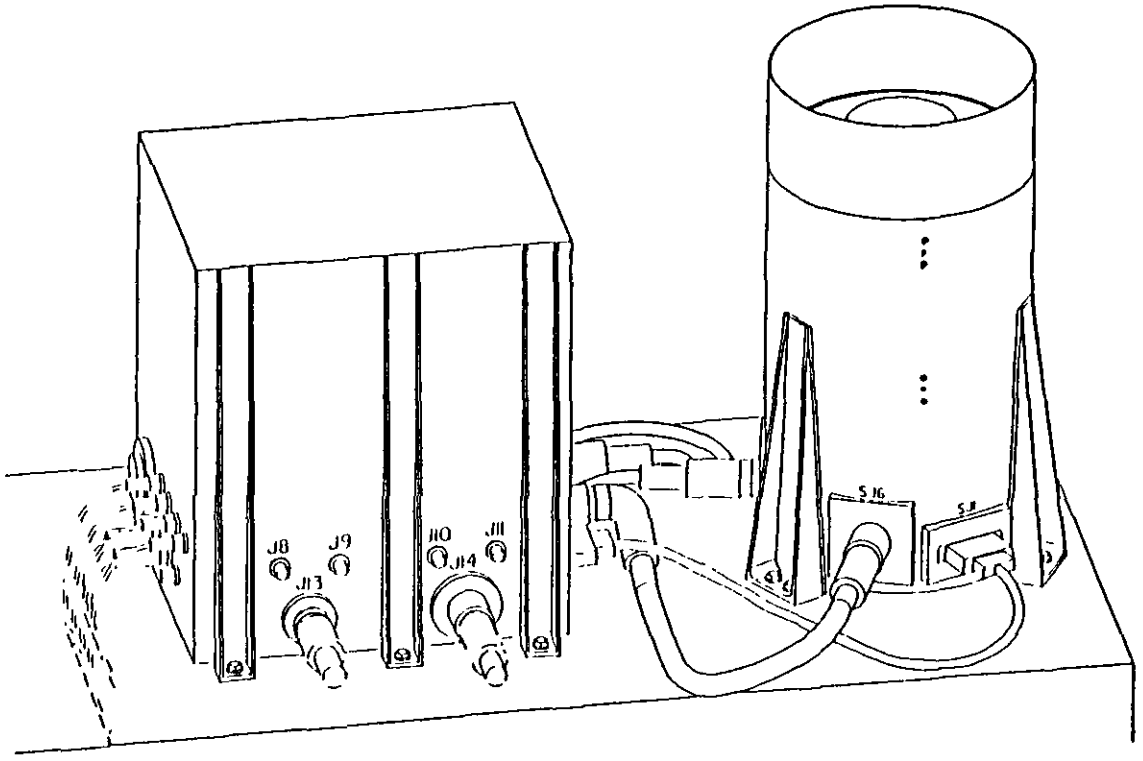
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Structures and Dynamics Laboratory

Brad T. Perkins
Vibroacoustics and Data Analysis Branch
October 1993

LIGHTNING IMAGING SENSOR (LIS)



TROPICAL RAIN MEASUREMENT MISSION (TRMM) CONFIGURATION

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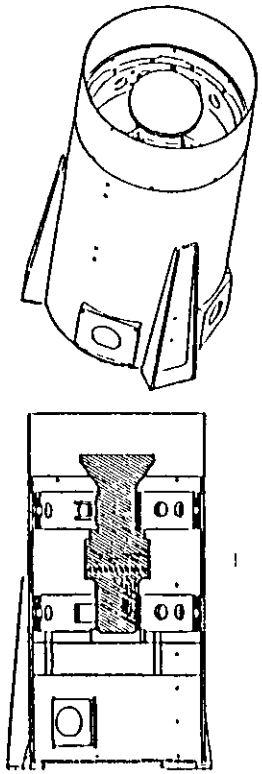
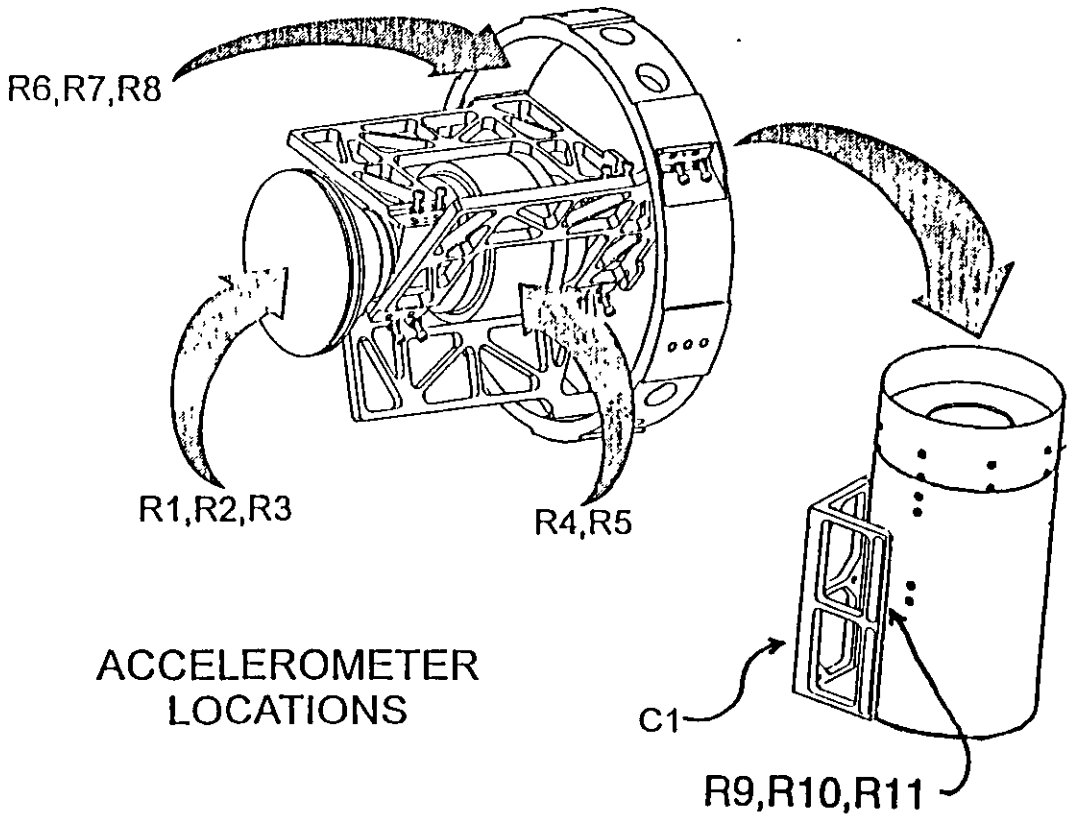
SENSOR CONFIGURATIONS





TRMM (OLD STRUT DESIGN) **OPTICAL TRANSIENT DETECTOR (OTD)**

Brad T. Perkins
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OTD RANDOM VIBRATION ISSUE

- EB23 has concerns relative to the functional aspects of the lens assembly and local board-mounted electrical components as a result of environment/load increases
- ICD random vibration criteria (derived by OSC) is maximum-predicted +3 dB and is based on FEM response (for 20-200 Hz) and MIL-STD-1540B (for 200-2000 Hz) envelope for all three axes
- This generic approach provides a great amount of conservatism in the shelf's in-plane axes above 200 Hz

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MSFC APPROACH

- **ED23 criteria is derived from Orbital Sciences finite element model predictions below 200 Hz and response data from honeycomb panel exposed to Pegasus acoustic environment at MSFC**

CRITERIA FOR MICROLAB SHELF
ALL THREE AXES

		20	Hz @	.02	G^2/Hz
20	-	50	Hz @	9.8	dB/Oct
50	-	110	Hz @	.4	G^2/Hz
110	-	200	Hz @	-30.1	dB/Oct
200	-	500	Hz @	.001	G^2/Hz
500	-	600	Hz @	22.8	dB/Oct
600	-	2000	Hz @	.004	G^2/Hz

Composite: 6.29 G's RMS

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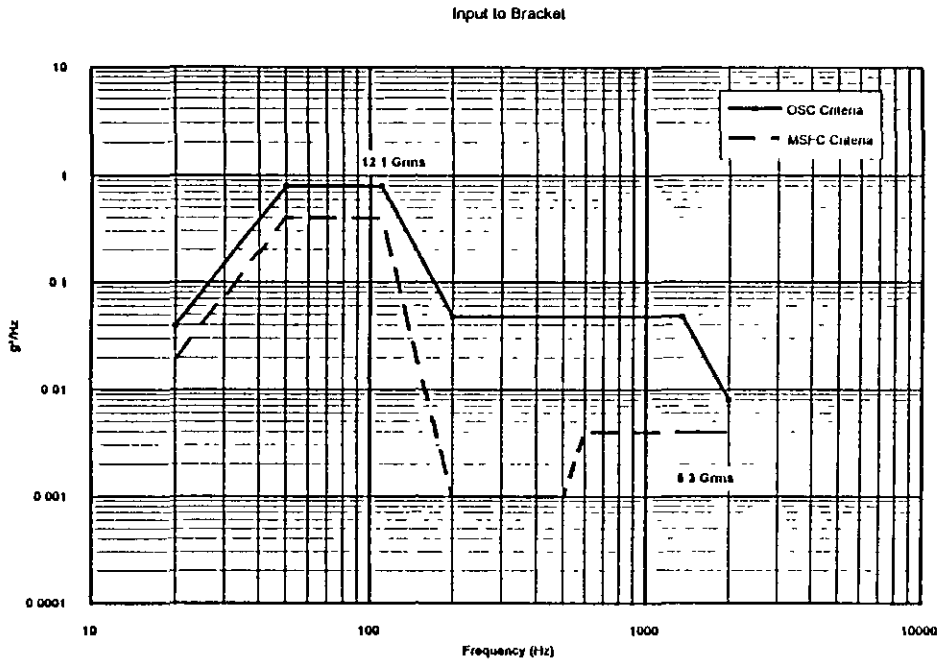
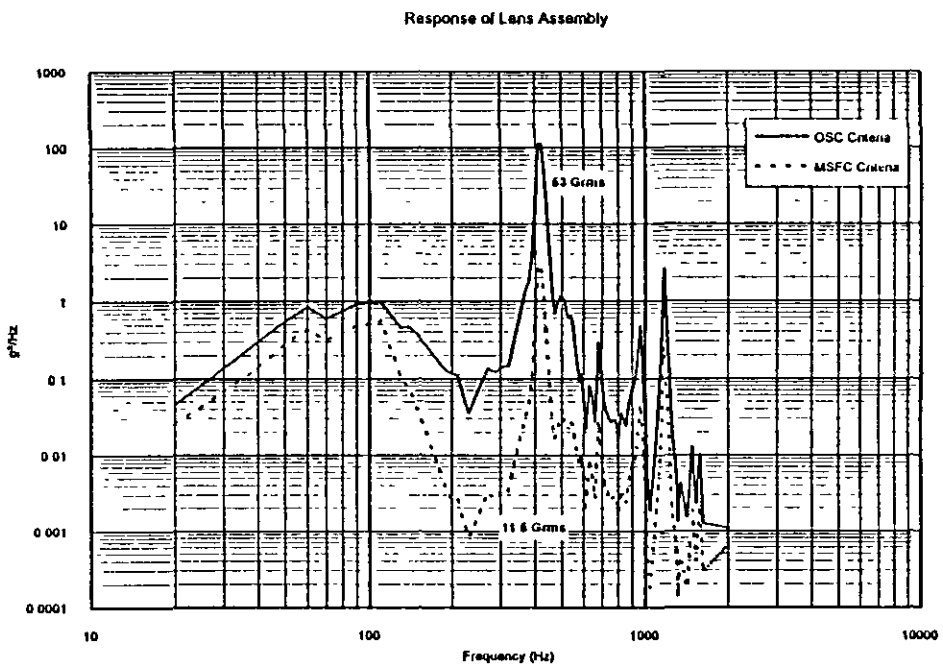
DATA COMPARISON





RECOMMENDATION

- ED23 recommends testing to the newly derived criteria
  - Use one criteria for all three axes
  - Test duration will be 60 seconds per axis
- This criteria provides protoflight qualification for the random vibration environment

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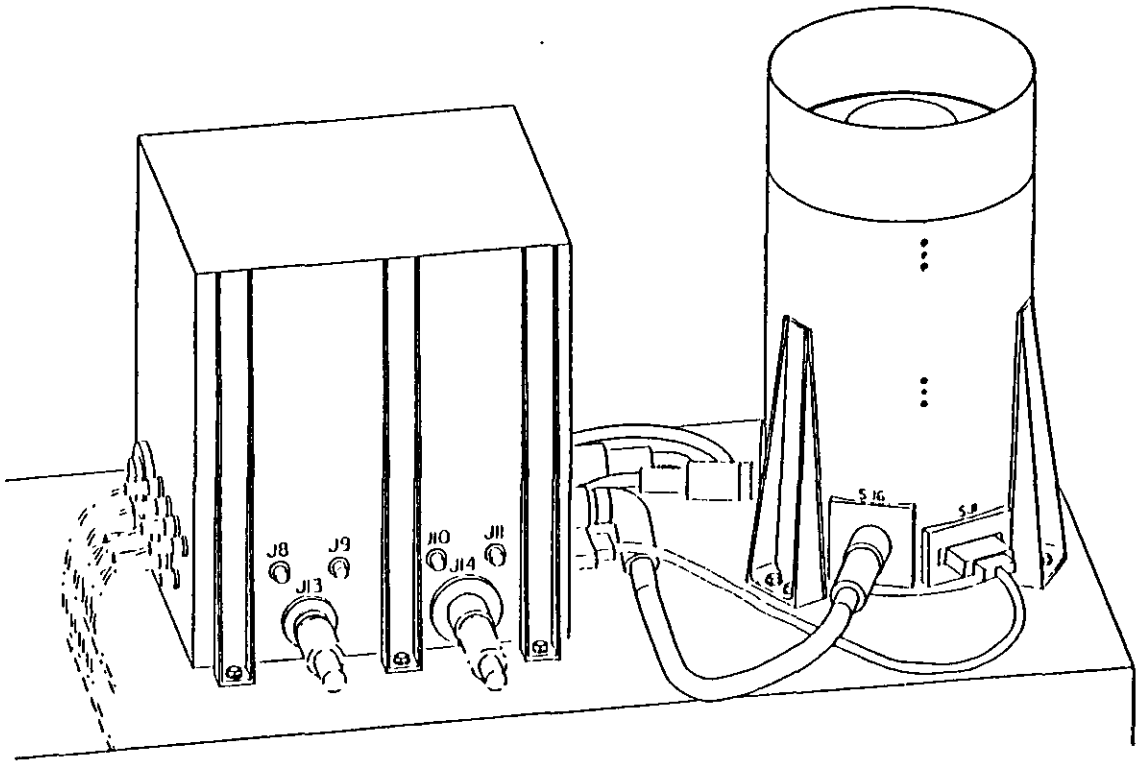

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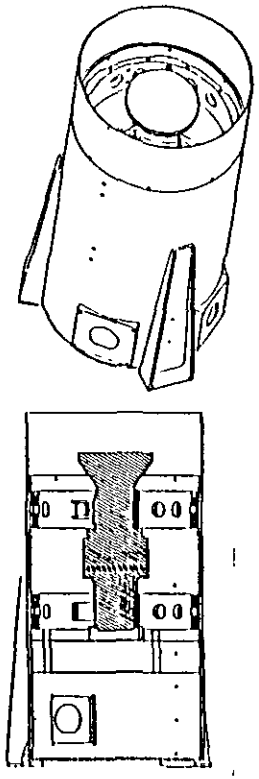

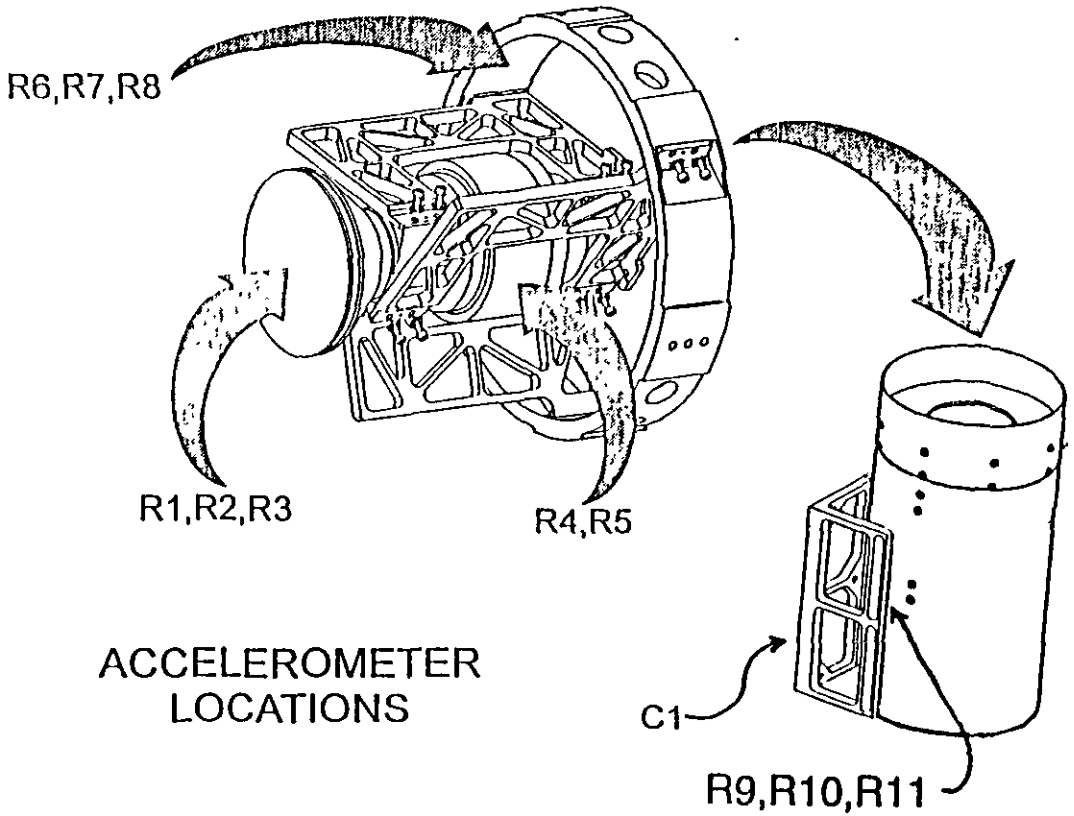

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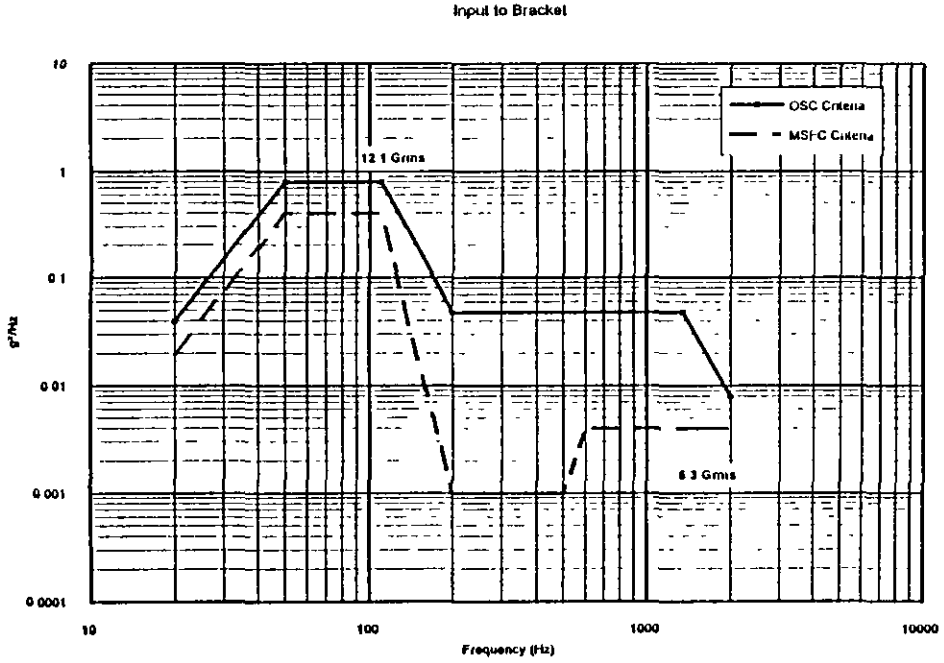

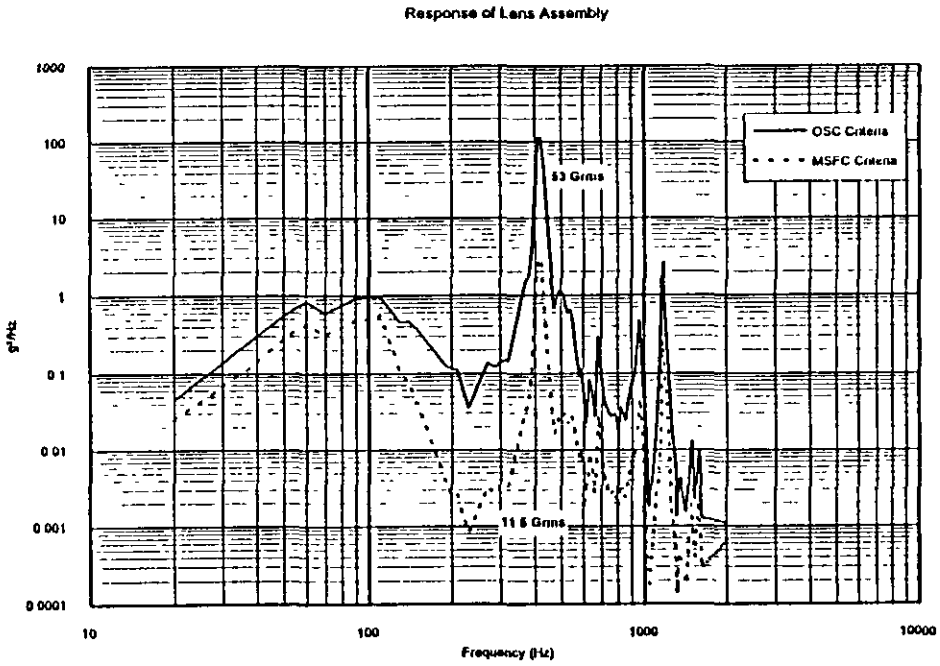

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