



National Radio Astronomy Observatory

VLBA Antenna Memo Series – No. 111

Steve Taylor

TRIP REPORT – Fort Davis, March 10-12, 2026

1. Trip Summary

A group from the VLA traveled to Fort Davis, Texas VLBA station to rebuild remaining two gearboxes

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Steve Taylor

2. Executive Summary

Available workdays would be Wednesday and Thursday to complete all major scheduled tasks, with early Friday for a final replacement of oil and check for leaks and function. . Work was planned around the site-specific weather forecast. Work procedures ensured that essential guidelines and best practices were followed to ensure safety when working on site.

3.) Gearbox overhaul process.

1. The EL2 and AZ1 motor-gearboxes were disassembled, measured and reassembled with all new sun gear, new input shaft bearings and seals, and new thrust washers between the first two stages. This is now routine work, and is essentially around 20 man-hours of time per box. .
2. The gearboxes are drained of oil, the motor is removed.
3. The gearbox is split at the input shaft housing and the shaft housing removed.
4. The measurement plate is attached to the remaining gearbox and measurements taken that establish the current end clearance in the gear box. .
5. Following the measurement the box is stripped down to the 3rd planetary stage, and everything is cleaned.
6. The input shaft housing is stripped and cleaned, and the input shaft replaced with a new one, and new bearings. This is essential, because the gearbox oil seal at the very front of the box has usually rubbed a groove into the oil seal face of the input shaft. Failure to replace the shaft will rapidly wear a new seal, and lead to leaking.
7. The gearbox is reassembled. The 3rd stage housing is sealed to the gearbox and the sealant allowed to cure.
8. The input shaft housing is replaced, and a quick test made to ensure clearance in the box - this can usually be felt by turning the input shaft by hand
9. The input shaft housing is removed and sealant applied, before final assembly.
10. Final tightening of all screws and motor refitted



Tooling.

For this visit new tooling was tested for the first time.

We fabricated a 50 ton press to help assemble and disassemble the 3rd stage sun gear.

The design allows for easy disassembly for compact packing

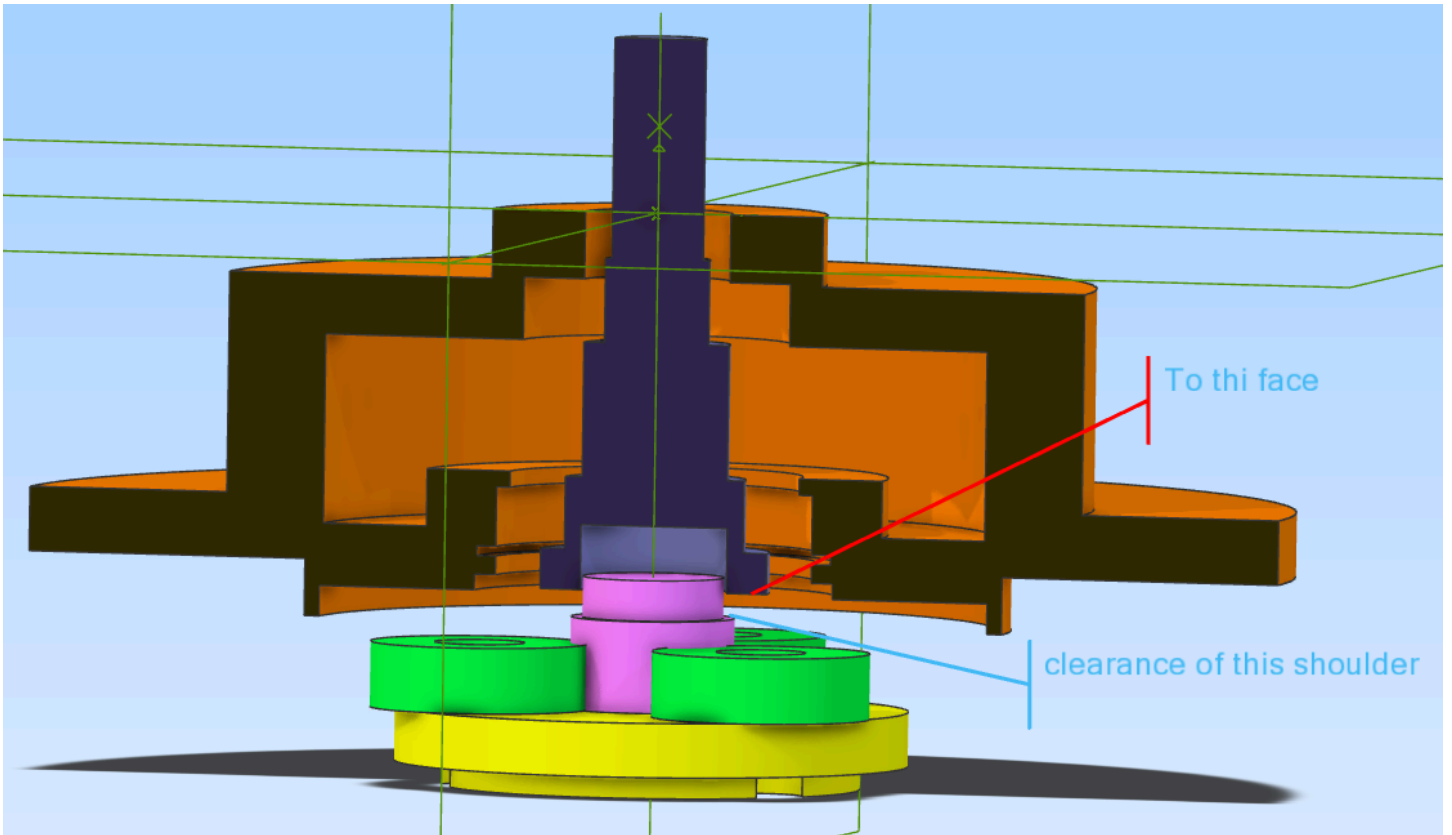


Whilst the applicable force was sufficient (but needs a pressure gauge), the press was unfortunately slightly too narrow, and slightly too long. New sideframes will be fabricated and the device retested.

To make the gear box measurements, a new gauge was tested, again for the first time. Performance was acceptable, though some simple improvements will separate the measurement from the application of force, which affects the readings of this and its previous, very very heavy, incarnation.

The measurement we are trying to make is illustrated below.





Its is a complex measurement to reach, and requires 5 different measurements to achieve.

During examination of the components of the input shaft housing this was observed. This nicely demonstrates a gearbox with insufficient interal clearance, as the imprint of the first stage input gear may be clearly seen on this input shaft spline. To counter this, the box was reassembled with a 1mm spacer removed from the thrust washer on the rear of the second stage stage sun gear.





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The construction of the EI and AZ gearboxes is identical. On the 2nd day, the EL2 motor was overhauled. No special observations were made.