Notes on SEDM Collimator clamp replacement on 6/30/16

(J. Ericksen and S. Wieman were at P60 to install the clamps; R. Walters analyzed images remotely to guide the alignment of the collimator/lenslet assembly)

- The clamps slide 2) are intended to improve stability of the collimator mounting in its vee-block and address the problem of loss of collimator/lenslet alignment that occurred on several occasions (5/5/16, 6/8/16, and 6/24/16)

- Though it was possible to install the clamps without disassembly of the SEDM frame/housing, access was very limited resulting in:

    - One of the tension springs and a spacer sleeve from the original mounting configuration remain on the clevis pin on the inboard side of the vee-block because the pin could not be removed (or retracted far enough) to free these parts, however they did not obstruct installation of the new clamps.

    - One of the four clamping arms needed to be slightly modified to fit on the inboard clevis pin. This modification does not weaken it or reduce its stiffness.

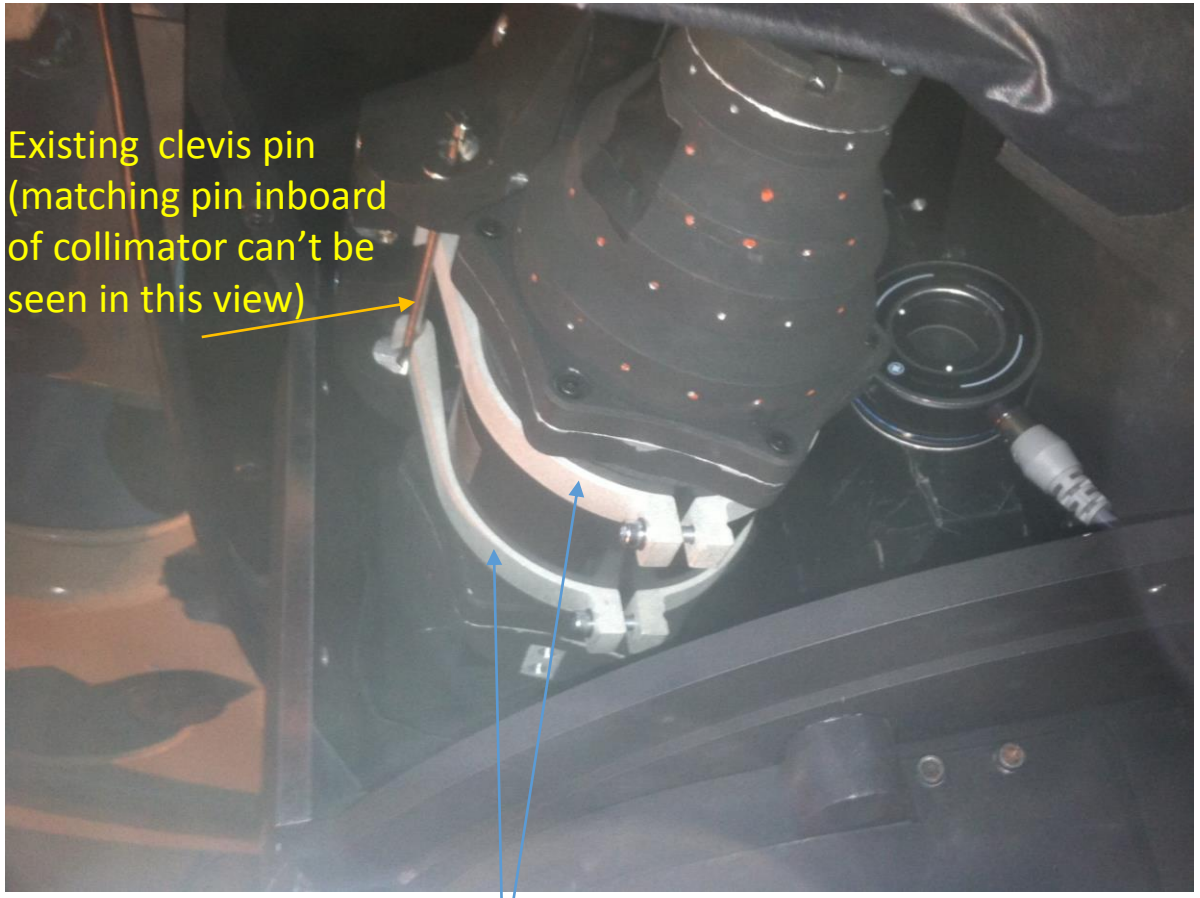
    - We concluded that it would not be possible to install clamps on the camera optics barrel which is far less accessible than the collimator without removing the instrument from the telescope and at least partly disassembling the housing. So, although clamps have been made to fit the camera barrel, they were not installed.

- An axial force (slide 3) comparable to about 2g acceleration loading (measured with a force sensor) was applied to the collimator after the clamps were installed. The application of this load showed that the shift of the collimator (measured with a dial indicator) was within 3µm. This deflection is within the level of drift observed in the dial indicator measurements with no load applied over a comparable time interval.

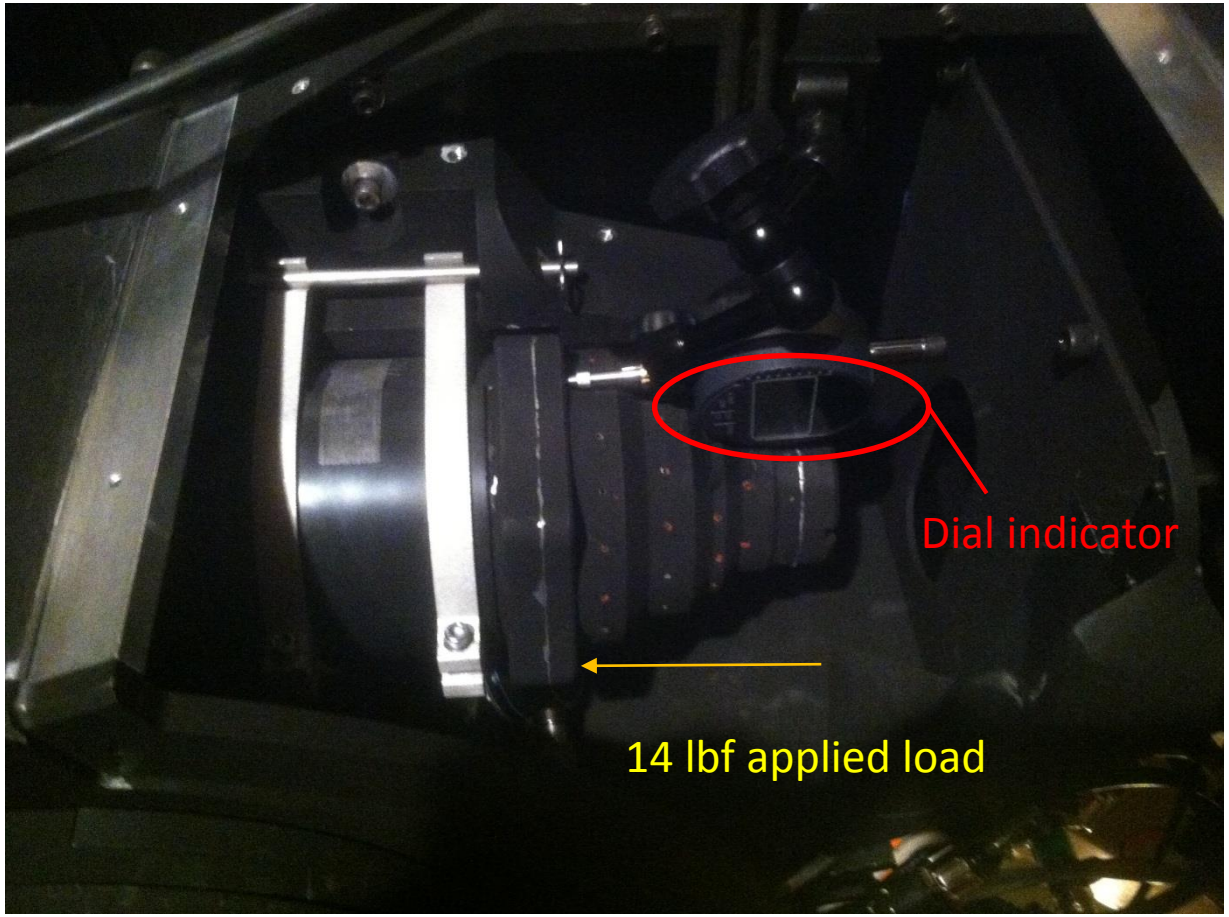
- Telescope East-West and North-South slews were run with the dial indicator base fixed to the SEDM frame and the stylus tracking relative movement of the collimator flange (case 1), and another point on the frame to provide a baseline (case 2). Deflections were comparable for both cases and seemed anomalously high (up to ~100) for instrument flexure suggesting that the measured deflection was most likely due to flex in the indicator support arm as it moved relative to the gravity vector. In order for this test to be conclusive a more rigid mount will need to be made for the indicator. Note: this problem does not apply to the above force sensor tests as the indicator arm remains fixed relative to gravity for those measurements.

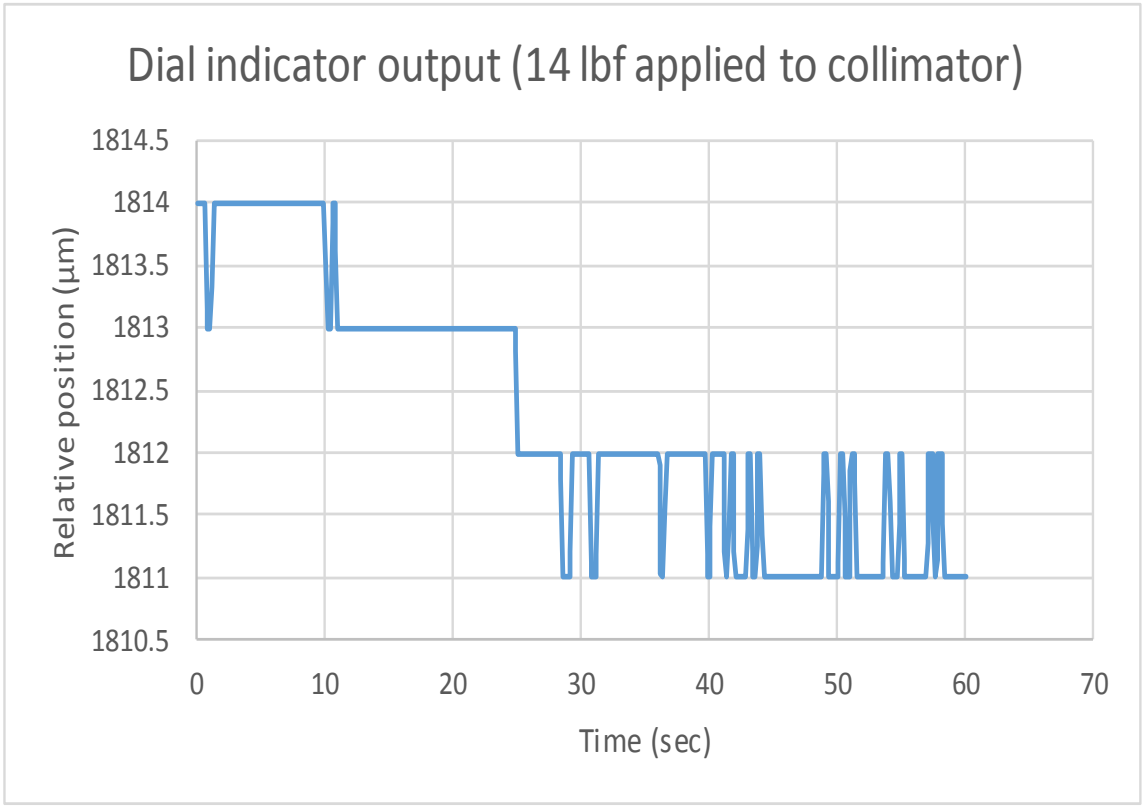
- The first alignment attempts after installation resulted in a data cube (started at around 12:30p on 6/30) that was reasonable but with some room for improvement evident from the rms trace width. Realignment done starting at about 3:10p on 6/30/16 with cube to be repeated starting at about 3:30p. Currently awaiting the results of the repeat cube. . .

Original configuration – collimator clamped with tension springs



New configuration uses rigid clamps that attach to the existing clevis pins





An axial load of ~14 lbf was applied/removed four times over a 60 sec interval resulting in the measured deflection shown in the plot at right. The observed 3µm deflection is within the drift of the indicator over a comparable interval with no load applied.