APPLICATION NOTE
040890

*** COMPONENT TESTING ***

*** USING REAL ENVIRONMENTAL SHOCKS ***

WHAT IS COMPONENT TESTING IN THE ENVIRONMENT?

Many new test requirements try to subject a product to real world environmental shock and vibration excitation. This real world testing can sometimes be accomplished in the laboratory using SRS analysis to insure fidelity. Another approach is testing in the environment using real excitation.

Problem: Products fail in the environment. Typical shock and vibration test techniques in the laboratory fail to isolate the cause because a true simulation of the total environment can't be duplicated in the laboratory.

Solution: Inject real environmental excitation into the structure associated with the product. At the same time, record input and output as it flows through the structure connected to the product. Resulting data is then analyzed with frequency domain software.

APPLICATION EXAMPLE

(See reverse side of this page.) A major car manufacturer was experiencing premature light bulb failure. Environmental shock and vibration was suspected. A series of road tests failed to isolate the cause. A simple hood closure test was performed to provide excitation. The hood spring latch was the source. The GHI CAT System captured the resulting triaxial excitation and response from both the car structure and bulb fixture.

Transmissibility, PSD and SRS analysis was then performed. Low coherence between excitation and response proved that no direct coupling existed. PSD analysis gauged response power vs frequency. SRS plots defined the response to provide a specification for further laboratory testing. Results indicated that the bulb was subjected to high g excitation produced by fixture response. The frequency of the fixture response matched known filament resonances, thus being a probably cause of failure.

WHAT'S NEEDED FOR THIS TYPE OF TESTING?

Sensors and turn-key GHI CAT capture and analysis system.

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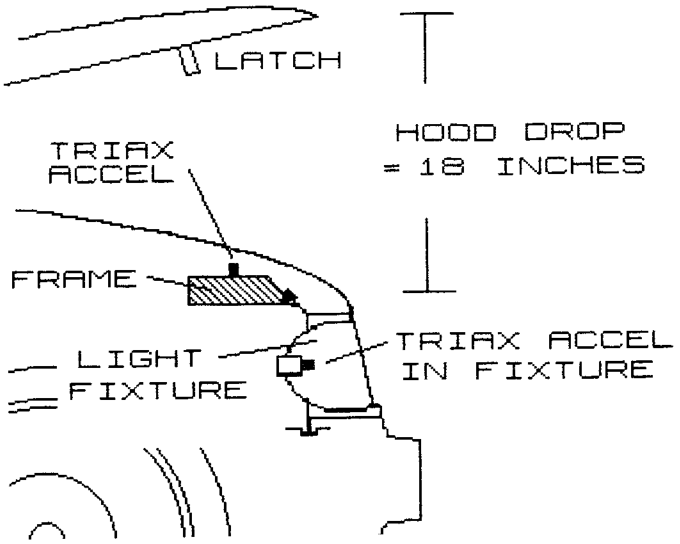
update



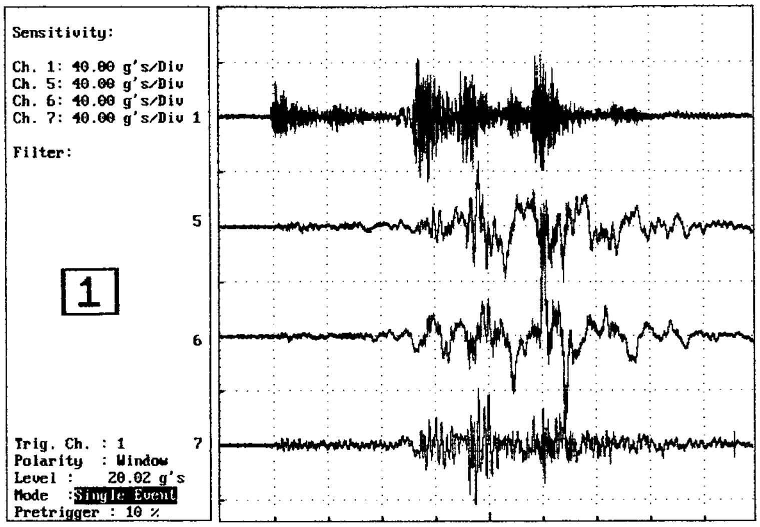
Six channels were recorded, three each from two triaxial accelerometers.

FIGURE 1. Examples of time domain signals. Ch 1 is frame vertical; Ch 5 is fixture vertical; Ch 6 is fixture transverse; Ch 7 is fixture front to rear.

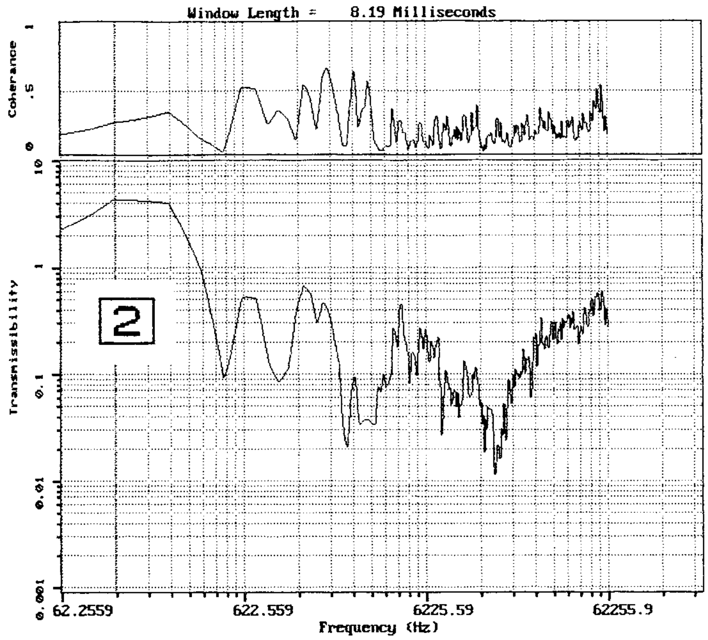
FIGURE 2. Transmissibility and coherence, frame to fixture, front to rear.

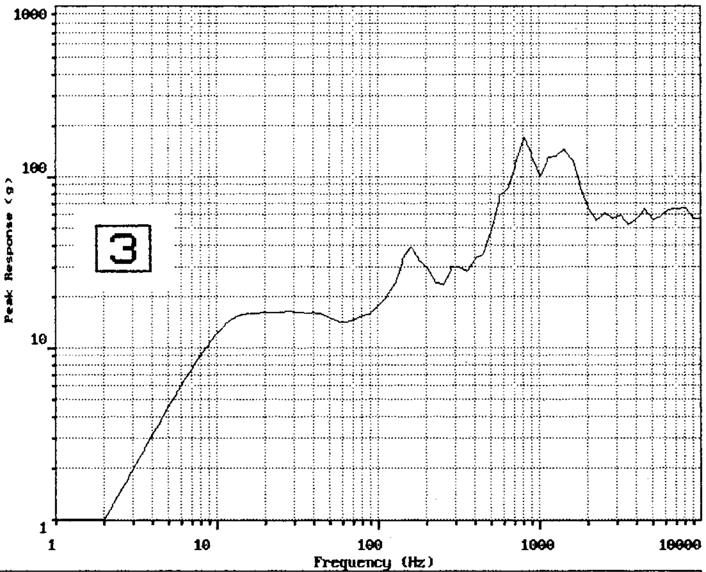
FIGURE 3. SRS of fixture, front to rear.

FIGURE 4. PSD of fixture, front to rear.



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	115.71 mS	-0.66 g's	-47.88 g's	12.48 In/s		12.8 mS
5	121.34 mS	1.88 g's	47.24 g's	4.10 In/s		12.8 mS
6	121.09 mS	-0.02 g's	79.61 g's	-8.82 In/s		12.8 mS
* 7	122.37 mS	-0.08 g's	-43.10 g's	8.92 In/s		12.8 mS





Channel Number	= 7	Model	= Acceleration
Damping	= 0.05	Plot	= 6th Oct.
Max Type	= Maxi-Max	Samples from Memory