Gudgel Results –

Mr. Gudgel had three primary factors he tested: slew rate, repeatability, and point rotation.

Slew rate –

Mr. Gudgel’s system was built around positioning only and did not include the ability to control slew rate. Only when changing motor supply voltage did his slew rate change. Although his motors were rated for 24V, he tested for the slew rate at 15V. At this voltage his slew rate was ~0.70 degrees / second which (Did or did not meet his requirements)

Repeatability –

To test repeatability, Mr. Gudgel used an optical system with static test images spaced across its field of view. He manually aimed the telescope at each test image, noted the resulting altitude and azimuth angles, and then took a photo of the target image. He then commanded the telescope to return to those angles, and took a second photo. Overlaying these two images allowed him to find an error distance and error angle.

The results of this test were less than satisfactory. Among the five test images he used, he had error distance ranging from 0.5 cm to 2.8 cm and error angle ranging from 0.04 degrees to 0.26 degrees.

Point rotation –

To test image rotation, Mr. Gudgel aimed the telescope at one of the static test images used for the repeatability testing and took a series of photos with the altitude and azimuth angles held constant while varying the image rotation angle. He compared the photo of image rotation = 0 degrees to each other commanded rotation which allowed him to test actual image rotation angle vs commanded angle.

Overall-

Overall, Mr. Gudgel felt the system showed that it could theoretically be capable of meeting the goals he set but that the system as implemented did not. He attributed this primarily to compounding tolerances in manufacturing the hardware. He felt that with better manufacturing processes and tighter tolerances the system could be used for celestial observation as desired.

Alt Az from Right Ascension and Declination.

Right Ascension (RA) and Declination (Dec) is a celestial coordinate system which is independent of the viewers location