

National Radio Astronomy Observatory

Socorro, New Mexico

March 7, 1984

To: C. Bignell

From: L. Temple

Subject: VLBA Site Technician

The following is my thoughts regarding the site technician expertise and time required.

1. Expertise

The technician should have training and expertise in Electronics, Servo, Electrical and Mechanical. I propose that the technician be available for the field test and acceptance for the servo, encoder, air conditioning, focusing feed mount and other equipment.

2. Time required

2.1 Monthly inspection (4 hours)

Inspect the antenna for:

- A. Oil leaks
- B. Loose reflector panels
- C. Track condition
- D. El Bull Gear Lubrication
- E. Lights
- F. Fire and security system
- G. Emergency Generator Operation

2.2 6 Months maintenance (1 day)

A. Lubricate:

- FFM
- El bullgear
- El bearings
- Az wheels

B. Check:

- Brakes
- Power supplies
- Air conditioning

C. Clean:

- Filters
- Floors
- Electronic Equipment

2.3 Repair (10 to 40 hours/month)

- A. Change servo and encoder electronics modules
- B. Understand and take corrective action necessary for security of antenna due to power or other types of failure or emergencies due to weather.
- C. Call responsible local contractor for utilities or air conditioning problems.

LT/bmg

National Radio Astronomy Observatory

Socorro, New Mexico

March 14, 1984

To: Carl Bignell

From: Bill Horne

Subject: Operations at Individual VLBA Antenna Sites

- VLBA Operations Memo No. 2

There are three types of work which must be performed at the antenna sites with respect to the antenna itself.

- I. Scheduled recurring maintenance
- II. Unscheduled repair and replacement of malfunctioning equipment
- III. Scheduled replacement of obsolete equipment or addition of new equipment (primarily receiving equipment)

The first type is comparatively easy to estimate and should probably be performed wholly by on-site personnel.

The second type of work will probably be performed by on-site personnel for the smaller, less complicated tasks, and by service personnel from the central service site for the larger, more difficult, more specialized repair.

The third type of work will most likely be performed in every instance by central service personnel. It should be anticipated that even though central service personnel are on hand at site to perform the work, the site technician/mechanic would be utilized to augment the work force.

Specific tasks to be performed:

I. Scheduled recurring maintenance

(1) Monthly

Inspect bull gear and pinion lubrication
Inspect gear box packing for leakage
Inspect and clean azimuth trackage
Oil air handler fan bearings

Estimated time - 4 hours

(2) Quarterly:

Lubricate Drive Motor Bearings
Lubricate focusing feed mounts
Check brakes on focusing feed mounts
Lubricate elevation bearings
Inspect pintle bearing seals
Check sealing and waterproofing at feed cones and doorways
Clean or replace air conditioning filters
Estimated time - 16 man hours

(3) Semi-Yearly:

Relubricate pintle bearing
Change gear oil in Az. and elev. gear boxes
Add lubrication to Elev. bull gear
Lubricate Az. wheel bearings
Check air conditioning - add freon
Check painting for scars and deterioration
Estimated time - 38 man hours

(4) Yearly:

Structural check of antenna
Inspect paint on reflecting surface
Check feed leg bolts, guy cable natural frequency
Check panel supports for looseness
Check alignment of drive pinions to bull gears
Lubricate drive couplings
Check drive brakes for disc wear
Clean elev. bull gear and re-grease
Estimated time - 58 man hours

(5) Servo Maintenance - Semi-Yearly

Check motor wiring, couplings, brushes, clean blower screens
Check data system connectors, clean cabinets
Check A.C.U. card contacts, clean connectors, check voltages
Check filters, clean cabinets, check wiring in drive cabinet
Check emergency stop switches, limit switches
Estimated time - 12 man hours

Total Time 270 man hours

II. Unscheduled repair and replacement of malfunctioning equipment

Consisting of service and repairs to drive motors and brakes; motor controllers; ACU; position Transducers and Data Converter; motor blowers; focusing feed mounts; Air conditioning systems-fans, compressors, condensers; heaters and heater controls; gear reducers

and seals; Az. bearing; El. Bearing; bearing seals; limit switches; lightning protection; El. Gear Segments; Structural, panels and walkways; electrical cable and distribution.

The estimated failure rates and time to repair are used from a study made at the VLA antennas yielding a yearly estimate per antenna for the following types of work:

Antenna Mechanic	-	142 hours
Servo Techs.	-	67 hours
Electrical work	-	51 hours
Air Cond. Tech.	-	15 hours
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Total	-	275 man hours

If one guesses that 1/3 of this will be provided by the on-site technician, then approximately 92 hours of the on-site man's time will be required.

III. Scheduled replacement or additions to observing equipment.

Just a wild guess, but estimate that 3 weeks a year will be spent modifying or installing equipment. Then $3 \times 40 = 120$ hours will be needed.

I hope this gives you the information you requested in your memo of February 10. As to level of expertise, the man will have to have fairly good mechanical capabilities in order to service equipment, some knowledge of the various electrical components and use of meters, oscilloscopes, etc. to service motors and controls and be able to also service or test the air conditioning system. Where will we find such a jewel?

WGH/bt

March 21, 1984

To: Carl Bignell
From: Frazier Owen and Bob Hjellming
Subj: Scientific Needs for VLA/VLBA Building in Socorro

The needs based for VLA/VLBA space in a Socorro building, based mainly on scientific considerations, are set by a combination of people and facilities. We will assume the following:

	<u>VLA</u>	<u>VLBA</u>
Deputy Director	1	1
Scientists	6	3
System Scientists	6	4
Postdocs	3	2
Long Term Visitors	3	2
Short Term Visitors	15	7
Students	3	2
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	37	21

Aside from offices for the above (and the Joint Array Director), the list of special facilities that should be provided are:

- Library/study area
- Journal/coffee area
- Measuring/print room
- Conference room
- Auditorium
- Visitors kitchen facilities
- Reception/switchboard

Given the above list, the principal consideration affecting the need for office space is the standard unit of office space. Typical offices at the VLA site range from 92 square feet to 140 square feet, and offices in Charlottesville are typically 142 square feet. Based upon the adequacy of this space we believe we should adopt a standard of 150 square feet for the normal staff office, 75 square feet for the office space of a short term visitor, and 200 square feet for deputy director offices.

Adding the space for the abovementioned facilities the scientific space requirements for the VLA/VLBA in Socorro become:

Director's Office	300 square feet
Director's Secretary	150
Offices VLA	4475
Offices VLBA	2675
Library/study area	1500
Journal/coffee area	500
Measuring/print room	300
Conference room	400
Auditorium	1500
Visitors kitchen facilities	200
Reception/switchboard	250
Total	12250 square feet
Budgeted (VLA/VLBA)	10900 square feet

National Radio Astronomy Observatory

Socorro, New Mexico

2-23-84

To: R.C. Bignell

From: L.M. Temple

Subject: VLBA Operations

Ref: VLBA Operations Memo No. 3

In reply to your request of Feb. 16, 1984, same subject, the following is submitted.

1. A total of 26 personnel is required in the E & S Division for the stand alone VLBA operations and a total of 35 personnel would be required for the combined VLA/VLBA operations.

2. Site space

The only additional space requirement is for the servo and encoder shop since two additional technicians will be required in addition to space for the large size test equipment for the VLBA servo systems. Preferably this shop should stay in the Technical Services Building area for access to the warehouse. If the Front End Group is moved to Socorro, and if the Waveguide Group is moved to the Control Building, there should be sufficient space in the Technical Services Building for a servo shop having approximately 1500 sq. ft.

3. Socorro Personnel - None (except as noted)

4. Socorro Space Requirements

An office for the Division Head and an Engineer for use when in Socorro for meetings, etc. - 200 sq. ft.

If the AOC is NRAO owned and maintained, space for maintenance personnel and shops will be required, or maintenance could be performed by site maintenance personnel if one more man is added to the site staff, or maintenance could be contracted.

LMT/lm