



Surface System and Instruments

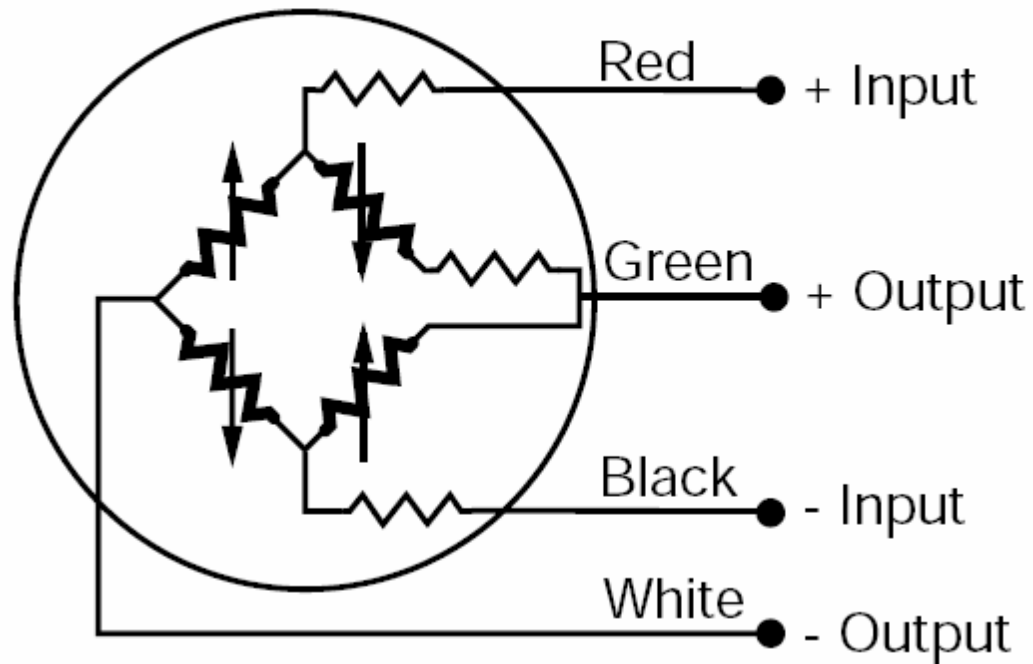
- Accelerometers
- Analog Electronics
- Sampling and Anti-Aliasing
- Signal Processing



Surface System and Instruments

- Accelerometers
 - Bridge-Based System

For specification -D





Surface System and Instruments

- Accelerometers
 - Temperature and Time Stability.

CERTIFICATE OF CALIBRATION			
Other characteristics according to : EGCSS001U-PC			
CALIBRATION DATA			
¹ Non linearity :±	¹ Hysteresis :±	¹ CNL&H :± 1.00 %FSO	
¹ Th. zero shift :± 2 mV/100°F		² Thermal Sens. Shift :± 2.5 %/100°F	
¹ Zero (typ.) : ± 15 mV			
Ref. Temp. : 22 °C (72°F)			
Shunt Cal :	with :	KΩ	across :
Sensitivity : 32.10 mV/g	with Excitation :	15.0 V	Max. : 18.0 V
Natural frequency : 280 Hz			Damping : 0.64
Input ohms : 1871 Ω			Output ohms : 1003 Ω
Cal Equip. : M82			
Notes :			

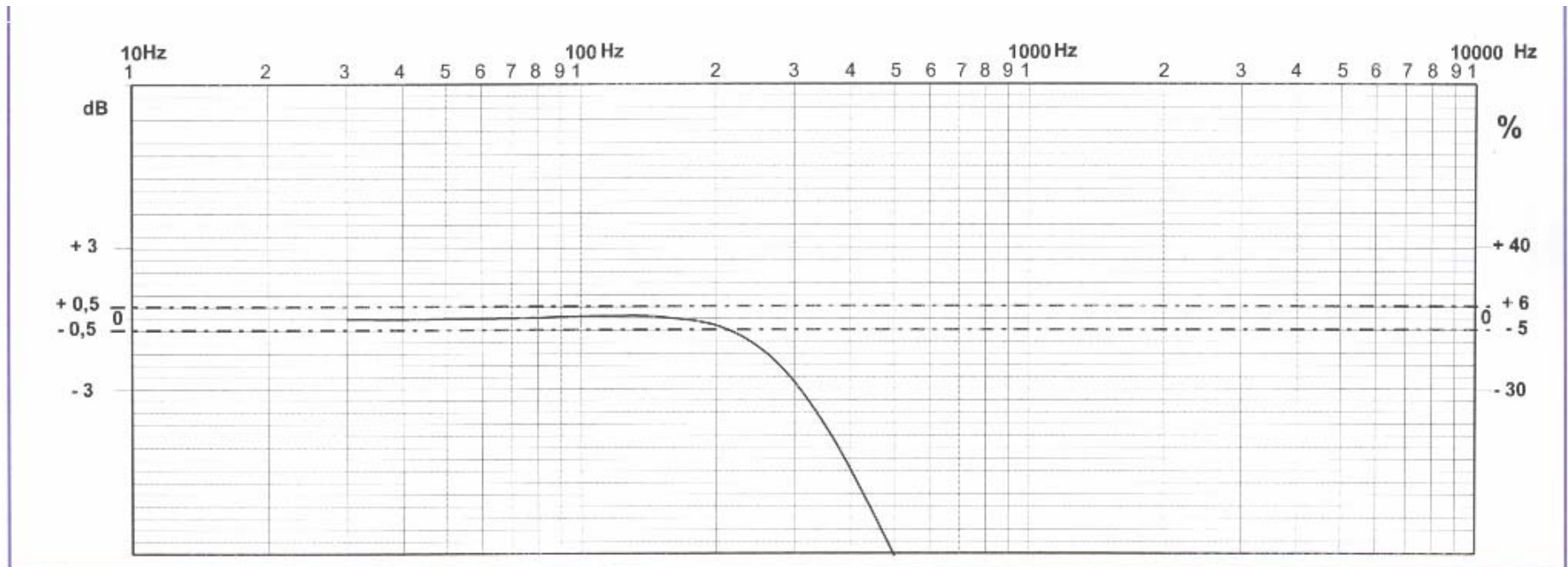


Surface System and Instruments

- Accelerometers

- Frequency Character

- ($v = \lambda * f$) $v = 70$ mph, $\lambda = 0.5$ ft $\rightarrow f = 205$ Hz.





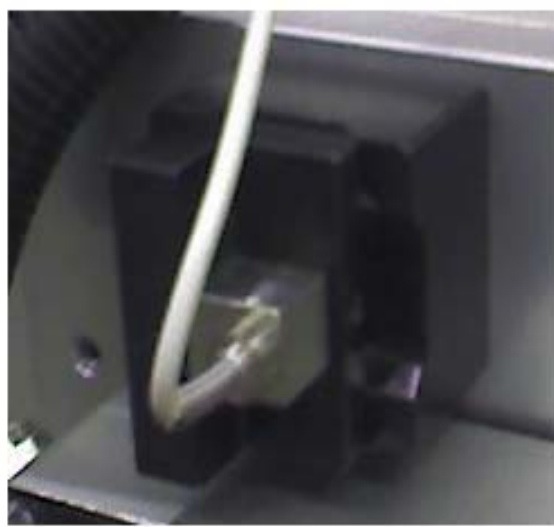
Surface System and Instruments

- Accelerometers

- Calibration

- Measure $-g$, 0 , and $+g$

- Achieved by rotating Accelerometer.





Surface System and Instruments

- Analog Electronics
 - Kept to a minimum
 - Analog Amplification
 - Offset Bias.
 - No filtering



Surface System and Instruments

- Sampling and Anti-Aliasing
 - Follow current principle in instrumentation
 - Place ADC as close to signal as possible!
 - No Anti-Aliasing Filter in the System
 - Use the cutoff of the sensor
 - Avoiding electronic phase distortion
 - Sampling rate set above Nyquist rate



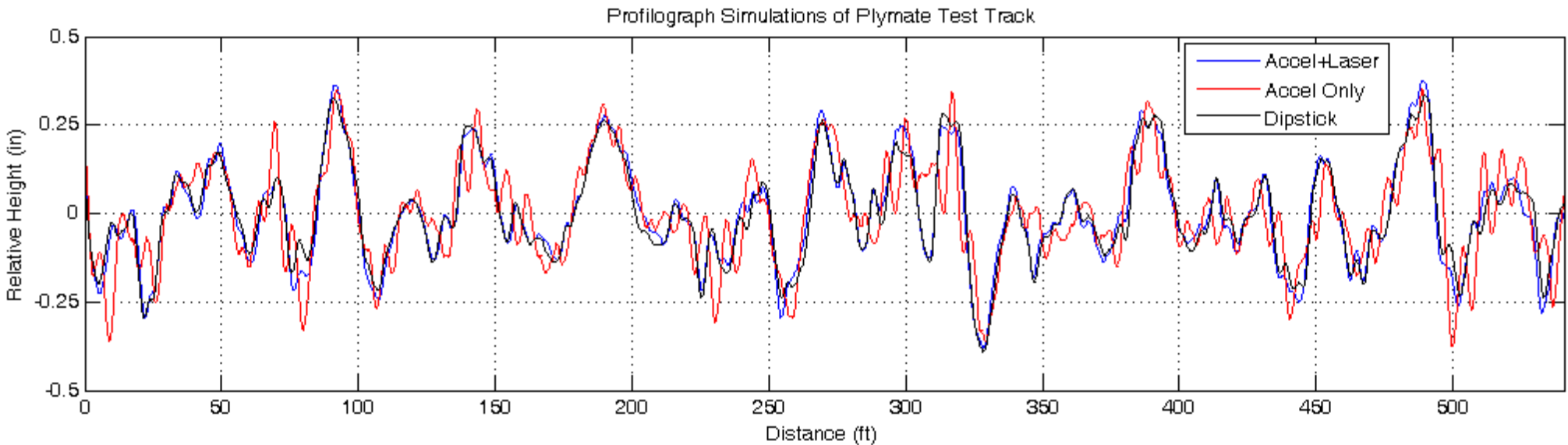
Surface System and Instruments

- Signal Processing
 - High Pass Filter (Why?)
 - Small DC offsets need to be removed to avoid integrator run away.
 - Double Integration
 - Numerical Damping to eliminate run away
 - Double Precision
 - FIR Only: Allowing for Phase Correction



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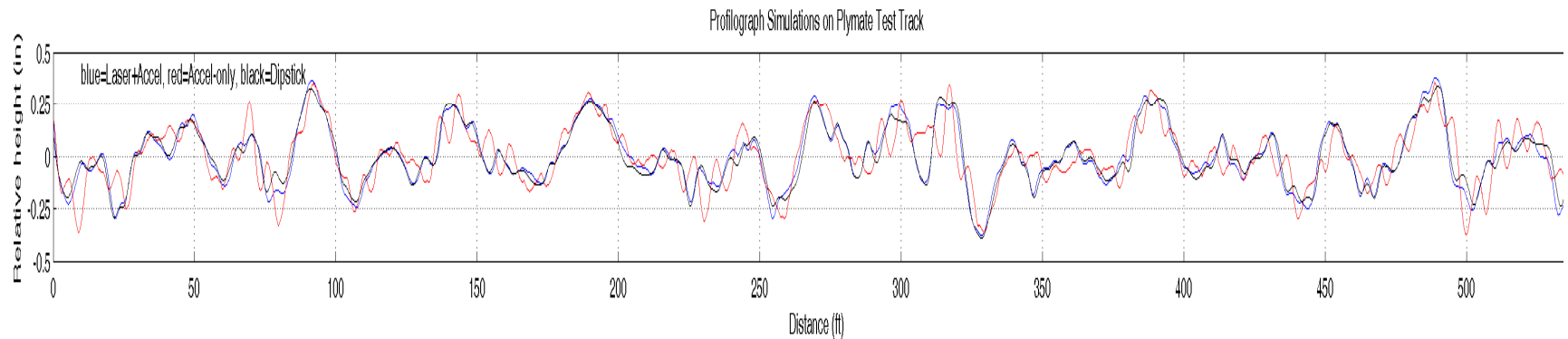
- Accelerometer Results.
 - Accelerometer versus LWP versus DipStick
 - Plot slope at $\simeq 45$ degrees





Surface System and Instruments

- Second Plot



PRI

Laser + Accel: 75.7 with 42 scallops

Accel only: 74.0 with 44 scallops

Dipstick: 71.1 with 44 scallops



Surface System and Instruments

- Conclusion
 - Accelerometer the major contributor to profile content.
 - Laser secondary contributor to profile.
 - Shouldn't RFQ for inertial profilers, be more concerned about the “inertial” portion of the system instead of the laser ranger.