

made during pre-test system checks. Unfortunately, the warnings were ignored by test personnel.

We cannot depend solely upon people to prevent test lab mishaps, mishaps that can cost money, that can cause schedule delays, that can embarrass management or that can cause injury.

We should investigate protective equipment that shuts down our shaker and prevents us from continuing with a test until we have corrected a faulty situation. The cost of such protection can seem small compared to the cost of damage prevented. Think of it as preventive medication. Think of it the way we think about fire and smoke alarms.

23.25 Intense noise testing

MIL-STD-810 and other standards have long required intense noise testing. Noise alone can simulate the acoustic inputs to external panels on aircraft and rockets, to front-end rocket guidance sections and to satellites or other cargo, that occur during lift-off and during transonic flight. On such large, soft structures only the very lowest frequency vibrations are mechanically conducted; “black boxes” sometimes better respond to noise. Noise (combined with vibration and temperature cycling) can simulate the captive carry environment for aircraft external weapons and stores.

Noise spectra may be described by graphs similar to Figure 23-24.

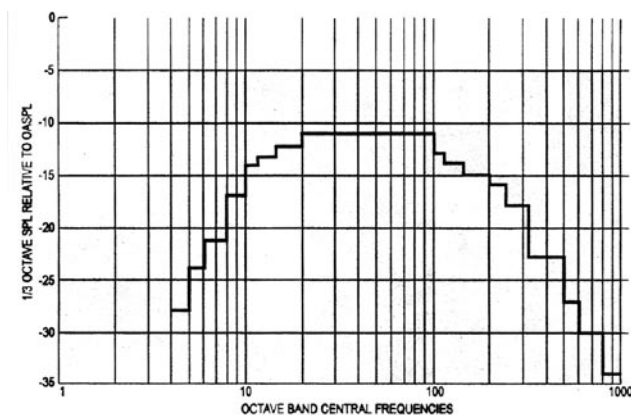


Figure 23-24 Intense noise test spectrum

The abscissa (x-axis) in such graphs is the center frequency (in hertz) of analysis bandwidth in octave (2:1 frequency increment) or fractional (such as 1/3) octaves. The ordinate is sound pressure

level (SPL) in dB. Levels are compared with the threshold of hearing, 0 dB, which you will recall is 20 micropascals.

Table 23-1 compares a wide-ranging variety of sound pressure levels, some of which you will have encountered.

$$\text{number of dB} = \frac{\text{number of Pa}}{000020\text{Pa}}$$

0.000020 Pa	0 dB	Threshold of hearing
0.00020 Pa	20 dB	Recording studio
0.0020 Pa	40 dB	Quiet library
0.02 Pa	60 dB	Conversation
0.2 Pa	80 dB	Typical library
2 Pa	100 dB	Symphony orchestra
20 Pa	120 dB	Aircraft takeoff
200 Pa	140 dB	Pain
2,000 Pa	160 dB	Rocketry
20,000 Pa	180 dB	Valve throat

Table 23-1 Decibel comparison table

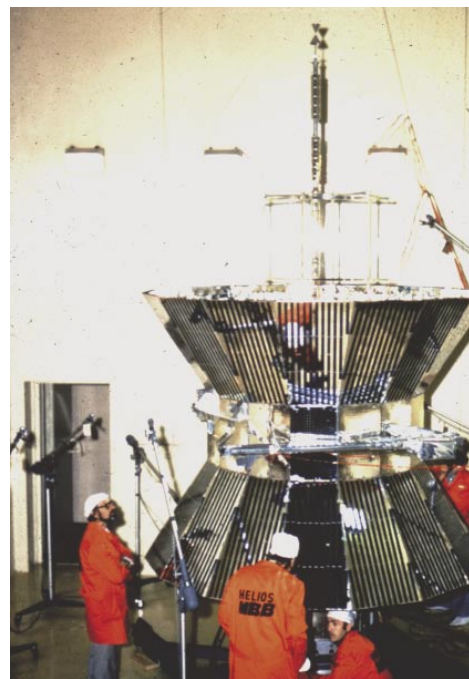


Figure 23-25 Satellite being prepared for intense noise testing (courtesy JPL)

Intense noise tests are conducted in a reverberant (hard-walled) room, as in Figure 23-25. Note the microphones at various locations to (during the test) check the SPL. Their outputs are usually averaged