

“Failure is Always an Option”

- Various launch vehicle failures (video only)
- STS 51-L - Challenger
- STS 107 - Columbia
- AMROC SET-1

© 2024 University of Maryland - All rights reserved
<http://spacecraft.ssl.umd.edu>

Atlas Launch Failure



AtomCentral.com



Titan 34D Failure



Antares OA-3 Launch



SpaceX AMOS-6 Static Test Fire



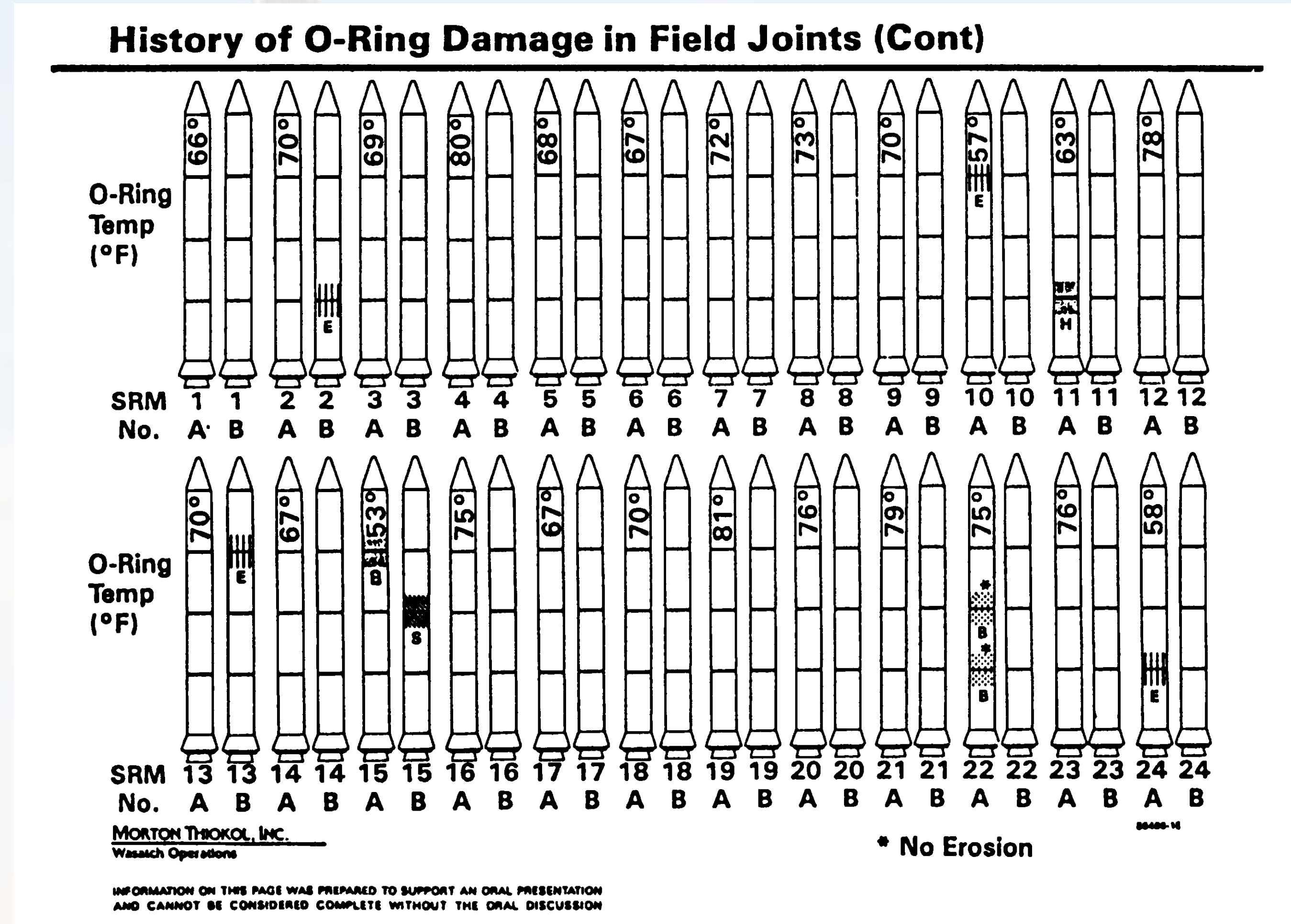
“How Not to Land an Orbital Rocket”



January 28, 1986



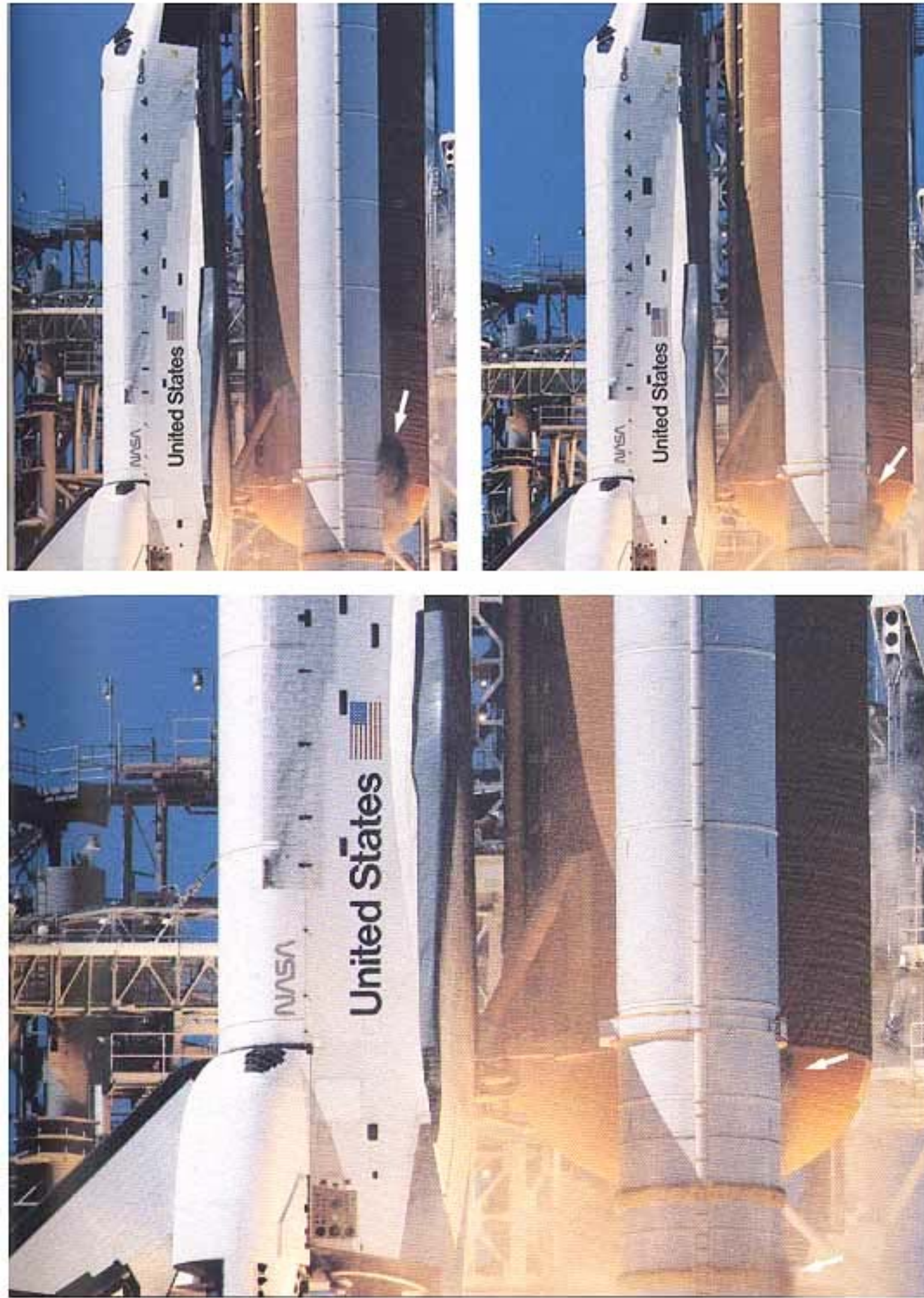
Review Slide - STS-51L L-1 FRR



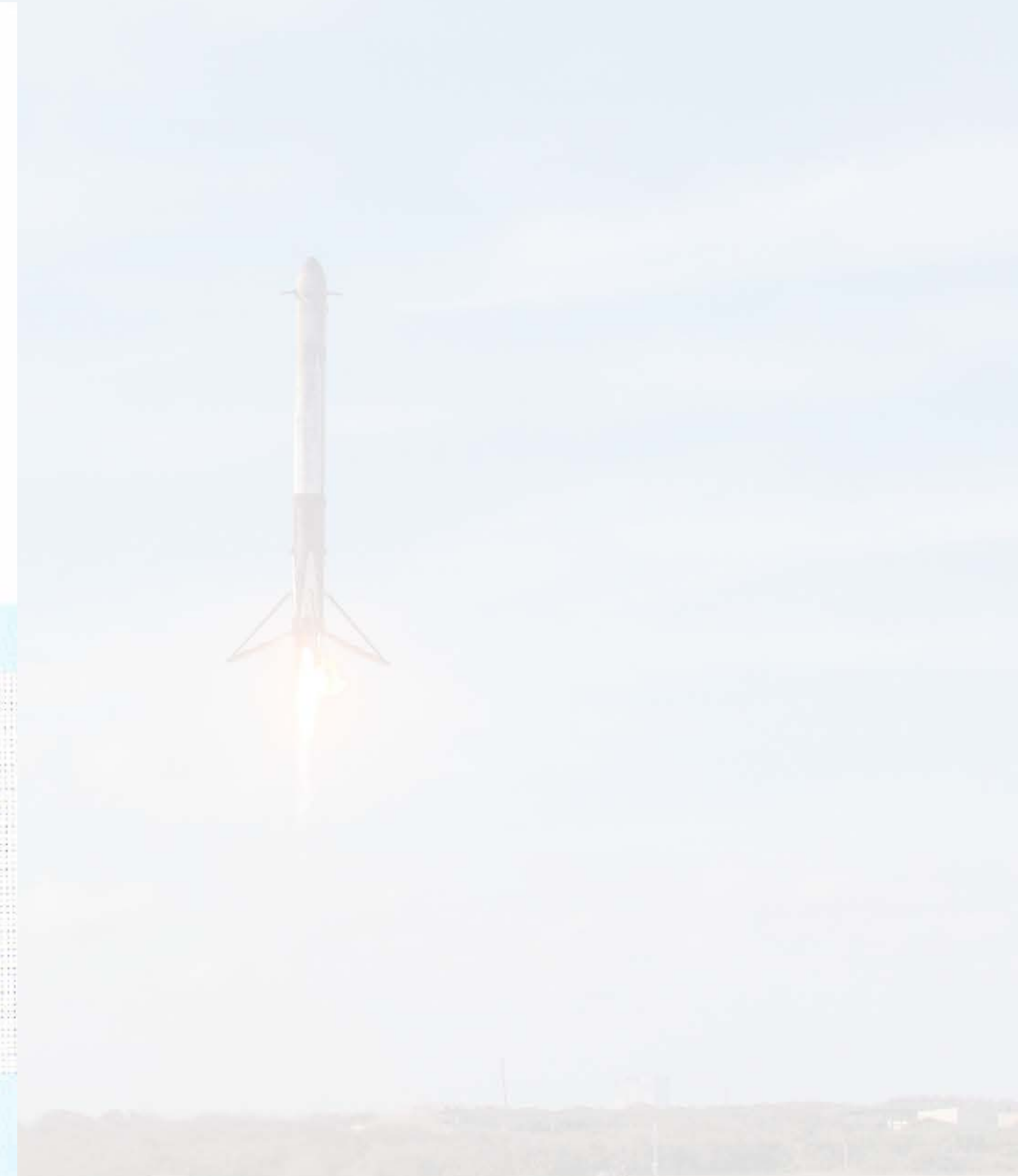
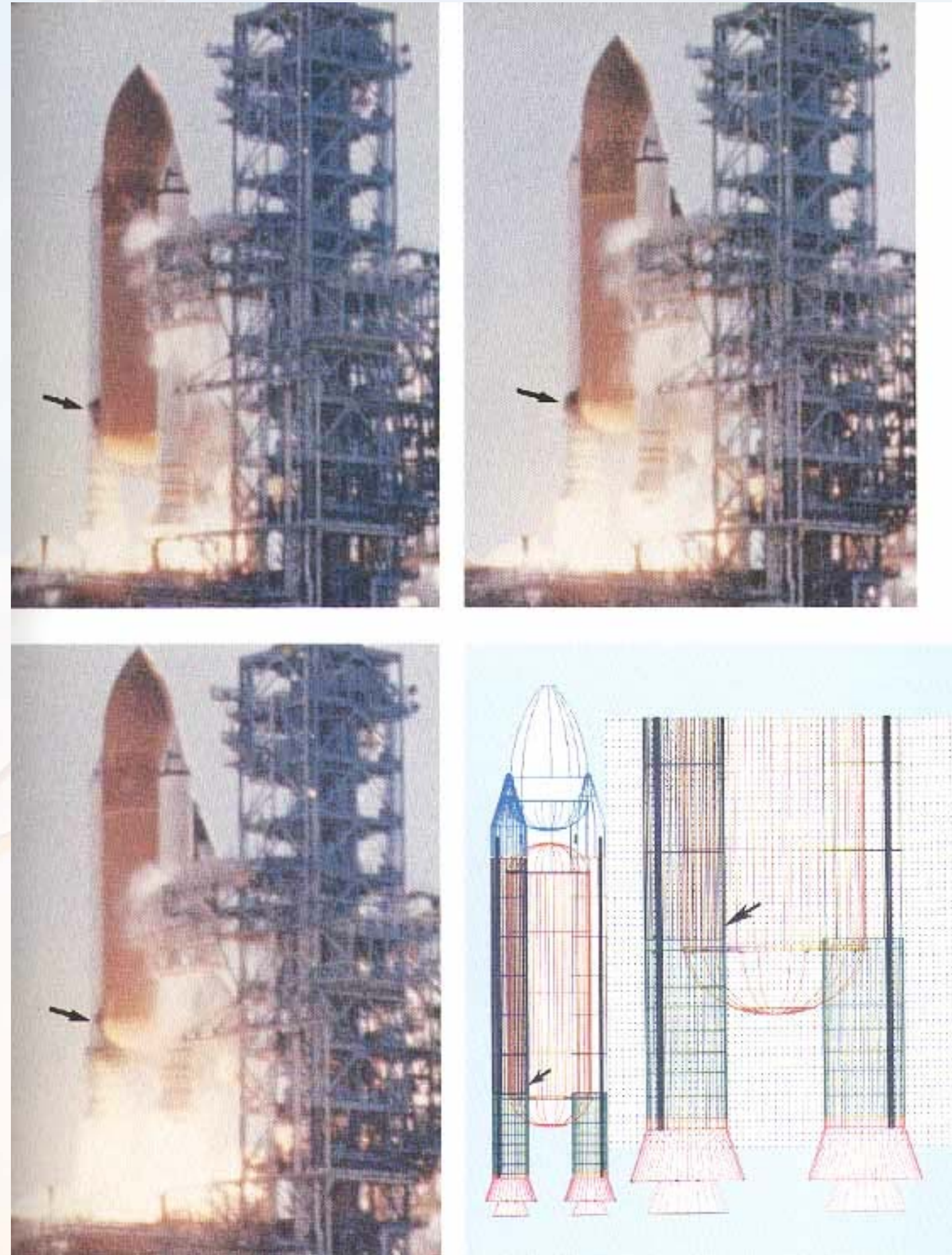
From Edward R. Tufte, *Visual and Statistical Thinking: Displays of Evidence for Making Decisions*
Graphics Press, 1997

Black Smoke Plumes from Aft Field Joint

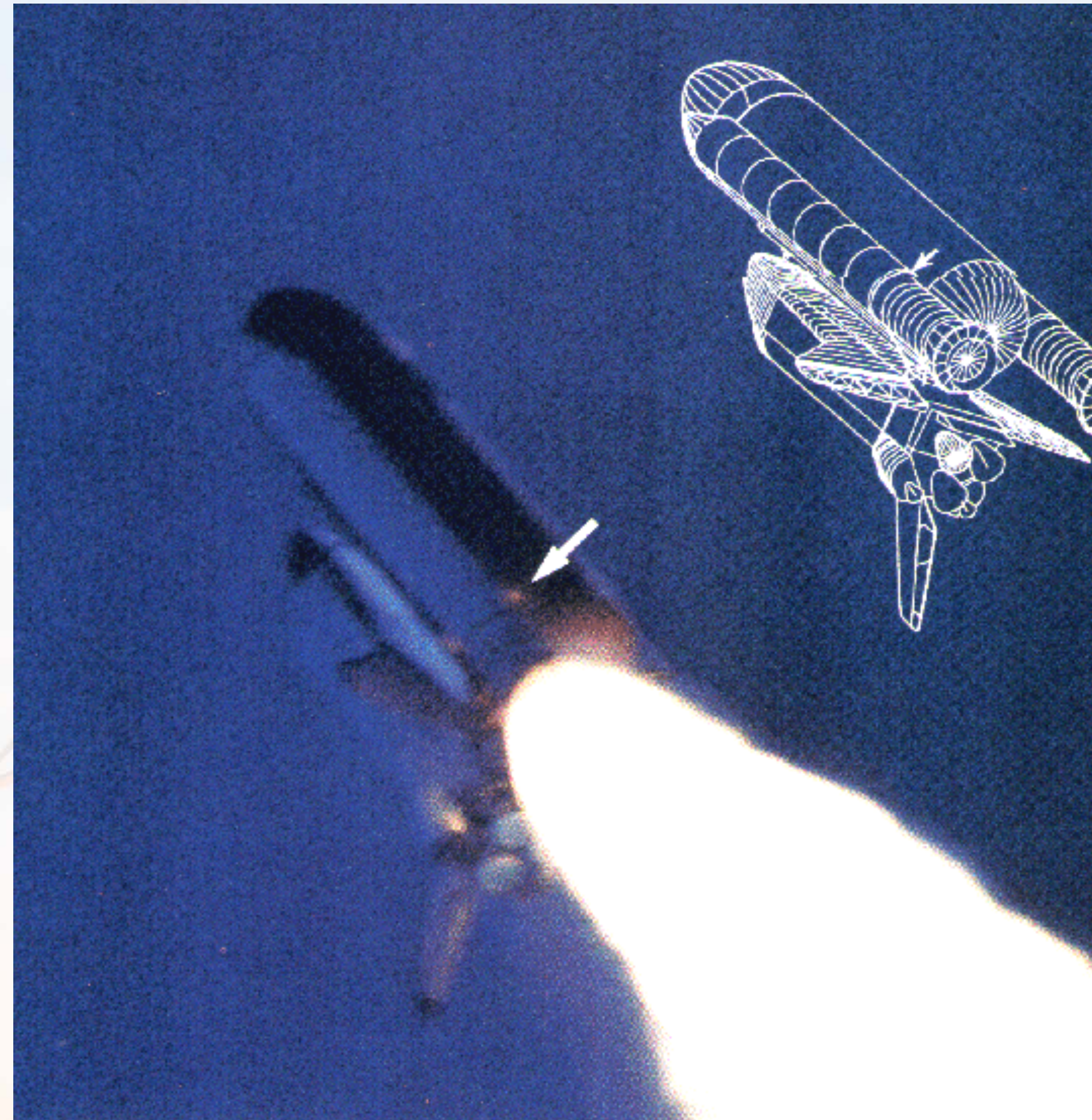




Photographic Evidence



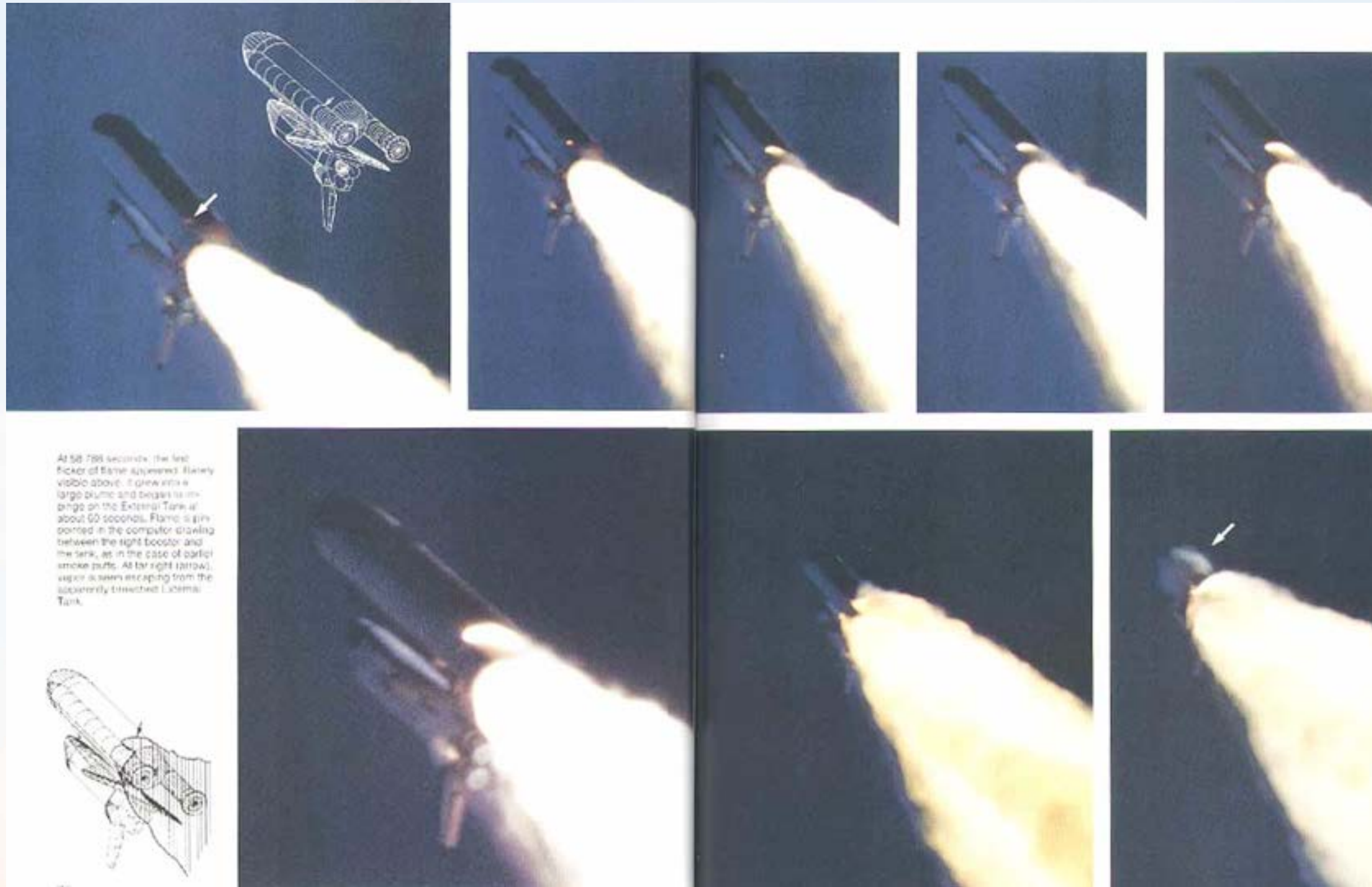
T+58 sec - Appearance of External Flame



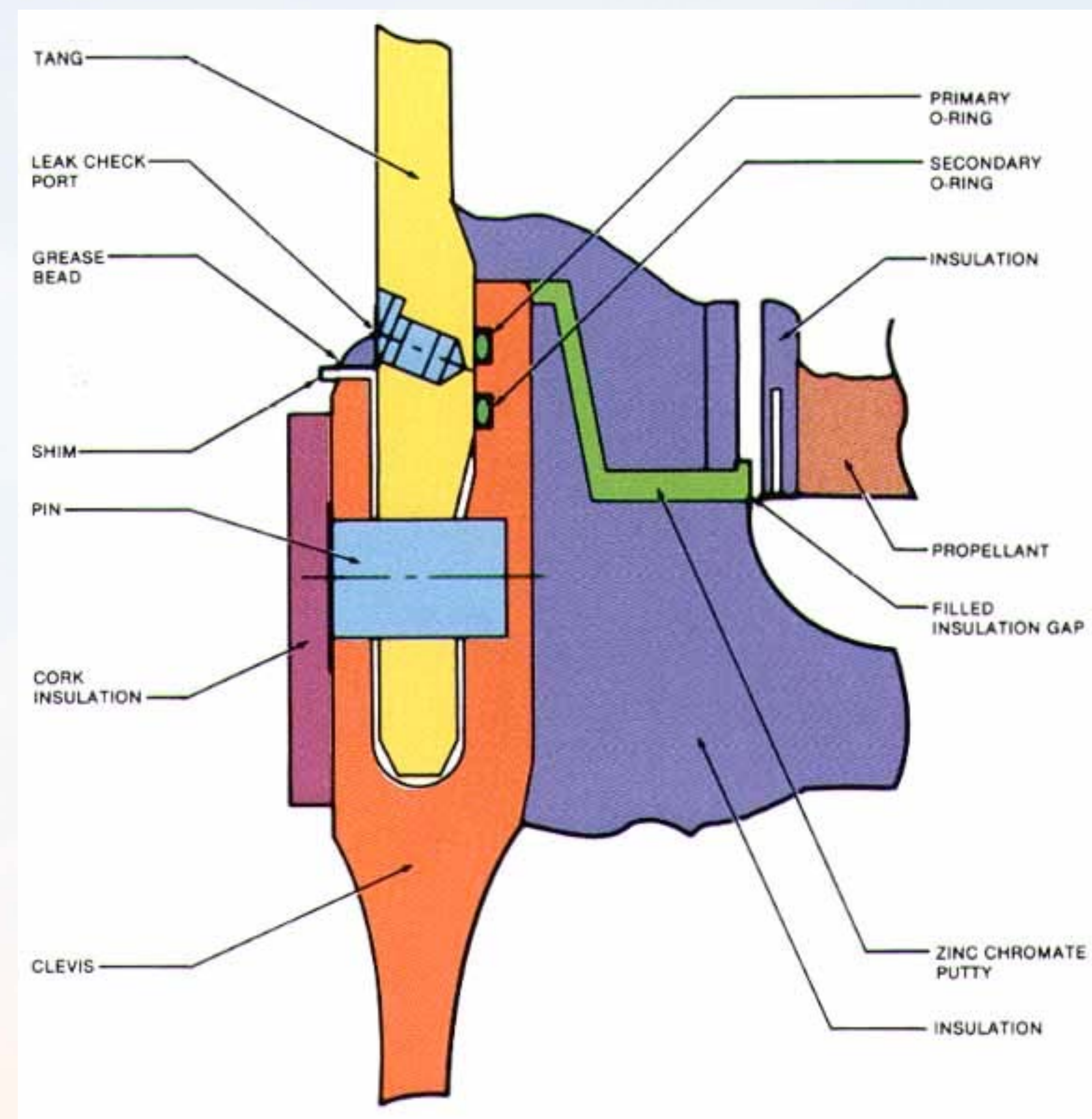
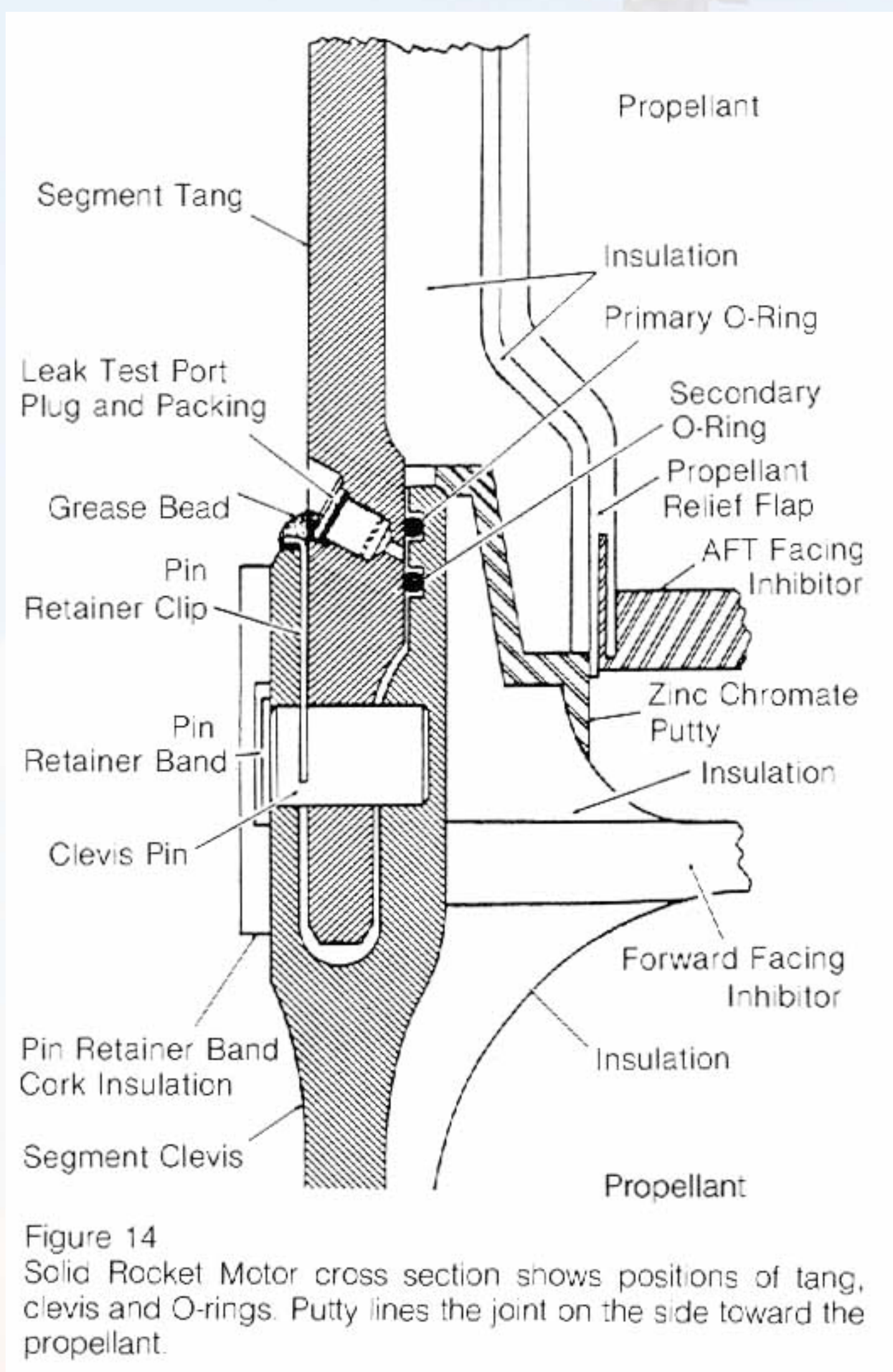
Flame Hitting Aft Attach Fixture and ET



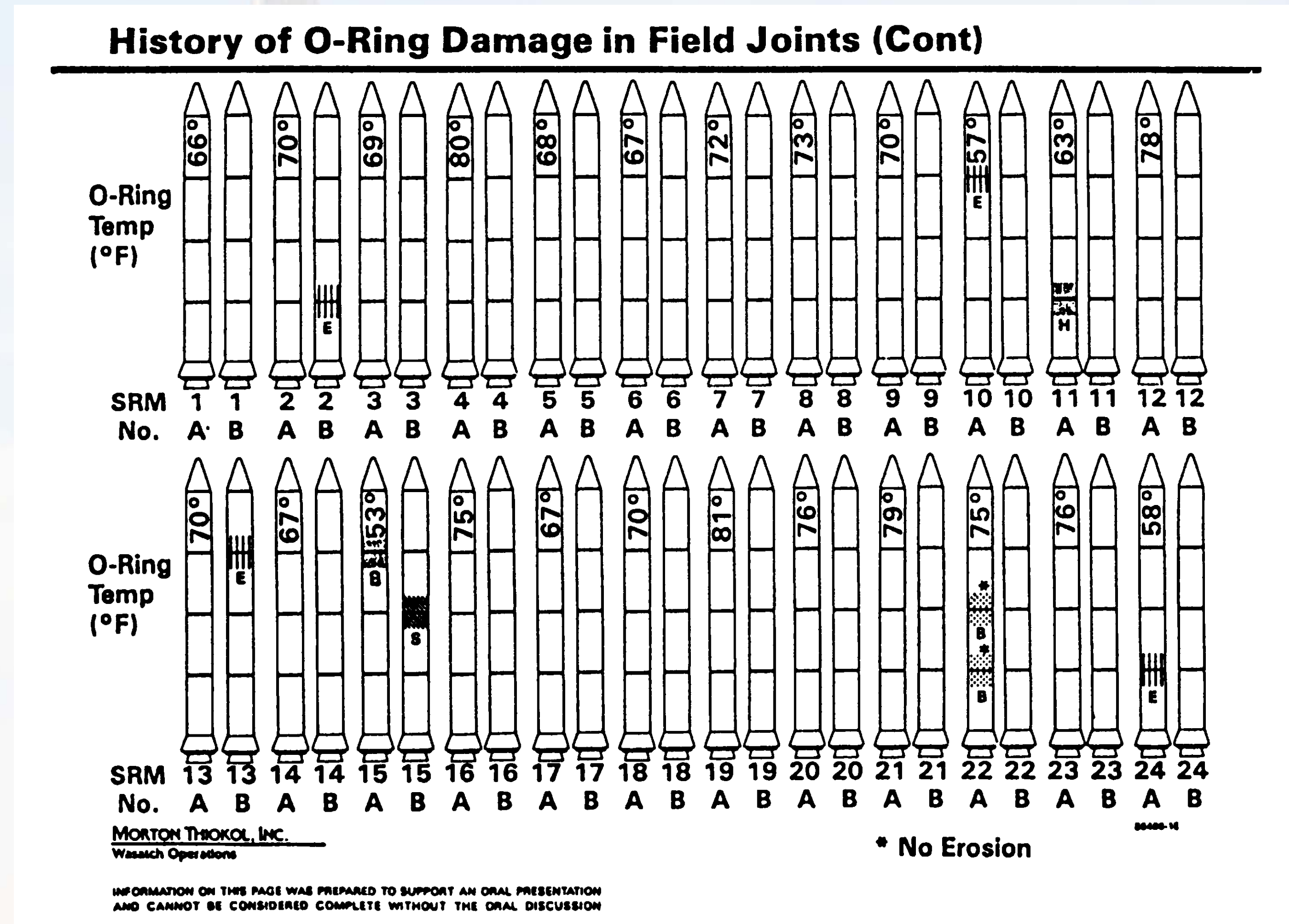
Progression of SRB Burn-through



Original SRB Field Joint Design

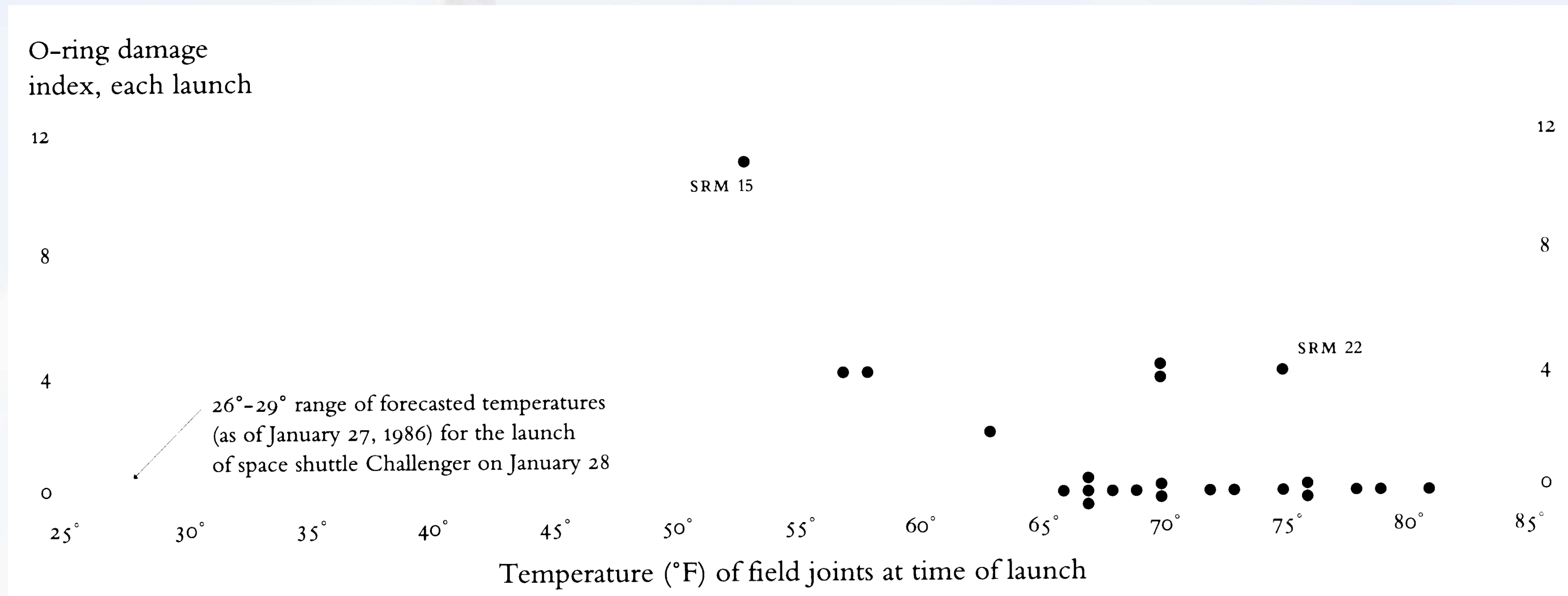


The Slide That Was Presented



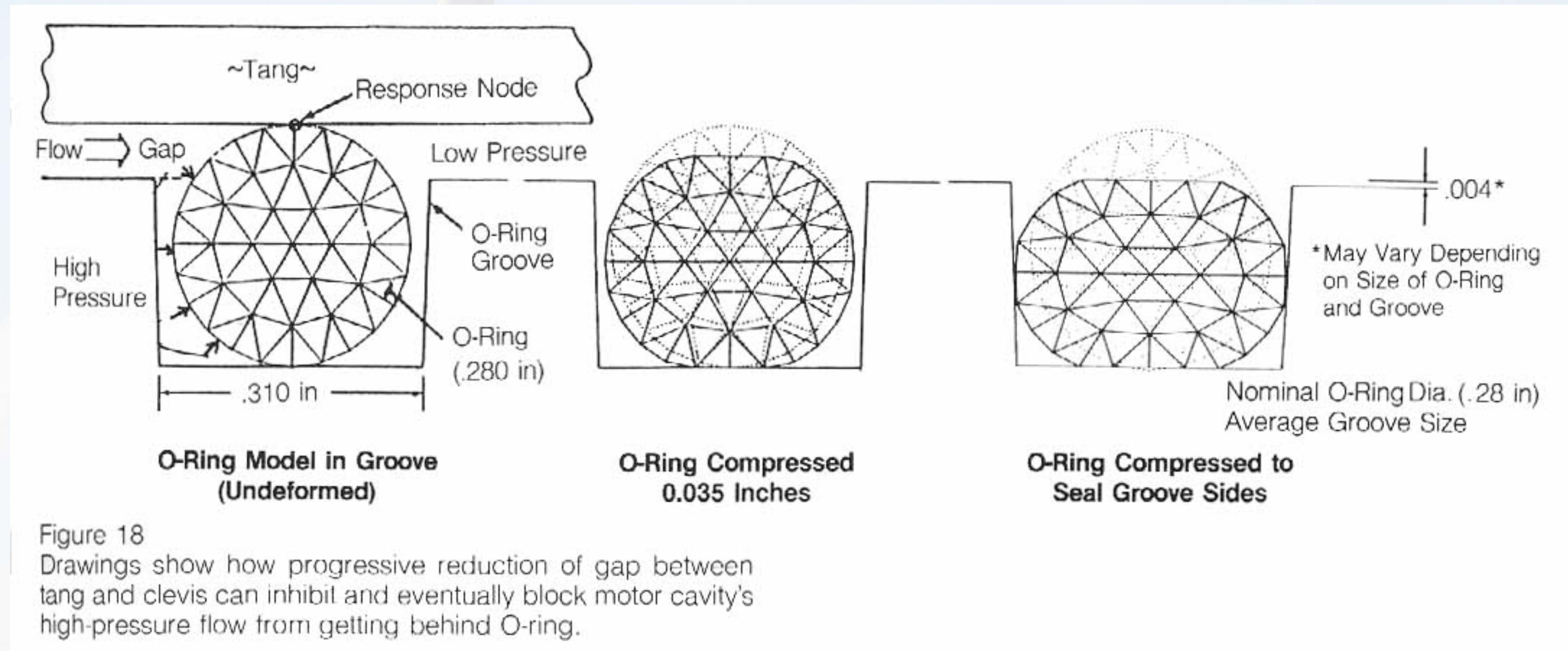
From Edward R. Tufte, *Visual and Statistical Thinking: Displays of Evidence for Making Decisions*
Graphics Press, 1997

The Slide That Should Have Been...

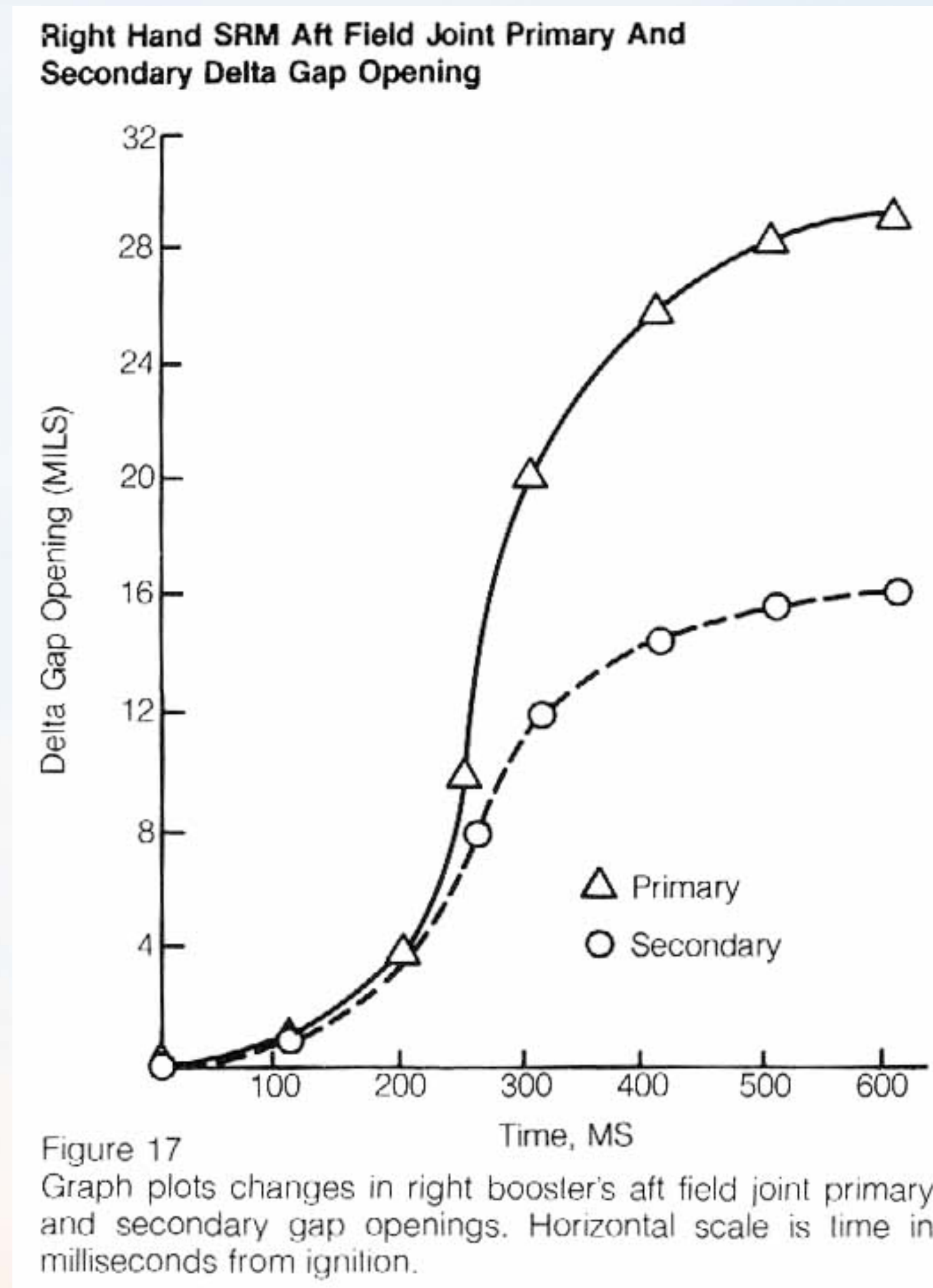
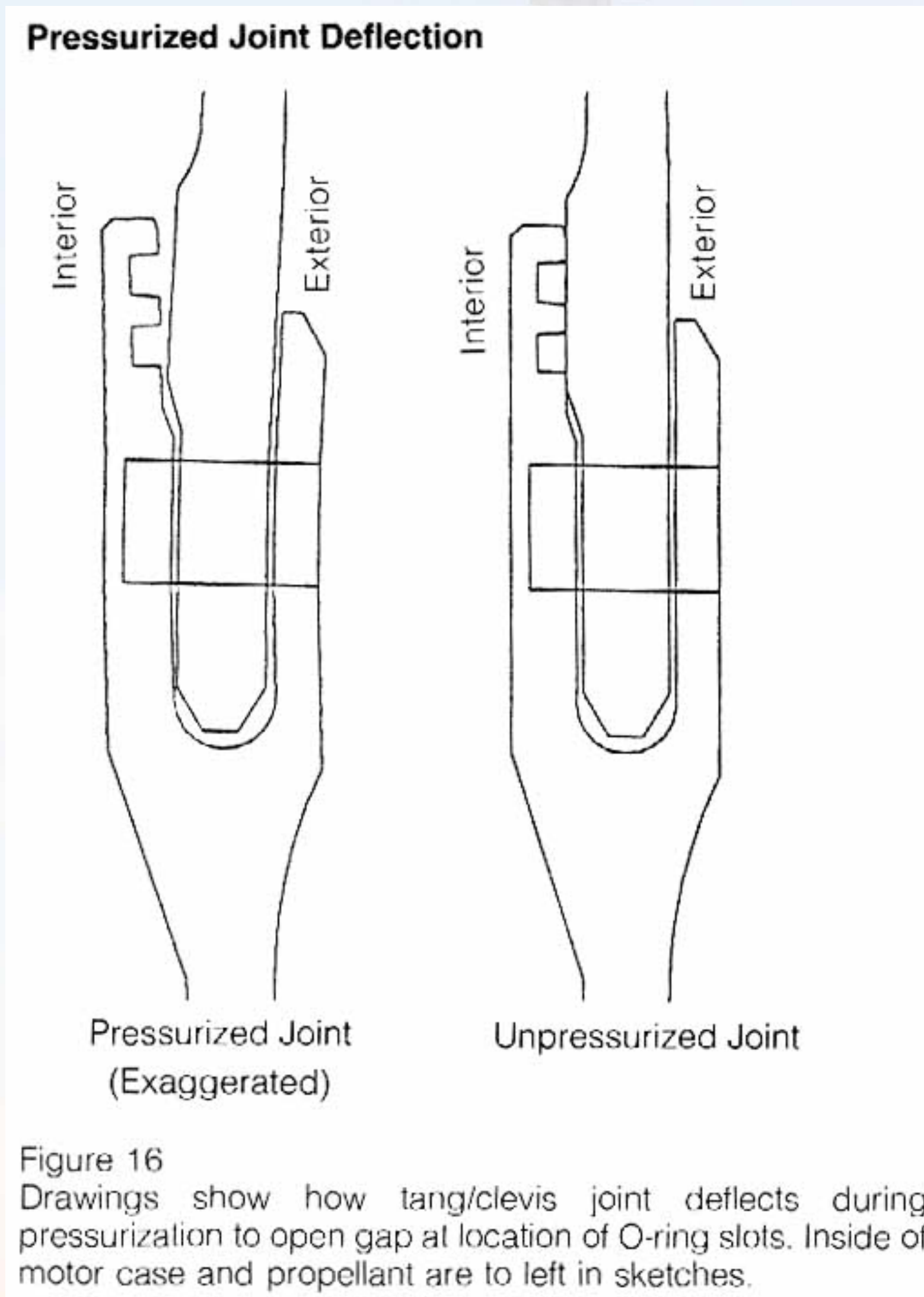


From Edward R. Tufte, *Visual and Statistical Thinking: Displays of Evidence for Making Decisions*
Graphics Press, 1997

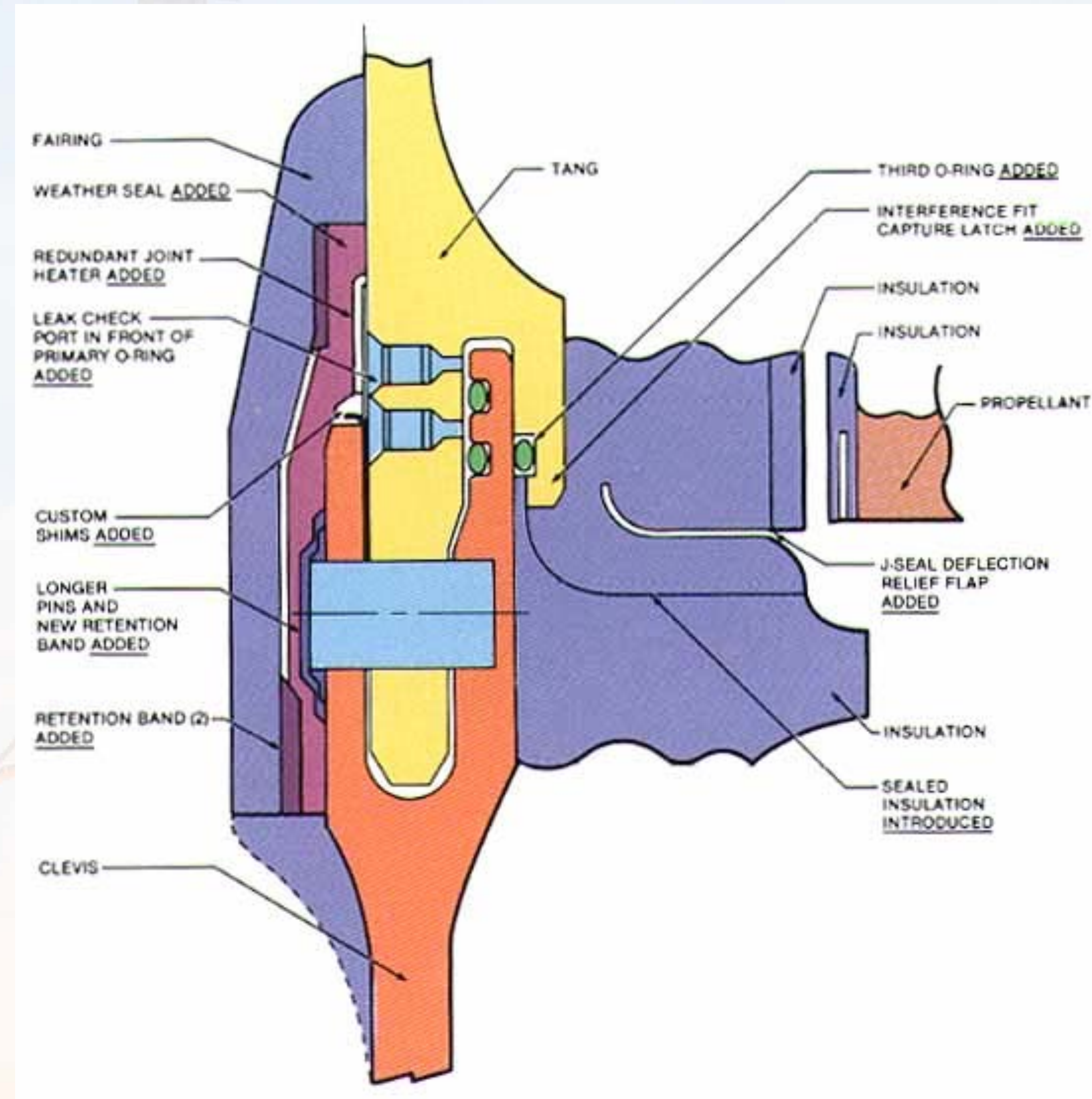
Clearance Effects on O-Ring Seating



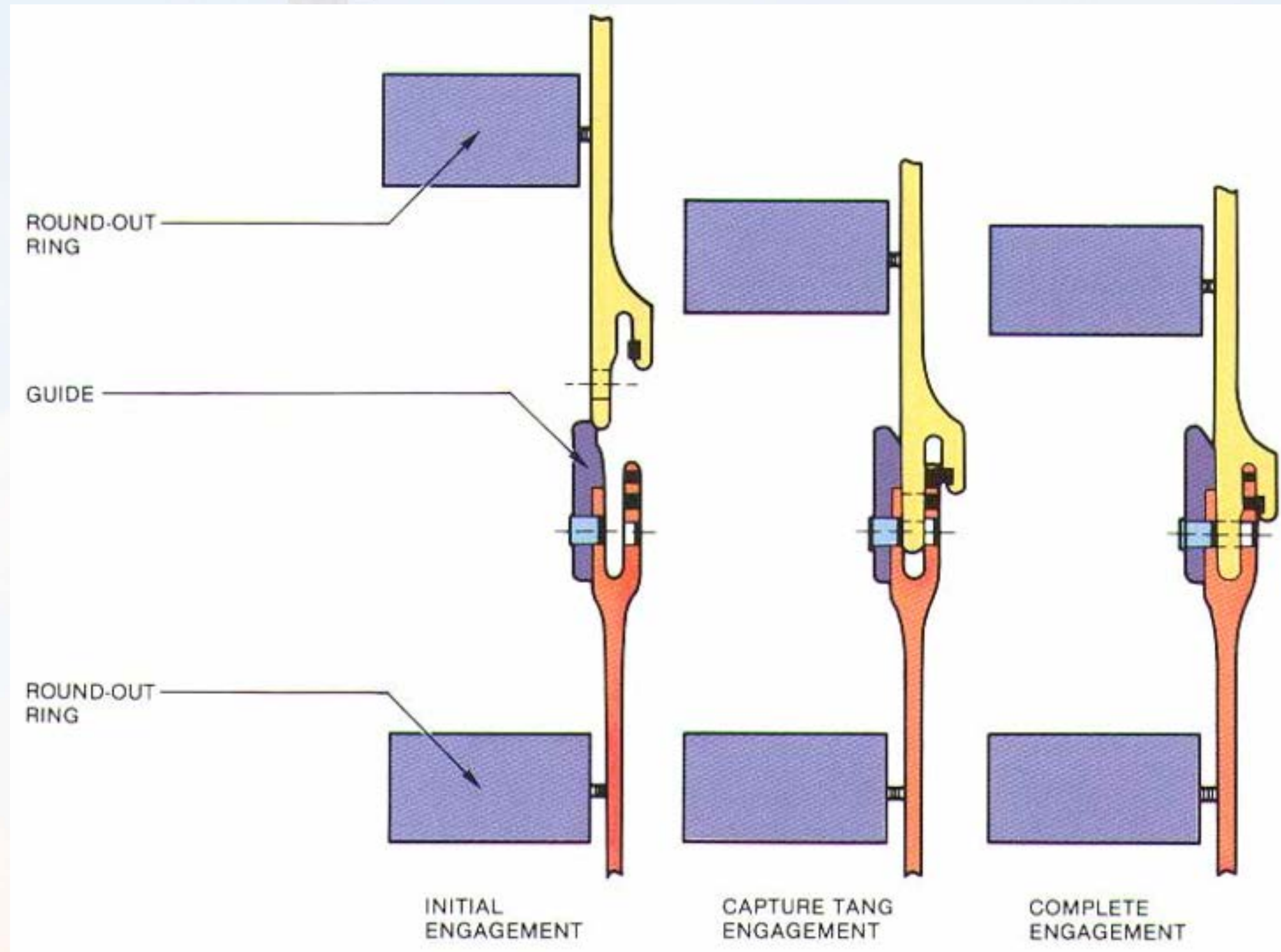
Dynamic Motion of O-Ring Seals



Redesigned SRB Field Joint



Revised SRB Assembly Technique



Columbia Launch - STS-107



L+81.9 sec



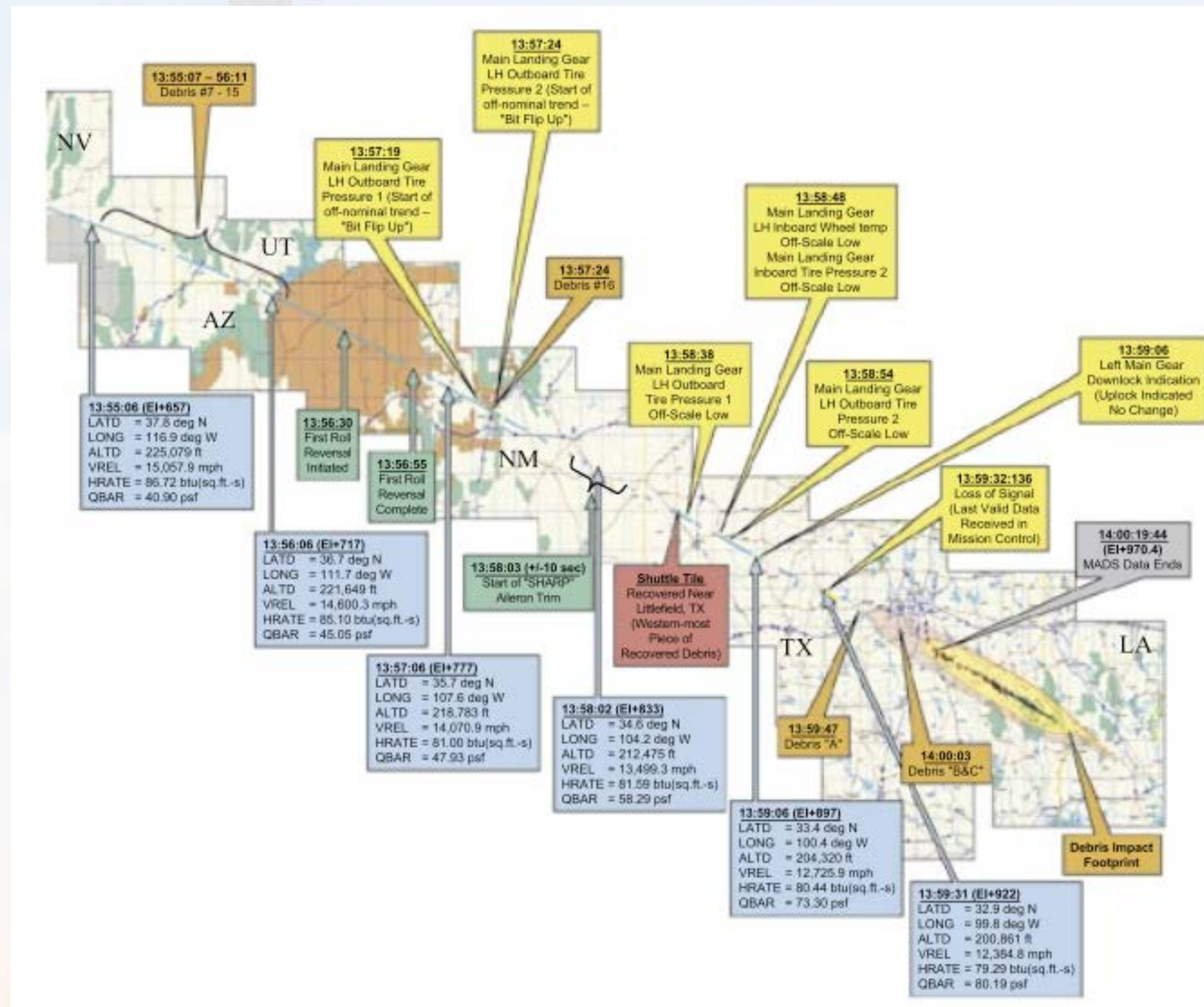
Columbia Entry Break-up



In-Flight Breakup



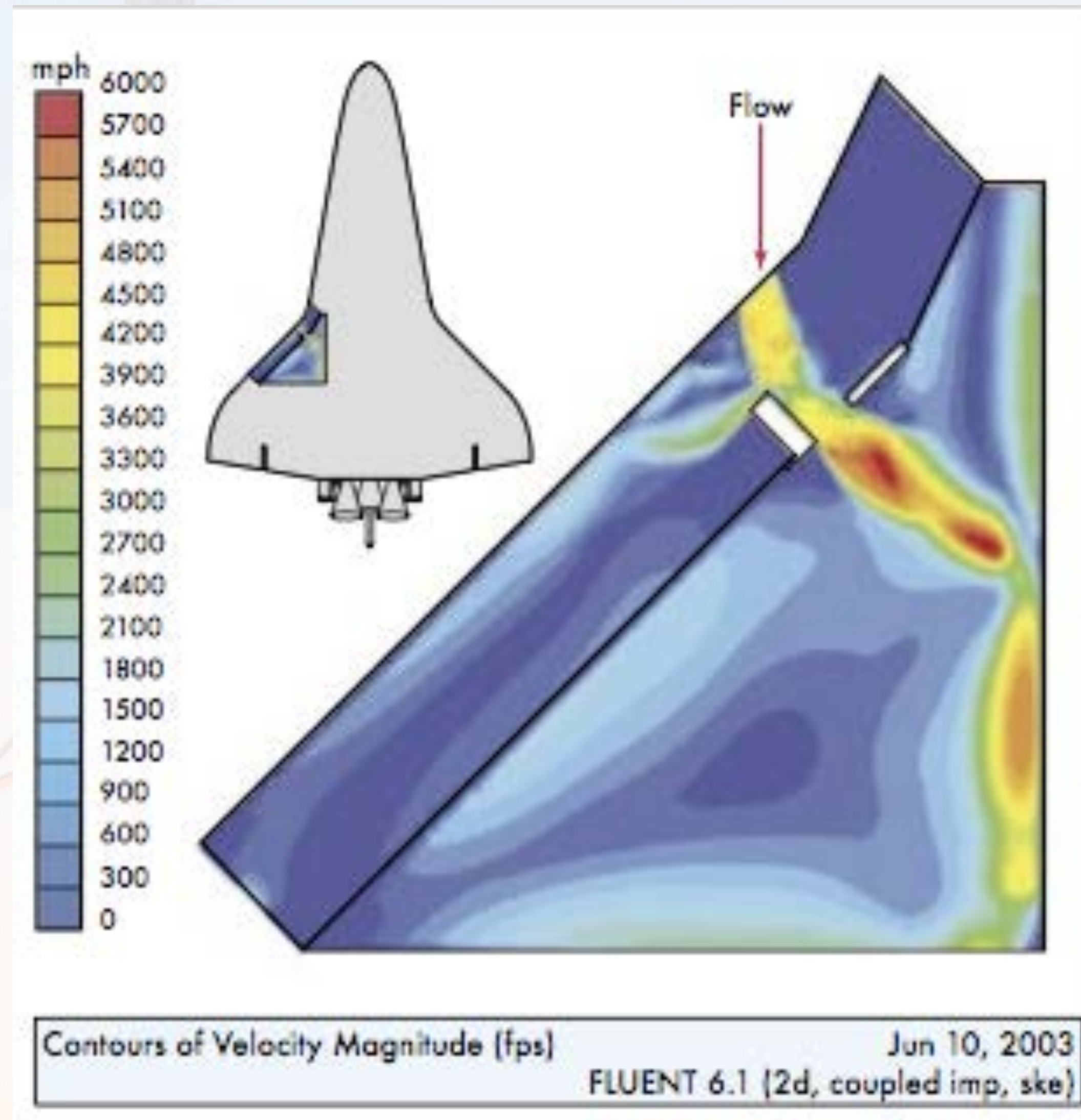
Events Along Flight Path



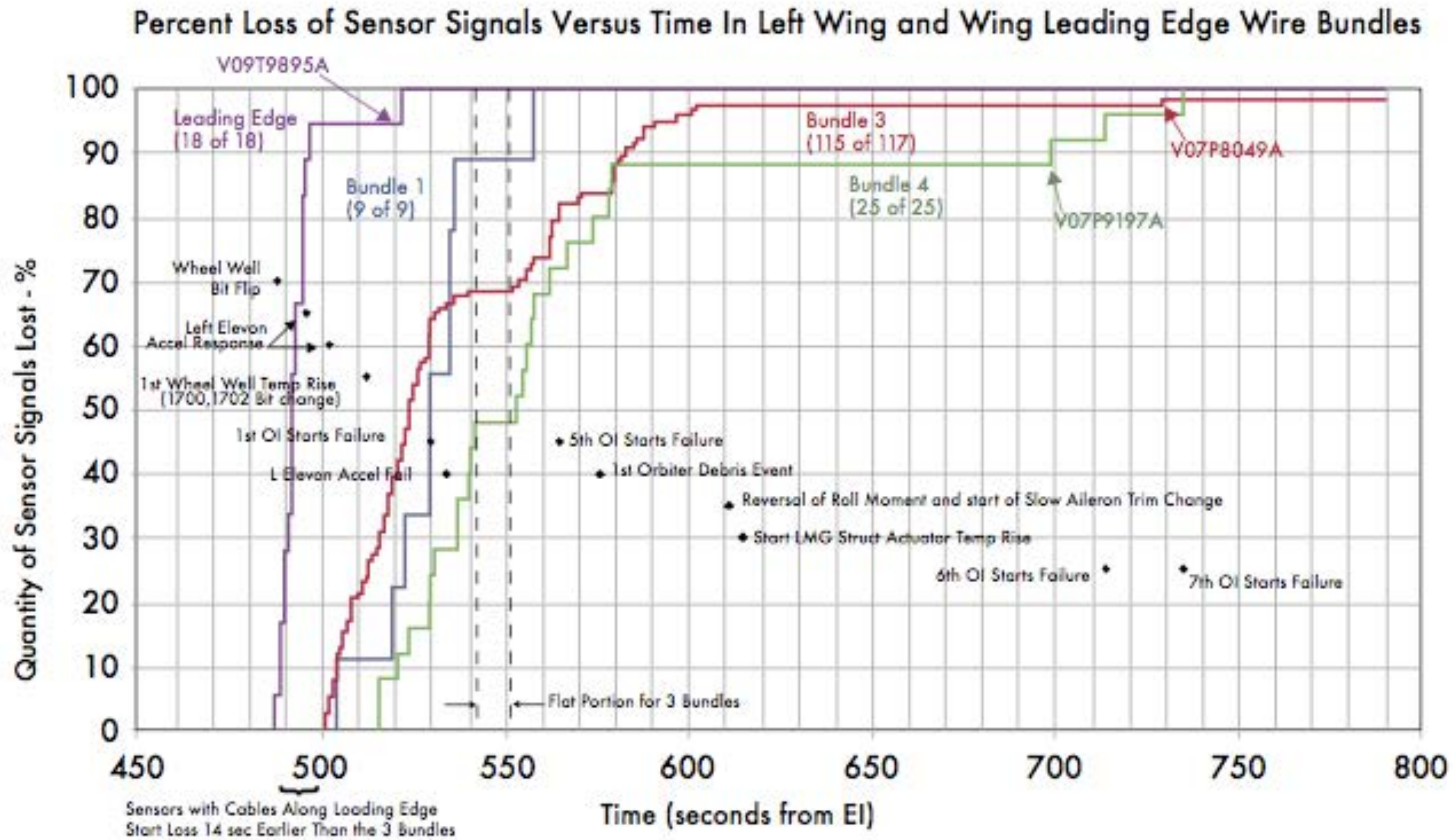
Columbia Debris Reconstruction



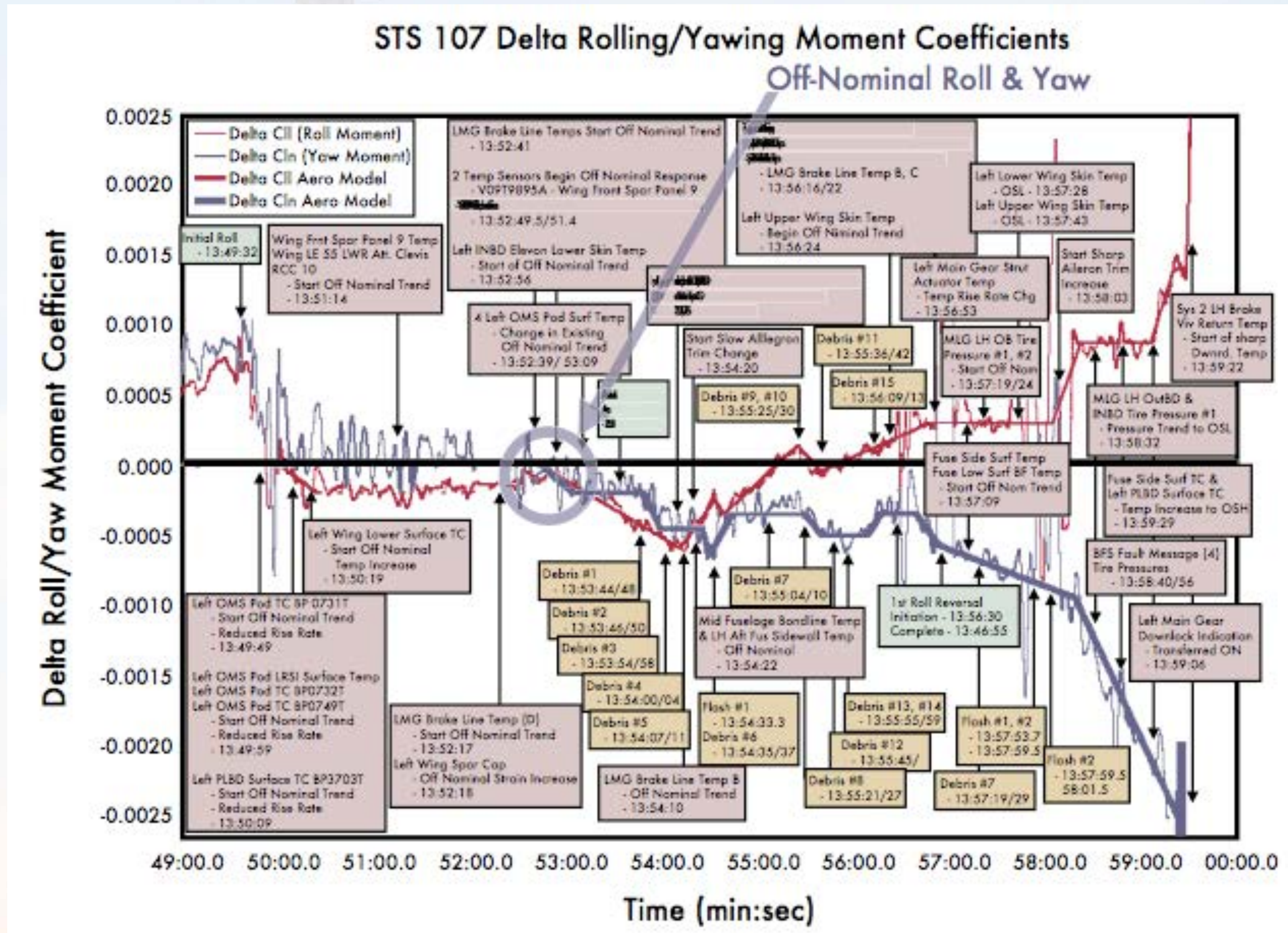
CFD Analysis of Internal Airflow



Failure Rates of Sensor Wiring Bundles



Divergence of Roll/Yaw Angles



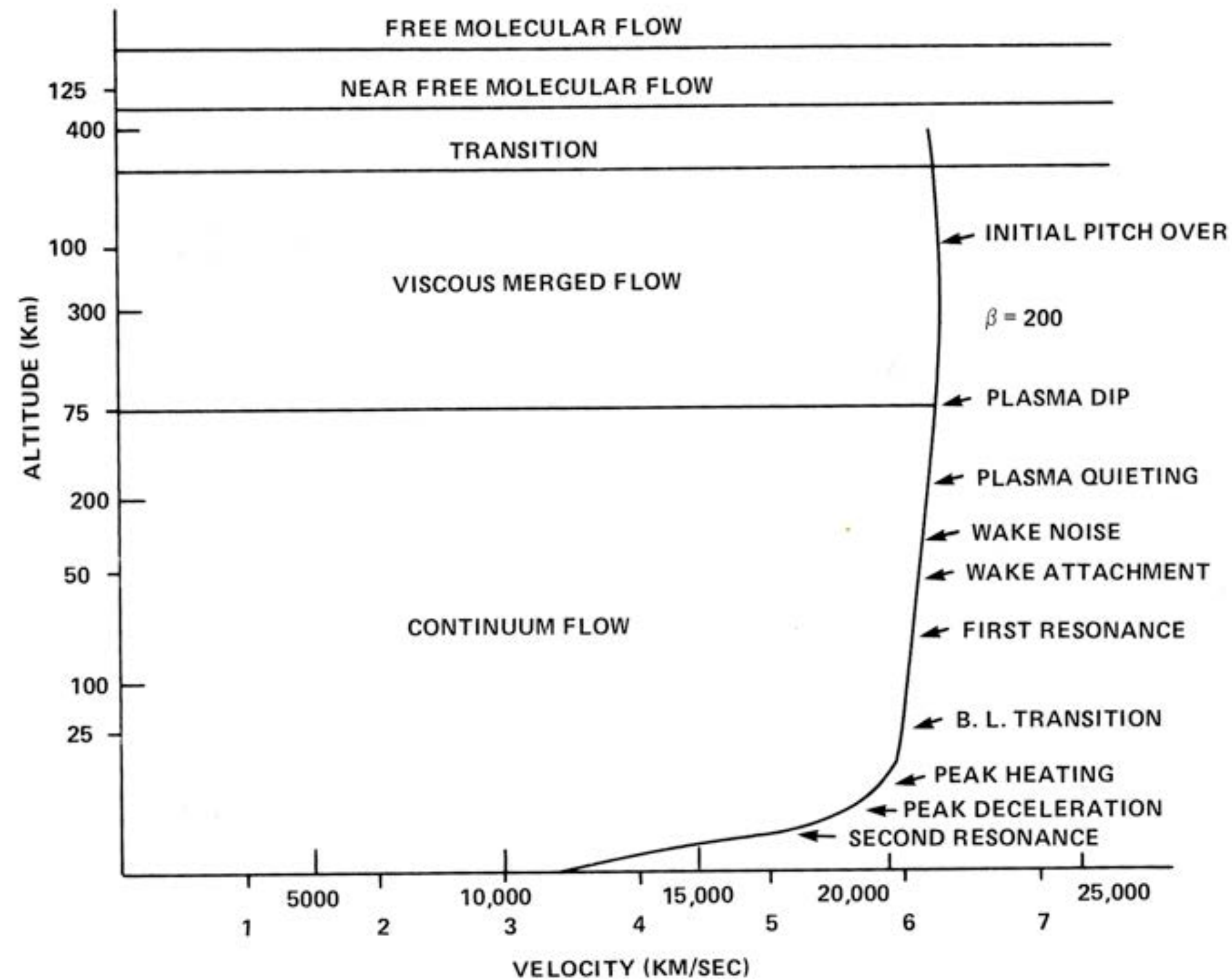
High-Velocity Impact Testing of RCC



Results of Impact Tests on RCC



Entry Flow Regimes



ref: Frank J. Regan, Reentry Vehicle Dynamics AIAA Education Series, NY, NY 1984



AMROC SET-1 Launch Attempt

**SET - 1
LAUNCH ATTEMPT
OCTOBER 5, 1989**



October 5, 1989 - T+2 sec



October 6, 1989 - Aftermath

