

20 Ton Actuator Failure

September 2016

My antenna system is one-of-a-kind in the world, so not much help to a DIY'er. But it is still quite interesting. This is a dive into what raises the monster in elevation.

First I thought it was just the motor that burned out. So I took the "opportunity" to change out to DC and got lucky and found a DC motor with same footprint and same 90 RPM. I bought a 90v motor controller and wired everything up and still no movement, and realized the jack screw was locked up and that probably burned out the old AC motor.

So it was locked up with screw almost fully extended which made removal very tricky. I had to rig up ratchet straps to support the weight as I slid the screw out of the track.

First I had to remove the motor, shroud, limit switches, etc. [Jack removal](#)

Then I had to jack up the dish to take the weight off the link so I could disconnect: [Removal-1](#)

Then I could slide the lifting screw out of the channel, supporting the gearbox with ratchet straps. [Removal-2](#) Notice the little yellow jack which had 10,000 pound lift in a very small space!

Finally got the thing down to earth: [Removal - 3](#) It weighs close to 300 pounds.

It was a real challenge getting it apart to see what the problem was. I think it failed due to a tiny finger breaking off allowing the balls to escape: [BallguideRepair](#) Its the little finger on the lower left of the ball guide that broke off.

This jack was purchased in 1982 by Alascom and never greased until I did it in 2010, and I mistakenly used graphite grease, so the balls were all significantly worn and a couple of the balls actually fractured and cause the jack to lock up. So I replaced all the balls. The ball nut was also worn, but with all new balls and proper grease, I'm hoping it will survive ok. The individual balls had worn 0.008" amazingly very evenly. I guess due to the fact they are constantly rotating and moving. [Ball Nut & Guides](#)

The worm and drive gear are in very good shape: [Worm Gear](#) I also needed to replace the rear thrust bearing. Total cost to repair was less than \$100.

I'm got off cheap. A new jack is >\$5000. I have learned a lot, and realized much of the wear and ultimate failure was due to my lack of maintenance - GREASE !!! I will be greasing regularly from now on, and praying it will survive a bit longer.