



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025

Attending team

Lorenzo Benevidez – team manager

David Dirmeyer

Norman Aguilar

Edgar Aceves

Javier Alvarez

Steve Taylor – supervising engineer

With Site Techs

Tom Baldwin

Doug Whitton

Tasks Completed

Sub reflector painting and repair

Secured power cable to antenna

AZ2 motor replacement and gearbox rebuilt

AZ1 gearbox rebuilt.

Lifted new motors to EL1 and EL2

FRM

- Flex shaft replacement
- Dustcovers
- General maintenance

Splice bar upgrade

Packed stuff to ship to NM

Regouted ½ rail.



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025

Tasks not completed

Half of the rail was regouted, due to press of time and cost of materials.

The elevation motors were not serviced, due to the requirements to have more input shafts assembled with their bearings. Field disassembly was not possible with equipment we have.

Though not an assigned task for the trip, it was strongly felt that the dish should have been cleaned, due a buildup of lichens and moss on the surface, which was a slip hazard, and might affect signal quality.



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025



Project pictures at this link <https://photos.app.goo.gl/Z6fpKV81T43KbjmZ8>



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025

Summary of works

Sub reflector painting and repair.

Surface filled and renovated. A new silver layer and Goldstone 7

Secured power cable to antenna

Replaced sun damaged power cable to vertex room

AZ2 motor replacement and gearbox rebuilt

Replaced sun gears – We need a heavier press or access to a local shop nearer the sites

Replaced thrust races – no signs of wear evident on any of the replaced units

Replaced input shaft bearings – this should be done in the shop before arrival on site.

Reused gear box oil – no need to replace, it was clean and only a month old. We no longer recommend a specific oil, but a good quality VG46 hydraulic oil is acceptable

AZ1 gearbox rebuilt.

Replaced sun gears – We need a heavier press or access to a local shop nearer the sites

Replaced thrust races – no signs of wear evident on any of the replaced units

Replaced input shaft bearings – this should be done in the shop before arrival on site.

Lifted new motors to EL1 and EL2

FRM

Flex shaft replacement

Dustcovers

General maintenance

Splice bar upgrade

Need to modify the part slightly to improve the fit of the screws.

Packed stuff to ship to NM

RegROUTED ½ rail.

This grouting project went very well. Great care at the resin mixing stage and the use of the mortar mixer reduced air entrainment to minimal levels. Previous trips had used a standard concrete mixer which folded in much air and reduced final strength.



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025

Diary

Monday 22nd.

Unpack. Introduction to Tom and Doug, Site briefing on safety and expectations. The Team helped with delivery of manlift and mixer. We moved all the resin and hardener into the control building to allow it to condition to 70F or so. Steve undertook a 4 hour long, but abortive survey of loaded rail. Begun chipping out of grout. It was decided we needed heavier hammers to break out the grout, so Lorenzo went to hire some from Home Depot. We also decided to acquire a wheelbarrow and a couple of shovels for site clean-up, also purchasing hearing protection. Steve and Dave went to inspect the sub reflector and learn how to drive the manlift.



BEFORE



AFTER



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

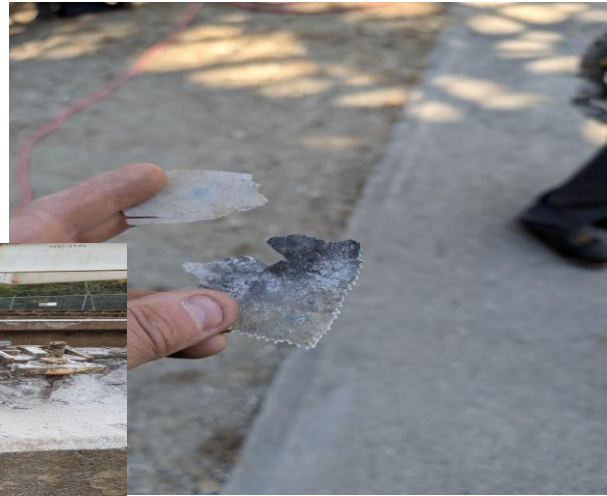
Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025

Pieces from sub-reflector surface

Tuesday 23rd



More grout removal.

Steve attempted to reduce survey data. Dave and Edgar worked to sand the sub-reflector. Steve decided the survey instrument is wildly out of calibration. After wearing out the originals, more drills and chisels (Milwaukee brand) were acquired.

Wednesday 24th

Rain slowed work. Grout removal.

Splice bars We had brought out a full set of splice bars for rail joints, made in the VLA site machine shop from 1" x 3" steel bar. These are designed to stop the forcing apart of the head of the rail from the base, observed at Fort Davis.

Steve repaired the hydraulic wrench after the control cable got yanked, and a spade connector came off inside the box.

WO XXXX It would appear that some of the foundation concrete on the west side of the foundation may have frozen during cure, it was extremely loose and friable, and extended two feet down the wall at the maximum extent. On the inside of the wall the breakdown was only a couple of inches deep. Jackhammers were used to break out this rotted concrete



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025

Thursday 25th

Rain slowed work. Javier led the concrete repair, fabricating a piece of formwork for the outside foundation and 6 bags of concrete were mixed and poured



Grout removal.

Friday 26th

The area of broken out grout was cleaned, blown off, and then pressure washed, the concrete was then thoroughly dried with a propane torch, and we fitted formwork coated with wide packing tape to prevent the grout from sticking to it, then we poured the first epoxy grout. Ambient temperatures were in the mid 60s Fahrenheit (18..20C). The material poured and flowed very well. We have good video of DavidD, who mixed all of the material using appropriate equipment and taking great care to not entrain air.

Doug and Steve attempted to survey rail with self-levelling laser.



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025



Steve repaired the grout mixer with a new power cord.

Saturday 27th

The Az 2 gearbox was stripped down, refurbished and inspected by Norman, Edgar and Steve. We also fitted a new motor. Tom undertook the rewiring. Unfortunately,

we were unable to separate our stage 4 sun gear with the press we had and so we had to use our spare stage. This meant we couldn't do any more work on gearboxes until we could guarantee that we could make another spare 4th stage. That problem was left until Monday morning.

The formwork was stripped off the first two sections of epoxy grout. Note the polished finish!

More grout removal



Sunday 28th

Grout removal. Dave did silver paint (x2 layers) and Goldstone 7 final painting of sub reflector



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

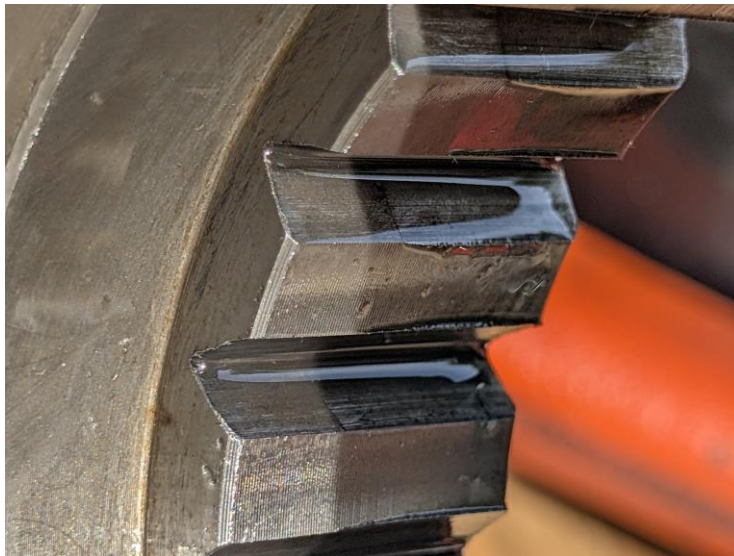
2025

Monday 29th

Dave D drove the man lift while Tom removed an old wire and secured its replacement in the cable trays on the antenna framework.

The final grout removal was completed, then pressure washed. Formwork was fitted as previous, sealed and then more epoxy grout poured. David D replaced parts in FRM.

Steve took gearbox stage to press out sun gear at a local machine shop. 3rd stage took much more force than expected to separate – see burrs in picture below



Tuesday 30th

AZ 1 gearbox rebuild complete and test. Remove formwork and clean. Man-lift and mixer returned to supplier. Filled holes in foundation from formwork screws

Wednesday 1st

Site cleanup.



National radio Astronomy Observatory VLBA Antenna Memo Series – No. 108

Steve Taylor

TRIP REPORT – Hancock, NH Tiger team, September

2025

Personal observations and suggestions

A site survey visit should be made by a single engineer before the actual work is spec-ed out.

The antenna surface needs cleaning – lichens and mosses make the surface dangerous to walk on and probably cause some reduction in signal at shortest wavelengths.

Need to improve rail survey, takes too long and with too many uncertainties.

Grout removal was probably not warranted. Track problems were down to loose splices, in the main. We found no failures in the grout, and it took five guys five days to remove it all. Grout was painted with some sort of elastomeric coating, which was looking loose and bad.

Grout removal would be greatly expedited with diamond core drills to bore through each bay.

Need 35 ton press. 12 tons is not sufficient to dismantle and reassemble the stage plate.

Need metal top on worktable

We used just over half of the 70 cubic feet of grout purchased for the project.

Our site tech hosts were very helpful and willing to pitch in when needed. The whole team would like to thank them for their extra time and the apple pie