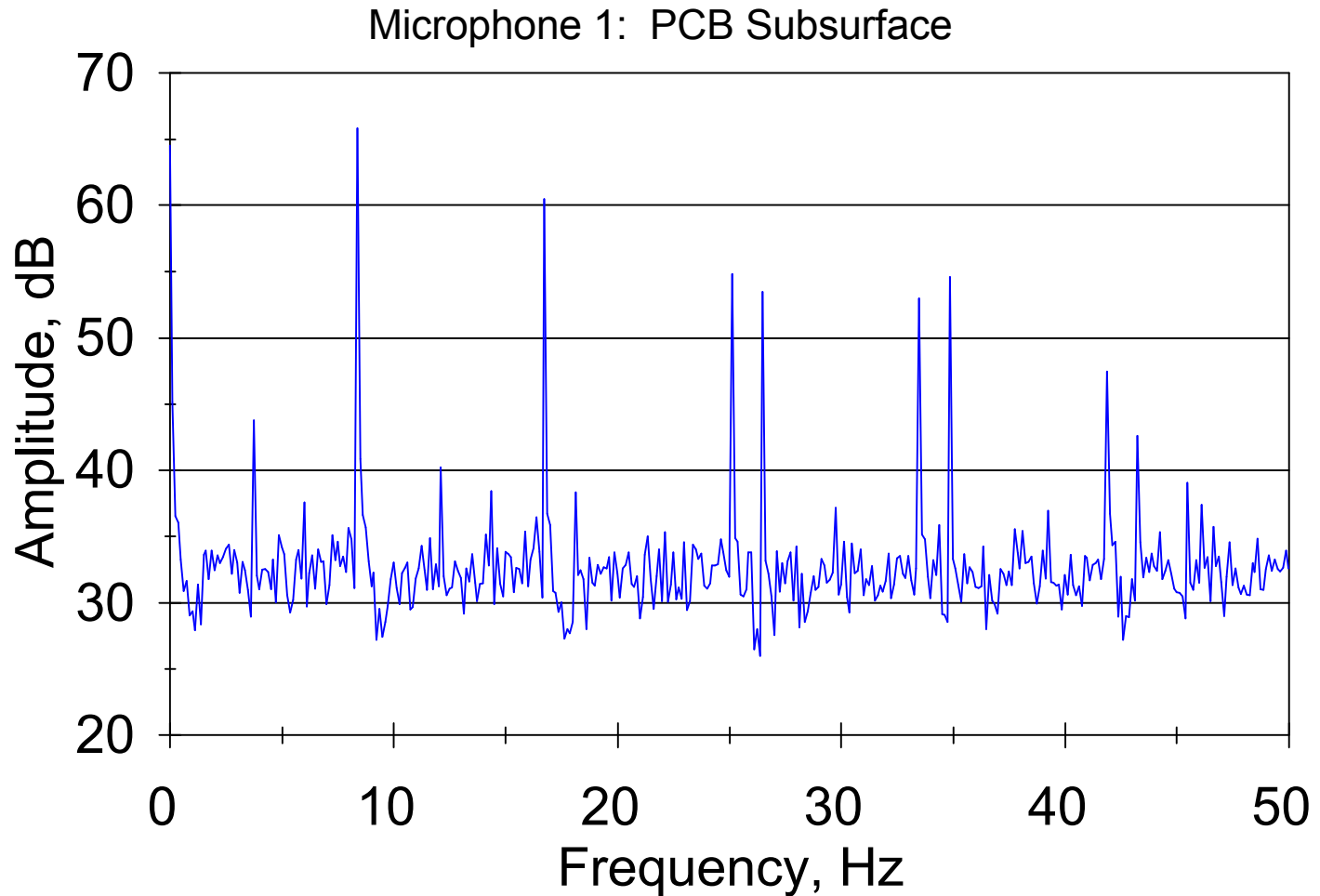
Windscreen

- “Eight-pounder” closed-cell polyurethane foam
- 0.0127 m wall (1/2”)
- Cutoff frequency 19.1 Hz (-3 dB)



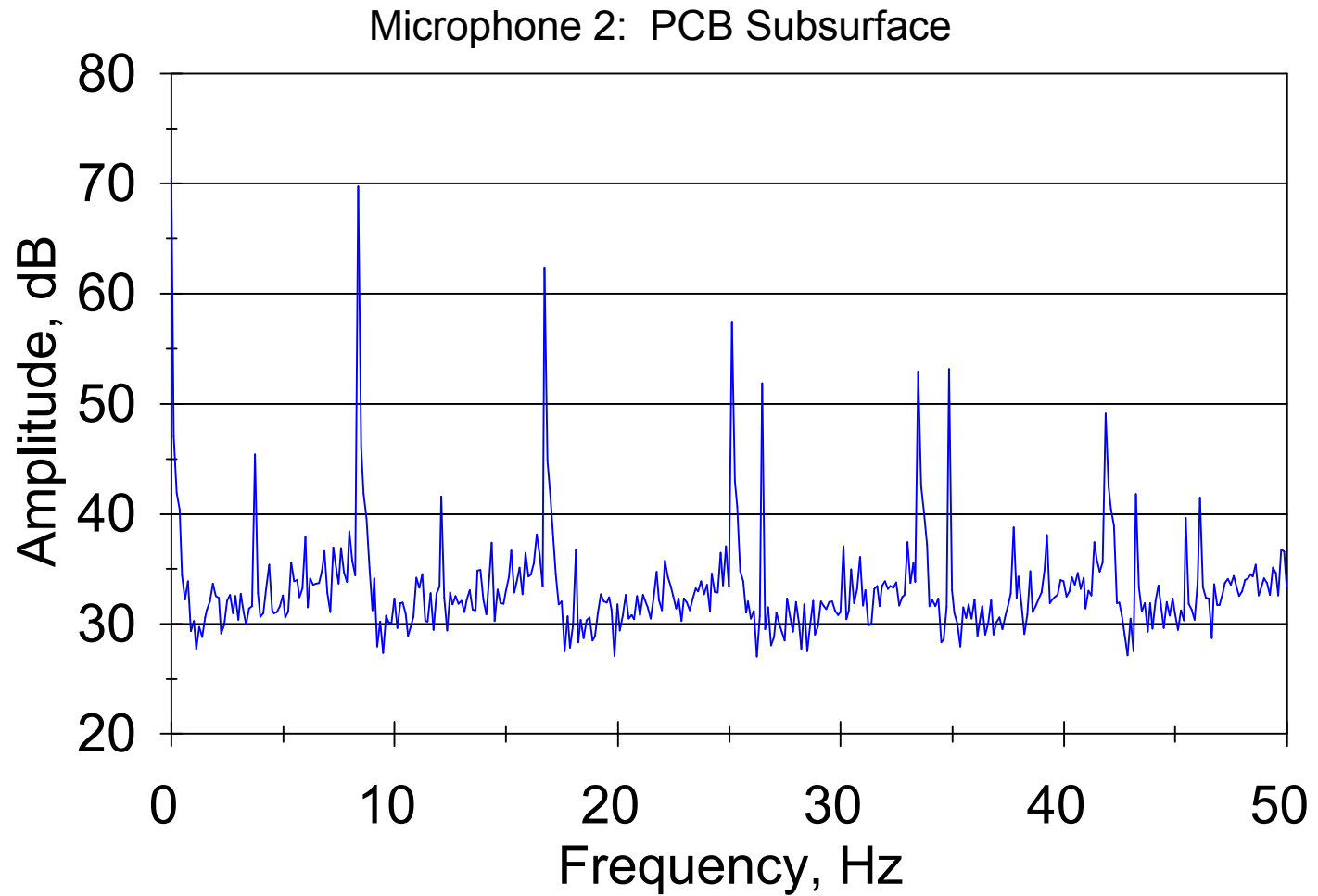
PCB Microphone 1 (Sub-surface Windscreen)

Response to 8.375 Hz tone



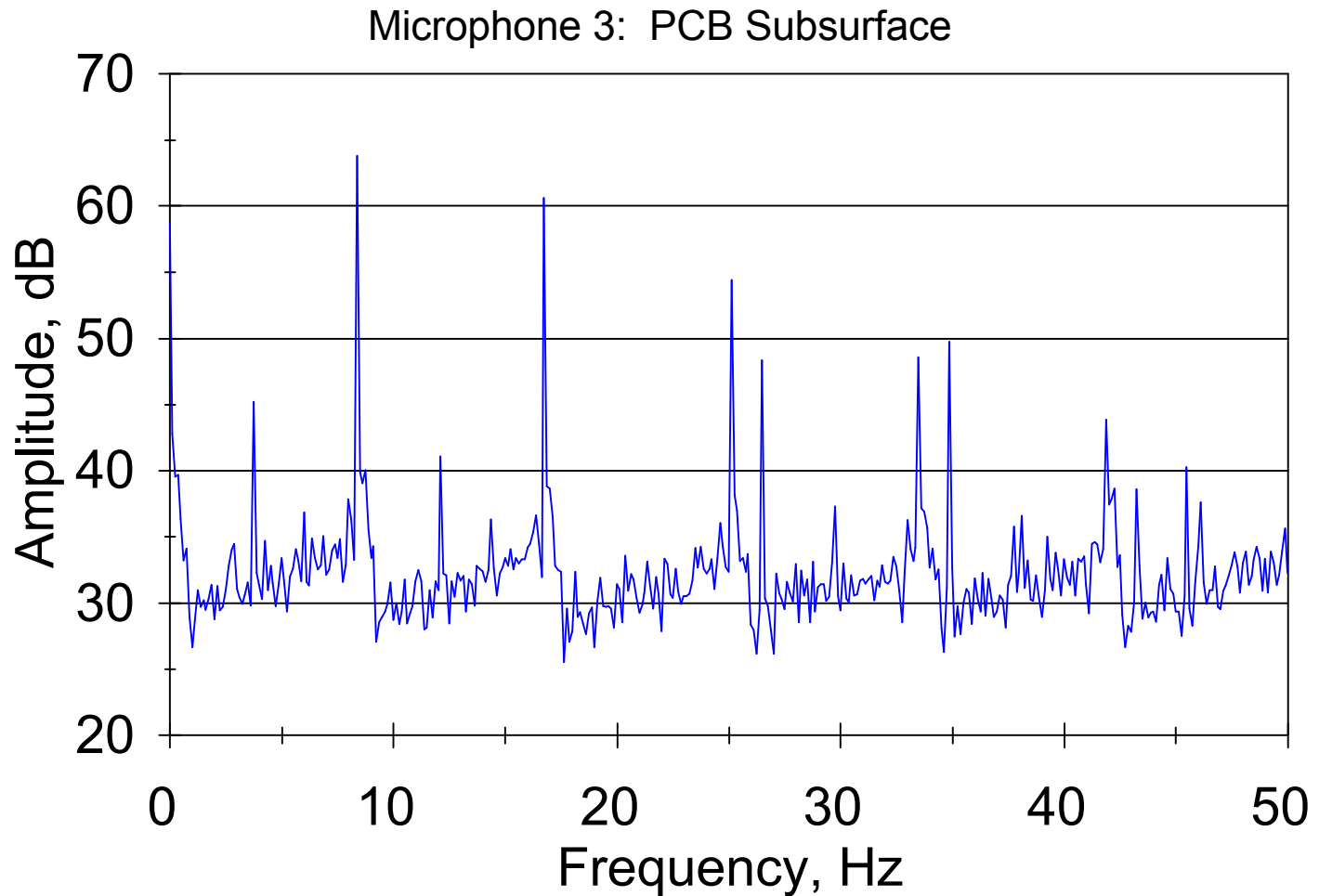
PCB Microphone 2 (Sub-surface Windscreen)

Response to 8.375 Hz tone



PCB Microphone 3 (Sub-surface Windscreen)

Response to 8.375 Hz tone



Measured Sound Pressure Level at Microphone

Method 1: Direct Measurement

$$P_i = V_i / M_i$$

Method 2: Spherical Spreading

$$P_i = 101 - 6 \log_2 (X_i) \text{ (dB)}$$

Measured SPL at Microphone

Microphone	Direct Measurement	Spherical Spreading	Diff.
	dB	dB	dB
1	64.6	62.2	2.4
2	66.9	62.4	4.5
3	63.1	60.0	3.1