

DECEMBER 1979

NATIONAL RADIO ASTRONOMY OBSERVATORY

DECEMBER PROGRESS REPORT

VLA PROGRAM

January 16, 1979

NATIONAL RADIO ASTRONOMY OBSERVATORY

MONTHLY PROGRESS REPORT

VLA PROGRAM

DECEMBER 1979

SYSTEMS INTEGRATION DIVISION

The array was scheduled for 43 percent of the time; 32 percent went to astronomical programs and the remaining 11 percent to tests. The average downtime for the month was approximately 25.2 percent.

The maximum number of antennas used for an astronomical observing program during the month of December was 19. Antenna 9 was returned to operation and Antenna 8 was removed from operation on December 26. Antennas 1, 8, 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.

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, southeast and southwest arms respectively. Our longest astronomically usable baseline is approximately 24 km.

ELECTRONICS DIVISION

One set of AIL parametric amplifiers was received during December and will be used in the front end of Antenna 25, the construction of which was begun in the latter part of the month. The front end rack from Antenna 8 was brought into the laboratory for retrofitting with C.T.I. cryogenics, and one set of parametric amplifiers was removed from it for use in Antenna 23. These will be replaced in Antenna 8 by cooled GaAs FET amplifiers. The front end for Antenna 9 was completed and that antenna was returned to service on December 26.

Retrofitting of the new spectral-line baseband system was completed for all but one rack of the North arm, and by the end of the first week of the new year only the electronics for West arm antennas will be awaiting this change. The first retrofit of the new front end IF subsystem was started on Antenna 13, and detailed planning to implement this addition to all of the antennas will follow in the new year.

Detailed measurements have been made of the signal compression which occurs in the modems of the waveguide transmission system. This phenomenon has become important because of a change in the amplitude calibration scheme required for spectral-line observations. Studies to

TO A. J. W. S. 100-1102

determine how to reduce or compensate for this effect are now in progress. Development of the new design of Focus-Rotation controller for the antenna subreflectors is continuing on schedule, and a prototype unit will be installed in Antenna 23 when it comes into operation next month. The hardware construction for this unit is complete, but some programming of a microprocessor which it incorporates remains to be done.

The racks for the second half of the spectral-line correlator system have been installed in the screened room and cabling for the power has been installed. The situation with regard to availability of the integrated circuits improved in December and most of those required for the spectral-line correlator have now been received. Six units of the new design of digital sampler have been completed and preliminary tests show considerable improvement in the frequency response compared with the original units.

COMPUTER DIVISION

Procurement is underway on a PDP-11/44 from DEC to replace the PDP-11/40 in the IMPS system. The 11/40 will function as the array processor host for the FFT processor system.

Through use of prototype system, maps can be made of single spectral line channels. The line system was used for scientific observations in December, although major systemic errors in hardware and software are still being discovered.

The map data format redesign is now essentially complete and the implementation of the redesign has been started. In addition, a push has been started to, for the first time, provide programmer level documentation and formal checkout-update procedure for the PDP-11 programs.

Procurement of additional terminals is underway for use with the Modcomp on-line systems in implementation of the final control center/maintenance center display system.

The CLEAN algorithm as implemented on the PDP-11/70 is proving a very successful system and is in heavy use.

Procurement action continues for tape drives for the PDP-11 computers. These drives will support 1600 and 6250 bpi densities.

ANTENNA DIVISION

Antenna No. 25

Mechanical outfitting progressing.

Antenna Nos. 26, 27 and 28

Awaiting mechanical outfitting.

Antenna No. 1

Reconditioning progressing.

PROJECT MANAGEMENT

General

The State Highway Department has agreed to widen and improve New Mexico Route 78 to the site at their expense.

New Mexico Gross Receipts Tax Case: The State Division of Finance and Taxation has filed its appeal brief to the U. S. Tenth District Court of Appeals, objecting to the decision of the U. S. District Court. Basis was the denial by Judge Campos of the State's request for a trial by jury. The Department of Justice has filed an answering brief. The case is on the docket but has not been assigned a hearing date. Attorney Stratton of the Department of Justice does not believe the State's case has merit. Hopefully, the approximately \$120,000 held by the State will be returned to the Program by June or July.

Personnel

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

Division	Budgeted 12/79 Level	11/30/79 Level	Additions	Reductions	12/31/79 Level
Site & Wye	9	9	0	0	9*
Antenna Division	17	16	1	0	17
Electronics	53	50	1	0	50*
Site Management	4	4	0	0	4
Computer Division	14	14	1	0	15
Operations Division	11	10	0	0	10*
Project Management	27	26	0	0	26*
Total	135	129	2	0	131

*Does not include two part-time employees.

12/31/79

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		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	\$90,906 invoiced thru 11/30/79. 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. 1 set to ship 12/21/79. 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-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	Delivery schedule being negotiated.
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	complete.
VLA-344 P.O. S-08595	Wheeler Construction Co.	Crushed Stone	1/08/79	\$ 668,660	Complete by 4/01/80	
P.O. S-11461	A & K Railroad Materials, Inc.	Rail & Matching Joint Bars	1/03/80	\$ 39,320	Complete by 1/31/80	
P.O. S-11264	Floating Point Systems, Inc.	Array Processors	12/20/79	\$ 201,092.70	4/29/80	

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>
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VLA-354	Fire Protection Sprinkler System	\$110,000.00	12/4/79	01/9/80			
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NATIONAL RADIO ASTRONOMY OBSERVATORY

VERY LARGE ARRAY

STATUS AS OF DECEMBER 31, 1979

CY - 79

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/WYE	5,471,000	874,609	4,334,598	10,257	4,324,341	1,146,223	5,480,821	(9,821)
12000	ANTENNA	1,549,000	18,733	755,834	23	755,811	758,267	1,514,101	34,899
13000	ELECTRONICS	2,741,000	175,796	2,288,071	39,129	2,248,942	365,168	2,653,239	87,761
14000	COMPUTER	1,310,000	261,590	420,359	---	420,359	651,302	1,071,661	238,339
17000	PROGRAM MANAGEMENT	120,000	6,419	105,983	---	105,983	278	106,261	13,739
18000	COMMON COSTS	487,752	52,960	463,960	---	463,960	6,063	470,023	17,729
19000	CONTINGENCY	514,871	---	---	---	---	---	---	514,871
	TOTAL PROGRAM	12,193,623	1,390,107	8,368,805	49,409	8,319,396	2,927,301	11,296,106	897,517

NATIONAL RADIO ASTRONOMY OBSERVATORY

VERY LARGE ARRAY

STATUS AS OF DECEMBER 31, 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	912,684	23,320,327	11,499,362	11,820,965	1,330,231	24,650,558	8,351
12000	ANTENNA	22,587,553	316,129	21,794,366	17,938,487	3,855,879	758,267	22,552,633	34,920
13000	ELECTRONICS	16,915,061	194,446	16,411,539	7,896,673	8,514,866	415,334	16,826,873	88,188
14000	COMPUTER	5,043,674	261,590	4,134,142	2,874,739	1,259,403	671,092	4,805,234	238,440
16000	SYSTEMS INTEGRATION	201,022	---	201,022	200,965	57	---	201,022	---
17000	PROGRAM MANAGEMENT	1,904,999	6,419	1,890,982	1,782,794	108,188	278	1,891,260	13,739
18000	COMMON COST	1,723,100	52,960	1,699,308	1,235,347	463,961	6,063	1,705,371	17,729
19000	CONTINGENCY/RESERVE	514,871	---	---	---	---	---	---	514,871
20000	CY-1980	1,503,000	24,128	24,128	---	24,128	816,375	840,503	662,497
	SUB TOTAL	75,052,189	1,768,356	69,475,814	43,428,367	26,047,447	3,997,640	73,473,454	1,578,735
30000	RETIREMENTS	(6,580)	---	(6,580)	(6,580)	---	---	(6,580)	---
	TOTAL PROGRAM	75,045,609	1,768,356	69,469,234	43,421,787	26,047,447	3,997,640	73,466,874	1,578,735

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.

NATIONAL RADIO ASTRONOMICAL OBSERVATORY
VLA PROGRAM

FINANCIAL STATUS REPORT
(in thousands)

As of: December 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)			Notes
		Allocated	Expended and Committed	Allocated Balance		Estimate to Complete	Estimate Total	(Over) Under Ceiling	
Site and Wye	27,860	24,952	24,944	8	2,908	1,902	26,846	1,014	
Antennas	20,400	22,587	22,553	34	(2,187)	169	22,722	(2,322)	
Electronics	17,000	16,931	16,843	88	69	1,152	17,995	(995)	
Computer	4,850	5,044	4,805	239	(194)	1,164	5,969	(1,119)	
Systems Integration	400	201	201	-	199	-	201	199	
Program Management	2,650	1,922	1,908	14	728	207	2,115	535	
Common Cost	-	1,723	1,705	18	(1,723)	429	2,134	(2,134)	
Subtotal	73,160	73,360	72,959	401	(200)	5,023	77,982	(4,822)	
Contingency	2,840	515	-	515	2,325	593	593	2,247	
TOTAL	76,000	73,875	72,959	916	2,125	5,616	78,575	(2,575)	

NOTES: (A) Includes \$293K for site acquisition, \$15.7K for ECAC Study, and \$17.1K for NSF Ad Hoc Advisory Panel.

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

(C) 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 and the \$1,300K advanced on Amendment No. 12 dated November 5, 1979.

NATIONAL RADIO ASTRONOMY OBSERVATORY VLA ACTIVITY SCHEDULE

UPDATE DATE: 01/02/80

