

OCTOBER 1979

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NATIONAL RADIO ASTRONOMY OBSERVATORY

OCTOBER PROGRESS REPORT

VLA PROGRAM

November 14, 1979

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NATIONAL RADIO ASTRONOMY OBSERVATORY

MONTHLY PROGRESS REPORT

VLA PROGRAM

OCTOBER 1979

SYSTEMS INTEGRATION DIVISION

The array was scheduled for 59 percent of the time; 40 percent went to astronomical programs and the remaining 19 percent to tests. The average downtime for the month was approximately 12.1 percent.

The twenty-two antennas currently outfitted with electronics are located at stations N14, W32, E1, W16, E2, W24, E4, W40, W48, E3, E8, E16, E12, W56, W64, E18, W8, E24, N6, N2, N8, and N4. These stations are positioned approximately 1.14, 5.22, 0.08, 1.59, 0.05, 3.19, 0.15, 7.66, 10.47, 0.09, 0.48, 1.59, 0.97, 13.6, 17.2, 1.95, 0.48, 3.2, 0.27, 0.05, 0.44, and 0.13 respectively from the array center. Our longest astronomically usable baseline is approximately 19 km. Antennas 1, 9 and 11 are currently unavailable for observation. Antennas 21 and 24 are in the shakedown stage. The test array consists of Antennas 3 and 5.

ELECTRONICS DIVISION

In the front end area, AIL is still unable to deliver acceptable C-Band cryogenic paramps. Efforts are underway to encourage AIL to use new approaches in solving the paramp problems. Further tests on the cryogenically cooled C-Band GaAs FET amplifiers supplied by the Charlottesville Electronics Lab continue to show that they are acceptable as second stages to paramps. The first pair of a production run of these GaAs FETs have been built into the front end for Antenna 22 and are being tested in preparation for first fringes in early November. On Antenna 17 a prototype switchable attenuator for solar observing was installed and tested. This switchable attenuator is designed to have no phase shift and will allow the sun to be observed with the paramps on at all observing bands.

The installation of the new spectral line baseband system (modules T3, T4, T5, T6) was started during the month and is running smoothly at the rate of one D-rack per week.

Construction of the new front end IF system (modules F4, F7, F8) is well underway. Installation of this new system will begin in the first week of December, 1979.

COMPUTER DIVISION

We are in the process of cleaning up the on-line software so that it will operate efficiently with all 28 antennas on-line.

The interim spectral line Filler is now working, and the spectrum plotting program has been used to display line data. Work has started on making line data available to other members of the reduction package.

Work is underway at incorporating Clean into the PDP 11-70 mapping system in a convenient fashion. Work has started on the implementation of a self-calibration algorithm, to run on the 11-70 Array Processor system.

Antsol has been rewritten, broken into pieces for comprehensibility and maintainability, with additional options and algorithms inserted.

Contour and grayscale maps written from the IMPS system to the Versatec printer-plotter have been made available.

Hardware and software for the interface between the Modcomp computers and the Century disks is now in the last stages of debugging.

The design process for the final Map FFT processor is now at the stage of taking care of the final details. We are nearly ready for the final procurement process.

ANTENNA DIVISION

Work of the Antenna Division at the end of October reached the following level:

Antenna No. 23

Mechanical outfitting continued on the maintenance pad with completion estimated at 90%. Remaining items consisted of installation of L-Band feed horn and touch-up painting.

Antenna No. 24

Moved on October 9th from station CW5 to North arm station DN4 for observing.

Antennas No. 25 and 26

Awaiting mechanical outfitting.

Antenna No. 27

Accepted on October 4th after completion of acceptance testing and checkout. Moved on October 18 to CN5 to await outfitting.

Antenna No. 28

Pedestal and reflector structure mated on October 8th and panel installation started. Panel installation and alignment completed on October 25 with a panel setting rms of 0.0115 inches. On October 29 the antenna was moved to the master pad to start servo installation and final checkout and alignment.

Transporter number two fabrication essentially complete with subassembly, sandblasting and painting of frame and trucks in progress. Assembly at fabricators plant to start first week of November.

SITE AND WYE

Waveguide Installation

Installed approximately 5738 feet of waveguide, set to line and grade and backfilled between AN5 and AN7 also at antenna station on East arm (BE6, BE7, and BE8 and BE9). Trenched 5000 feet on North and East arm.

Phase IV

Overall completion 95%. Track work on the West arm is still 98% complete with modifications required before final acceptance. Main track work on the East arm is partially complete to AE8 and interchanges are 80% complete. Ballast has been placed to Highway 52 on both tracks and on one track to AE8. Antenna spur tracks have been installed to AE8. Round Place Construction is 99% complete with the earthwork. Electric work is 90% complete.

Phase V

A Change Order was issued to the contract to include the completion of all VLA track work. Overall completion of the revised contract is 55%. Mountain States, the dirt work subcontractor, has completed all the excavation work on all arms. He has completed approximately 50% of the subgrade prep work on all arms. Track materials layed out to AN7 and rough layed track to BN9. Road crossing was installed over U. S. 60. The first lift of ballast has been placed on the North arm on one track to BN7. Electric work is progressing, all cable, transformers and isolation switches have been delivered. Electrical work is 10% complete.

PROJECT MANAGEMENT

General

Land Acquisition: Judge Bratton overruled the objections of the Department of Justice to the Land Commission's report and on October 18, 1979 issued a Memorandum Opinion and Order. The U. S. Attorney must now draw up the Final Judgement and submit it to Judge Bratton for signature. This is expected about November 15th. At that time NRAO must pay into the Registry of the Court a sum of approximately \$205,000 for the deficiency and interest.

Personnel

The personnel changes as of October 31, 1979 are as follows:

Division	Budgeted 12/79 Level	9/30/79 Level	Additions	Reductions	10/31/79 Level
Site & Wye	9	9	0	0	9*
Antenna Division	17	14	0	0	14
Electronics Division	53	50	1	1	50*
Site Management	4	4	0	0	4
Computer Division	14	13	1	0	14
Operations Division	11	9	1	0	10*
Project Management	27	25	2	1	26*
Total	135	124	5	2	127

*Does not include two part-time employees.



p10-79-1

East Arm Earthwork, View East from Station 634+00



p10-79-2

East Arm Earthwork, View East from Station 647+00



p10-79-3

View East Showing Road Detour
Around Construction at U. S. Highway 60



p10-79-4

Placement of Rail Across U. S. Highway 60

10/31/79

VLA PROGRAM
MAJOR SUBCONTRACTS AND PURCHASE ORDERS PLACED

NUMBER P.O. SUBCONTRACT	VENDOR	ITEM DESCRIPTION	DATE PLACED	DOLLAR AMOUNT	DELIVERY DATE	CURRENT STATUS - ALL FIRM FIXED PRICE CONTRACTS EXCEPT WHERE NOTED
VLA-5 Amend. #12	BWH/CVA Joint Venture	E/A Title I and II	6/11/73	\$ 1,090,684		Complete awaiting audit.
VLA-6 Amend. #21	E-Systems, Inc.	28 Radio Telescopes	10/18/73	\$ 18,156,054		Complete.
VLA-70 P.O. 52322 C.O. #7	Sumitomo Electric USA, Inc.	3000 pieces of wave- guide and 3900 pieces of coupling sleeves	11/03/78	\$ 3,215,847	1/31/80	Next 1000 pieces of waveguide and coupling sleeves to arrive Oakland port by 1/31/80.
VLA-233 P.O. S-02611	Silicon Systems, Inc.	Custom Integrated Circuits	12/12/76	\$ 206,375	5/31/79	Complete except for 468 each of Item 4.
VLA-256 P.O. S-07990	New Mexico State University	Archaeological Exca- vation	9/20/77	\$ 107,000	2/20/79 Completion	\$90,184 invoiced thru 8/31/79. Final reports expected in November.
P.O. S-07990	AIL Division Cutler- Hammer	Parametric Amplifiers	9/21/78	\$ 197,600	Complete by 1/21/80	6 sets received. No additional delivery information available at this time.
P.O. S-08085	AIL Division Cutler- Hammer	Parametric Upconverters	10/23/78	\$ 102,525	4/13/79 thru 8/13/79	6 units received.
P.O. S-08510	RLC Electronics, Inc.	Switch filter assemblies and filters	12/12/78	\$ 193,943	Start 4/3/79	
P.O. S-08329	Contact Systems, Inc.	Various Wiring Modules	10/31/78 1/19/79	\$ 30,486	Complete by 9/30/79	Should complete by 11/30/79.
VLA-323	Logemann Bros.	Transporter	1/17/79	\$ 788,758	1/17/80	Should complete by 2/28/80.
P.O. S-08684	A & K Railroad Materials, Inc.	Wood Cross Ties	1/17/79	\$ 375,000		Shipments in progress.
P.O. S-08685	Standard Pipe- protection	Coating of Waveguides	2/02/79	\$ 61,793	Complete by 2/15/80	On schedule.

VLA PROGRAM
MAJOR SUBCONTRACTS AND PURCHASE ORDERS PLACED

NUMBER P.O. SUBCONTRACT	VENDOR	ITEM DESCRIPTION	DATE PLACED	DOLLAR AMOUNT	DELIVERY DATE	CURRENT STATUS - ALL FIRM FIXED PRICE CONTRACTS EXCEPT WHERE NOTED
VLA-345	G. C. Dean	Labor Hour (Waveguide installation)	3/19/79	\$ 170,000	One Year Completing 3/18/80	
VLA-346	Wm. A. Smith Contract- ing Co., Inc.	Phase V Construction	4/26/79	\$ 2,820,000	June, 1980	
P.O. S-09818	Dataram Corp.	Very Large Memory	5/22/79	\$ 161,625	9/28/79	Complete
P.O. S-09849	BWH/CVA Joint Venture	A/E Service Phase V	5/16/79	\$ 39,000	June, 1980	
P.O. S-08645	DEC	Computer Maintenance	1/08/79	\$ 90,063	CY '79	Monthly expenditure rate estimated at \$7,500.
P.O. S-06827 Amend. #2.	C.T.I. Cryogenics	Cryocooler	5/23/78	\$ 239,760	2/15/80	
VLA-325	Pacific Railroad Constructors, Inc.	Phase IV Construction	6/23/78	\$ 2,916,080	9/16/79	Work progressing satisfactorily.
VLA-326 P.O. S-08191 C.O. #1	California Computer Products, Inc.	Data Storage Subsystem	11/12/78 12/18/78	\$ 221,190	2/01/79	99% complete.
VLA-344 P.O. S-08595	Wheeler Construction Co.	Crushed Stone	1/08/79	\$ 668,660	Complete by 4/01/80	

NATIONAL RADIO ASTRONOMY OBSERVATORY
VERY LARGE ARRAY
STATUS AS OF OCTOBER 31, 1979

CY - 79

<u>PROJECT NUMBER</u>	<u>DESCRIPTION</u>	<u>ALLOCATION</u>	<u>EXPENDED MONTHLY</u>	<u>TOTAL EXPENDED</u>	<u>TRANSFER TO FIXED ASSETS</u>	<u>BALANCE CONSTRUCT. IN PROGRESS</u>	<u>TOTAL COMMITTED</u>	<u>TOTAL EXPENDED & COMMITTED</u>	<u>NET BALANCE</u>
11000	SITE/WYE	5,471,000	93,870	2,586,199	4,814	2,581,385	2,790,155	5,376,354	94,646
12000	ANTENNA	1,549,000	117,352	713,065	23	713,042	642,070	1,355,135	193,865
13000	ELECTRONICS	2,741,000	217,019	2,001,134	34,279	1,966,855	497,328	2,498,462	242,538
14000	COMPUTER	1,310,000	11,131	133,878	---	133,878	393,054	526,932	783,068
17000	PROGRAM MANAGEMENT	120,000	6,214	93,925	---	93,925	99	94,024	25,976
18000	COMMON COSTS	487,752	19,183	375,898	---	375,898	8,463	384,361	103,391
19000	CONTINGENCY	514,871	---	---	---	---	---	---	514,871
		<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	TOTAL PROGRAM	12,193,623	464,769	5,904,099	39,116	5,864,983	4,331,169	10,235,268	1,958,355
		<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

Note: In October, \$215,000 was transferred from Contingency to Site/Wye for land acquisition.

Project allocation consists of \$11,500,000 in new funding, \$7,752 in Common Cost commitments carried forward, and \$685,871 in prior years funds. Contingency includes \$205,000 of funds withdrawn from CY-1979 allocations which will be required for Computer and Electronic items in CY-1980.

NATIONAL RADIO ASTRONOMY OBSERVATORY

VERY LARGE ARRAY

STATUS AS OF OCTOBER 31, 1979

PROJECT NUMBER	DESCRIPTION	ALLOCATION	EXPENDED MONTHLY	TOTAL EXPENDED	TOTAL PROGRAM TRANSFER TO FIXED ASSETS	BALANCE CONSTRUCT. IN PROGRESS	TOTAL COMMITTED	TOTAL EXPENDED & COMMITTED	NET BALANCE
11000	SITE AND WYE	24,658,909	62,536	21,497,777	7,227,782	14,269,995	3,048,314	24,546,091	112,818
12000	ANTENNA	22,587,553	(236,848)	21,454,203	11,783,289	9,670,914	939,485	22,393,688	193,865
13000	ELECTRONICS	16,915,061	172,586	16,089,353	6,887,488	9,201,865	582,744	16,672,097	242,964
14000	COMPUTER	5,043,674	6,941	3,847,660	2,529,107	1,318,553	412,865	4,260,525	783,149
16000	SYSTEMS INTEGRATION	201,022	---	201,022	179,370	21,652	---	201,022	---
17000	PROGRAM MANAGEMENT	1,904,999	6,214	1,878,924	1,676,390	202,534	99	1,879,023	25,976
18000	COMMON COST	1,723,100	19,183	1,611,246	1,235,347	375,899	8,463	1,619,709	103,391
19000	CONTINGENCY/RESERVE	514,871	---	---	---	---	---	---	514,871
20000	CY-1980	203,000	---	---	---	---	---	---	203,000
	SUB TOTAL	73,752,189	30,612	66,580,185	31,518,773	35,061,412	4,991,970	71,572,155	2,180,034
30000	RETIREMENTS	(10,820)	---	(10,820)	(10,820)	---	---	(10,820)	---
	TOTAL PROGRAM	73,741,369	30,612	66,569,365	31,507,953	35,061,412	4,991,970	71,561,335	2,180,034

Note: Project allocation excludes \$325,811 withheld and paid directly to other agencies by the NSF in prior years.

Project allocation includes \$11,500,000 for CY-79 funding and \$203,000 in new funding obligated by the NSF in September, 1979.

In October, \$215,000 was transferred from Contingency to Site/Wye for land acquisition.

NATIONAL RADIO ASTRONOMY OBSERVATORY
VLA PROGRAM

FINANCIAL STATUS REPORT
(in thousands)

As of: October 31, 1979

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Item	(A) Program Ceiling	Allocation to Date (C)			Un- allocated Balance	Outlook (B)			Not
		Allocated	Expended and Committed	Allocated Balance		Estimate to Complete	Estimate Total	(Over) Under Ceiling	
Site and Wye	27,860	24,952	24,839	113	2,908	2,007	26,846	1,014	
Antennas	20,400	22,587	22,394	193	(2,187)	328	22,722	(2,322)	
Electronics	17,000	16,931	16,688	243	69	1,307	17,995	(995)	
Computer	4,850	5,044	4,260	784	(194)	1,709	5,969	(1,119)	
Systems Integration	400	201	201	-	199	-	201	199	
Program Management	2,650	1,922	1,896	26	728	219	2,115	535	
Common Cost	-	1,723	1,620	103	(1,723)	514	2,134	(2,134)	
Subtotal	73,160	73,360	71,898	1,462	(200)	6,084	77,982	(4,822)	
Contingency	2,840	515	-	515	2,325	593	593	2,247	
TOTAL	76,000	73,875	71,898	1,977	2,125	6,677	78,575	(2,575)	

NOTES: (1) Includes \$293K for site acquisition, \$15.7K for ECAC Study, and \$17.1K for NSF Ad Hoc Advisory Panel. Allocated and Expended includes \$11K in assets which were retired in prior years.

(2) Estimate to complete is as of November 1, 1979.

(3) Includes \$11,500K of CY-79 Funding.

The above statement does not reflect the \$203K advanced by the NSF on Amendment No. 10 dated September 4, 1979.

NATIONAL RADIO ASTRONOMY OBSERVATORY VLA ACTIVITY SCHEDULE

UPDATE DATE: 11/01/79

