National Radio Astronomy Observatory

Socorro, NM

VLBA Antenna Memo Series #36

Pie Town Maintenance Visit 2001

Jim Ruff 1/04/02

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

The work was performed on maintenance days over a period of months. Contributing personnel included Ramon Gutierrez, Steve Aragon, Adrian Zamora, Steve Troy, the VLA Servo Techs, Doug Scott, Bob Broilo, and Jim Ruff. Site Techs Eric Carlowe, Kelly Gatlin and Nelson Atencio assisted throughout.



Kelly and Eric were treated to a training session on use of the Sellstrom system and general fall protection. They are using short nylon webs to attach the Sellstrom trolleys to their harnesses. These webs are lightweight and strong, and would facilitate rescue in event of a fall. But, they can not be left outside when not in use. This issue is being investigated.

The FRM INA bearing clearance measured 0.0025".



Structural cracks found previously had not progressed. A backup structure tube with freeze cracking was found.

No metal was found in the elevation pillowblock grease.

The azimuth bearings were inspected. The outer races had been rotated previously, so we didn't re-do it.

Az Bearing Grease Inspection				
Drive 1 Drive 2 I1 I2				
Inner	small flakes	some flakes	flakes to 1/16"	OK
Outer	OK	replaced	OK	OK

The drive wheels are located within spec.

Drive Wheel Alignment						
Wheel #	Radius Error					
D1	0° 0' 14"	0° 1' 9" (flat)	0.02" (in)			
D2	0° 0' 6"	0° 1' 1" (steep)	0.16" (out)			



The dichroic panel is in good condition.



There is a dented panel near the main dish access hatch.



There are areas of eroded paint on some of the panels.



The azimuth rail grout is in need of spot patching. There are damp spots under the Vulkem that may promote further degradation.



First order tilt is 0.31 inch (3' 32").

The paint on this antenna is in need of touch-up.



Memo

To:	Distribution
From:	Servo Group
Date:	10 APR 01
Subject:	VLBA PT SERVO TESTS
Day 1	Travel to PT and perform VLBA Servo Safety Tests Performed Servo Response Tests
Day 2	Travel to PT and performed VLBA Servo PM's

The PT VLBA Station's Servo System was in great shape, as is usual with this Site. The Station Technicians have obviously been keeping up with the Servo System PM procedures, and with the exception of AZ #2 motor, the armatures of the other 3 motors were spotless. AZ #2 motor's armature had a slight case of threading that was most likely precipitated by the use of the 'old style' brushes. These have since been replaced by the much softer 'new style' brushes.

While performing the Safety tests, the antenna inadvertently drove into the CW limit due to the failure of the CW/CCW switch in the upper pintle bearing room. A replacement switch was sent to the Site and has been replaced by the Techs. The brake torque tests revealed that both AZ brakes were only 50 ft-lbs instead of the specified 75 ft. lbs. The brakes were disassembled and adjusted to within tolerance.

On day 2 we traveled back to PT to perform the Servo PM procedures. During the course of the procedures, we discovered that the motor j-box modifications have not been done at this Site. We tightened some connections inside the Servo Drive Cabinet that were a little loose, and inspected the power distribution panels with an IR thermometer for loose/hot connections; none were found.

Action Items:

- A. Replace lightning protection cable from EL axle to DGB platform. *Cable is on Site, waiting for install by Site Techs*
- B. Install motor j-box mods on AZ/EL motors to permit easier access to bushes.
 Site Techs declined this mod, saying "We don't need this" to service our brushes

From: Doug Scott To: Clint Janes Cc: J. Ruff P. Rhodes

Electronics Division Tiger Team Report For VLBA Pie Town, December 2001 Site Manager: Nelson Atencio Site Technician: Kelly Gatlin Tiger Team Leader: Jim Ruff

General.

January 5, 2002

The VLBA Pie Town station is in transition. Our new station manager, Nelson Atencio, is sorting out the differences between Pie Town and Kitt Peak. A good portion of the differences between PT and other sites are old project components and associated cables. These are left on the antenna long after the people who requested them have gone. These should be removed or labeled and documented.

The former and most original VLBA PT site manager, Eric Carlowe, is to be congratulated for his effort in running PT. No other VLBA station manager has had the number of engineers, technicians and scientists go through his front door like Eric has. He suffered us with great results.

I wish both Nelson and Eric, the best on their new assignments.

Item List.

My inspections took me from the antenna apex to the bottom of the pintel bearing room. Listed below are the areas in which action was taken or still required. This is not in any order of priority.

- 1. Missing antenna warning signs were replaced.
- 2. Focus motor coupling was replaced (broken). Suspect focus motor needs to be replaced but currently is not available. Motor noise can be heard from the front of the control building when focus is driving down.
- 3. Reattached ground cable at elevation yoke, located on the opposite side of vertex access ladder.

Action Required:

- 4. Power cable, in pedestal room, needs replaced. The cable's outer protective insulation has broken down. It connects to J13 Input Power on FRM panel and to the isolation transformer, located in same room.
- 5. Replace protective glass on exterior light, above door to control building.
- 6. Weather proofing of FRM boxes at the apex, should be re-done. Cables and connectors will be taped and sealed with waterproof coating.
- 7. Antenna apex hatch strap is missing.

The cryo compressors are functioning fine. They should be cleaned out more and to do so would require they go off line. If a spare compressor is available it should be moved to VLBA PT for this purpose.

I would like to thank the rest of the tiger team for their assistance, cooperation and patience. As one of the junior members, I have growing respect for their talents and experience.

SERVO					
SAFETY TESTS	Recordings				
MULTIPLE FAULT STATUS	EL System Response Test				
MANUAL MODES TEST	Implement test setup				
INDIVIDUAL FAULT STATUS	Calculate acceleration				
REMOTE BOX TESTS	Locked rotor resonance, AZ/EL				
AZ Travel Limit Switch Tests	AZ System Response Test				
AZ Clockwise tests	Implement test setup				
AZ Counter-Clockwise tests	Calculate acceleration				
EL Travel Limit Test	Locked rotor resonance, AZ/EL				
Elevation up tests	AZ Position Loop Tests				
Elevation down tests	Small signal step response				
BRAKE HOLDING-TORQUE TESTS	Large signal step response				
Troubleshoot -drops DPM/MCB errors	Single motor step response				
Motor Inspections	EL Position Loop Tests				
Install stainless steel j-boxes on drive motors (4)	Small signal step response				
Motor and Tach Couplings	Large signal step response				
Drive motors wiring orientation	Single motor step response				
Commutator & Brush Inspection	Auto Modes Test				
Servo PM	Check stow commands				
	Synchro feedback operation				
ACU PM	Test AUI COMM DEAD				
Lightning Grounding					
EL Bearing Ground Cables					
EL Motor Platform to Pintle Turret					
Pedestal Room Grounding					
AZ Wheel Ground Straps					
Pintle Bearing Room Grounding					
Detailed Test					
System and Axis Faults					
Motor Fault Status					
Measure EL Velocity					
Measure AZ Velocity					
Record 1st Limits EL/AZ					
broken ground cable - el bearing opposite encoder					

HVAC				
Antenna	Control Building			
Pedestal room A/C inspection	Building A/C System			
Provide Site Techs w/manual and hold Q&A session.	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	Install primary unit interface relay board			
Repair/replace damaged line insulatiion	Instal Hoffman SCR's			
Replace any suspect bulkhead fitting	Install auxillary terminal block			
Evacuate & place unit back in service	Replace V-belt & adjust pully to maximum			
Install ROC & set to (C1, set 135, Dif.30)	Perform operational checks			
Check PCtool to DDC connection @ computer	Condensing Unit			
Make hard copy of program parameters	Inspect for leaks & clean oil			
Check programing, save program file to disk.	Inspect electrical connections			
Hold Q&A session w/ Site Tech's	Perform operational checks			
	Primary Contempo			
	Indoor Unit			
	Install auxillary terminal block			
	Install utility interface auxillary switch & cable			
	Install wiring to stand-by unit			
	Install upgraded interface			
	Install UPS transformer & cable to DDC			
	Replace control transformers			
	Replace humidity sensor			
	Condensing Unit			
	Inspect for leaks & clean oil			
	Inspect electrical connections			
	Peform operational checks			
	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			

	ANTENNA MECHANICS								
	Apex Safety (nylon webs?)			El Bearings					
х	Install new ladder & fall arrest system		x	Ins	Inspect EL bearings lip seals				
Х	Install apex guardrail		x	Cle	ean off e	excess g	jrease		
Х	Fall Protection training (s	ign-in sheet)	X	Ins	Install El bearing grease trays				
	FRM		X	Gre	Grease				
X	2-year PM				El Bearing Grease Inspection				
х	INA bearing check			F	Encoder Side OK				
	FRMINAB	earing Check				Siuc			— -
	50# pull on	primary side			ach sid	e	OK		
	Dely Troy al. 0001	Socky Troyal, 0.0015		Az bearings					
	FI y Havel.+0.001	Sec y Havel0.0015	╢╴	Ομ					
	50# pull on s	econdary side	╢╢	Az	Az Bearing Grease Inspection/Bearing Replacement			nt	
x	Pr'y Travel:-0.001	Sec'y Travel:-0.0015				Inne	er	Outer	
	Subretector		71	D1	:	small f	lakes	OK	
х	Check for peeling, delarr	ination (stained)		D2	some	e flakes	s, but OK	replaced	
х	Check cover			I1	fl	akes to	1/16"	OK	
	Quad Legs, Guy Wires Etc			12				OK	
X	Inspect guywires & turnb	uckles		12	UK				
X	Inspect quadleg flange b	olts		Ro	Rotate outer races (done previously)				
	Anemometer		X		Close pillowblocks and grease				
X	Inspt mounts/cnk operation	on		AZ V	Az Wheels				
X	Install Baldwin bracket pa	arts	X		Check wheel to struct clearances				
v	Inspect feeds mounts by	ators ato	X	CI	A7 wheel radii and alignment				
×	Check dish tinner				<i>۾</i>				$\neg \vdash$
×	Check Dichroic reflector	(sealed panel)	+ T	$\begin{array}{c c} D1 & D2 \\ \hline D2 & 0' f'' \\ \hline D2 & 0' f$			D2	$\neg \vdash$	
x	Check feedcone exterior		H	Oriz.	OTTZ. EFFOR 0 14		$\frac{0.14}{0.01}$		- -
	Replace hatch latches as	reg'd		$\frac{1}{2}$ ert. E	error	1	9 [°] flat	1 [°] 1 [°] steep	- -
	Dish Surface & Panels	•		Radius 0.02 in 0.16 out					
х	Inspect for damaged pan	els (1 - next to hatch)	-	Az Motors & Gearboxes					
х	Spot check panel bolts-lo	oseness	x	Inspect pumps, seals & couplings					
	Elevation/Hoist/Swing Plat	form	X	Check gearbox heater enclosures					
X	Instl hoist safety mods			Paint & Insulation Inspection					
X	Checkout swinging platform		X	Inspect ant paint and report					
х	x Instl condensor platform toe guard		X	Inspect & repair ant insulation as needed					
	Structural		1	Pintle Bearing					
X	Spot check structural bolts		X	Inspect seals					
X	Inspect structural weids (cracks navent progressed)		X	Check for loose bolts					
×	 Inspirate backup/lower struct (Theeze-cracked tube) Inspect FL ayle for cracks 								
Ê	FL Bull and Pinion Gears		x	Close gap in grease catcher					
x	Inspt bull/pinion gears (c	hecked backlash: OK)		Az Rail Inspection					
x	Lub bull gear as req		x	Inspect ant foundation, grout and Vulkem					
х	Check stow pin		x	Ins	pect for	excess	ive rail moven	nent	
	El Motors & Gearboxes		x	Ins	pect joi	nt bars	& clips		
х	Inspect pumps, seals & c	ouplings	X	Ra	il level r	measure	ements		
X	Check gearbox heater er	nclosures	X	Ch	eck for	popping	g wheel		
X	replaced FRM focus motor			vulke	em poor	r. grout	needs repairs	3	

ELECTRONICS						
	Antenna Maintenance & Inspections					
	Apex/FRM inspections					
	Feedcone/Receiver system inspections					
	Activate & test feed heaters					
	Vertex Room/Racks & cable inspections					
	Vertex to pintle bearing inspection					
	Replace tie wraps on antenna cabling with metal ty	ре				
	Install cable wrap strain reliefs					
	Inspect pintle bearing rm bulkhead, cablewrap, etc.					
	Inspect pedroom UPS, FRM controller, dry air sys,	etc.				
	Install breaker for air comp & hydraulic wrench					
	Station Building Inspections					
	100 - Check electrical, UPS and test operation					
	103 - Chatter/supervisory boxes, alarms, etc.					
	104 - Bulkhead, underfloor, maser, etc					
	Check tools, test equip, manuals, wtr sys, UIS, etc					
	Outside Building and Misc. Inspections					
	Run and inspect site generator					
	Inspect weather station					
	Check gates. fence, signs, grounds, etc					
	Inspect lightning protection for antenna & bldg					
	Check safety items/hazmat storage, etc.					
	FINAL INSPECTIONS					
x	Spot check critical PM's					
x	Review problem areas with site tech's					
x	Site Inspections for Oversights					
x	Site clean-up					
	Contact VLBA Operations for Station Startup Verification Tests					