JANUARY 1975

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA MONTHLY PROGRESS REPORT

JANUARY 1974 5

NARRATIVE

Site and Wye Division

Title II work by the E/A firm continues to progress and is estimated to be 97% complete. The earthwork recalculations along the wye arms have been completed and adjustments of the grades are in progress. Waveguide layouts and profiles are still being reviewed.

All plumbing lines in the prefabricated service building have been installed and insulated. Plumbing fixtures will be placed after the floor coverings are situated. Approximately 90% of the electric conduit has been run and wire is now being pulled for lighting fixtures and duplex outlets. The main building service has been installed and is in service. The interior partitions are 90% complete and prehung doors have been installed. Combination heaters and air conditioners are being installed in the building walls. This total subcontract is estimated to be 80% complete.

All antenna foundation bare plates have been installed on the concrete pedestals as required under Subcontract VLA-34. Final alignment remains to be done.

The main line track from CW5 to CW9 has been aligned and gaged. It is now ready for final adjustment. All spur trackage has been spiked and preliminarily aligned. All the special interchange timbers have been installed and the track inserts have been delivered to the site. The road crossing on old Highway 60 at the Antenna Assembly Building is installed.

All of the water piping from the well to the Antenna Assembly Building has been run and tested. The chlorine ejector and appurtenances have been installed in the chlorine room of the Pump House. All of the electric work has been completed in the Pump House with the exception of pump controls wiring.

Totally, Subcontract VLA-34 is estimated to be 96% complete.

No construction work at the site has been performed on Subcontract VLA-65. Shop Drawing submittals are being transmitted for approval.

Antenna Division

Trial assembly of the reflector for Antenna No. 1 has been started and trial assembly of the yoke and alidade section for Antenna No. 1 is approximately 50% complete. The pedestal azimuth bearing mount and pedestal base

trial assembly is subject to a delay of about three weeks because of a slippage in machining of the azimuth bearing support housing. Assembly of these parts is anticipated to start the first week of February with completion by the end of February.

Forgings for the azimuth bearing and gear are in the final stages of completion. They are now scheduled to be delivered to the azimuth bearing vendor by February 7, 1975, who anticipates completion of the bearing for Antenna No. 1 by March 14 with second bearing following in about 2 weeks.

All gear box parts for Antennas No. 1 and 2 are in process at the manufacturer. It is anticipated that the gear boxes will be ready for acceptance testing by March 28, 1975.

The servo system is progressing on schedule and the vendor is now waiting for delivery of motors and data system for Antenna No. 1. Estimated factory test and acceptance date is March 12, 1975. Factory test procedure and O & M Manuals have been received by E-Systems and are being transmitted to AUI. The data system is essentially complete and acceptance testing is scheduled for the week of February 14.

Antenna Assembly Building

The structural portion of the building is complete with all of the siding installed. The electrical installation is in progress. The traveling crane is scheduled for manufacturer's checkout during the first week of February. Completion of office, rest room, and plumbing fixtures installation is expected in February.

Transporter

The truck assemblies are at E-Systems and are being assembled. Completion of the first truck is anticipated by February 5, 1975. All materials for truck assembly No. 1 are on hand and balance of materials for trucks Nos. 2, 3, and 4 is expected by February 13, 1975.

The control boxes, control equipment and control components are on hand at E-Systems and assembly is in progress at E-Systems' plant. It is anticipated that all assembled components will be shipped to the VLA Site by March 10, 1975. Major components such as diesel engine, hydraulic pumps, crane, and auxiliary generator are ready at suppliers plants and will be shipped to the VLA Site for assembly on transporter. The main frame weldment is at the Site and assembly is expected to begin during the last week in February.

Electronics Division

The model vertex room has been set up at Green Bank with the 14.4 - 15.4GHz and 22 - 24GHz bands feed horns mounted and ready for tests of the waveguide interconnection to the front-end. The matching of the horns to the circular and linear polarization junctions was measured and found to be satisfactory.

Tests on the first front-end are continuing with good progress although some problems remain. A noise temperture of 200°K was measured at K band (22 - 24 GHz) during one test. This is the lowest achieved so far for the cooled mixer system in this frequency band. David B. Coombs joined the VLA electronics staff as Cryogenics Specialist during January. He has many years of experience in refrigeration and vacuum systems for low noise receivers.

Measurements have been made on the test section of waveguide which was buried at the VLA site in December 1973. The mechanical "mouse" was used and the straightness of the waveguide was found to be within the required specifications. A test assembly of the couplings on the recently received waveguide showed some problems which can probably be solved by the development of an alignment system for use during assembly. Otherwise some machining of the couplings may be necessary.

Testing of the Monitor and Control modules supplied under Subcontract VLA-7 has continued. Numerous minor modifications have been necessary, and all of the problems encountered thus far have been overcome. Interfacing of the Serial Line Controller to the synchronous (Modcomp) computer is now complete and satisfactory transmission of data in both directions between the computer and the Monitor and Control system has been achieved. The first model of a Data Simulator module developed at NRAO has been constructed and is ready for testing. This module allows test data to be sent through the Monitor and Control system without the use of the computer.

In most areas of the system the electronic modules are largely completed and effort is being concentrated on wiring the racks and bins and incorporating the power supplies. As this is completed larger numbers of modules can be brought into simultaneous operation, and testing of the overall system performance can begin.

Computer Division

Asynchronous Sub-System

During January the major portions of the asynchronous computer were accepted and the software development phase of the project has started. The Computer Group is gaining in "hands-on" experience with programming and operation of the computer.

Planning for the multi-stage procurement of auxiliary equipment continues to progress.

Synchronous Sub-System

The digital communications system has been interfaced to the synchronous computer. The initial software for the system is being debugged and used to debug the DCS. The array geometry routines are complete, except for the ephemeris routines, which are being worked on. Time consuming problems of inter-CPU communications will probably be solved in the long run by a block of shared core.

Project Management

Take up of the 2.3 miles of rail at Fort Hood was started and shipments are being received at the site. The subcontract for the take up of the 6.7 miles of rail at the Holloman AFB has been awarded to the same company doing the work at Fort Hood. Work on this subcontract will commence shortly. Also, a RFP has been issued for the take up of 6 miles of rail at the Lincoln Ordnance Depot.

Approximately 44 miles of excess railroad track at Lualualei and West Loch, Hawaii has been frozen for the project. The Site and Wye Engineer will inspect this rail early in February to ascertain its usability; and a study is underway to determine the economic feasibility of obtaining this rail.

Personnel

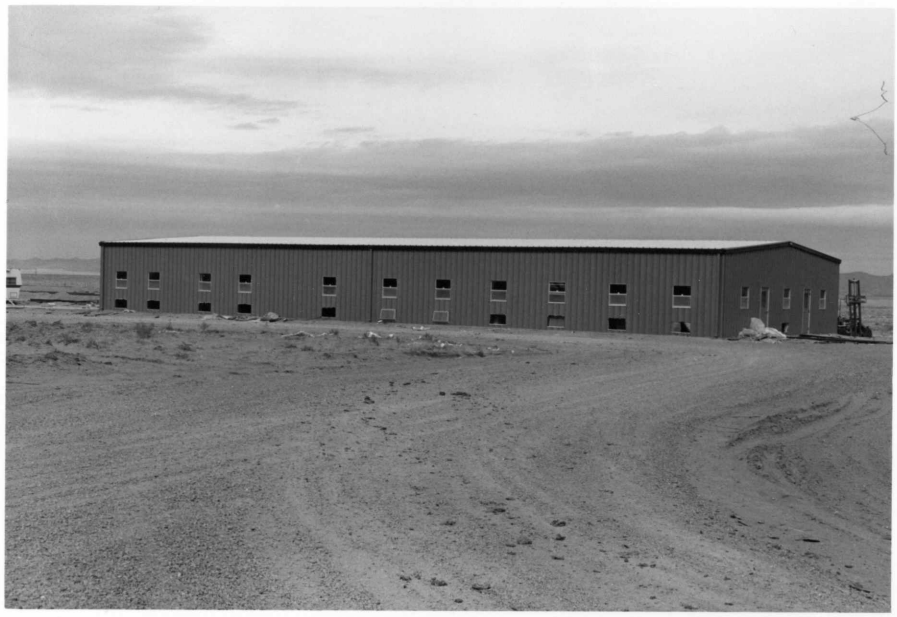
The personnel changes which have occurred on the VLA Project during the month of January are delineated in the following table.

Division	Previous Level	Additions	Reductions	Current Level
Site and Wye	4			4
Project Management	11		1	10
Antenna	5			5
Electronics	27*	2		29
Computer	11	1	1	11
Systems Integration	1			1
Totals	59*	3	2	60*

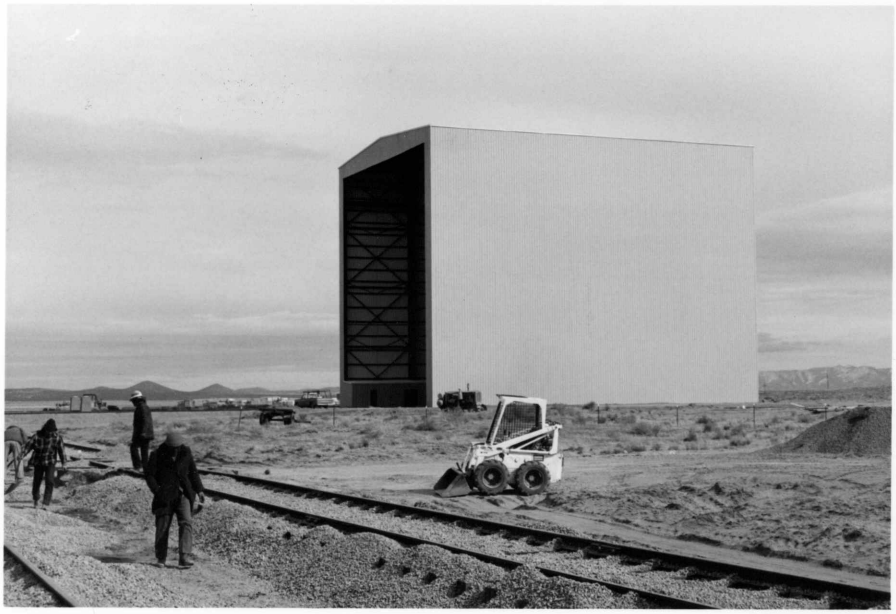
*Includes three part time people.

p2-75-1 Partially completed transporter frame inside of the Antenna Assembly Building.

p2-75-2 Pedestals with the antenna base plates installed at the Maintenance Pad.



p2-75-3 Service Building viewed from the Southwest.



p2-75-4 Antenna Assembly Building viewed from Station CW 9.

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-72	Waveguide signal distributor	$200,000	9/16/74	11/8/74	Submitted to NSF for approval 1/30/75		
P.O. 052055	Labor hour contract for temporary Electronic Technician	$3,000			Submitted to NSF for approval 11/26/74		Order approved by NSF on 12/13/74. Order will not be issued; we have hired permanent employee.
VLA-78	Take up of Rail at Holloman AFB	$80,000	11/8/74	12/6/74	Submitted to NSF for approval 1/13/75		NSF approval received 1/31/75. Expect to mail P.O. by 2/3/75.
VLA-79	Take up of rail at Ft. Hood, Texas	$40,000	12/13/74	1/8/75			Within NRAO contractual authorization.
VLA-93	Truck mounted derrick	$40,000 to $50,000	12/20/74	1/17/75			Purchase has not been made but price is within NRAO contractual authorization.
VLA-98	Fabricated Metal Parts	$110,000	1/13/75	2/13/75	Expect to submit to NSF by 2/28/75		
VLA-101	Labor Contract	$12,000	1/22/75	2/20/75	Expect to submit to NSF by 3/7/75		
052439	Cross ties	$55,000			Submitted to NSF for approval 1/31/75		Replaces VLA-62 which was cancelled because of better price.

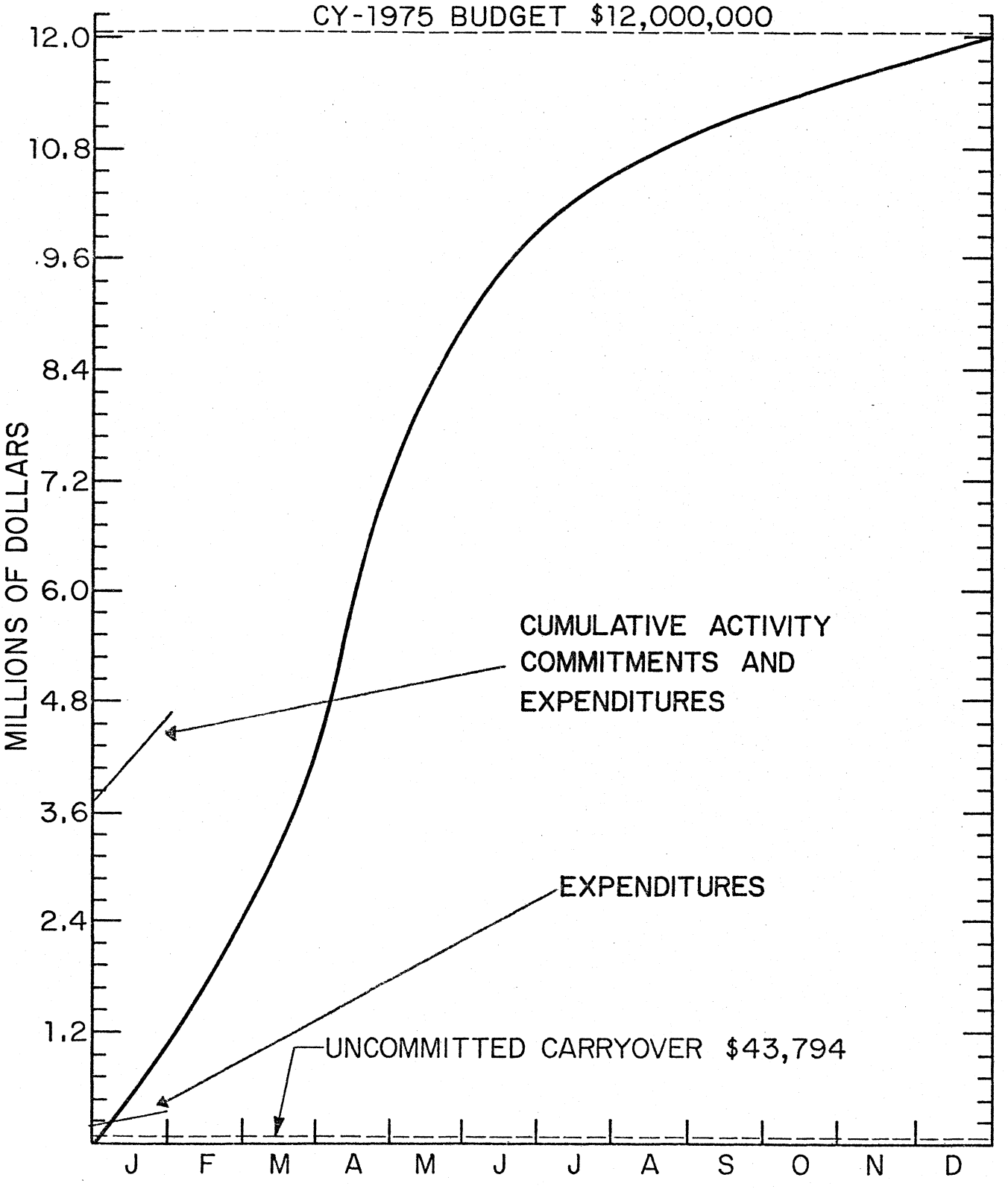
VLA PROJECT
MAJOR SUBCONTRACTS AND PURCHASE ORDERS PLACED

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	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. 9 for antennas 3, 4, 5, and 6 has been sent to E-Systems.
VLA-7	Metric Systems Corp.	Digit. Comm. System	11/15/73	$76,846	8/12/74	Hardware has been delivered to NRAO. Documentation is in final stages of review prior to acceptance.
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 Sub-contractor's receipt of castings.
VLA-34	Burn Const. Co.	Initial Construction	6/17/74	$605,000	1/15/75	Construction 96% complete.
VLA-43	Mod. Comp. Sys.	Synchronous Computer	6/24/74	$248,616	9/15/74	Order is 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 2/28/75.
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 DESCRIPTION	DATE PLACED	DOLLAR AMOUNT	DELIVERY DATE	CURRENT STATUS - ALL FIRM FIXED PRICE CONTRACTS EXCEPT WHERE NOTED
VLA-52 P.O.51770	NMIMT	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-62 P.O.51830	John Phariss	Cross Ties	9/17/74	$80,000	1/15/75	Order cancelled 1/31/75.
VLA-66	Dura-Bilt Prod. Inc.	Prefab Service Building	10/4/74	$111,281	2/10/75	Expect construction to be completed by March 1, 1975.
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	Some shop drawings received. Expect to start work by week of 2/17/75.
P.O. 52322	Sumitomo Electric USA Inc.	1313 pieces of waveguide 1350 each coupling sleeves	1/27/75	$429,975	9/30/75	Order mailed to vendor 1/28/75.

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



FY 1974

VERY LARGE ARRAY

Status as of January 31, 1975

Project Number	Description	Allocation	Monthly	Expended	Committed	Total	Balance	Outstanding Obligations Pending	Major Procure. Pending	Net Cumulative Free Bal
11000	Site and Wye	907,608		715,001	189,847	904,848	2,760	-	-	2,760
12000	Antenna System	2,451,950		208,527	2,244,575	2,453,102	(1,152)	-	-	(1,152)
13000	Electronic System	1,459,488		1,244,720	227,396	1,472,116	(12,628)	-	-	(12,628)
14000	Computer System	413,694		398,255	15,439	413,694	-0-	-	-	-0-
16000	Systems Integration	-		669	-	669	(669)	-	-	(669)
17000	Project Management	249,300		234,775	635	235,410	13,890	-	-	13,890
	Contingency									
	Total VLA	5,482,040		2,801,947	2,677,892	5,479,839	2,201	-	-	2,201

VERY LARGE ARRAY

Status as of January 31, 1975

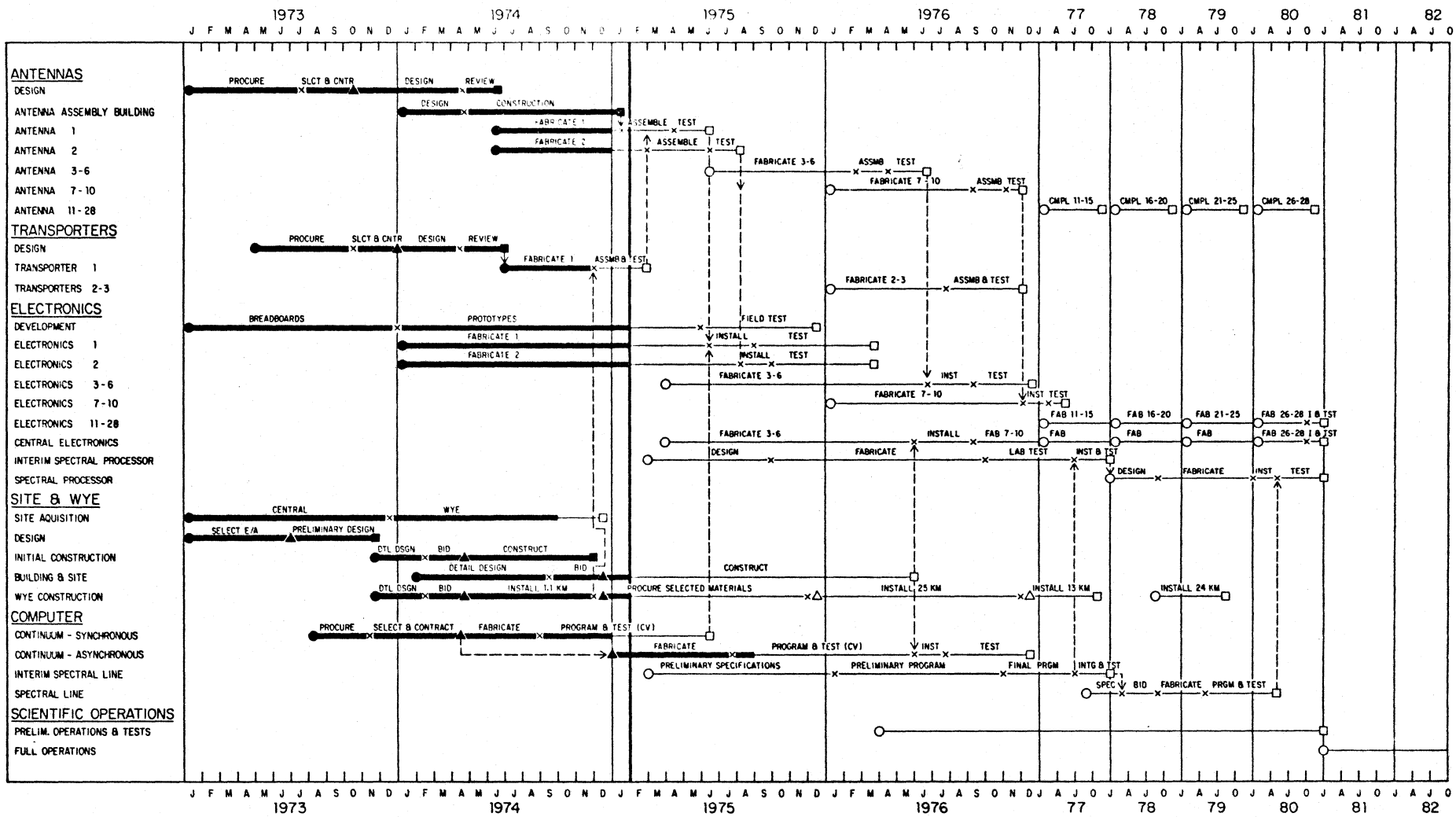
Project Number	Description	Allocation	Monthly	Expended	Committed	Total	Balance	Outstanding Obligations Pending	Major Procure. Pending	Net Cumulative Free Bal
11000	Site and Wye	4,358,728	6,765	184,007	3,183,648	3,367,655	991,073	80,263	-	910,810
12000	Antenna System	2,544,000	10,100	10,279	7,840	18,119	2,525,881	108,258	2,378,000	39,623
13000	Electronic System	2,799,066	37,175	59,822	154,953	214,775	2,584,291	479,515	-	2,104,776
14000	Computer System	1,442,000	15,686	49,137	1,013,319	1,062,456	379,544	191,090	-	188,454
16000	Systems Integration	98,000	2,146	2,155	1,474	3,629	94,371	21,612	-	72,759
17000	Project Management	421,000	16,487	18,701	43,315	62,016	358,984	160,620	-	198,364
	Contingency	381,000	-	-	-	-	381,000	-	-	381,000
	Total VLA	12,043,794	88,359	324,101	4,404,549	4,728,650	7,315,144	1,041,358	2,378,000	3,895,786

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA ACTIVITY SCHEDULE

11/15/74

UPDATE DATE: 01 FEBRUARY 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