ZTF Shutter Installation Plan

Last updated **2016-08-16, 11 45 am**

by Roger Smith

# Pre-installation [ Mon Aug 22]

* Uncrate on ground floor of 200”. Lift onto “stands” to allow examination of both sides, contacting frame not panels. Use lifting eyes mounted on shutter frame.
* Check contents against bill of materials.
* Blow off dust and debris (including interior).
* Inspect for damage or loose parts (all surfaces).
  + Remove covers to inspect interior
* Connect and power up (with advice from BonnShutter).
* Initialize and run from TTL control pulse.
* Test with shutter control pulse provided by Justin’s network controlled selector.
* Test selector on PTF.
* Return to crate.

# Installation on P48, by day. [Wed Aug 31]

* Remove corrector storage hatch.
* Park and tether telescope using new tie down link. [crew]
* Remove top end baffle and counter weights. [crew]
* Install new shutter adapter ring [Michael] …will be bonded at end of week. Lifting fixtures?
* Uncrate shutter outside dome and man handle through door and observing floor hatch. [crew]
* Mount shutter on shutter adapter [Michael, Jeff]
* Install new baffle [Michael]
* Install shutter electronics and shutter control signal selector on PTF electronics rack. [Justin]
* Install cables to shutter.
* Install emergency stop switch.
* Install counter weights at new location(s) and adjust telescope balance. [crew]
* Run PTF then ZTF shutter via control signal selector. Check that the unused shutter is parked in the open position during operation. Can we close both on demand?

# Daytime tests [subsequent days]

* **Reliability**: simply run shutter repeatedly. …Always responds? Vibration, sound ok?
* **Light tightness:**

Compare darks PTF shutter open then closed (ZTF shutter closed in both cases.), and dome lights on/off. BonnShutter will be vulnerable to light leaks in telescope, but this should not be a problem at night with dome lights off.

* **Dome flats:** compare ZTF and PTF flats at several exposure times. Use stabilized LED as light source.
* **Accelerometer:**

Jeff/Jamie to procure more suitable accelerometer, and measure baseline signal (noise) when mounted on P48 tube.

# Night Time Tests during engineering time [Thu Sep 15]

1) **Image motion** measurements comparing ZTF and PTF shutters. Shutter induced?  Wind induced?

            a) Image size/elongation at a range of short exposure times.

            b) Movie mode:  near real time analysis to produce plots of XY centroid motion and FFTs of same. [Roger, Richard Walters, Justin, Philipp Mueller]

2) Measure **exposure time correction** for both shutters.  Compare multiple-exposure (ten by one sec) to a conventional ten second exposure. [Roger, Richard W, Philipp]

3) Compare **successive exposures of same field**, alternating between shutters at several exposure times. Provide these data to scientists. [Roger, Richard W, Philipp]

4) Compare **photometry**. [Richard W, PTF science pipeline]

# NOTES:

Lead counter weights are on order but may not arrive in time. Steel will have to be used in the interim. Jeff is coordinating the balance calculations and counter weights.

Between now and Aug 31, Michael will be installing flocking on baffle and bonding the large water jetted pieces forming the shutter adapter (to avoid unacceptable distortions caused previously by welding).

Justin will visit the telescope prior to leaving for a few days vacation, to verify shutter electronics mounting scheme, panic button installation location, and test the shutter timing signal selector (on PTF).

Jeff raised the possibility that the ~3% increase in moment of inertia due to shutter and counter weight installation could require Right Ascension preload in excess of that required to avoid loss of contact on the worm gear and thus oscillation during slews. Since we are still running on the old TCS we don't have the option to tailor the motion profile (jerk, acceleration) to mitigate this problem. The extra preload weights are still about 3 weeks out and will be available by the engineering night.

After some discussion the risk of installation prior to preload upgrade was deemed to be low enough (given that we can in fact back out the installation) to be worth taking, so that we can find out what other issues may be awaiting us.