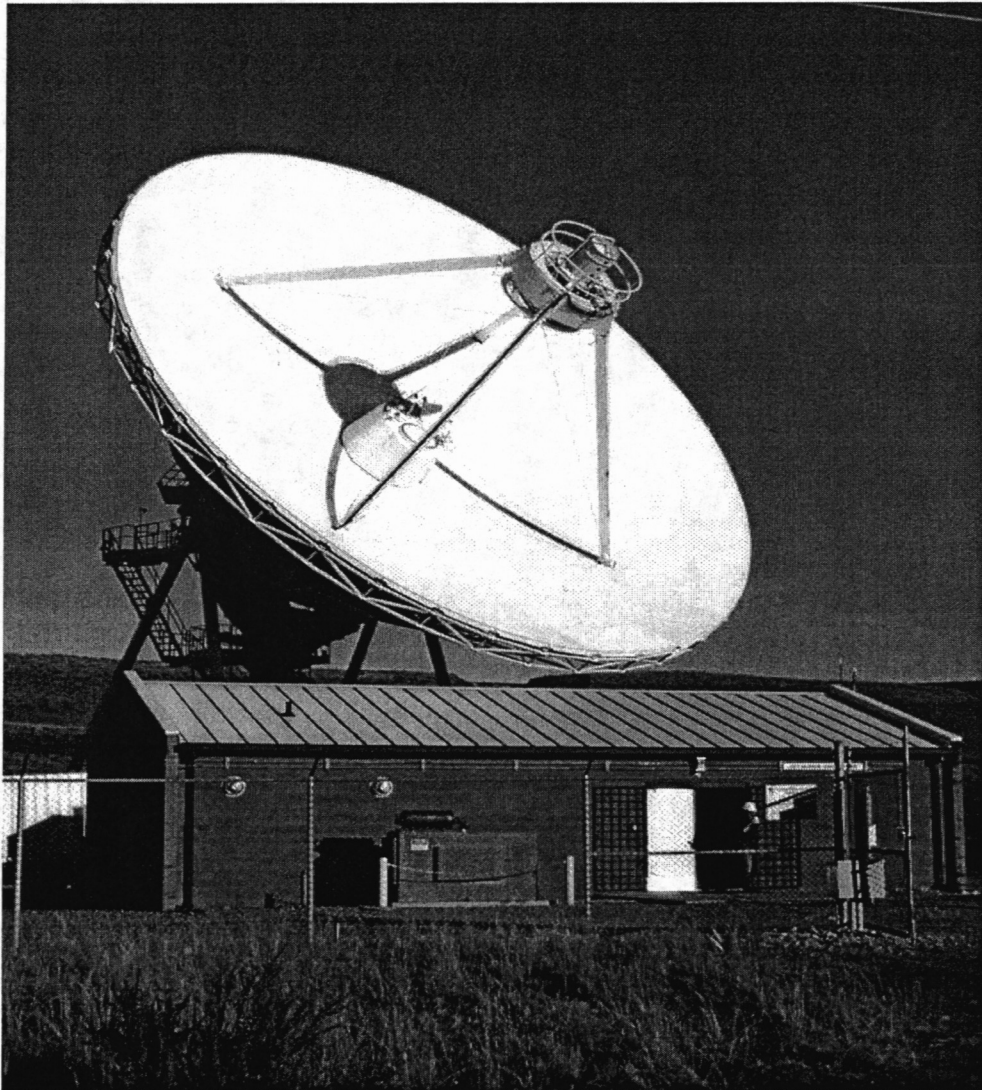


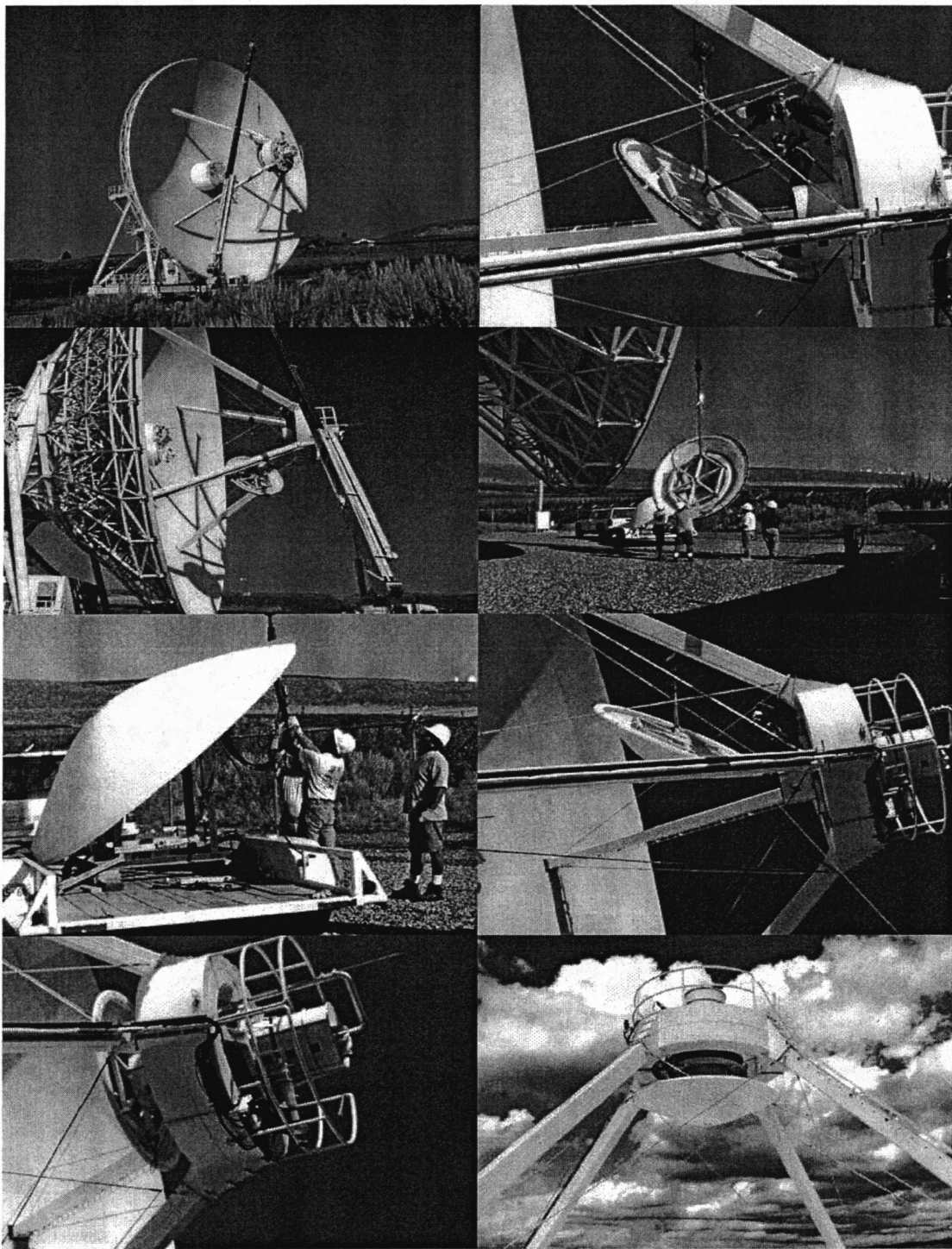
National Radio Astronomy Observatory  
Socorro, New Mexico

VLBA Antenna Memo #56

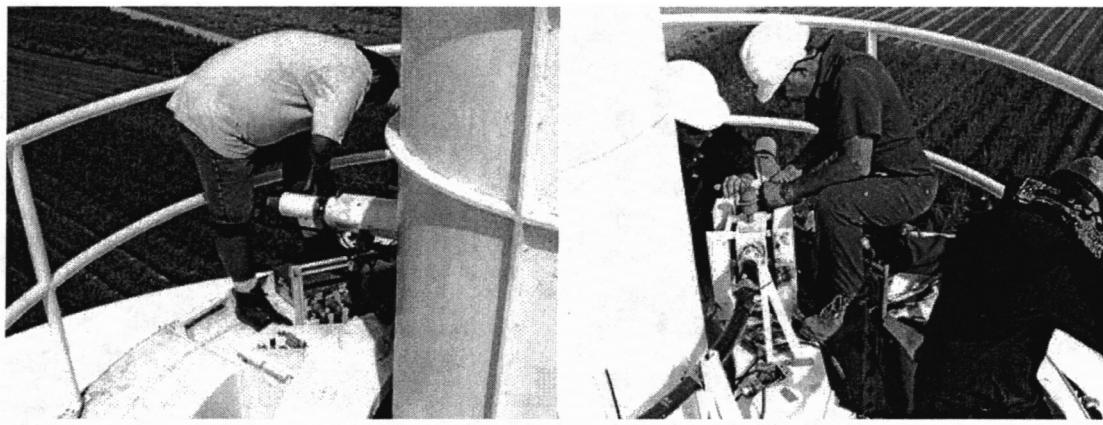
Brewster, WA. VLBA Maintenance Visit July 28<sup>th</sup> thru August 8<sup>th</sup> 2004.

Team members consisted of Nelson Antencio, Steve Aragon, Eric Carlowe Kelly Greene, Ramon Gutierrez and Ken Lakies. VLBA Site Technicians Bob Sanderson and Mark Hofmann assisted in all areas of maintenance during the visit. A completed task list is attached.





The subreflector was replaced and the new one aligned.



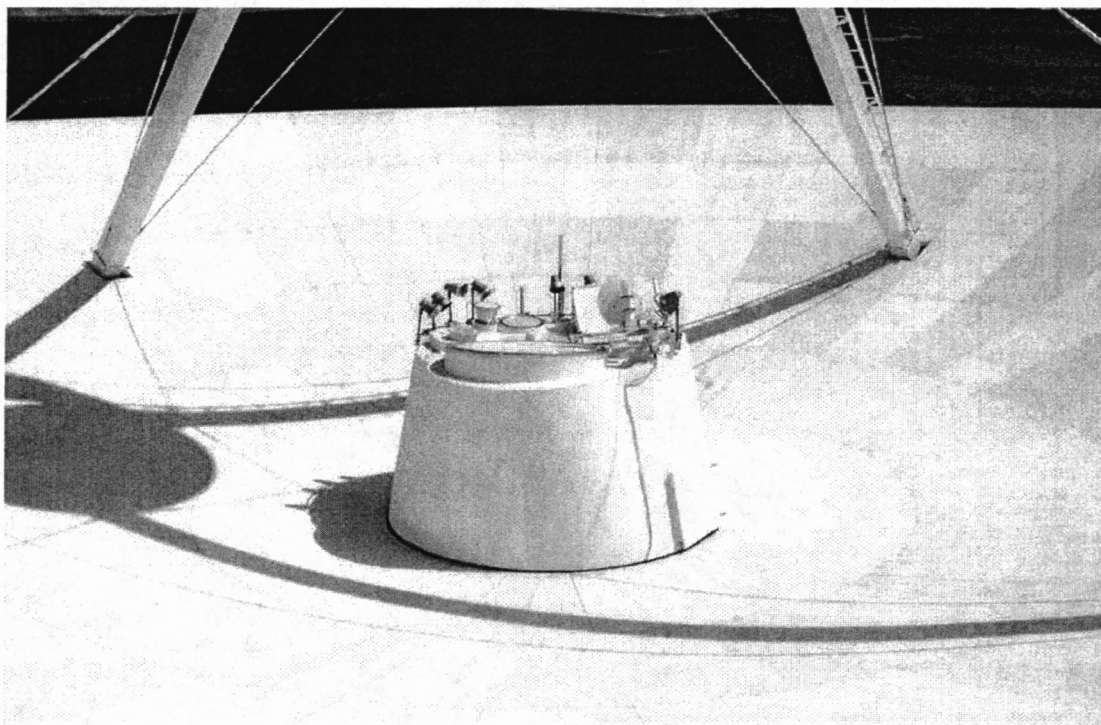
FRM was given a thorough inspection. A focus flex shaft was replaced and the new encoder coupling modification was installed.

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

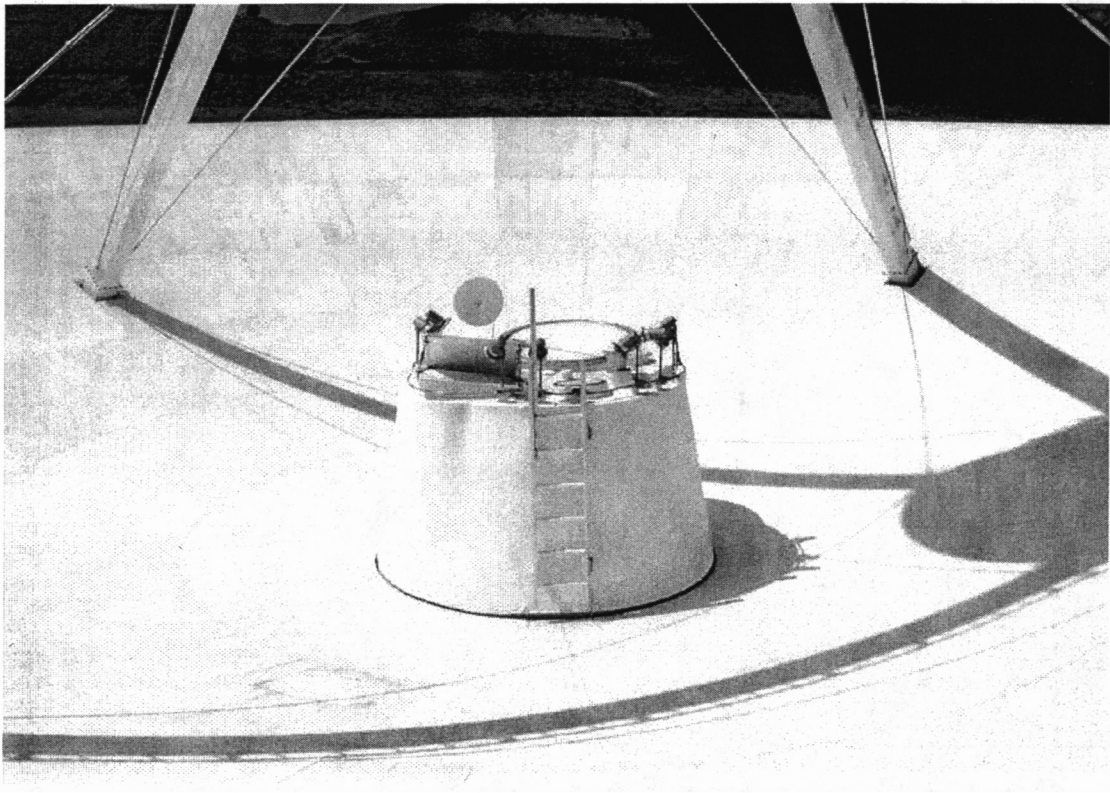
East Travel:	+ .001	West Travel:	- .001
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**FRM INA BEARING CHECK 50LBS PULL ON WEST MOTOR**

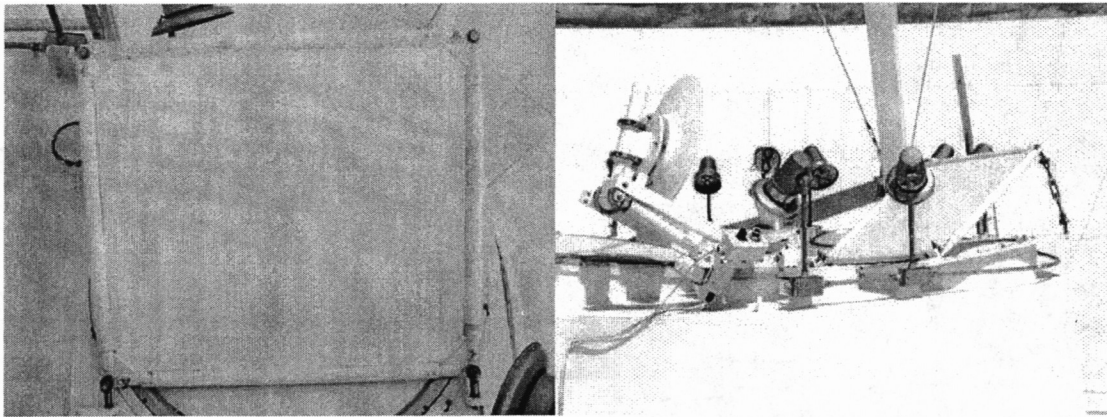
East Travel:	- .001	West Travel:	+ .001
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Feed cone was spot sealed and painted with elastomeric

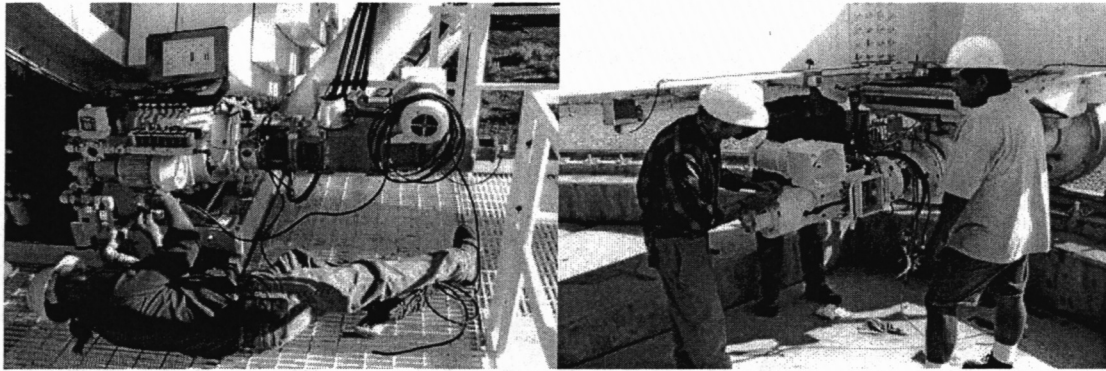


Dish panels are in good condition. Panels paint is in good condition. Quad legs paint and guy wires are in good condition.

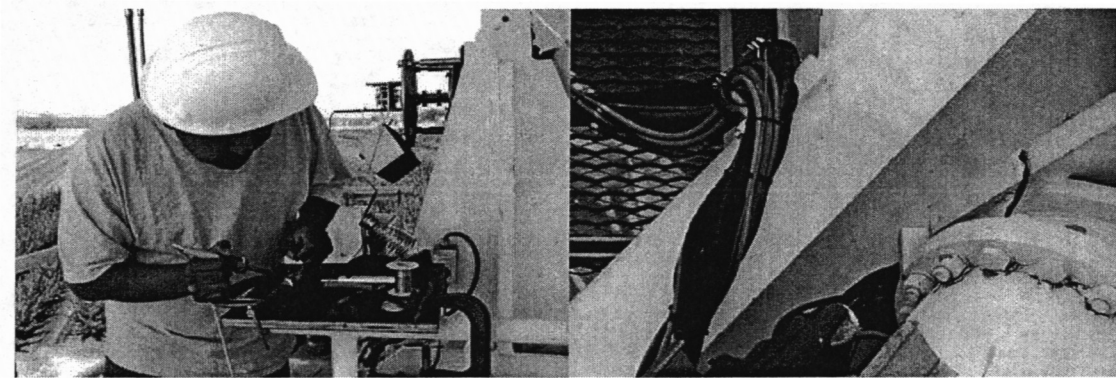


Dichroic reflector is good condition. Elipsoid reflector is in good condition.

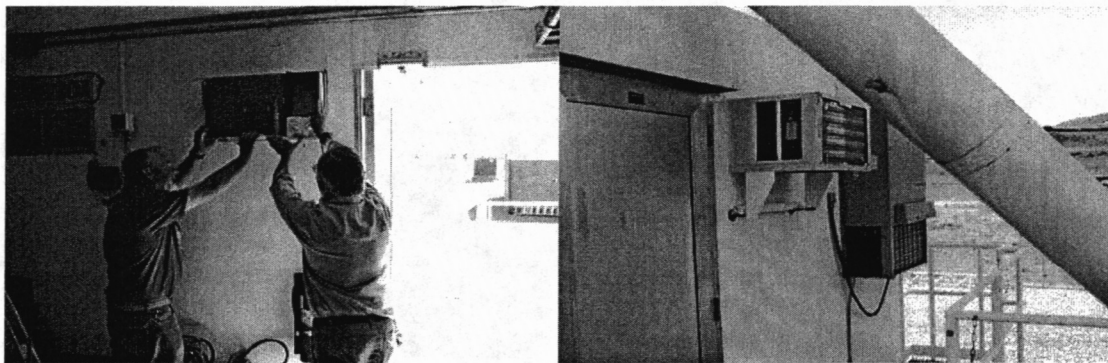




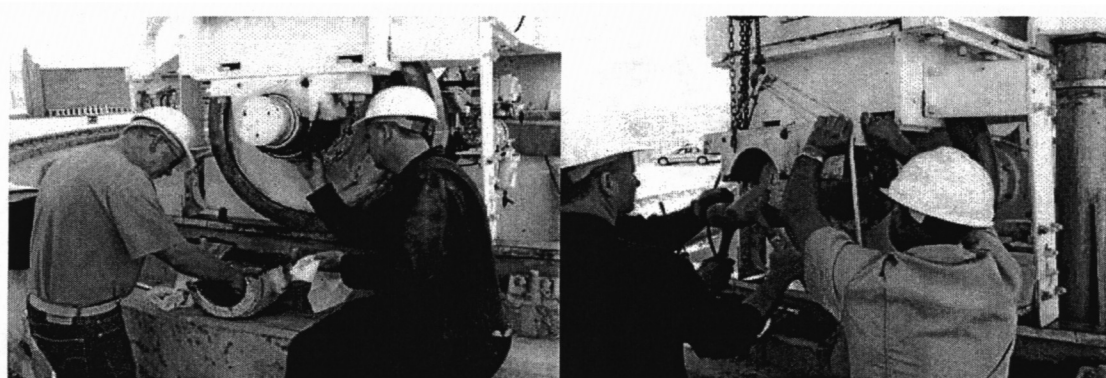
New digital tachs were installed on EL and AZ motors. All AZ and EL lube pump SJO power cables were replaced. Azimuth #2 motor was replaced. The ACU power supply and backplane upgrade were installed and tested.



Elevation synchro data and power cable connector was repaired. The encoder side cable wrap strain relief and mounting bracket was repaired.



A Marvair backup air conditioner was installed in the Ped room.



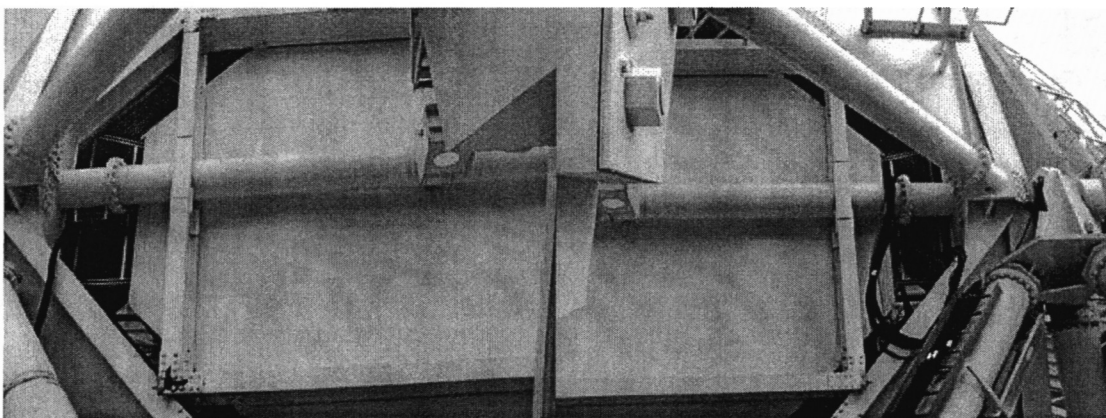
AZ bearings were inspected. AZ drive #1 outside bearing was replaced.

#### AZIMUTH BEARING GREASE INSPECTION

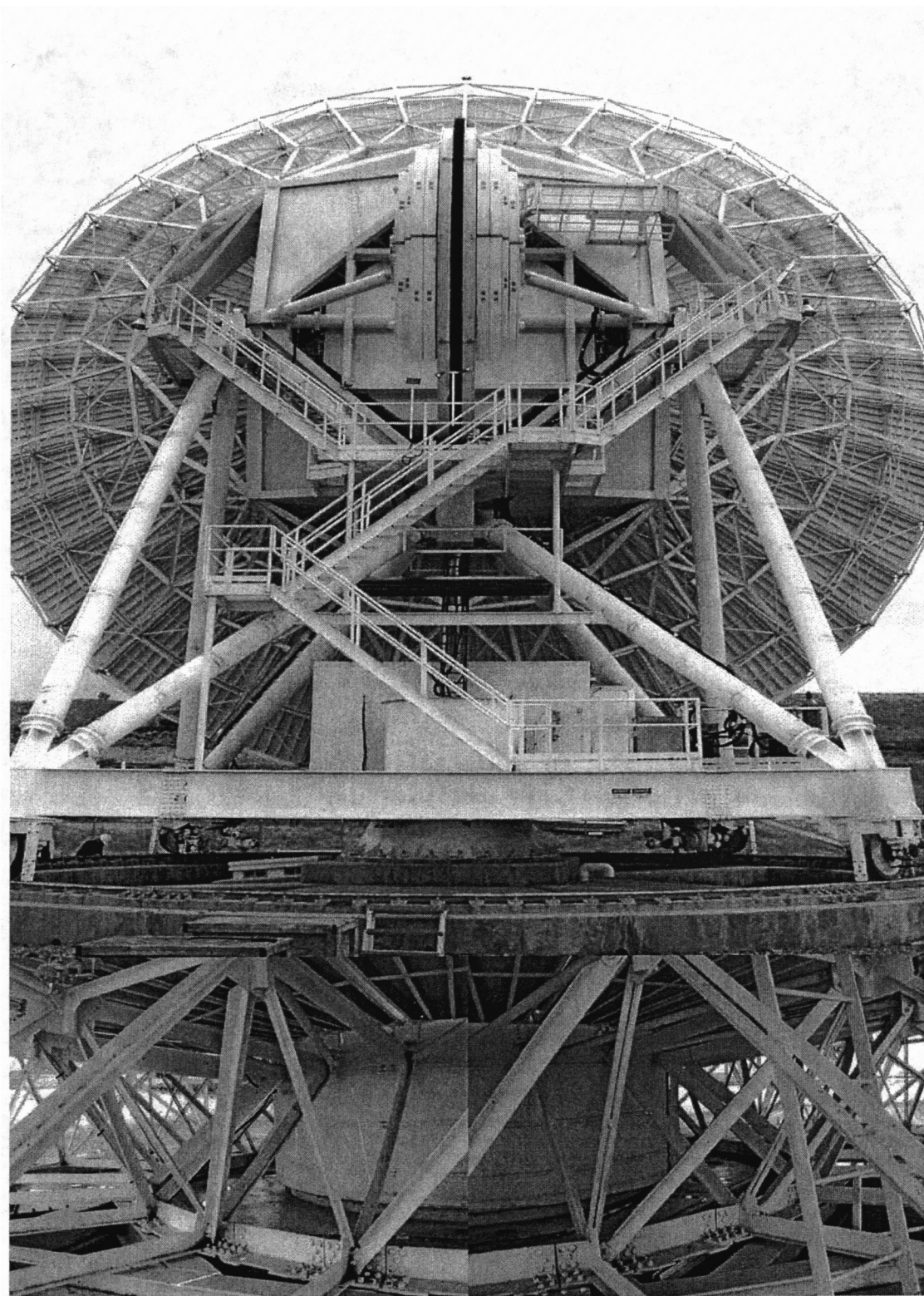
	INNER BEARING	OUTER BEARING
D1	No metal found/rollers scratchy	REPLACED
D2	NEW WHEEL	NEW WHEEL
I1	No flakes/race a little scratchy	No flakes/good races
I2	Few brass flakes/smooth race	No flakes/race a little scratchy
All bearings were very well lubricated.		

#### ELEVATION BEARING GREASE INSPECTION

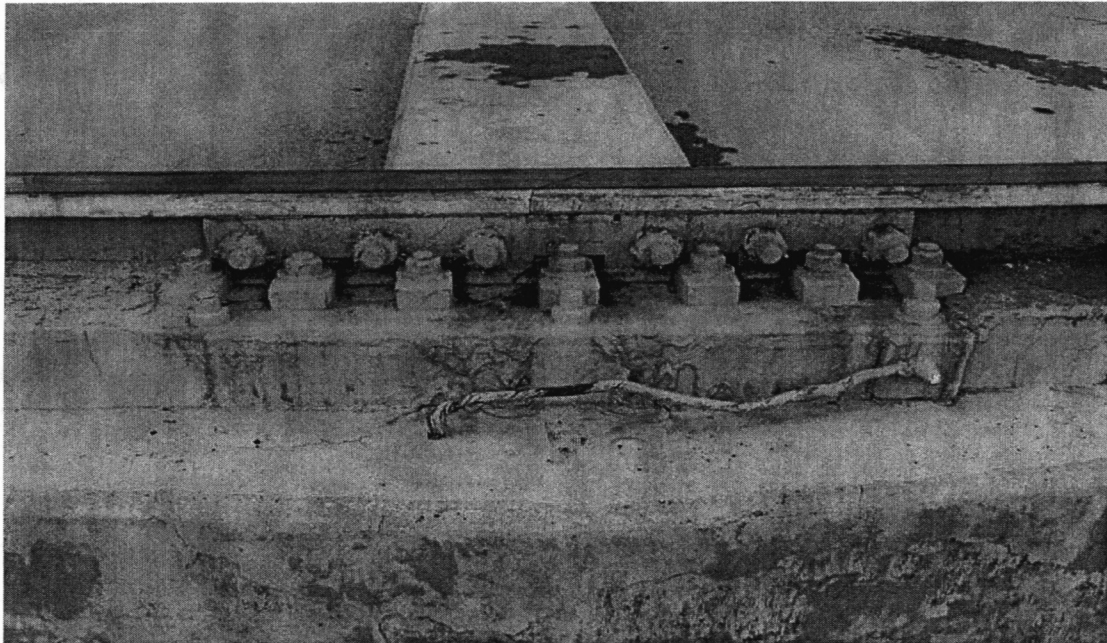
Encoder	Good grease with no metal flakes.
Synchro	Good grease with no metal flakes.



Elevation axle has no visible signs of cracks. Paint is good condition. Pintle bearing is well greased with no metal flakes.



The antenna paint is in good condition.

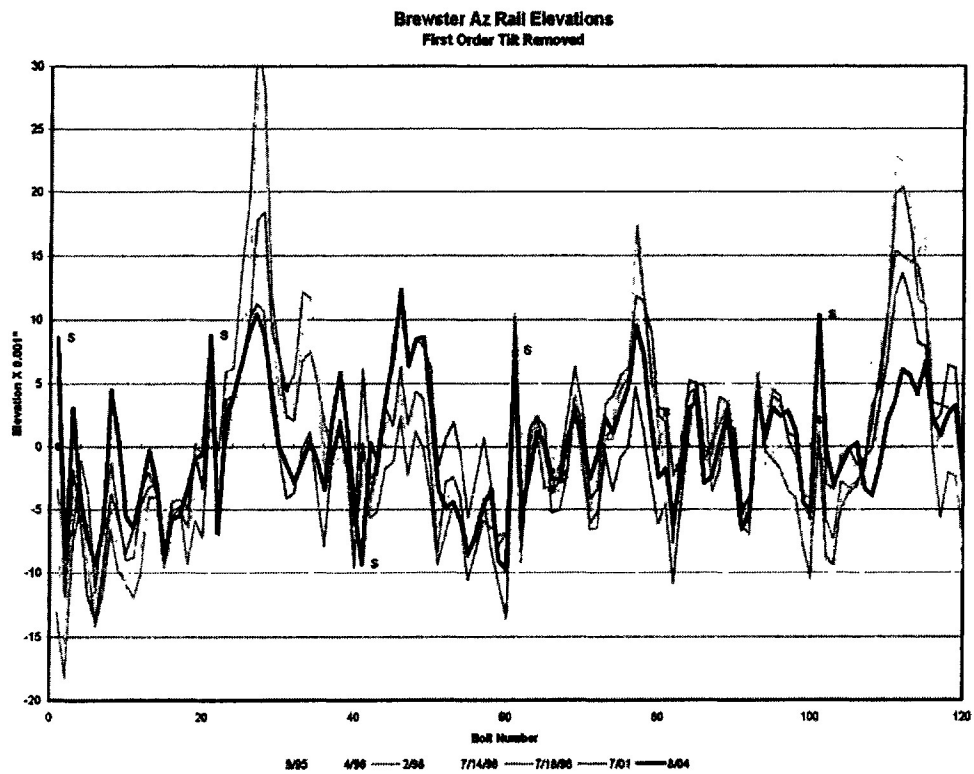


Vulchem is beginning to deteriorate from this rail splice and all others.



The rail is pulverizing the grout in many spots. Vulchem is deteriorating all over the rail. Site Techs began removing vulchem while the maintenance team was on site and will continue removing vulchem until it is all removed.





The Brewster rail is very flat with less than .025" change in elevation.



## ANTENNA MECHANICAL MAINTENANCE BRVLBA 7/30-8/8/04

### APEX INSPECTION:

FRM 2-YEAR INSPECTION PM. Complete.

● all INA zirks. FRM is in good mechanical condition.

### 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.

Dipole.

Peeling paint/delaminating.

SUBREFLECTOR REPLACED.

### QUAD LEGS INSPECTION:

Guy wires. OK.

Turn buckles. OK.

● ad leg flange bolts. Tight, OK.

### DISH INSPECTION:

Anemometer mounts/operation. Good.

Panel surfaces. Some discolored panels. Good condition other wise.

Spot check panel bolts. Done, all tight.

### FEED CONE INSPECTION:

Feed cone surface/insulation. Spot sealed and painted with elastomeric.

FE feed windows. OK.

FE feed mounting hardware. OK.

FE feed heaters. OK.

Dichroic reflector cracking/delaminating. (NOP#6C3C) Panel in good shape, small frame crack.

Ellipsoid dish/mount. Good condition.

FC hatch latches replace as needed. All OK.

**ELEVATION BEARING/AXLE INSPECTION:**

EL. Grease inspection/Encoder side	Done, no metal found.
EL. Grease inspection/DGB side	Done, no metal found.

Grease elevation bearings. Done.

Check elevation axle for cracks. No cracks found.

Listen for popping or grinding. No popping or grinding noises detected.

**ELEVATION BULL/PINION GEAR INSPECTION:**

Bull gear. A little dry.-----GREASED.

Bull gear welds/hardware. Bolts tight, no cracked welds.

Pinion gears. Dry need lube-----GREASED.

Lube bull/pinion gears as needed. GREASED.

Check stow pin. OK, installed safety pin.

**ELEVATION MOTOR AND GEARBOX INSPECTION:**

EL.#1 seals/coupling. No leaks, couplings OK.

EL.#2 seals/coupling. No leaks, couplings OK.

Gearbox heaters/lube pumps. OK heaters, lube pumps power cables insulation bad.

Flow gauges/fish eyes. Very dirty changed.

Change gearbox oil. Done.

Listen for popping or grinding. No noises detected.

**ELEVATION PLATFORM INSPECTION:**

Swinging catwalk. In good shape.

Hoist. OK, Oil level good.

**ANTENNA STRUCTURAL INSPECTION:**

Spot-check structural bolts. OK.

VTX walk way. Good shape, lots of bird droppings.

Antenna structural welds. OK, no cracks.

Antenna backup/lower structure. Good.



**AZIMUTH BEARING/GREASE INSPECTION**

	INNER	OUTER
●	No metal/rollers scratchy	Replaced.
D2	New Wheel	New Wheel
I1	No flakes/little scratchy.	No flakes/good races.
I2	Few brass flakes/races in good shape	No flakes/Races a little scratchy.
I2 Few Flakes were found 7/01.		

**AZIMUTH WHEEL INSPECTIONS:**

Wheel to structure clearances. OK, plenty of clearance.

Listen for popping or grinding. None, detected.

**AZIMUTH WHEEL RADIUS/ALIGNMENT**

Measured	Specified	D1	D2
Horizontal	0.00.00 (<1'24")	0.00.30	New Wheel/Axle
Vertical	93.26.23(+/-1'24")	0.03.59	New Wheel/Axle
● Radius	300.000" (+/- .25")	.134"	New Wheel/Axle

**AZIMUTH MOTOR AND GEARBOX INSPECTION:**

AZ#1 seals/coupling. No leaks, couplings good.

AZ#2 seals/coupling. No leaks, coupling good.

Gearbox heaters/lube pumps. Lube pump power cable insulation deteriorating.

Flow gauges/fish eyes. Dirty, changed.

Change gearbox oil. Done.

Listen for popping or grinding. None detected.

**PINTLE BEARING INSPECTION:**

Cable wrap & cables. OK.

Check for loose bolts. Done.

Check bearing grease. Done, no metal flakes found.

## **ANTENNA MECHANICAL MAINTENANCE BRVLBA 7/30-8/8/04**

### **AZIMUTH RAIL INSPECTION:**

Rail level measurements. Done.

Excessive rail movement. Tight, minimal movement.

Joint bars and clips. All tightened.

Antenna foundation/grout/vulchem. Deteriorating rapidly, needs to be removed.

Re-torque rail splice plates as needed. Done, most a little loose, all tightened.

### **ANTENNA PAINT/INSULATION INSPECTION:**

Antenna paint condition. Fair to Good, Lots of bird nests and droppings.

Repair antenna insulation as needed. Good shape.

### **MECHANICAL MAINTENANCE ITEMS TO BE COMPLETED:**

1. Replace tie wraps w/metal as needed. Done, when needed.
2. Spot Seal and Paint Feed with Elastomeric. Done.
3. Replace Subreflector. Done.
4. Replace AZ#2 motor. Done.
5. Install Ped room AC. Done.

### **ANTENNA MECHANICS NOTES:**

**Repaired encoder side elevation cable wrap. Welded unistrut and replaced cable strain relief.**

**Welded VTX cat walk unistrut.**

## ANTENNA SERVO MAINTENANCE BRVLBA 7/30-8/8/04

### ANTENNA SAFETY TESTS:

Electrical Panel Inspections. Done, phase detectors turned up.

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

AZ #1	84lbs.
AZ #2	88lbs.---brake still tight when released---swapped motor.
EL #1	62lbs.---replaced brake and adjusted.
EL #2	94lbs.

### MOTOR INSPECTIONS:

Elevation motor/tach couplings.---good, replaced with digital tachs.

Elevation brush/commutator.----great shape.

Azimuth motor/tach couplings.---good replaced with digital tachs.

Azimuth brush/commutator. Great.

### ANTENNA GROUNDING INSPECTION:

Elevation ground cable. Good.

Elevation platform to pintle turret. Good.

Testal room. Good, OK.

Azimuth wheel contacts. Adjusted 3 units.

Pintle room/cable wrap. Teflon cable wrap on the bottom, OK.

Apex/Dish lightning rods. Good, cable tight.

### 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. Done---all good.

AZ/EL motor fault status. Done---all good

Stow commands. Done, all good.

Synchro position feedback. Repaired elevation cable connector.

VME to ACU communication. OK, Stows in 10 minutes.

Restore ACU parameters. Done.

## **ANTENNA SERVO MAINTENANCE BRVLBA 7/30-8/8/04**

### **SERVO MAINTENANCE ITEMS TO BE COMPLETED:**

1. Install Digital tachs on both axis. Done.
2. Install New ACU Back plane. Done.
3. Install ACU power supply Mod. Done.
4. Spot Seal and Paint Feed Cone with Elastomeric. Done.
5. Replace Tie wraps w/metal as needed. Done, used when needed.
6. Replace AZ#2 motor. Done.
7. Install PED room AC. Done.

### **SERVO TECHNICIAN NOTES:**

**Elevation synchro side blowing fuses——Nelson repaired/cut and resolderd cable conn.**  
**All drive motor lube pump power cables insulation deteriorating——Repaired all lube**  
**Pumps with new SJO power cable.**  
**Removed EL#1 RFI screen——screen was plugged.**  
**Ped room/antenna fire alarm batts dead——warehouse sending new ones.**  
**Adjusted 3 AZ idler contacts——(not touching rail).**



**APEX FRM INSPECTION:**

FRM cable/j-box condition. Power J-Box, clean inside-outside paint missing.  
M motors/encoders. All looks good.  
90/50cm FE/dipole/cables. Cables good, Di-pole removed.  
Replace tie-wraps w/metal as needed. Used when needed.

**FEEDCONE INSIDE/OUTSIDE INSPECTION:**

Ellipsoid operation. Operating properly in computer mode & w/Ruff switch.  
Feed heater operation. Works properly.  
All FE cables. Neat orderly.  
CRYO systems. No loose lines, pumps OK.  
FE dry air. Working good.  
Replace tie-wraps as needed. Used as needed.

**VTX ROOM IN/OUT INSPECTION:**

IF/PWR cable/connector blkhd. Inside OK, outside needs gentle cleaning.  
Power blkhd/rfi filters. Good condition.  
A/B racks/cables. Neat and orderly.

**ANTENNA CABLE INSPECTION:**

Elevation cable wraps. Encoder side repaired.  
All cable trays. Tie wraps as needed.  
Elevation platform/limit switches. Inspected all operated properly.  
Replace tie-wraps with metal as needed. Used as needed.

**PINTLE BEARING INSPECTION:**

Cable wrap/blkhd. All looked good.  
Limit switches. Operated correctly.  
Cable strain relief. Good condition/ need teflon in a couple spots?

**PEDESTAL ROOM INSPECTION:**

ACU/FRM logic on UPS. FRM was not on UPS, FRM corrected.  
UPS operation/by-pass switch. Operates properly.  
Breakers labeled correctly. Labeled correctly.  
Dry air compressor. (run time <25%) 23%.  
Serv Air operation. Marginal cold air, Installed backup AC.

**STATION BUILDING INSPECTION:**

**ROOM 100:**

UPS operation. Operates properly.

Electrical panels. Opened all panels checked all screws, checked contact temperatures.

Onan x/switch test generator. Tested good.

**ROOM 102:**

Contempo 1&2 operation/inspection. Inspected, correct operation.

**ROOM 103:**

VME/comm rack. Looks like new.

Recorders 1&2. Inspected.

Fire alarm operation. Operated correctly.

Chatter box/phone operation. Operation correct.

Under floor cables/bulk hd. Very good.

**ROOM 104:**

Maser/C&D rack. Lean, clean machine.

Under floor cables/bulk hd.

**WEATHER STATION INSPECTION:**

Check operation/test alarms. Operated properly.

Cabinet/tower. Condition looks good.

**SITE GROUNDS & STATION INSPECTION:**

Check generator. Tested good.

Contempo condensers. Clean on owner.

Station building. Good.

Fence/gate/signs/grounds/storage. Nice and orderly grounds.

**ELECTRONIC MANTENANCE ITEMS TO BE COMPLETED:**

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

2.Install New ACU Backplane. Done.

3.Install ACU power supply mod. Done.

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

5.Install new PED room AC. Done, helps Marv Air a lot.

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

7.Replace Tie wraps with metal as needed.

8.Check FRM servo amp contactors for auto reset/FRM on UPS. FRM Put on UPS.

9.

**FINAL ANTENNA/SITE INSPECTIONS:**

Spot-check PM's. Check.

●y TT oversights. None.

Site cleanup. Done.

Review TT list/problems with site techs. Discussed with Bob and Mark.

VLBA operations startup tests. Back in the array, for tests on 8/2.

**ELECTRONICS TECHNICIAN NOTES:**

**Elipsoid control box may need replaced?? Investigating!**

**Repaired elevation synchro cable connector.**

**Repaired—Rewired out board cryo compressor.**

