

Ogura Brake Application on a Radio Telescope Drive

The Allen Telescope Array at Hat Creek California is a joint venture between the University of California Berkeley and the SETI Institute of Mountain View CA. The array will ultimately consist of 350 offset parabolic antennas distributed over an area about 1 kilometer in diameter. The instrument will be used simultaneously for both astronomy projects and the search for intelligent life. Each antenna is about 6m in diameter and is positioned using a turntable bearing with pinion and large gear for azimuth moves and a ball screw drive for elevation moves.



View of two antenna elements of the Allen Telescope Array at Hat Creek.

With so many antennas a low cost design with efficient components is critical. Since wind load on an antenna is one of the main drive system design issues the wind is allowed to overpower and backdrive the antenna at wind speeds higher than 50 mph. Wind speeds like this are not common but can occur a couple of times a year.

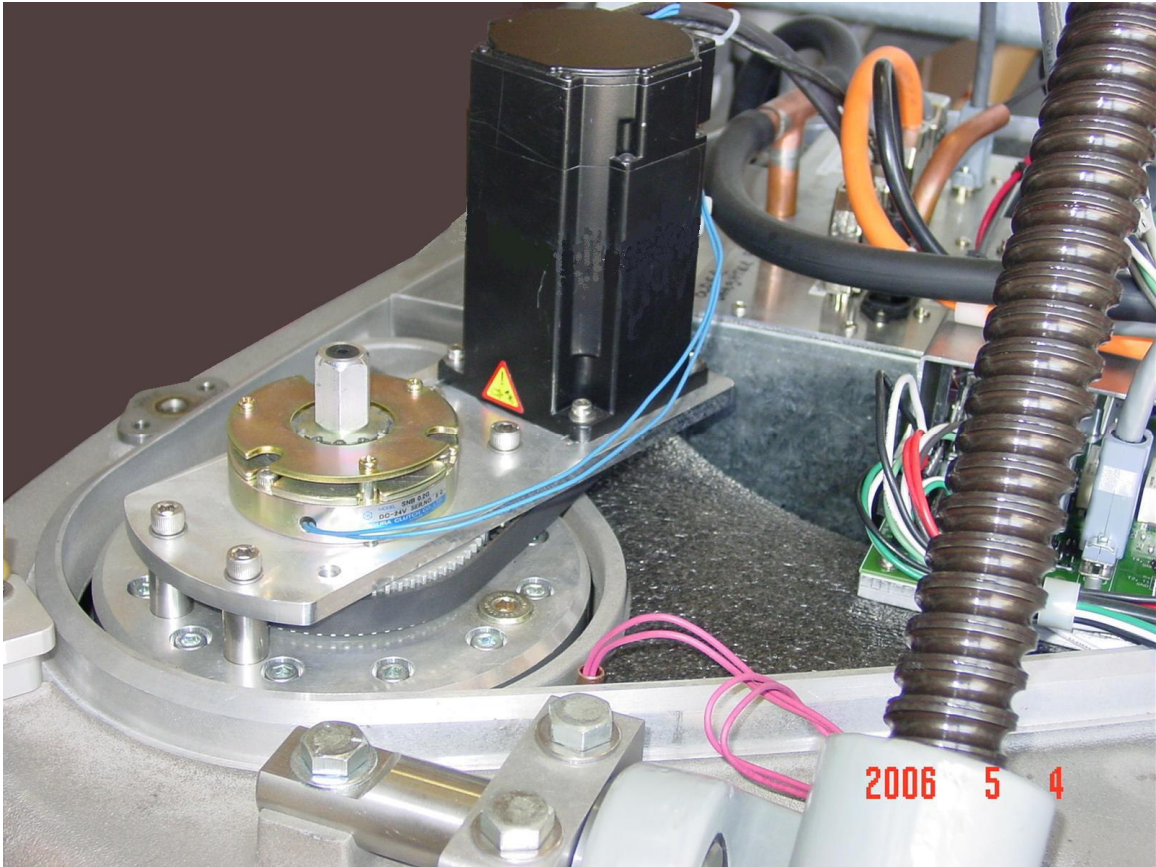


View of several additional antennas with the assembly tent in the background



View of the Ogura SNB-0.2G brake on the back of the drive module.

The azimuth or vertical axis of the antenna has a gear ratio of 4,800 : 1 from motor to antenna and averages about 8,000 : 1 on the elevation or horizontal axis drive. The output pinion shown on this azimuth drive unit uses a 180 : 1 harmonic drive to deliver over 10,000 in-lbs torque with a 2.5" pinion using a motor about 3.3 x 3.3 x 5.8" dimensions. Once this module is installed, the gear train operates with 57% efficiency and can be successfully backdriven. Both axis use the same motor, a Kollmorgan AKM-42 brushless servo motor and Copley Controls amplifiers. On both azimuth and elevation axis the Ogura SNB-0.2G brake is used to hold antenna position during power failures or other loss of control by the motors. The brake has been sized so that during severe wind conditions the drive can be backdriven to allow the antenna to point downwind to its designed survival position.



View of the azimuth drive module installed on an antenna.

Above is a closer view of the brake on the azimuth drive unit. The brake can be unplugged and powered by a battery so that the unit can then be driven with an electric drill motor and 3/4 hex socket.