National Radio Astronomy Observatory

Socorro, NM

VLBA Antenna Memo Series #45

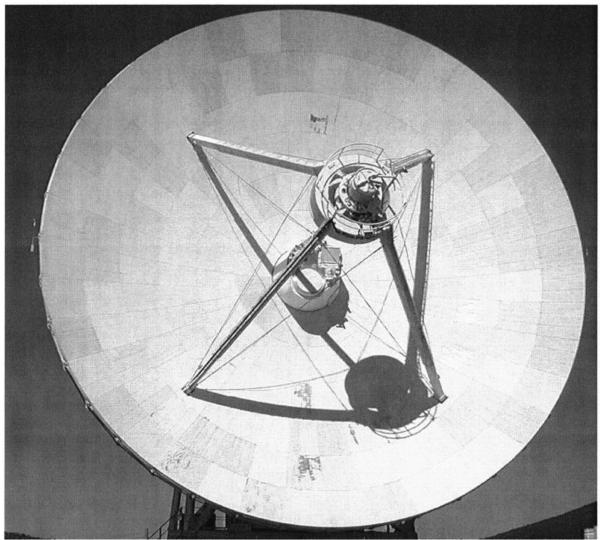
Mauna Kea Maintenance Visit

August 12th through 21st, 2002

Jim Ruff 9/30/02

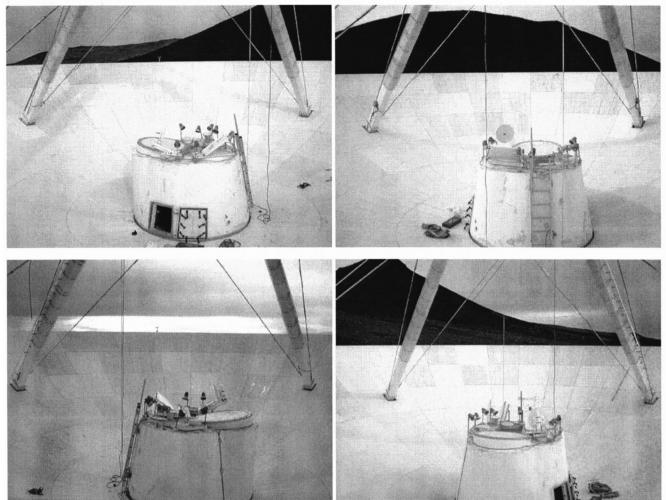
Attachments: Azimuth Rail Survey, Servo Trip Report, Task Schedule

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.

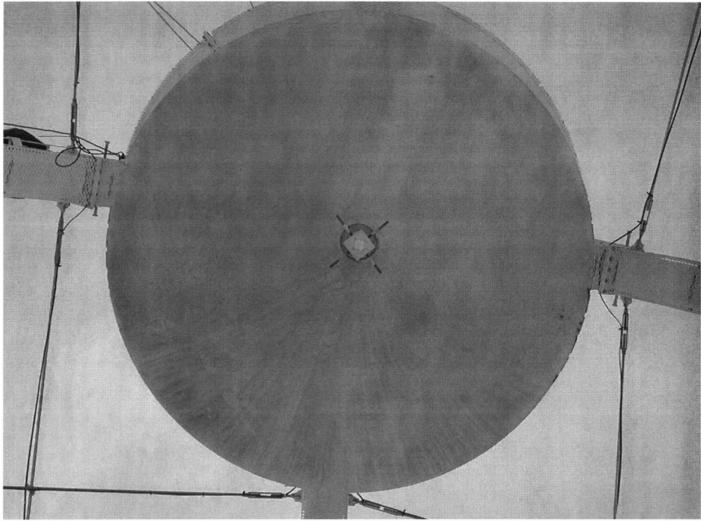
Az Bearing Grease Inspection							
Drive 1 Drive 2 Idler 1 Idler 2							
Inner	fine flakes, no pits	Some flakes, no pits	clean	small flakes			
Outer	much metal, no pits	Some flakes, Rollway	fine metal, Rollway	Replaced			

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

	El Bearing Grease Inspection
Encoder Side	ОК
Tach Side	ОК

Drive wheel positions were measured.

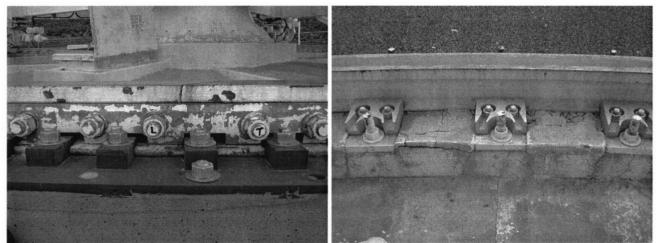
Drive Wheel Alignment							
Wheel #	Horizontal Error	Vertical Error	Radius Error				
D1	0° 2' 15"	0° 1' 2"	0.003"				
D2	54"	16"	0.003"				



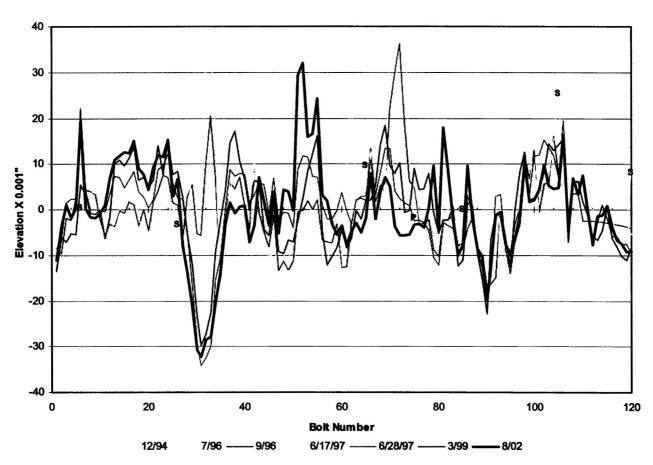
The subreflector is stained, but otherwise in good condition. Some of the cover seams are ripped.

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.



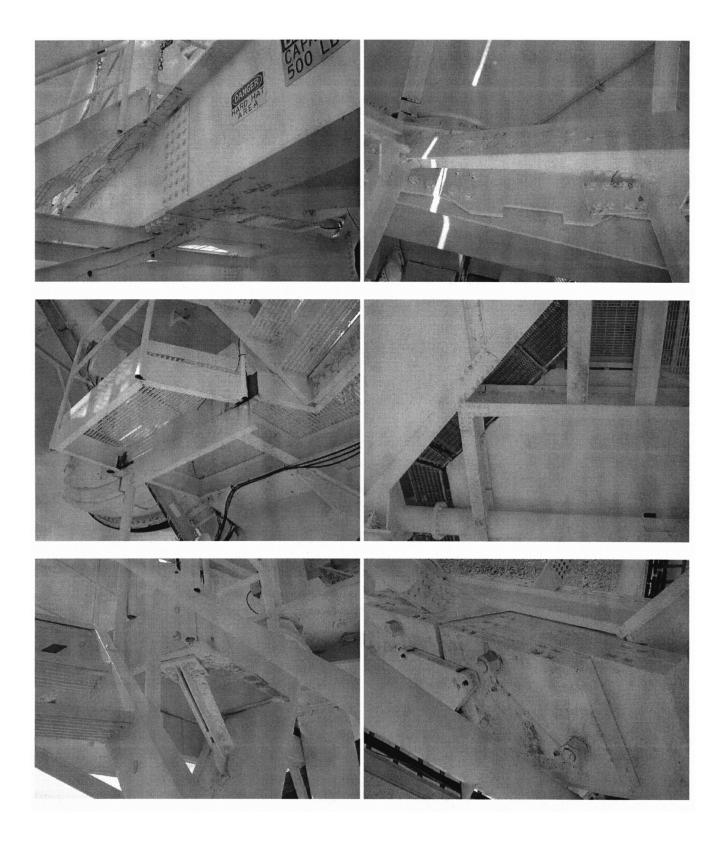
The dichroic panel is in good condition. We realigned it and replaced the dish tipper springs.

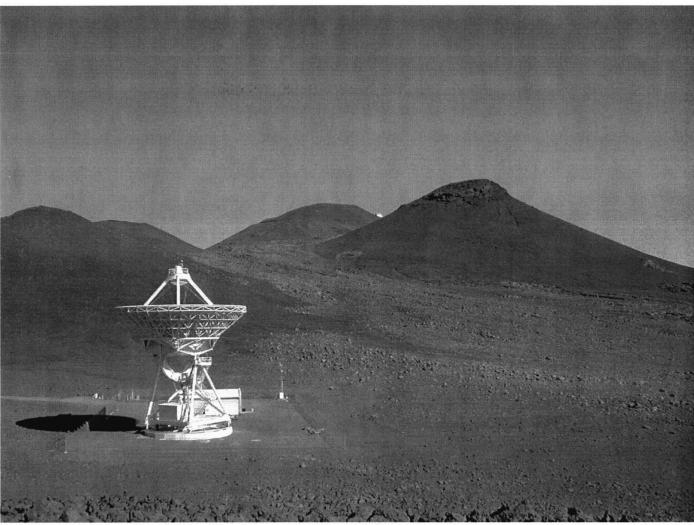
The FRM was put on UPS power.

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.

					VO
	SAFETY TESTS				Recordings
x	MULTIPLE FAULTS	STATUS	· · · · · · · · ·	x	EL System Response Test
x	MANUAL MODE			x	Implement test setup
x	INDIVIDUAL FAUL	LT STATUS		x	Calculate acceleration
x	REMOTE BOX TESTS			x	Locked rotor resonance, AZ/EL
x	AZTravel Limit Switch Tests			x	AZ System Response Test
x	AZClockwise t	ests		x	Implement test setup
x	AZCounter-Ck	ockwise tests		x	Calculate acceleration
x	EL Travel Limit Te	st		x	Locked rotor resonance, AZ/EL
x	Elevation up te	sts		x	AZ Position Loop Tests
x	Elevation dow			x	Small signal step response
	BRAKE HOLDING-T	ORQUE TESTS		x	Large signal step response
				x	Single motor step response
	Brake Hold	ding Torques (ft-lbs)		x	EL Position Loop Tests
	Az 1	96		x	Small signal step response
	Az 2	72		x	Large signal step response
	El 1	80		X	Single motor step response
	El 2	70			Auto Modes Test
		/0		x	Check stow commands
				x	Synchro feedback operation
	Motor Inspections		··	X	Test AUI COMM DEAD
х	Motor and Tach				
x	Commutator & E				Check El Counterweight balance
x		poxes on drive motors	;(4)	<u> </u>	
			()	x	replaced motor j-boxes
x	ACUPM				
		·			
	Servo PM				
	Lightning Groundi	na			
x	EL Bearing Grou				
x	EL Motor Platform				
x	Pedestal Room (
x					
x					
	Detailed Test				
x	System and Axis	Faults			
x	Motor Fault State				
x	Measure EL Velo			<u> </u>	
Ë				<u> </u>	
x	Measure AZVelo	ocity		 	
x	Record 1st Limits				
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		HV	AC
	Antenna		Control Building
	Pedestal room A/C inspection		Building A/C System
	Provide Site Techsw/manual and hold Q&A ses	sion	Perform operational checks
			Inspect indoor & outdoor units
	Vertex Room A/C		Correct deficiencies as needed.
(Inspect air handler		Stand-By Contempo
	Inspect condenser unit		Indoor Unit
	inspect lines & bulkhead fittings	X	Install primary unit interface relay board
ĸ	Repair/replace damaged line insulatiion	X	Instal Hoffman SCRs
	Replace any suspect bulkhead fitting	x	Install auxillary terminal block
	Evacuate & place unit back in service	x	Replace V-belt & adjust pully to maximum
	Install ROC & set to (C1, set 135, Dif.30)	X	Perform operational checks
	Check PCtool to DDC connection @computer		Condensing Unit
	Make hard copy of program parameters	X	Inspect for leaks & clean oil
	Check programing, save program file to disk.	x	Inspect electrical connections
	Hold Q&A session w/ Site Tech's	x	Perform operational checks
			Primary Contempo
			Indoor Unit
		X	Install auxillary terminal block
			Install utility interface auxillary switch & cable
		x	Install wiring to stand-by unit
		x	Install upgraded interface
			Install UPStransformer & cable to DDC
			Replace control transformers
5			Replace humidity sensor
			Condensing Unit
	· · · · · · · · · · · · · · · · · · ·	X	Inspect for leaks & clean oil
		x	Inspect electrical connections
		x	Peform operational checks
		x	Check PCtool to DDC connection at computer
			Make hard copy of program parameters
			Check program & save program file to disk
			Schedule and perform hard test of emergency
			power interface for both Contempo units.
			Hold Q&A session w/ Site Tech's
			Review site documentation with site techs
			Inspect site utilities Water supply & distribution
			Propane system
			Sewer/septic system
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	ANTENNA MECHANICS								
	Apex Safety		BΒ	earings					
x	Install new ladder & fall arrest system						, . 		
x				Clean off excess grease					
x				Install 🗄 bearing grease trays					
				x Grease					
x	2-year PM		El Bearing Grease Inspection						
x	INA bearing check		Encoder Side OK						
	FRM INA Bearing Check		Tach side OK						
	50# pull on primary side								
P	r'y Travel: Sec'y Travel:			Bearings					
	50# pull on secondary side	x	x Open, clean & Inspect pillowblocks						
P	r'y Travel: Sec'y Travel:	+ [Az Bearing Grease Inspection/Bearing Replacement						
x	Install INA zirks	┼┨	Inner Outer				Outer		
	Subrefector	tΓ	D1	fx/fir	ne metal / 1	no pits	fl/lots of metal / no pits		
x	Check for peeling, delamination discolored	┼╌┠╴	D2	fx/ sor	ne metal /	no pits	fl/some flakes/Rollway		
x	Check cover Some seams ripped	\dagger	<u>I1</u>		clean / no		fl/fine metal/Rollway		
	Quad Legs, Guy Wires Bc Heaters no good	ϯ╊	12	<u> </u>	ull flakes /	A	fl / replaced		
х	Inspect guywires & tumbuckles	ŤĿ	12	14/2116	ui IIanco /	no his l			
x	Inspect quadleg flange bolts		-R	otate ou	iter races				
	Anemometer	X	C	lose pillo	wblocks	and grea	198		
X	Inspt mounts/chk operation			Wheels					
x	Install Baldwin bracket parts	x	Check wheel to struct clearances						
	Feeds& Dichroic	no	no Check axle bolt tightness						
x	Inspect feeds, mounts, heaters, etc.		AZwheel radii and alignment						
x	Check dish tipper <i>Replaced springs</i>		D1 D2						
x	Check Dichroic reflector	H	oriz. Error 2'-15" 54"			54"	1L		
x	Check dichroic alignment					16"	11		
x				Radius 0.003" 0.003"				11-	
X	x Replace hatch latches as req'd								
	Dish Surface & Panels			1 - 1 9	0+		·		
X	Inspect for damaged panels some eroded pain	1			Gearbox				
X	x Spot check panel bolts-looseness				umps, sea				
X	Bevation/Hoist/Swing Platform Checkout swinging platform	X	Check gearbox heater enclosures Paint & Insulation Inspection						
X	Structural	x							
	Spot check structural bolts	x							
x	Inspect structural welds		Pintle Bearing						
Ë-	Inspt ant backup/lower struct			spectse					
x	Inspect EL axle for cracks	x	_		ocket leve	1			
	B Bull and Pinion Gears	X			r loose bo				
	Inspt bull/pinion gears	x	Lu	bricate			· <u> </u>		
	Lub bull gear as req		Close gap in grease catcher						
x	Check stow pin		Az Rail Inspection						
X	Install Hard Stop		Inspect ant foundation, grout and Vulkem						
	El Motors & Gearboxes		Inspect for excessive rail movement						
	Inspect pumps, seals & couplings		Inspect joint bars & clips						
X	Check gearbox heater enclosures	X X			measuren				
					rpopping				
x	Find/Repair leaks in Vertex Room caulked	x	R	e-torque	fish plate)S			
	Check Cracks	no	<u> </u>		<u> </u>				
x					holesov				
X	K HVAC-side cwt tube						tform grating	·••	
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	ELEC	TRC	DNICS
	Antenna Maintenance & Inspections		
X	Apex/ FRM inspections		Replace FRM focus encoder mounting bracket
x	Feedcone/Receiver system inspections		
Ê	Activate & test feed heaters		
x	Vertex Room/Racks& cable inspections		
^ X	Vertex to pintle bearing inspection		
	Replace tie wrapson antenna with metal type		
X	Install cable wrap strain reliefs		
X	Inspect pintle bearing m bulkhead, cablewrap		
X	Inspect pedroom UPS, FRM controller, dry air sys		
X		, en	·
X	Install breaker for air comp & hydraulic wrench		
	Station Building Inspections		
x	100 - Check electrical, UPS and test operation		
x	103 - Chatter/supervisory boxes, alarms, etc.		
x	104 - Bulkhead, underfloor, maser, etc		
x	Check tools, test equip, manuals, wtr sys, UIS, etc		
	Outside Building and Misc. Inspections	X	put fm on UPS
x	Run and inspect site generator	X	repaired 2nd screw cable. needs to be replaced.
x	Inspect weather station		
x	Check gates, fence, signs, grounds, etc		
	Inspect lightning protection for antenna & bldg		
X	Check safety items/hazmat storage, etc.		
		NSF	ECTIONS
X	Spot check critical PM's		
x	Review problem areas with site tech's		
	Ste Inspections for Oversights		
	Ste clean-up		
x	Contact VLBA Operations for Station Startup Verif	icat	tion Tests
Not			
	Rail plates & nuts rusting. Paint w/ rust conv. primer	-	•
	recommend new UPS. Old one is noisy.	[
	Seal around pintle bearing?		
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