Latching Lightband for fairing release, staging and payload separation

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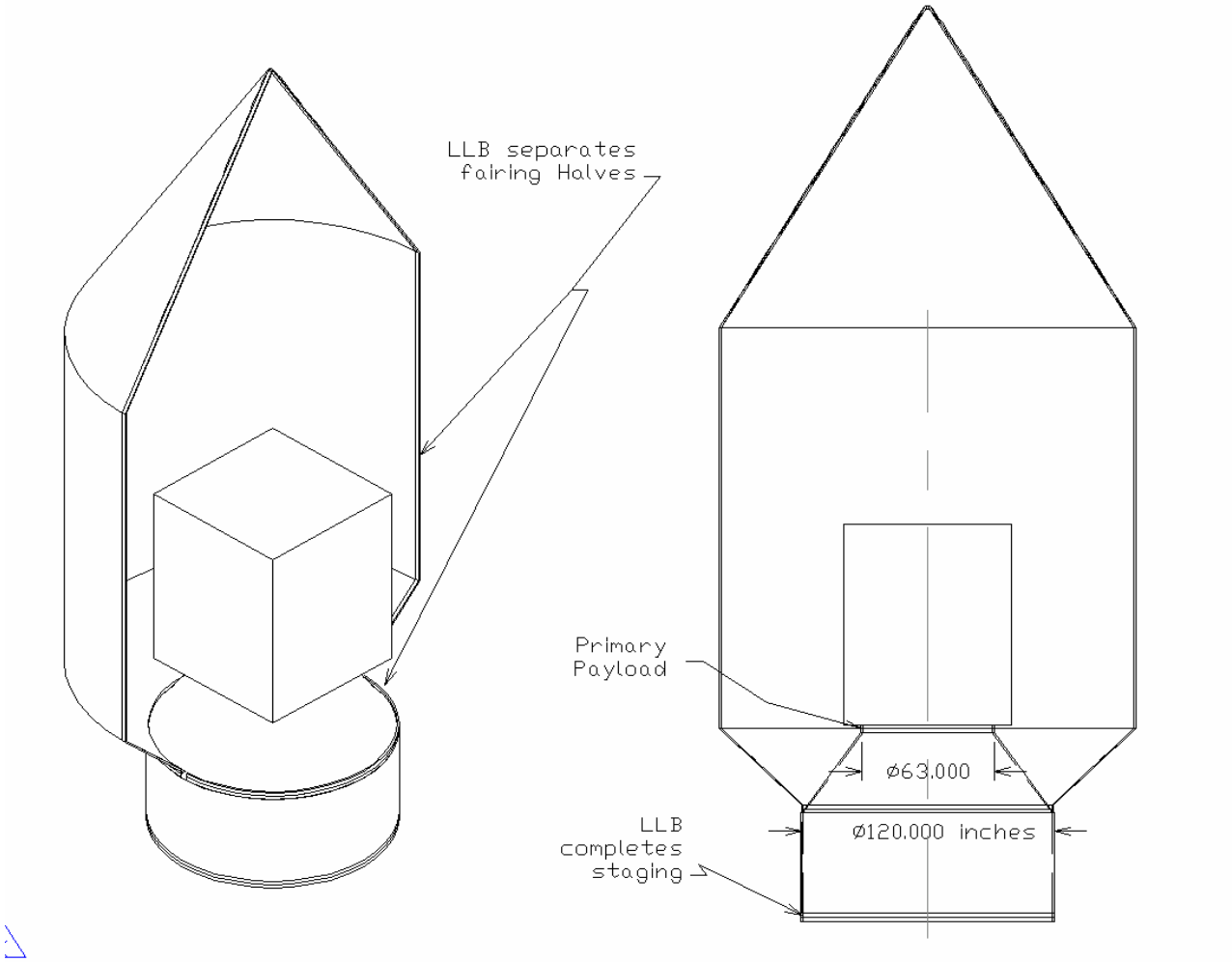
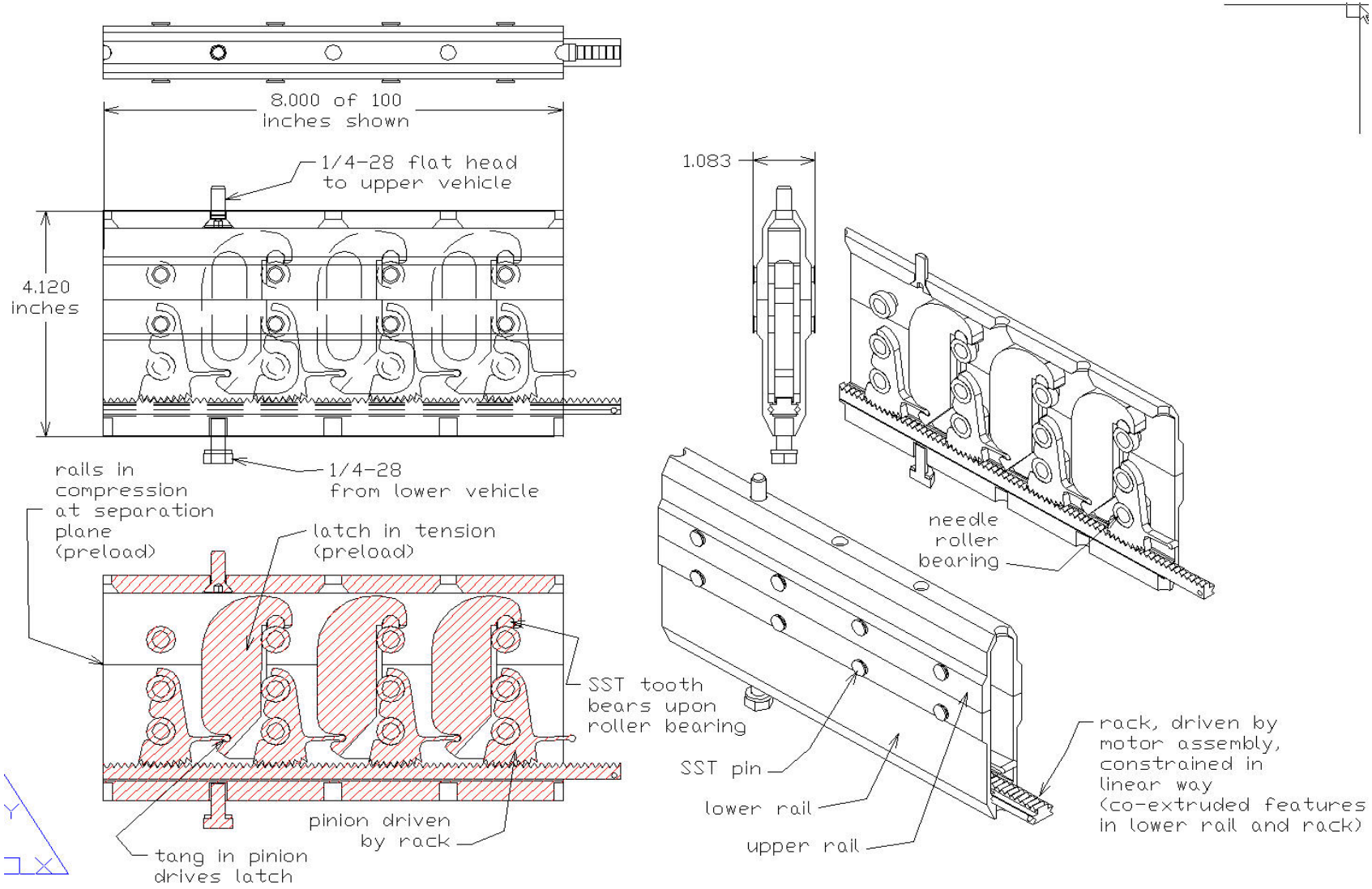
Applications

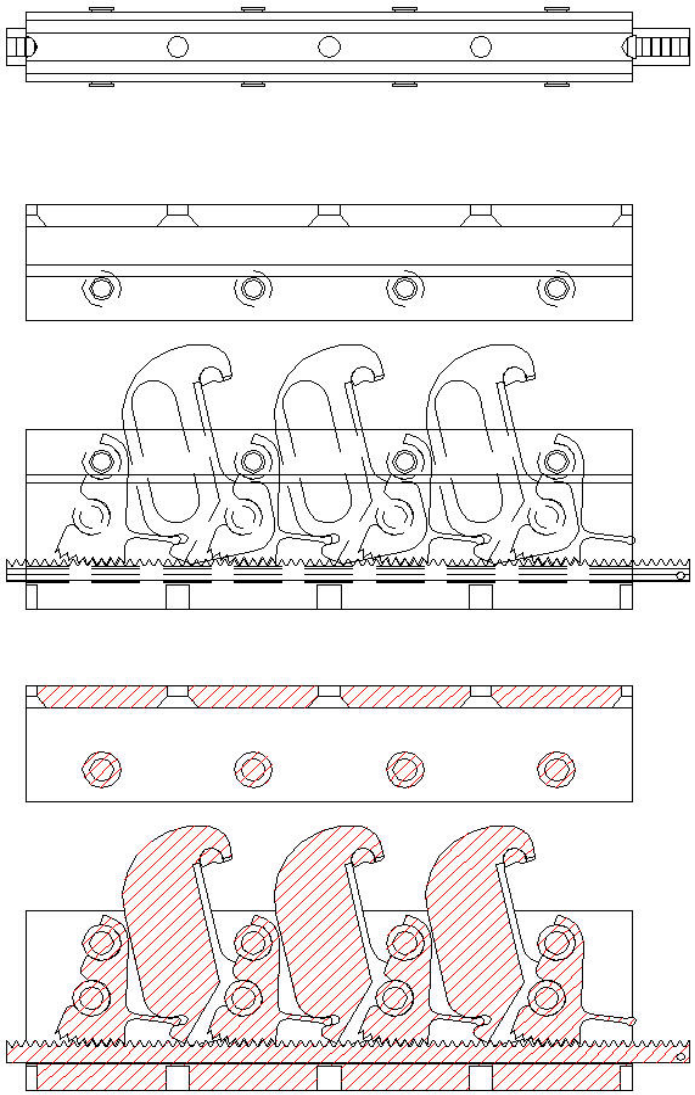
- The Latching Lightband (LLB) is a separation system for straight seams, curves and large diameters
  - Launch vehicle fairings
  - Launch vehicle staging
  - Payload separation

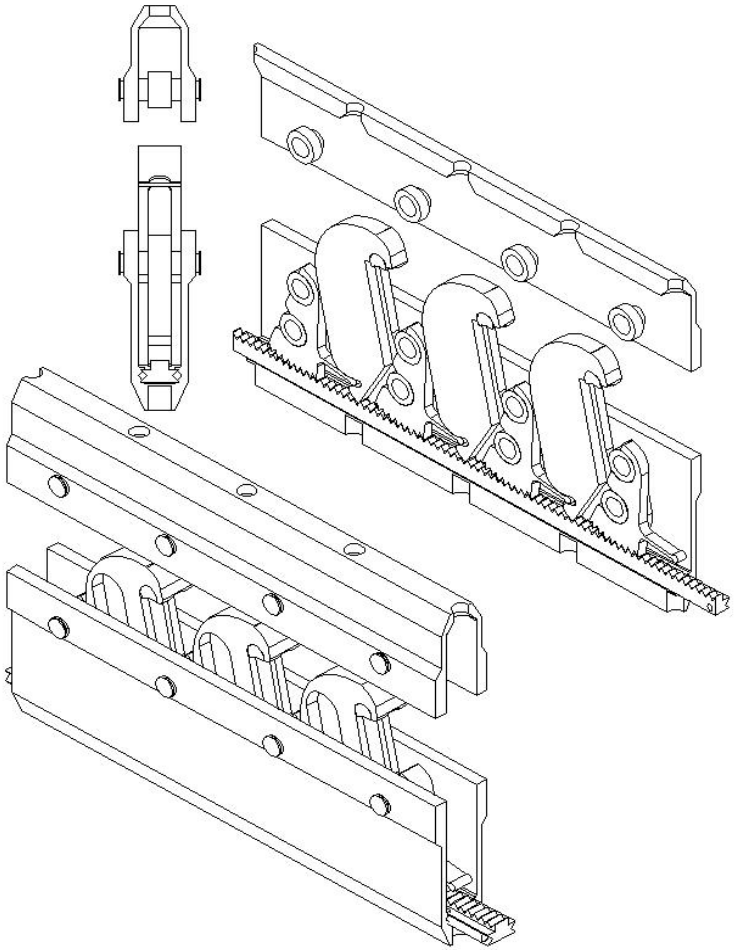


Set for Flight



LLB separating





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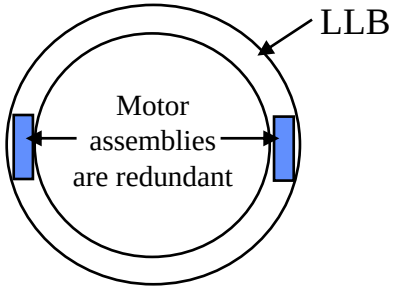
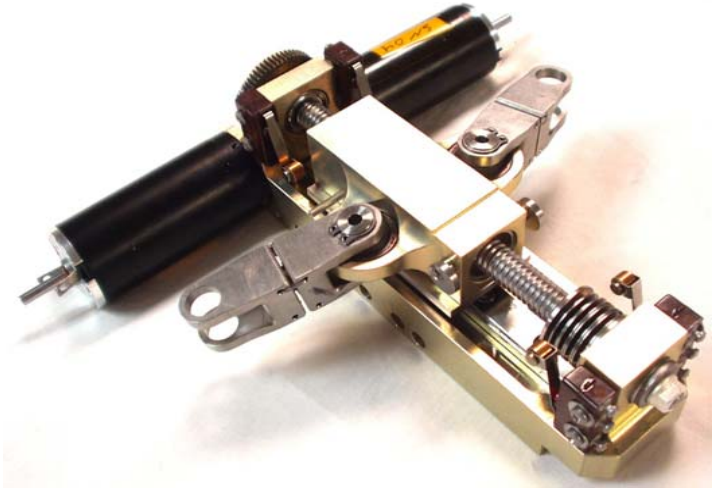
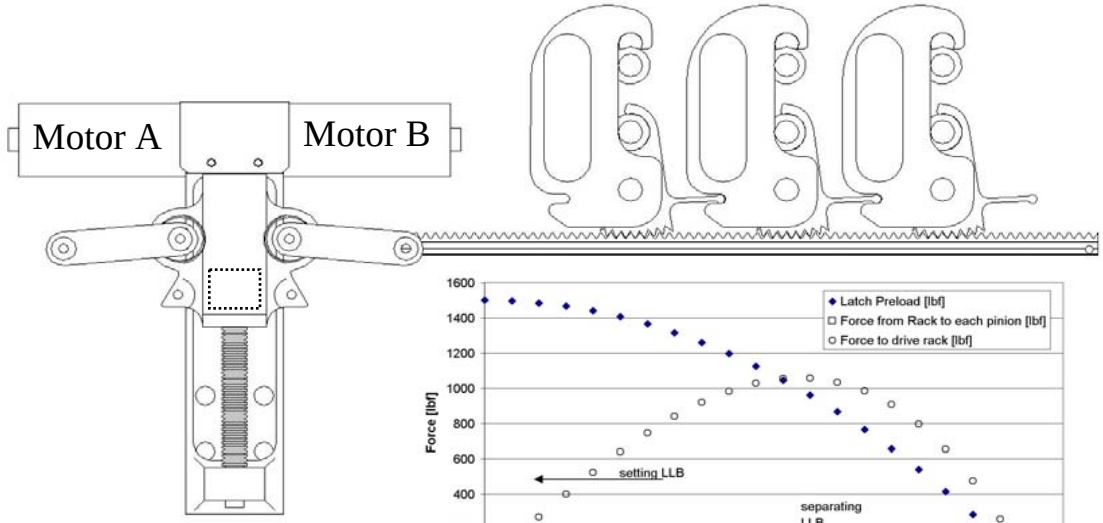
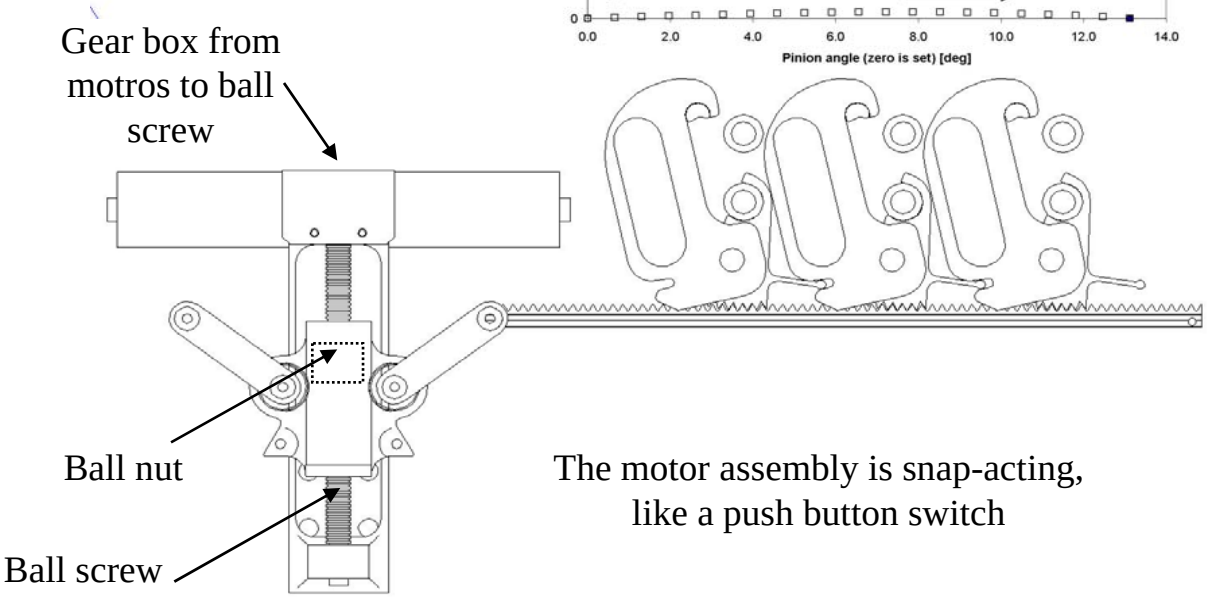
Motors initiate separation (reverse voltage to set)





Motor assembly from Motorized Lightband (MLB)

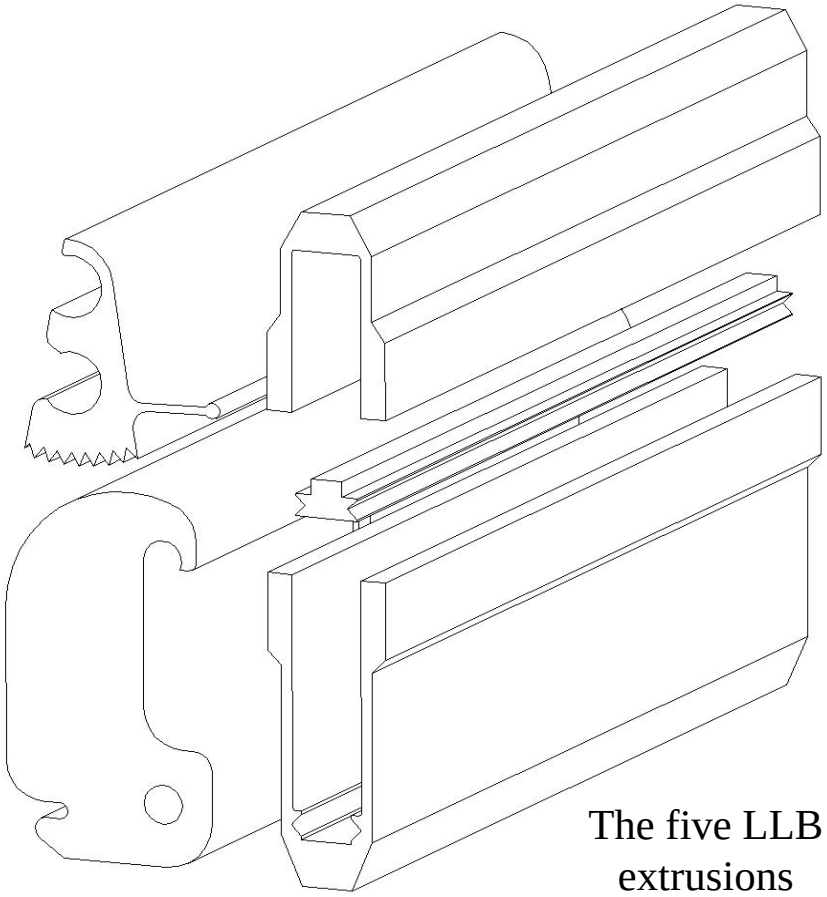




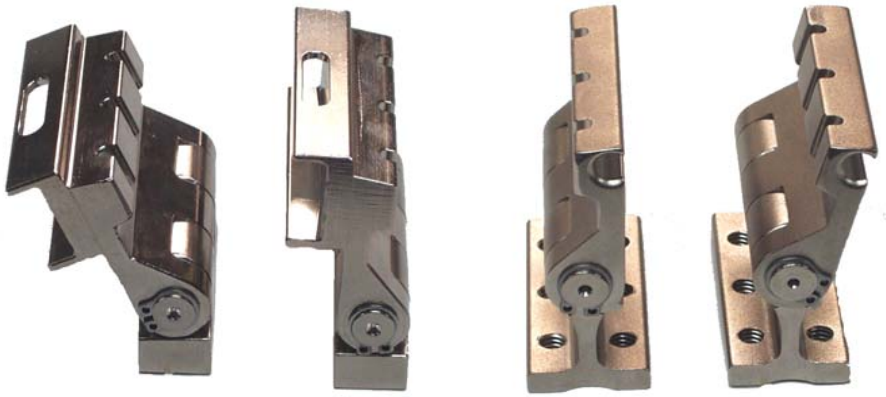
The motor assembly is snap-acting, like a push button switch

Extrusions are enabling technology

- Aluminum extrusions are inexpensive and precise
  - $1.50/foot
  - Standard deviation on dimensions <0.0005 inches



The five LLB extrusions



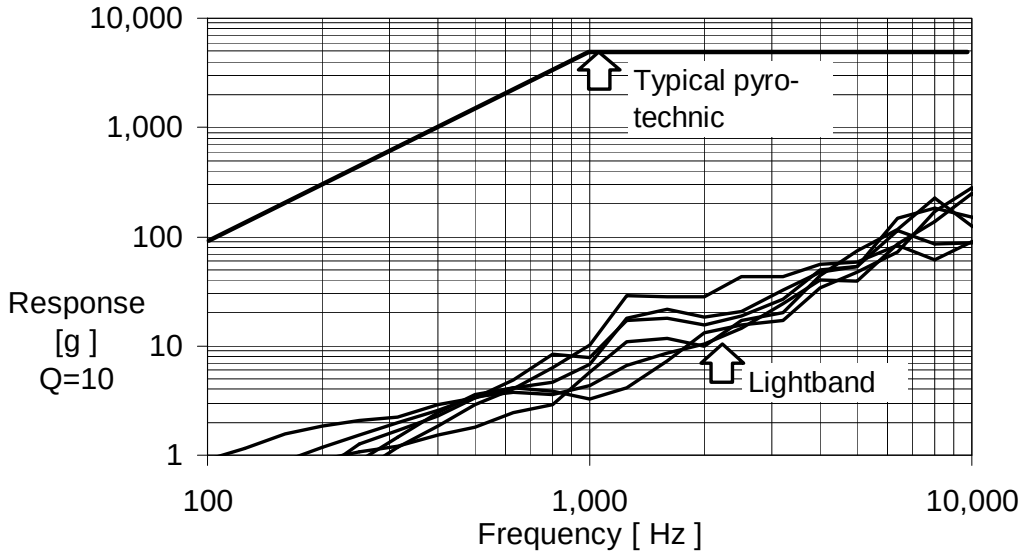
Deployed Set for flight

Leaves used on Motorized and Standard Lightband:

PSC understands how to make high performance mechanisms from inexpensive extrusions!

LLB shock

- By similarity, the shock generated by the LLB is expected to be close to the shock of other Lightbands
- The shock source in the LLB is the sudden release of preload of the latches, just prior to mechanical separation
  - Since shock comes from each latch it will not be concentrated at one location
  - The mechanisms in the LLB are expected to consume a substantial amount of the shock energy and convert it into useful motive force to unlatch.



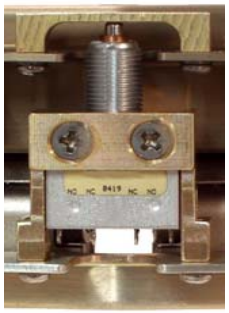
The LLB shock is expected to be like that of the other Lightbands

PSC will measure shock in upcoming tests of the LLB

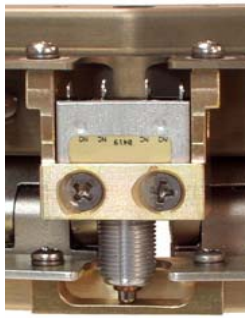
Subsystems can be added

- Taken from the PSC's other Lightband products

Separation Switch Switch power on or off as a function of separation.



On lower rail



On upper rail

Separation Electrical Connectors
Zero-force pins for ultra low tip-off.
Guide pins guarantee alignment.

EMI gasket

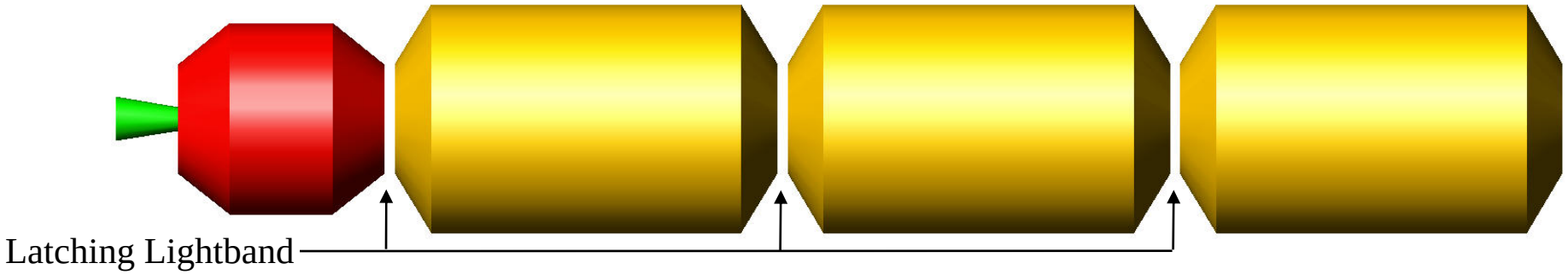
Separation Springs Impart separation velocity and cause alignment during mate.

LLB Benefits

- Much lower cost than competing technology
  - Explosive frangible joints
  - V-bands
  - Separation bolts
- Completely re-useable
  - The use of electric motors to initiate separation eliminates all consumables
  - Can test what you fly and fly what you test
  - Cost cutting technology for re-useable launch vehicles
- Easy to use
  - The initiation motors are also used to set for flight
  - Precise preload is automatic
  - No training, non-standard tools or load cells required
- Low shock
- Non-pyrotechnic
- Pyro-pulse compatible
- Preload is independent of temperature

Other Applications

- Separating space station components from an Atlas V or Delta IV
- Joining and separating large cylinders
  - Joining and separating large cylinders in space
  - Large missions beyond Earth (Moon and Mars) will require joining and separating vehicles in orbit
  - Fuselage joining
- Bulkhead door operation
  - The capacity to add O-ring features on the rail allows the LLB to be a sealed-bulkhead



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PSC will succeed at LLB development, validation and commercialization

- Standard and Motorized Lightband was all of the above
  - Presently assembling 35th Lightband
  - Space flight validation in 2001
  - 15 Lightbands manifested on 6 different launch vehicles
- PSC is capitalized to make separation systems
  - Excellent development laboratory
  - Trained personnel
  - Qualified vendors

PSC's Motorized Lightband has been manifested on 7 upcoming missions.

PSC has provided space flight hardware to:

Lockheed Martin, Air Force Research Labs, Micro Sat Systems Inc., NASA GSFC, Cal Poly, CSA, Muniz Engineering, NRL, Space X, Aero Astro, Starsys, Orbital and Boeing