# VLA MONTHLY PROGRESS REPORT

NOVEMBER 14, 1974

OCTOBER REPORT

NATIONAL RADIO ASTRONOMY OBSERVATORY

VLA MONTHLY PROGRESS REPORT

OCTOBER 1974

## NARRATIVE

### Site and Wye Division

Title II work by the Engineer-Architect is progressing and is estimated to be 94% complete. Four bids were received on the building construction phase of the Project on October 24, 1974 (Solicitation IFB-VLA-65). The low bid of $3,250,000 from George A. Rutherford exceeded the engineering estimate by approximately 13% and was in excess of available funding for this phase of the work. Hence, all bids have been rejected and new prices from the four original bidders are being obtained for amended plans and specifications which eliminate the Maintenance Building and the two Visiting Scientists' Quarters.

Pat Lewis joined the Site and Wye Division in October as an electrical inspector.

The subcontract, VLA-66, for the 6,000 square foot Prefabricated Service Building was issued October 4, 1974 in the amount of $111,281.00 to Dura-Bilt Products, Inc., of Albuquerque, New Mexico. Site preparation is currently underway and materials for the basic building are scheduled to arrive by the end of November. This subcontract is estimated to be 5% complete.

The earthwork under subcontract VLA-34, Phase I Construction, is estimated at 98% complete. All the required antenna foundation piers have been drilled and belled and concrete has been poured up to the tie beams. The foundations in the Antenna Assembly Building have been completed.

All ballast for the trackage has been crushed and the track subcontractor has started work. This portion of VLA-34 is estimated to be 63% complete.

### Antenna Division

All jigs and fixtures for the antenna structure have been completed. 70% of the steel for antennas 1 and 2 has been received. Specifically, the support tubes for the elevation wheel counterweight and the azimuth bearing support weldment have been completed. The lower portion of the pedestal assembly is about 95% complete.

Fabrication of the transporter frame assembly and truck weldment assembly is in process and is expected to be complete November 15.

The foundation and portions of the floor of the Antenna Assembly Building have been completed. The structural steel for the building is on the VLA site and erection has commenced.

Electronics Division

The dichroic and ellipsoidal reflectors for the dual 6 cm and 2 cm operation of the antennas were received during this month. The first feed-mounting ring has been constructed and will be shipped to Green Bank during the second week of November for fitting of the feed horns.

During October the first operation tests were made of the 140 foot telescope with the new Cassegrain feed system and front ends. The new system is basically the same design as the feeds and front ends for the VLA antennas, except that the L-band (18 to 21 cm) feed for the 140 foot telescope is a full-sized horn rather than the lighter and less expensive design using a parabolic reflector and a small horn for the VLA. Antenna efficiencies measured were 49% at 21 cm, 57% at 18 cm, 50% at 6 cm, 42% at 2 cm and 21% at 1.3 cm. These figures are good and close to the calculated values. Higher efficiencies are to be expected for the VLA antennas because of the shaped reflectors and the higher surface accuracy, although at L-band these effects will be offset by the somewhat less efficient feed design for the VLA. System temperatures measured were $49^{\circ}$K at 21 cm, $57^{\circ}$K at 18 cm, $52^{\circ}$K at 6 cm, $350^{\circ}$K at 2 cm and $540^{\circ}$K at 1.3 cm. Again, these were close to predicted values, and for the VLA slightly lower temperatures may be expected at the shorter wavelengths because the waveguide runs from the feed horns are shorter. As an indication of performance to be expected with the VLA antennas the tests of the new 140 foot system are very encouraging.

The first VLA front end is now virtually complete except for the up-convertors which have not yet been received, but are expected within a few days. Preliminary tests indicate satisfactory operation, and the inclusion of a small quantity of molecular sieve material within the dewar appears to alleviate the outgassing problem. The stainless steel dewar for the second front end has been received and tests at the factory indicated that its outgassing rate is about the same as that of the first one. Assembly of the second front end has now been started.

Design of the manholes for access to the waveguide was completed during October and preparations for installing the first 1.25 km can now proceed. Problems involved included the provision of adequate electrical grounding, insuring that the size is large enough to fit the required coupler but at the same time minimizing the cost, providing watertight seals and allowing for effects of waveguide expansion. The two 600 meter shipments of waveguide have now been coated and should arrive at the site at the beginning of November.

Work is continuing on details of the design of the waveguide couplers. Two modems for the waveguide transmission system were received from both TRG and Westinghouse during the month and all four units have been tested and found to meet specifications.

Most of the modules of the Monitor and Control System have been shipped by Metric Systems and are expected to be received during the first few days of November. The exceptions are units which are awaiting replacement components.

The design of the System Controller for the Delay and Multiplier System has continued and is expected to be completed next month. Most of the cards in this part of the system have been received and some preliminary testing has commenced.

Computer Division

Testing and programming of the Synchronous Computer continues. The Asynchronous Computer staff is working to ready their location to receive the Asynchronous Computer equipment in early December. Acceptance tests are currently scheduled for the third week of November at the DEC plant.

Project Management

Effort to obtain excess Government rail for the Wye continues. Currently, we have inspected and, as a result, requested the Foundation to obtain transfer of the following trackage:

1. 2.3 miles at Fort Hood, Texas
2. 6.7 miles at Holloman Air Force Base, New Mexico
3. 3.5 miles at the Naval Supply Center in Torrance, California
4. 4.5 miles at the Lincoln Ordnance Depot in Springfield, Illinois

A request for proposal will be issued shortly to pick up the Holloman rail with the intent that a subcontract can be awarded as soon as the transfer is finalized. This will be followed by the Fort Hood and Lincoln Ordnance Depot rail. The rail at Torrance cannot be picked up until GSA disposal of the heavy equipment at the Center is completed. It should be emphasized that, with the exception of the Holloman rail, which is in excellent shape, the quantities of trackage cited contain varying amounts of scrap that cannot be fully determined until the take up job is finished.

Major Procurements

Amendment No. 2 to subcontract VLA-44 in the amount of $226,261 to increase the capacity of the Asynchronous Computer.

VLA-66 with Dura-Bilt Products, Inc., in the amount of $111,281 for the construction of a Prefabricated Service Building, to be completed by March 1, 1975.

Personnel

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

| Division | Previous Level | Additions | Reductions | Current Level |
|---|---|---|---|---|
| Site and Wye | 3 | 1 | | 4 |
| Project Management | 11 | | | 11 |
| Antenna | 5 | | | 5 |
| Electronics | 27 | 1 | | 28* |
| Computer | 9 | 2 | | 11 |
| Systems Integration | 0 | | | 0 |
| Totals | 55 | 4 | 0 | 59 * |

*Includes 4 part-time people.

(p10-3) Drilling foundation piers for antenna station CW5. Note the pier reinforcing steel held by the crane.

(p10-5) Emplacing the reinforcing steel for the piers in the antenna assembly building. Note rig used to bell the piers in the foreground.

(p10-7) Emplacing the reinforcing steel for the piers in the antenna assembly building.

(p10-8) Pouring concrete for the piers of antenna station CW5.

VLA PROJECT

PROCUREMENT ACTIVITIES INITIATED

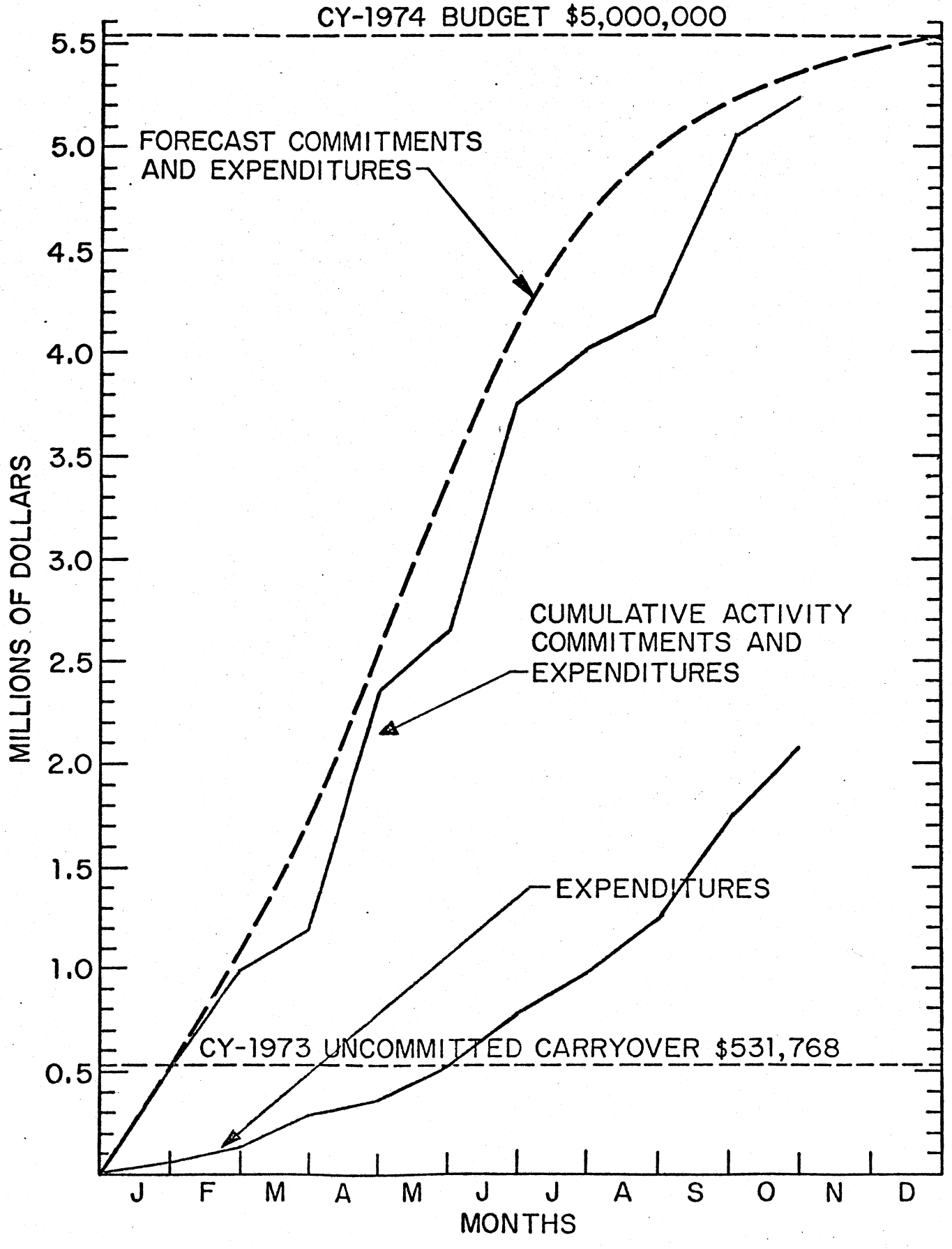
| RFP NUMBER | ITEM DESCRIPTION | ESTIMATED COST | ISSUE DATE | BID DUE DATE | SUBMISSION TO NSF DATE | AWARD DATE | CURRENT STATUS |
|---|---|---|---|---|---|---|---|
| VLA-65 | Site Construction Phase II | $2.2 to $2.6 M | 9/3/74 | 10/24/74 | Expect to Submit to NSF by 12/1/74 | | Bids rejected. VSQ and Maintenance Building were deleted and new bids requested from four companies that bid. |
| VLA-70 | $TE_{01}$ Mode Circular Waveguide | $250,000 to $500,000 | 9/5/74 | 10/17/74 | Expect to Submit to NSF by 12/1/74 | | |
| VLA-72 | Waveguide Signal Distributor | $200,000 | 9/16/74 | 11/8/74 | Expect to Submit to NSF by 12/1/74 | | |
| 46022 | Labor-hour contract for temporary draftsman | $17,500 | | | Submitted to NSF for approval 11/1/74 | | |

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<br>12/31/74<br>1/15/75 | Title I - Completed<br>Title II - 91% completed<br>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 scheduled to start 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*<br>8/10/74 600M*<br>9/10/74 600M* | Everything received except 15 coupling sleeves. |
| VLA-16 | AIL | Up-converters | 3/14/74 | $57,054 | 7/21/74 2 units<br>9/21/74 4 units | - Received 3. Remaining units will be delivered by 11/27/74 |
| 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 | 1/15/74 | 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 completed by March 1, 1975. |

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



VERY LARGE ARRAY

Status as of October 31, 1974

Summary
CY-1974

| Project Number | Description | Allocation | Monthly | Expended | Committed | Total | Balance | Outstanding Obligations Pending | Major Procurements Pending | Net Cumulative Free Balance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11000 | Site and Wye | 944,030 | 5,674 | 544,886 | 367,465 | 912,351 | 31,679 | 13,614 | (21,229) | 39,294 |
| 12000 | Antenna System | 2,451,950 | 10,081 | 90,388 | 2,331,297 | 2,421,685 | 30,265 | 20,164 | - | 10,101 |
| 13000 | Electronic System | 1,459,488 | 38,891 | 966,462 | 399,511 | 1,365,973 | 93,515 | 72,387 | - | 21,128 |
| 14000 | Computer System | 427,000 | 15,448 | 300,299 | 55,340 | 355,639 | 71,361 | 33,706 | - | 37,655 |
| 16000 | System Integration | - | - | - | - | - | - | - | - | - |
| 17000 | Project Management | 249,300 | 16,579 | 186,627 | 4,146 | 190,773 | 58,527 | 34,008 | - | 24,519 |
| | TOTAL - VLA | 5,531,768 | 86,673 | 2,088,662 | 3,157,759 | 5,246,421 | 285,347 | 173,879 | (21,229) | 132,697 |

VERY LARGE ARRAY

Status as of October 31, 1974

Summary

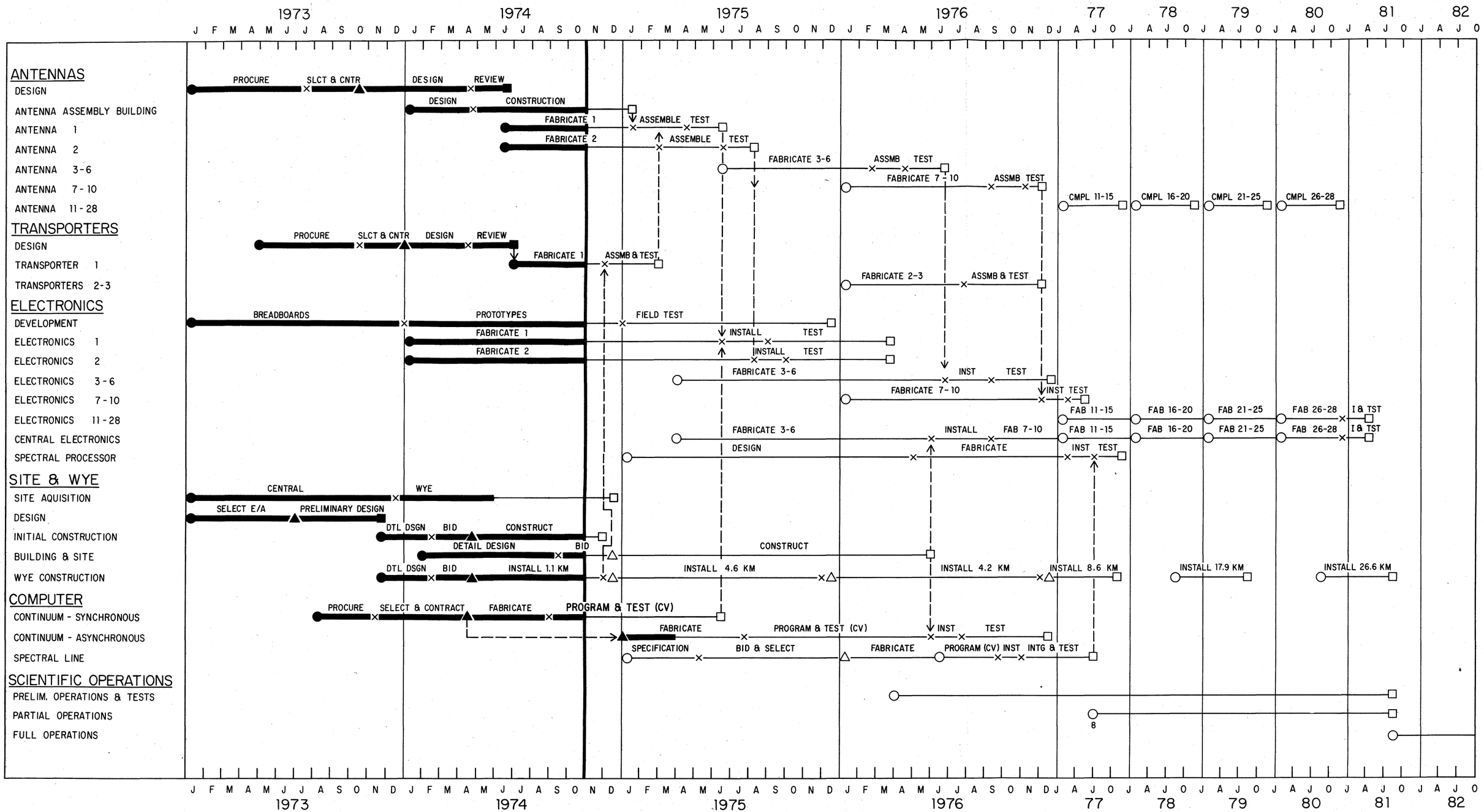
| Project No. | Description | Allocation | CY-1975 Monthly | CY-1975 Expended | CY-1975 Committed | CY-1975 Total | Balance | Outstanding Obligations Pending | Major Procurements Pending | Net Cumulative Free Balance |
|---|---|---|---|---|---|---|---|---|---|---|
| 11000 | Site and Wye | 500,000 | - | 74,301 | 348,320 | 422,621 | 77,379 | | | 77,379 |
| 12000 | Antenna System | - | - | - | - | - | - | | | - |
| 13000 | Electronic System | 463,000 | - | 3,392 | 12,510 | 15,902 | 447,098 | | | 447,098 |
| 14000 | Computer System | 1,000,000 | - | 378 | 990,491 | 990,869 | 9,131 | | | 9,131 |
| 16000 | System Integration | - | - | - | - | - | - | | | - |
| 17000 | Project Management | 1,537,000 | - | - | - | - | 1,537,000 | | | 1,537,000 |
| | TOTAL - VLA | 3,500,000 | - | 78,071 | 1,351,321 | 1,429,392 | 2,070,608 | | | 2,070,608 |

NATIONAL RADIO ASTRONOMY OBSERVATORY

# VLA ACTIVITY SCHEDULE

12/1/73

*UPDATE DATE:* 01 NOVEMBER 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 |
|---|---|---|
| | | |
| | | |
| | | |
| 2 | 01 SEPT. 74 | ANT. BLDG. AND SITE ACQ. |
| 1 | 18 FEB. 74 | FINANCIAL PLAN 3-5-13-10 → |