
NATIONAL RADIO ASTRONOMY OBSERVATORY
Socorro, New Mexico

VLBA Antenna Memo Series No.6

Owens Valley Maintenance Visit, April 20 - 25, 1998 - Trip Report

J. E. Thunborg
May 8, 1998

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

The Owens Valley maintenance team consisted of S. Aragon, P. Baca, T. Frost, S. Troy, J. Thunborg, and P. Ulbricht. The team worked at the Owens Valley antenna from April 20 to April 25, 1998. The Site techs J. Brown and R. McFarlin were also instrumental in the completion of the scheduled tasks.

The Servo Safety Tests were performed by the site techs prior to the arrival of the maintenance team. This allowed the maintenance team to begin work on the antenna when they arrived at the site.

Cracked welds were found on the backup structure of the antenna. The cracked welds were ground out and then re-welded. Metal particles were found in the azimuth drive #2 outside bearing. This bearing was replaced. All of the outer races on the other azimuth bearings were rotated 180 degrees. A faulty MCB card in the ACU was replaced. Dented anemometer cups were also replaced.

A few details were left uncompleted. These details and their required follow-ups are listed below.

1. All four drive motors need grease-relief fittings. Tom Frost has ordered new fittings and will ship them to the site when available. The site technicians will then install them. A work order has been submitted for this task.
2. The fire alarm system does not activate the shunt trip circuitry due to a faulty relay. Tom Frost will send a new relay to OV and it will be installed by the site techs. A work order has been issued for this item.
3. The manual ellipsoid operation switch is loose. Pete Ulbricht will send a new one that will be installed by the site techs. A work order has been issued for this repair.
4. The vertex room condenser unit fan motor and speed control needs to be replaced. Steve Troy will send the replacement parts to OV where they will be installed by the site technicians. A work order has been issued for these changes.
5. The breakout box RS232 connections have poor solder joints and faulty crimp connections. These breakout boxes will need to be rebuilt to correct this problem. A work order has been issued for this repair.

The following items were tested/inspected and repaired if needed. A more detailed list/schedule is attached to this document.

1. Drive Motors - brakes, couplings, commutators and brushes
2. Servo system - Complete checkout per servo shop checklist.
3. Lightning protection - cables, straps and grounding.
4. Elevation counterweight balance measurement.
5. Vertex room HVAC upgrade.
6. Control building Contempo upgrade.
7. HVAC inspections per detailed checklist.
8. Utilities - Water, Sewer and Propane System
9. FRM - per detailed checklist.
10. Subreflector.
11. Feeds and DiChroic reflector
12. Quad legs and guy wires.
13. Anemometers
14. Bull and pinion gears - lubricated and tightened bolts.
15. Elevation hoist modifications.
16. Swinging platform.
17. Elevation platform extensions.
18. Condenser platform toe guard.
19. Bearing Inspections - Azimuth, Pintle and Elevation.
20. Gearbox - Azimuth and Elevation
21. Paint Inspection - Complete Hancock paint report.
22. Rail inspection and level measurement.
23. Antenna structure - Cracks, loose bolts
24. Antenna electrical inspections - Per detailed checklist
25. Station building electrical inspections - Per detailed checklist
26. Other electrical inspections - generator, weather station and grounds.
27. B-Rack modifications.
28. Installed feed heaters for 3 and 7mm receivers.
29. Check sensor cards.

The following non-scheduled items were also completed.

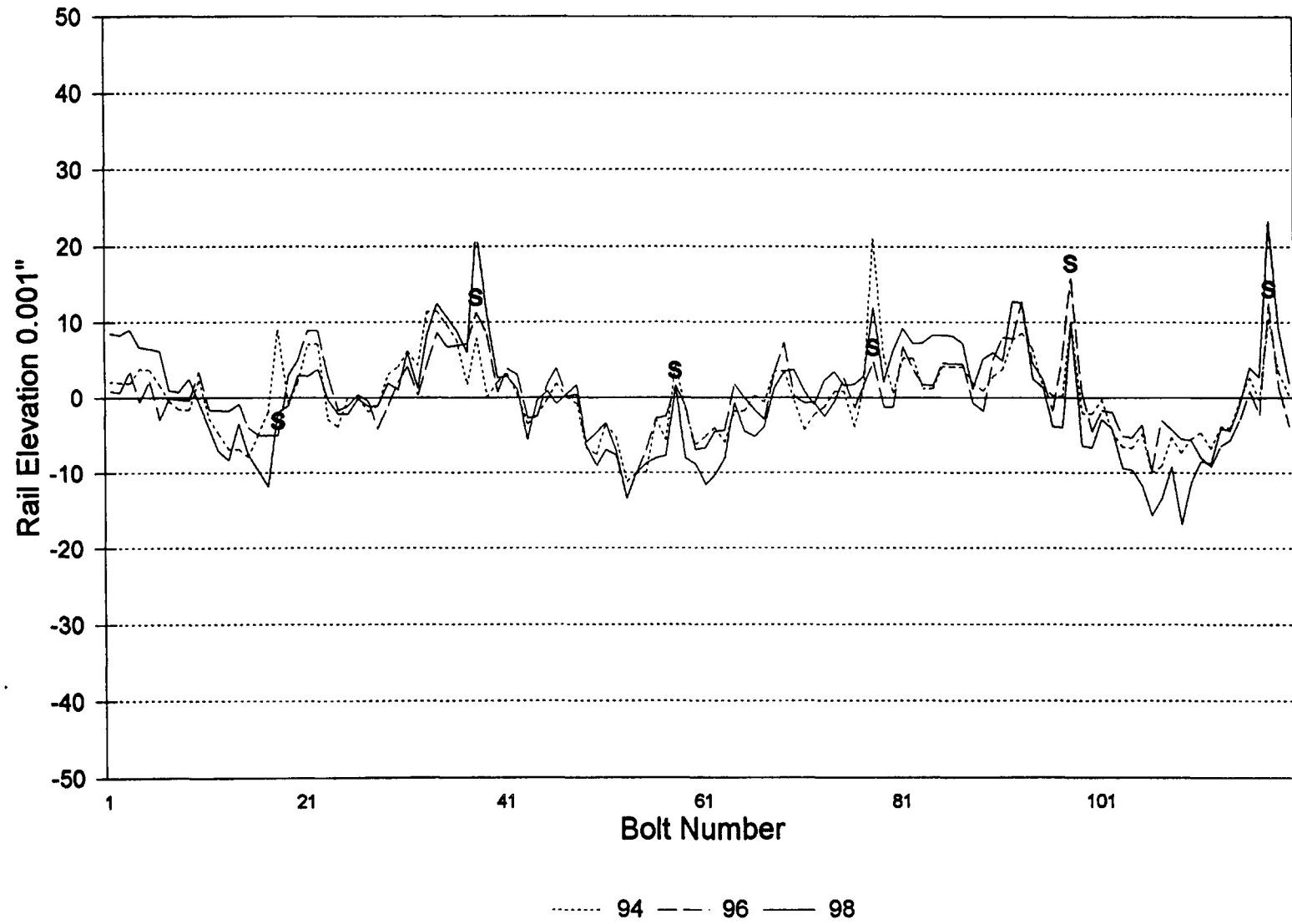
1. Replaced Hail Damaged cups on anemometer.
2. Replaced faulty MCB card in ACU.
3. Repaired antenna RS232 line.
4. Replaced Azimuth #2 outside bearing.
5. Re-routed ellipsoid positioner cable
6. Replace slotted cable wrap screws with button heads.
7. Removed guard rail by apex room.

The scheduled items that were not completed are as follows:

1. Install antenna hard stops - The up-side stop is awaiting fabrication by the machine shop. The down-side stop is currently being redesigned to facilitate installation.
2. We were unable to check the Pintle bearing pocket flatness. The pintle bearing bolts could not be loosened by hand. A pneumatic or hydraulic wrench will be necessary to complete this task.

OV Azimuth Rail

Comparison 1994 to 1998



interoffice

MEMORANDUM

To: List
From: Thomas Frost
Subject: VLBAOV Tiger Team Trip Report
Date: April 29, 1998

- 19 APR 98 Day #1 Travel to VLBA Owens Valley
- 20 APR 98 Day #2 Performed following tasks:
- A. Servo PMs
 - B. Inspect Structure Lightning Grounding System Connections
 - C. Assist welder with EL Platform Installation
- 21 APR 98 Day #3 Performed following tasks:
- A. AZ Wheel Bearing Inspections
 - B. Rotate AZ Wheel Bearing Races
 - C. Clean & Re-grease AZ Pillow Blocks
 - D. Grease AZ Pintle Bearing
 - E. Removed Frozen AZ #2 Motor Grease Plug
- 22 APR 98 Day #4 Performed following tasks:
- A. Servo Response Tests
 - B. Analyze Servo Response Data

23 APR 98 Day #5 Performed following tasks:

- A. Adjusted Limit Switches AZ/EL**
- B. Troubleshoot ACU CW/CCW Indicator Lamp Problem**
- C. Shoot AZ Rails**
- D. Replace AZ #2 Outside Wheel Bearing**
- E. Inspect EL Encoder**

24 APR 98 Day #6 Performed following tasks:

- A. Assist Welder with EL Hard-stop Measurements**
- B. Tighten Panel Bolts**
- C. EL Counterweight Tests**
- D. Troubleshoot ACU MCB Problem**

25 APR 98 Day #7 Load truck for return trip to VLA & travel to Reno

Conclusions:

The Servo System was in excellent shape, mainly to the diligent efforts of the Site Techs when performing the required PM procedures. The only minor problems noted were as follows:

- a. All four motors need grease-relief fittings-they will be shipped to the Site and installed by the Site Techs.**
- b. The Fire Alarm System didn't activate the Shunt Trip circuitry- a new relay will be shipped to the Site & installed by Site Techs.**

TO: Jon Thunborg, Paul Rhodes, Jim Oty
FROM: Pete Ulbricht
SUBJECT: OWENS VALLEY MAINTENANCE TRIP
April 19-25, 1998

Here is a summary of tasks I worked on during our week in Owens Valley.

1. B-Rack Modifications. *Removed S11 and S12 from the B-Rack and installed new switches to control the inputs of the 2cm and 3mm into the T108 converter module. (This required replumbing the 43Ghz and the 14Ghz, as well as adding cables for the future 3mm frontend).*

2. Vertex Room HVAC Control Cabling. *I built and installed cables to connect the HVAC controller to the site computer in Room 100 to enable the site techs to use Steve Troy's Staefa software to watch and control the Vertex Room temperature from the Control Building.*

3. Re-routed cables to the actuator on the ellipsoid. *Removed the cables running up and over the feedcone and re-routed them under the dish surface and under the feedcone insulation to better protect them from the UV.*

4. Installed feedheaters for the 7mm and 3mm.

5. Replaced screws in Asimuth cablewrap with buttonhead screws. *Also replaced the first section of spring assembly. Adjusted the cable tray for better clearance with the support arm---was rubbing. Note: The cable tray tower had shifted out of level-----possibly due to all the work done inside the Pintle Bearing Room with the bolt checking. The tilt created a high spot on one side which caused the spring arm to bind. Luckily, we were watching it at the time and stopped it before we had a repeat of the Hancock cablewrap incident. Any work done in the Pintle Bearing Room should be followed up with a limit-to-limit inspection of operation from inside with the remote box to prevent any potential problems!!*

6. Installed temperature and humidity sensors in Rooms 103 and 104. *Used a matched set of sensors and controller calibrated in the lab for the first time. (Steve has given me units for the next two sites to setup for the installations.)*

7. Checked and reprogrammed Chatterbox callout numbers.

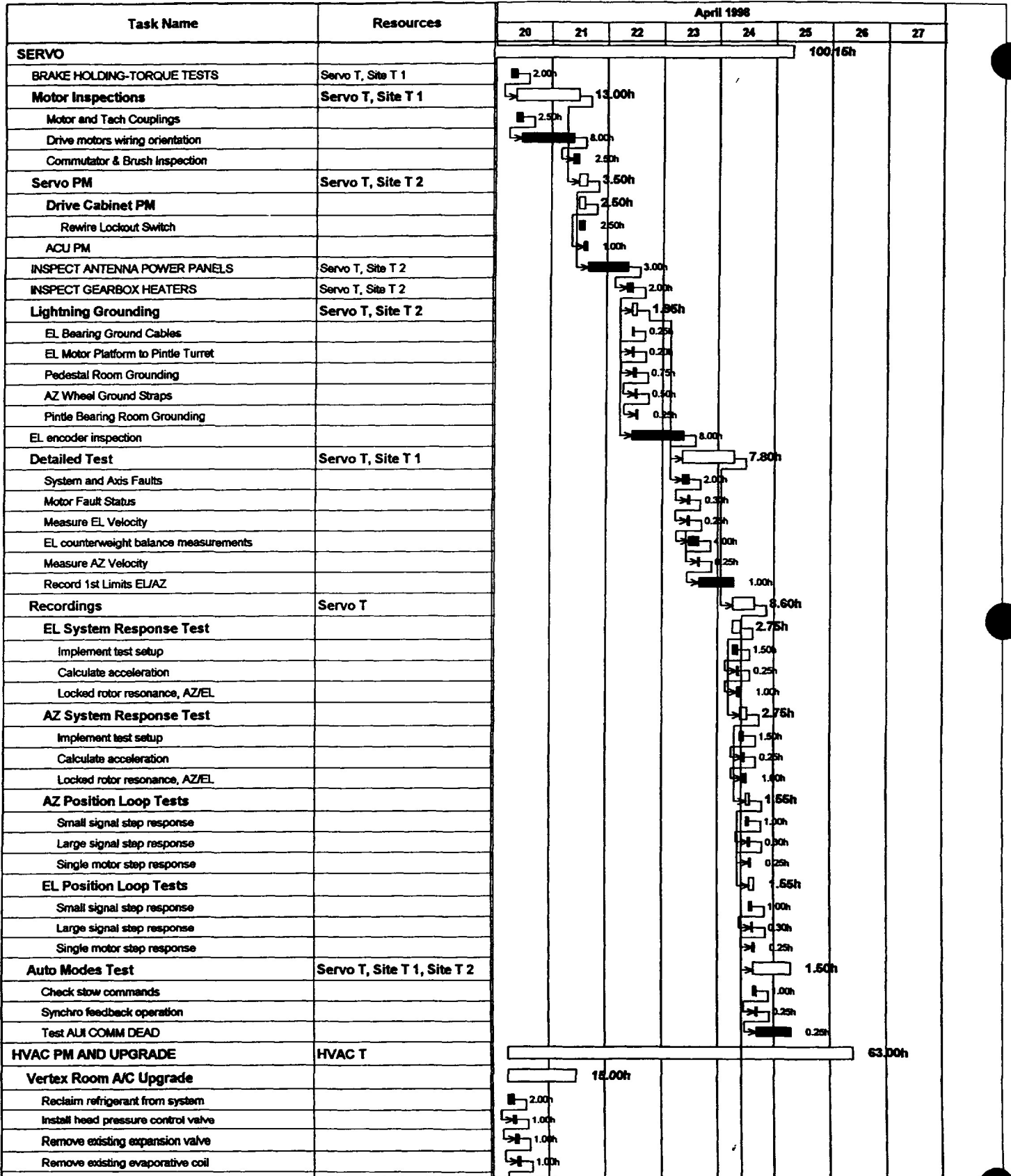
8. Inspected RS232 cabling. *The breakout box connections in the Vertex Room, Ped Room, and Room 104 have all been tampered with since the outfitting of this site. Although the wires seem to be connected properly, we found several poor solder joints and crimp connections. The lightning protection was also clipped at the Vertex Room bulkhead. The Spark Laptop at OV has a terrible screen but would work through the cabling if connected through the Smart Switch. It would not, however, work when connected directly to the Station Computer. Replacing the 050 card (as per Fred Dunn) did not fix the problem. I have suggested to the site techs to go through each breakout box and rebuild it.*

9. Completed "Top to Bottom" Electronics Inspection List. *The site looks to be in very good shape. Jim and Ray are doing an excelent job. I had Willie Zamora send anemometer cups to replace one set on the antenna---looked like they*

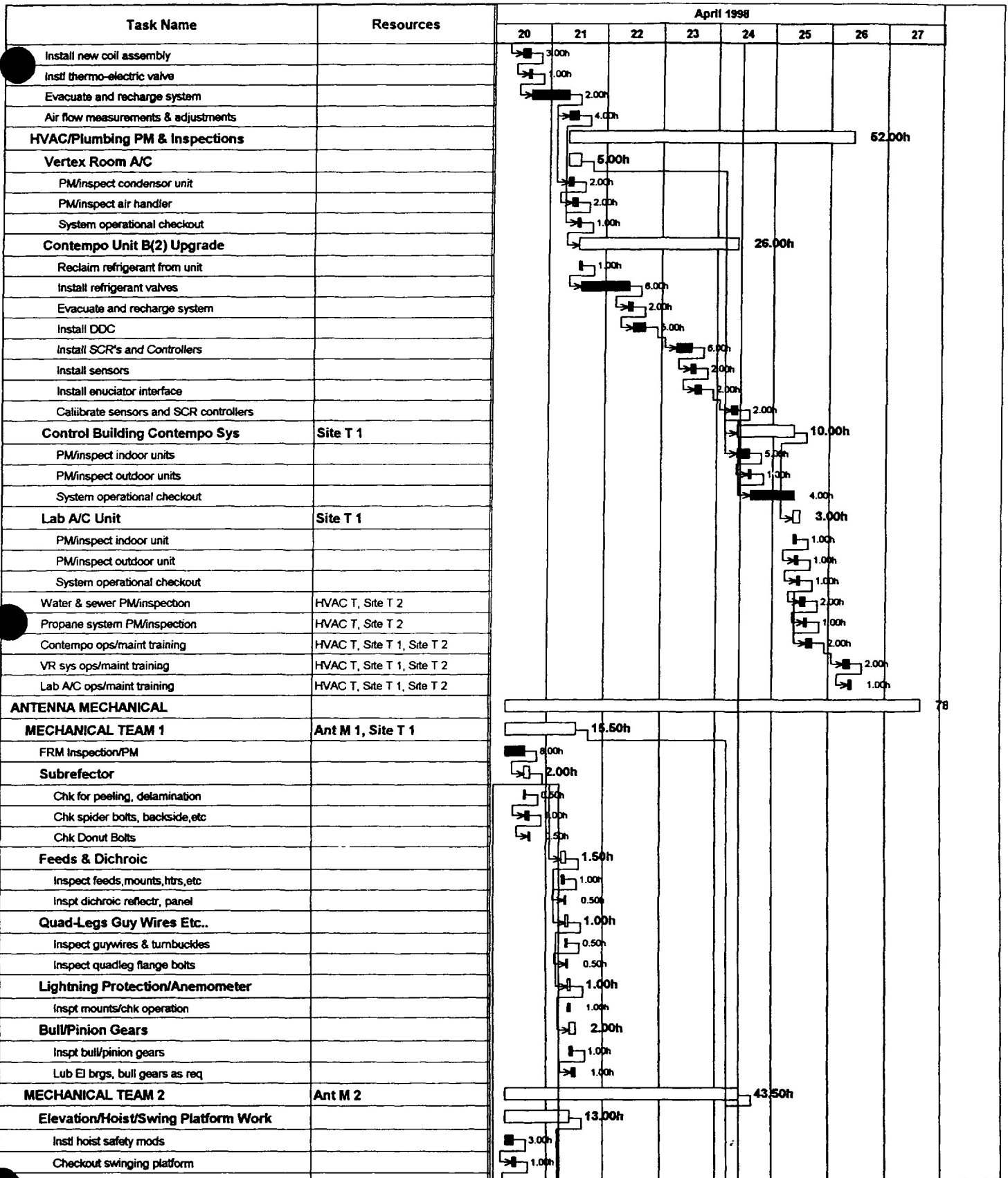
were attacked by a big bird.

10. Checked the Sensor cards. *I could not check the 2cm or the 6cm without pulling the frontend. OV has DT-500 type sensor cards in all their frontends. Since all the sensor cards were working, I did not adjust anything. I will show Everett Callan the results.*

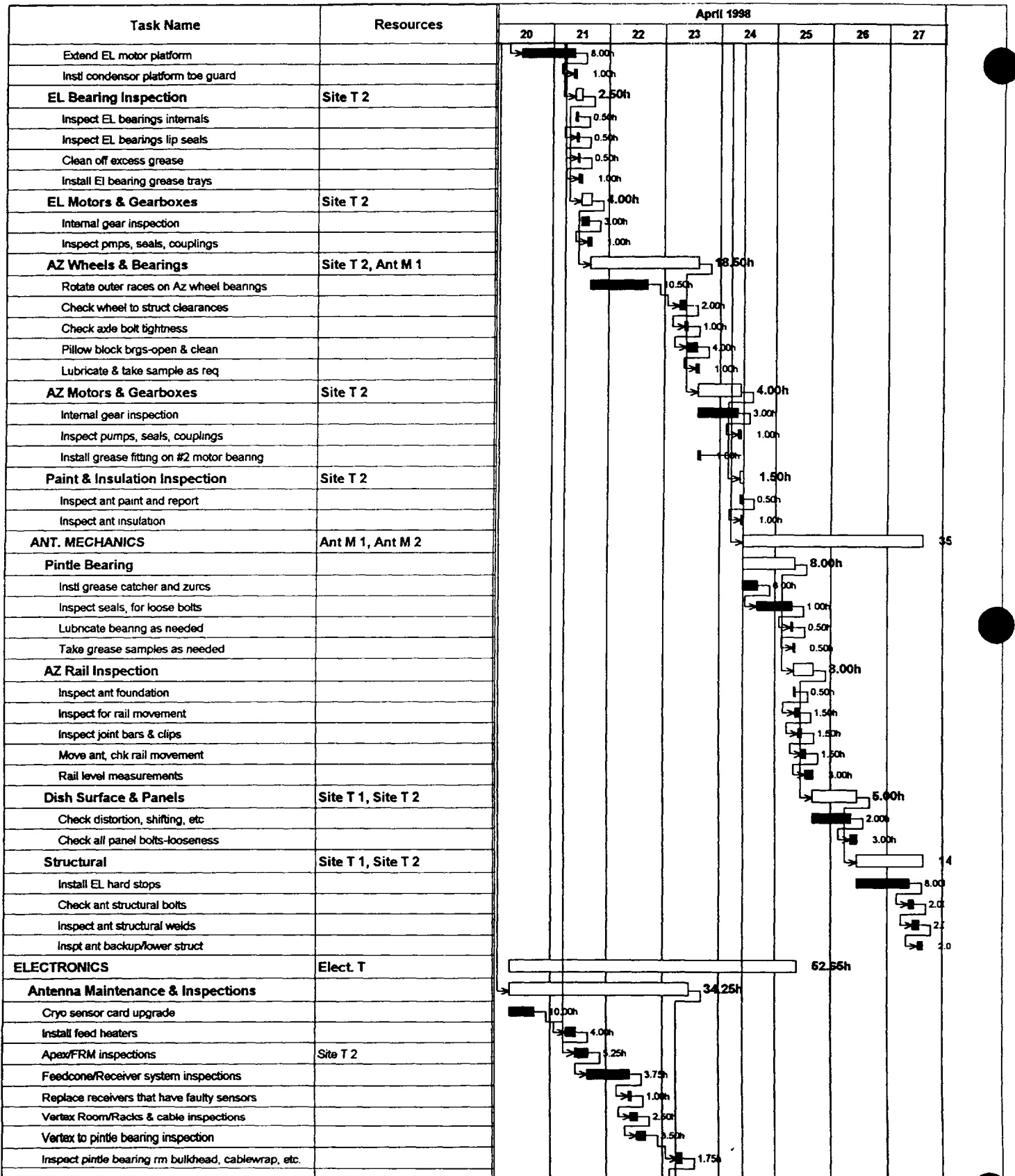
1998 VLBA Tiger Team Maintenance
Task Listing for OV, BR, LA



1998 VLBA Tiger Team Maintenance
Task Listing for OV, BR, LA







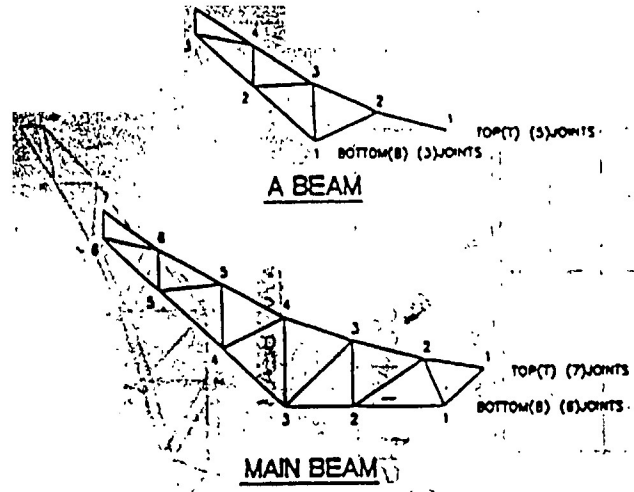
1998 VLBA Tiger Team Maintenance
Task Listing for OV, BR, LA



**1998 VLBA Tiger Team Maintenance
Task Listing for OV, BR, LA**

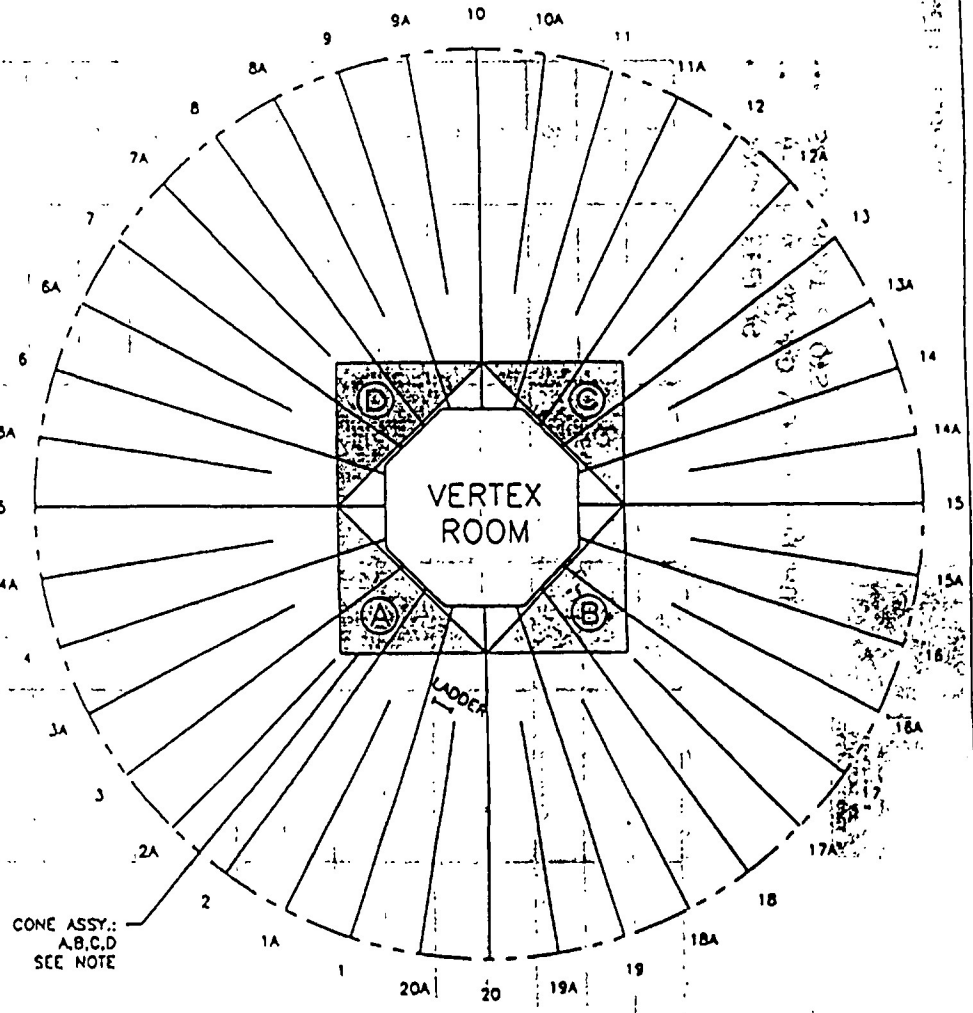
| Task Name | Resources | April 1998 | | | | | | | |
|--|-------------------------------------|------------|----|----|-------|----|----|----|----|
| | | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| Inspect pedroom UPS, FRM controller, dry air sys, et | | | | | 2.5h | | | | |
| Station Building Inspections | | | | | | | | | |
| Rm 100 - Check electrical, UPS and test operation | | | | | 3.00h | | | | |
| Rm 103 - Chatter/supervisory boxes, alarms, etc. | | | | | 2.5h | | | | |
| Rm 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. | | | | | | | | | |
| Spot check critical PM's | | | | | | | | | |
| Review problems areas with Site Techs | | | | | | | | | |
| FINAL INSPECTIONS | Elect. T, Site T 1, Site T 2 | | | | | | | | |
| Site Inspections for Oversights | | | | | | | | | |
| Station Startup Verification Tests | | | | | | | | | |

Milestone  Summary 
 Fixed Delay  Slack 



JOINT LISTING REQUIRING REPAIR
(NOT INCLUSIVE)

Valley 4/22/98
Paint is in Excellent condition.
Very few spots where paint is peeling.



- ... ANGLE PEELING
- ... WF BEAM AROUND VERTEX TOUCHUP
- ... SMALL RUST SPOTS

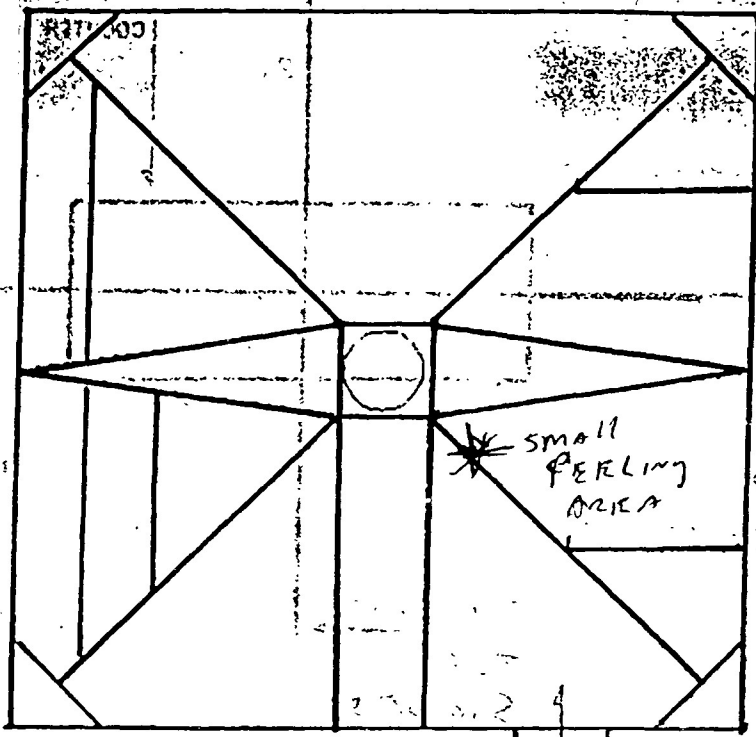
NOTE: INSPECT CONE ASSY. INTERNALLY
REPAIR/PAINT AS REQUIRED.

IDENT LABEL: VL.BAPAIT

| | | | |
|--|--|---|--|
| | UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES UNLESS OTHERWISE SPECIFIED: 1 PLACE RECEIVES LUGS ± .005 2 PLACE RECEIVES LUG ± .01 3 PLACE RECEIVES LUG ± .05 | HANCOCK PAINT REPORT LOCATION OF DELAMINATIONS | NATIONAL RADIO ASTRONOMY OBSERVATORY NAME: C. GARCIA DATE: 12/2/98 |
| | MATERIAL: _____ FINISH: _____ | IDENT: _____ DATE: _____ DRAWN BY: _____ CHECKED BY: _____ | SCALE: _____ SHEET: _____ |

AZIMUTH LEVEL PAINT CONDITIONS DATE:

VIEW FROM SKY PERFORMED BY:



DOWN
DOWN



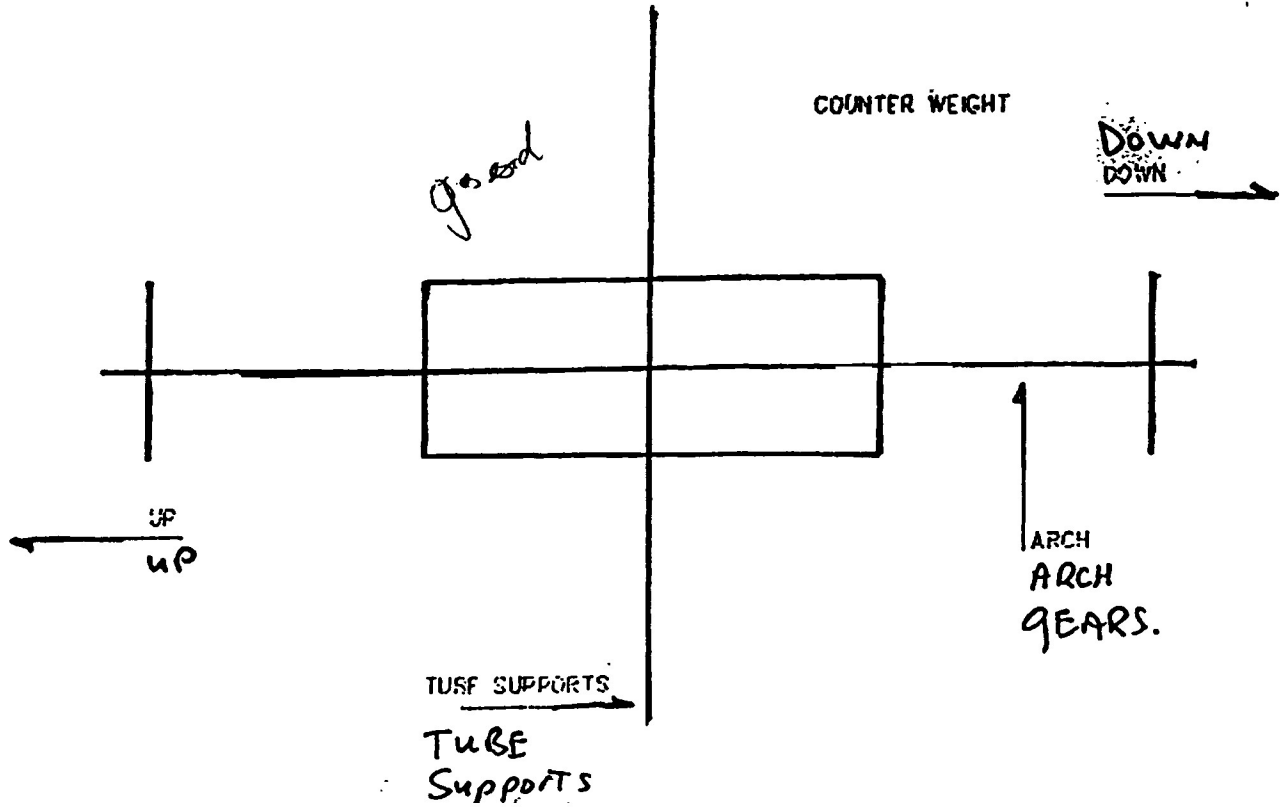
UP

SYMBOL KEY

| | |
|--------------------------|-----------|
| SURFACE AREA DEGRADATION | |
| ■ RUST | □ NO RUST |
| SPLICE PLATE DEGRADATION | |
| ● RUST | ○ NO RUST |
| WELDED SEAM DEGRADATION | |
| ↙ RUST | ↘ NO RUST |
| T=TOP B=BOTTOM S=SIDE | |
| * -PREVIOUSLY REPAIRED | |

COUNTERWEIGHT PAINT CONDITIONAL INDICATE

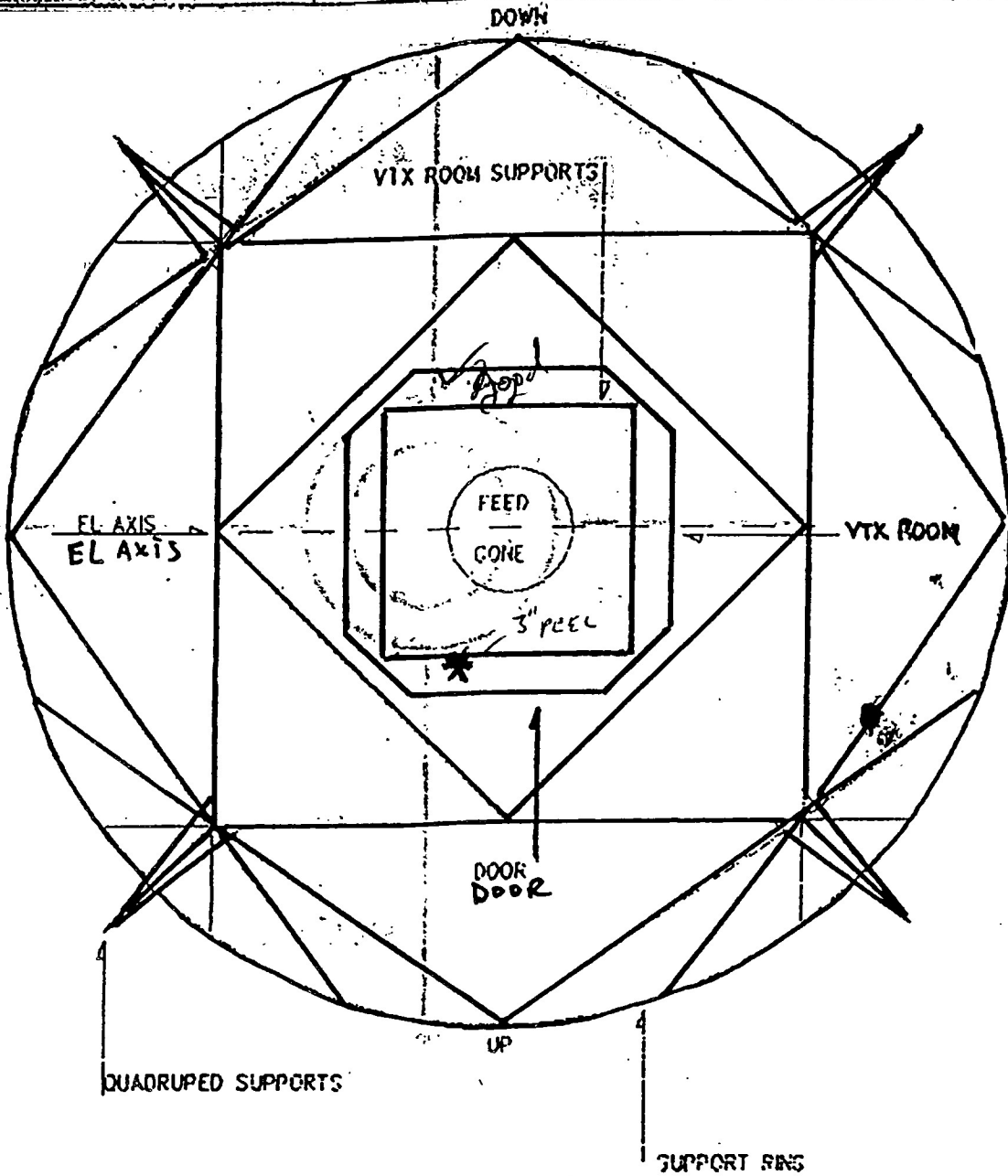
VIEW FROM SKY BY: PERFORMED BY: DATE:



| SYMBOL KEY | |
|--------------------------|-----------|
| SURFACE AREA DEGRADATION | |
| ■ RUST | □ NO RUST |
| SPLICE PLATE DEGRADATION | |
| ● RUST | ○ NO RUST |
| WELDED SEAM DEGRADATION | |
| ~ RUST | — NO RUST |
| T-TOP, B-BOTTOM, S-SIDE | |
| * PREVIOUSLY REPAIRED | |

VERTIX LEVEL PAINT CONDITIONAL QUADRUPE

BY GEOMISKY BY MURPHY PERFORMED BY DATE NEXT WBY



| SYMBOL KEY | |
|--------------------------|-----------|
| SURFACE AREA DEGRADATION | |
| ■ RUST | □ NO RUST |
| SPlice PLATE DEGRADATION | |
| ● RUST | ○ NO RUST |
| WELDED SEAM DEGRADATION | |
| — RUST | — NO RUST |
| T=TOP, B=BOTTOM, S=SIDE | |
| * =PREVIOUSLY REPAIRED | |




Backup structures in excellent condition ONLY PAINT chipped
 ARE from retightening bolts

JOINT LISTING REQUIRING REPAIR
 (NOT INCLUSIVE)

| BEAM # | BOTTOM | TOP | BEAM # | BOTTOM | TOP |
|--------|--------|-----|--------|--------|-----|
| 1 | | | 11 | | |
| 1A | | | 11A | | |
| 2 | | | 12 | | |
| 2A | | | 12A | | |
| 3 | | | 13 | | |
| 3A | | | 13A | | |
| 4 | | | 14 | | |
| 4A | | | 14A | | |
| 5 | | | 15 | | |
| 5A | | | 15A | | |
| 6 | | | 16 | | |
| 6A | | | 16A | | |
| 7 | | | 17 | | |
| 7A | | | 17A | | |
| 8 | | | 18 | | |
| 8A | | | 18A | | |
| 9 | | | 19 | | |
| 9A | | | 19A | | |
| 10 | | | 20 | | |
| 10A | | | 20A | | |

- ANGLE PEELING
- WF BEAM AROUND VERTEX TOUCHUP
- SMALL RUST SPOTS

ACAD LABEL: VLBAPAT



NRA

UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN INCHES
 TOLERANCES ARE:
 FRACTIONS DECIMALS
 ±.0000 ±.0005 ±.0010 ±.0015 ±.0020 ±.0030 ±.0040 ±.0050 ±.0060 ±.0070 ±.0080 ±.0090 ±.0010 ±.0015 ±.0020 ±.0025 ±.0030 ±.0040 ±.0050 ±.0060 ±.0070 ±.0080 ±.0090 ±.0010 ±.0015 ±.0020 ±.0025 ±.0030 ±.0040 ±.0050 ±.0060 ±.0070 ±.0080 ±.0090

ANTENNA PAINT REPORT

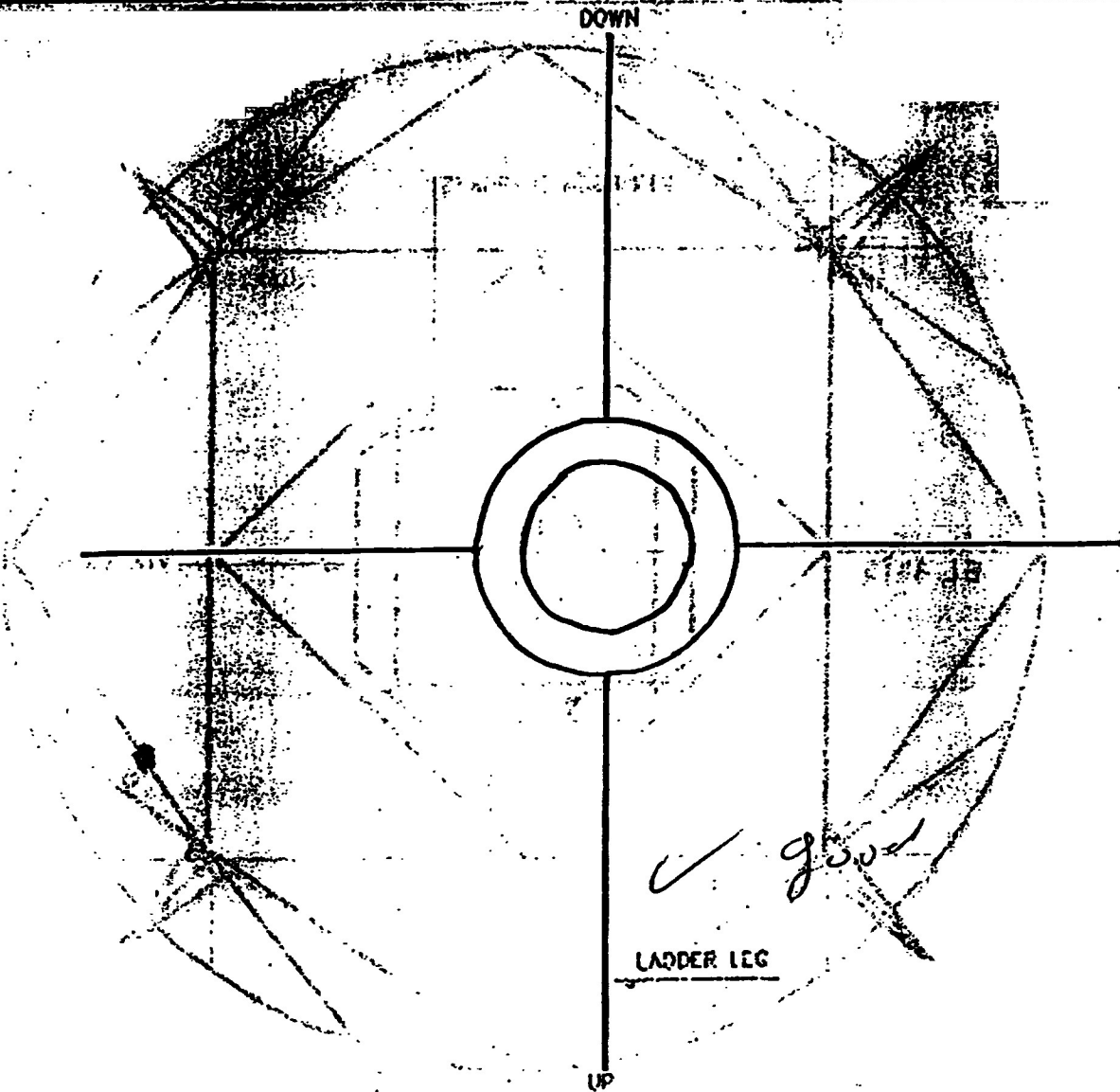
NATIONAL RADIO ASTRONOMY OBSERVATORY

WORKSHEET

QUADRUPEL PAINT CONDITIONS A4 LEVEL DATE

VIEW FROM SKY

PERFORMED BY:



LADDER LEG

| SYMBOL KEY | |
|--------------------------|---------------|
| SURFACE AREA DEGRADATION | |
| ■ RUST | □ NO RUST |
| SPICE PLATE DEGRADATION | |
| ● RUST | ○ NO RUST |
| WELDED SEAM DEGRADATION | |
| — RUST | - - - NO RUST |
| T-TOP, B-BOTTOM, S-SIDE | |
| * = PREVIOUSLY REPAIRED | |

