

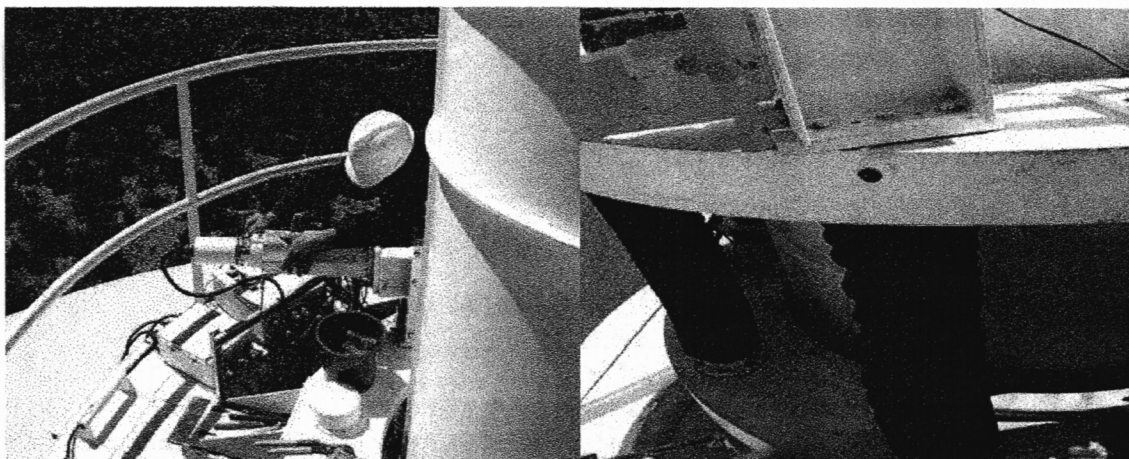
**National Radio Astronomy Observatory  
Socorro, New Mexico**

**VLBA Antenna Memo #60**

**Los Alamos, NM. VLBA Maintenance Visit July 28<sup>th</sup> – August 3<sup>rd</sup> 2005.**

**Team members consisted of Steve Aragon, Eric Carlowe, Kelly Greene, Ken Lakies and Bob McGoldrick. VLBA Site Technicians Paul Johnson and Gene Dunn assisted in all areas of maintenance during the visit.**





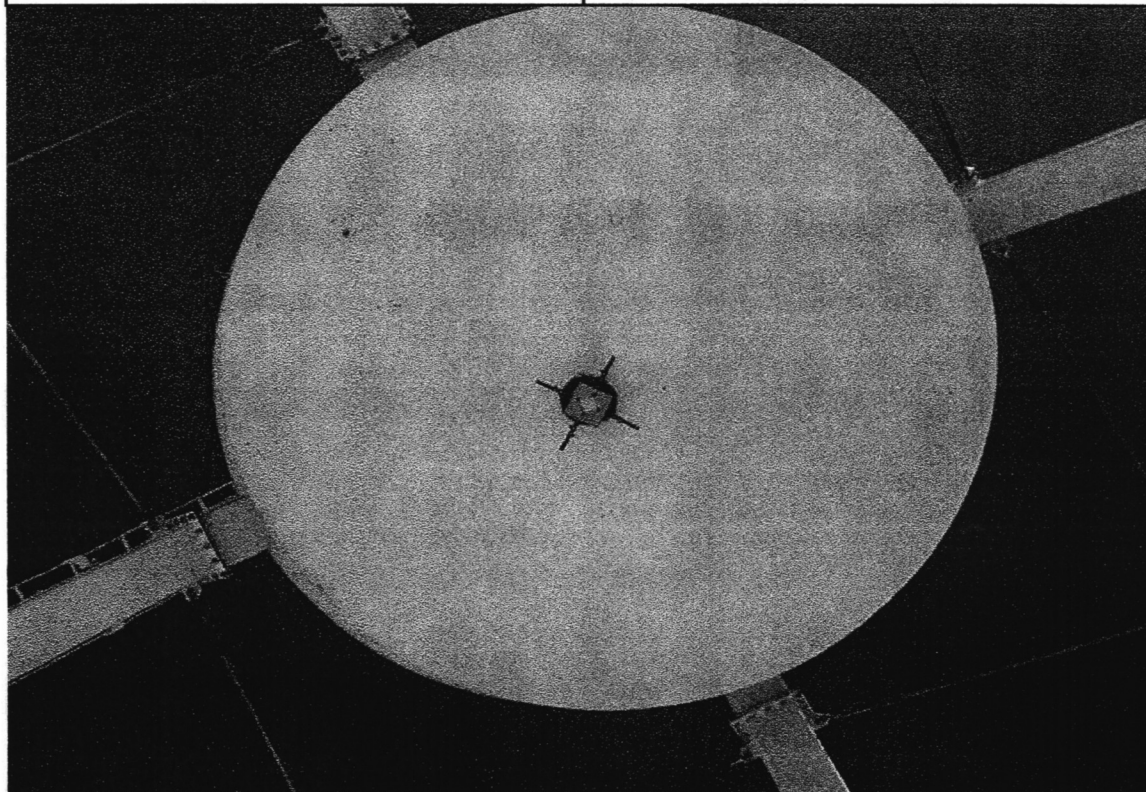
FRM was given a thorough inspection. A focus flex shaft was replaced and the new encoder coupling modification was installed. Both, 1<sup>st</sup> and 2<sup>nd</sup> screw bellows were replaced. Two bellows access holes were drilled in the mount.

**FRM INA BEARING CHECK 50LBS PULL ON EAST MOTOR**

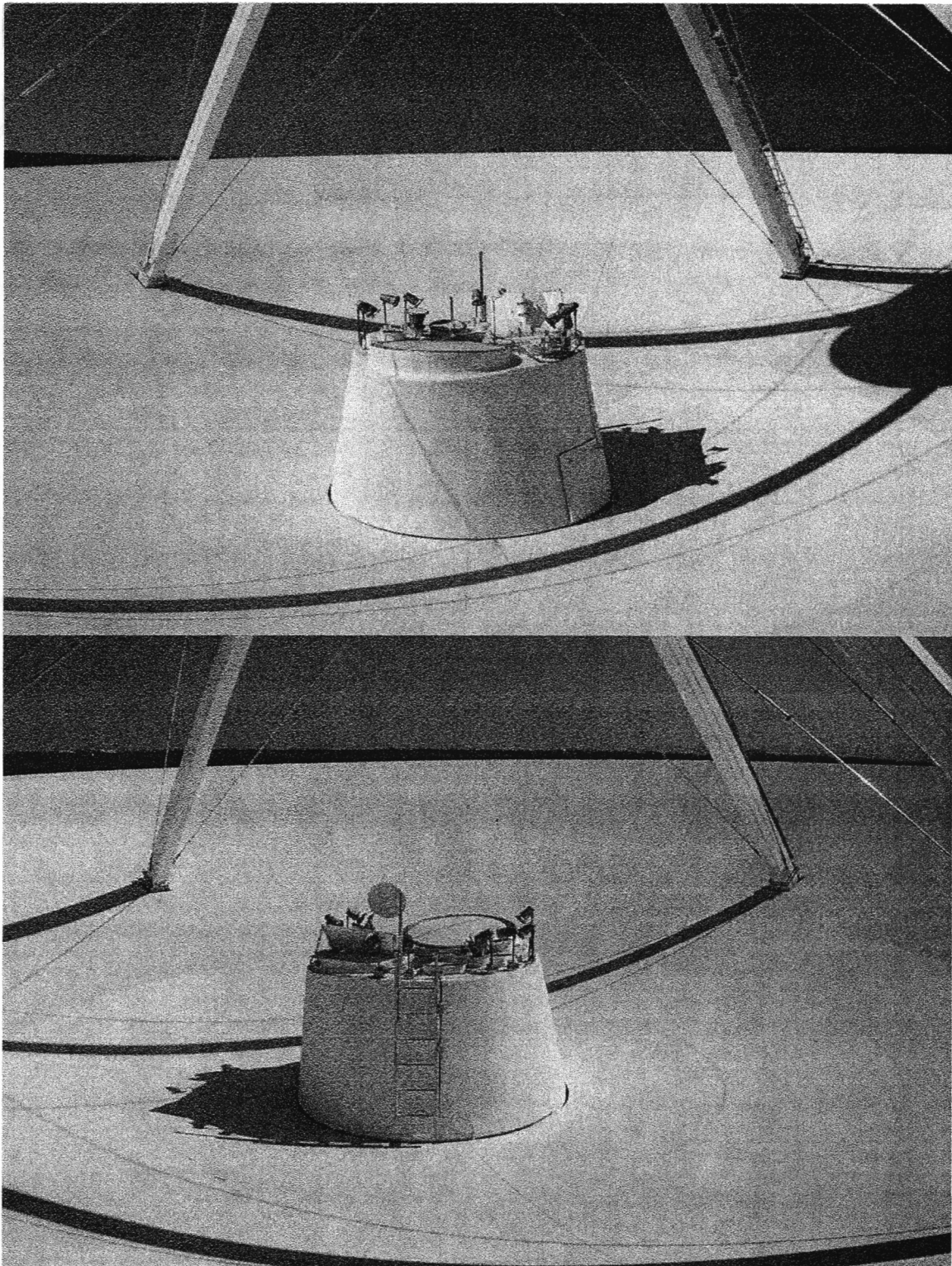
East Travel:	+0.0005	West Travel:	-0.0005
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**FRM INA BEARING CHECK 50LBS PULL ON WEST MOTOR**

East Travel:	-0.001	West Travel:	+0.001
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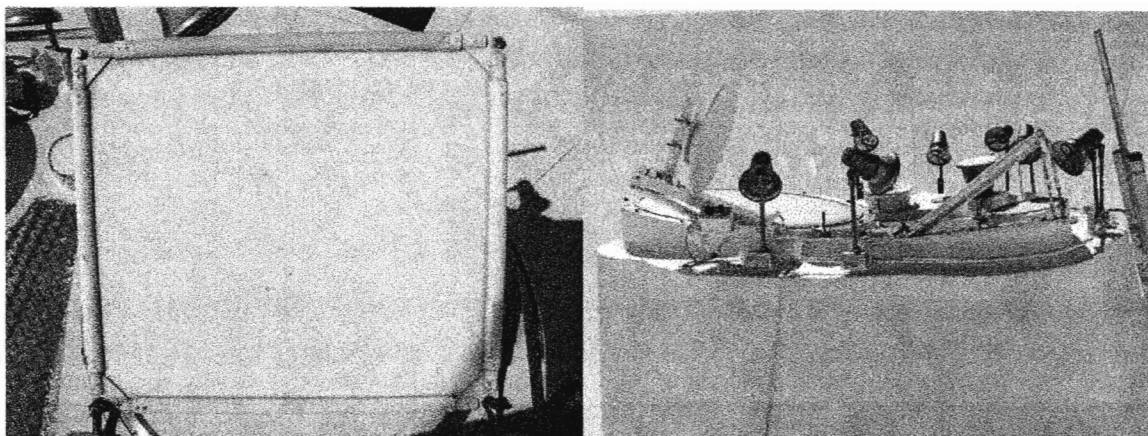


Sub reflector is in good condition. Three 1 inch holes were drilled in the center of the reflector for extra drainage. The snow tarp was removed.



Dish panels, and the dish panels paint are in good condition. Guy wires are in good condition. Feed cone was spot sealed and painted with elastomeric.

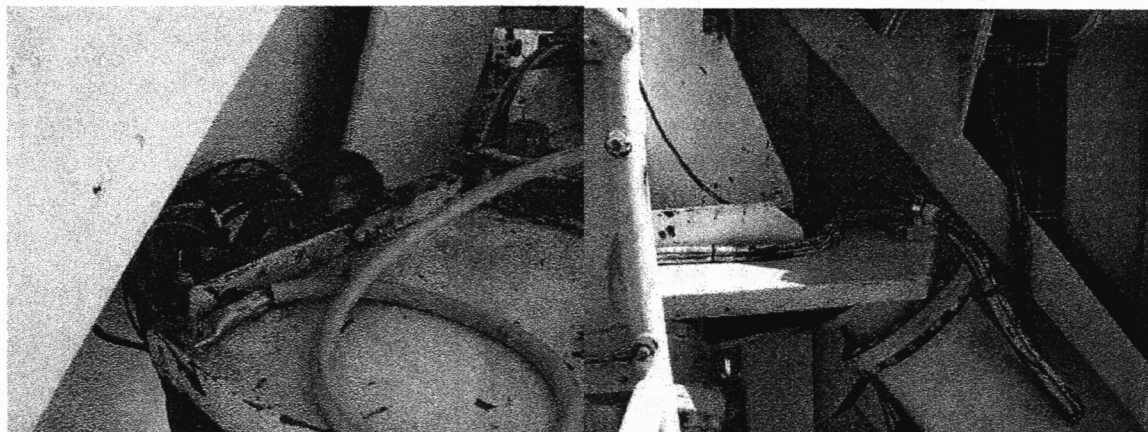




**Dichroic reflector is good condition. Elipsoid reflector is in good condition.**



**Elevation #2 and azimuth #1 motors were replaced. Digital tachometers were installed and calibrated on the azimuth and elevation motors.**

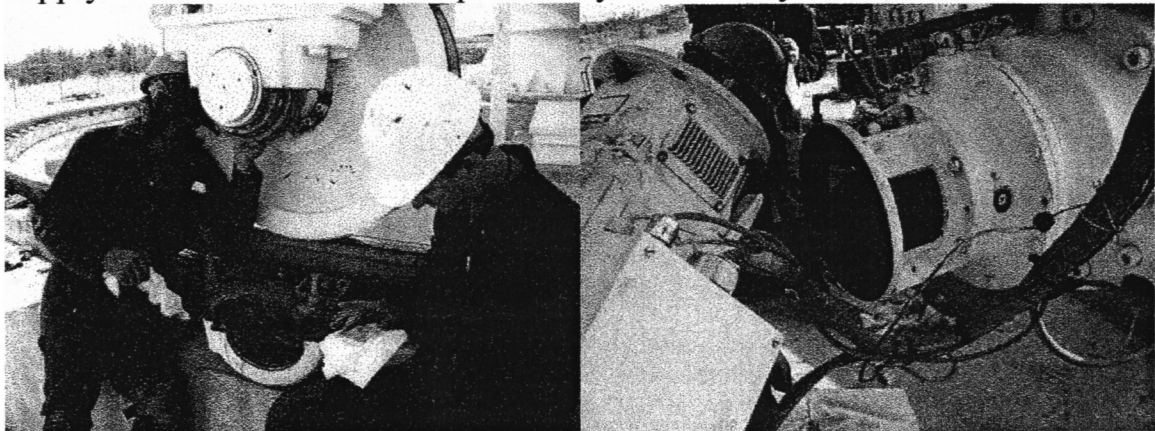


**Both the encoder and synchro side elevation cable wraps were repaired by repositioning and replacing strain relief brackets. Both sides elevation ground cables were replaced.**





The ACU backplane upgrade was installed and tested. The ACU power supply modification had been previously installed by Paul Johnson.



Azimuth wheel bearings were inspected. Azimuth #2 gear box seal was replaced with a double seal setup.

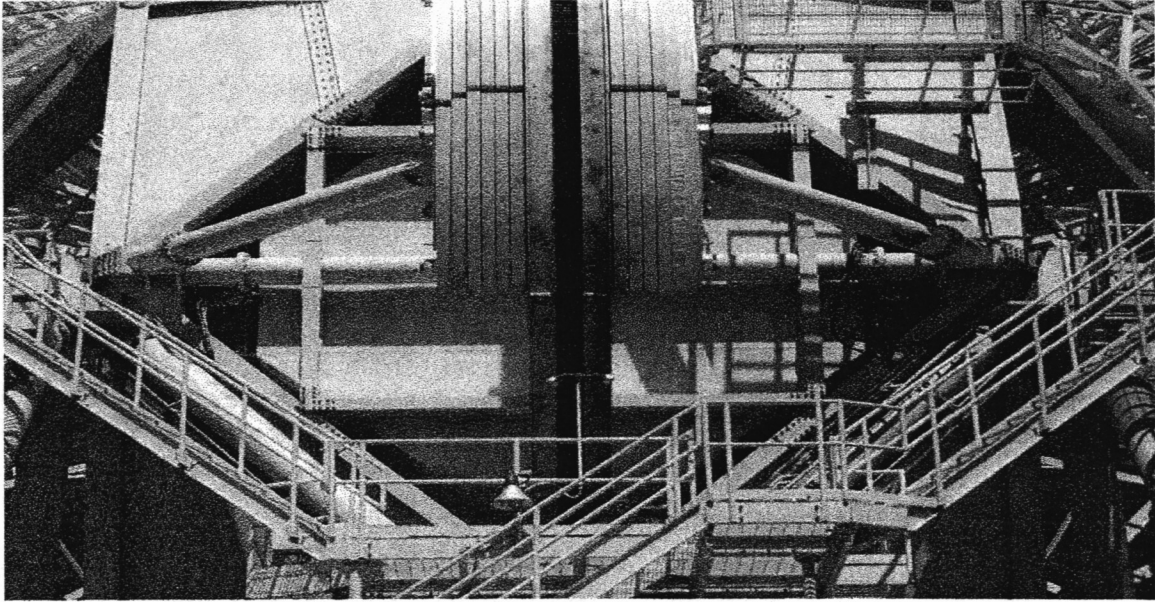
#### AZIMUTH BEARING GREASE INSPECTION

	INNER BEARING	OUTER BEARING
D1	New drive wheel.	New drive wheel.
D2	New drive wheel.	New drive wheel.
I1	OK	OK
I2	A few flakes.	OK
All bearings were very well lubricated.		

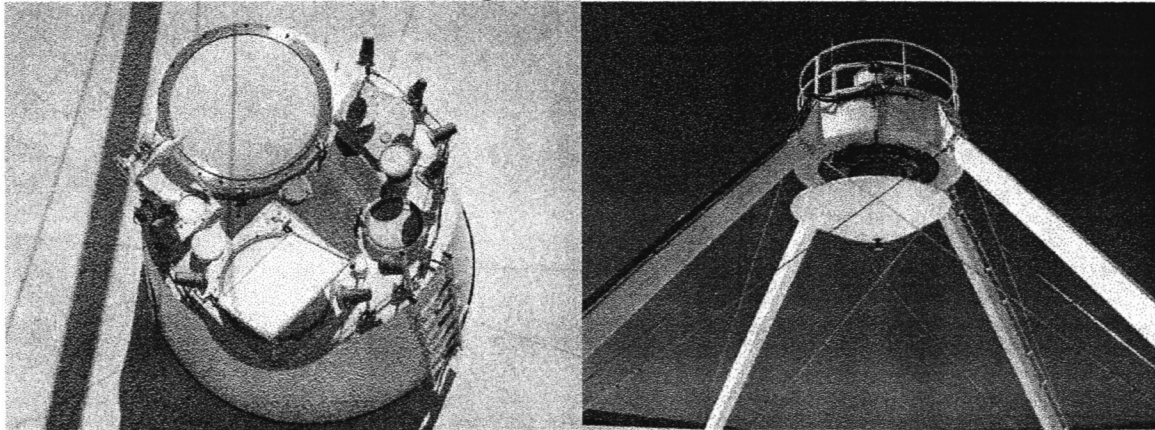
#### ELEVATION BEARING GREASE INSPECTION

Encoder	Good grease with no metal flakes.
Synchro	Good grease with no metal flakes.
Excess grease was removed from the encoder side bearing.	

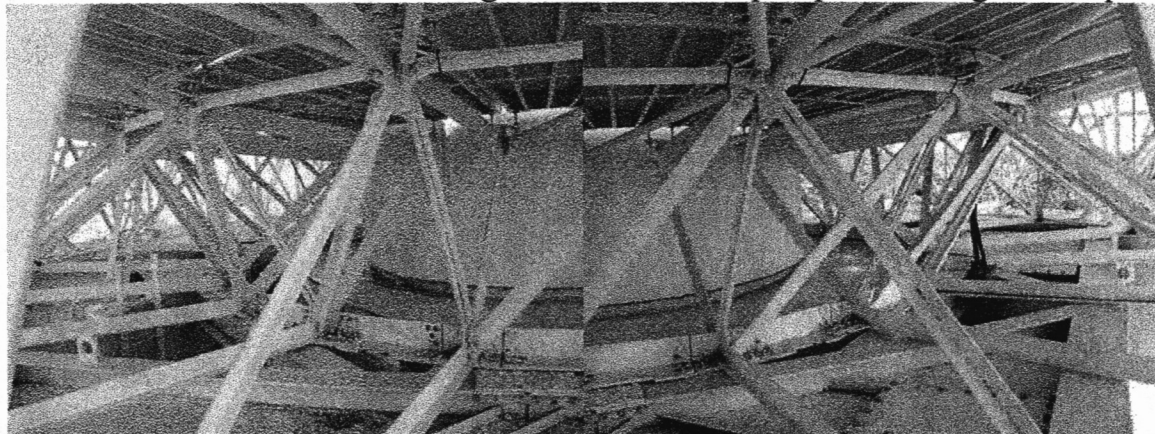
Pintle bearing is well lubricated with no metal flakes.



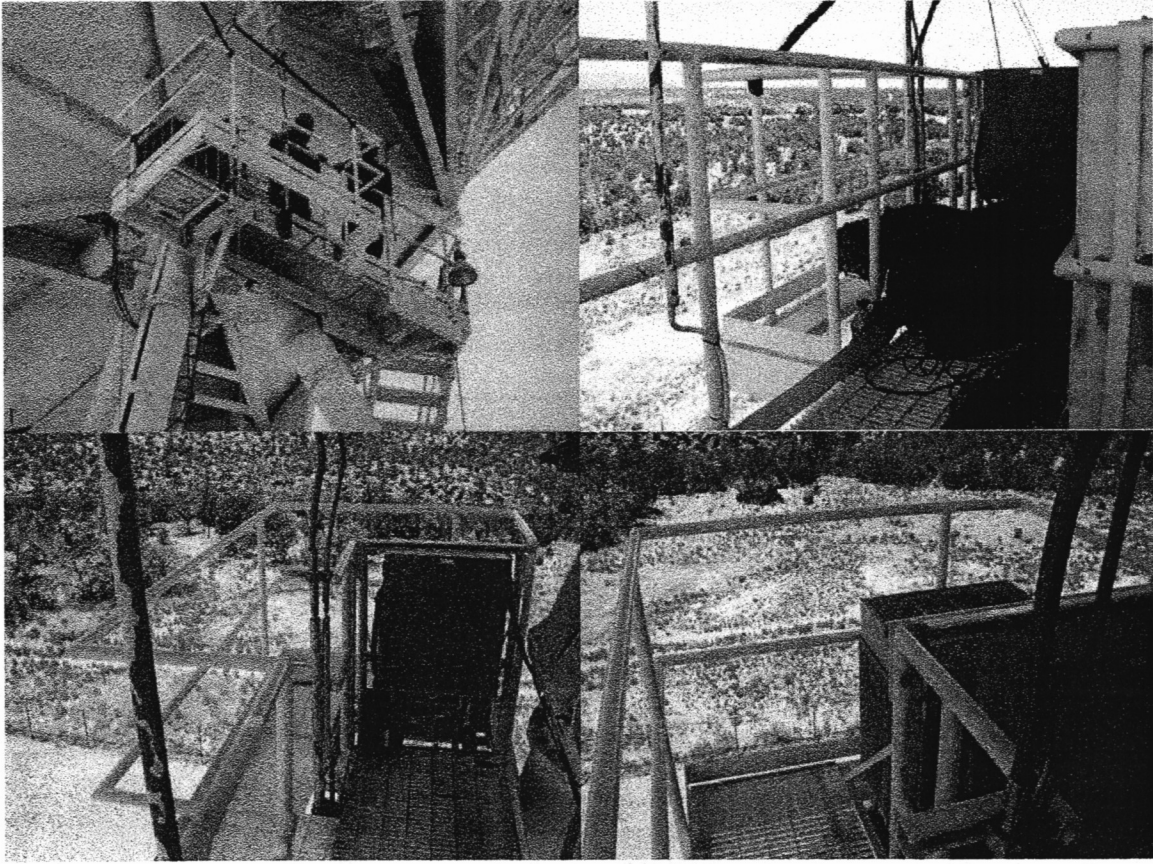
**Elevation axle has no visible signs of cracks. Paint is in good condition.**



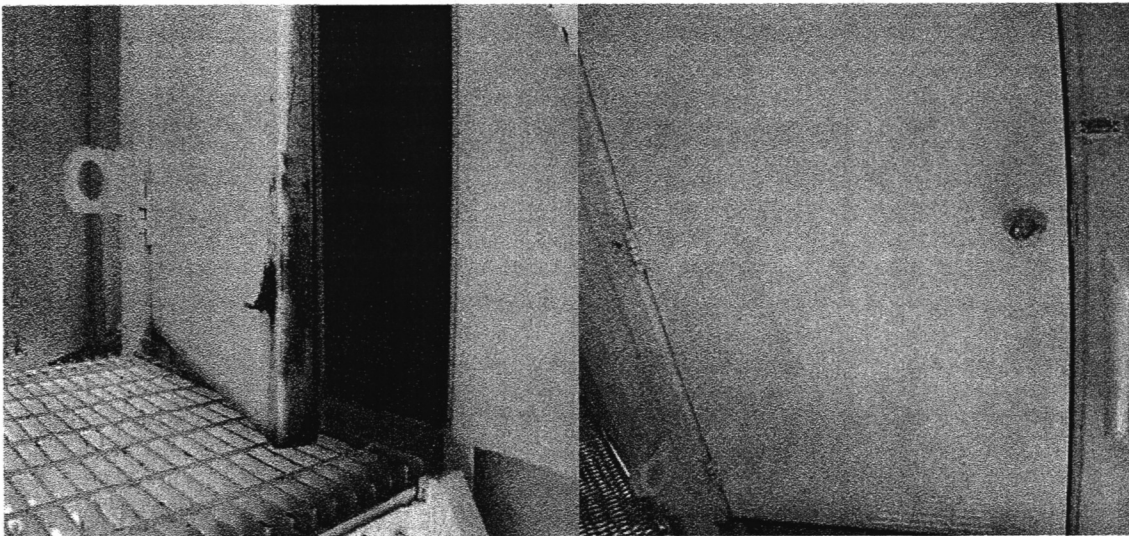
**Feed windows & heaters are in good condition. Apex paint is in good shape.**



**Backup structure paint is in good condition.**

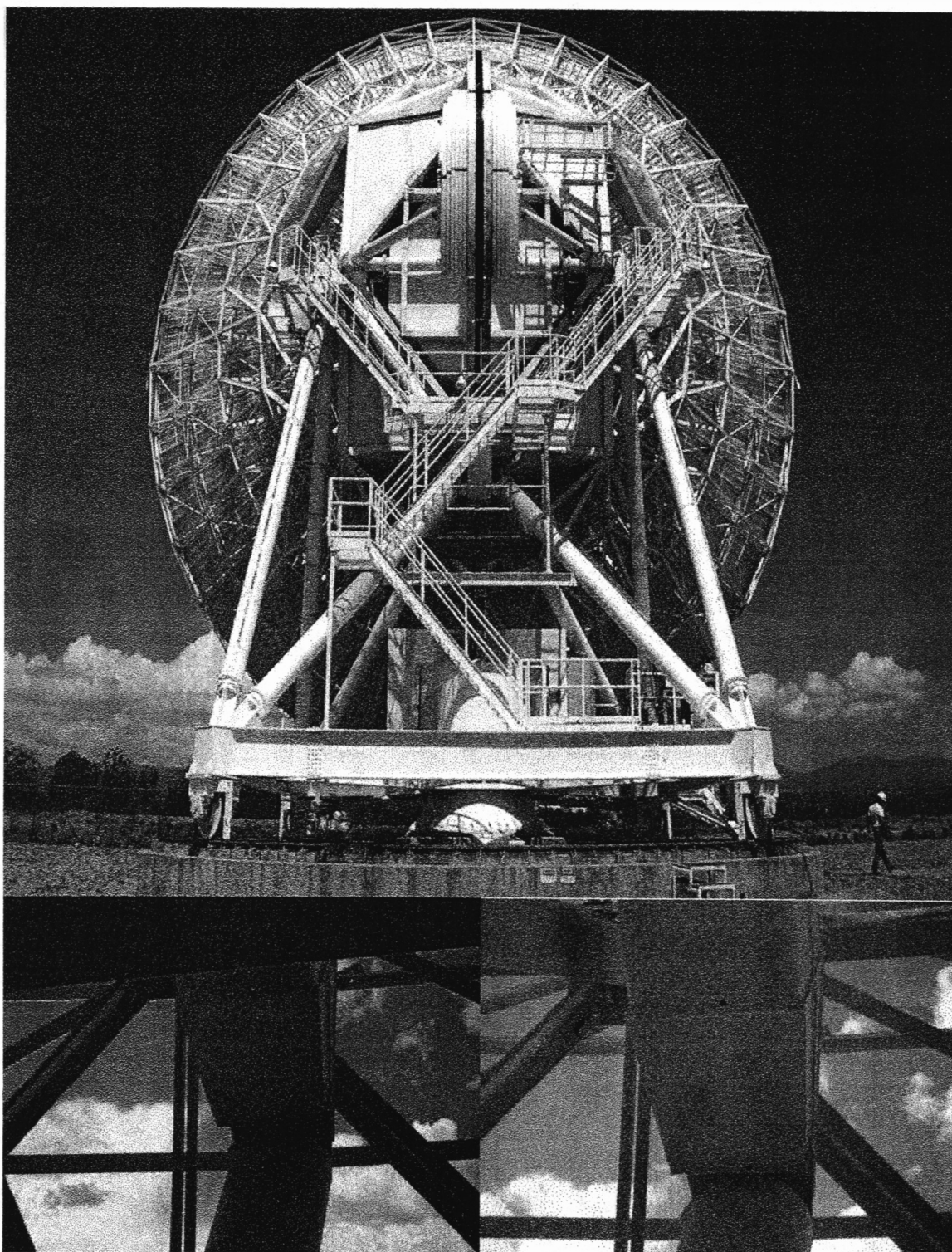


**A new HVAC platform extension was installed. Maintenance performed on the vertex room compressor/condenser can now be completed safely.**

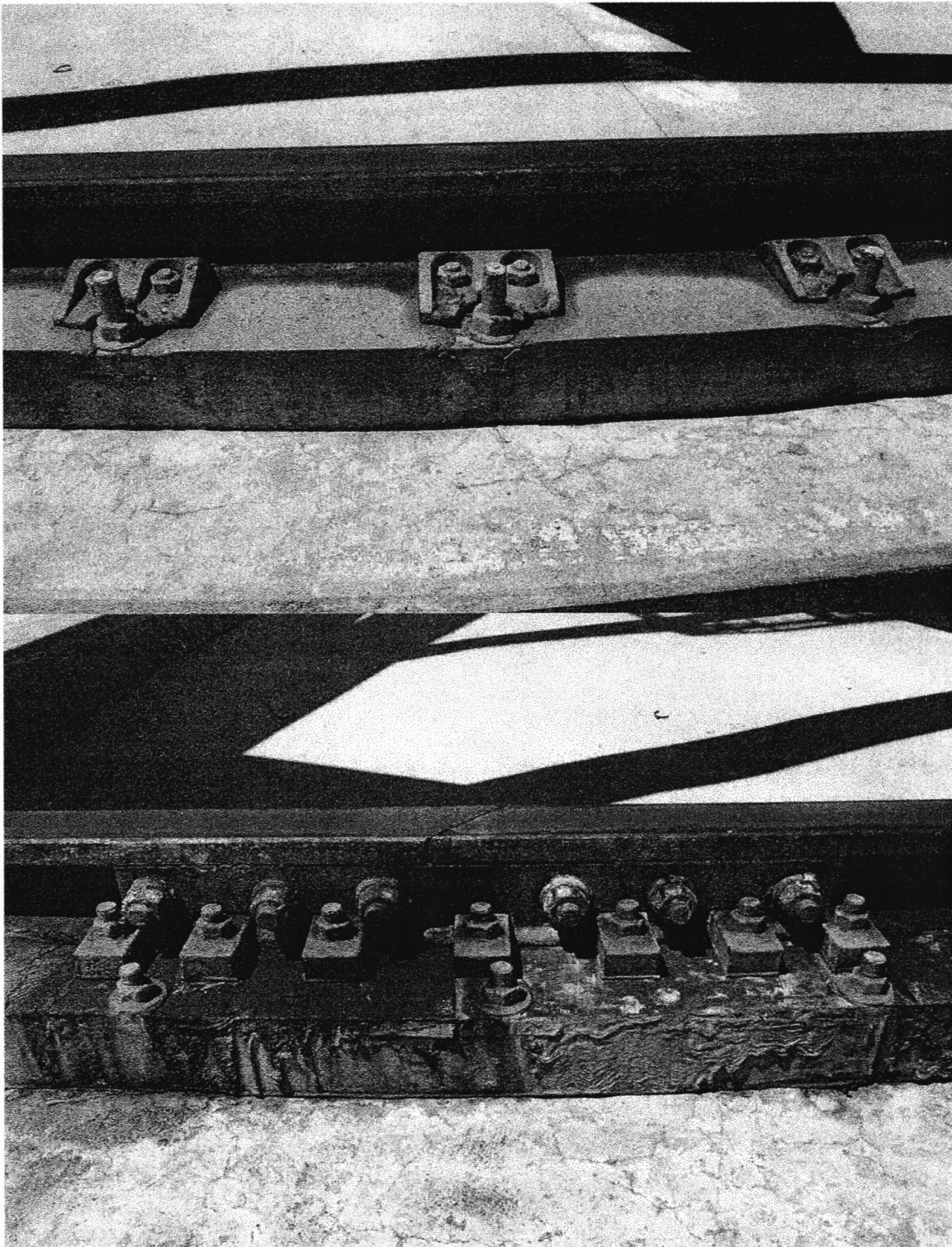


**The vertex room door was replaced.**

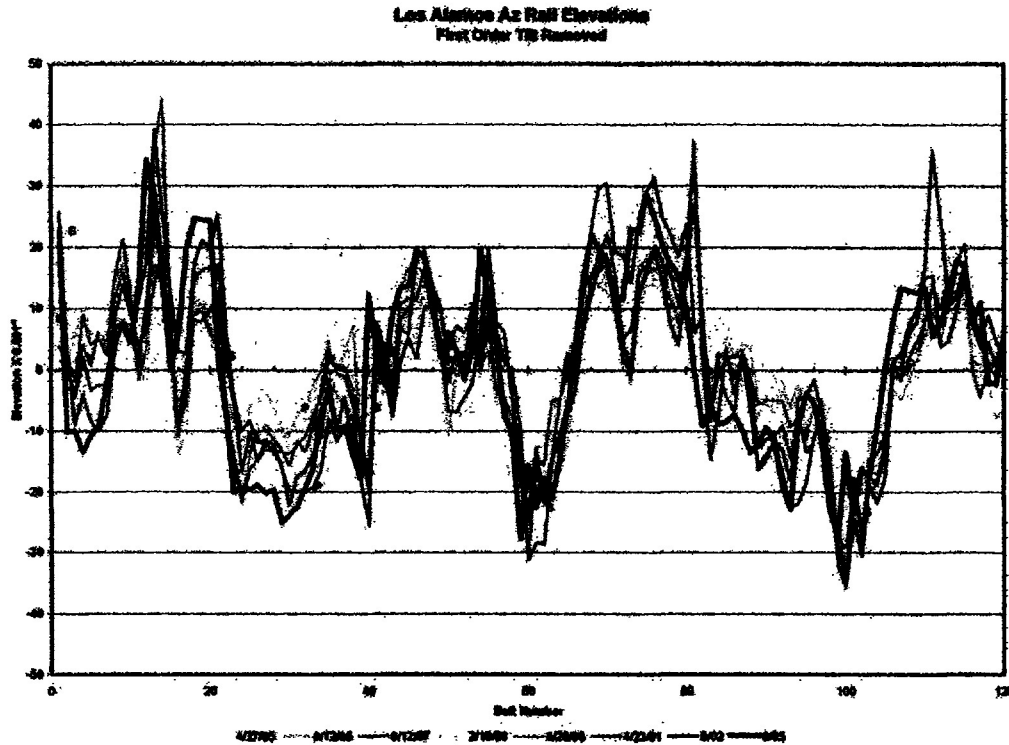




Overall the paint on the Los Alamos antenna is in good condition. Notice the drain holes drilled in the Quad Legs.



**Rail is in good condition. Site techs will remove remaining vulchem.**



Los Alamos antenna rail elevations.

#### ACTION ITEMS:

1. Repair, (band) antenna leg insulation.
2. Replace azimuth #2 motor with a sealed bearing motor.
3. Tie wrap loose cables on the elevation knuckle cable tray.
4. Replace 6cm FE.
5. (FRM) single rotation motor retrofit.

A team consisting of Steve Aragon, Eric Carlowe, and Kelly Greene returned to the Los Alamos antenna on August 16<sup>th</sup> and 17<sup>th</sup>. With the help of Paul Johnson and Gene Dunn all action items 1 thru 5 were completed.



**APEX INSPECTION:**

**FRM 2-YEAR INSPECTION PM. FRM INA BEARING IS WELL LUBRICATED.**

**Install INA zirks. GREASE ZIRKS WERE INSTALLED ON THE INA TUBE.**

**● place damaged bellows. 1<sup>st</sup> and 2<sup>nd</sup> screw bellows were replaced. Access holes drilled in mount.**

**FRM INA BEARING CHECK 50 LBS PULL ON EAST MOTOR**

**East Travel:   +.0005**

**West Travel: -.0005**

**FRM INA BEARING CHECK 50 LBS PULL ON WEST MOTOR**

**East Travel:   -.001**

**West Travel:   +.001**

**SUBREFLECTOR INSPECTION:**

**Mounting Hardware. COMPLETE AND IN GOOD CONDITION.**

**Dipole. IN GOOD CONDITION.**

**Peeling paint/delaminating. MINOR PEELING OF VULCHEM UNDER TARP.**

**Drill 3-1 inch drain holes. COMPLETED, TARP WAS REMOVED.**

**QUAD LEGS INSPECTION:**

**Guy wires. OK.**

**Turn buckles. OK.**

**Quad leg flange bolts. OK.**

**DISH INSPECTION:**

**Anemometer mounts/operation. EAST ANEMOMETER BEARINGS BAD, REPAIED ON SITE.**

**Panel surfaces. GOOD.**

**Spot check panel bolts. CHECKED OK.**

**FEED CONE INSPECTION:**

**Feed cone surface & insulation. In good condition, small cracks, spot sealed and painted.**

**FE feed windows. OK.**

**FE feed mounting hardware. OK, TIGHT.**

**FE feed heaters. OK**

**Dichroic reflector cracking/delaminating. (NOP#6664) OK.**

**Ellipsoid dish & mount. REPLACED ACTUATOR TIPPER SPRINGS.**

**FC hatch latches replace as needed. OK.**

**ELEVATION BEARING/AXLE INSPECTION:**

EL. Grease inspection/Encoder side	LOOKED GOOD, WELL GREASED.
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EL. Grease inspection/DGB side	WELL LUBRICATED.
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Remove excess grease from encoder side bearing. DONE.

Grease elevation bearings. DONE.

Check elevation axle for cracks. OK.

Listen for popping or grinding. NONE DETECTED.

**ELEVATION BULL/PINION GEAR INSPECTION:**

Bull gear. OK.

Bull gear welds & hardware. All OK.

Pinion gears. GOOD CONDITION.

Lube bull & pinion gears as needed. Very well lubricated by site techs.

Check stow pin. OK, REPLACED SAFETY PIN.

**ELEVATION MOTOR AND GEARBOX INSPECTION:**

EL.#1 seal & coupling. SEAL GOOD, REPLACED COUPLING SPIDER.

EL.#2 seal & coupling. REPLACED SPIDER.

Gearbox heaters/lube pumps. CHECKED OK.

Flow gauges & fish eyes. Cleaned flow gauges, replaced outer fish eyes.

Change gearbox oil. DONE.

Listen for popping or grinding. NONE DETECTED.

Replace motor air boxes. EL#1 DONE, NEW MOTOR EL#2 W/AIR BOX.

**ELEVATION PLATFORM INSPECTION:**

Swinging catwalk. OK.

Hoist. CABLE IS FRAYED, WILL REPAIR ON RETURN TRIP.

Install VTX AC platform. COMPLETED.

**ANTENNA STRUCTURAL INSPECTION:**

Spot-check structural bolts. DONE.

VTX walk way. GREAT CONDITION.

Antenna structural welds. WELDED CRACK ON ENCODER SIDE.

Antenna: backup & lower structure. OK.

**AZIMUTH BEARING/GREASE INSPECTION**

	INNER	OUTER
D1	NEW DRIVE WHEEL	NEW DRIVE WHEEL
D2	NEW DRIVE WHEEL	NEW DRIVE WHEEL
I1	OK	OK
I2	Slight/few flakes in grease.	OK
ALL BEARINGS WERE VERY WELL LUBRICATED.		

**AZIMUTH WHEEL INSPECTIONS:**

Wheel to structure clearances. ALL OK.

Listen for popping or grinding. NONE DETECTED.

**AZIMUTH WHEEL RADIUS/ALIGNMENT**

Measured	Specified	D1	D2
Horizontal	0.00.00 (<1'24")		
Vertical	93.26.23(+/-1'24")		
Radius	300.000" (+/- .25")		

**AZIMUTH MOTOR AND GEARBOX INSPECTION:**

AZ#1 seal & coupling. OK, NO LEAKS FOUND.

AZ#2 seal & coupling. INSTALLED DOUBLE SEALS IN GEAR BOX.

Gearbox heaters & lube pumps. DONE.

Flow gauges & fish eyes. REPLACED BOTH AZ #2 FISH EYES.

Change gearbox oil. CHANGED #2 GEAR BOX OIL.

Listen for popping or grinding. NONE, DETECTED.

Replace motor air boxes. AZ#1 NEW MOTOR W/AIR BOX, AZ #2 REPLACED.

**PINTLE BEARING INSPECTION:**

Cable wrap & cables. OK.

Check for loose and broken bolts. DONE.

Check bearing grease. OK, THE GREASED BEARING.



**AZIMUTH RAIL INSPECTION:**

Rail level measurements. DONE, 7/29.

Excessive rail movement. NONE NOTED.

Joint bars and clips. CEHCKED AND TIGHTEND LOOSE BOLTS.

Antenna foundation: grout & vulchem. GROUT LOOKS GOOD, left over vulchem needs removed.

Re-torque rail splice plates as needed. COMPLETED, TIGHT.

**ANTENNA PAINT/INSULATION INSPECTION:**

Antenna paint condition. OVERALL GOOD CONDITION.

Repair antenna insulation as needed. ALL THE ANTENNA LEG INSULATION NEEDS REPAIRED AND BANDED

**MECHANICAL MAINTENANCE ITEMS TO BE COMPLETED:**

1. Replace tie wraps w/metal as needed. NO METAL, DONE WITH NYLON WRAPS.
2. Spot Seal and Paint Feed with Elastomeric. ALL DONE.
3. Install VTX AC platform. COMPLETED.
4. Replace AZ #1 motor. DONE.
5. Remove sub reflector tarp. COMPLETED.
6. Install AC outlets above AZ motors. DONE.

**ANTENNA MECHANICS NOTES:**

**ELEVATION ENCODER SIDE CRYO LINES, ( SUP/RTN) TO SHORT OVER THE TOP.**

**ANTENNA SAFETY TESTS:**

Electrical Panel Inspection. FOUND A FEW LOOSE CONTACTS.

Drive Cabinet Inspection.(TURN OFF LOGIC POWER). OK, ALL TIGHT.

**BRAKE HOLDING-TORQUE TESTS ( FT-LBS)**

<b>AZ #1</b>	<b>30lbs.</b>
<b>AZ #2</b>	<b>64lbs. Replaced spyder</b>
<b>EL #1</b>	<b>100lbs. Replaced blower box.</b>
<b>EL #2</b>	<b>90lbs. Motor swapped out.</b>

**MOTOR INSPECTIONS:**

Elevation motor & tach couplings. New tachs installed.

Elevation brush & commutator. Elevation #2 replaced.

Azimuth motor & tach couplings. New tachs installed.

Azimuth brush & commutator. AZ#1 replaced, AZ#2 needs replaced.

**ANTENNA GROUNDING INSPECTION:**

Elevation ground cable. Done, Cables replaced.

Elevation platform to pintle turret. Good, Replaced pintle ground connector.

Pedestal room. OK.

Azimuth wheel contacts. Good shape, None replaced.

Pintle room cable wrap. OK.

Apex & Dish lightning rods. OK.

**SERVO RECORDINGS:**

Elevation response test. EL timing DN 1:04, UP 58:22

Azimuth response test. AZ CW 1:01.41, AZCCW 1:02.72

Elevation position loop test. N/A.

Azimuth position loop test. N/A.

**ACU AUTO MODE TESTS:**

System axis faults. All work.

AZ & EL motor fault status. AZ and EL OK.

Stow commands. All work.

Synchro position feedback. AZ & EL, both good.

VME to ACU communication. Auto stows after 10 minutes.

Restore ACU parameters. Not changed.

**SERVO MAINTENANCE ITEMS TO BE COMPLETED:**

1. Install digital tachs on both axis. Done, tested and calibrated.
2. Install new ACU backplane. Done, and tested.
3. Install ACU power supply Mod. (Done by Paul).
4. Spot Seal and Paint Feed Cone with Elastomeric. DONE.
5. Replace Tie wraps w/metal as needed.
6. Replace AZ #1 motor? (TIGHTEN ALL 4 BOLTS). Done
7. Install new motor air boxes. Done, removed screens.
8. Install AC outlets above AZ motors. Done, Tested.

**SERVO TECHNICIAN NOTES:**

**Replaced ground clamp below ped room.**



**APEX FRM INSPECTION:**

FRM cable & j-box condition. Looks good, connections secure.

FRM motors & encoders. Focus and rotation in good condition, well lubricated.

50cm FE dipole cables. All in good condition.

Replace tie-wraps w/metal as needed. Replaced as needed.

**FEEDCONE INSIDE/OUTSIDE INSPECTION:**

Ellipsoid operation. Works great.

Feed heater operation. OK. 6.25 amps

All FE cables. Look good, connections tight.

CRYO systems. 4, 20, 7mm cold heads replaced.

FE dry air. New compressor.

Replace tie-wraps as needed. Done.

**VTX ROOM IN/OUT INSPECTION:**

IF/PWR cables & connector blkhd. Caulked bulk head feed thru's.

Power blkhd rfi filters. Covers are well caulked.

A/B racks & cables. Clean, cables tight.

**ANTENNA CABLE INSPECTION:**

Elevation cable wraps. Encoder side repaired w/new clamps.

All cable trays. Good condition.

Elevation platform & limit switches. Checked good.

Replace tie-wraps with metal as needed. Replaced as needed.

**PINTLE BEARING INSPECTION:**

Cable wrap & blkhd. Clean, tight and secure.

Limit switches. Actuate, all are OK.

Cable strain relief. Good and secure.

**PEDESTAL ROOM INSPECTION:**

ACU & FRM logic on UPS. Both on UPS.

UPS operation & by-pass switch. Works OK.

Breakers labeled correctly. Labeled OK

Dry air compressor. (Run time <25%) New compressor, Nice setup.

Marv Air operation. OK, but weak. Could use a backup AC.

**STATION BUILDING INSPECTION:**

ROOM 100:

UPS operation. 11KVA Liebert works good, 1<sup>st</sup> voltage drop @ 16 minutes.

Electrical panels. All panels good and tight connections.

Onan x/switch test generator. Tested OK.

ROOM 102: Checked power panels, OK.

Contempo 1&2 operation/inspection. Done, OK.

ROOM 103: Checked power panels, OK.

VME/comm rack. Clean and orderly.

Recorders 1&2 or Mark V. Bob did the formatter upgrade.

Fire alarm operation. Cant check, operated by LANL.

Chatter box/phone operation. Worked OK, All #'s present.

Under floor cables/bulk head. Done, OK.

ROOM 104: Checked power panels, OK.

Maser/C&D rack. Clean, OK.

Under floor cables & bulkhd. Done, OK.

**WEATHER STATION INSPECTION:**

Check operation test alarms. ALL work, OK w/ACU alarms.

Cabinet & tower. Tower in good condition, Paint is good.

**SITE GROUNDS & STATION INSPECTION:**

Check generator. All fluids OK.

Contempo condensers. Good condition.

Station building. OK.

Fence/gate/signs/grounds/storage. All in order.

**ELECTRONIC MANTENANCE ITEMS TO BE COMPLETED:**

1. Install new focus motor encoder coupling. Done.

2. Install new ACU backplane. Done and tested.

3. Install ACU power supply mod. (Done by Paul) great job.

4. Install digital tachs on both axis. Finished both axis and calibrated done 7/31.

5.

6. Spot Seal and Paint Feed Cone with Elastomeric. Done, by 7/30.

7. Replace Tie wraps with metal as needed. No metal ones available for this trip.

8. Check FRM servo amp contactors for auto reset. FRM on UPS. Done, Wiring is correct.

9.

**FINAL ANTENNA/SITE INSPECTIONS:**

Spot-check PM's Done.

Any TT oversights. None.

●e cleanup. Done.

Review TT list/problems with site techs. Done.

VLBA operations startup tests. Antenna tested.

**ELECTRONIC TECHNICIAN NOTES:**

**West anemometer bearings were replaced.**

