MMA Memo 235: Drawing Numbers and Drawing Archive

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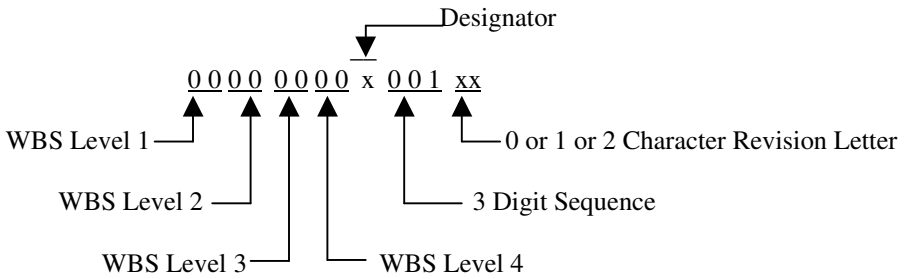
Abstract:
This document describes the MMA drawing numbering system, drawing archive, and drawing submission procedures.

Introduction

This document outlines the MMA drawing numbers system and the procedure for submitting these drawings to be archived. The document will also be issued as drawing number 10010000n001 and revisions will be documented by drawing number revision and not in memo form.

1. Drawing Numbers

The drawing number is a modified version of the existing NRAO drawing number system [1] where the project number field is constructed from the WBS (Work Breakdown Structure) number as shown below. It uses an eight-digit prefix to allow four levels in the WBS number; for levels not needed 00 is used in its place. The one character designator is adopted from the existing NRAO numbering system, the three-digit sequence allows 999 drawings to be made of each type, and the one or two-character revision letter allows for 676 revisions of a drawing. One of the changes from the existing system is the deletion of the drawing paper size in the drawing number; this information will be included in the drawing archive list instead. This system is shown below.



DESIGNATORS

a – ASSEMBLY
b – BILL OF MATERIALS
c – CIVIL AND CONCRETE
d – DATA LIST
e – ELECTRICAL
f – FIXTURES
h – HEAVY EQUIPMENT
k – BLOCK DIAGRAM
m –MECHANICAL
n – SPECIFICATIONS
p – P.C. BOARD, MECHANICAL
r – ARCHITECTURAL
s – SCHEMATIC
t – STRUCTURAL
v – TIMING DIAGRAM
w– WIRE LIST
z – SKETCH

For a more detailed definition of the designators, see appendix A.

Note: j, o, u, and x are the only open designators that may be assigned for new designations in the future. The letters g, i, l, and q have been used in the past as designators and may not be reused in the future.

For example, the first revision of the first drawing in the series of mechanical drawings for the subreflector (WBS number 3.4.1), would have a drawing number 03040100m001a. If this drawing does not have any revisions, the drawing number will be 03040100m001. Revision letters will have the following sequence: a, b, … z, aa, ab, … zz.

Drawing numbers will be assigned to the designers in a particular group by the person who is responsible for that specific WBS task that the designers are working on. The WBS is broad enough to allow individual group leaders, or their designee, to apportion and keep track of drawing numbers for the specific WBS task that they are responsible for. An automated system to assign drawing numbers is planned and will be described in future documentation.

2. Drawing Archive

A central depository for all approved drawings has been set up. There will be two formats of the drawings kept electronically: one in the native format (e.g., dwg for AutoCAD) and one for viewing, when practical to do so. The viewing format will be in pdf. The native and viewing formats will be put on an accessible computer system, so the person in charge of the central depository can retrieve the drawings. The archive copy is the master and the master will be backed up. The archive will also keep a hard copy of the drawing as a secondary backup.

Filenames will be in the form of the drawing number followed by a period and three-character code (extension) that specifies the format of the file. A partial list of valid codes is given in Appendix B; it is expected that this list will be expanded in the future. The code should uniquely specify the format, so once a code is used it should not be used again for something different. It is recognized that this might force some new codes to differ from the extensions normally used by the software that creates the files. However, a revision of a format by its designer does not necessarily require the use of a new code; instead, the exact version of the software that created the file will be given in the database (see below). For drawings whose data spans more than one file, there are two possibilities: (a) if each file is of a different format, then all the filenames follow the scheme already given and are the same except for the format code (extension); (b) if several files have the same format, then an underscore and a sequential decimal number are appended to the drawing number for each such file, so as to make the names unique (e.g., 00000000x001xx_1.xxx). All the characters in the filenames will be lower case to avoid ambiguity in file systems with case-sensitive names.

3. Drawing Submission Procedures

To submit a drawing or a revised drawing, the submitter must create the files containing the drawing data and place them in a location accessible to the archive manager. When appropriate and possible, they should include one or more files in a generic format for viewing and printing, where pdf is preferred. It is the submitter's responsibility to ensure that the archive manager has all necessary permissions to access the files for reading and copying. Anonymous ftp may be used if necessary, but direct access via an intranet is preferred when possible.

In rare cases, a drawing that does not exist in electronic form may be submitted as a hard copy. Then the master copy shall be sent to the archive manager for filing.

No one shall submit a drawing or a revised drawing unless it has been approved by its author's supervisor or by someone at a higher level in the project management; authors who are supervisors may not approve their own drawings.

In the future, an automated database is planned that will handle submission and archiving of the drawings. At present, the submitter shall then send an e-mail message to the archive manager with the following information.

(1) **Drawing Number**: (00000000x001xx)

(2) **Drawing Title**: (Drawing title that appears in the title block of the drawing.)

(3) **Keywords**: (A list of keywords to be used in searching the drawing archive, of which "mma" must always appear in this list. See Appendix C for a list of standard keywords, to be expanded in the future.

(4) **Drawing Paper Size**: (Paper size shown in the title block of the drawing.)

(5) **Site**: (XX) (The site at which the drawing was produced. The following are the American and Chilean sites, with the European and Japanese sites to be determined in the future.)

CV – Charlottesville	AC – Antofagasta, Chile
GB – Green Bank	PC – San Pedro, Chile
SO – Socorro	SC–Santiago, Chile
TU–Tucson	

(6) **Author**: (Name of the person who is responsible for the drawing that is not necessarily the submitter or author of the e-mail.)

(7) **Approved By**: (Name of person who approved the drawing for release, normally a group leader, division head or their designee.)

(8) **Software**: (Software and version of that software that was used to produce the file(s) being submitted.)

(9) **Filename Path**: (Path to the file(s) being submitted, the approximate size of each file in kB, and any other information needed to allow the archive manager to read and copy the file(s).

This information will be sent to archive manager, who will be in charge of the central depository, at mma-drawings@nrao.edu. An index to the drawing archive will be kept online at http://www.tuc.nrao.edu/mma/drawings with wide read permissions and restricted write permissions. The drawing files themselves will be kept at /home/tservo/ftp/mma/drawings and they will be accessible via anonymous ftp via ftp://ftp.tuc.nrao.edu/mma/drawings. This document, and later revisions, will also be kept online at the archive so that it can be easily referenced.

There are various documents within NRAO that pertain to drawing numbers, and the archiving of drawings, that have not been specifically referenced to in this document, but may be useful for background information. These documents are listed below.

1. H. Dill, "Drawing Numbers." VLBA-CC Memo No. 23, 840112.

2. L. D'Addario, "OVLBI Drawing Archives." 95/01/27, ftp://ftp.gb.nrao.edu/ovlbi/doc/drawings.doc.

3. L. D'Addario, "Hardware Documentation Standards." OVLBI-ES Memo No. 51, 94/12/07, Available in NRAO libraries or from ftp://ftp.gb.nrao.edu/ovlbi/memoseries/es51_documentation.txt.

References

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

Appendix A

Definitions

a – Assembly: Drawing that shows how to construct a part that is made up of other parts. Generally associated with a bill of materials (designator B). Note: Whenever an Assembly Drawing is submitted, a drawing number will be assigned to the associated BOM, even if the latter is not yet submitted. Similarly, when a BOM is submitted, a number will be assigned to the associated Assembly Drawing. These numbers will be identical except for the type code and revision suffixes. Even if no Assembly Drawing exists yet, the assembly itself will have a part number identical to the Assembly Drawing number.

b – Bill Of Materials (BOM): List of the parts that are needed to construct an assembly. Generally associated with an assembly drawing (designator A).

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

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

e – Electrical: Drawings pertaining to power distribution in mechanical and architectural systems.

f – Fixtures: Drawings pertaining to appliances, e.g., plumbing, lighting, etc.

h – Heavy Equipment: Drawings pertaining to large equipment, e.g., antenna transporter.

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

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

n – 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.

p – 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.

r – Architectural: Drawings of buildings and other structures.

s – 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 E or K.

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

v – Timing Diagram: Diagram of various signals, their timing, and their relationship with each other.

w – 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.

z– 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.

Appendix B

File codes

Code	Type
bmp	Windows or OS/2 Bitmap File
doc	Microsoft Word Document
dwg	AutoCad Drawing File
eps	Encapsulated Postcript File
gif	Compuserve Graphics Interchange File
jpg	Joint Photographic Experts Group File
max	OrCAD Layout Board File
pdf	Adobe Portable Document Format
ps	Postscript File
sch	OrCAD Schematic File
tex	TeX Input Language
tif	Tagged Image Format File
txt	ASCII Text File
wpd	Corel Word Perfect Document
wri	Microsoft Write Document

Appendix C

Keywords

Air Conditioning
Alignment
Amplifiers
Attenuation
Board
Cables
Calibration
Clocks
Coding
Coatings
Collimation
Computer
Concrete
Connector
Construction
Cooling
Cryogenics
Detector
Dewar
Diode
Encoder
Evaluation
Feed Horn
Fiber
Filter
Fiber Optics
Heat Sinks
HFET Amplifiers
IF
Inspection
Interfaces
Integration
IR Filters
Laser
Lens
Local Oscillators
Mask
Material
Mirror
Mixers
Mma
Modulation
Modes
Multiplexer
Multiplier Local Oscillator
Network
Optics
Optical Design
Optoelectronics
Optomechanical Design
Oscillators
Phase
Photograph
Photodiode
Photonics
Photonic Local Oscillator
Polarimeter
Polarization
Prototype
Quartz
Radiation Shields
Receiver Optics
Refrigerators
Sensor
SIS
SIS Mixers
Transducer
Transformer
Vacuum Window
Waveguide
Windows