



# NATIONAL RADIO ASTRONOMY OBSERVATORY

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January 27, 1987

Donald W. Brown  
TDA Engineering  
MS264-803  
JPL/CALTECH  
4800 Oak Grove Dr.  
Pasadena, CA 91109

REF: VLA-GDSCC Telemetry Array Project

Dear Mr. Brown:

Here are six copies of the Quarterly Status Report for October-December 1986. I leave to you the distribution of copies within JPL.

Sincerely yours,

*William D. Brundage*

William D. Brundage  
VLA-Voyager Preparation  
Manager and Project Engineer

WDB/lt

cc: W/REPORT  
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NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA-GDSCC TELEMETRY ARRAY PROJECT

VLA-JPL VOYAGER 2 AT NEPTUNE

QUARTERLY STATUS REPORT

OCTOBER - DECEMBER 1986

Prepared by:

*William D. Brundage*

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William D. Brundage  
VLA-Voyager Preparation  
Manager and Project Engineer

Approved by:

*Richard A. Sramek*

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Richard A. Sramek  
VLA Deputy Site Manager

During this fourth quarter of 1986, JPL and VLA staff continued testing the antennas operating at X-band. NRAO continued procuring materials and constructing front-ends and receivers for installation in 1986 and 1987.

#### CDL

The Central Development Laboratory delivered four more front-ends (#6 through #9) to the VLA this quarter. Serial #10, #11, and #12 will be shipped in January. We anticipate no problems in shipping the remaining 18 front-ends during 1987.

#### TESTS

Each month JPL staff used four to six hours of array test time to examine the phase stability of the "phased-up" array of 27 antennas. They also measured the performance of the four and five X-band antennas in pointing at radio sources, in tracking the Voyager 2 spacecraft in a phased-up array, in feed efficiency, and in system noise at low elevation angles.

#### SCHEDULE

The seventh X-band system did not become operational this quarter because of late delivery of band-switches. We expect nine antennas to be operational at X-band by the end of next quarter, with six of them utilizing lower noise HEMT amplifiers. The current schedule has a total of 12 operational antennas by mid 1987, 16 by the end of 1987, 22 by mid 1988, and 25 by the end of 1988. All 28 antennas will be operational with HEMT amplifiers by April, 1989.

#### FEEDS

VLA received the seventh and eighth production feed from JPL. We expect two more feeds next quarter.

## RECEIVER SYSTEM

VLA nearly completed the sixth production receiver system this quarter. Late delivery of the electromechanical coaxial band-switches delayed outfitting antennas on schedule. The switches should arrive by mid January.

## ELECTRIC POWER

The power line monitor provided more data on voltage sags, spikes and dropouts on the VLA power source (Socorro Electric Cooperative). JPL and VLA continued planning for on-site diesel electric power generation which could substitute for commercial power during telemetry reception in 1989.

Concerns continued this quarter about reliability of on-site power distribution in spite of no additional failures of buried cables feeding the arms of the wye. VLA issued a report for NRAO and NSF on the problem including a cable replacement schedule and cost estimate .

## RELIABILITY

Following the Reliability Review No. 1 , VLA continued to monitor downtime statistics and explore possible mitigations. We will continue periodic reviews. To help achieve the goal of 98% availability and 4 hour mean-time-to-recover, VLA ordered a backup on-line computer, as recommended by JPL, with funds NASA transferred to NSF-NRAO-VLA from the 1989 funding schedule. It will be delivered next quarter.

Several CTI 22 cryogenic refrigerators in operational antennas have failed after only 3000 hours running time. VLA began exploring ways to extend the MTBF to at least 8 months. Implementing any successful improvements to all 30 refrigerators will add more costs in 1987 and 1988.

## FUNDS

Spending by CDL is on schedule, and VLA is slightly beyond schedule. Projections have shown a negative balance before the end of the project. Total funding for VLA in the Management Plan is inadequate to complete the receiver system because benefits, overhead, receiver construction costs, and reliability goals are higher than originally planned.

Last quarter JPL requested that NASA:

1. Change the funding schedule to provide \$100K more in 1986 and \$100K less in 1989,
3. Add \$250K of new funds in 1986 to purchase a backup MODCOMP on-line computer for improved on-line system reliability.

But NASA actually transferred all \$350K from the 1989 funding schedule, leaving the total project short an additional \$250K.

In December, VLA submitted to JPL a revised budgetary estimate and funding schedule. It estimated VLA needs additional funds of \$235k for 1987, \$192k for 1988, and \$262k for 1989, \$689k total.

A fiscal statement for the project from inception thru 1986 December 31 follows. Although total expenditures were less than available funds, total expenditures plus commitments exceeded funds by \$47k, in expectation of receiving 1987 NASA funds by December 31. NSF did receive the funds in early December, but NRAO has not yet received them from NSF.

WDB/wdb  
870126

DESCRIPTION	ALLOCATION IT 1986 \$k	EXPENDED ITD \$k	BALANCE EXP \$k	EXP+COMM ITD \$k	BALANCE EXP+COM \$k
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CENTRAL DEVELOPEMENT LAB					
WAGES	402	354	48	354	48
BENEFITS (.27*WAGE)	126	93	33	93	33
COMMON COSTS (.65*WAGE)	260	229	31	229	31
	-----				
SUBTOT WBC	788	676	112	676	112
MATERIALS & SERVICES	372	360	12	371	1
EQUIPMENT	219	276	-57	294	-75
TRAVEL & RELOCATION	21	16	5	16	5
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CDL TOTAL	1400	1327	73	1356	44
VERY LARGE ARRAY					
WAGES	282	278	4	278	4
BENEFITS (.27*WAGE)	77	72	6	72	6
COMMON COSTS (.95*WAGE)	268	263	5	263	5
	-----				
SUBTOTAL WBC	627	613	14	613	14
MATERIALS & SERVICES	494	553	-59	675	-181
EQUIPMENT	317	168	149	249	68
JPL DONATED EQUIP	326	326	0	326	0
TRAVEL & RELOCATION	30	22	8	22	8
	-----				
VLA TOTAL	1794	1682	112	1885	-91
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PROJECT TOTAL	3194	3009	185	3241	-47
NASA FUNDS	2868				
JPL DONATED EQUIP	326				
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TOTAL FUNDS	3194				
BALANCE (FUND-PROJECT)	0				

IT = INCEPTION THRU

D = DATE

EXP+COMM = EXPENDITURES + COMMITMENTS