**Summary**

- WFC3 continues to perform nominally.
  - Photometric zero points (including UV) are stable to \(< 0.5\% \) since August 2009
  - Astrometric calibration is stable and dominated by Telescope “breathing”
  - UVIS CCD Detectors CTE decline as expected with radiation damage
  - IR Detector shows essentially zero evolution of its performance in flight

- Notes to Observers:
  - UVIS CCD Post-Flash became available in Cycle 20 to reduce CTE effects
  - Photometric Zero Point and Post-Flash calibrations are available
  - IR Detector Persistence tracking is now implemented in MAST
  - Spatial Scan Mode supported including FGS control to 4.8 arc sec/second

**CCD CTE Mitigation Options → POST-FLASH**

- The WFC3/UVIS CCD detectors experience an inevitable decline in charge transfer efficiency due to proton damage in the space environment.
- Combined with the lower readout noise of the CCDs compared to prior HST instruments this results in a significant (and increasing) loss of S/N for faint sources.

Observers have several options to mitigate and correct for this effect:

1. Sources placed near the readout amplifiers in the corners are less impacted.
2. Post-observation corrections
   - Empirical Point Source Flux Model
   - Pixel Based Charge Transfer Model (e.g. ACS ISR 2010-03 Anderson&Bedin) being developed for WFC3 during FY13
3. Post-Flash (i.e. Background Enhancement)
   - Recommended option for Cycle 20+
   - 10-15 e- per pixel restores most CTE
   - Post-Flash plus background \( \rightarrow \) 12e-
     - Cost: Increased noise level
     - e.g. zero background UV observation: 3e- readnoise plus 12 e- post-flash is equivalent to 4.6e- readnoise detector
   - Replaces Cy 16-18 Charge-Injection approach (no longer supported).

[See Poster S. Baggett et al 344.06]

**Spatial Scans for High S/N WFC3 Spectroscopy, High Precision Astrometry, and More**

- Spatial Scans allow the light from astronomical objects to be trailed across the WFC3 detectors in a predictable and repeatable manner during exposures at rates up to 4.8 arc seconds per second (FGS control) and 7.8 arc seconds (GYRO control).
- This enables significantly increased S/N observations — especially for infrared spectroscopy of bright sources (e.g. exo-planets, transits).
- Higher precision astrometric measurements are orthogonal to the scan direction (measurements \(< 30 \mu \)arc-seconds)
- Opportunity to observe brighter sources (especially with the IR detector)
- Vega has been observed using this technique combined with the IR GRISM -1 order (See Deustua et al Poster 344.12)
- Multiple scans of a pair of bright stars provides both check on flat fields and a path to improved calibration of mid-spatial freqs

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**Improved Calibrations**

- Photometric Zero Points
  - All UVIS and IR photometric observations reanalyzed with new flats
  - Results at http://www.stsci.edu/hst/wfc3/phot_zp_lbn (March 2012)
  - Most filters have \(< 1\% \) scatter using 4 HST calibrators
  - New: all filters directly measured (removed interpolation to smoothed QE curve)
- Post-Flash Calibration Files became available 5 Dec 2012
  - \(< 20\% \) variation over UVIS Field of View and \(< 3\% \) Shutter Blade difference
- Pipeline accounts for Blade and Post-Flash exposure time

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**Infrared Image Persistence**

- The WFC3/IR detector has excess dark currents for several hours following exposures to \( \sim \) full well or above producing a typical signal \( \sim 0.3 \) e/s after 100s
- Mitigation Approaches:
  1. Users should differ IR images
  2. STScI manually identifies a subset of the “worst events” in advance and generally precludes other IR observations during several subsequent orbits
  3. STScI now provides a predicted residual image for every WFC3/IR observation

http://archive.stsci.edu/preps/persist/search.php

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**Additional Information:**

- [http://www.stsci.edu/hst/wfc3](http://www.stsci.edu/hst/wfc3)

Questions and Support: help@stsci.edu

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**Abstract**

We report on the current status and calibration of the Hubble Space Telescope’s Wide Field Camera 3. This UV, Visible, near Infrared Camera was installed in 2009 during HST Servicing Mission 4 and has proven to be the most used instrument on the observatory. Recent improvements in its photometric, flat field, dark current, and astrometric calibrations are discussed. As WFC3 approaches the mid-point of its 4th year of operation in space, the impacts of the space environment are presented with particular attention to the consequences of radiation damage on the performance of the CCD detectors. Recent improvements in operational strategies including post-flashing CCD observations are discussed together with recommendations for acquiring optimal observations and methods of improving data analysis. We also highlight recent progress in using observatory level spatial scans to achieve higher dynamic range observations, to obtain higher precision and more efficient photometric measurements of bright sources, to improve our knowledge of the flat fields, and to increase the precision of astrometric measurements.