

National Radio Astronomy Observatory
Socorro, NM

VLBA Antenna Memo Series #33

Owens Valley Maintenance Visit
June 11th through 17th, 2001

Jim Ruff
7/10/01

Attachments: Azimuth Rail Survey, Servo Trip Report, Electronics Trip Report, Task Schedule

The team consisted of Steve Aragon, Ramon Gutierrez, Bob McGoldrick, Steve Tenorio, Steve Troy and Jim Ruff. Site Techs Jim Brown and Bill Robbins assisted throughout.



An apex handrail and a quad leg ladder and Sellstrom fall arrest system were installed.

The pintle bearing pocket was checked for flatness. Measured TIR was 0.004”.

The FRM INA bearing clearance measured 0.003”.

No structural cracks were found.

Kellum grips were installed on three chafing power cables.

The elevation pillowblocks were outfitted with button grease fittings. No metal was found in the grease.

The watch spring cable wrap had some cables dragging on the deck plate. Moved them up.

The azimuth bearings were inspected. No bearings needed replacing. The outer races had been rotated previously, so we didn't do it. The bearings on this antenna are getting plenty of grease. Jim and Bill are to be commended for their conscientious job. OV uses a different grease from the other sites. They find that Shell *Darina EP2* and Shell *Alvania EP2* retain oil better in the hot weather common there.

	Drive 1	Drive 2	Tach-side Idler	Other Idler
Inner	OK	OK. Pits in O.R.	OK	OK
Outer	OK	Very fine metal flakes	OK. Minor pitting.	OK

Drive Wheel Alignment			
Wheel #	Horizontal Error	Vertical Error	Radius Error
D1	0° 0' 9"	0° 1' 45" (too flat)	0.09" (out)
D2	-0° 0' 34"	-0° 1' 5" (too steep)	0.17" (out)



The dichroic panel is in good condition, but the paint on the frame needed touch-up.



One quad leg t-buckle jam nut needed tightening.

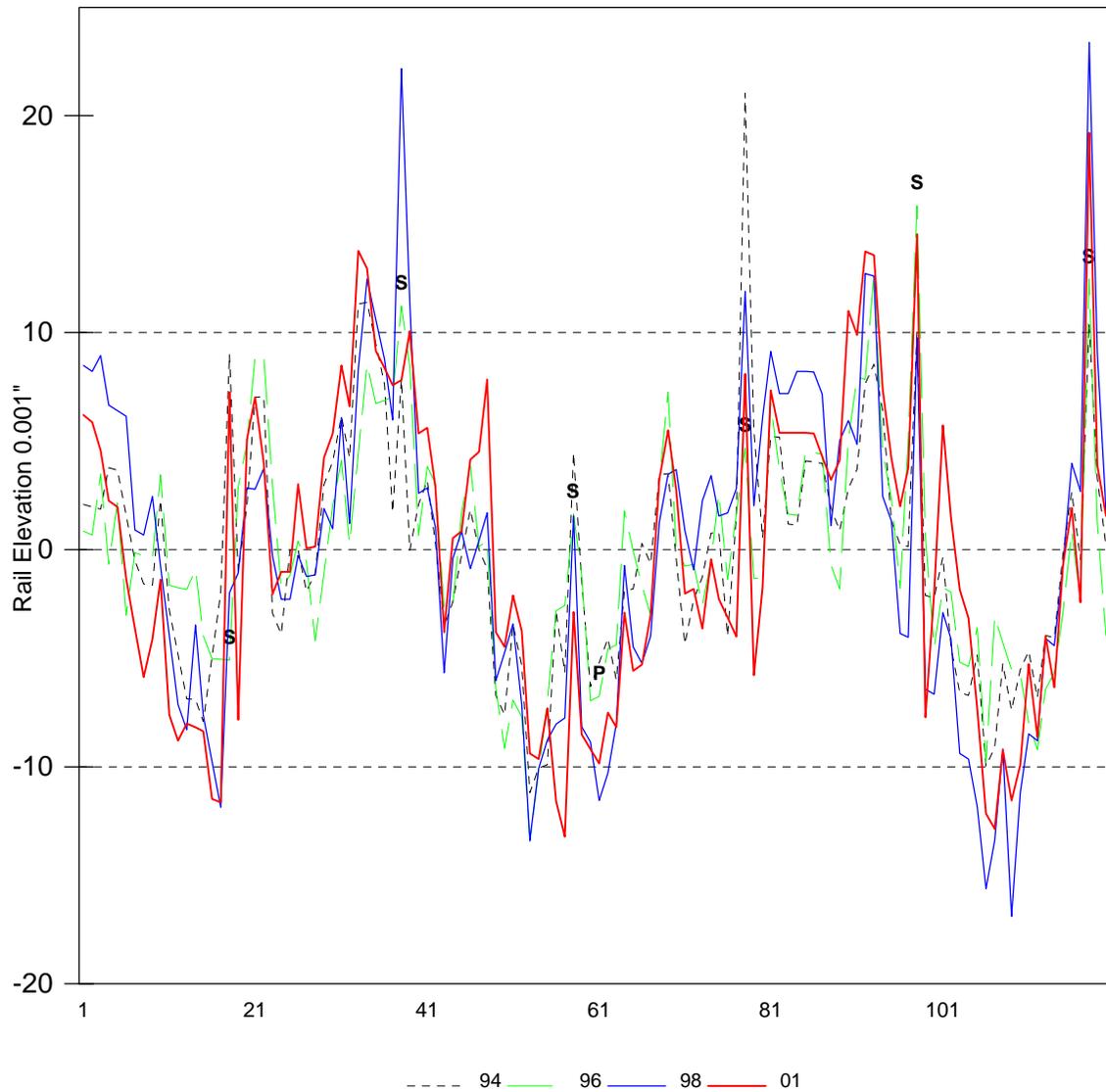


86 GHz Receiver



The azimuth rail grout and Vulkem are in excellent condition.

OV Azimuth Rail



The paint on this antenna is in excellent condition.





The subreflector is in good condition.

National Radio Astronomy Observatory

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To: Jim Ruff

Subject: Owens Valley Tiger Ream Report

From: Bob McGoldrick

Date: 2 July 2001

The Owens Valley Station is well maintained, and a considerable amount of maintenance was completed by the Tiger Team in conjunction with the Site Techs, Jim Brown and Bill Robbins. The members of the Tiger Team were Jim Ruff (PE Engineer in charge), Ramon Gutierrez, Steve Tenorio, Steve Aragon, Steve Troy, and Bob McGoldrick.

The Site Techs leave little to find fault with around the station as is evidenced with their replace as you go attitude concerning station maintenance and upkeep. Many improvements and maintenance issues were corrected, but some items were left for the Site Techs to correct.

ACTION COMPLETED

1. The Electronics Inspection Sheet was completed, except where Tom Baldwin left specific instructions to leave for him on a later visit.
2. Ramon Gutierrez, Steve Aragon, and Steve Tenorio removed the old bolt-ladder on the apex leg, installed a new safer ladder in its place, and also installed the new fall arrest rail on the ladder; Ramon Gutierrez installed the apex safety rail also.
3. A new RH sensor over the recorders for Contempo temperature/humidity control was installed by Steve Troy. He also did the HVAC upgrades in the station building and pedestal room.
4. Strain reliefs for all cables needing strain relief in the Cable Wrap were installed; three holes were drilled in the top-plate(just below the bulkhead ceiling) to hang the strain reliefs. Steve Aragon found one of the stain reliefs needed to be reinstalled as it was being interfered with and coming undone, while another was too big. He showed me how to use a smaller size to compensate. Tom Baldwin has acquired some more strain reliefs of the proper size.
5. Bob McGoldrick cleaned/decontaminated the cable wrap and all the rings in pintel bearing room; Jim Brown cleaned out the grease from the pintel bearing overflow. Ring three through ring six has only the OEM supplied cheap plastic rings in each hole to protect the cables; there were nine holes per ring that have cables running through them which totals out to thirty six holes that need the improved plastic protectors.
6. The Pedestal Room bulkhead feedthroughs (adjacent to the outside Pintel bearing Room bulkhead) were found to have some water damage on the inside/outside wall surfaces, but the damage is old and the previous caulking is still working well.
7. Bob McGoldrick inspected both site Tape Recorders and looked at some Recorder Test results to determine if any major work would be needed; He found that recorder one needed a replacement idler roller and some hub parts were needed for both recorders. It was found that the denatured alcohol contained some questionable ingredients, specifically "1% of either (gasoline, kerosene or a rubber hydrocarbon solvent)."
8. Jim Ruff replaced the dish anemometer roll pin blocks with replacement blocks and new

- bolts rather than roll pins; He had the machine shop modify old blocks prior to the visit, and plans to take the old blocks back for modification prior to the next trip.
9. Jim Brown and Bob McGoldrick checked the generator out and found it to be up to par with the rest of the station; hoses, wires, filters, and switches were in good condition.
 10. Tie wraps from Az motors to the Apex were replaced as needed; the cable run from the bottom of the quadraped leg to the Apex showed no sign of any tie wrap problems at the time.
 11. Steve Tenorio replaced the j-boxes for all motors, including wiring, and replaced brushes and holders where necessary.
 12. Steve Tenorio installed the Hacr-breaker in the non critical panel in Pedestal room.

ACTIONS TO BE COMPLETED

1. The upper room of the Vertex room, inside the feed cone, hatch has some styrofoam insulation on the door sill that is loose and should be repaired or replaced; the Site Techs are aware of the problem.
2. A couple of cinder blocks on the station building are cracked, but do not appear to be serious.
3. The Antenna paint is in remarkable condition considering it has never been painted, however the lower underside of the structure seems to have accelerated its coating deterioration, and paint is flaking off at a seemingly greater rate. Jim Ruff is aware of this.
4. The phone system will be upgraded when the rest of the phones arrive.
5. Chafe rings for rings three through six on the cable wrap need to be replaced; Tom Baldwin is aware of this.
6. The denatured alcohol used to clean the recorders and heads should be replaced with isopropyl alcohol.
7. The dirt road should be routinely graded by Cal Tech rather than infrequently graded.
8. The weather station to pedestal room MCB portable cable will be built by the site techs.

CC: Paul Rhodes, Tom Baldwin, Steve Durand

To: List

From: Steve Tenorio

Subject: Trip report Owens Valley

Date: 20mar99

09jun01 Day # 1 Travel to Laughlin Nevada

10jun01 Day # 2 Travel from Laughlin to Bishop.

11jun01 Day # 3 Emptied container. Helped ant. Mechanics remove apex quad. Leg bolts and install new ladder and fall arrest system. Changed Az. #2 motor J- Box.

12jun01 Day # 4 Had two tires changed on truck.. Changed out #1 & #2 Elevation motor J- Boxes.

13jun01 Day # 5 Checked power panels in ped. Room with IR thermometer. Checked gear box heaters. Checked ped room grounding. Completed Drive Cabinet pm. Completed A.C.U. pm. Completed motor pms. Seated Brushes, cleaned commutator on Az. #1. Az. #1 quit failing single motor cw.

14jun01 Day # 5 Changed Az. & El. Motor coupling spiders, Checked Brake tensions. Completed servo test.

15jun01 Day # 6 Trouble shot stow setting problem. When you set stow parameters they don't repeat. Off by .005 degrees. Auto control board bad. Will send one from VLA. Moved E-stop on El. Platform. Moved claxton horn on El. Platform. Helped Aragon with hard stops. Moved stow pin switch for Aragon. Ty-rapped El. Motor cables.

16jun01 Day # 7 Checked wave shapes on tp 14 on SCR cards. No difference on Az. #1. Checked grounding from ped room up.

17jun01 Day # 8 Checked Az. #1 motor. Changed Brushes holders on Az. #1 motor . Cleaned ped. Room. Loaded tools into container. Showed Jim & Bill how to change parameters. Loaded container, cleaned up site, Did pre-trip on truck.

18jun01 Day #9 Traveled from Bishop to Flagstaff.

19jun01 Day #10 Traveled from Flagstaff to San Antonio.

Conclusions:

Owens Valley site looks pretty good as far as the servo systems goes. Az. #1 seems to be fixed now. Site techs should keep an eye on it though. The servo shop will send a replacement Auto Board to Site techs to correct the Stow parameter setting problem.

Task Name Resources

SERVO

SAFETY TESTS

MULTIPLE FAULT STATUS
MANUAL MODES TEST
INDIVIDUAL FAULT STATUS
REMOTE BOX TESTS

AZ Travel Limit Switch Tests

AZ Clockwise tests
AZ Counter-Clockwise tests

EL Travel Limit Test

Elevation up tests
Elevation down tests
BRAKE HOLDING-TORQUE TESTS Servo T, Site T 1

Motor Inspections

Install stainless steel j-boxes on drive motors (4)
Motor and Tach Couplings
Drive motors wiring orientation
Commutator & Brush Inspection

Servo PM

Replace SCR EL cooling fan
ACU PM

Lightning Grounding

EL Bearing Ground Cables
EL Motor Platform to Pintle Turret
Pedestal Room Grounding
AZ Wheel Ground Straps
Pintle Bearing Room Grounding

Detailed Test

System and Axis Faults
Motor Fault Status
Measure EL Velocity
EL counterweight balance measurements
Measure AZ Velocity
Record 1st Limits EL/AZ

Recordings

EL System Response Test

Implement test setup
Calculate acceleration
Locked rotor resonance, AZ/EL

AZ System Response Test

Implement test setup
Calculate acceleration
Locked rotor resonance, AZ/EL

AZ Position Loop Tests

Small signal step response
Large signal step response
Single motor step response

EL Position Loop Tests

Small signal step response
Large signal step response
Single motor step response

Auto Modes Test

Check stow commands
Synchro feedback operation
Test AUI COMM DEAD

HVAC PM AND UPGRADE

Antenna

Pedestal room A/C replacement

Remove window A/C unit & wall sleeve
Remove wall heater
Remove environmental control box
Install Marvair unit
Install thermostat
Install power & control wiring
Perform operational tests & place unit in service
Provide Site Techs w/manual and hold Q&A session.

Vertex Room A/C

Inspect air handler
Inspect condenser unit
inspect lines & bulkhead fittings
Repair/replace damaged line insulation
Replace & calibrate Hoffman fan control
Replace any suspect bulkhead fitting
Evacuate & place unit back in service
Check ROC settings (Cl, set 120, Def.30)
Check PCTool to DDC connection @ computer
Make hard copy of program parameters

Check programing, save program file to disk.
Hold Q&A session w/ Site Tech's

Control Building Building A/C System

Perform operational checks
Inspect indoor & outdoor units
Correct deficiencies as needed.

Stand-By Contempo

Recover refrigerant

Condensing Unit

Install head pressure control by-pass valve
Install & calibrate Hoffman fan units
Replace fan unit

Indoor Unit

Install primary unit interface relay board
Install controll relay
Instal Hoffman SCR's
Replace control panel light
Install auxillary terminal block
Replace V-belt & adjust pully to maximum
Evacuate & recharge refrigerant
Perform operational checks

Primary Contempo

Condensing Unit

install & calibrate Hoffman fan control
Replace fan switch

Indoor Unit

Install auxillary terminal block
Install utility interface auxillary switch
Install wiring to stand-by unit
Peform operational checks
Check PCTool to DDC connection at computer
Make hard copy of program parameters
Check program & save program file to disk
Perform hard test of emergency power w/ Contempo's
Review site documents with Site Techs
Inspect site utilities

ANTENNA MECHANICAL

Install new ladder & fall arrest system
FRM 2-year PM

FRM INA bearing check
Install apex guardrail

Subreflector

Check for peeling, delamination

Feeds & Dichroic

Inspect feeds,mounts,htrs,etc
Repair feedcone housing exterior, chk dichroic reflector

Quad-Legs Guy Wires Etc..

Inspect guywires & turnbuckles
Inspect quadleg flange bolts

Lightning Protection/Anemometer

Inspt mounts/chk operation
Install Baldwin bracket

Bull/Pinion Gears

Inspt bull/pinion gears
Lub El brgs, bull gears as req
Check stow pin

Elevation/Hoist/Swing Platform Work

Instl hoist safety mods, checkout winch, etc
Checkout swinging platform
Extend EL motor platforms
Instl condensor platform toe guard

EL Bearing Inspection

Inspect EL bearings lip seals
Clean off excess grease
Install El bearing grease trays

EL Motors & Gearboxes

Change gear oil in gearbox
Inspect pumps, seals & couplings
Check gearbox heater enclosures

AZ Wheels & Bearings

Pressure wash gear boxes
Rotate outer races on Az wheel bearings
Check wheel to struct clearances
Check AZ wheel radii and alignment
Check axle bolt tightness
Pillow block brgs-open & clean
Lubricate & take sample as req

AZ Motors & Gearboxes

Inspect pumps, seals, couplings

Paint & Insulation Inspection

Inspect ant paint and report

Inspect & repair ant insulation as needed

Pintle Bearing

Inspect seals, check pocket level & for loose bolts

Lubricate bearing as needed

Close gap in pintle grease catcher done previously

AZ Rail Inspection

Inspect ant foundation

Inspect for rail movement

Inspect joint bars & clips

Move ant, chk rail movement

Rail level measurements

Check popping wheel none

Dish Surface & Panels

Inspect panels, check distortion, shifting, etc

Spot check all panel bolts-looseness

Structural

Install EL hard stops

Spot check ant structural bolts

Inspect ant structural welds

Inspt ant backup/lower struct

Inspect EL axle

ELECTRONICS

Antenna Maintenance & Inspections

Activate & test feed heaters

Apex/FRM inspections Site T 2

Feedcone/Receiver system inspections

Vertex Room/Racks & cable inspections

Vertex to pintle bearing inspection

Replace tie wraps on antenna cabling with metal type

Install cable wrap strain reliefs

Inspect pintle bearing rm bulkhead, cablewrap, etc.

Inspect pedroom UPS, FRM controller, dry air sys, etc.

Install electrical breaker for air comp & hydraulic wrench

Station Building Inspections

Rm 100 - Check electrical, UPS and test operation

Rm 103 - Chatter/supervisory boxes, alarms, etc.

Rm 104 - Bulkhead, underfloor, maser, etc

Check tools, test equip, manuals, wtr sys, UIS, etc

Outside Building and Misc. Inspections

Run and inspect site generator

Inspect weather station

Check gates, fence, signs, grounds, etc

Inspect lightning protection for antenna & bldg

Check safety items/hazmat storage, etc.

FINAL INSPECTIONS

Spot check critical PM's

Review problem areas with site tech's

Site Inspections for Oversights

Site clean-up

Station Startup Verification Tests

Fall Protection training