NOVEMBER 1980

US GR BK,

NATIONAL RADIO ASTRONOMY OBSERVATORY
OCTOBER PROGRESS REPORT
VLA PROGRAM
November 25, 1980

NATIONAL RADIO ASTRONOMY OBSERVATORY

MONTHLY PROGRESS REPORT

VLA PROGRAM

OCTOBER 1980

SYSTEMS INTEGRATION DIVISION

The array was scheduled for 37 percent of the time; 26 percent went to astronomical programs and the remaining 11 percent went to tests. The average downtime for the month was approximately 10.2 percent.

The array was reconfigured from the C to the A configuration during the middle of October. A total of 21 antennas were moved during the month. The number of antennas used for astronomical observations reached a maximum of 25. Antennas 2, 4, and 6 are unavailable for observations. The test array consists of 11, 17 and 21.

The longest astronomically useable baseline is approximately 35 km.

ELECTRONICS DIVISION

The most important activity during the month was the reconfiguration of the array to the A configuration. In the electronics area this required the reallocation of several modem channels so that total waveguide attenuation was within range for all antennae. After routine adjustments to the electronics at each antenna, all antennae appear to work correctly in the A Array.

The first astronomical test of the B & D IF correlator system was carried out during the month. Some problems in the B & D sampler system were discovered during the test and have been corrected. The B & D IF system hardware is expected to be declared operational during the first quarter of 1981.

COMPUTER DIVISION

The orders for most of the hardware necessary to upgrade the DEC-10 from a KI processor to KL have now been placed; the other orders are awaiting approval from the NSF. The new system will have about 300% of the throughput of the existing KI according to benchmarks run earlier this year. To go with the new KL, we have ordered a VAX 11/780 system to assist the KL with the calibration of the data. The interface to the existing Synchronous subsystem which comprises ModComp equipment is proposed to be done using a ModComp 7810 Classic mini computer.

The software changes in the Synchronous system to perform the 10 second integration of data in the Array Processor has been tested sufficiently, and now is part of the standard observing system. With the use of the phase dosure technique in the PDP 11/70 (MAPPER), the dynamic range attainable in finished maps has been increased to better than 31dB in some cases. At this sensitivity, small errors that remain undetected in the calibration stage can cause ripples on the radio image. In order to make an attempt to isolate these errors, the LISTER program has been modified to allow printing of data contributing only to small selected areas of the transform plane.

ANTENNA DIVISION

Antenna Moves

The "C" array was reconfigured to the "A" array, which required 20 moves. The "A" array is complete except station AE9 which is awaiting completion of the waveguide. Antenna No. 4 was also moved from the Antenna Assembly Building to DE3 after completion of major overhaul. Antenna No. 5 was moved into the AAB on 10/20/80 for major overhaul.

Transporters

During the "A" array reconfiguration, Transporter No. 1 developed a serious leak in the suspension cylinder of the center axle of truck No. 3. Several days were required to correct this problem and therefore the majority of the moves was accomplished using transporter No. 2.

Transporter No. 2 still has problems with truck rotation, however this should be corrected soon.

Transporter No. 1 will be retrofitted and overhauled during January thru April, 1981. Systems to be checked and reworked are wiring, plumbing, jacks and diesel engines.

Transporter No. 2 Detroit Diesel Engine was repaired under warranty by the Detroit Diesel local distributor in Albuquerque. Valve stem seals were installed to reduce oil consumption.

Miscellaneous

90% of the Van Turntable prototype parts have been received and work is progressing.

Array reconfiguration has been scheduled for:

To Configuration	Date
B	May, 1981
C	Aug., 1981
D	Oct., 1981
A	Jan., 1982

SITE AND WYE DIVISION

Waveguide Installation

Installed approximately 4,080 feet of waveguide and trenched approximately 3,420 feet on East arm.

Phase V

Overall completion of the total contract is 99.8%. All work is 100% complete, except for the reconstruction of the Highway 60 road crossing. Here the use of relayer ties has resulted in problems. The crossing will be rebuilt using all new ties and planking.

Waveguide Cathodic Protection

Work on the gathering of soil corrosion, and resistivity data continues along the arms of the wye. The ancient lake bed is a very inhospitable area for the buried waveguide system. All data should be available by January 15th and the system designed by Pacific Corrosion later that month. It is expected the necessary system will be of the impressed current type and will cost approximately $40,000.

Waveguide Protective Coating

It has been found that the last two shipments of waveguide have defective coatings in that the coating has moved after placement toward the center of the wye. This movement is independent of sun angle, stage of placement, direction of coating application, and grade of trench. The coating concern cannot explain it but has tentatively admitted responsibility and is negotiating cost of repair. At some 2,000 joints it will be necessary to uncover the waveguide and add a second shrink sleeve. This work is now underway and will be completed in February, 1981.

PROJECT MANAGEMENT

General

Dedication - On October 10, 1980 the VLA was formally dedicated at a ceremony attended by 600 guests and staff members. Dr. Frank Press, Science Advisor to the President, was the principal speaker.

Open House Days - On October 24, 1980 the VLA hosted some 200 College and High School students at an Open House. On October 25, 1980 the VLA was open to the General Public. Approximately 2,000 persons attended.

Revised 1980 Program Plan - On October 14, 1980 the Foundation approved the revision to the VLA 1980 Program Plan which was submitted September 26, 1980. This approved the reallocation of funds so that the $850,000 DEC-10 upgrade could proceed.

New Mexico Gross Receipts Tax - To our knowledge the appeal has not yet been scheduled for hearing before the Tenth District U.S. Court of Appeals in Denver.

Personnel

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

Division	Budgeted 12/31/80 Level	9/30/80 Level	Additions	Reductions	10/31/80 Level
Site & Wye	10	9	0	0	9
Antenna Division	17	17	0	0	17
Electronics	45	44	0	2	42*
Site Management	6	5	0	0	5
Computer Division	15	17	0	0	17
Operations Div.	12	13	0	0	13
Project Mgmt.	26	23	2	1	24*
TOTAL	131	128	2	3	127

*Does not include two part-time employees.

10/31/80

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
P.O. S-07990	AIL Division Cutler-Hammer	Parametric Amplifiers	9/21/78	$ 212,800	Complete by 1/21/80	11½ sets received.
P.O. S-08329	Contact Systems, Inc.	Various Wiring Modules	10/31/78 1/19/79	30,486		On schedule. NRAO owes them additional components for assembly.
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 Contracting Co., Inc.	Phase V Construction	4/26/79	2,820,000	Sept., 1980	Complete, final amendment pending.
P.O. S-09849	BWH/CVA Joint Ventures	A/E Service Phase V	5/16/79	39,000	Dec., 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-11481	Century Data Systems	Disk Drives	2/15/80	64,078		Completed Nov. 4, 1980.
P.O. S-11478	Digital Equipment Corp.	Computer Systems	2/27/80	74,635	Feb. '81	

NATIONAL RADIO ASTRONOMY OBSERVATORY

VERY LARGE ARRAY

STATUS AS OF OCTOBER 31, 1980

TOTAL PROGRAM

PROGRAM 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	26,667,703	34,434	26,321,003	11,520,538	14,800,465	140,674	26,461,677	206,026
12000	ANTENNA	22,742,286	3,161	22,611,270	17,941,560	4,669,710	97,742	22,709,012	33,274
13000	ELECTRONICS	17,875,084	22,013	17,451,600	7,927,598	9,524,002	163,645	17,615,245	259,839
14000	COMPUTER	6,486,066	(106,057)	4,920,024	2,874,739	2,045,285	1,107,436	6,027,460	458,606
16000	SYSTEMS INTEGRATION	201,022	---	201,022	200,965	57	---	201,022	---
17000	PROGRAM MANAGEMENT	2,090,732	14,811	1,980,341	1,782,795	197,546	10,263	1,990,604	100,128
18000	COMMON COST	2,089,296	17,944	2,002,142	1,699,308	302,834	16,401	2,018,543	70,753
19000	CONTINGENCY/RESERVE	100,000	---	---	---	---	---	---	100,000
	SUB TOTAL	78,252,189	(13,694)	75,487,402	43,947,503	31,539,899	1,536,161	77,023,563	1,228,626
30000	RETIREMENTS	(67,979)	---	(67,979)	(67,979)	---	---	(67,979)	---
	TOTAL PROGRAM	78,184,210	(13,694)	75,419,423	43,879,524	31,539,899	1,536,161	76,955,584	1,228,626

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

VERY LARGE ARRAY

STATUS AS OF OCTOBER 31, 1980

CY - 80

PROGRAM 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	2,109,777	34,434	1,763,078	1,766	1,761,312	140,674	1,903,752	206,025
12000	ANTENNA	274,389	3,161	143,379	640	142,739	97,742	241,121	33,268
13000	ELECTRONICS	1,140,464	22,013	716,981	88	716,893	163,645	880,626	259,838
14000	COMPUTER	1,867,513	(106,057)	301,472	---	301,472	1,107,436	1,408,908	458,605
17000	PROGRAM MANAGEMENT	198,923	14,811	88,531	---	88,531	10,263	98,794	100,129
18000	COMMON COSTS	389,988	17,944	302,835	---	302,835	16,401	319,236	70,752
19000	CONTINGENCY	100,000	---	---	---	---	---	---	100,000
	TOTAL PROGRAM	6,081,054	(13,694)	3,316,276	2,494	3,313,782	1,536,161	4,852,437	1,228,617

Note: Project allocation for CY-80 consists of $4,500,000 in new funding plus $1,581,054 in prior year funds re-allocated in CY-1980.

NATIONAL RADIO ASTRONOMY OBSERVATORY
VLA PROGRAM

FINANCIAL STATUS REPORT
(in thousands)

As of: October 31, 1980

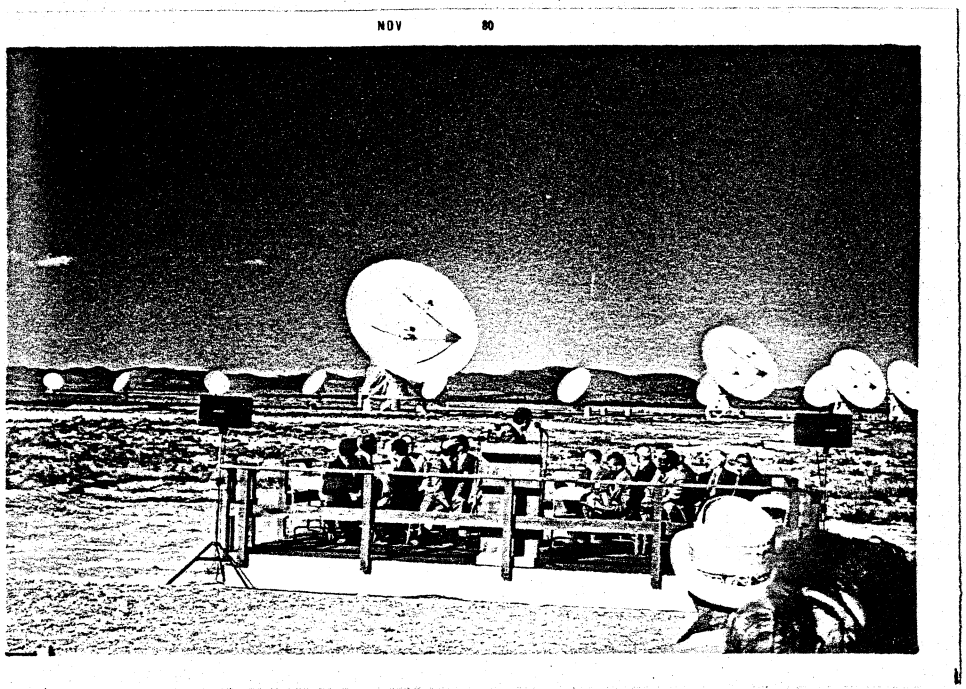
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10
Item	Program Ceiling	(A) Allocation to Date (C)			Un-Allocated Balance	Outlook (B)			Note
		Allocated	Expended and Committed	Allocated Balance		Estimate to Complete	Estimate Total	(Over) Under Ceiling	
Site and Wye	27,860	26,961	26,755	206	899	206	26,961	899	
Antennas	20,400	22,742	22,709	33	(2,342)	33	22,742	(2,342)	
Electronics	17,000	17,891	17,631	260	(891)	260	17,891	(891)	
Computer	4,850	6,486	6,027	459	(1,636)	459	6,486	(1,636)	
Systems Integration	400	201	201	-	199	-	201	199	
Program Management	2,650	2,108	2,008	100	542	100	2,108	542	
Common Cost	-	2,089	2,019	70	(2,089)	70	2,089	(2,089)	
Subtotal	73,160	78,478	77,350	1,128	(5,318)	1,128	78,478	(5,318)	
Contingency	2,840	100	-	100	2,740	100	100	2,740	
TOTAL	76,000	78,578	77,350	1,228	(2,578)	1,228	78,578	(2,578)	

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 October, 1980.

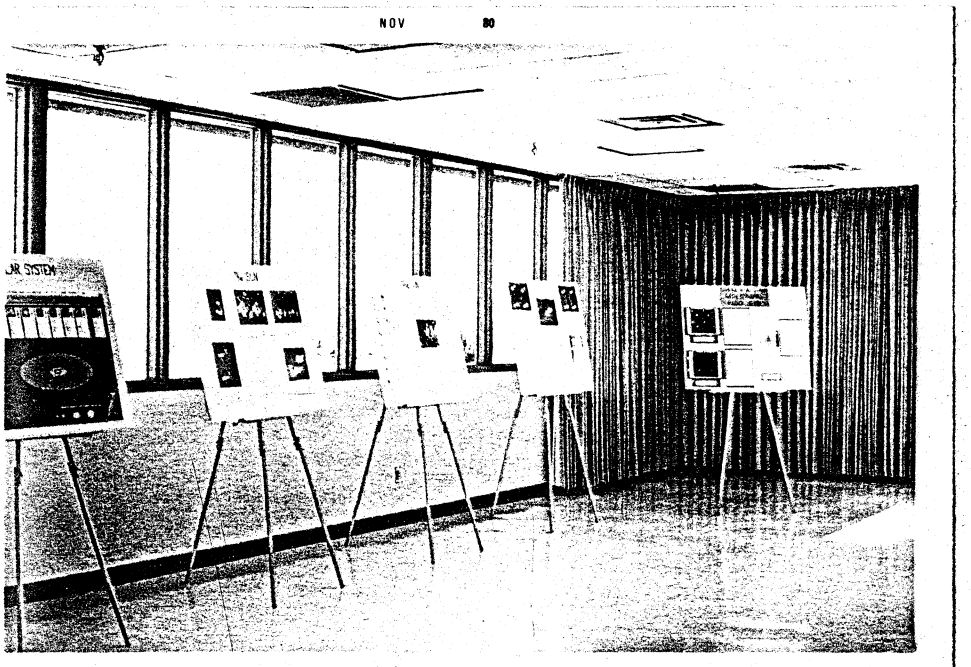
(C) Includes $4,500K in CY-80 Funding.

OCTOBER 10, 1980 DEDICATION PICTURES

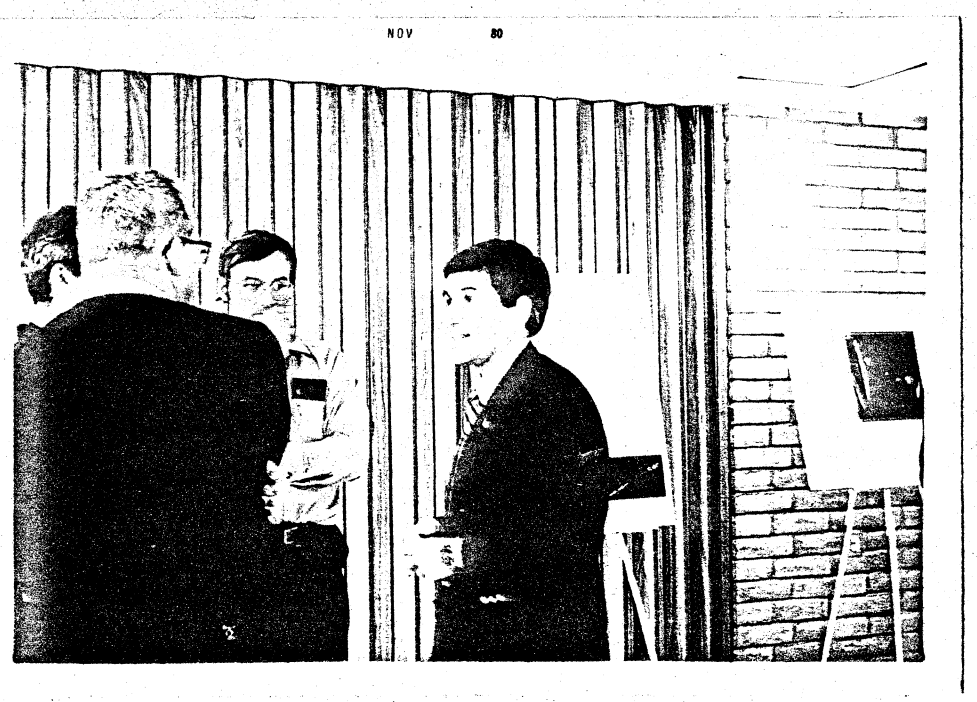


Dr. Morton Roberts and dignitaries on Speakers Platform turn to observe antenna movement at moment of dedication.

Dr. David Heeschen in display area.



Poster display area before the arrival of visitors.



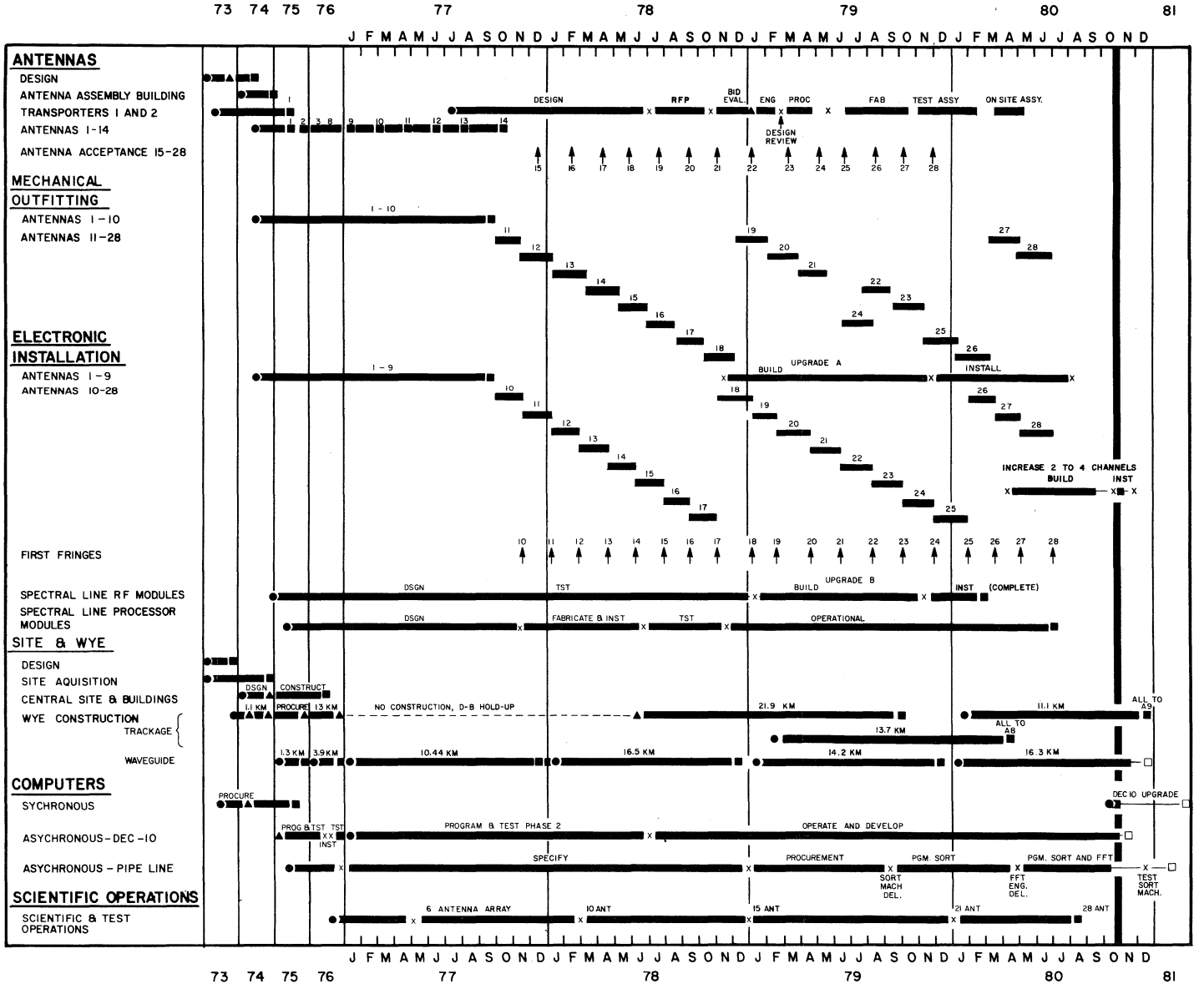
U.S. Senator Harrison Schmitt chatting with Dr. Carl Bignell and Dr. Robert Hjellming in the display area.

U.S. Senator Peter Domenici at the Antenna Assembly Building.

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA ACTIVITY SCHEDULE

UPDATE DATE: 11/01/80



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. (COMPLETED 03/03/80)
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.
4	9/1/80	SHOW BUILD & INST, 2 TO 4 CHAN
5	10/31/80	DEC 10 UPGRADE ADDED