NATIONAL RADIO ASTRONOMY OBSERVATORY

JANUARY PROGRESS REPORT

VLA PROGRAM

February 20, 1980

NATIONAL RADIO ASTRONOMY OBSERVATORY

MONTHLY PROGRESS REPORT

VLA PROGRAM

JANUARY 1980

SYSTEMS INTEGRATION DIVISION

The array was scheduled for 54 percent of the time; 39 percent went to astronomical programs and the remaining 15 percent to tests. The average downtime for the month was approximately 17.2 percent. Almost all of this downtime was attributed to front end problems (paramps, upconverters and mixers).

First fringes were obtained from antenna 23 on January 14, 1980. Antenna 24 was declared operational on January 15, 1980. The maximum number of antennas used for an astronomical observing program during the month of January was 20. Antenna 13 was returned to operation and antenna 24 was removed from operation on January 31. Antennas 1, 8, 11, and 24 are currently unavailable for observation. Antennas 22 and 23 are in the shakedown stage. The test array consists of antennas 3 and 5.

Several antennas were reshuffled about the array and most notably antenna 19 was moved to 4.7 km out on the north arm. The furthest station on each arm occupied by operating antennas are currently located at a distance of 4.7, 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

The front-end for antenna 23 was completed and first fringes were obtained during the month. The front-end for antenna 25 was completed and underwent final adjustments ready for first fringes in early February. Both of these front-ends were constructed using AIL paramps as first stages and cooled GaAs FET amplifiers as second stages. As the month ends, the situation with respect to AIL paramp delivery is looking more optimistic. For the last two weeks they have maintained a one stage per week delivery and by mid-February they expect to be able to deliver two stages per week. The decision has been made to build all future front-ends with the AIL-cryogenic-GaAs FET combination. This should result in a surplus of approximately 25 AIL paramp stages which will be used to increase the available spares at the VLA site and for other applications within NRAO.

In the cryogenics area, the CTI contract has now been completed and all cryogenic hardware is on site and ready for installation.

The baseband retrofit continued and by month's end only four antennas remained to have the new baseband system installed. A significant spurious response problem in the T3 (IF to Baseband Converter) Module was discovered during the month. It is hoped that this problem can be solved by the straightforward addition of four filters in the T3 module. The specification and procurement of these filters is proceeding as a high priority item.

The installation of the new front-end IF system was completed on antenna 13. Starting in February, the system will be installed on other antennas at the rate of one antenna every one to two weeks.

The new Focus/Rotation controller is now complete except for a small amount of microprocessor software. It has been decided that, instead of installing the new controller immediately on an antenna, it will undergo extensive testing on the spare Stirling Mount in the Lab.

The retrofit of all F2 and F3 modules to reduce the level of the spurious L Band signals that they generate was completed. This will allow the L Band RFI investigation to be started again with a goal of reducing the remaining spurious signals.

COMPUTER DIVISION

The order for the PDP-11/44, which will replace the PDP-11/40 as the output map display computer, has been placed.

Although still rudimentary, the software for the interim spectral line system has been expanded. In particular the off-line programs on the DEC-10 now allow listings of the channels to be produced, selection of data by channels (so that mapping may be performed using the continuum system) and computation of average passbands.

The Modcomp Classic 7810 has now been tested satisfactorily so that appropriate software changes may proceed in order to incorporate it into the synchronous system to drive the CRT terminals.

Evaluation of the bids on the high density tape drives is still in progress. Five drives are being procured, one for each of the PDP-11's in the pipeline system and one for the VAX image processor.

Procurement for additional Century disk drives and controllers is now underway. These will be used for additional disk storage on the current PDP-11's and the new PDP-11/44.

ANTENNA DIVISION

Antenna Moves

Date	Ant. No.	From	To
1-7-80	25	Main. Pad	CW7 (W14)
1-7-80	26	CE7 (E14)	Main. Pad
1-18-80	19	DN6 (N6)	BN8 (N32)
1-18-80	22	CW6 (W12)	DN6 (N6)
1-21-80	25	CW7 (W14)	CW6 (W12)
1-21-80	28	Master Pad	CE7 (E14)
1-30-80	23	CW5 (W10)	CN9 (N18)

* This was the first move across U.S. Highway 60 and now extends the north baseline to 4.7 Km.

Outfitting

Antenna No. 25 was completed on 7 January, 1980 and was temporarily moved to CW7 until CW6 was unoccupied. Antenna No. 26 outfitting was started on 8 January, 1980.

Major Overhaul

Continued on Antenna No. 1 in the Antenna Assembly Building. Work completed included structural checks and tests, repainting some parts, replacing the Focusing Feed Mount with the spare, reworking the cable wrap, reworking the Vertex Room Heaters and other scheduled retrofits.

Preventative Maintenance

Six months Preventative Maintenance completed on Antenna No. 7.

Transporter No. 2

Assembly of major components has started at the sub-contractor's plant in Saukville, Wis. R. Stidstone is providing technical assistance to the sub-contractor at his plant.

SITE AND WYE DIVISION

Waveguide Installation

Installed approximately 5,520 feet of waveguide between AN6 and AN7. Trenched approximately 5,560 feet from AN6 toward AN7.

Phase IV

Overall completion 97%. 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 98% complete. All Antenna spur tracks have been installed. Round Place Construction 99% complete with the earthwork. Electric work is 99% complete.

Phase V

Overall completion of the total contract is 78%. Track materials layed out to AN9 and rough layed track to 5,000 feet past AN7. The first lift of ballast has been placed on the North Arm on both tracks to 3,000 feet past AN7. Work on the Maintenance vehicle spur is still 30% complete. Electrical work for the month consisted of plowing in the primary feeder cable setting transformer and isolation switches. Electrical work is 61% complete.

PROJECT MANAGEMENT

General

Approval of the VLA Program Plan for CY1980 was received by National Science Foundation letter of February 1, 1980.

Personnel

The personnel changes as of January 31, 1980 are as follows:

Division	Budgeted 12/79 Level	12/31/79 Level	Additions	Reductions	1/31/80 Level
Site & Wye	9	9	0	0	9*
Antenna Division	17	17	0	0	17
Electronics	53	50	0	0	50*
Site Management	4	4	0	0	4
Computer Division	14	15	0	1	14
Operations Division	11	10	1	0	11
Project Management	27	26	1	2	25
TOTAL	135	131	2	3	130

*Does not include two part-time employees.

1/31/80

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 waveguide and 3900 pieces of coupling sleeves	11/03/78	$ 3,215,847	1/31/80	Remaining 1000 pieces of waveguide and coupling sleeves arrived Oakland port 2/2/80.
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 Excavation	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	9 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	8 units received. Of the 5 units returned for repair, 3 have been returned; 1 will ship in March and 1 in April. 2 New production units to ship 3/month to completion.
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		Will complete in February.

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	Will complete in February.
VLA-345 Amendment	G. C. Dean	Labor Hour (Waveguide Installation)	3/19/79	335,000	Two years completing 2/28/81	
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-11638	DEC	Computer Maintenance	2/13/80	90,024	CY '80	Monthly expenditure rate estimated at $7,500.
P.O. S-06827 Amendment #2	C.T.I. Cryogenics	Cryocooler	5/23/78	239,760	2/15/80	Units to VLA complete. 1 unit due Tucson, 2 units due G.B.
VLA-325	Pacific Railroad Constructors, Inc.	Phase IV Construction	6/23/78	2,916,080	9/16/79	Should complete 3/31/80.
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	Rail & Matching	1/03/80	39,320	Complete by 1/31/80	Should complete in February.
P.O. S-11264	Floating Point Systems, Inc.	Array Processors	12/10/79	201,092	4/29/80	

VLA PROGRAM

PROCUREMENT ACTIVITIES INITIATED

RFP NUMBER	ITEM DESCRIPTION	ESTIMATED COST	ISSUE DATE	PROPOSAL/BID DUE DATE	SUBMISSION TO NSF DATE	AWARD DATE	CURRENT STATUS
VLA-354 P.O. S-11480	Fire Protection Sprinkler System	$ 57,840.00	12/4/79	01/9/80	02/1/80		
P.O. S-11478	Computer System	74,635.75	1/04/80	01/18/80	02/6/80		
P.O. S-11481	Computer Gear	64,078.56	1/04/80	01/18/80	02/1/80		
P.O. S-11731	Tape System	Waiting for estimate		-	-		

NATIONAL RADIO ASTRONOMY OBSERVATORY

VERY LARGE ARRAY

STATUS AS OF JANUARY 31, 1980

CY - 80

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	1,894,000	74,648	88,107	---	88,107	825,105	913,212	980,788
12000	ANTENNA	134,000	6,415	6,415	---	6,415	740	7,155	126,845
13000	ELECTRONICS	1,064,000	30,611	41,279	---	41,279	42,744	84,023	979,977
14000	COMPUTER	925,000	10,664	10,664	---	10,664	19,389	30,053	894,947
17000	PROGRAM MANAGEMENT	193,000	6,453	6,453	---	6,453	3,933	10,386	182,614
18000	COMMON COSTS	401,063	18,359	18,359	---	18,359	13,704	32,063	369,000
19000	CONTINGENCY	88,937	---	---	---	---	---	---	88,937
	TOTAL PROGRAM	4,700,000	147,150	171,277	---	171,277	905,615	1,076,892	3,623,108

Note: Project allocations for CY-80 consists of $4,700,000 of this amount $1,503,000 has been obligated by the NSF.

NATIONAL RADIO ASTRONOMY OBSERVATORY

VERY LARGE ARRAY

STATUS AS OF JANUARY 31, 1980

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	26,552,909	648,665	23,489,585	11,499,363	11,990,222	2,043,684	25,533,269	1,019,640
12000	ANTENNA	22,721,553	18,304	21,514,282	17,938,486	3,575,796	1,054,057	22,568,339	153,214
13000	ELECTRONICS	17,979,061	101,672	16,490,219	7,896,673	8,593,546	422,923	16,913,142	1,065,919
14000	COMPUTER	5,968,674	34,537	4,141,295	2,874,739	1,266,556	708,722	4,850,017	1,118,657
16000	SYSTEMS INTEGRATION	201,022	---	201,022	200,965	57	---	201,022	---
17000	PROGRAM MANAGEMENT	2,097,999	7,182	1,898,163	1,782,795	115,368	4,032	1,902,195	195,804
18000	COMMON COST	2,124,163	18,359	1,717,667	1,699,306	18,361	13,704	1,731,371	392,792
19000	CONTINGENCY/RESERVE	603,808	---	---	---	---	---	---	603,808
	SUB TOTAL	78,249,189	828,719	69,452,233	43,892,327	25,559,906	4,247,122	73,699,355	4,549,834
30000	RETIREMENTS	(67,979)	---	(67,979)	(67,979)	---	---	(67,979)	---
	TOTAL PROGRAM	78,181,210	828,719	69,384,254	43,824,348	25,559,906	4,247,122	73,631,376	4,549,834

Note: Project allocation excludes $325,811 withheld and paid directly to other agencies by the NSF in prior years. Project allocation includes $4,700,000 for CY-1980 Funding, $1,503,000 of this amount has been obligated by the NSF.

NATIONAL RADIO ASTRONOMY OBSERVATORY
VLA PROGRAM

FINANCIAL STATUS REPORT
(in thousands)

As of: January 31, 1980

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1
		(A) Allocation to Date		(C)		Outlook		(B)	
Item	Program Ceiling	Allocated	Expended and Committed	Allocated Balance	Un-Allocated Balance	Estimate to Complete	Estimate Total	(Over) Under Ceiling	Not
Site and Wye	27,860	26,846	25,826	1,020	1,014	1,020	26,846	1,014	
Antennas	20,400	22,722	22,568	154	(2,322)	154	22,722	(2,322)	
Electronics	17,000	17,995	16,929	1,066	(995)	1,066	17,995	(995)	
Computer	4,850	5,969	4,850	1,119	(1,119)	1,119	5,969	(1,119)	
Systems Integration	400	201	201	-	199	-	201	199	
Program Management	2,650	2,115	1,919	196	535	196	2,115	535	
Common Cost	-	2,123	1,732	391	(2,123)	402	2,134	(2,134)	
Subtotal	73,160	77,971	74,025	3,946	(4,811)	3,957	77,982	(4,822)	
Contingency	2,840	604	-	604	2,236	593	593	2,247	
TOTAL	76,000	78,575	74,025	4,550	(2,575)	4,550	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. Allocated and Expended includes $68K in assets which were retired in prior years.

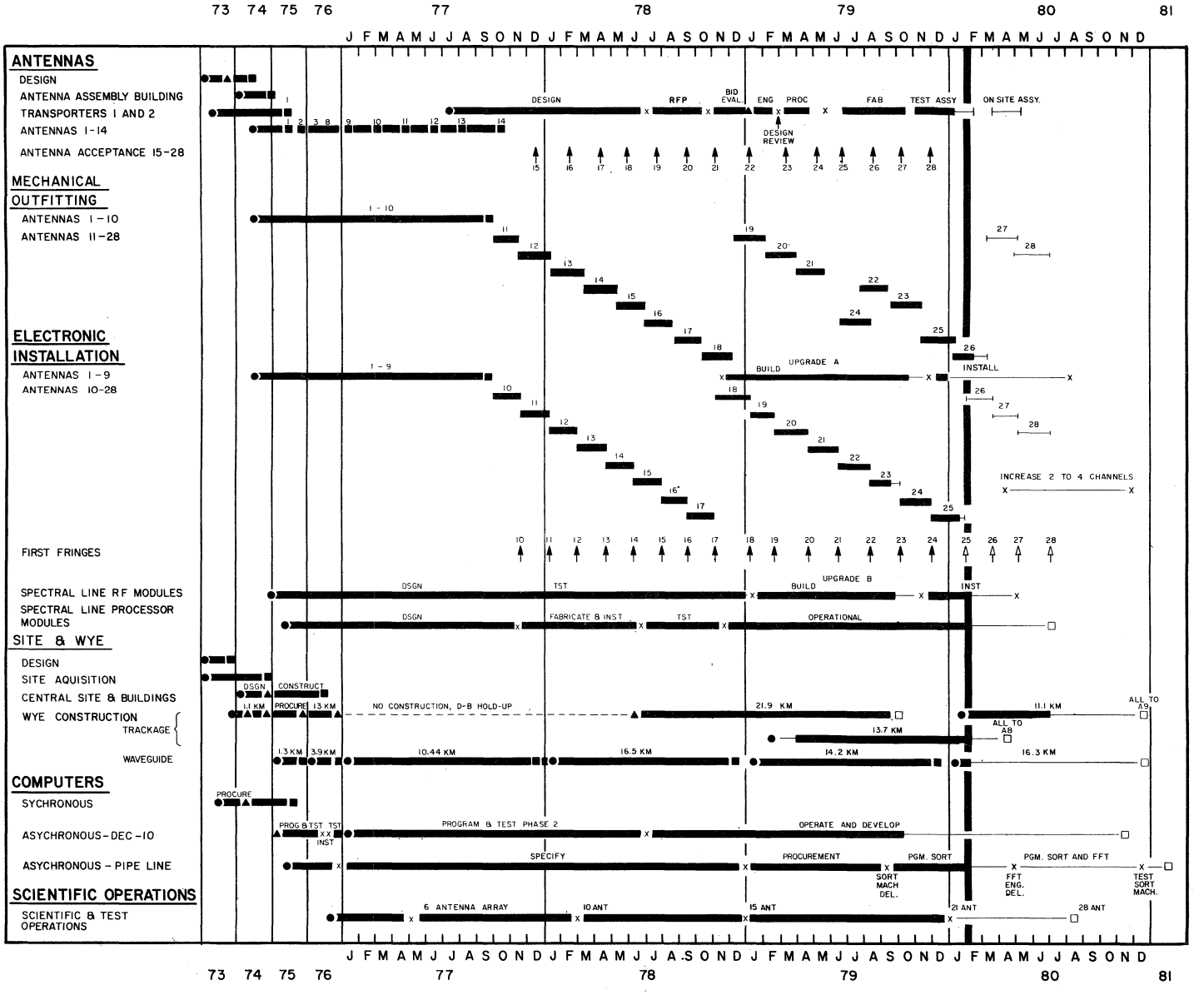
(B) Estimate to complete is as of November 1, 1979.

(C) Includes $4,700K in CY-80 Funding.

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA ACTIVITY SCHEDULE

UPDATE DATE: 02/01/80



TASKS

UPGRADE A	RECEIVER FRONT-END FILTERS, MODULES F4, F7, F8. INSTALL 5 ANT/MO. (25 MODULES)
UPGRADE B	SPECTRAL LINE IF MODULES T3, T4, T5, T6. INSTALL 4 SYSTEMS (24 MODULES) PER MONTH.
INCREASE 2 TO 4 CHANNELS	ADDITIONAL MODULES OF ABOVE TYPES. TOTAL 224, INSTALL 36 PER MONTH.

ABBREVIATIONS

DSGN — DESIGN	TST — TEST
LAB — LABORATORY	PRELM — PRELIMINARY
INST — INSTALL	OPNS — OPERATIONS
ANT — ANTENNA(S)	PGM. — PROGRAM
	DEL. — DELIVERY

SYMBOLS

O START OF A PHASE	△ CONTRACT AWARD
X END OF AN ACTIVITY	□ END OF A PHASE
SCHEDULED	COMPLETED

REV. NO.	REV DATE	DESCRIPTION
1	12/1/78	UPDATE PROGRAM PLAN '79
2	11/1/79	UPDATE PROGRAM PLAN '80
3	2/1/80	MISC. PLAN CHANGES.