

FEBRUARY 1980

# VLA LIBRARY

NATIONAL RADIO ASTRONOMY OBSERVATORY

FEBRUARY PROGRESS REPORT

VLA PROGRAM

March 14, 1980

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MAR 27 1980

# NATIONAL RADIO ASTRONOMY OBSERVATORY

## MONTHLY PROGRESS REPORT

### VLA PROGRAM

FEBRUARY 1980

#### SYSTEMS INTEGRATION DIVISION

The array was scheduled for 57 percent of the time; 41 percent went to astronomical programs and the remaining 16 percent to tests. The average downtime for the month was approximately 16.4 percent.

First fringes were obtained with antenna 25 on February 7. The maximum number of antennas used for an astronomical observing program during the month of February was 22. Antenna 24 was returned to operation on February 19. Antennas 1, 8 and 11 are currently unavailable for observation. Antennas 22 and 23 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 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

During the month the electronics for antenna 25 was installed on the antenna and first fringes were obtained. AIL is continuing to ship parametric amplifiers at a rate of one per week. They now have a good supply of varactors from Alpha which can be built into paramps without problems of time variability or passband flatness.

Switchable attenuators have now been installed on most operating antennas to make Solar observing more convenient.

Valuable discussions concerning L Band upconverter reliability were had with the AIL Upconverter engineer who visited the site on 11th and 12th of February. Several cooperative tests were arranged to further investigate the causes of upconverter failures. The AIL engineer pointed out that some of our procedures, which occasionally allow upconverters to be pumped without DC bias being applied, could result in damage to the upconverters. These procedures have been changed.

As the month ends, the last antenna is having its spectral line baseband system installed. This means that all hardware for full spectral line operation with two IF channels will be in place. The procurement of the new filters, mentioned in January Progress Report, needed for the T3 (IF to Baseband Converter) module is proceeding. Considerable effort was spent during the month working on spurious oscillation problems in the T5 (Baseband Driver) module. These problems now seem to be under control.

### COMPUTER DIVISION

Century Data Systems have completed the installation of the modified disk controllers that are necessary to enable dual access of their disk drives between the Modcomps (CORA and CORBIN) and PDP-11/70 (SORTER).

Four Teletronix 4025 CRT terminals have been received. These will be used to provide additional on-line displays in the synchronous system for the operators and the Electronics Division.

One-half of the new memory for the DEC-10 has been received but has not yet been hooked up pending the resolution of contractual difficulties with the delivery of the second half.

Additional features have been added to the IMPS system to permit the production of contour maps. The contour maps may be displayed on the Comtel CRT or written onto the Dicomed film writer; in addition there may be output onto the Versatec plots with the additional overlaying of polarization vectors.

The program (HARVEY) on the DEC-10 which handles the communications with the PDP-11's has been augmented to provide a general interface between user tasks running on the PDP-11's.

The DEC-10 standard reduction programs have been extended to allow for the eventual extension of the index records in the database.

The synchronous system has been made to function with the addition of the Modcomp 7810 (EUNICE), and work is in progress to include it in the standard observing system.

### ANTENNA DIVISION

#### Antenna Moves

Antenna No. 1 was moved to the Master Pad 2-6-80 for servo tests and painting. Wind, snow, and rain has prevented the painting.

#### Outfitting

Antenna No. 26 outfitting is 95% complete.

### Preventative Maintenance

Six month Preventative Maintenance completed on Antenna No. 8, 16, 19, and 22.

### Transporter No. 2

Assembly at the sub-contractor's plant in Saukville, Wis. is 70% complete.

## SITE AND WYE DIVISION

### Waveguide Installation

Installed approximately 4,690 feet of waveguide to 3,000 feet past AN7. Trenched approximately 5,300 feet to 4,200 feet past AN7. Installed manhole at AN7.

### Phase IV

Overall completion 98%. Track work on the West arm is still 98% complete with modifications required before final acceptance. Main track work on the East arm is substantially complete to AE8 and interchanges are 99% 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 81%. Track materials layed out to 4000 feet from AW9. Track rough layed to AN9. The first lift of ballast has been placed on the North arm on both tracks to 1000 feet from AN8. Work on the Maintenance vehicle spur is still 30% complete. Electrical work for the month consisted of completion of plowing in the primary feeder cables. Forming of concrete pads for Antenna transformers. Electrical work is 68% complete.

## PROJECT MANAGEMENT

### General

On February first the final increment of funds necessary to complete the VLA construction was received from the National Science Foundation. Total funding now amounts to \$78,578,000.

No date has yet been set for the U.S. Tenth District Court of Appeals to hear the New Mexico appeal on the Gross Receipts Tax case decision.

As of February first approvals had not yet been received from DoD and GSA covering the transfer of 5,000 track feet of rail from Camp Parks, Ca., and 12,900 track feet of rail from Fort Sam Houston, Texas.

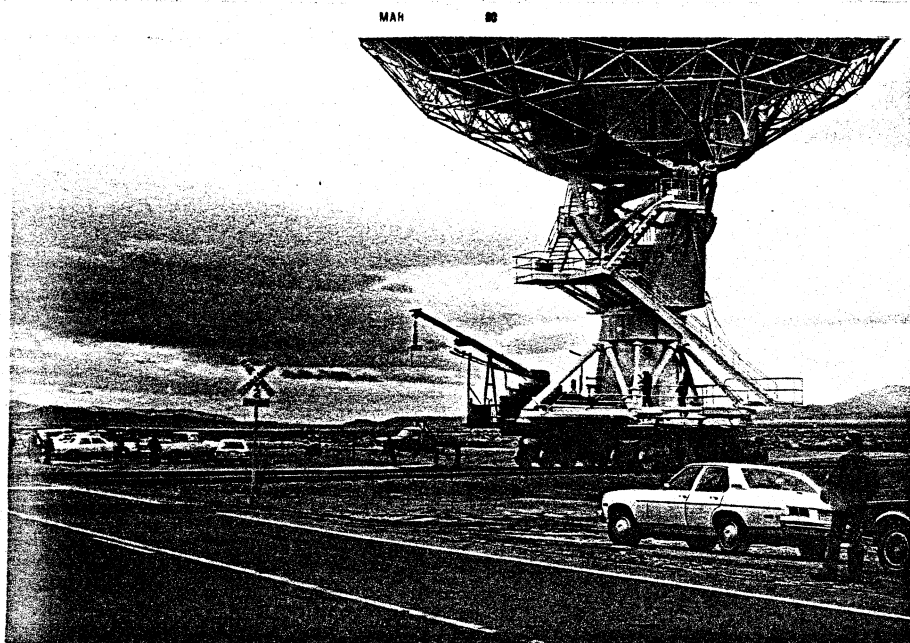
A meeting on 11 February 1980 with one of the ranchers brought into sharp focus the need to make firm decisions on the construction of the VLA airstrip and the continued use of the site roads along the wye. NRAO is preparing its recommendations for the Foundation.

### Personnel

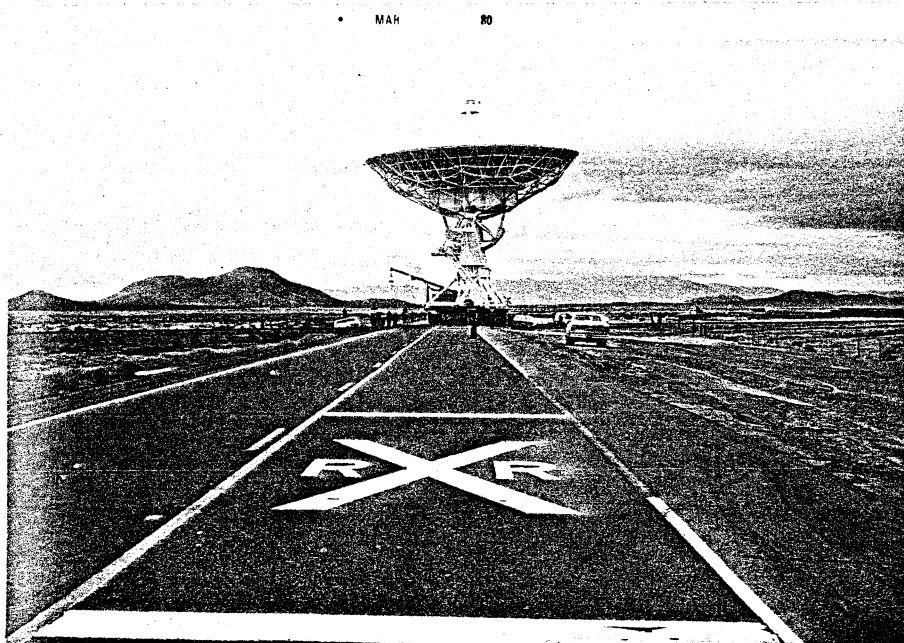
The personnel changes as of February 29, 1980 are as follows:

Division	Budgeted 6/30/80 Level	1/31/80 Level	Additions	Reductions	2/29/80 Level
Site & Wye	10	10	0	0	10
Antenna Division	17	16	1	0	17
Electronics	52	50	0	0	50*
Site Management	6	5	0	0	5
Computer Division	15	14	0	0	14
Operations Division	12	11	0	0	11
Project Management	26	24	1	0	25*
TOTAL	138	130	2	0	132

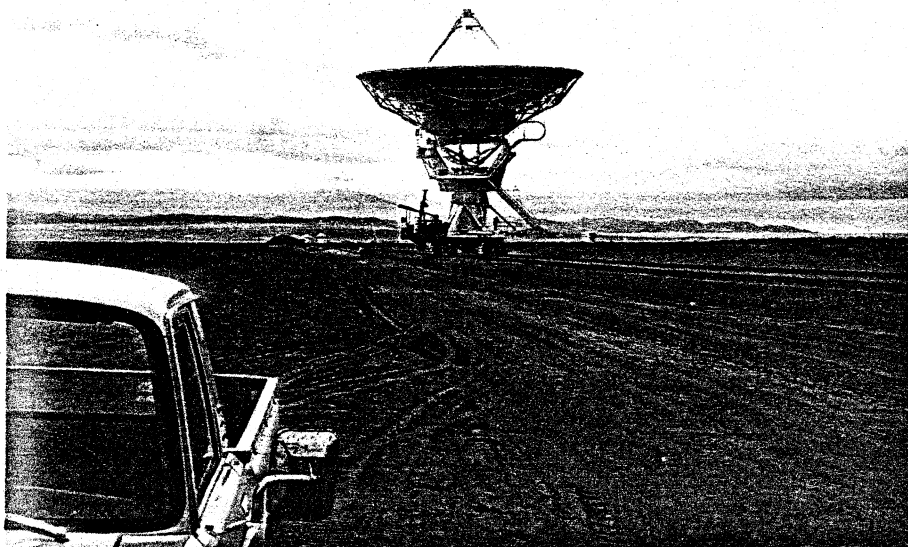
\*Does not include two part-time employees.



Antenna #19 approaching U.S. 60 on North Arm



Antenna #19 crossing U.S. 60 on North Arm



Antenna #19 traveling up North Arm



2/29/80

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
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 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 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	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		Complete

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	Complete
P.O. S-11264	Floating Point Systems, Inc.	Array Processors	12/10/79	201,092	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>
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 FEBRUARY 29, 1980

PROJECT NUMBER	DESCRIPTION	ALLOCATION	EXPENDED MONTHLY	CY - 80 TOTAL EXPENDED	TRANSFER TO FIXED ASSETS	BALANCE CONSTRUCT. IN PROGRESS	TOTAL COMMITTED	TOTAL EXPENDED & COMMITTED	NET BALANCE
11000	SITE/WYE	1,917,000	136,384	224,491	---	224,491	1,032,477	1,256,968	660,032
12000	ANTENNA	160,000	8,424	14,839	---	14,839	8,561	23,400	136,600
13000	ELECTRONICS	1,153,000	67,920	109,200	---	109,200	84,838	194,038	958,962
14000	COMPUTER	1,191,000	30,796	41,460	---	41,460	15,633	57,093	1,133,907
17000	PROGRAM MANAGEMENT	207,000	9,943	16,396	---	16,396	79	16,475	190,525
18000	COMMON COSTS	401,063	56,754	75,113	---	75,113	25,354	100,467	300,596
19000	CONTINGENCY	581,942	---	---	---	---	---	---	581,942
	TOTAL PROGRAM	5,611,005	310,221	481,499	---	481,499	1,166,942	1,648,441	3,962,564

Note: Project allocation for CY-80 consists of \$4,500,000 in new funding plus \$1,111,005 in prior year funds reallocated in February, 1980.

NATIONAL RADIO ASTRONOMY OBSERVATORY

VERY LARGE ARRAY

STATUS AS OF FEBRUARY 29, 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	26,555,230	636,638	24,126,222	11,499,363	12,626,859	1,750,729	25,876,951	678,279
12000	ANTENNA	22,721,203	360,333	21,874,615	17,940,920	3,933,695	709,969	22,584,584	136,619
13000	ELECTRONICS	17,982,546	163,579	16,653,799	7,896,673	8,757,126	368,851	17,022,650	959,896
14000	COMPUTER	6,011,066	39,161	4,180,456	2,874,739	1,305,717	675,315	4,855,771	1,155,295
16000	SYSTEMS INTEGRATION	201,022	---	201,022	200,965	57	---	201,022	---
17000	PROGRAM MANAGEMENT	2,098,809	10,041	1,908,205	1,782,794	125,411	79	1,908,284	190,525
18000	COMMON COST	2,100,371	56,754	1,774,420	1,699,306	75,114	25,354	1,799,774	300,597
19000	CONTINGENCY/RESERVE	581,942	---	---	---	---	---	---	581,942
	SUB TOTAL	78,252,189	1,266,506	70,718,739	43,894,760	26,823,979	3,530,297	74,249,036	4,003,153
30000	RETIREMENTS	(67,979)	---	(67,979)	(67,979)	---	---	(67,979)	---
	TOTAL PROGRAM	78,184,210	1,266,506	70,650,760	43,826,781	26,823,979	3,530,297	74,181,057	4,003,153

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

Project allocation includes \$4,500,000 for CY-1980 Funding.

NATIONAL RADIO ASTRONOMY OBSERVATORY  
VLA PROGRAM

FINANCIAL STATUS REPORT  
(in thousands)

As of: February 29, 1980

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Item	Program Ceiling	(A) 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	26,848	26,170	678	1,012	676	26,846	1,014	
Antennas	20,400	22,722	22,585	137	(2,322)	137	22,722	(2,322)	
Electronics	17,000	17,998	17,038	960	(998)	957	17,995	(995)	
Computer	4,850	6,011	4,856	1,155	(1,161)	1,113	5,969	(1,119)	
Systems Integration	400	201	201	-	199	-	201	199	
Program Management	2,650	2,116	1,925	191	534	190	2,115	535	
Common Cost	-	2,100	1,800	300	(2,100)	334	2,134	(2,134)	
Subtotal	73,160	77,996	74,575	3,421	(4,836)	3,407	77,982	(4,822)	
Contingency	2,840	582	-	582	2,258	593	593	2,247	
TOTAL	76,000	78,578	74,575	4,003	(2,578)	4,000	78,575	(2,575)	

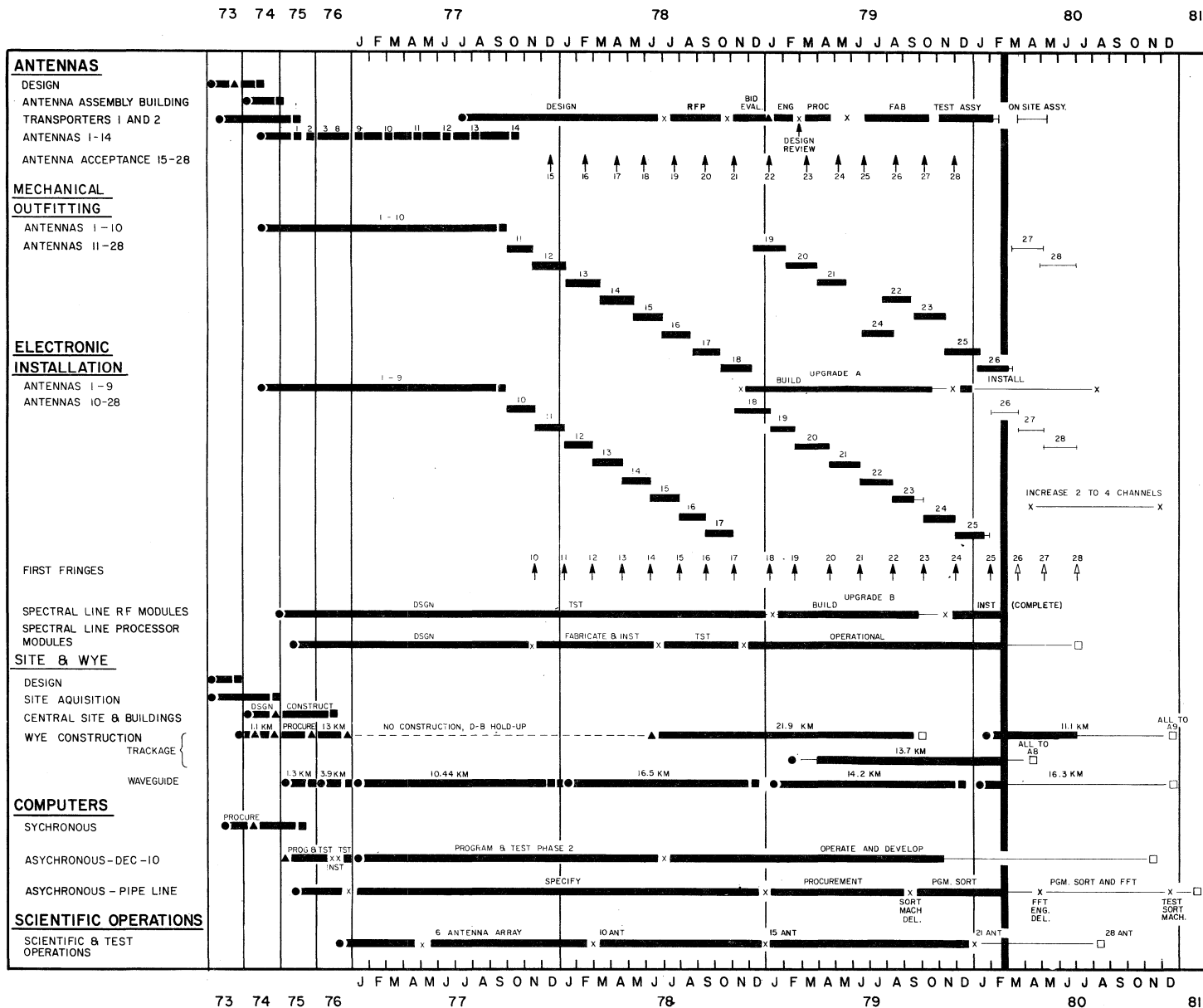
NOTES: (A) Includes \$293K for site acquisition, \$15.7K for ECAC Study, and \$17.1K for NSF Ad Hoc Advisory Panel. Allocated and Expended includes \$68K in assets which were retired in prior years.

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

(C) Includes \$4,500K in CY-80 Funding.

# NATIONAL RADIO ASTRONOMY OBSERVATORY VLA ACTIVITY SCHEDULE

UPDATE DATE: 03/03/80



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.