

**National Radio Astronomy Observatory  
Socorro, NM**

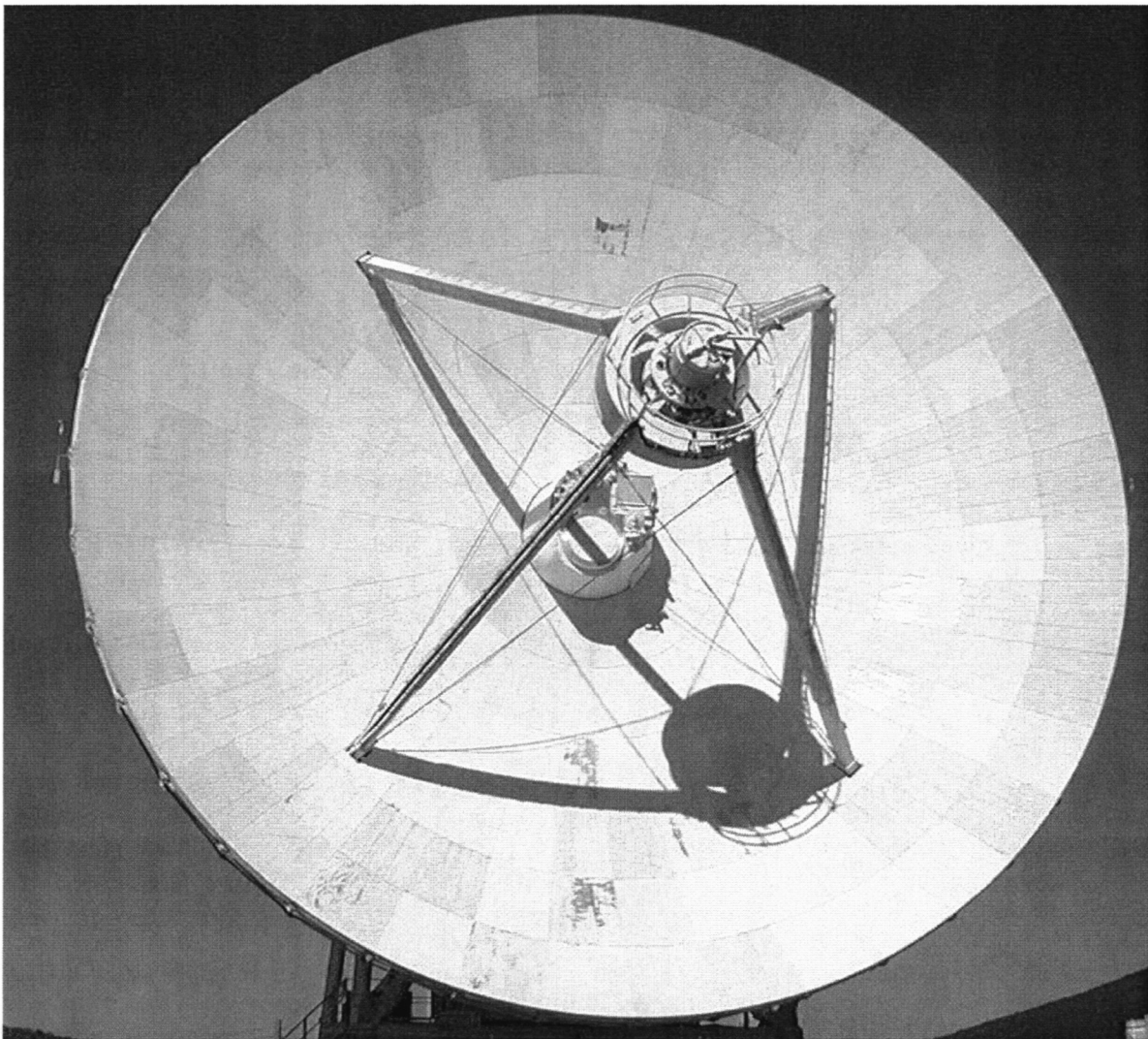
**VLBA Antenna Memo Series #45**

**Mauna Kea Maintenance Visit  
August 12<sup>th</sup> through 21<sup>st</sup>, 2002**

**Jim Ruff  
9/30/02**

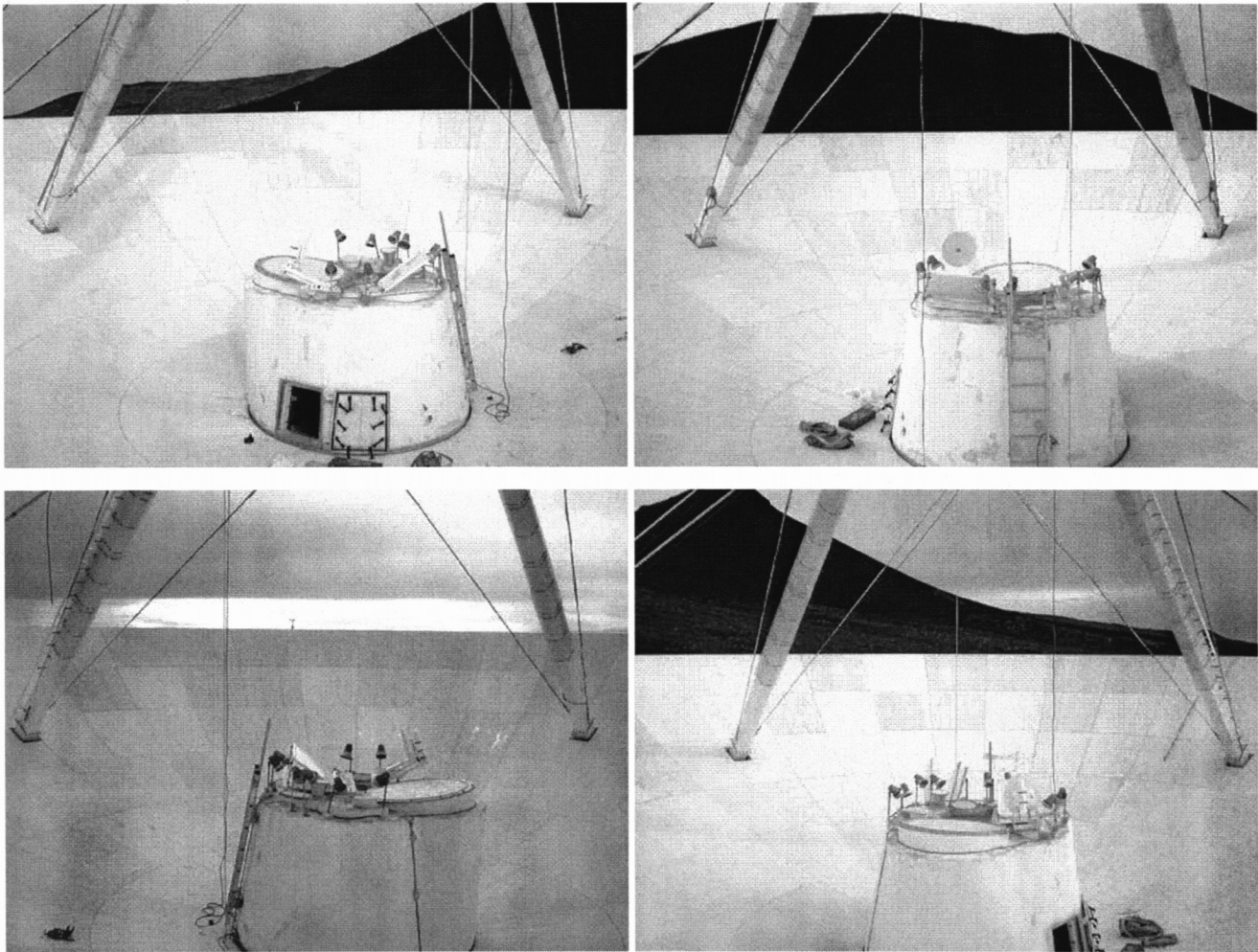
**Attachments: Azimuth Rail Survey, Servo Trip Report, Task Schedule**

**The team consisted of Steve Aragon, Ramon Gutierrez, Eric Carlowe, Steve Tenorio, Steve Troy and Jim Ruff. Site Techs Bill Hancock and Tony Sylvester assisted throughout.**



**An apex handrail, quad leg ladder and Sellstrom fall arrest system were installed. The site techs were treated to a training session on use of the Sellstrom system and general fall protection.**

**Some of the panels are losing their paint, but the remaining paint is firmly adhered and not slippery. The guy wire heaters are ineffective because they are not well attached. This should be corrected.**



**Antenna Surface Panels**

The vertex room hatch door does not close tightly. We left some of the new latches for the site techs to install.

The azimuth bearings were inspected. One was replaced. The outer races had been rotated previously, so we did not do it. The RBC bolt heads are only 0.012" away from the outer D2 pillowblock.

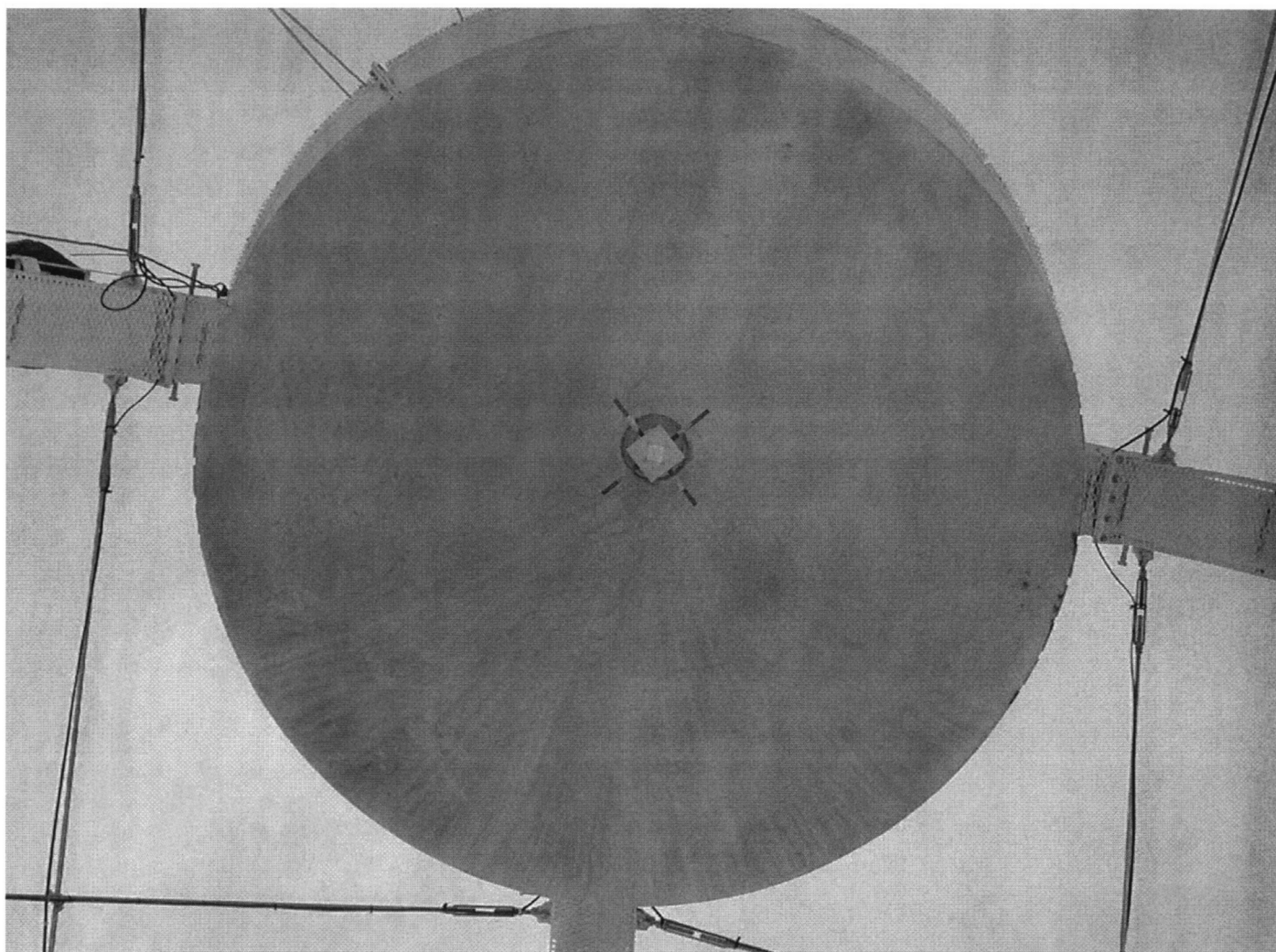
<b>Az Bearing Grease Inspection</b>				
	<b>Drive 1</b>	<b>Drive 2</b>	<b>Idler 1</b>	<b>Idler 2</b>
<b>Inner</b>	fine flakes, no pits	Some flakes, no pits	clean	small flakes
<b>Outer</b>	much metal, no pits	Some flakes, Rollway	fine metal, Rollway	Replaced

The el bearings were inspected. Zirk fittings were left in the housings per the site tech's request.

<b>El Bearing Grease Inspection</b>	
<b>Encoder Side</b>	OK
<b>Tach Side</b>	OK

Drive wheel positions were measured.

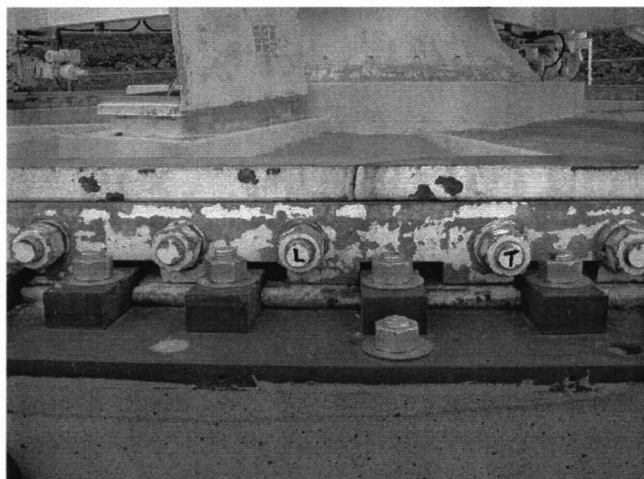
<b>Drive Wheel Alignment</b>			
<b>Wheel #</b>	<b>Horizontal Error</b>	<b>Vertical Error</b>	<b>Radius Error</b>
<b>D1</b>	0° 2' 15"	0° 1' 2"	0.003"
<b>D2</b>	54"	16"	0.003"



The subreflector is stained, but otherwise in good condition. Some of the cover seams are ripped.

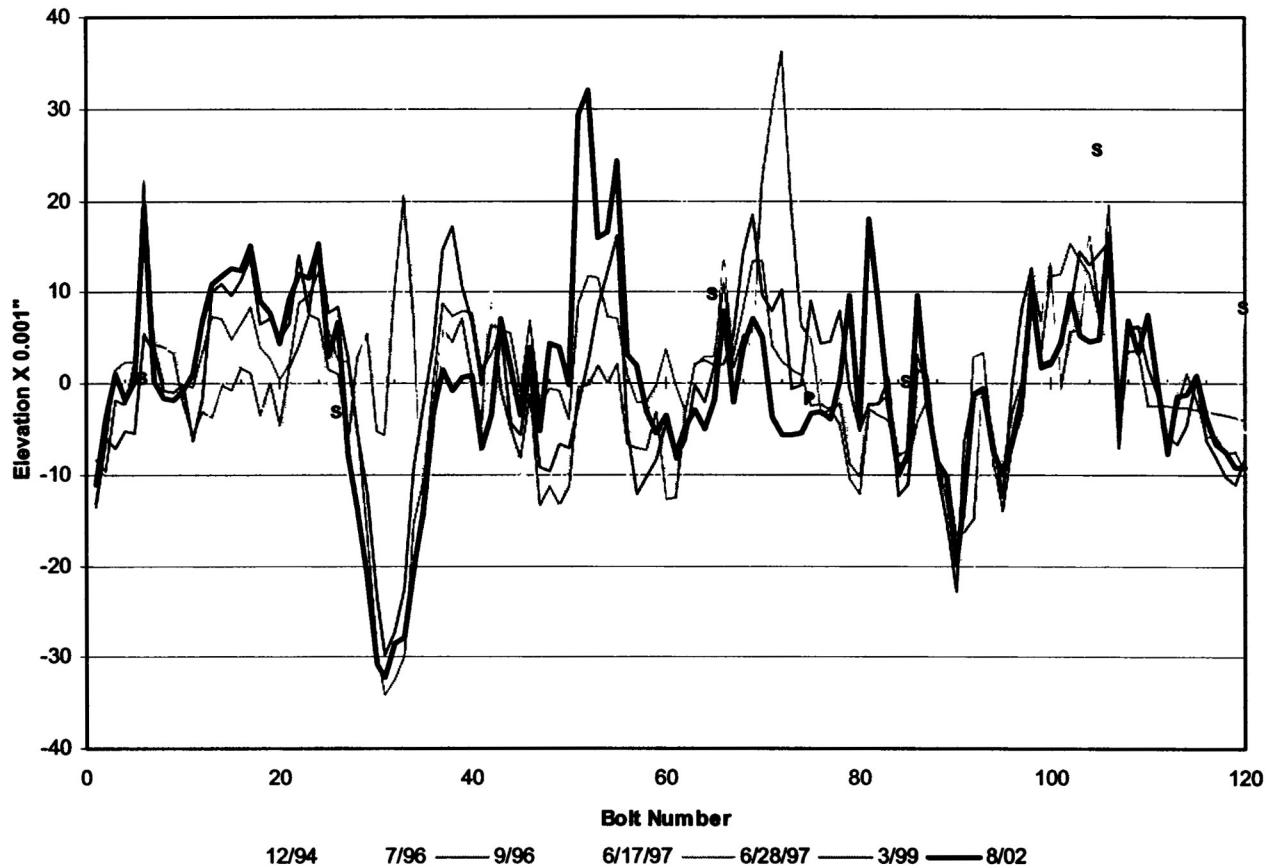
The stow pin tray and hard stops were installed. Hard stops are now installed on all antennas.

We made a valiant effort to seal the vertex room leaks. Time will tell whether or not we succeeded.

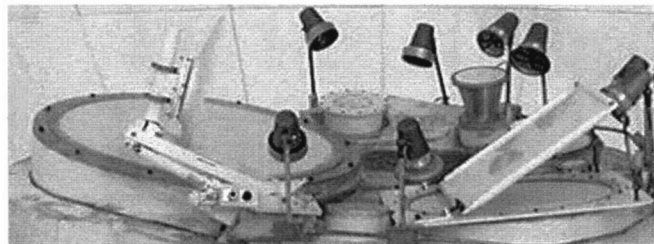


We tightened the rail splice plates. The unpainted base plates are rusting and should be painted with rust conversion primer. All remaining original grout should be replaced – soon.

# **Mauna Kea Az Rail Elevations** **First Order Tilt Removed**



Note deteriorating grout around bolts 48 to 58 and 80 to 83. Grout is also failing at bolts 17-22, 44, 98, 110 and 115. All epoxy grout looks good, including partial patches around bolt 62.



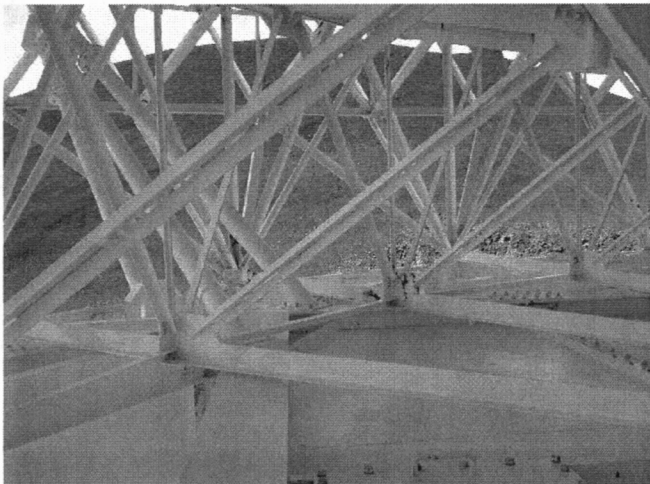
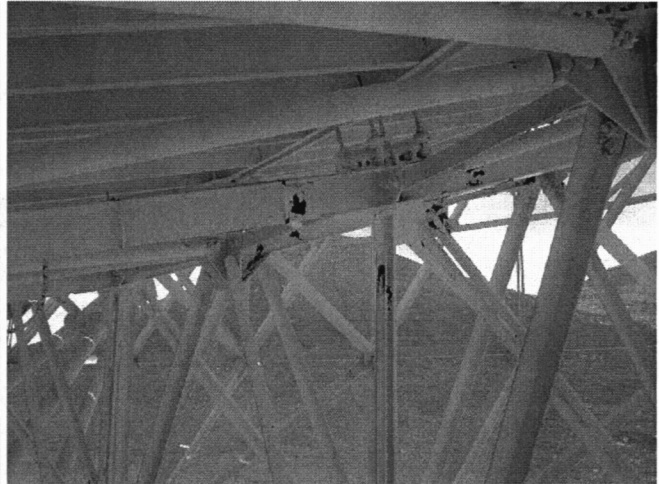
The dichroic panel is in good condition. We realigned it and replaced the dish tipper springs.

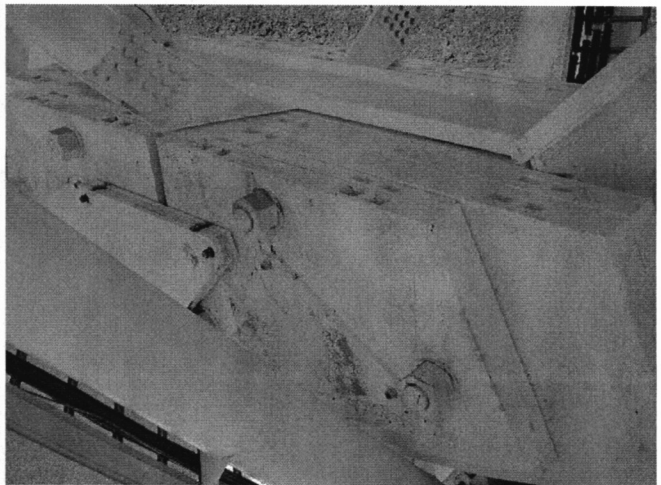
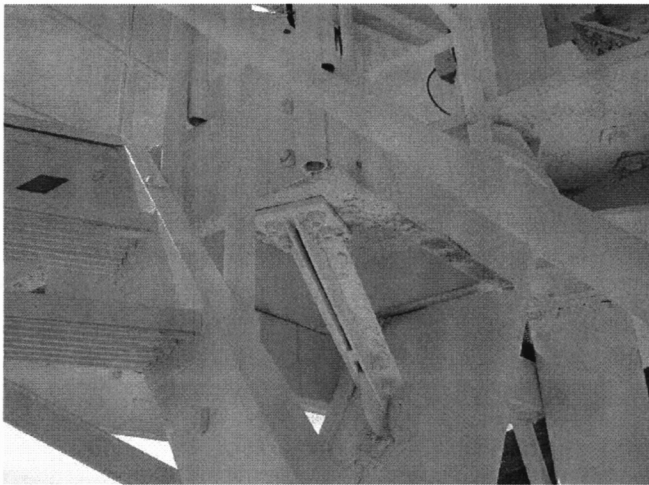
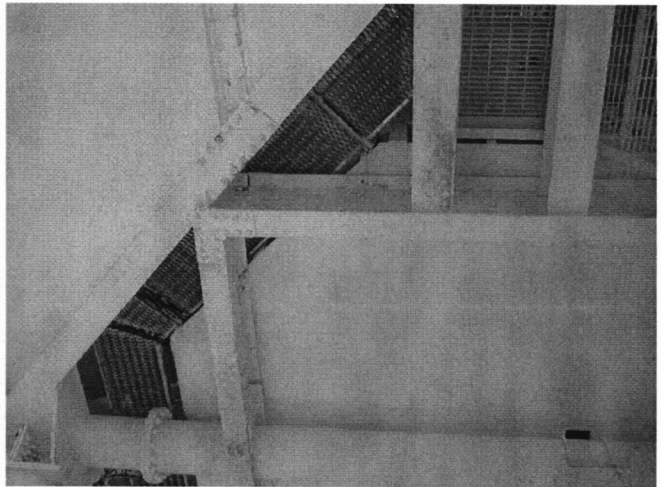
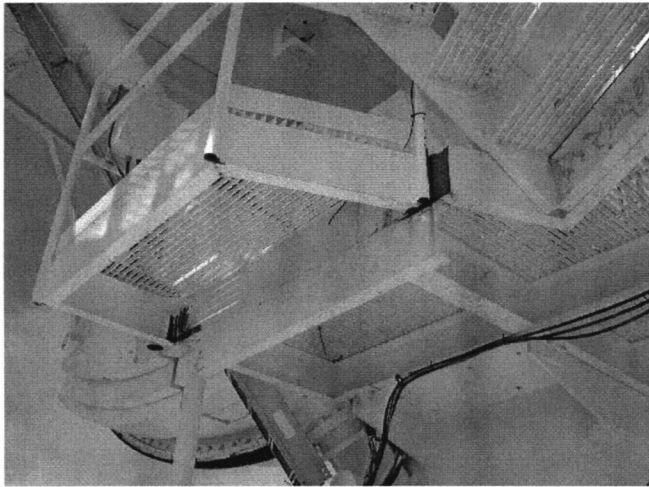
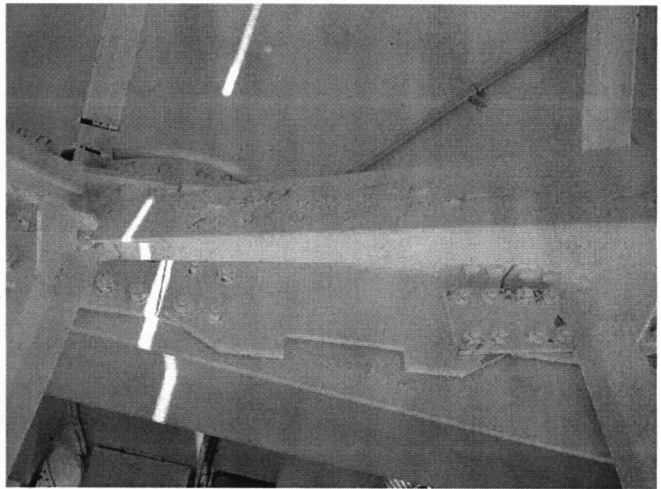
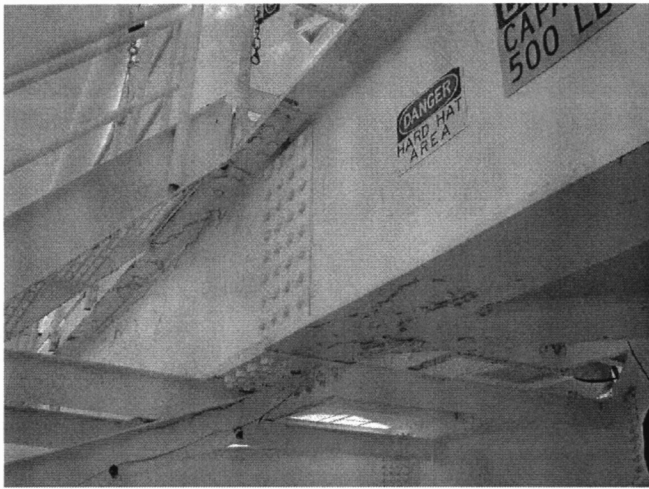
The FRM was put on UPS power.

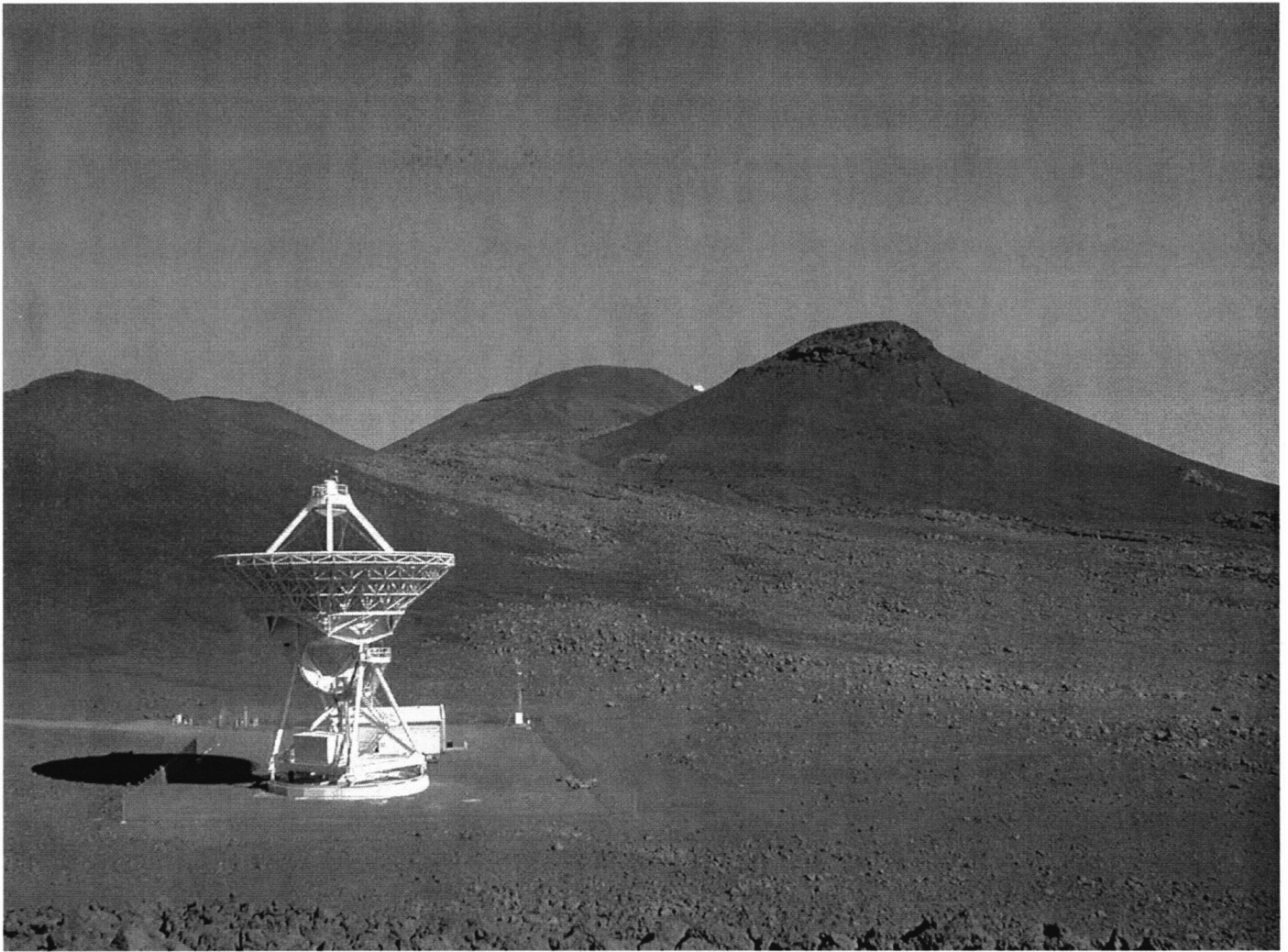
The station building UPS is noisy and should be replaced.



The paint is eroded or delaminating in many areas, but not much rust is evident yet.







**"The Moon"**

**On behalf of the entire team, I would like to thank Bill & Tony again for their hospitality during our visit!**

Servo Trip Report  
Steve Tenorio  
8/27/02

## Mauna Kea trip report

- Day # 1 12aug02 Traveled from San Antonio N.M. to Kona Hawaii.
- Day # 2 13aug02 Helped antenna mechanics install apex hand rails and ladder.
- Day # 3 14aug02 Completed El. # 2 Motor J-box mod. & started on El. # 1 J-box.  
Checked El. Encoder.
- Day # 4 15aug02 Completed El. #1 motor J-box mod. And Az. # 1 J-box mods.  
Started Az. # 2 J-box.
- Day # 5 16aug02 Completed & checked out Az. # 2 J-box mod. Started Motor pms.  
Found wires on El. # 2 brushes has broken off and damaged brush  
Holder. Changed brushes and brush holder, and seated brushes.  
Az. # 2 had old style brushes, I swapped them out.
- Day # 6 17aug02 Checked power panels in ped. Room with I.R. Thermometer.  
Checked grounding. Completed fault checks. Completed  
Velocity checks, and Data converted pm.
- Day # 7 18aug02 Completed A.C.U. pm. Completed Servo Test.
- Day # 8 19aug02 Helped Jim Ruff check Az. Wheel bearings. Picked up old grout  
From around antenna. Changed Wheel bearing.
- Day # 9 20aug02 Work with Eric Carlowe on F.R.M. problem. Greased El.  
Bearings.
- Day # 10 21aug02 Site clean up and Load container.
- Day # 11 22aug02 Started trip home.
- Day # 12 23aug02 Completed trip home.

Conclusion: Mauna Kea site is in good shape. I pointed out a couple of minor things to the site techs such as the broken wire on the El. Brushes and a couple of loose armature wires, but other than that the antenna seemed to be in real good shape.







# **ANTENNA MECHANICS**

<b>Apex Safety</b>		<b>E Bearings</b>	
x	Install new ladder & fall arrest system		
x	Install apex guardrail	x	Clean off excess grease
x	Fall Protection training (sign-in sheet)	x	Install E bearing grease trays
	<b>FRM</b>	x	Grease
x	2-year PM		<b>EI Bearing Grease Inspection</b>
x	INA bearing check		Encoder Side OK
	<b>FRM INA Bearing Check</b>		Tach side OK
	50# pull on primary side		
	Pr'y Travel:      Sec'y Travel:		
	50# pull on secondary side		
	Pr'y Travel:      Sec'y Travel:		
x	Install INA zirks		<b>Az Bearings</b>
	<b>Subrefector</b>	x	Open, clean & inspect pillowblocks
x	Check for peeling, delamination <i>discolored</i>		<b>Az Bearing Grease Inspection/Bearing Replacement</b>
x	Check cover <i>Some seams ripped</i>		Inner      Outer
	<b>Quad Legs, Guy Wires Etc.. Heaters no good</b>		D1    fx / fine metal / no pits    fl/lots of metal / no pits
x	Inspect guywires & tumbuckles		D2    fx/ some metal / no pits    fl/some flakes/Rollway
x	Inspect quadleg flange bolts		I1      fl / clean / no pits      fl/fine metal/Rollway
	<b>Anemometer</b>		I2    fx/small flakes / no pits      fl / replaced
x	Inspt mounts/chk operation		<del>Rotate outer races</del>
x	Install Baldwin bracket parts	x	Close pillowblocks and grease
	<b>Feeds &amp; Dichroic</b>		<b>Az Wheels</b>
x	Inspect feeds, mounts, heaters, etc.	x	Check wheel to struct clearances
x	Check dish tipper <i>Replaced springs</i>	no	Check axle bolt tightness
x	Check Dichroic reflector		<b>AZ wheel radii and alignment</b>
x	Check dichroic alignment		Horiz. Error      D1      D2
x	Check feedcone exterior		Vert. Error      2'-15"      54"
x	Replace hatch latches as req'd		Radius      1'-2"      16"
	<b>Dish Surface &amp; Panels</b>		Radius      0.003"      0.003"
x	Inspect for damaged panels <i>some eroded paint</i>		
x	Spot check panel bolts-looseness		<b>Az Motors &amp; Gearboxes</b>
	<b>Elevation/Hoist/Swing Platform</b>		Inspect pumps, seals & couplings
x	Checkout swinging platform	x	Check gearbox heater enclosures
	<b>Structural</b>		<b>Paint &amp; Insulation Inspection</b>
	Spot check structural bolts	x	Inspect ant paint and report
x	Inspect structural welds	x	Inspect & repair ant insulation as needed
	Inspt ant backup/lower struct		<b>Pintle Bearing</b>
x	Inspect E axle for cracks		Inspect seals
	<b>E Bull and Pinion Gears</b>	x	Check pocket level
	Inspt bull/pinion gears	x	Check for loose bolts
	Lub bull gear as req	x	Lubricate
x	Check stop pin		Close gap in grease catcher
x	Install Hard Stop		<b>Az Rail Inspection</b>
	<b>E Motors &amp; Gearboxes</b>	x	Inspect ant foundation, grout and Vulkem
	Inspect pumps, seals & couplings	x	Inspect for excessive rail movement
x	Check gearbox heater enclosures	x	Inspect joint bars & clips
		x	Rail level measurements
x	<b>Find/Repair leaks in Vertex Room caulked</b>	x	Check for popping wheel
	Check Cracks	x	Re-torque fish plates
x	E Axle encoder side		
x	HVAC-side cwt tube	no	Drill weep holes over az wheels
			Fill holes in HVAC side el platform grating
		x	show site tech show to use motor replacement bracket

[illegible]