Electronic Assembly Inspection

• 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…

Pre-Decisional Not For Release Outside NASA

Subject to U.S. Export Control Regulations:

This document may contain information within the purview of the International Traffic in Arms Regulations (ITAR), 22 CFR §120-130 and/or the Export Administration Regulations (EAR), 15 CFR §730-774, and is export-controlled. It may not be transferred to foreign nationals in the U.S. or abroad without specific approval of a knowledgeable export control official, and/or unless an export license, license exemption, or license exception is obtained/available from the Directorate of Defense Trade Controls, United States Department of State or Bureau of Industry and Security, United States Department of Commerce. Violations of these regulations are punishable by fine, imprisonment, or both.
Reverse Polarity Capacitor Damage

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

Challenge with Cleaning Optics during Integration

Pre-clean

Post-clean

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.
Electrostatic Discharge (ESD) Control

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

The two pin holes on the right in the capacitor of the integrated circuit (IC) are indicative to ESD induced damage.
Questions?
NOAA-19 Satellite Incident during I&T

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