FEBRUARY 1975

VLA MONTHLY PROGRESS REPORT

MARCH 11, 1975

NATIONAL RADIO ASTRONOMY OBSERVATORY

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NARRATIVE

Site and Wye Division

Combination heaters and air conditioners have been installed and are operating in the Prefabricated Service building. Installation of the interior partitions and doors, ceramic tile floors in the restrooms, electric lighting fixtures and outlets, the suspended ceiling, and the vinyl asbestos flooring have been installed. This Subcontract is estimated to be 96% complete.

All trackage under Subcontract VLA-34 has been installed, gaged and aligned to meet specifications. The water system has been completed and is operational. This Subcontract is approximately 98% complete with only minor items remaining to be corrected.

Work on Subcontract VLA-65, Phase II Construction, has commenced with the Subcontractor and his electrical and plumbing subcontractors moving onto the site. Engineering layout of the buildings, access road to the building, water lines, sewage lagoon access road, and parking lot have been completed.

The subgrade preparation below the cafeteria building has been almost completed. The Control Building subgrade is being prepared and the main access road to the buildings off of old Highway 60 has been cleared and stripped.

Electrical grounding for the antenna stations have been completed and tested at CW-5, CW-9, the master pad and the maintenance pad.

The water main connecting to that provided in the Phase I subcontract and running to the west side of the Control Building has been installed.

Shop drawings are being submitted for approval.

Antenna Division

Work continues to progress towards the completion of the Antenna Assembly Building. In the office section, the plumbing and restrooms have been completed. It is anticipated that the electrical installation will be completed by March 15, 1975.

Transporter

All components for the transporter are on hand at either E-Systems, Garland, or the VLA Site. The truck assemblies are approximately 90% complete. Logic boxes, control panels, control consoles, and cab assembly are essentially completed. The truck assemblies are all scheduled to be at the site by March 25, 1975. Assembly of trucks and transporter frame is anticipated to be

to be completed by March 30, 1975.

Electronics Division

Testing has commenced on the overall operation of subsystems making up large portions of the electronic system. One of these tests has been on the combination of the final I.F. amplifiers, the samplers, and the delay and multiplier system.

Another test involved the first front end, a part of the local oscillator system, the frequency converter modules and the modems. This test simulated the transmission of signals from the front end to the central electronics systems using a 60 dB attenuator in place of the long waveguide run and coupler. These tests were made possible by the completion of 90% of the modules and almost 50% of the bin and rack wiring for the first two antennas. The test results show that the system is operating essentially as expected, however, a number of minor problem areas requiring attention were revealed and are being pursued.

Major progress has been made with the waveguide couplers. A new design has been tried in which a spiral rectangular waveguide is milled into the wall of the circular waveguide. This version uses smaller coupling holes between the waveguides to reduce the excitation of unwanted modes in the circular waveguide. As a result, the strength of the coupled signal shows much less variation with frequency than in earlier models. A coupling of - 28.5 dB over a 1.5 GHz bandwidth with a variation of $\pm$ 0.5 dB has been achieved. This performance should be adequate for all but the most distant stations of the array, for which at least a year of further development can be allowed to obtain a coupler with lower coupling loss.

The support towers for the L-band feeds have been completed, and the K and Ku band feeds on the Model Vertex room at Green Bank have been mounted.

Testing of the front end continues, and failures of mixer diodes on cool down have not yet been fully overcome. A better understanding is being developed as to the main cause of these failures which appears to be defective solder joints in the diode packaging. The waveguide to coaxial transition for the C-band input has been redesigned, and the new version appears significantly better with regard to a loss problem that resulted in high noise temperatures in the first tests.

The modules of the monitor and control system, designed and fabricated under subcontract VLA-7, have proven to contain rather numerous minor problems in the complicated logic circuitry. These problems have slowed down testing, however, they are steadily being detected and corrected. Interconnection of the data set modules and part of the front end control circuitry was recently tested, and satisfacory operation obtained after some minor problems were rectified in the data set.

Computer Division

Asynchronous Sub-System

February 1975 was the first month during which the DEC-10 computer was entirely devoted to the software development effort that will be the main task of this Group until the summer of 1976. The final design of the CANDID command language continued as planned, with a combined effort on the definition of the syntax of the language and the identification of the primary language components. The implementation of a data base design using a SAIL-readable structure concept began with both a theoretical design of the initial VLA data base and experimentation with a "dummy" data base using the basic design concepts.

Work on the VLA simulation project continues with the coding and use of programs on the NRAO 360/65 to give printer wrap displays and evaluations of synthesizer beams.

The procedures for handling documentation on the DEC-10 have been completed. The processing of the text will be carried out on the NRAO 360/65 using the available SCRIBE program until SCRIBE-10 is completed.

Work continues on the hardware choices for the asynchronous sub-system display equipment with procurement for the first part of the system to start in March 1975. The associated software design of display capabilities also began as part of the overall effort to specify the initial system for which implementation will begin shortly.

Synchronous Sub-System

During February progress continued on the software interface of the digital communication routine. A preliminary version of the Ephemeris has been completed. A new software interface to the Superbee terminals has been installed. The array geometry routines are individually complete and are being interfaced to the rest of the software system.

Personnel

The personnel changes which have occured on the VLA Project during the month of February are delineated in the following table.

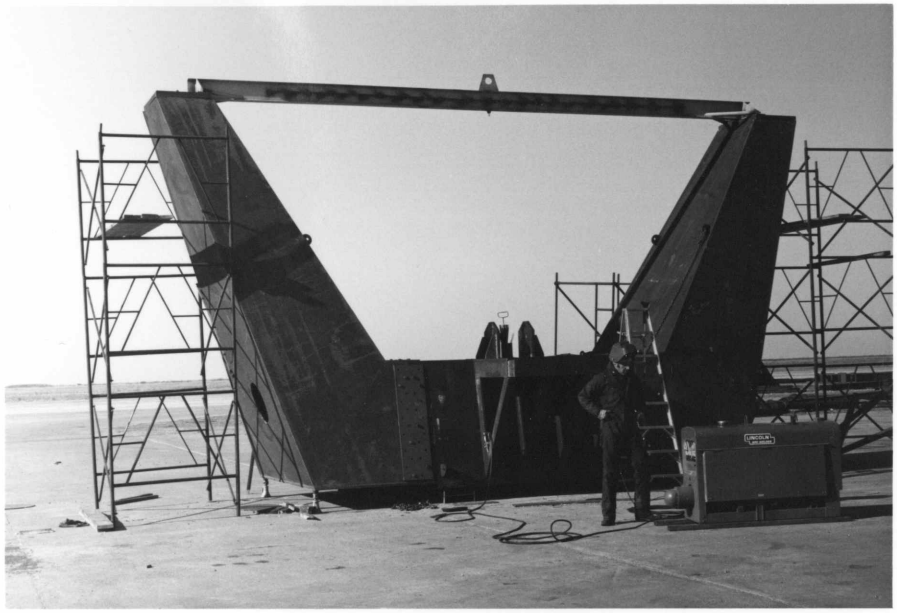
Division	Previous Level	Additions	Reductions	Current Level
Site and Wye	4			4
Project Management	10	2	1	11
Antenna	5		1	4
Electronics	29			29*
Computer	11			12**
Systems Integration	1			1
Totals	60	3	2	61

* Includes three part time people.
** Includes one part time person.

Project Management

All of the Fort Hood rail has been received at the VLA site. The take-up of 6.7 miles of track has started at Holloman AFB and should be completed early in April. A subcontract will be let for the take up of 6 miles of track at the Lincoln Ordnance Depot as soon as GSA completes the negotiation of railroad freight rates.

Inspection on rail at Hawaii, Aberdeen Proving Gound and Redstone Arsenal has been conducted. Analysis of the feasibility for obtaining this rail is in process.



p3-75-1 Antenna Yoke Assembly at Hobbs, New Mexico

p3-75-2 Antenna Pedestal with Bearing Support Mount at Hobbs, New Mexico

VLA PROJECT
PROCUREMENT ACTIVITIES INITIATED

RFP NUMBER	ITEM DESCRIPTION	ESTIMATED COST	ISSUE DATE	BID DUE DATE	SUBMISSION TO NSF DATE	AWARD DATE	CURRENT STATUS
VLA-98	Fabricated Metal Parts	$110,000	1/13/75	2/13/75			Two orders will be awarded within NRAO contractual authorization.
VLA-101	Labor Contract	$12,000	1/22/75	2/20/75	Expect to submit to NSF by 3/15/75		
052439	Cross ties	$55,000			Submitted to NSF for approval 1/31/75		Replaces VLA-62 which was cancelled because of better price.
VLA-5	Engineering and Architectural services Amendments 7 and 8	$42,679			Submitted to NSF for approval 2/6/75		Amendment No. 7 increases contract by $42,679 to cover supervision of Phase II Construction. Amendment No. 8 withholds $17,000 from Title II.
VLA-106	Solid State Amplifiers	$24,154	2/18/75	3/4/75			Initial order will be within NRAO contractual authorization; however there are options that may be exercised by 9/1/75 that will increase the Purchase Order to approximately $70,000.
VLA-104	Gunn Diode Pump Source	$28,000	2/7/75	2/26/75			Initial order is within NRAO contractual authorization; however, there is an option that may increase Purchase Order to approx. $51,000 if it is exercised.

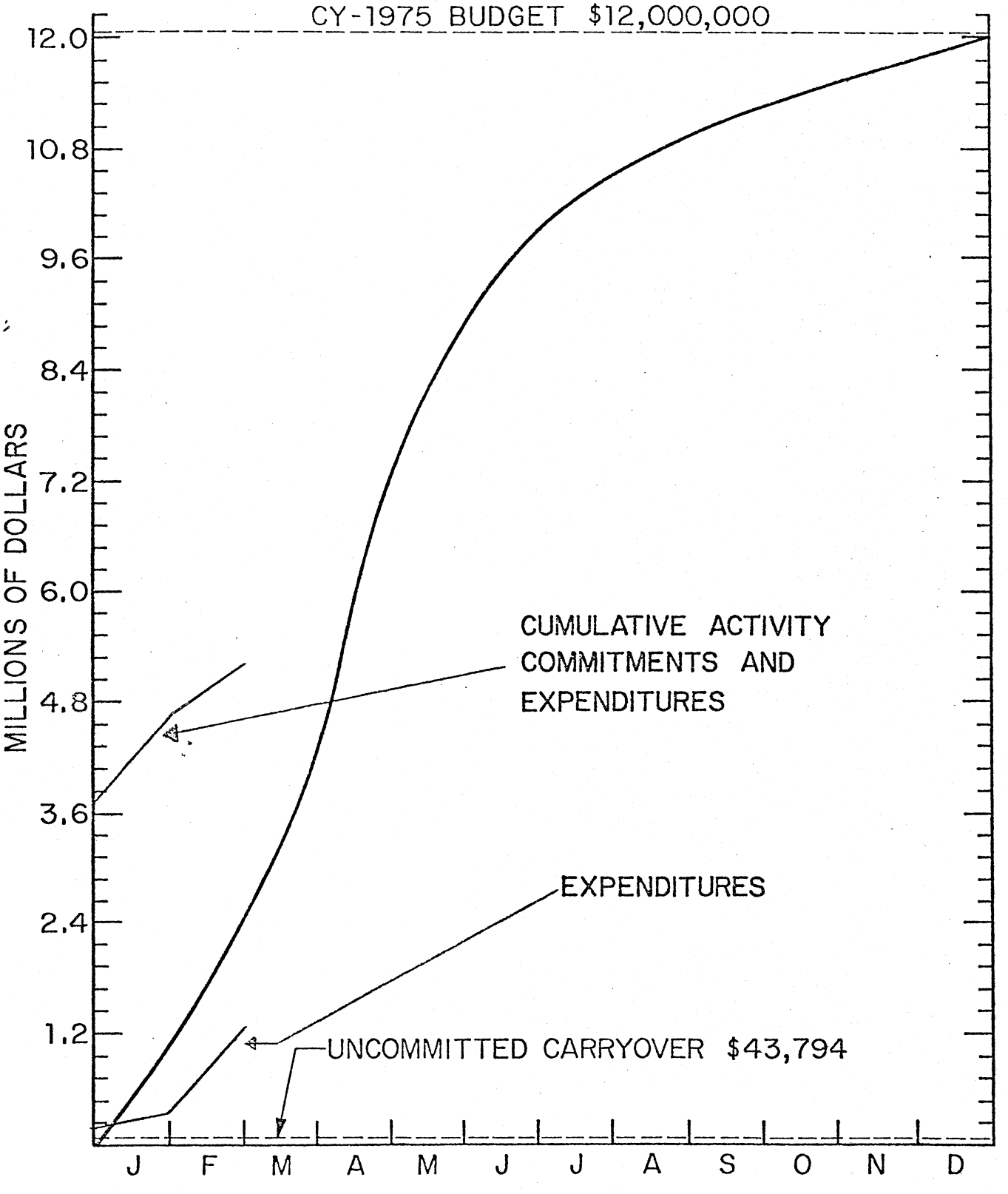
VLA PROJECT
MAJOR SUBCONTRACTS AND PURCHASE ORDERS PLACED

NUMBER P.O. SUBCONTRACT	VENDOR	ITEM DESCRIPITON	DATE PLACED	DOLLAR AMOUNT	DELIVERY DATE	CURRENT STATUS - ALL FIRM FIXED PRICE CONTRACTS EXCEPT WHERE NOTED
VLA-5	BWH/CVR Joint Venture	E/A Title I and II	6/17/73	$907,782	3/15/74 12/31/74 1/15/75	Title I - Completed Title II - 97% completed Title III - Work in progress in conjunction with VLA-34. Fixed price plus cost reimbursables. $814,600 expended to date.
VLA-6	E-Systems, Inc.	28 Radio Telescopes	10/18/73	$17,275,227	7/31/74	Design complete, antenna structural components are being fabricated at Hobbs, New Mexico. Servo System started production December 1, 1974. Construction of Assembly Building is nearing completion. Amendment No. 11 has been executed and returned by E-Systems.
VLA-10	E-Systems, Inc.	Antenna Transporter	1/30/74	$393,396	7/31/74	Design complete. Majority of components received by E-Systems. Fabrication underway.
VLA-14	Comtech Lab. Inc.	Parametric Amplifiers	3/13/74	$224,000	7/15/75	10 each additional parametric amplifiers* purchased for antennas 3, 4, 5, and 6 and Kitt Peak on Amendment No. 1.
VLA-16	AIL	Up-converters	3/14/74	$98,063	7/1/75	Option to purchase 8 additional units executed under Amendment No. 3 increases Subcontract by $41,009.
VLA-29	Sterling-Detroit	Focusing Feed Mounts	6/17/74	$86,174	3/1/75	Delivery will be about 4/1/75 due to delay in Subcontractor's receipt of castings.
VLA-34	Burn Const. Co.	Initial Construction	6/17/74	$605,000	1/15/75	Construction 98% complete.
VLA-44	Digital Equip. Corp.	Asynchronous Computer	6/17/74	$990,869	2/15/75	Major part of system delivered 12/16/74. Acceptance tests completed 1/30/75. Balance of system is due 3/15/75.
VLA-62 P.O. 51771	John Phariss	Cross Ties	8/27/74	$70,000	11/29/74	Partial shipments have been received. Deliveries being held up because of weather.

* $28,000 for 2 Kitt Peak amplifiers has been charged to NRAO general operation and maintenance.

NUMBER P.O. SUBCONTRACT	VENDOR	ITEM DESCRIPITON	DATE PLACED	DOLLAR AMOUNT	DELIVERY DATE	CURRENT STATUS - ALL FIRM FIXED PRICE CONTRACTS EXCEPT WHERE NOTED
VLA-52 P.O. 51770	MNIMT	Equipment and equipment operator	9/6/74	$9,500	8/15/75	Blanket Purchase Order awarded for Sept. 1, 1974, through August 31, 1975.
VLA-66	Dura-Bilt Prod. Inc.	Prefab Service Building	10/4/74	$111,281	2/10/75	Construction is about 95% complete.
P.O. 046022	Industrial Design Engineering Assoc.	Labor hour contract for temporary draftsman	7/1/74	$17,500	5/1/75	Draftsman is at work in VLA Drafting Room.
VLA-65	Geo. A. Rutherford, Inc.	Site Construction Phase 2	12/16/74	$2,386,600	6/1/76	Work began week of February 24, 1975
P.O. 52322	Sumitomo Electric USA Inc.	1313 pieces of waveguide 1350 each coupling sleeves	1/27/75	$429,975	9/30/75	Order accepted 2/10/75 by vendor.
P.O. 52432	Hitachi Shibaden Corp. of America	3 ea. Waveguide Signal Distributors	2/7/75	$230,000	12/15/75	Order accepted 2/13/75 by vendor.
P.O. 052439	A and K Railroad Materials, Inc.	10,000 ea. cross ties	2/21/75	$55,000	7/1/75	Partial delivery has been made.
P.O. 052360	Longwill-Scott, Inc.	Take-up rail at Holloman AFB	1/31/75	$82,502	5/31/75	Vendor began work week of 3/3/75.

VLA-PROJECT REPORT
EXPENDITURES AND COMMITMENTS
CY-1975 CUMULATIVE ACTIVITY



CY 1975

VERY LARGE ARRAY

Status as of Feb. 28, 1975

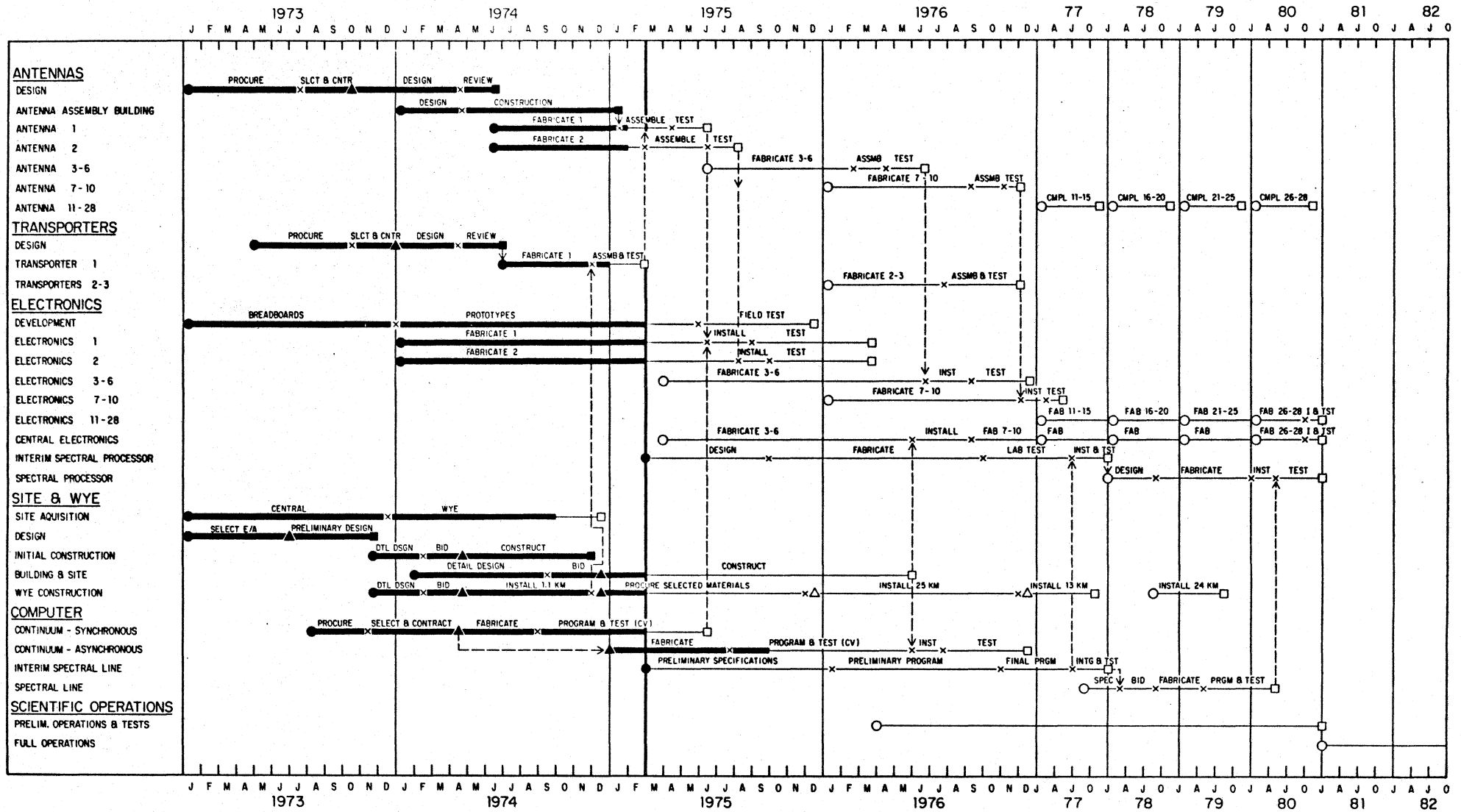
Project Number	Description	Allocation	Monthly	Expended	Committed	Total	Balance	Outstanding Obligations Pending	Major Procure. Pending	Net Cumulative Free Bal
11000	Site and Wye	4,358,728	6,765	255,686	3,145,483	3,401,169	957,559	151,073	-	806,486
12000	Antenna System	2,544,000	10,100	21,292	7,988	29,280	2,514,720	98,160	2,369,635	46,925
13000	Electronic System	2,799,066	40,261	141,387	495,654	637,041	2,162,025	423,920	-	1,738,105
14000	Computer System	1,442,000	17,171	788,447	294,745	1,083,192	358,808	175,977	-	182,831
16000	Systems Integration	98,000	1,965	5,261	411	5,672	92,328	19,934	-	72,394
17000	Project Management	421,000	16,315	41,402	43,144	84,546	336,454	144,352	-	192,102
	Contingency	381,000	-	-	-	-	381,000	-	-	381,000
	Total VLA	12,043,794	92,577	1,253,475	3,987,425	5,240,900	6,802,894	1,013,416	2,369,635	3,419,843

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA ACTIVITY SCHEDULE

11/15/74

UPDATE DATE: 01 MARCH 1975



ABBREVIATIONS

ASSEMBLE - ASSMB	CH-VILLE - CV	INSTALL - INST	PROGRAM - PRGM
COMPLETE - CMPL	DESIGN - DSGN	INTEGRATE - INTG	SELECT - SLCT
CONTRACT - CNTR	DETAIL - DTL	NEW MEXICO - NM	

SYMBOLS

- ○ START OF A PHASE
- △ CONTRACT AWARD
- × END OF AN ACTIVITY
- □ END OF A PHASE

REV. #	REV. DATE	REVISION