

NOVEMBER 1979

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NATIONAL RADIO ASTRONOMY OBSERVATORY

NOVEMBER PROGRESS REPORT

VLA PROGRAM

December 11, 1979

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NATIONAL RADIO ASTRONOMY OBSERVATORY

MONTHLY PROGRESS REPORT

VLA PROGRAM

NOVEMBER 1979

SYSTEMS INTEGRATION DIVISION

The array was scheduled for 62 percent of the time; 50 percent went to astronomical programs and the remaining 12 percent to tests. The average downtime for the month was approximately 19.5 percent. Approximately half of this downtime was the result of a single power failure.

First fringes were obtained with Antenna 22 on November 26 and Antenna 21 was declared operational on November 5th. Antenna 13 was removed from operation on November 15 for an indefinite period. Antennas 1, 9, 11, and 13 are currently unavailable for observation. Antennas 22 and 24 are in the shakedown stage. The test array consists of Antennas 3 and 5.

Antenna 12 was moved to AE6(E48) on November 26. The furthest station on each arm occupied by operating antennas are currently located at a distance of 0.44, 10.5 and 17.2 km from the array center along the north, south-east and southwest arms respectively. Our longest astronomically usable baseline is approximately 24 km.

ELECTRONICS DIVISION

The most significant problem for the Electronics Division continues to be the lack of AIL parametric amplifiers. During the month, however, some progress was made in this area. AIL has allocated more, higher level, manpower to the paramp problems and they have reported the successful construction of at least one paramp, although they are not yet ready to start shipping paramps again.

Front end 22 was completed and first fringes obtained with the antenna. Front end 22 was constructed using cryogenically cooled GaAs FET amplifiers as second stages to paramps. The cryogenic retrofit on the front end for Antenna 9 was completed and testing of the front end, again using cryo-FETS as second stages, was begun in preparation for installation on the antenna in early December.

The installation of the new spectral line baseband system was completed on the East arm of the array and work was started on the North arm.

Construction and testing of the new design Samples (D1) module is proceeding. A test set that allows modules to be adjusted and tested to give the best matching of amplitude and phase response between modules is now in operation and is giving encouraging results for the new sampler design. In conjunction with this work, a theoretical and computer modeling analysis of the closure errors to be expected from measured passband responses is being carried out.

A significant problem with the continuing construction of the second half of the delay-multiplier system is the poor availability of many of the digital integrated circuits needed for the construction. Some IC's, if they are available at all, are costing up to 4 times the normal prices. The business office is pursuing this as a high priority item.

COMPUTER DIVISION

The specification stage of the spectral line map FFT processor is now complete, and the formal procurement process is now underway, for two FPS array processors and a host DEC-11. The current plan is to replace the 11/40 IMPS map processor with something faster and use the 11/40 as the array processor host.

A listing capability has been added to the spectrum plotting capability in the interim spectral line system.

A redesign of map data formats is being done in conjunction with the Charlottesville group, in an attempt to have common data formats at both places. This effort is nearly complete.

CLEAN is now operable in the 11/70 system, but a high-level user interface yet needs to be written.

The hardware interface from the Modcomp computers to the Century Disks has been completed.

A Modcomp Classic 7810, which will take over the terminal communications from "MONTY" has been received.

ANTENNA DIVISION

Antenna No. 23

Mechanical outfitting completed and on November 13 the antenna was moved to station CW5 for completion of electronics and initial operation.

Antenna No. 25

Moved on November 13 to maintenance foundation and mechanical outfitting started.

Antennas No. 26 & 27

Awaiting mechanical outfitting.

Antenna No. 28

Servo installation and checkout completed on November 8 with a displayed natural frequency of 2.3 Hz in elevation and 2.5 Hz in azimuth. Final inspection and alignment completed and on November 9, 1979 the antenna was accepted from E-Systems. This date is three weeks ahead of the schedule established in July of 1976 and 16 months ahead of the original subcontract schedule which specified completion by April 10, 1981.

Antenna No. 1

Moved on November 29th into assembly building to start reconditioning. This antenna was accepted on September 22, 1975.

Miscellaneous

Assembly of Transporter No. 2 started at manufacturer's plant.

SITE AND WYE DIVISION

Waveguide Installation

Installed approximately 1768 feet of waveguide, set to line and grade and backfilled at antenna stations on East arm (AE5, AE6, AE7, and AE8). Trenched 1500 feet on East arm and set manholes at AE5 and AE6.

Phase IV

Overall completion 96%. 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 95% complete. Ballast has been placed to Highway 52 on both tracks and first lift on both tracks to AE8. All antenna spur tracks have been installed. Round Place Construction is 99% complete with the earthwork. Electric work is 95% complete.

Phase V

Overall completion of the total contract is 67%. Mountain States, the dirt work subcontractor, has completed all the excavation and subgrade preparation work on all arms. Track materials laid out to AN8 and rough laid track to AN6. The first lift of ballast has been placed on the North arm on both tracks to AN5. Work on the maintenance vehicle spur is progressing and is 25% complete. Electrical work for the month consisted of plowing in the primary feeder cable and all electrical work is 20% complete.

PROJECT MANAGEMENT

General

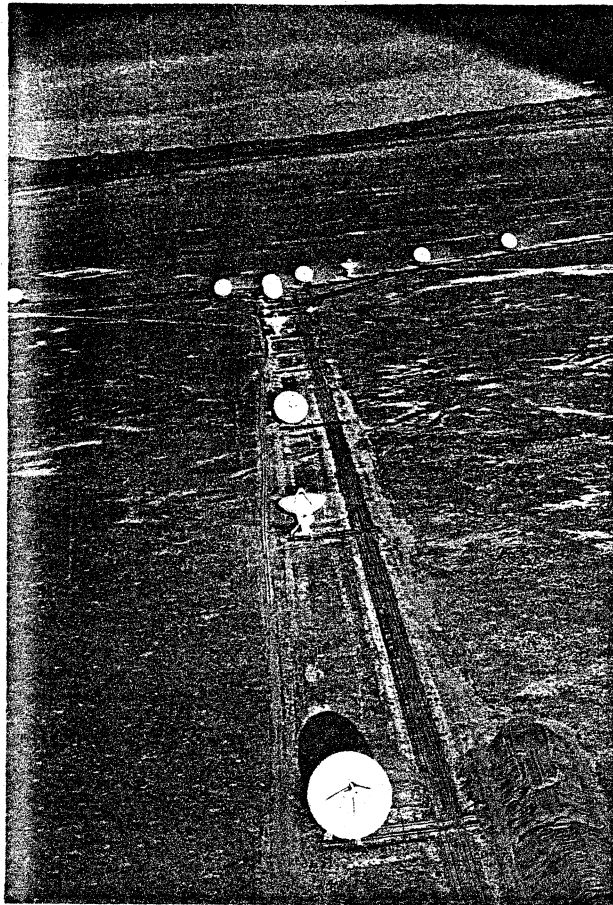
Land Acquisition: Final judgement on the Land Condemnation Suit against three ranchers was entered on 14 November 1979 by Federal Judge Bratton. On 20 November checks totaling \$205,448 were delivered by NRAO to the Registry of the Court. The Department of Justice has 60 days from 14 November to appeal Judge Bratton's decision to the Tenth Circuit Court of Appeals in Denver. The local U. S. Attorney has recommended that no appeal be made but the Solicitor General has the final decision in this matter.

Personnel

The personnel changes as of November 30, 1979 are as follows:

Division	Budgeted 12/79 Level	10/31/79 Level	Additions	Reductions	11/30/79 Level
Site & Wye	9	9	0	0	9*
Antenna Division	17	14	2	0	16
Electronics	53	50	1	1	50*
Site Management	4	4	0	0	4
Computer Division	14	14	0	0	14
Operations Division	11	10	0	0	10*
Project Management	27	26	0	0	26*
Total	135	127	3	1	129

*Does not include two part-time employees.

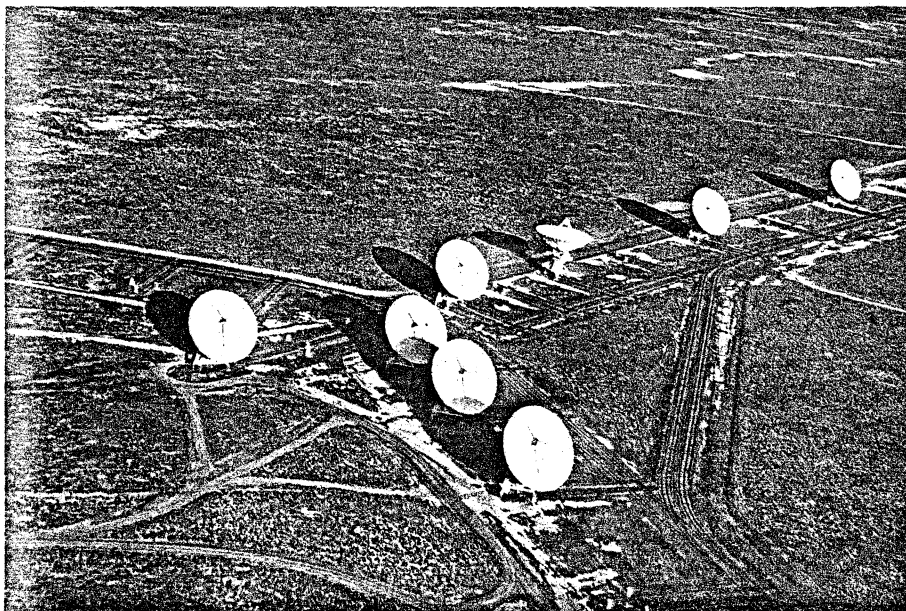


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p11-79-1

Aerial View East Arm Towards Center of Wye

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p11-79-2

Aerial View Center of Wye

11/30/79

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		Deliveries are complete, but final paper work must be issued.
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	Remaining 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	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 Jan. 1980.
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. 5 units returned for repair. Repaired units should turn around 3rd week of Jan. 1980. New production units to ship 2/month starting last week of Jan. to com- pletion.
P.O. S-08510	RLC Electronics, Inc.	Switch filter assemblies and filters	12/12/78	\$ 193,943	Complete	
P.O. S-08329	Contact Systems, Inc.	Various Wiring Modules	10/31/78 1/19/79	\$ 30,486	Complete by 4/1/80	On schedule.
VLA-323	Logemann Bros.	Transporter	1/17/79	\$ 788,758	1/17/80	Should complete by 4/30/80.
P.O. S-08684	A & K Railroad Materials, Inc.	Wood Cross Ties	1/17/79	\$ 375,000		Shipments in progress.

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
P.O. S-08685	Standard Pipe- protection	Coating of Waveguides	2/02/79	\$ 61,793	Complete by 2/15/80	On schedule.
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	Work progressing satisfactorily.
P.O. S-09849	BWH/CVA Joint Ventures	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 Railraod Constructors, Inc.	Phase IV Construction	6/23/78	\$2,916,080	9/16/79	Should complete 2/29/80.
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	

VLA PROGRAM

PROCUREMENT ACTIVITIES INITIATED

<u>RFP NUMBER</u>	<u>ITEM DESCRIPTION</u>	<u>ESTIMATED COST</u>	<u>ISSUE DATE</u>	<u>PROPOSAL/BID DUE DATE</u>	<u>SUBMISSION TO NSF DATE</u>	<u>AWARD DATE</u>	<u>CURRENT STATUS</u>
P.O. S-11264	Array Processors	\$201,092.70			12/4/79	Est. 12/31/79	
JWB-041	Rail & Matching Angle Bars	\$ 40,000.00	11/29/79	12/14/79			
VLA-354	Fire Protection Sprinkler System	\$110,000.00	12/4/79	01/4/80			

NATIONAL RADIO ASTRONOMY OBSERVATORY
VERY LARGE ARRAY
STATUS AS OF NOVEMBER 30, 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	873,791	3,459,990	7,997	3,451,993	1,920,300	5,380,290	90,710
12000	ANTENNA	1,549,000	24,035	737,100	23	737,077	676,615	1,413,715	135,285
13000	ELECTRONICS	2,741,000	111,141	2,112,275	38,879	2,073,396	477,398	2,589,673	151,327
14000	COMPUTER	1,310,000	24,892	158,769	---	158,769	378,685	537,454	772,546
17000	PROGRAM MANAGEMENT	120,000	5,638	99,564	---	99,564	185	99,749	20,251
18000	COMMON COSTS	487,752	35,102	411,000	---	411,000	11,410	422,410	65,342
19000	CONTINGENCY	514,871	---	---	---	---	---	---	514,871
		<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	TOTAL PROGRAM	12,193,623	1,074,599	6,978,698	46,899	6,931,799	3,464,593	10,443,291	1,750,332
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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 NOVEMBER 30, 1979

TOTAL PROGRAM

PROJECT NUMBER	DESCRIPTION	ALLOCATION	EXPENDED MONTHLY	TOTAL EXPENDED	TRANSFER TO FIXED ASSETS	BALANCE CONSTRUCT. IN PROGRESS	TOTAL COMMITTED	TOTAL EXPENDED & COMMITTED	NET BALANCE
11000	SITE AND WYE	24,658,909	909,866	22,407,643	7,230,966	15,176,677	2,142,384	24,550,027	108,882
12000	ANTENNA	22,587,553	24,035	21,478,238	11,783,289	9,694,949	974,030	22,452,268	135,285
13000	ELECTRONICS	16,915,061	127,740	16,217,093	6,892,088	9,325,005	546,215	16,763,308	151,753
14000	COMPUTER	5,043,674	24,892	3,872,552	2,529,107	1,343,445	398,474	4,271,026	772,648
16000	SYSTEMS INTEGRATION	201,022	---	201,022	179,370	21,652	---	201,022	---
17000	PROGRAM MANAGEMENT	1,904,999	5,638	1,884,563	1,676,390	208,173	185	1,884,748	20,251
18000	COMMON COST	1,723,100	35,102	1,646,347	1,235,347	411,000	11,410	1,657,757	65,343
19000	CONTINGENCY/RESERVE	514,871	---	---	---	---	---	---	514,871
20000	CY-1980	1,503,000	---	---	---	---	829,945	829,945	673,055
	SUB TOTAL	75,052,189	1,127,273	67,707,458	31,526,557	36,180,901	4,902,643	72,610,101	2,442,088
3000	RETIREMENTS	(10,820)	---	(10,820)	(10,820)	---	---	(10,820)	---
	TOTAL PROGRAM	75,041,369	1,127,273	67,696,638	31,515,737	36,180,901	4,902,643	72,599,281	2,442,088

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 \$1,503,000 in new funding obligated by the NSF in September and November, 1979.

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

NATIONAL RESEARCH AND OBSERVATORY
VLA PROGRAM

FINANCIAL STATUS REPORT
(in thousands)

As of: November 30, 1979

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Item	(A) Program Ceiling	Allocation to Date (C)			Un-allocated Balance	Outlook (B)			N
		Allocated	Expended and Committed	Allocated Balance		Estimate to Complete	Estimate Total	(Over) Under Ceiling	
Site and Wye	27,860	24,952	24,843	109	2,908	2,003	26,846	1,014	
Antennas	20,400	22,587	22,452	135	(2,187)	270	22,722	(2,322)	
Electronics	17,000	16,931	16,779	152	69	1,216	17,995	(995)	
Computer	4,850	5,044	4,271	773	(194)	1,698	5,969	(1,119)	
Systems Integration	400	201	201	---	199	---	201	199	
Program Management	2,650	1,922	1,902	20	728	213	2,115	535	
Common Cost	-	1,723	1,658	65	(1,723)	476	2,134	(2,134)	
Subtotal	73,160	73,360	72,106	1,254	(200)	5,876	77,982	(4,822)	
Contingency	2,840	515	---	515	2,325	593	593	2,247	
TOTAL	76,000	73,875	72,106	1,769	2,125	6,469	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 \$1,503K advanced by the NSF for CY-1980 commitments and expenditures on Amendments No. 10 and 12.

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA ACTIVITY SCHEDULE

UPDATE DATE: 12/01/79

