

Safety & Mission Assurance

Brad Weidema

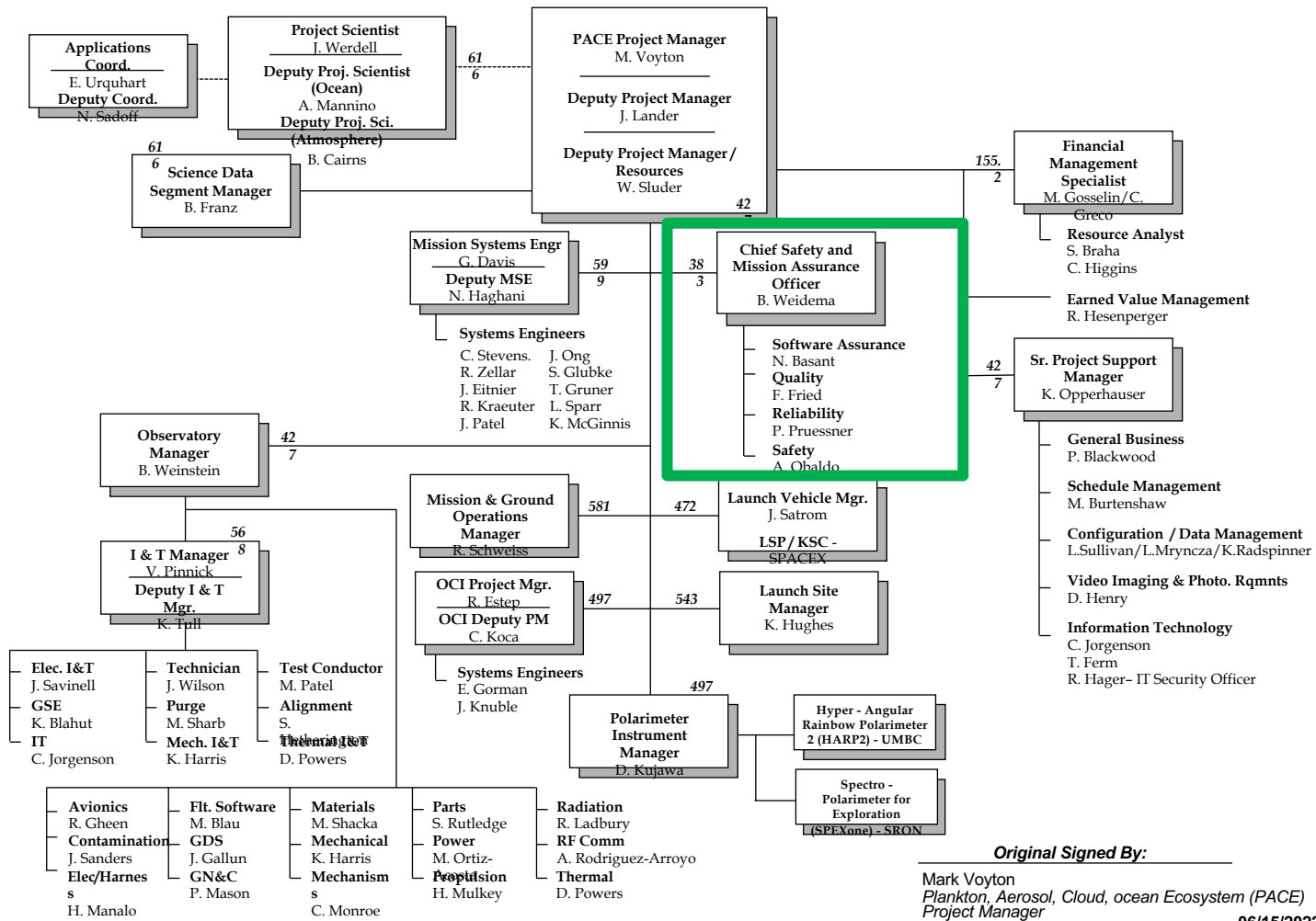
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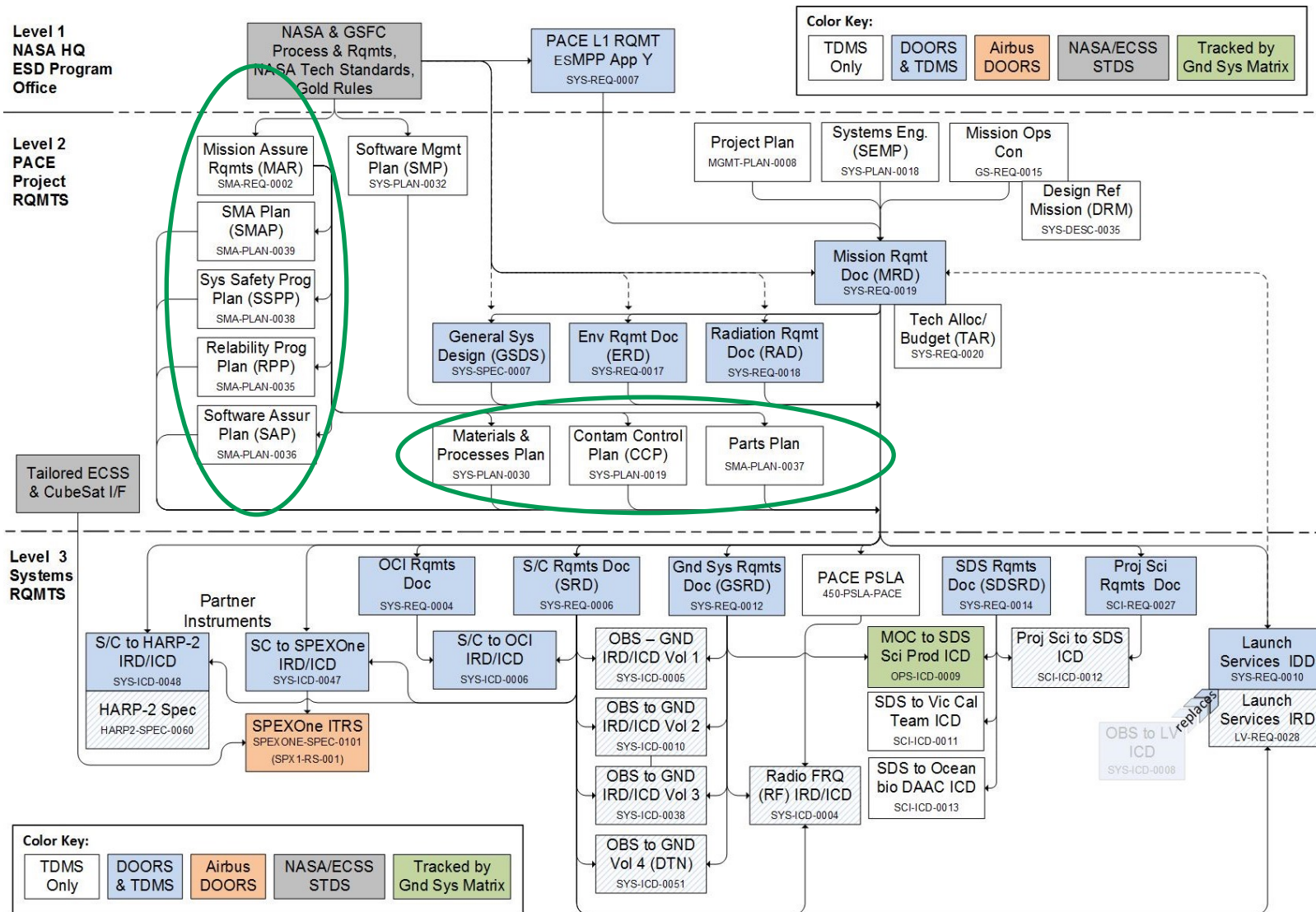


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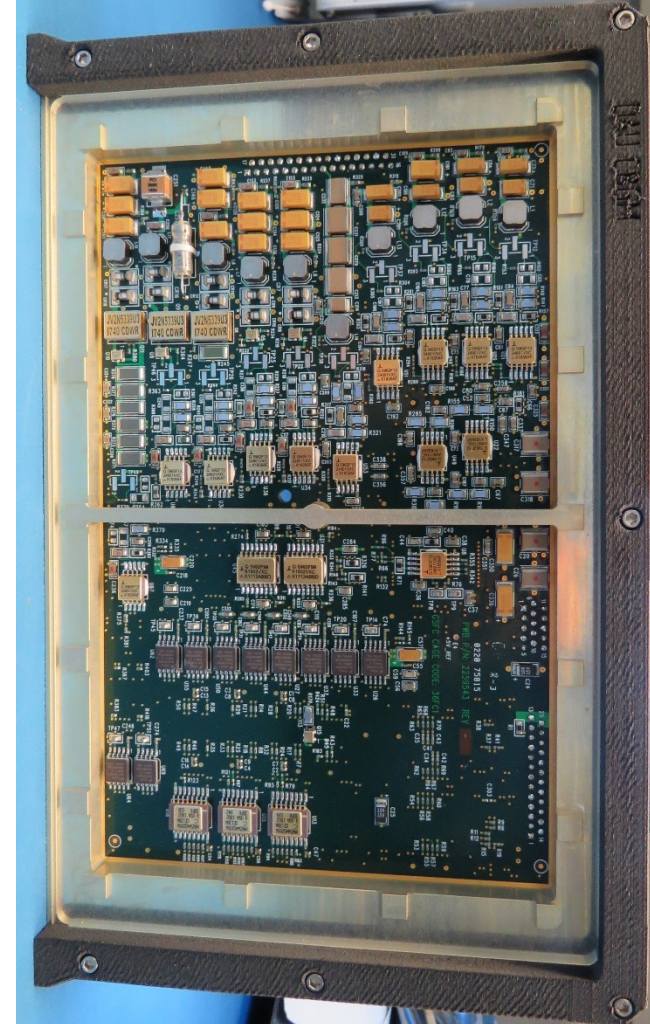
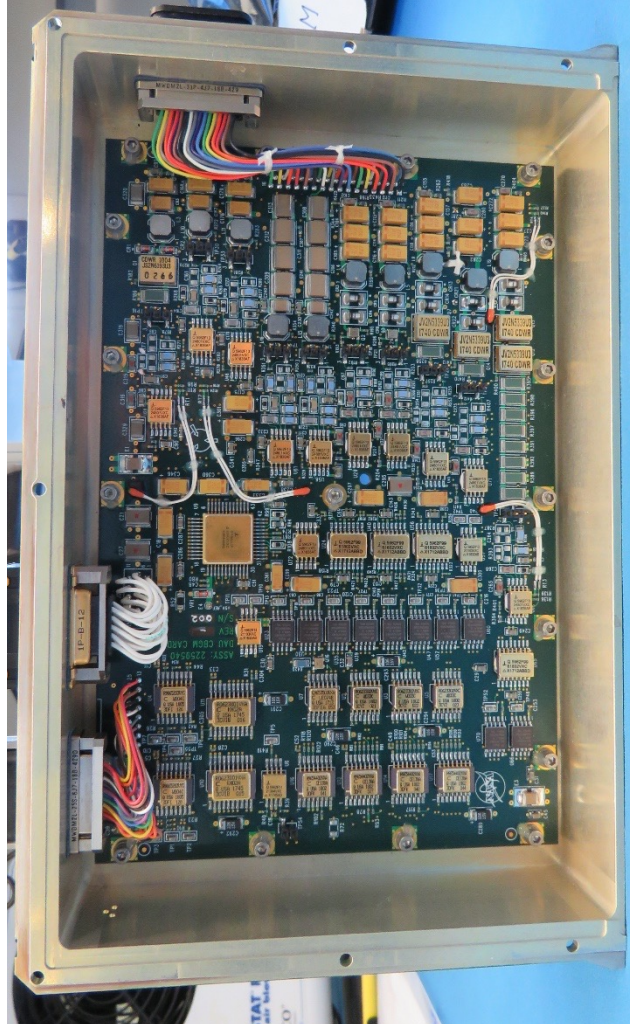
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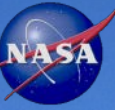
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- 100% visual inspection to drawing requirements
 - Component population
 - Polarity of components
 - Part Marking on components
 - Bonding
 - Staking
 - Wiring
 - Mechanical Configurations
 - Solder joint workmanship
 - Foreign Object Debris
 - Damage
 - Configuration control
- Projects have Hundreds of electronic assemblies
- Each assembly with Thousands of inspection points





A Few Development Challenges...



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Reverse Polarity Capacitor Damage

- **Discrepancy:** capacitor was installed in reverse polarity, the card was powered up and incurred damage to the capacitor.

Photo before card power up

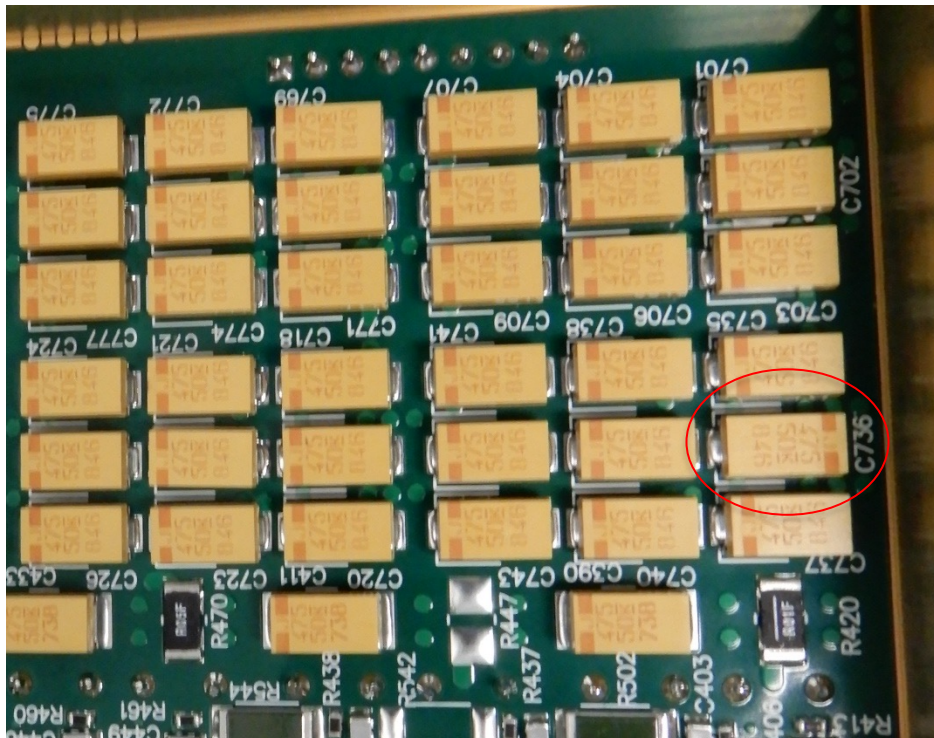
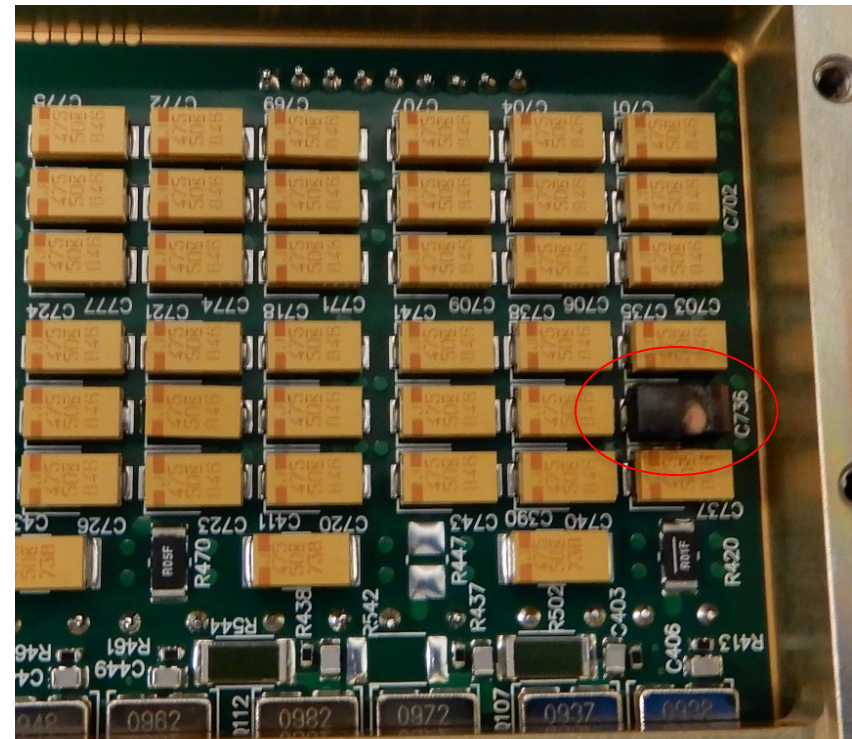


Photo after card power up

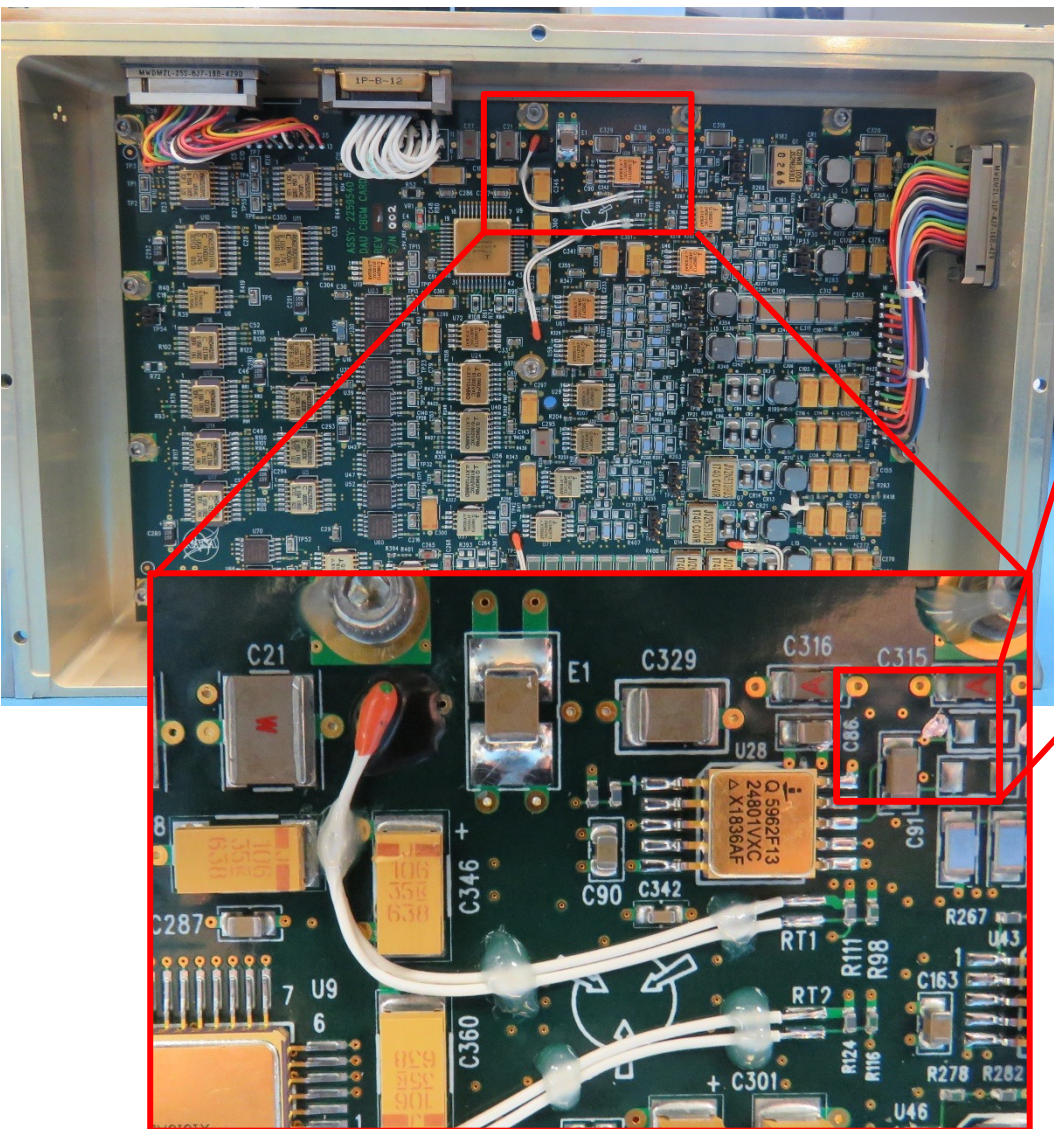


Reverse Polarity Diode

- **Discrepancy:** Diode was installed in reverse polarity.

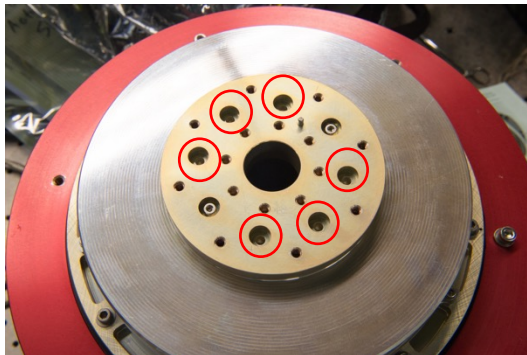


Solder Splash Bridging Conductive Vias After Rework



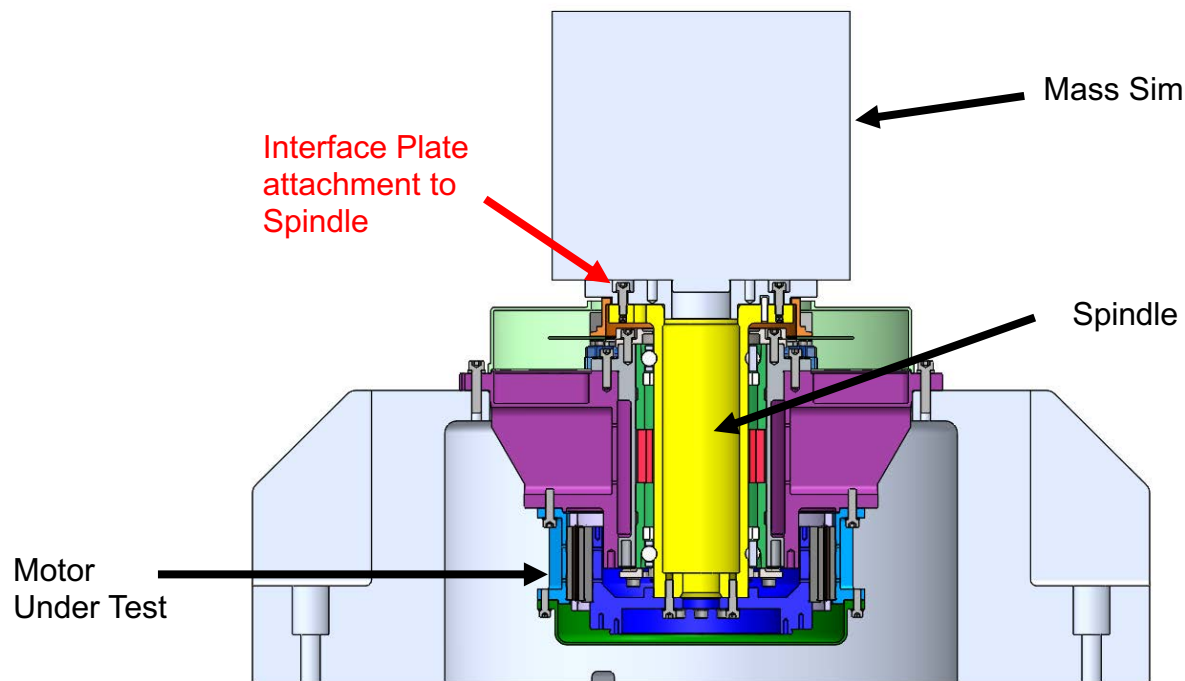
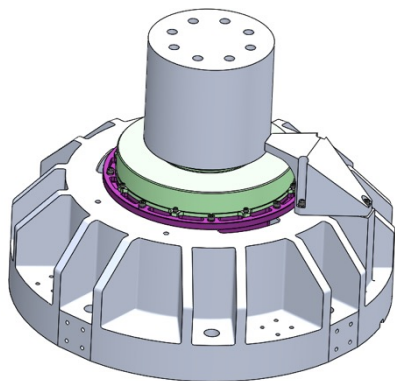
Solder Bridge was identified after rework
And functional testing, which revealed a failure

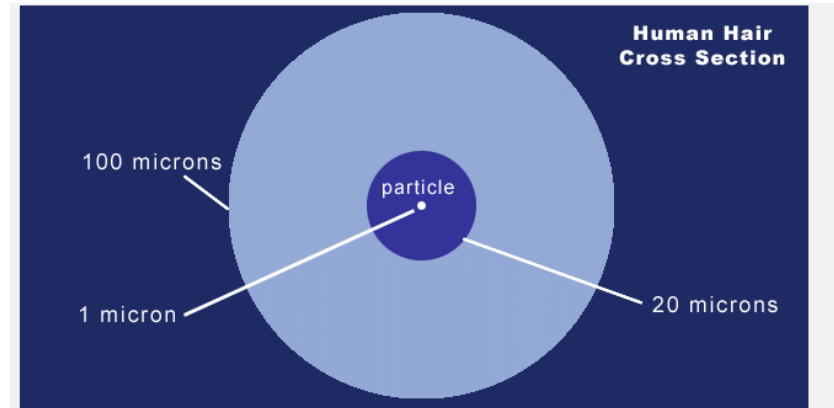
Solder splash occurred after a replaced nearby
Thermistor component (orange with white wires)



Discrepancy: Interface used to attach the Mass simulator to the spindle which in turn is holding the Motor was found to be attached with **only 2 "snugged"** fasteners during test. Missing other 6 fasteners and full torque.

Process Escape: Fit check steps not included in WOA. WOA steps calls for interface plate to spindle assembly – didn't do it b/c tech/engineer/QA thought it was already assembled, redlined this step out of the event WOA calls for torque values. But wasn't recorded, as tech thought it was already assembled and torqued in an earlier event (no earlier event calls for this)





When speaking of particulate contamination we are talking about particles that are very small and not necessarily visible to the eye. The graphic above demonstrates the variance in particulate size. The smallest visible particulates are approximately 50 microns.

Challenge with Cleaning Optics during Integration





ESD Wrist Strap required whenever we are within 1 meter of ESD sensitive hardware.

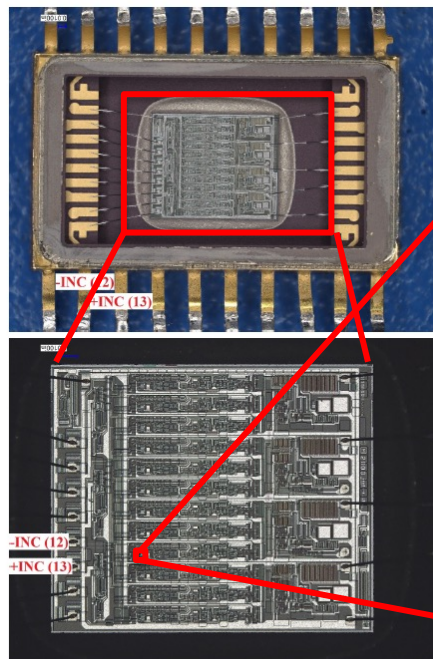
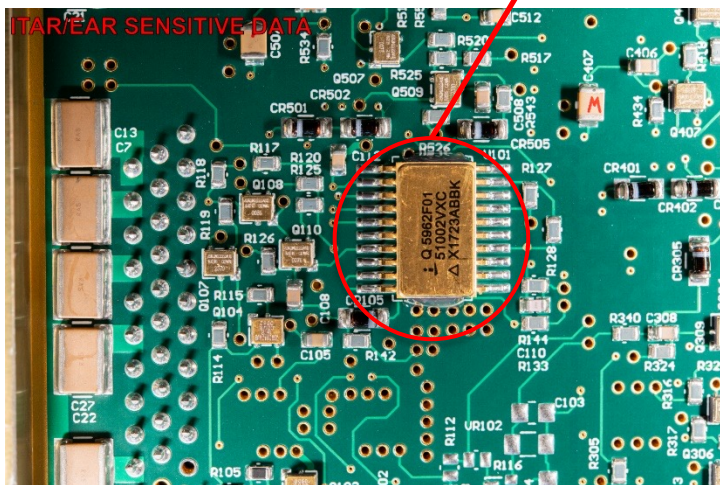


Figure 7. Optical images of SN 0537 after decapsulation. The INC signal pins are indicated.

The two pin holes on the right in the capacitor of the integrated circuit (IC) are indicative to ESD induced damage.



Figure 14. Optical image of the capacitor with much of the polysilicon chemically removed (some residual remains). The capacitor dielectric is exposed. The red oval indicates two pinholes in the dielectric layer.



Figure 17. Tilted and rotated SEM image of the pinholes in the dielectric layer.

Questions?



Back Up



NOAA-19 Satellite Incident during I&T

- Cause: A result of process and procedural control deficiencies.
- Impact: \$135 Million in repairs

