

On-site Ground Verification

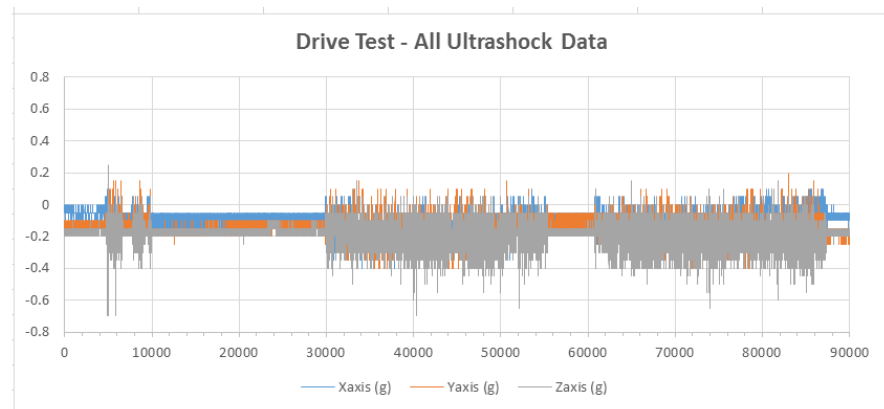
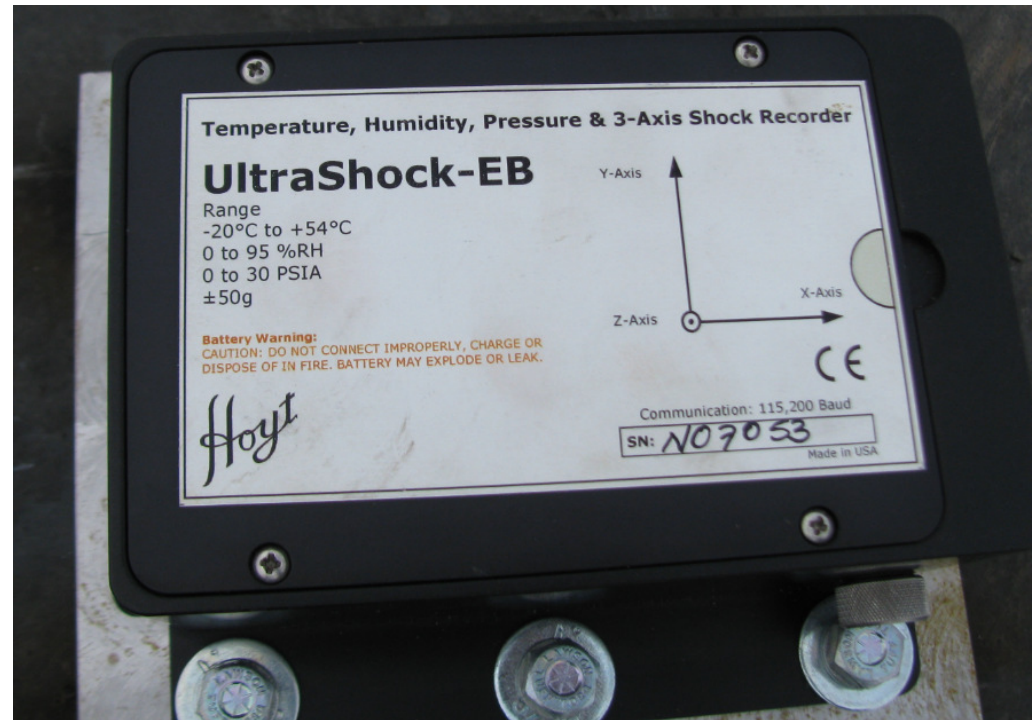
April 6, 2015 (original)
April 10, 2015 (revised)

Outline

- **Upon the delivery of the WFC at the HET, a combination of the following inspections will be performed.**
 - Review of shock monitor data.
 - Visual inspection of the exterior / interior of the WFC/Maintenance Cart/Shipping container.
 - System CGH test
 - (If necessary) the mirror position measurement using the center references, the video alignment telescope, and the laser tracker.

Review of shock monitor data

- Shock monitor records 3-axis g-load, humidity, temperature during the transit from Tucson to the HET.
- Review these environmental data and check if these parameters have exceeded the requirements at any point in time during the transit.
- Requirements
 - g-load: <3g lateral, <5g vertical.
 - Temperature: -25 to 66degC.
 - Humidity: < 100% (condensing).



Visual inspection

- Inspect the exterior of the shipping container for apparent damages.
 - Upon passing this, open the shipping container.
- Inspect the interior of the shipping container & the exterior of the WFC moisture bags / maintenance cart for apparent damages / loose components / debris / dust / condensation etc.
 - Upon passing this, open the WFC moisture bags.
- Inspect the exterior of the WFC for apparent damages / loose components / debris / dust / condensation etc.
 - Upon passing this, open one of the WFC lower skins and one of three hatches of the WFC upper skins.
- Inspect the interior of the WFC for apparent damages / loose components / debris / dust / condensation etc. (especially the mirror surfaces).
- Inspect the mount points / epoxy lines for possible damages / cracks / breakage.

System CGH test

- Upon passing the visual inspection, reconstitute the system CGH test.
- Perform the test and compare the result to the ones obtained at UA's shop.
 - Renting PhaseCam 6000 interferometer (same model as the one used at UA).
 - Renting Faro Laser Tracker (same model as the one used at UA).
- Passing requirements
 - Tilt / Coma / Focus aberrations must be compensable below the following range.
 - Tilt aberration: $< 0.5 \text{ wv}$
 - 3rd order coma: $< 0.25 \text{ wv}$
 - Focus: $< 4\text{wv}$.
 - Other requirements
 - Non-compensable aberration change : $< 0.05\text{wv rms}$ individually wrt the mean of previous measurements at UA.
 - CGH position change: $< 50\mu\text{m}$ in centration/focus, $< 30\mu\text{rad}$ in tip/tilt relative to M4 CGH wrt the mean of previous measurements at UA.
 - Interferometer focus change : $< 50\mu\text{m}$ in centration/focus wrt the mean of previous measurements at UA.
 - These requirements are based on the allowed mirror position change described in the next page.

Mirror position measurement

- Install the center references and measure the centration / focus / tip tilt using the laser tracker and the video alignment telescope.
- Compare the results to the prior measurements made at UA's shop.
- Passing requirements
 - The shipping load analysis indicated that all mounting points are elastic, so long as the g-load requirement is met.
 - Thus, all mirrors must remain in the same positions.
 - However, we made the following provision allowed for the change in the mirror position between before and after the transit, to account for the repeatability in measuring the mirror position using the laser tracker and the video alignment telescope.
 - Change in mirror position must be less than 10um in x,y,z and 10 urad in tip/tilt wrt the mean value of the mirror position measurements at UA.