NATIONAL RADIO ASTRONOMY OBSERVATORY

1984 VERY LONG BASELINE ARRAY (VLBA) PROGRAM

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PART 1. DISCUSSION OF 1984 ACTIVITIES

VERY LONG BASELINE ARRAY (VLBA).....($2,500,000)

During 1984, the NRAO's VLBA efforts will be concerned primarily with taking existing VLBA concepts and preliminary designs and turning them into purchasable designs with schedules and detailed cost estimates for each element of the project. The major VLBA activities to be undertaken in 1984 are set out below.

Antenna System

Early in 1984 the contract work proposed for the VLBA antennas will be advertised in Commerce Business Daily and an RFP issued to qualified companies. The RFP will call for the design of the antenna with unilateral options to be exercised by AUI for the manufacture and delivery of ten such antennas under terms and conditions to be prescribed in the RFP. Detailed design of the antennas will commence immediately upon contract award.

The preliminary schedule for selecting the antenna contractor is:

VLBA Antenna Contract Selection Schedule

December 20, 1983 - Advertisement for Commerce Business Daily submitted to NSF for approval.

January 5, 1984 - Approved advertisement runs in Commerce Business Daily.

February 1, 1984 - Request for proposals issued to qualified companies.

March 1, 1984 - Preproposal conference held in Charlottesville.

May 1, 1984 - Proposals due at NRAO.

July 15, 1984 - Recommendation for award of contract forwarded to NSF for approval.

August 1, 1984 - Contract awarded to successful firm.

An Antenna Contract Selection Committee composed of NRAO scientists, engineers, and senior business and fiscal personnel has been designated by the Director to assist in the selection and award of the antenna contract. This committee is set out below.

VLBA Antenna Contract Selection Committee

Contract Selection Committee

Chairman: H. Hvatum, Associate Director
T. R. Riffe, Associate Director
K. I. Kellermann, Senior Scientist

Technical Evaluation Committee

Chairman: J. W. Findlay, Senior Scientist
W. G. Horne, Antenna Engineer
L. J. King, Structural Engineer
L. Temple, Head, VLA Antenna Division

Business Evaluation Subcommittee*

Chairman: J. Marymor, Contracts Manager
D. H. Hovatter, Fiscal Officer
M. E. Petty, Personnel Officer
_____, VLBA Business Manager

* Will be assisted by AUI Internal Audit group as necessary

Site Acquisition

In early 1984, the location for the VLBA Control Center will be determined and the Foundation will be requested to proceed with acquiring the site. By mid-1984 the ten VLBA antenna sites will be fixed and their ownership determined. Requests to have NSF acquire these sites will be forwarded to the Foundation as they (individually) become known during the year.

Site Development and Site Facilities

During late 1983, the NRAO will begin the process of selecting an Architect-Engineer (A/E) firm for the site(s) work. The anticipated contract award date for the A/E is May 1984. The principal tasks for the A/E in 1984 will be to complete the general plot and lay-out for a typical antenna station, assist in completing detailed cost estimates for all site work, complete the preliminary design of the Operations Control Center by December 1984, and assist in preparation of local and/or state environmental impact statements if and when necessary. (Note: It is assumed that federal environmental impact statements will not be necessary for the VLBA antenna sites.) A preliminary schedule for the selection of an Architect-Engineer firm is:

VLBA A/E Contract Selection Schedule

October-November 1983 - Scope of work to be performed by the A/E defined.

December 1983 - Solicitation letters sent to several A/E firms; ad placed in Commerce Business Daily.

January 1984 - Process of reducing the number of respondents to a workable number begun by the NRAO Contract Selection Committee.

February 1984 - Interviews with a small number of interested A/E's (7-8).

March 1984 - Final selection and recommendation of award forwarded to NSF.

April 1984 - Approval to negotiate with the successful A/E given by NSF.

May 1984 - Contract awarded.

The following committee has been established by the Director to assist in the selection of an architect-engineer for the VLBA project:

VLBA Architect-Engineer Contract Selection Committee

Contract Selection Committee

Chairman: H. Hvatum, Associate Director
T. R. Riffe, Associate Director
K. I. Kellermann, Senior Scientist

A/E Evaluation Subcommittee

Chairman: G. M. Peery, Head, Engineering Division
R. C. Walker, Systems Scientist
S. C. Smith, Civil Engineer
J. Marymor, Contracts Manager
J. P. Lagoyda, Business Officer
_____, VLBA Business Manager

Electronics System

In 1984, the VLBA front-end and feed system design will begin and some prototype feed development will be undertaken. There will be no major electronic procurements during 1984.

Data Recording System

In late 1983, the Massachusetts Institute of Technology (MIT) is expected to offer a proposal whereby MIT will design and build the VLBA recording system under a contract with NRAO. Preliminary discussions between NRAO/MIT should be completed in November 1983 and the scope of work and a contract price for the data system agreed upon by January 1984.

Monitor and Control System

The design of the electronics part of the antenna control system will be undertaken in 1984 and the software development for the antenna computers will begin. There will be no major monitor and control procurement during 1984.

Processor System

In late 1983, the California Institute of Technology (CIT) is expected to offer a proposal whereby CIT will design and build the VLBA processor system under a contract with NRAO. The processor design, which is currently being developed at CIT, is tentatively scheduled to be adopted as the VLBA processor system. The scope of the work and a contract price for the processor system will be agreed on by NRAO/CIT in early 1984.

Project Management

The VLBA project management staff will be assembled in Charlottesville during 1984 and quartered in NRAO rented office facilities on Ivy Road. The project management staff will be headed by a Project Manager who will have general direction of VLBA construction activities. The NRAO is currently seeking a project manager for the VLBA construction program, and it is anticipated that the position will be filled in 1984. Dr. Hein Hvatum, Associate Director for Technical Services, is currently holding this position.

During 1984, the VLBA project staff will be concerned with developing detailed time and cost schedules for the project; purchasing and subcontract administration; and developing field construction and management guidelines for the project to cover local administrative and logistical requirements for the various VLBA sites. All general management and operating procedures adopted for the VLBA project will be consistent with existing Observatory practices and procedures.

Part 2 shows the projected staffing for VLBA construction covering the five-year period 1984-1988. Peak staffing for the project will occur in 1986-87, although it could change somewhat depending on the project funding schedule finally adopted by the NSF. (A funding schedule of $2.5M, $20.0M; $20.0M; $20.0M for 1984-87 is presently contemplated by NRAO.)

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PART 2. PROJECT STAFFING PLAN

Very Long Baseline Array

Project Staffing Plan
(Number Employees @ 12/31)

	1984	1985	1986	1987	1988
Site Development	2	4	4	4	3
Antenna System	1	8	8	8	6
Electronics System	14	20	21	19	13
Data Recording System	2	2	2	2	-
Monitor and Control	4	4	7	7	6
Processor	1	1	1	1	-
Post Processing	-	2	3	4	1
Project Management	10	10	10	10	10
Total	34	51	56	55	39
Estimated Man Years	23	48	56	54	34

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PART 3. 1984 FINANCIAL PLAN

VLBA Financial Plan - 1984

The distribution of planned commitments and expenditures for VLBA activities in 1984 are given in the following table:

	Man Months	Salaries and Wages	Employee Benefits (22.5%/wage)	Material and Supply	Travel	Contract Charges	Total
		(thousands)					
1. Site Development	9	$ 30.0	$ 7.0	$ 2.0	$15.0	$ 81.0	$ 135.0
2. Antenna Syst.	9	20.0	5.0	5.0	8.0	785.0	823.0
3. Electronics Syst.	98	211.0	47.0	132.0	10.0	-	400.0
4. Data Recording Syst.	24	56.0	13.0	1.0	8.0	295.0	373.0
5. Monitor and Control	36	84.0	19.0	40.0	8.0	-	151.0
6. Processor Syst.	12	24.0	5.0	2.0	4.0	290.0	325.0
7. Post Processor	-	-	-	-	-	-	-
8. Project Management	86	189.0	42.0	10.0	19.0	-	260.0
Subtotal	274	$614.0	$138.0	$192.0	$72.0	$1,451.0	$2,467.0
Other:							
9. Spare Parts	-	-	-	-	-	-	-
10. Contingency	-	-	-	$ 33.0	-	-	$ 33.0
Total	274	$614.0	$138.0	$225.0	$72.0	$1,451.0	$2,500.0

1. Salaries and Wages.....$614,000

In 1984, approximately 23-man years of direct in-house labor costs will be incurred by the VLBA project. These costs cover the salaries and wages of VLBA employees who have been hired directly into the project or transferred into the project from other Observatory operations. In addition to those employees whose wages are charged directly to the

project, other non-direct NRAO employees will be involved in overall planning, design and procurement activities for VLBA during 1984. Certain of these latter employees will be transferred full-time into the project in 1985 as construction gets underway.

2. Employee Benefits.....$138,000

Benefits are computed at 22.5% of salaries for the NRAO during 1984. All NRAO cost centers (e.g., VLBA) bear the same benefit rate.

3. Material and Supply.....$192,000

The majority of Material and Supply expenditures for the VLBA in 1984 is expected to be in the electronics and monitor and control areas of the project. Considerable prototype work in feed systems and front-end development in 1984 will require the early procurement of both current shop material and laboratory bench stocks.

4. Travel.....$ 72,000

Travel costs are expected to be relatively high in 1984 due to moving costs of new employees hired for the project and the relocation expenses of NRAO employees who are expected to transfer to the project. In addition, it is anticipated that considerable travel expenses will be incurred in the area of site evaluation, acquisition, and development and in the selection of an antenna contractor.

5. Contract Charges.....$1,451,000

Almost 60% of the $2,500,000 VLBA allocation in 1984 is earmarked for contract work, primarily design activities.

(a) Site development: $81,000 is the amount estimated for the first phase A/E work in 1984, which is expected to include the design of an

antenna control building that can be adapted to all antenna sites; a typical site layout, including the telescope foundation, utilities, roads, etc.; and completion of the preliminary design of the Array Operations Center (AOE).

(b) Antenna system: $785,000 is the amount estimated for the contract for antenna design and for engineering consultants for pre-contract award design work.

(c) Data recording system: $295,000 will be required to support the design and development work by MIT on the data-recording system during 1984.

(d) Processor system: $290,000 is the amount Caltech has estimated will be required to support its development efforts on the VLBA processor during 1984.

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PART 4. CONTRACTOR SELECTION PROCEDURES

PART 4(A)

PROCEDURE FOR SELECTION OF THE ANTENNA SUBCONTRACTOR

The following procedures will be adhered to in the selection of a subcontractor to design, manufacture, deliver, erect, align and test the 10 radio telescopes required for the Very Long Baseline Array Telescope System.

1. Preparation of the Request for Proposals

This document will be prepared by the NRAO staff and consultants, reviewed by AUI, and submitted to the National Science Foundation. An agreed upon version will be the basis for the procurement action.

2. Qualification of Potential Subcontractors

Qualification will be accomplished by the following methods:

(a) Solicitation of known concerns - There are several concerns in the United States who have designed and erected large steerable antennas. The interest of these firms will be solicited directly by letter.

(b) Publication of notice in the Commerce Business Daily - A notice will be placed in the Commerce Business Daily setting forth information on the project and requesting interested concerns to contact the VLA Project Manager.

(c) Qualification of concerns - Interested concerns will be requested to furnish Form 251 or other data to show that they are generally qualified. Should it be found that a firm is not qualified, it will be so notified. Should an impasse result where the concern states that it is qualified and insists on receiving the RFP, copies will be forwarded.

3. Issuance of the Request for Proposals

Two copies of the RFP will be sent to each concern. Transmittal letter will be brief and will not repeat data which is contained within the body of the RFP. Twelve weeks will be allowed for the preparation of the proposals.

4. Pre-Proposal Conference

A pre-proposal conference of all interested parties will be held at Charlottesville, Virginia, about four weeks after issuance of the RFP.

5. Requests for Interpretation of Documents

Efforts will be made to have concerns submit their questions in writing. All answers will be in the form of written addenda to the RFP.

6. Contents of Proposal

Proposals will contain the following sections:

General Summary of the Proposal

Technical Proposal Based on AUI Design Concept

Alternate Technical Proposal

Business Proposal

Master Summary Schedules

Subcontract Price

Price and cost data will be received in separate sealed envelopes.

7. Review of Proposals

The Director of NRAO will name the following:

Contract Selection Committee which will have overall responsibility for selection of the successful concern and making the recommendation of award to the Director of NRAO. The Committee will be assisted by the following two subcommittees.

Technical Evaluation Subcommittee which will have the responsibility of delving deeply into all technical aspects of the proposals to ensure that the proposed designs are feasible and will meet the requirements of the RFP.

Business Evaluation Subcommittee which will have the responsibility of ensuring that the concerns have the resources, financial strength, and management capability to properly execute the work covered under the RFP.

The Contract Selection Committee shall direct the priorities and activities of the two Evaluation Subcommittees. Price information will not be divulged to any outside person or organization until the selection has been made.

As the selection process proceeds, it is expected that each Evaluation Subcommittee will review the entire proposal of the key concerns.

Each Evaluation Subcommittee shall prepare its own "Criteria for Evaluation" and shall file them with the Contract Selection Committee prior to the receipt of proposals.

Written reports will be furnished by the Subcommittees on the concerns as requested by the Selection Committee.

It is expected that one or more technical and management conferences will be held with key concerns during the selection process and requests for additional data sent out.

8. Selection of the Subcontractor

After full consideration of all facets, the Contract Selection Committee will make a selection and recommendation to the Director of NRAO setting forth in writing the basis for the selection. After approval by the NRAO Director, the selection will be forwarded to the NSF for approval. Public announcement and the notice to unsuccessful proposers will not be given until the NSF has approved the selection.

9. Liaison with the National Science Foundation

NSF will be kept fully informed as to the selection process to the extent that NSF requests.

10. Negotiating Committee

The Director of NRAO shall name a Negotiating Committee to negotiate the terms of the contract with the successful concern.

PART 4(B)

PROCEDURE FOR SELECTION OF THE ARCHITECT-ENGINEER

The following procedures will be followed in the selection of an Architect-Engineer subcontractor to complete preliminary planning, detailed design, preparation of working drawings and specifications, and assistance during construction for the ground facilities, structures, buildings, site work and utilities required for the Very Long Baseline Array Radio Telescope Project.

1. Selection Committee - The Director, NRAO will name a selection committee to accomplish the selection of the Architect-Engineer. This committee will include senior engineers and NRAO business employees acquainted with the requirements of the project.

2. Description of Work Requiring A/E Participation - This document will set down in general terms those items of work which will require the services of an Architect-Engineer.

3. Scope of Architect-Engineer Services Required - This document will set down the services which will be required of the Architect-Engineer.

4. List of Preliminary A/E Qualifications - A list of preliminary Architect-Engineer qualifications will be prepared to assist in compiling the names of firms to be solicited. This list will include such items as geographic location of firm, size of firm, type and extent of integrated services required, experience of firm, etc.

5. Selection of Initial List of A/E Firms - An initial list of A/E firms to be considered will be prepared using the following sources:

McGraw-Hill Information Systems Company

Engineering News-Record Listing of Design Firms

National and State Engineering Societies

National and State Architectural Societies

Solicitation Letters to NRAO

Commerce Business Daily

6. Obtain Data on Initial List of A/E Firms - Where adequate data is not available on a firm's general capabilities, a letter requesting Form 251, brochures or other data will be sent.

7. Selection of Firms to be Solicited - This selection of up to ten firms will be made by the Selection Committee using the List of Preliminary A/E Qualifications and rating each firm on its qualifications.

8. Request for Proposals - This document will set forth the scope of the A/E work required and request formal proposals from the firms solicited. It will be much less formal in format than the RFP's used for commercial work. Pricing data will not be requested at this time nor will the type of contract to be used specified.

9. Criteria for Final Selection - A final selection criteria will be prepared setting forth those items upon which the selection would be made and giving each a weighted point value.

10. Review of Proposals - The Selection Committee will analyze the proposals, develop additional information as required, and narrow the selection down to one to three firms. These will be interviewed at their

home offices and discussions held with the key personnel to be assigned to the project. At this time general data on direct and overhead costs will be obtained to ensure that there will not be a major differential in cost between the firms selected for interview and final consideration.

11. Selection of the A/E Subcontractor - After full consideration of all facets, the Selection Committee will make a selection and a recommendation to the Director of NRAO setting forth in writing the basis for the selection.

12. Liaison with the National Science Foundation - The Foundation will be kept fully informed as to the selection process to the extent that the Foundation requests.

13. Negotiating Committee - Upon selection, the Director of NRAO will name a negotiating committee to negotiate the type, cost, and terms of the subcontract with the successful firm.

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PART 5. OTHER

VERY LONG BASELINE ARRAY

Preliminary Antenna Design and Delivery Schedule

Antenna Design and Engineering	Start	Complete
Initial Design	Aug. 1, 1984	Oct. 30, 1984
AUI Review	Nov. 1, 1984	Nov. 31, 1984
Final Design	Dec. 1, 1984	Jan. 31, 1985

Antenna Authorization* Dates and Delivery Schedules

Group I	Authorization	Delivery
Antenna No. 1	Feb. 1, 1985	Dec. 31, 1985
Antenna No. 2	Feb. 1, 1985	Jan. 31, 1986
Antenna No. 3	Feb. 1, 1985	Apr. 30, 1986
Group II		
Antenna No. 4	Jan. 1, 1986	Oct. 30, 1986
Antenna No. 5	Jan. 1, 1986	Nov. 31, 1986
Antenna No. 6	Jan. 1, 1986	Feb. 28, 1987
Antenna No. 7	Jan. 1, 1986	Mar. 31, 1987
Group III		
Antenna No. 8	Jan. 1, 1987	Oct. 30, 1987
Antenna No. 9	Jan. 1, 1987	Nov. 31, 1987
Antenna No. 10	Jan. 1, 1987	Feb. 28, 1988

Antenna Contract Term

Design Start	Aug. 1, 1984
Construction Completed	Feb. 28, 1988
Total Term	43 months

*Equals commitment date

VLBA Preliminary Antenna Delivery Schedule