

DECEMBER 1974

VLA MONTHLY PROGRESS REPORT

JANUARY 16, 1975

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VLA LIBRARY

NATIONAL RADIO ASTRONOMY OBSERVATORY

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NARRATIVE

Site and Wye Division

Title II work by the E/A firm continues to progress. The amount of earthwork along the wye arms is being recalculated to incorporate the earth shrinkage factor actually encountered during Phase I Construction. The waveguide layout and profiles along the wye and from the Control Building have been submitted to NRAO for review.

The steel superstructure for the Prefabricated Service Building, Subcontract VLA-66, has been erected and insulation, siding and roofing have been installed. The interior partitions are approximately 75% completed. This total subcontract is estimated to be 50% complete.

The earthwork being done under Subcontract VLA-34 is essentially complete with only slope cleanup remaining.

All antenna foundations being constructed under Subcontract VLA-34 have been poured and anchor bolts have been installed. Installation of antenna base plates will begin in January.

The main line track from CW5 to CW9 has been spiked and preliminarily aligned. Ballast has been placed on all antenna foundation spurs, and all of the rail has been laid and roughly aligned. Timbers for the road crossing of old Highway 60 at the Antenna Assembly Building have been delivered to the site.

The roof and floor slabs have been poured in the Pump House. The underground water piping to the Antenna Assembly Building has been installed complete with fire hydrants. Hydrostatic testing will be performed prior to backfill in early January.

The fencing required by this contract is 85% completed.

Totally Subcontract VLA-34 is estimated to be 75% complete.

Subcontract VLA-65, George A. Rutherford, Inc. dated December 9, 1975, was approved by the National Science Foundation and sent to the subcontractor. No construction work was performed at the site during December.

Antenna DivisionAntennas

All structural steel for antennas Nos. 1 and 2 has been received by the antenna fabricator and fabrication of antenna No. 1 is essentially complete. The torque box section of the yoke and the bearing support section of the transition assembly were shipped for machining of the azimuth bearing mounting surfaces. The elevation bearing mounts have also been shipped for machining.

E-Systems' azimuth bearing vendor is still having trouble with delivery of bearing race forgings. If the February 7, 1975 delivery date of the forgings cannot be improved, the delivery date of the first prototype antenna will be delayed approximately 6 to 8 weeks.

Some minor slippage has occurred in scheduled delivery of panels, drive motors and servo system, but all are still scheduled for delivery in time to avoid any impact on the antenna delivery. Gear segments, speed reducers, encoders, elevation bearings and miscellaneous hardware deliveries are presently proceeding according to schedule.

Antenna Assembly Building

The structural portion of the building is complete with sheathing almost complete. Contracts for installation of lighting, wiring, and plumbing have been let, work is in progress and completion of the building is anticipated by mid-January.

Transporter

The main frame weldment is completed and it has been shipped to the site. The wheels and axle assemblies are being machined. Completion of the first truck at E-Systems is scheduled for January 8, 1975 and the final truck assembly is scheduled for January 22, 1975.

Electronics Division

During December the first feed support ring was completed and received at Green Bank. A test model of the Vertex Room has also been shipped to Green Bank, and test assembly of the feeds, front ends and interconnecting waveguides is about to commence. It is expected that this will not be completed before mid-February, since the L-band feeds are not expected until the end of January.

Systems tests on the first front end are continuing and the dewar is holding a satisfactory pressure between 10^{-8} and 2×10^{-8} Torr. On the first cool-down, diodes in all four mixers failed mechanically, and a modified mounting arrangement in which the diodes are attached by solder is now being tested.

In the local oscillator area 24 modules are now complete and have been satisfactorily tested, and seven more are in various stages of completion. Wiring of the bins and modules is about half complete and some sub-system testing is in progress.

A mechanical "mouse" is under development at NRAO which can be pulled through a length of waveguide to measure deviations from straightness. Tests of the mouse during the last month have been encouraging, and it is expected to be ready for use at the VLA site early in the new year. Integration of the modems into the electronic system is continuing, and enough units are now complete to allow operation of one antenna.

Eight Fringe Generator modules have just been assembled and are ready for testing. A contract is just starting for the assembly of eight 2-4 GHz Synthesizer Modules. The sampler boards have been assembled and are now in a stage of final adjustment and testing at Green Bank.

In the digital area the first phase of testing of the Monitor and Control System has been completed and some small modifications are required. A good deal of time during the last month has been spent on interfacing this system with the Modcomp computers. Design of the system controller for the delay and multiplier system is complete, and the required software for it is about 90% complete.

Computer Division

Asynchronous Sub-System

During December the major portion of the asynchronous computer was delivered, installed, and made operational in the Gallery Mall Building. The software development group's activities have mostly been concerned with learning to use and operate the new system.

Plans are now being made for procurement of auxiliary graphics display equipment. This multi-stage plan will provide for the needed auxiliary equipment over the next few years.

Synchronous Sub-System

The computer terminal control program is being revised to make it more convenient for real-time usage. Internal tests have been essentially completed for the VLA interferometer geometry routines. Programs have been written to accept observation requests on cards, decode information from cards, and distribute the information to the remaining programs. The digital communications system has been interfaced to the Modcomp computer. Work has been started on programs to complete software interfacing.

Project Management

Transfer of 2.3 miles of rail at Fort Hood, Texas and of 6.7 miles of rail at Holloman Air Force Base, New Mexico has been accomplished. Subcontracts will be awarded shortly for the take up of this rail and its shipment to the site. Effort is underway to obtain 6 miles of rail at the Lincoln Ordnance Depot, Springfield, Illinois, 3.1 miles at Redstone Arsenal, Alabama and 4 miles at Torrance, Calif.

Negotiations were completed with the three Japanese firms that replied to our request for proposal for the 1975-76 requirements of TE₀₁ 60 mm waveguide. The price of \$65.18 per meter that was obtained compares with the original low bid of \$70.78 per meter. A subcontract will be awarded shortly.

Personnel

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

<u>Division</u>	<u>Previous Level</u>	<u>Additions</u>	<u>Reductions</u>	<u>Current Level</u>
Site and Wye	4			4
Project Management	11			11
Antenna	5			5
Electronics	27*			27*
Computer	11			11
Systems Integration	<u>0</u>	<u>1</u>	<u>—</u>	<u>1</u>
Totals	58*	1		59*

*Includes three part time people.

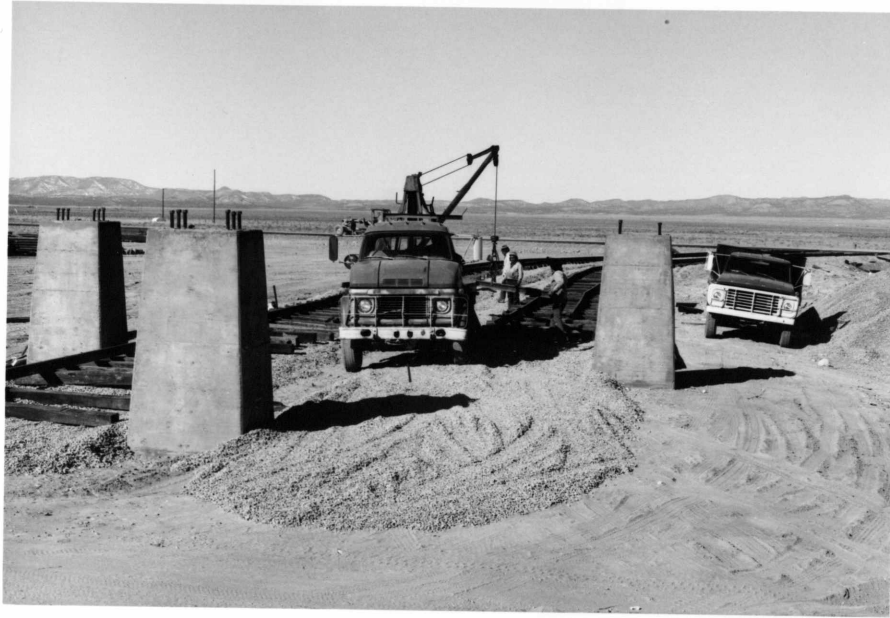


(p1-75-1)

Prefabricated Service Building



(p1-75-2) Spiking and preliminary alignment of the track



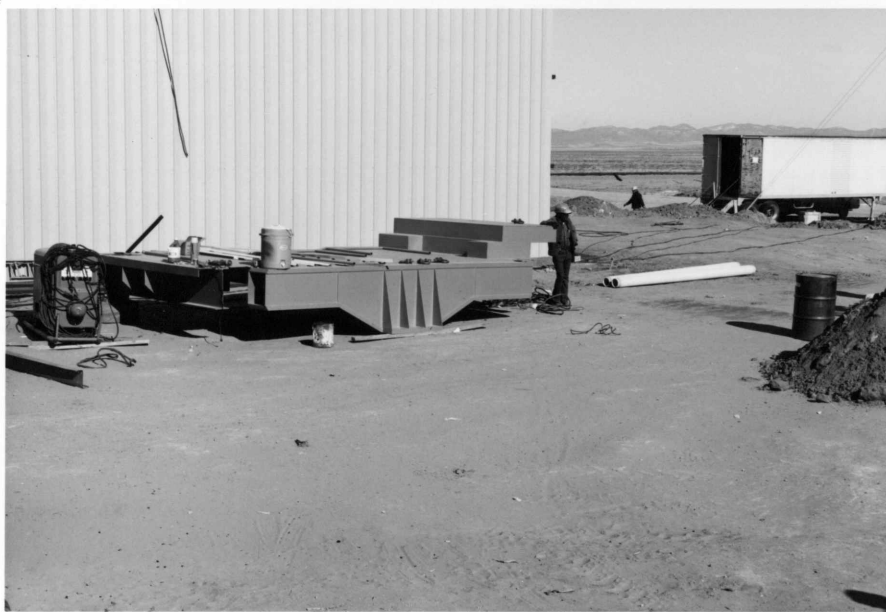
(p1-75-3) Completed Maintenance Pad showing the foundations ready for installation of the antenna base plates and the placement of rail and ties for the maintenance spur



(p1-75-4) Installation of siding on the Antenna Assembly Building



(pl-75-5) Transporter weldments at Site awaiting assembly



pl-75-6) Transporter weldments at Site awaiting assembly



(p1-75-7) DEC-1060-E Asynchronous Computer Installation at
the Gallery Mall Building



(p1-75-8) Six Model RP04-A Memory Disc Subsystems to the
DEC-1060-E Asynchronous Computer

VLA PROJECT

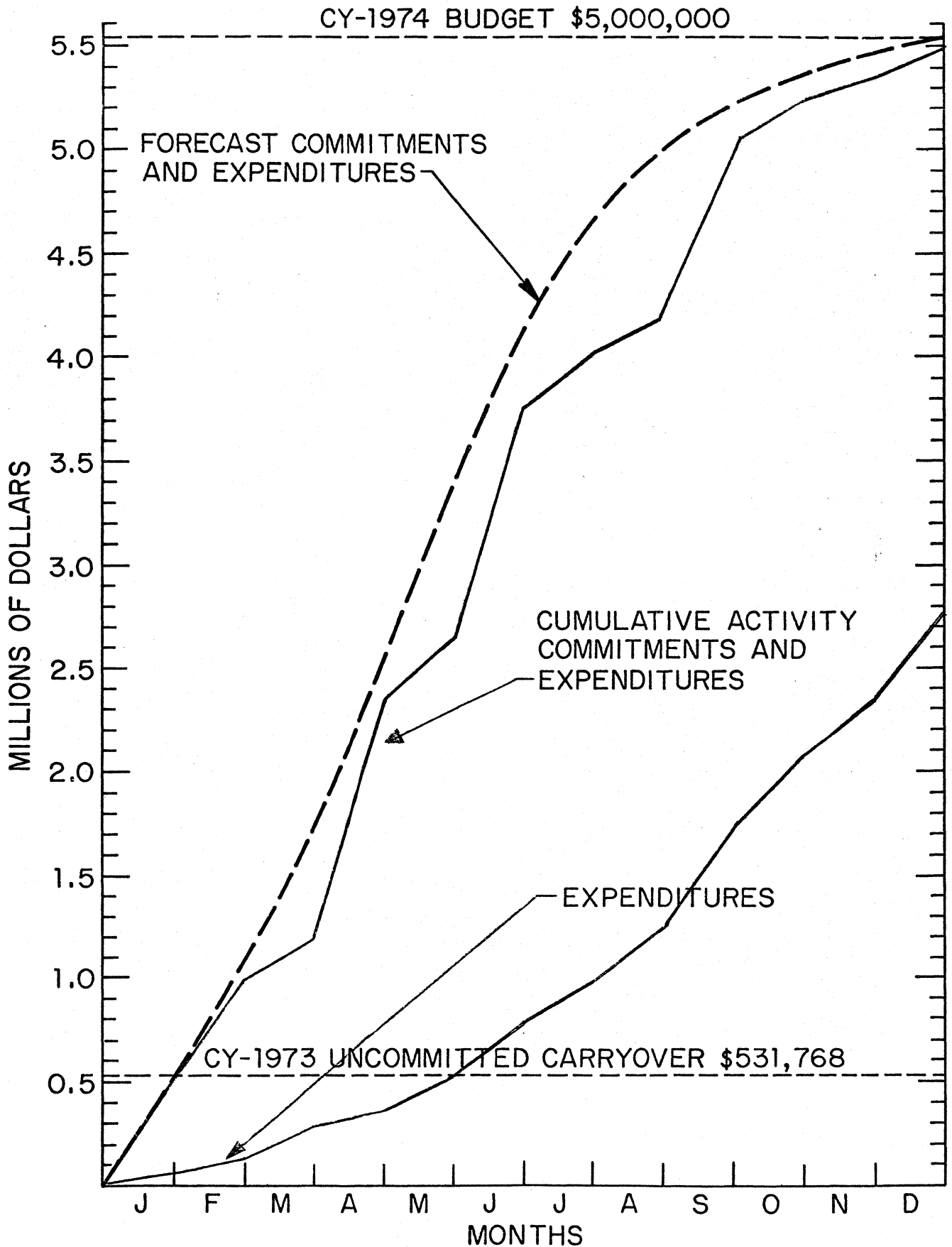
PROCUREMENT ACTIVITIES INITIATED

RFP NUMBER	ITEM DESCRIPTION	ESTIMATED COST	ISSUE DATE	BID DUE DATE	SUBMISSION TO NSF DATE	AWARD DATE	CURRENT STATUS
VLA-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		Negotiations are completed. We expect to submit to NSF by 1/15/75.
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		Order approved by NSF on 12/13/74. We will decide whether to award contract by 1/31/75.
VLA-78	Take up of Rail at Holloman AFB	\$80,000	11/8/74	12/6/74	Expect to Submit to NSF by 1/20/75		Awaiting bids on RFP-VLA-79 before we make award.
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-79	Take up of rail at Ft. Hood, Texas	\$40,000	12/13/74	1/8/75	Expect to submit to NSF 1/20/75		
VLA-92	Parametric amplifiers for antennas 3,4,5, &6	\$120,000	12/19/74	1/15/75	Expect to submit to NSF for approval 1/31/75		
VLA-93	Truck mounted derrick	\$40,000 to \$50,000	12/20/74	1/17/75	Expect to submit to NSF 1/31/75 if price exceeds \$50,000.		

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 - 96% 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	\$17,288,107	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. Docu- mentation 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 re- ceived by E-Systems. Fabrication underway.
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	Major part of system delivered 12-16-74. Acceptance tests underway.
VLA-62 P.O. 51771	John Phariss	Cross Ties	8/27/74	\$70,000	3/1/75	Partial shipments have been made.
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-65	Geo. A. Rutherford, Inc.	Site construction Phase 2	12/16/74	\$2,386,600	6/1/76	Bonds received and Subcontractor is moving equipment to site.

VLA-PROJECT REPORT
EXPENDITURES AND COMMITMENTS
CY-1974 CUMULATIVE ACTIVITY



CY-1974

VERY LARGE ARRAY

Status as of December 31, 1974

Summary

<u>Project Number</u>	<u>Description</u>	<u>Allocation</u>	<u>Monthly</u>	<u>Expended</u>	<u>Committed</u>	<u>Total</u>	<u>Balance</u>	<u>Outstanding Obligations Pending</u>	<u>Major Procurements Pending</u>	<u>Net Cumulative Free Balance</u>
11000	Site and Wye	944,030	6,843	714,791	191,650	906,441	37,589	-	-	37,589
12000	Antenna System	2,451,950	10,081	206,588	2,246,515	2,453,103	(1,153)	-	-	(1,153)
13000	Electronic System	1,459,488	39,485	1,233,034	237,937	1,470,971	(11,483)	-	-	(11,483)
14000	Computer System	427,000	16,805	367,208	48,061	415,269	11,731	-	-	11,731
16000	System Integration	-	-	669	-	669	(669)	-	-	(669)
17000	Project Management	249,300	17,285	234,634	951	235,585	13,715	-	-	13,715
TOTAL - VLA		5,531,768	90,499	2,756,924	2,725,114	5,482,038	49,730	-	-	49,730

CY-1975

VERY LARGE ARRAY

Status as of December 31, 1974

Summary

<u>Object Number</u>	<u>Description</u>	<u>Allocation</u>	<u>Monthly</u>	<u>Expended</u>	<u>Committed</u>	<u>Total</u>	<u>Balance</u>	<u>Outstanding Obligations Pending</u>	<u>Major Procurements Pending</u>	<u>Net Cumulative Free Balance</u>
11000	Site and Wye	500,000		136,079	2,731,901	2,867,980	(2,367,980)	-	-	(2,367,980)
12000	Antenna System	-		-	-	-	-	-	-	-
13000	Electronic System	447,300		16,922	51,850	68,772	378,528	-	-	378,528
14000	Computer System	1,000,000		28,258	995,221	1,023,479	(23,479)	-	-	(23,479)
16000	System Integration	-		-	-	-	-	-	-	-
17000	Project Management	1,537,000		27	-	27	1,536,973	-	-	1,536,973
	TOTAL - VLA	3,484,300		181,286	3,778,972	3,960,258	(475,958)			(475,958)
	Unallocated CY-1975 appropriation	6,927,000					6,927,000			6,927,000
		10,411,300		181,286	3,778,972	3,960,258	6,451,042			6,451,042

UPDATE DATE: 01 JANUARY 1975

1973 1974 1975 1976 77 78 79 80 81 82

