VLBA DOCUMENTATION STANDARDS

Larry R. D'Addario

13 July 1984

VLB ARRAY MEMO No. 364

The VLBA telescope will be documented on three levels: informal planning; design documentation; and description of the final product. The first of these is covered by the various memo series and the Project Book. The method of handling the others will be described in this memo.

During the design phase, when hard design decisions are made, the primary documentation of them will be engineering drawings. A system of numbering and filing drawings is described in Specification A58001N001 (based on CC Memo No. 23 by H. Dill), and is reproduced here as Appendix A. Conformance to this system is now required. A special type of "drawing" is the Specification, described in Appendix B (which is a reproduction of Specification A58001N002). Specifications will normally consist mostly of text and will be on A-size (8.5 by 11 inch) paper, but they will be numbered and filed like other drawings. All designers are urged to document their work through this system; for certain items, Specifications are strictly required (see Appendix B).

The work of building the VLBA is broken down into "projects," each of which is assigned a 5-digit number. These numbers will be used to identify the documentation, as well as for fiscal planning and cost accounting. Project numbers are assigned to individual projects by the VLBA business manager (Bill Porter). A current list of numbers and their corresponding project titles is given in VLBA Memo No. 362.

When the design of any part of the telescope is finalized, or when the entire telescope is complete, we will produce a series of manuals which describe all of the hardware and software. These are intended to facilitate maintenance and future modifications, and should be a complete description of the design. They can incorporate by reference any of the Specifications and drawings previously produced. We have not yet decided how to separate the parts of the telescope for the purpose of final documentation, i.e., what goes in each manual; nor have we established formats or detailed standards for these final documents. However, such standards will be set and conformance to them will be required before the end of the project.

Appendix A

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, VA
VLBA PROJECT

SPECIFICATION: A58001N001 DATE: July 9, 1984

TITLE: Drawing Numbers and Part Numbers

PREPARED BY: Larry R D'Addario APPROVED BY:

The following drawing number system shall be used on all drawings and related documents pertaining to the VLBA Project. It will consist of a 10 character identifier that includes the project number. All internally designed parts shall be assigned a part number that is the same as the number of a corresponding drawing (if the part is described by more than one drawing, then the top assembly drawing number shall be used.)

1.0 FORMAT

Drawing numbers shall be of the form

SPPPPPTNNN

where:

S = size designator

Designation	Paper Size (in.)
A	8.5 by 11
B	11 by 17
C	17 by 22
D	22 by 34
E	34 by 44
F	34 by cut length

PPPPP = first five digits of project number; this number is assigned by management, and is also used for fiscal planning.

T = drawing type designator (1 of 26 letters), including:

Common types	B - bill of materials
	A - assembly
	M - mechanical
	N - specification
	Z - sketch
	F - fixtures
Primarily structural	Y - control drawing
	C - civil and concrete
	H - heavy equipment
	E - electrical
	T - structural
Primarily electronics	S - schematic

L - logic diagram
W - wire list
P - printed circuit board, mechanical
Q - printed circuit board, artwork
I - silkscreen
D - data list
K - block diagram

The remaining letters (G, J, O, R, U, V, Z) are not yet assigned.

NNN = sequence number, a 3 digit number from 001 through 999, assigned consecutively for each Type under each Project (but not for each size).

2.0 EXAMPLES

A53200M001
C53200M002
D53200K001

The above numbers correspond to the first two mechanical drawings (which happen to be of two different sizes) and the first block diagram produced under project 53200 (Front Ends).

3.0 GUIDELINES

1. Drawing numbers must be 10 characters long.

2. A drawings may have more than one sheet, but all sheets must be of the same size.

3. For filing, drawings will be sorted by size, project, type, and sequence number. Initially, original drawings will be stored at the site where they are generated; later, they will be combined into a common file at the VLBA Operations Center.

4. Individual drawing numbers will normally be assigned and logged by the head of the VLBA Drafting Department (currently Harry Dill in Charlottesville). However, blocks of numbers may be allocated to a particular individual at each site, who will then assign individual drawing numbers and periodically report them to the Drafting Department.

5. Drawings may also be numbered and filed using some other system if that is preferred at some sites, provided that each drawing generated for the VLBA project also contains a number of the form specified here.

6. More detailed specifications may be issued later, including descriptions of each drawing type and guidelines for drafting practices. Meanwhile, it is recommended that the methods, formats, and procedures described in the following reference be used wherever they are applicable: "VLA Electronics Drafting Manual", VLA Tech. Report No. 31, by D. Weber et al. (Feb. 1978).

Appendix B

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, VA
VLBA PROJECT

SPECIFICATION: A58001N002 DATE: July 9, 1984

TITLE: Specifications

PREPARED BY: Larry R D'Addario APPROVED BY:

1.0 Purpose; Parts For Which Specifications Are Required

Formal specifications will establish the exact performance requirements for various parts of the VLBA. Each specification is a document which describes one component, set of components, or subsystem. The issuance of a specification reflects definite design decisions, not speculations about possible designs.

A specification must be written for:

1.1 Components procured from outside vendors. Purchase orders should reference the VLBA Specifcation Number. However, no specification is required for items which are adequately specified in the vendor's catalog or other documentation; in that case, the catalog number or vendor's specification should be referenced, and a copy should be retained by the designer and included in the final documentation of the VLBA subsystem in which the component is used.

1.2 Components fabricated by the VLBA that have multiple users within the project. This will facilitate incorporation of the component into subsystems designed by persons other than the component designer.

1.3 Interfaces between major subsystems. This is required even if the subsystems involved are being designed by the same group or by people at the same site, because maintenance responsibilities may later be separated.

1.4 Any other performance requirements needing precise statement or clarification. This could apply at the level of the entire telescope, major subsystems, or individual parts. Each group leader may write such a specification, and the Systems Engineer or the Project Manager may request that such a specification be written, whenever a need for it becomes apparent.

2.0 Numbering, Filing, and Revising

Each specification will be assigned a number by following the system of drawing numbers given in Specification A58001N001. A specification may be thought of as a "drawing." All specifications will be on A-size (8.5 by 11 inch) paper, and will be called type "N" drawings. The full number is of the form

A<project#>N<spec#>-<revision>

where <project#> is a VLBA project number; <spec#> is a three digit number assigned in chronological sequence for each project number; and <revision> is omitted for the original issuance of a specification, is "A" for the first revision, then "B", "C", etc. Note that the revision code is not part of the drawing number as specified in A58001N001.

If a revised version of a specification is issued, then all previous versions with the same number are obsolete. If it is necessary to issue a specification that is slightly different from an earlier one, but where the earlier one remains applicable in some cases, then a new specification number must be assigned.

A specification is considered "issued" when an approved copy is filed at the VLBA Project Office. It will be stamped with the filing date. Copies may be requested from the Project Office by persons inside and outside the VLBA. A log will be kept of copies sent to outside persons. Any copies not showing the Project Office date stamp should be considered unofficial and may be inaccurate.

Specifications should begin with a header similar in form to the beginning of this document; however, other formats are acceptable as long as all the required information is included.

3.0 Requests For Proposals

When a request for proposals (RFP) is issued to outside vendors, it will normally contain specification information. Either the various things specified in the RFP should each be made a VLBA Specification, and then the various Specifications should be included in the RFP by reference or by attaching copies; or the entire RFP should be made a Specification. At this time, the RFP for the antenna fabrication has already been issued; it is hereby assigned the following Specification Number:

A52500N001.

4.0 Authorship and Approval

A specification may be written by anyone responsible for the design of a portion of the VLBA. Before it is issued (made official), it must be approved by someone other than the author, as follows:

4.1 Specifications affecting items used only within a project may be approved by the leader of the project.

4.2 Specifications affecting items used only within a major subsystem may be approved by the manager responsible for that subsystem.

4.3 Specifications for interfaces between major subsystems must be approved by the Systems Engineer or the Project Manager, who will ensure that they are first reviewed by those responsible for each side of the interface.

4.4 Specifications for software must be approved by the

chairman of the Computer Advisory Group or the Project Manager.

4.5 Any other specifications must be approved by the Project Manager, a Deputy Project Manager, or the Systems Engineer, who will ensure that they are first reviewed by appropriate persons.

4.6 If any of the persons mentioned above is the author of a specification, then that specification must be approved by someone at the next higher management level.

5.0 Major Subsystems

The following are considered "major subsystems" for the purposes of this document:

Station Building (and associated site development)
Antennas (as delivered by vendor)
Feeds (includes all NRAO-built optics)
Front Ends (includes support electronics and cryo)
Local Oscillators (includes H-maser)
I.F. Processing (includes baseband converters)
Digitizers
Recorders
Monitor and Control (both station and central)
Operations Center Building
Playback Equipment
Correlator
Post Processor