ALMA Memo No. 323

NUMBERING OF DRAWINGS, SPECIFICATIONS AND SIMILAR DOCUMENTS

L. D'Addario, 2000-09-11

INTRODUCTION

This memo describes a system for assigning identifying numbers to certain critical documents within the ALMA project. The phrase "document number" or "drawing number" refers to the unique identification string assigned to a document, even though the string is not entirely numeric.

An underlying principle is that the numbering is related to things rather than to tasks or persons. It reflects the object being worked on, not the person(s) doing the work. In this way, it is applicable primarily to engineering documents, including drawings (broadly defined), specifications, parts lists, and interface control documents (ICDs). Possible extensions to other kinds of documents are discussed later in this memo.

To the extent that human involvement is required in assigning numbers, responsibility is distributed hierarchically so as to allow local management of document numbers for a particular object.

The numbering scheme described in MMA Memo 235 [1] is hereby made obsolete.

DEFINITION OF THE IDENTIFICATION STRING

Each drawing, specification, ICD, or similar item shall be assigned an identification string of the following form.

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ALMAddpppTTnnnnR:     "drawing" number
ALMAddpppddpppnnnnR:  ICD number
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where

- ALMA: Identifies this as an ALMA document. May be omitted from data files used only within ALMA, but should always be included within the document itself. Enables including these documents (especially drawings) in indices that cover additional major projects.
- dd: ALMA group number, 2 digits. Permanently assigned to each technical group by the Project Manager. Group numbers may never be deleted or re-assigned, even if the group itself ceases to exist, but new group numbers may be created at any time. Every physical element of the telescope is the responsibility of exactly one group at any one time. If responsibility is transferred to another group, new documents use the new group number but old documents are not re-numbered.
- ppp: Project number within group, 3 digits. Corresponds to a specific set of hardware, typically at the "module" level. Permanently assigned by the group leader, never deleted. Projects may become obsolete, but their documents retain the same numbers, even if the documents are re-used within a new project. New project numbers can be created at any time.
- TT: Drawing type code (see discussion below), 2 letters.
- nnnn: Sequence number, unique within project (not reused among types) or within pair of projects for ICDs; 4 digits.
- R: Revision code, 1 letter. Blank (null) for the initial

version of a document, "A" for the first revision, etc. If a document ever gets to "Z" and further revision is needed, it should be marked obsolete and a completely new number issued for the next version.

Notes:

[1] ICD numbers include two projects; these identify the two telescope elements whose interface the document describes. It is possible to have an ICD for an interface that is internal to a project, in which case the two 5-digit strings (ddppp) are identical. Two ICD numbers which are related by interchanging the two 5-digit strings shall be understood to refer to the same document (i.e., it is immaterial which number is listed first).

[2] A Specification is considered a type of "drawing" (type code NX), even if it contains mostly text. The numbering system does not depend on the structure of the document, which may be graphical or textural or some mixture.

[3] Management of the number assignments is done at three levels: group numbers by the Project Manager; project numbers by the group leader; and sequence numbers by the person directly responsible for each document, typically an engineer. Groups and group leaders for this purpose need not correspond exactly to the project's administrative Divisions and Division Heads.

[4] For any of the alphabetic fields in the document number, case is not significant. For example, type codes AX, Ax, ax, aX should all be treated as equivalent. (Care must be taken if the document numbers are copied into case-sensitive software, such as using them as file names in some operating systems.)

[5] The official identification string contains only numbers and letters, with no delimiters, as shown above. However, software designed to display the string to humans may insert delimiters between the fields so as to make the string easier to read.

AUTOMATION

An automatic system for assigning numbers shall be established. It must be available to anyone over the Internet, but may require username and password for access. It will assign a name to the next available project number, but only if the user is an authorized group leader. It will assign the next available sequence number within a project to anyone, and will record that person as being responsible for the resulting document; it will require that the user provide a project code, type code, a title for the document, and a set of keywords describing it, which it will also record. It will allow an authorized group leader to change the name of the responsible person under a previously-issued number.

The same system should allow read-only access without passwords. It should be able to return the title and responsible person given any valid document number, and the title of any project given its 5-digit code. It should allow searching for documents by title and keywords.

The number assignment and retrieval system just described will be supported by a data base. It should then be straightforward, but is not hereby required, to include considerably more information about each document, such as its current status, revision date, location, format, and cross-references to other documents.

The documents themselves will be kept in an electronic archive, details of which will be described elsewhere.

TYPE CODES

The original author of a document is required to classify it by assigning one of a pre-defined set of type codes. This gives a general indication of the document's purpose, but it is not definitive; for some documents, more than one choice might be reasonable, but the author must select only one. The code does not specify technical information about the document, such as its format. Like all fields of the document number except the revision code, the type code cannot be changed once assigned. Note that the document number remains unique even if the type code is ignored (there cannot be two document numbers that differ only in their type codes).

The current list of type codes and their corresponding names is given in Appendix A, along with a brief explanation of each. This list is inherited from drawing numbering systems used earlier at the NRAO [1-3]. Some of these codes are not likely to be used within the ALMA project. New type codes can be established by the Project Manager as needed, but old ones can never be changed.

For one type, the document number has an additional significance. An "assembly drawing" number (type code AX) also serves as the Part Number of the assembly that it describes, and is thus used in the parts lists of higher level assemblies. See further discussion in Appendix A.

CAD FILES

In modern engineering practice, computer aided design (CAD) is important. Many documents traditionally called "drawings" are actually generated by CAD software. Such software evolves rapidly, and a general document numbering system cannot take account of CAD system details, nor be tied to any particular software. However, it is recognized that CAD systems often collect a variety of engineering data into one file or a set of interrelated files which must be updated together; and that from these files various displays or reports can be generated, each of which might traditionally be considered a "drawing."

It is therefore our policy to treat any such file or inseparable set of files as a single document, and to assign a single document number. Printouts or reports that can be generated from it are considered elements of that document, similar to sheets of traditional drawings or pages of text documents, rather than separate documents.

APPLICABILITY

As mentioned in the Introduction, this system applies primarily to engineering documents, but more generally it applies to documents that describe the design of the ALMA telescope. Each one should be associated with an identifiable physical or logical element of the instrument. Documents to which this clearly applies include specifications (including high level specifications affecting the whole instrument or major subsystems); bills of materials (parts lists); drawings of all types; and ICDs. Some software documents, but perhaps not all, are also included; formal software specifications, at least, belong under this system.

The ALMA project also has a well-established numbered memo series for less formal documentation of an archival nature. That series should be continued, and is not intended to be supplanted by the system described here. ALMA also has a Project Book, which is a volatile document in which the current design is summarized. It too should be maintained and is unaffected by this system.

Additional documents not covered by any of the above are likely to be needed. It is possible to make use of the numbering system described here for other purposes, distinguished via the type code. Proposals along these lines should be submitted to the Project Manager, who can assign a new type code if appropriate.

REFERENCES

[1] V. Gasho et al., "Drawing numbers and drawing archive." MMA Memo 235, 1998-Nov-02.

[2] H. Dill, "Drawing Numbers." VLBA-CC Memo No. 23, 1984-01-12.

[3] D. Weber, R. Runyon, T. Cote, L. Carlisle, "VLA Electronics Drafting Manual" VLA Technical Report No. 31, February 1978.

Appendix A: DOCUMENT TYPE CODES

AX - Assembly: Drawing that shows how to construct a part that is made up of other parts. Generally associated with a bill of materials (BOM, code BX). Note: Whenever an assembly drawing number is assigned, a drawing number will be assigned to the associated BOM, even if it is not yet submitted. Similarly, when a BOM number is assigned, a number will be assigned to the associated assembly drawing. Even if no Assembly Drawing exists yet, the assembly itself will have a part number identical to the assembly drawing number.

BX - Bill Of Materials (BOM): List of the parts that are needed to construct an assembly. Generally associated with an assembly drawing (code AX).

CX - Civil and Concrete: Pertaining to civil engineering type drawings, e.g., site development drawings.

DX - Data List: A listing of relevant functional or physical data, e.g., computer-aided analysis and synthesis program output data.

EX - Electrical: Drawings pertaining to power distribution in mechanical and architectural systems.

FX - Fixtures: Drawings pertaining to appliances, e.g., plumbing, lighting, etc.

HX - Heavy Equipment: Drawings pertaining to large equipment, e.g., antenna transporter.

KX - Block Diagram: Simplified drawings of circuit functions or signal flow in electronic circuits and systems.

MX - Mechanical: A drawing that sufficiently shows the features and dimensions of a mechanical part so that part can be manufactured.

NX - Specifications: A detailed, exact statement of particulars, especially a statement prescribing material, dimensions, and quality of work for something to be built, installed, or manufactured.

PX - P.C. Board: Printed circuit board layout may include artwork for multiple layers of various types (metal, silk screen, solder mask, etc.), and other manufacturing information like a drill drawing. The complete set of elements or sheets of a drawing of this type should contain all necessary information needed to manufacture the board.

RX - Architectural: Drawings of buildings and other structures.

SX - Schematic: Electrical or electronic circuit diagrams of all types (including analog, digital, and microwave) except those that are better described by the definitions of type EX or KX.

TX - Structural: Engineering drawings that delineate such items as structural steel framing for buildings, antennas, etc.

VX - Timing Diagram: Diagram of various signals, their timing, and their relationship with each other.

WX - Wire List: Wire lists define wire paths, connections, wire size, code, signal names, I/O connections, etc., and are used for rack, module, and cable drawings.

ZX - Sketch: A drawing with little detail used for presentation or outlining purposes. May be hand-drawn or informal. Normally such a drawing is assigned a number and maintained in the archive only if there is a specific reason that it should be preserved. If it is later made more formal, the new drawing should be assigned another appropriate type and the sketch will be marked obsolete.