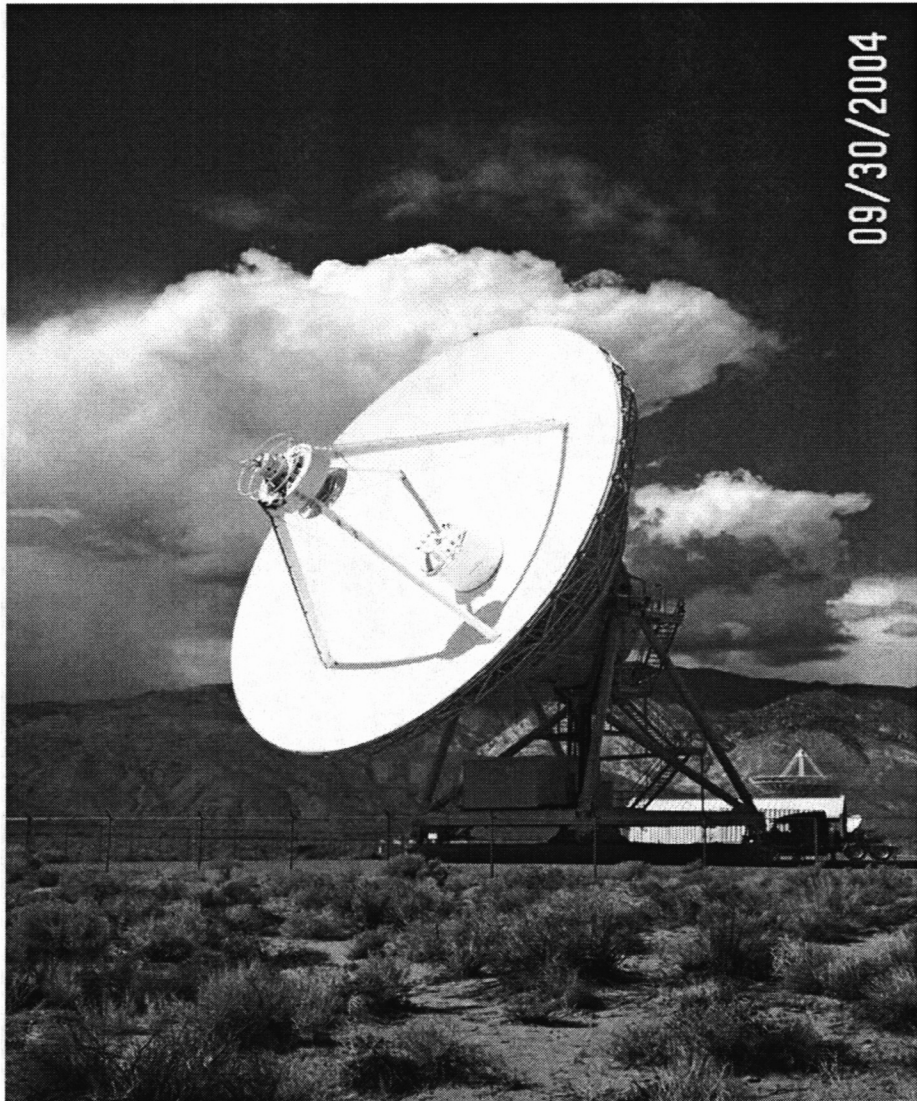


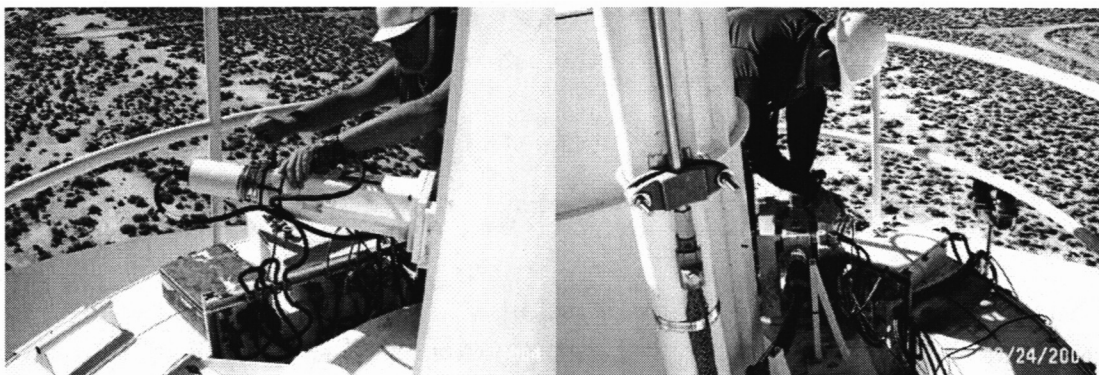
**National Radio Astronomy Observatory
Socorro, New Mexico**

VLBA Antenna Memo #57

Owens Valley, CA. VLBA Maintenance Visit Sept. 23 thru Oct. 1 2004.

Team members consisted of Steve Aragon, Eric Carlowe, Ramon Gutierrez, Ken Lakies, Bob McGoldrick and Phillip Sanchez. VLBA Site Technicians Jim Brown and Bill Robbins assisted in all areas of maintenance during the visit. A completed task list is attached.





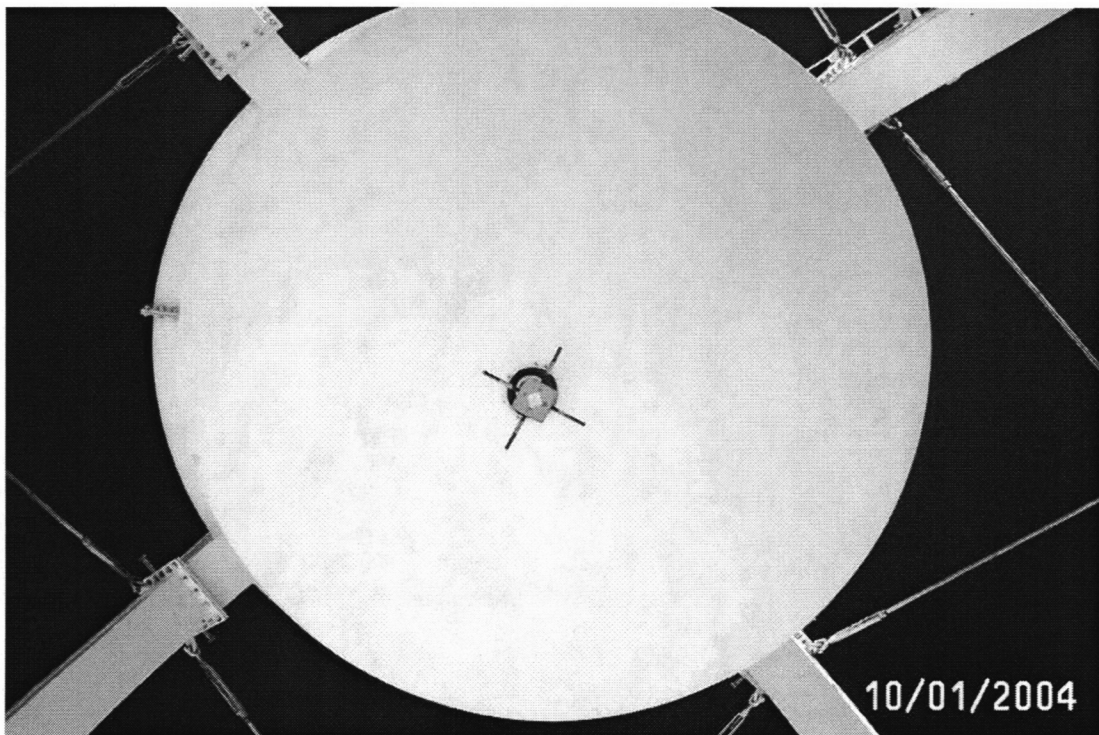
FRM was given a thorough inspection. A focus flex shaft was replaced and the new encoder coupling modification was installed.

FRM INA BEARING CHECK 50LBS PULL ON EAST MOTOR

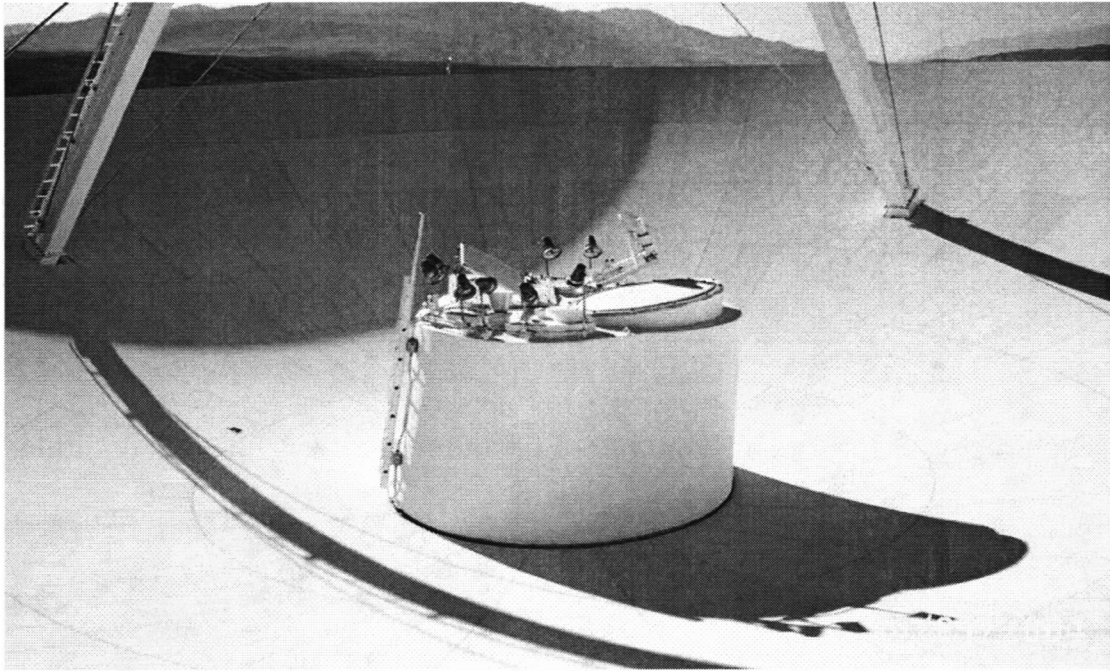
East Travel:	+ .001	West Travel:	- .001
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FRM INA BEARING CHECK 50LBS PULL ON WEST MOTOR

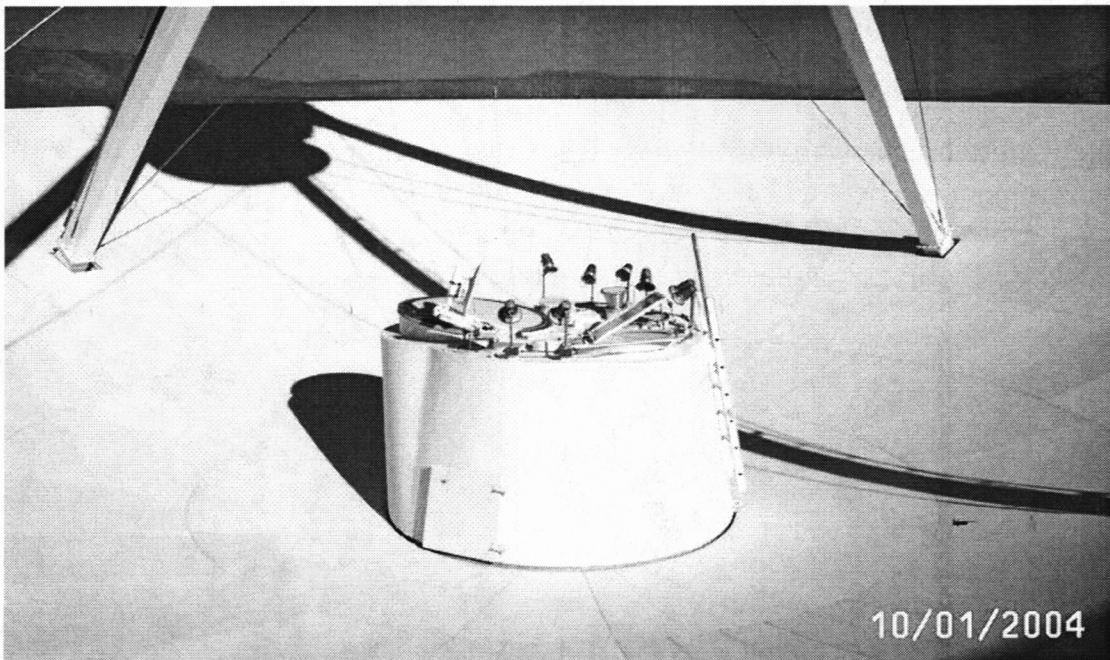
East Travel:	- .001	West Travel:	+ .001
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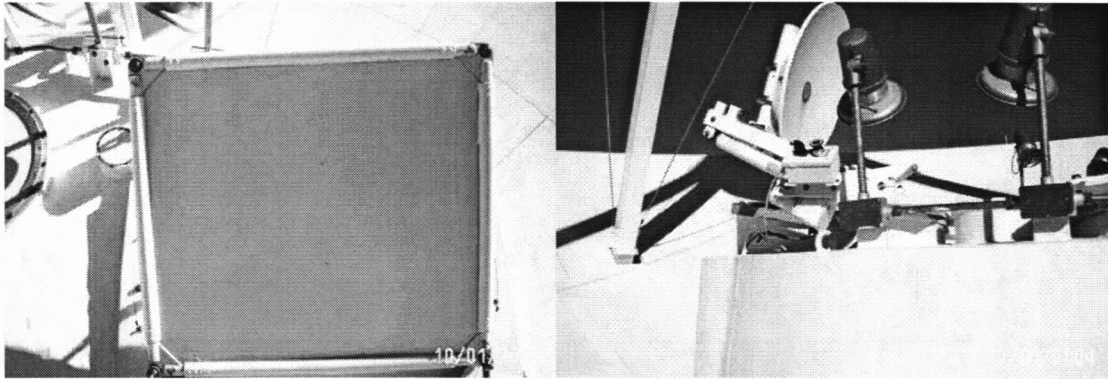
Subreflector is in good condition. Six 1 inch holes were drilled in the center of the reflector for extra drainage. The snow tarp was removed.



Feed cone was spot sealed and painted with elastomeric.



Dish panels, and the panels paint is in good condition. Quad leg paint is excellent. Guy wires are in good condition.



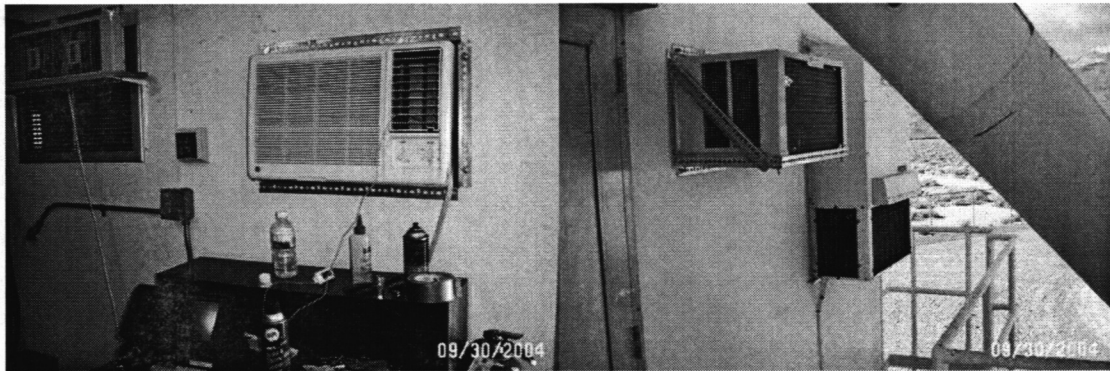
Dichroic reflector is good condition. Elipsoid reflector is in good condition.



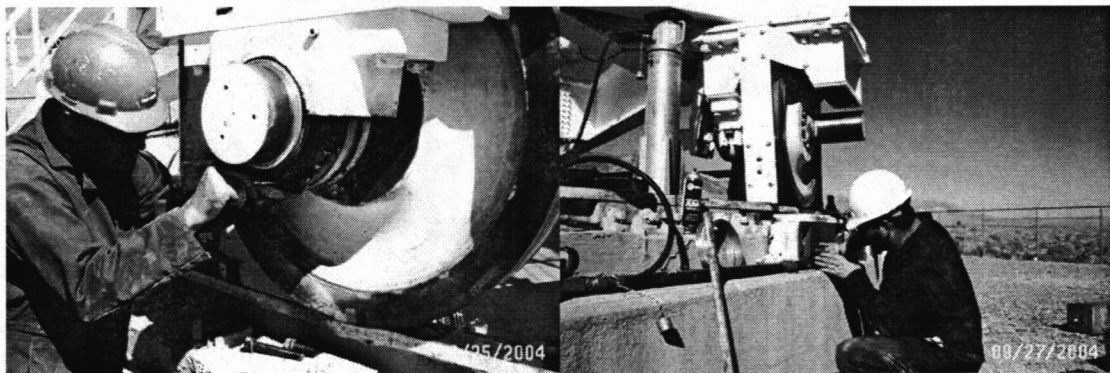
New digital tachs were installed on EL and AZ motors. Elevation #1 motor was replaced. The ACU power supply modification was previously installed by the site techs. The ACU backplane upgrade was installed and tested. An ACU +12 voltage regulator (U1) was replaced and tested.



Both the encoder and synchro side elevation cable wraps were repaired by repositioning and replacing both sides strain relief brackets.



A backup AC was previously installed by the site techs in the ped room.



AZ bearings were inspected. AZ idler #1 outside bearing was replaced.

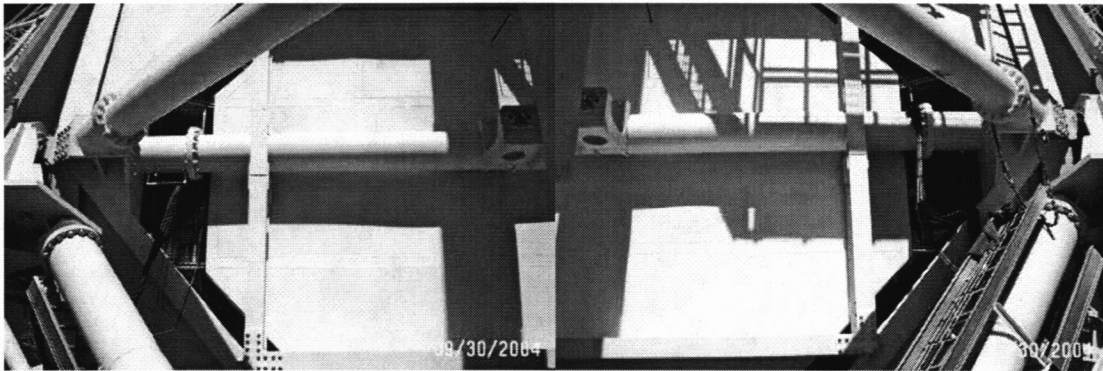
AZIMUTH BEARING GREASE INSPECTION

	INNER BEARING	OUTER BEARING
D1	Metallic looking grease.	Same as inner bearing
D2	Needs to be replaced	Outer race severely grooved.
I1	OK	Replaced bearing.
I2	OK	OK
All bearings were very well lubricated. Azimuth D2 needs to be replaced.		

ELEVATION BEARING GREASE INSPECTION

Encoder	Good grease with no metal flakes.
Synchro	Good grease with no metal flakes.

Pintle bearing is well greased with no metal flakes.



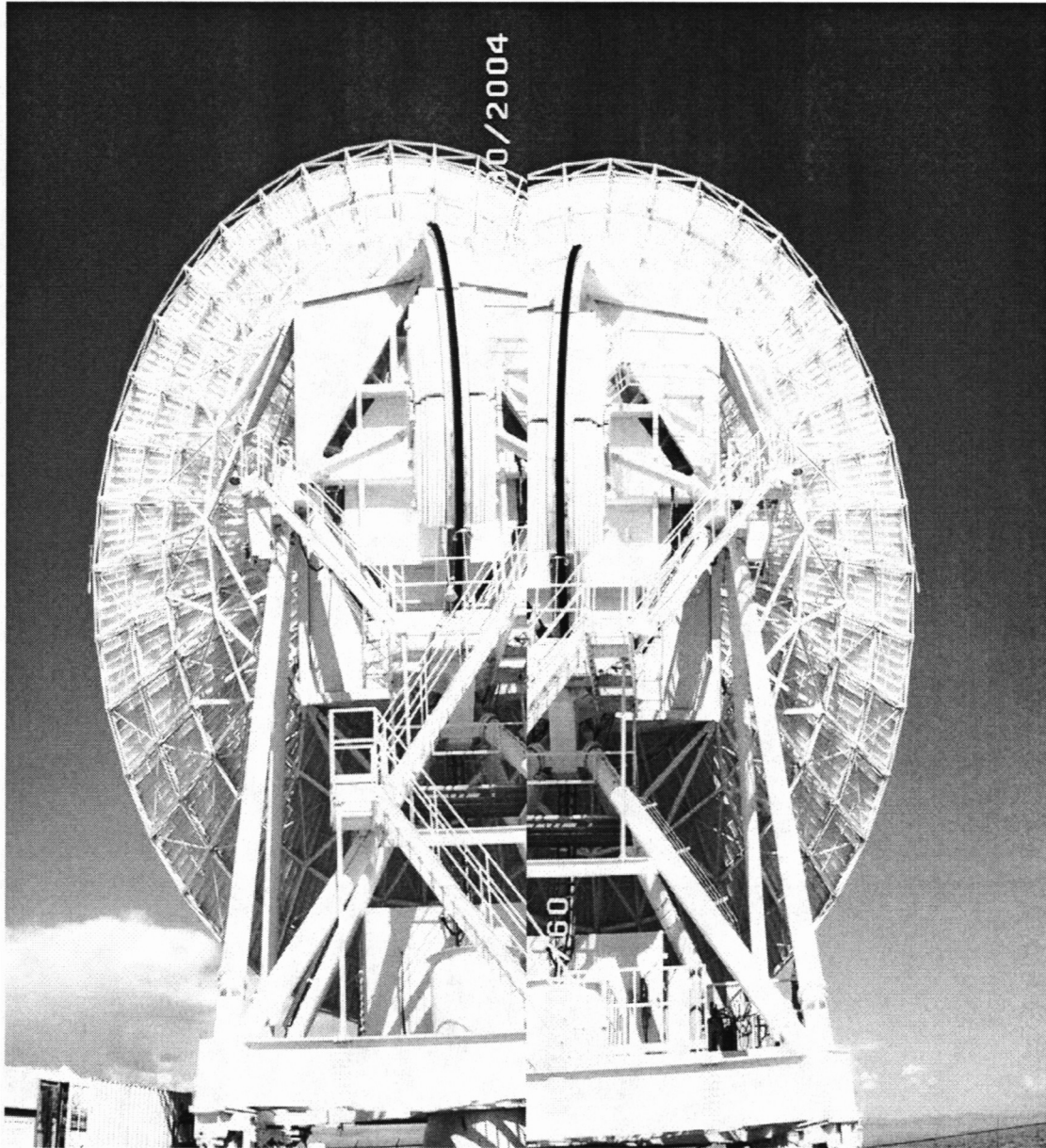
Elevation axle has no visible signs of cracks. Paint is in excellent condition.



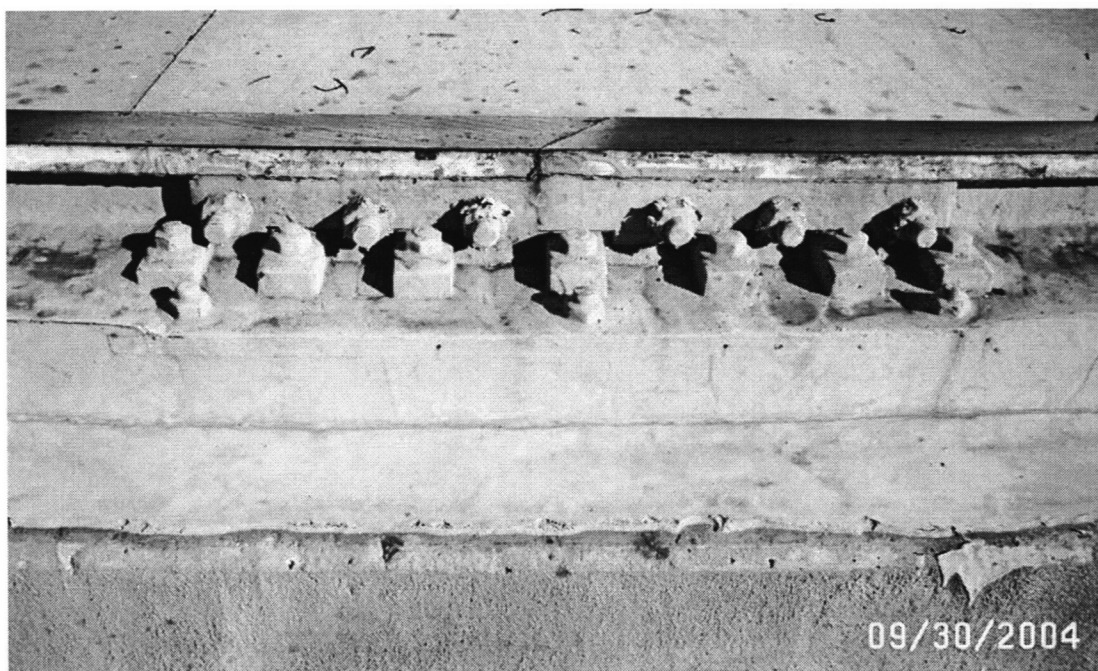
Feed cone and feed windows are in good condition. Apex paint is excellent.



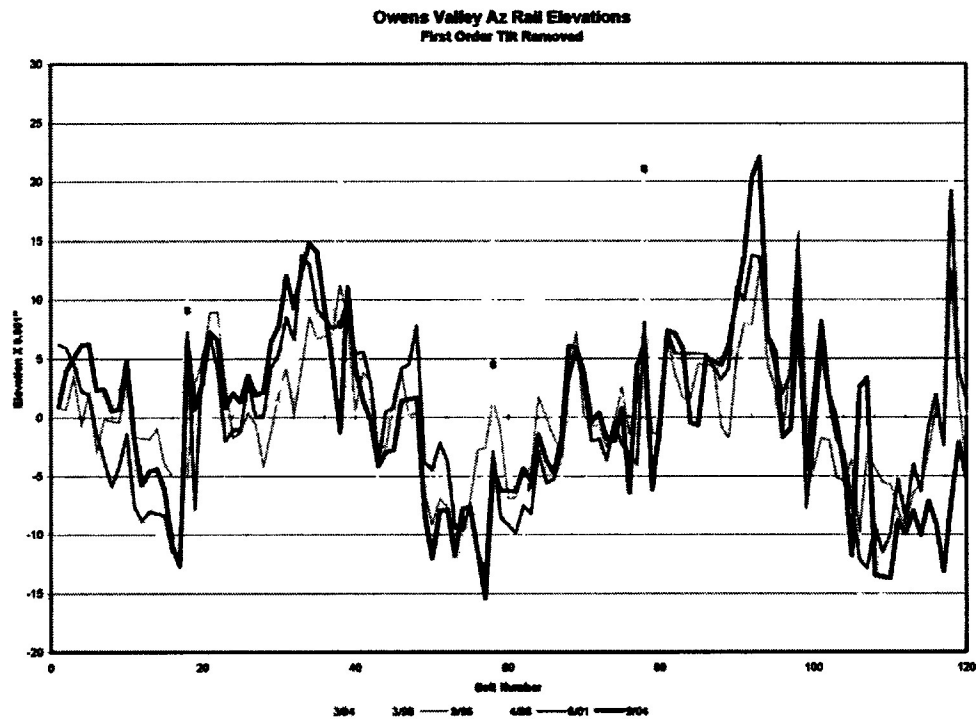
Backup structure paint is in excellent condition.



Overall paint on the OV antenna is in excellent condition.



Vulchem is beginning to show signs of deterioration. Otherwise it is in fair to good condition all around the rail.



Owens Valley rail Elevations.

ACTION ITEMS:

1. Azimuth drive #2 Wheel/Bearing assembly needs to be replaced.
2. Elevation #2 motor needs replaced.

ANTENNA MECHANICAL MAINTENANCE OVVLBA 9/23-10/1/04

APEX INSPECTION:

FRM 2-YEAR INSPECTION PM. Done: FRM in good condition.

Replace INA bearing HHCS neoprene washers as needed. All OK.

Remove snow tarp if needed. Previously Removed.

FRM INA BEARING CHECK 50 LBS PULL ON EAST MOTOR

East Travel: +.001

West Travel: -.001

FRM INA BEARING CHECK 50 LBS PULL ON WEST MOTOR

East Travel: -.001

West Travel: +.001

SUBREFLECTOR INSPECTION:

Mounting Hardware. All tight.

Dipole. OK, cabling OK.

Peeling paint/delaminating. In good condition.

Drill 6-1 inch holes around dipole. Completed.

QUAD LEGS INSPECTION:

Guy wires. Good condition.

Turn buckles. OK.

Quad leg flange bolts. All tight.

DISH INSPECTION:

Anemometer mounts/operation. Good.

Panel surfaces. OK.

Spot check panel bolts. All Tight.

FEED CONE INSPECTION:

Feed cone surface/insulation. OK.

FE feed windows. OK.

FE feed mounting hardware. OK.

FE feed heaters. Mounting OK.

Dichroic reflector cracking/delaminating. (NOP#65E8) Reflector is in good condition.

Ellipsoid dish/mount. OK.

FC hatch latches replace as needed. All OK.

ANTENNA MECHANICAL MAINTENANCE OVVLBA 9/23-10/1/04

ELEVATION BEARING/AXLE INSPECTION:

EL. Grease inspection/Encoder side	No Metal Flakes.
EL. Grease inspection/DGB side	No Metal Flakes.

Grease elevation bearings. Done.
Check elevation axle for cracks. No cracks visible.
Listen for popping or grinding. None detected.

ELEVATION BULL/PINION GEAR INSPECTION:

Bull gear. OK, well lubricated.
Bull gear welds/hardware. OK.
Pinion gears. OK, well lubricated.
Lube bull/pinion gears as needed. Done.
Check stow pin. OK, installed release pin.

ELEVATION MOTOR AND GEARBOX INSPECTION:

EL.#1 seals/coupling. OK, replaced rubber coupling. Motor replaced.
EL.#2 seals/coupling. OK, replaced rubber coupling. Needs replaced.
Gearbox heaters/lube pumps. OK.
Flow gauges/fish eyes. (Replace fish eyes) Replaced on both gearboxes.
Change gearbox oil. Done.
Listen for popping or grinding. None detected.

ELEVATION PLATFORM INSPECTION:

Swinging catwalk. No cracks, bolts tight. (Needs safety barrier tape).
Hoist. OK.

ANTENNA STRUCTURAL INSPECTION:

Spot-check structural bolts. OK.
VTX walk way. OK.
Antenna structural welds. OK.
Antenna backup/lower structure. OK.

ANTENNA MECHANICAL MAINTENANCE OVVLBA 9/23-10/1/04

AZIMUTH BEARING/GREASE INSPECTION

	INNER	OUTER
D1	Metallic paint looking (Scratchy race).	Same as inner.
D2	Needs to be replaced.	Outer race severely grooved.
I1	OK.	Replaced bearing.
I2	OK.	OK.
All bearings were very well lubricated. Azimuth drive #2 needs to be replaced.		

AZIMUTH WHEEL INSPECTIONS:

Wheel to structure clearances. Done.

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 seals/coupling. (Shimmed gear box) (Seal needs replaced). Seal replaced.

AZ#2 seals/coupling. OK.

Gearbox heaters/lube pumps. All checked OK.

Flow gauges/fish eyes. (Replace fish eyes) Fish eye's replaced & cracked flow gauges.

Change gearbox oil. Done.

Listen for popping or grinding. None detected.

PINTLE BEARING INSPECTION:

Cable wrap & cables. OK.

Check for loose bolts. Done, none found.

Check bearing grease. Done, no metal flakes.

ANTENNA MECHANICAL MAINTENANCE OVVLBA 9/23-10/1/04

AZIMUTH RAIL INSPECTION:

Rail level measurements. Done.

Excessive rail movement. None.

Joint bars and clips. All needed tightening.

Antenna foundation/grout/vulchem. Grout and Vulchem in good condition.

Re-torque rail splice plates as needed. Done.

ANTENNA PAINT/INSULATION INSPECTION:

Antenna paint condition. Very good condition.

Repair antenna insulation as needed. Good.

MECHANICAL MAINTENANCE ITEMS TO BE COMPLETED:

1. Replace tie wraps w/metal as needed. Replaced as many as possible.

2. Spot Seal and Paint Feed with Elastomeric. Done.

3. Replace EL#1 Motor. Done.

4. All gearbox fish eye's need replaced. Done on all gearboxes and as needed on flow indicators.

5. Install antenna AC outlets above AZ motors. Done on AZ1 and AZ2.

ANTENNA MECHANICS NOTES:

Replaced Pintle bearing inspection window.

Installed quick release stow pin.

Repaired and modified both elevation cable wraps.

All bearing and gears were well lubricated.

Azimuth Drive #2 needs to be replaced.

ANTENNA SERVO MAINTENANCE OVVLBA 9/23-10/1/04

ANTENNA SAFETY TESTS:

Red Room Electrical Panel Inspections. Tightened all breakers.

BRAKE HOLDING-TORQUE TESTS (FT-LBS)

AZ #1	84
AZ #2	88
EL #1	74
EL #2	66—this motor will be replaced.

MOTOR INSPECTIONS:

Elevation motor/tach couplings. EL # 1 was replaced, EL #2 needs replaced.

Elevation brush/commutator. EL #1 replaced. EL # 2 needs replaced.

Azimuth motor/tach couplings. Both motors in good shape. Filters need replaced or blown

Azimuth brush/commutator. out every 2 weeks.

ANTENNA GROUNDING INSPECTION:

Elevation ground cable. Repaired.

Elevation platform to pintle turret. OK.

Redeestal room. OK.

Azimuth wheel contacts. All good.

Pintle room/cable wrap. Perfect—Bob added Teflon to chaffed cables.

Apex/Dish lightning rods. OK.

SERVO RECORDINGS:

Elevation response test. Done.

Azimuth response test. Done.

Elevation position loop test. Done.

Azimuth position loop test. Done.

ACU AUTO MODE TESTS:

System/axis faults. All checked OK.

AZ/EL motor fault status. All checked OK.

Stow commands. Checked OK.

Synchro position feedback. OK.

VME to ACU communication. 10 minute time out, OK.

Restore ACU parameters. Done.

ANTENNA SERVO MAINTENANCE OVVLBA 9/23-10/1/04

SERVO MAINTENANCE ITEMS TO BE COMPLETED:

1. Install Digital tachs on both axis. AZ done 9/24 El finished 9/26 and tested.
2. Install New ACU Back plane. Completed 9/26 by Eric test ok & replaced U1 1815 ACU regulator.
3. Install ACU power supply Mod.----Previously done by Site Techs. Removed remaining wires.
4. Spot Seal and Paint Feed Cone with Elastomeric. Done, also touched up Subreflector.
5. Replace Tie wraps w/metal as needed. Done
6. Install backup Ped room AC.-----Previously done by Site Techs.
7. Replaced EL#1 motor. (#1 commutator bad) Done.
8. Install antenna AC outlets above AZ motors. Done.

SERVO TECHNICIAN NOTES:

SERVO RESPONSE TESTS——BEFORE ANALOG TACHS ARE REMOVED!! completed.

Elevation #2 needs to be replace, bad commutator.

Sealed Pintle bearing nuts and grout.

Sealed ped room feed thru's.

ACU +12 voltage regulator was replaced and tested.

ANTENNA ELECTRONIC MAINTENANCE OVVLBA 9/23-10/1/04

APEX FRM INSPECTION:

FRM cable/j-box condition. Clean dry and tight.
FRM motors/encoders. Good shape, replaced focus coupling.
90/50cm FE/dipole/cables. Done, good condition.
Replace tie-wraps w/metal as needed. Replaced a few.

FEEDCONE INSIDE/OUTSIDE INSPECTION:

Ellipsoid operation. Extends/contracts repaired exposed wire.
Feed heater operation. Works cycled on and off.
All FE cables. OK.
CRYO systems. OK, pumps ok.
FE dry air. All tight.
Replace tie-wraps as needed. Replaced as needed.

VTX ROOM IN/OUT INSPECTION:

IF/PWR cable/connector blkhd. Caulked dry rot to shrink boot.
Power blkhd/rfi filters. Clean, Dry replaced screws as needed.
A/B racks/cables. Checked tight, OK.

ANTENNA CABLE INSPECTION:

Elevation cable wraps. Both sides were rebuilt, new brackets & metal tie wraps.
All cable trays. Replaced many tie wraps w/metal wraps.
Elevation platform/limit switches. OK.
Replace tie-wraps with metal as needed. Done.

PINTLE BEARING INSPECTION:

Cable wrap/blkhd. OK, cleaned out.
Limit switches. OK.
Cable strain relief. Repositioned and added Teflon on some cables.

PEDESTAL ROOM INSPECTION:

ACU/FRM logic on UPS. FRM power control cable changed to UPS power.
UPS operation/by-pass switch. Checked OK.
Breakers labeled correctly. Relabeled FRM breaker.
Dry air compressor. (Run time <25% new prototype) Works great, <25%.
Marv Air operation. Works poorly, Techs installed backup AC, its works great.

ANTENNA ELECTRONIC MAINTENANCE OVVLBA 9/23-10/1/04

STATION BUILDING INSPECTION:

ROOM 100: Bathroom floor @ door entrance.

UPS operation. PM done, OK.

Electrical panels. Opened and tightened all breakers.

Onan x/switch test generator. OK.

ROOM 102:

Contempo 1&2 operation/inspection. OK, tightened terminal blocks.

ROOM 103:

VME/comm rack. OK.

Recorders 1&2. Did pm's on both recorders.

Fire alarm operation. Checked all smoke detectors and fire alarm, OK.

Chatter box/phone operation. OK.

Under floor cables/bulk head. Checked OK, inspected MK V cables.

ROOM 104:

Maser/C&D rack. OK, All Contempo filter boxes removed from room.

Under floor cables/bulk hd. All OK.

WEATHER STATION INSPECTION:

Check operation/test alarms. Performed PM.

Cabinet/tower. OK, old over spray in cabinet.

SITE GROUNDS & STATION INSPECTION:

Check generator. All fluids OK, new battery, charger working. Starts in 5 seconds.

Contempo condensers. Clean, leak free.

Station building. OK.

Fence/gate/signs/grounds/storage. OK reattached 1 sign.

ELECTRONIC MANTENANCE ITEMS TO BE COMPLETED:

1.Install FRM focus motor encoder/coupling. Done.

2.Install New ACU Backplane. Done and tested OK.

3.Install ACU power supply mod.-----Previously done by Site Techs.

4.Install digital tachs on both axis. Done and tested OK.

5.Install new PED room AC.-----Previously done by Site Techs.

6.Spot Seal and Paint Feed Cone with Elastomeric. Done.

7.Replace Tie wraps with metal as needed. Many replaced.

8.Replace El #1 motor. Done, EL#2 needs replaced---severly worn commutator.

9.Install antenna AC outlets above AZ motors. Done, tested.

ANTENNA ELECTRONIC MAINTENANCE OVVLBA 9/23-10/1/04

FINAL ANTENNA/SITE INSPECTIONS:

Spot-check PM's. All OK.

Any TT oversights. None

Site cleanup. Done last day.

Review TT list/problems with site techs. Done with Jim and Bill.

VLBA operations startup tests. Done, 9/29.

ELECTRONICS TECHNICIAN NOTES:

Put FRM logic on UPS power.

Put C-Rack GPS on UPS power.

EL#2 needs replaced, severely worn commutator.

