NOVEMBER 74

VLA MONTHLY PROGRESS REPORT

DECEMBER 10, 1974

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA MONTHLY PROGRESS REPORT

NOVEMBER 1974

NARRATIVE

Site and Wye Division

Title II work by the E/A firm is progressing and is estimated to be 96% complete. Waveguide profiles and layout along the arms and from the apex of the wye to the control building are being developed. Bids were received on the revised Phase II construction on November 19, 1974. Two bids were received and George A. Rutherford, the low bidder on the original solicitation, was again low with a bid of $2,386,600. A contract for this work has been prepared and has been transmitted to the Foundation for approval.

An amendment to Subcontract VLA-66 for the Prefabricated Service Building has been prepared in the amount of $2,973 to provide for a concrete slab for the vertex room mock-up, and the wooden test stand for the cryogenics compressor at the northwest corner of the Service Building.

111,882
2,973
114,855

The buried plumbing and electrical lines under the concrete floor slab have been installed and the floor slab and its appurtenances have been poured.

The steel structure, siding and roofing have been delivered to the subcontractor in Albuquerque and will be transported to the site in December. Erection will commence at that time. This subcontract is estimated to be approximately 10% complete.

The earthwork under Subcontract VLA-34, Phase I Construction, is estimated to be 99% complete, with only minor work remaining to be done on slope cleanup, and the base course has been installed for all new roads.

The below grade portions for all the antenna foundations have been completed, and the above ground pedestals for the maintenance pad have been formed and will be poured the first week in December. Waveguide encasements have also been installed for all of the antenna foundations.

All of the rail has been laid and roughly aligned from CW5 to CW9. Track has not been laid out to the antenna foundations as yet, but the new ties and timbers required for construction of the interchanges have been delivered to the site.

The underground piping at the pump house has been installed and tested, and the walls of the pump house are complete. The hydropneumatic pressure tank has been installed on its concrete saddles inside the building, forms for the roof slab have been installed, and it will be poured early in December.

This subcontract is estimated to be approximately 75% complete.

Antenna Division

Antennas

As of late November the antenna fabricator has received essentially all steel for manufacture of the first two antennas. The ring beams for these antennas have been completed and painted with the prime coat. The yoke and alidade sections of the antennas are approximately 80% complete, and the azimuth bearing weldments are ready for machining. The pedestal bases are complete and ready for painting, and the radial beams for the reflector are approximately 50% complete.

On November 26 E-Systems advised us that their vendor was having difficulty with the delivery of the castings for the main horizontal bearing. The full effect of this is not known at present, but it is estimated that the completion of the first prototype antenna will be delayed by several weeks.

The apex ring structure arrived in Green Bank on November 20 for trial assembly of feeds by the Electronic Division.

Antenna Assembly Building

Erection of the structural steel is in process with the columns in place and the rigid frames spanning the roof installed. Placement of the siding has also begun.

Transporter

The frame weldment has been completed, painted, and is now ready for shipment to the site. The truck frame weldments have been completed and shipped to E-Systems for assembly of wheels, axles, bearings and operating cylinders.

Electronics Division

The design has now been completed for the electronics trailer in which the central control equipment and the synchronous computer will be housed for the two-element prototype testing to be performed from mid-1975 to mid-1976. The trailer is now being bid.

About four weeks delay in the delivery of the L-band feeds has been predicted by the manufacturers, Structural Technology, Inc. The feed for the first antenna will be delivered on January 31, which removes most of the slack time in that part of the procurement plan, but does not, as yet, result in any delay in the testing phase. Expediting efforts are underway to ensure no further slippage. The system of noise sources and couplers for introducing calibration signals at the receiver inputs has been designed and assembled for the first two antennas.

The L-band upconverters for the first front end have been received and installed in the dewar. The upconverter pump module has also been designed and tested. Most of the electronics for the whole front end rack for the first antenna is now at a sufficient stage of completion to allow front end performance tests to begin.

In the local oscillator system the multiplier units which produce 1200 MHz and 1800 MHz frequencies from the standard 600 MHz were received early this month. Tests indicated good performance and specifications were slightly exceeded with regard to output power levels. Much of the oscillator system electronics that has been in a stage of partial completion is now being finished, and ten more modules were successfully tested during the past month.

The modems received from two of the three suppliers are being integrated into modules with related parts of the system. These will meet the need for the two prototype antennas. The third supplier has had difficulty in meeting the development specifications. If delivery of a satisfactory item has not been made when procurement for antennas 3 through 6 is undertaken, this supplier will not be solicited. Design of the first two antenna couplers has been completed, and the manholes in which they will be installed are now out for bids. A reinforcing bracket for the couplers has been designed to support the couplers against the stress in the waveguide resulting from temperature changes. Bids on the waveguide signal distribution system mentioned in the report for September have been received from only two companies, Marconi and Hitachi. Both bids are much higher than anticipated and possible modification of the specifications is being considered.

In the control and monitor system about 80% of the hardware built under subcontract has now been received. Units of the local buffer, data tap, data set and serial line controller have been operated satisfactorily, although a small technical problem in the clock system held up progress for a few days. The command simulator unit, which is being made by NRAO, has been designed and is now in the construction stage.

Computer Division

Asynchronous Sub-System

During November the final modification of the Gallery Mall Building for the asynchronous computer and the associated software development group was completed in preparation for the arrival of the computer.

The initial definition of program coding standards and of the data base design were completed, as was the initial portion of the VLA map, and u-v plane, simulation project. The project book for the asynchronous software development project was reorganized and the change from the old to the new plan of organization begun. Most of the manuals on the DEC 10 computer and its languages have arrived permitting the programming staff to commence becoming familiar with the equipment prior to its delivery in mid-December.

Synchronous Sub-system

During November the dual CPU software system has been perfected further, which now enables both background and foreground jobs to be run in the two computers, with complete sharing of peripheral resources. Coding has also proceeded on the VLA geometry routines, which solve the spherical triangles involved at the appropriate rates. During November a new programmer, K. Sowinski, started with the VLA Synchronous group, and has been learning and doing preliminary coding for the digital communication system.

Project Management

Effort to obtain excess rail continues with an award of a contract for the pick-up of the Holloman Air Force Base rail (6.7 miles) awaiting finalization of the property transfer.

The GSA Public Utilities Specialist has completed his review of the proposed rates and subcontract with the Socorro Electric Cooperative for electric service to the VLA site. It is expected that his recommendations will be received in December and that the subcontract will be submitted for approval to the Foundation and the various public utilities regulatory agencies shortly thereafter.

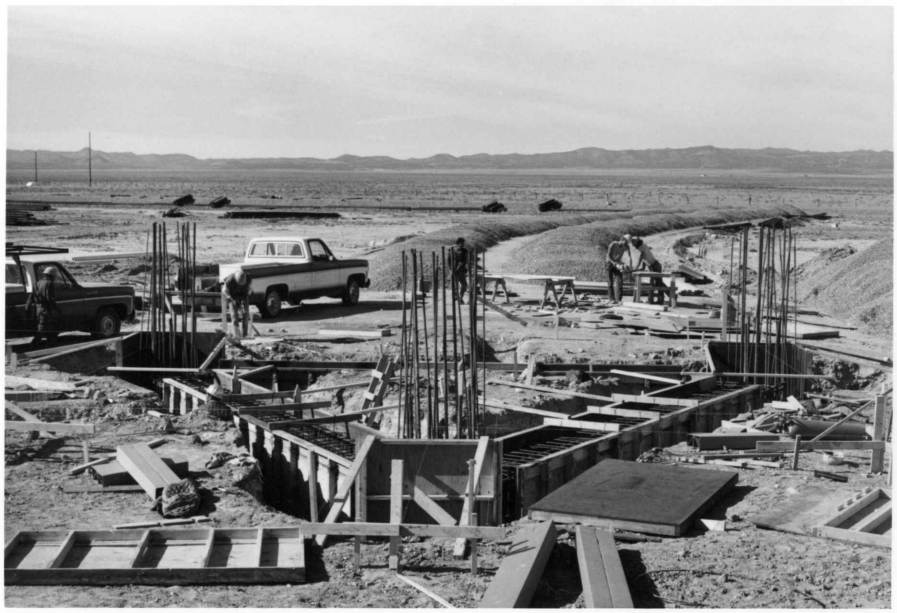
Competitive quotations for the 1975-76 requirement of TE_{01} 60mm waveguide were requested in October. Proposals were received only from the three Japanese companies which submitted quotations last year and were in the $71.00 to $75.00 per meter range compared with the $43.80 per meter previously negotiated. A negotiating team will leave for Japan early in December to negotiate procurement of 6.5 kilometers of waveguide and also the signal distributor purchase mentioned above in the electronics section of this report.

Personnel - The personnel changes which have occurred on the VLA Project during the month of November are delineated in the following table:

Division	Previous Level	Additions	Reductions	Current Level
Site and Wye	4			4
Project Management	11			11
Antenna	5			5
Electronics	28*		1	27*
Computer	10	1		11
Systems Integration	0			0
Totals	58*	1	1	59*

*Includes four part time people.

(p11-1) 11/15/74 - View of Wye to Northeast showing railroad ballast. Note rail spread at left, ties to right, Antenna Assembly Building in background.



(p11-2) 11/15/74 - View of maintenance area antenna station form work and reinforcing steel. Note ballast spread in background.

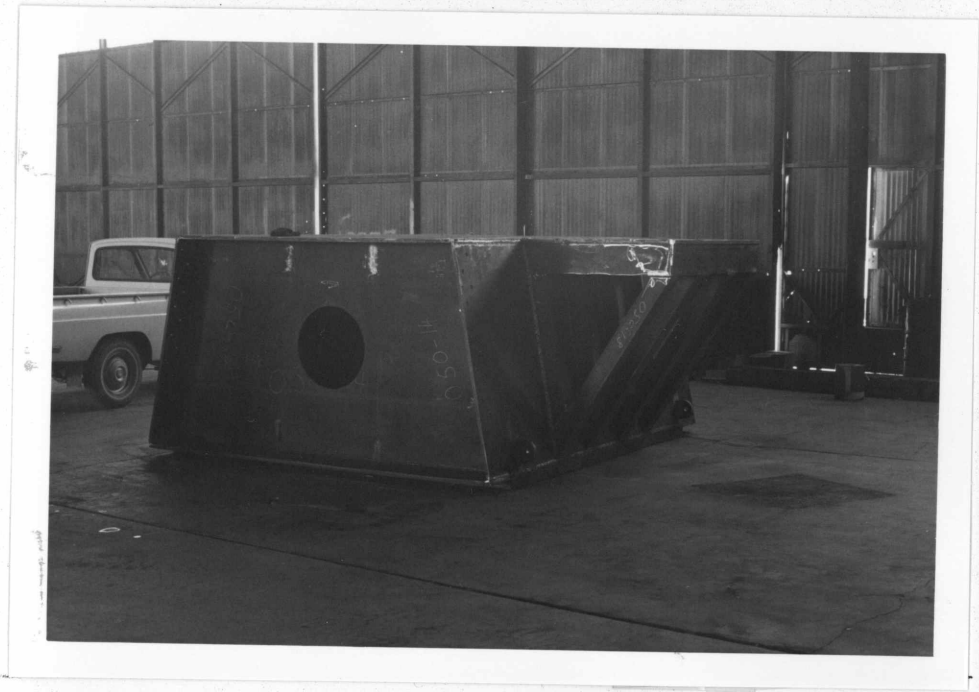
(p11-3) 11/20/74 - Steel erection at Antenna Assembly Building.

(p11-4) 11/20/74 - View of Wye to Northeast showing ties spread and track placed but not aligned or spiked into position.

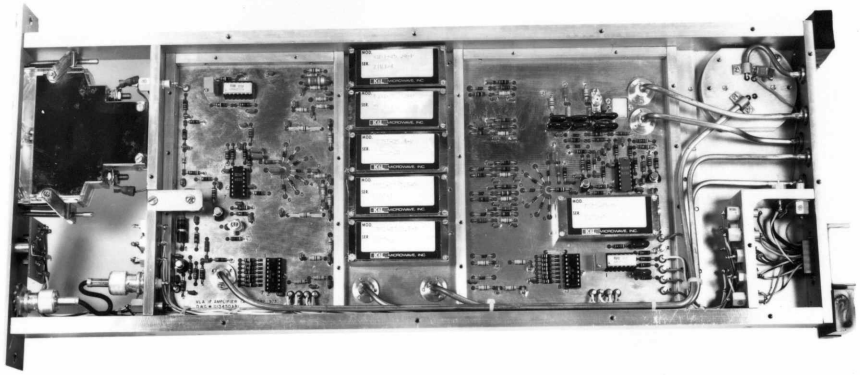
(p11-5) 11/20/74 - View of E-Systems antenna fabrication plant at Hobbs, New Mexico, belonging to Structures, Inc. Note completed antenna reflector truss parts stored in foreground.

(p11-6) 11/20/74) - View of completed triangular base for Antenna No. 1.

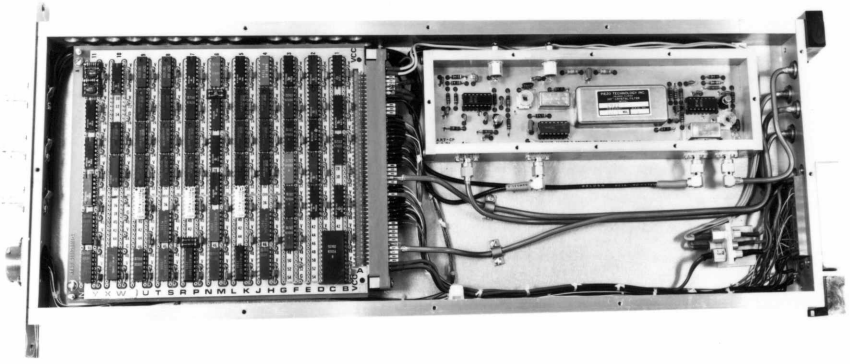
(p11-7) 11/20/74 - View of antenna azimuth support weldment inside fabrication plant.



(p11-8) 11/20/74 - View of weldment for center section of antenna yoke inside fabrication plant.



(p11-9) 11/74 - IF Receiver Module



(p11-10) 11/74 - Fringe Generator Module

VLA PROJECT

PROCUREMENT ACTIVITIES INITIATED

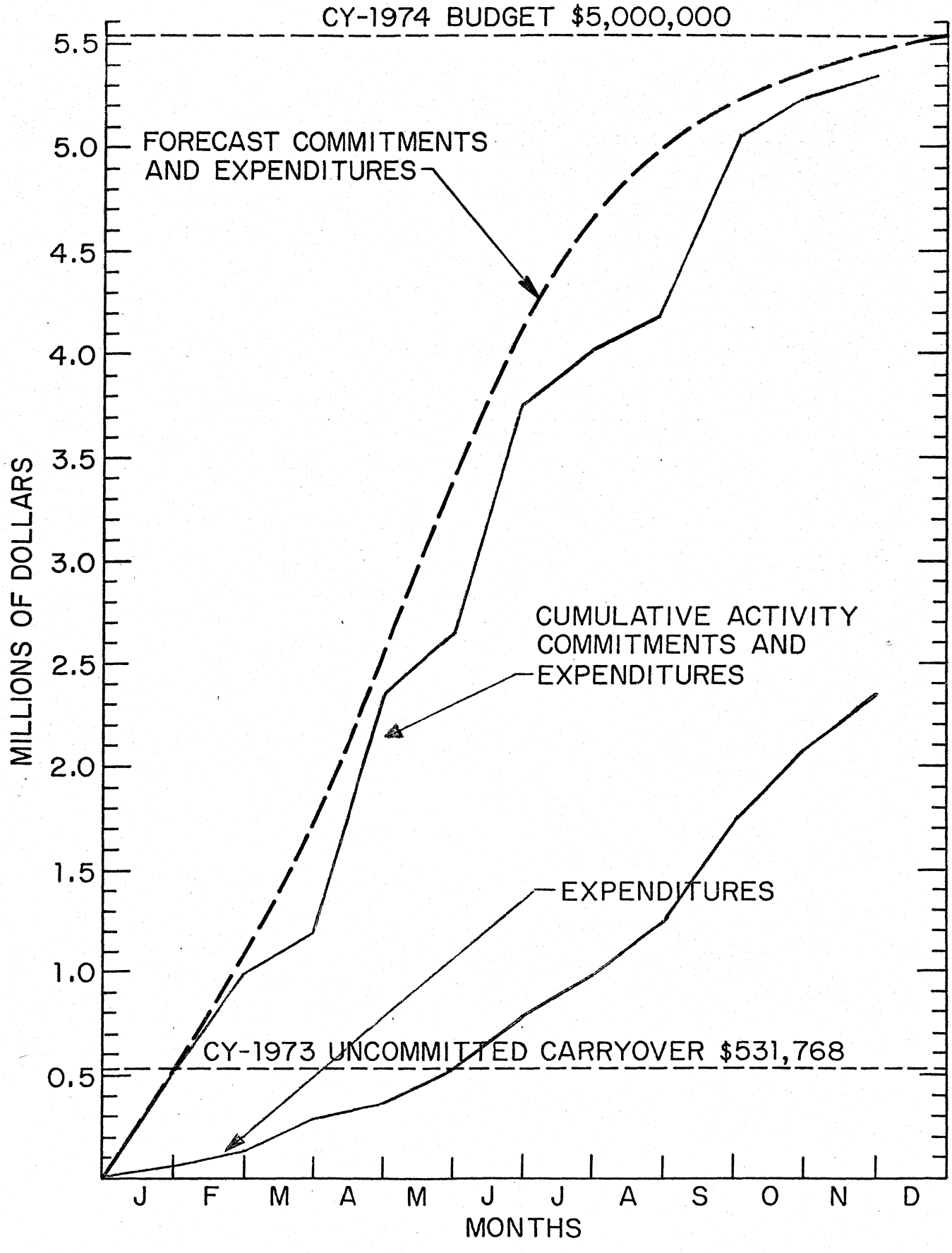
RFP NUMBER	ITEM DESCRIPTION	ESTIMATED COST	ISSUE DATE	BID DUE DATE	SUBMISSION TO NSF DATE	AWARD DATE	CURRENT STATUS
VLA-65	Site Construction Phase II	$2.2 to $2.6 M	9/3/74	10/24/74	Submitted to NSF for approval 11/20/74		Awaiting approval from NSF.
VLA-70	TE_{01} Mode Circular Waveguide	$250,000 to $500,000	9/5/74	10/17/74	Expect to Submit to NSF by 1/15/75		Jay Marymor and Read Predmore are conducting negotiations.
VLA-72	Waveguide Signal Distributor	$200,000	9/16/74	11/8/74	Expect to Submit to NSF by 1/15/75		Jay Marymor and Read Predmore are conducting negotiations in Japan.
P.O. 052055	Labor hour contract for temporary Electronic Technician	$3,000			Submitted to NSF for approval 11/26/74		
VLA-78	Take up of Rail at Holloman AFB	$80,000	11/8/74	12/6/74	Expect to Submit to NSF by 1/2/75		Awaiting property transfer.
VLA-6	Amendment No. 9 Antennas 3, 4, 5 and 6	$2,102,110			Submitted to NSF for approval 11/21/74		Awaiting approval from NSF.

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 - 91% completed Title III - Work in progress in conjuction with VLA-34. Fixed price plus cost reimbursables. $814,600 expended to date.
VLA-6	E-Systems, Inc.	28 Radio Telescopes	10/18/73	$17,288,107	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 underway at site.
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 completion.
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.
44234	Fujikura Cable Works	1.25 km of TE_{01} Mode Waveguide/258 Couplers	3/8/74	$54,860	6/10/74 50M* 8/10/74 600M* 9/10/74 600M*	Everything received except 7 coupling sleeves.
VLA-16	AIL	Up-converters	3/14/74	$57,054	7/21/74 2 units 9/21/74 4 units	- All units have been received. Final report and documentation are in final stages of completion.
VLA-29	Sterling-Detroit	Focusing Feed Mounts	6/17/74	$86,174	3/1/75	Delivery is on schedule.
VLA-34	Burn Const. Co.	Initial Construction	6/17/74	$605,000	1/15/75	Contract awarded and construction is underway.
VLA-43	Mod. Comp. Systems	Synchronous Computer	6/24/74	$248,616	9/15/74	All except spare parts delivered July 10, 1974.
VLA-44	Digital Equip.Corp.	Asynchronous Computer	6/17/74	$990,869	1/15/75	Amendment No. 1 has been written exercising Option No. 1 and Amendment No. 2 has been written increasing capacity of system and price accordingly.
VLA-62 P.O.51771	John Phariss	Cross Ties	8/27/74	$70,000	11/29/74	Delivery on schedule.
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	Delivery on schedule.
VLA-66	Dura-Bilt Prod.Inc.	Prefab Service Building	10/4/74	$111,281	3/1/75	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-PROJECT REPORT
EXPENDITURES AND COMMITMENTS
CY-1974 CUMULATIVE ACTIVITY



VERY LARGE ARRAY

Status as of November 31, 1974

Summary

CY-1974

Project No.	Description	Allocation	Monthly	Expended	Committed	Total	Balance	Outstanding Obligations Pending	Major Procurements Pending	Net Cumulative Free Balance
11000	Site and Wye	944,030	7,231	584,862	311,882	896,744	47,286	6,807	-	40,479
12000	Antenna System	2,451,950	10,081	102,092	2,331,421	2,433,513	18,437	10,082	-	10,082
13000	Electronic System	1,459,488	37,569	1,103,455	312,424	1,415,879	43,609	37,380	-	6,229
14000	Computer System	427,000	16,534	335,394	49,249	384,643	42,357	16,922	-	25,435
16000	System Integration	-	-	-	-	-	-	-	-	-
17000	Project Management	249,300	16,620	207,178	2,309	209,487	39,813	16,811	-	23,002
	TOTAL - VLA	5,531,768	88,035	2,332,981	3,007,285	5,340,266	191,502	88,002	-	103,500

CY-1975

VERY LARGE ARRAY

Status as of November 31, 1974

Summary

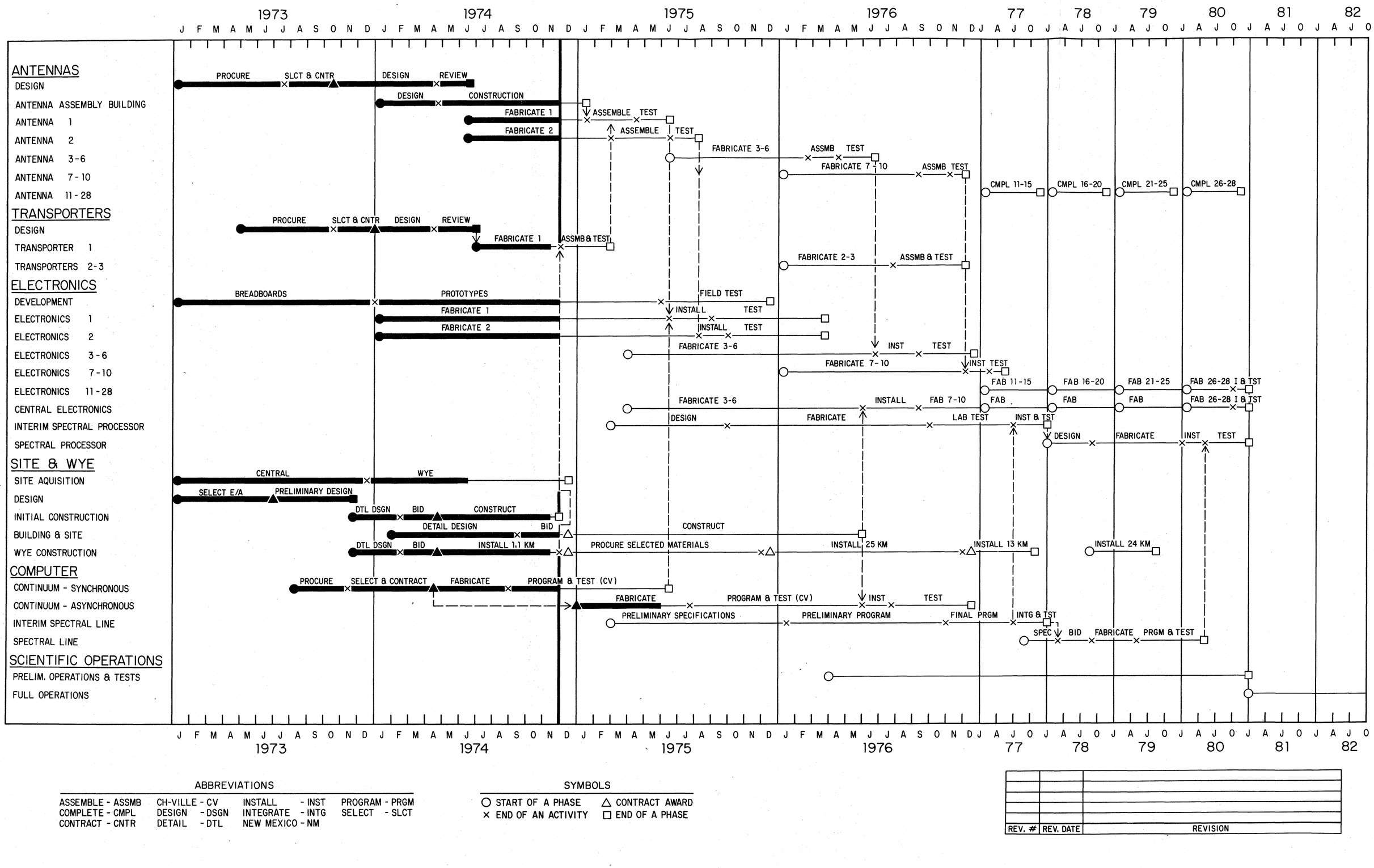
Project Number	Description	Allocation	Monthly	Expended	Committed	Total	Balance	Outstanding Obligations Pending	Major Procurements Pending	Net Cumulative Free Balance
11000	Site and Wye	500,000	-	86,824	340,320	427,144	72,856	-	-	72,856
12000	Antenna System	-	-	-	-	-	-	-	-	-
13000	Electronic System	463,000	-	3,993	27,467	31,460	431,540	-	-	431,540
14000	Computer System	1,000,000	-	378	1,018,371	1,018,749	(18,749)	-	-	(18,749)
16000	System Integration	-	-	-	-	-	-	-	-	-
17000	Project Management	1,537,000	-	-	-	-	1,537,000	-	-	1,537,000
	TOTAL - VLA	3,500,000	-	91,195	1,386,158	1,477,353	2,022,647	-	-	2,022,647

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA ACTIVITY SCHEDULE

11/15/74

UPDATE DATE: 01 DECEMBER 1974



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