

National Radio Astronomy Observatory

Socorro, New Mexico

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To: Scientific Staff and Programming Staff

From: R. D. Ekers

Subject: Map Names

This document incorporates the proposals in the memo's of BGC (August 12, and RDE (September 3). It is proposed that these conventions be implemented on both the VLA based and AIPS software. Although this proposal requires no terminal dependence in its simplest form, it should be able to take advantage of more powerful terminal features as they become available in future.

Definitions

The map can be specified three attributes:

1. A user generated map name.
2. A version number.
3. A computer generated map classification.

The map name together with the version number are always unique. The map classification can be used instead of the version number as a convenience to the user. Any incompatibility between these 3 specifications generates an explicit error message.

1. The map name.

The map name is given by the keyword¹:

NAME = xxxxxxxxxxxxxx

The field can contain up to 12 characters² with no restriction on character type, excepting use of the two separators; comma and space. Both upper and lower case characters are considered identical. Wild card options are allowed as discussed in section 4.

2. Version number³

On input the version number is specified by a separate keyword:

VERSION = nnn

Together with the map name this provides a unique identification. On output the version number is generated by the task in order to make a unique specification together with the map name. This will be greater than or equal to any version number specified by the user⁴.

The VERSION is a base 10 number, or list of numbers. Wild cards are allowed. If there is no map with the same name in existence the version number will start from that specified by the user. If the user has specified * or ? it will start from 1. The default input set by the command scanner will be *.

3. The map classification⁵.

This classification requires as many orthogonal sub-categories as are needed to cover the future needs, consequently it may have to be expanded at some future time. More than one sub-category may be needed to provide a full description. Some map classifications are given by the following keywords and parameters⁵.

WORD = REAL, IMAG, SIN, COS, AMP, PHASE TYPE = MAP, BEAM,
UVGRD, UVTRK, UVWT PLOTS, COMPS.
PROC = DIRTY, CLEAN, MEM, SPECT, MODEL,
BAND = 90, 20, 6, 2, 1.2, 0.7, ... or P, L, C, U, K, ...
POL = I, Q, U, V, LPOL, %LPOL, POS A
IF = AA, AB, AC, AD, BC,
CHANNEL = 1,2,3, ... or 1:32 or 100, 120, 140 ...km/s

If multiple values of the keywords are given multiple maps are intended eg. POL = I, Q, U implies three maps. If multiple values are given for more than one keyword all combinations are intended; eg

BAND = 20, 6

DATA = MAP, BEAM

implies maps and beams at both 20 and 6 cm.

4. Wild Cards

For input files:

- a) ? matches any single character
- b) * matches a string of any length up to the first occurrence of the character following it, or from the last occurrence of the character preceding it.
A possible future option would be to allow the expansion of wild cards.
eg. NAME = 3C* (* = 1:471)
- c) " repeats the previous string (only valid for one line of input).

5. Automatic list generation

In numeric fields, a list can be specified in the following forms:

VERSION = 1, 2, 3, 4, 5

VERSION = 1:5

VERSION = 1:10:2 (values from 1 to 10 with a step of 2).

Or in any combination of these, eg:

VERSION= 1:5, 7, 8, 10:20:2

6. Implied iteration for task performing the same operation on a list of input/output maps.

In this case there is nothing special about the input order so the multiple input lists associated with the keywords are adequate.

Examples:

NAME = 3C9, 3C24, 3C33

or NAME = NGC5128

CHANNEL = 1:64

or NAME = *

The task either has to be capable of recognizing the existence of a list (expanded in the command scanner?) and looping, or the application task should be invoked iteratively by a higher level task

which supplies the next element from the list each iteration. As a protection against unintended misuse the GO command could be expanded to GO ALL if multiple execution is required. In the case of VERSION = * the highest valid version number should be used.

7. Task requiring more than one input or output map name. Where possible the need for multiple names should be avoided by use of map classifications. For example a program to read an I, Q and U map and to generate a P, LPOL, % LPOL, POSA set of maps, all which have the same name but different class and version number, should work with the following inputs:

```
NAME= 3C84
VERSION = *
POL = *
```

However there will be some situations in which it will be necessary to specify more than one map name. Eg. input maps at two different frequencies generating an output spectral index map and an error map. Some possible⁷ solutions to this are:

a) Include the list of possible map names explicitly in the keywords (as in AIPS), eg.

```
NAME1    =
NAME2    =
VERSION1 =
VERSION2 =
```

Very cumbersome especially if the classes are also included!

b) Specify the multiple names by dividing the screen into columns with a heading displayed by the command scanner⁸.

```
          FREQ1      FREQ2
NAME      =      3C84      3C84
VERSION   =      *        *
BAND      =      20        6
etc.
```

To make this structure convenient to use it should be possible to skip columns using the tab key.

c) Give a list of map names parameters with each keyword. This has the disadvantage of an implied order which may not be transparent to the user, and an implied association between members of the list for different keywords. This use is also inconsistent with the implied iteration convention previously discussed.

d) Use multiple page inputs to the command scanner with the different names given on different pages. A page header would be displayed by the command scanner. May be too terminal dependant for present system.

Remaining Problems

These conventions don't give all the information necessary to uniquely associate files. Eg. the plot file will have a different version number from the map file, also the components file will have a different version number from the clean map file. In AIPS this association is built in by the use of the associated files. Either

pointers to an associated file should be added to the header, or the AIPS type scheme considered.

How fine should the map classification attribute be? It is certainly not sensible to duplicate all the processing information which is more appropriate for the history file. Since this is only a user convenience we should isolate the convenient attributes and not worry about completeness.

Complex images are assumed to be in two files distinguished by the classification WORD. This is proposed so that programs, such as display, could be used on either part of complex images without modification. However other system requirements may dictate different structure for complex images.

No differentiation is made between input and output files. Such a differentiation is generally not needed since the input and output name will be the same and the output map classification is determined by the computer. If a distinction is required it would only be necessary to add an OUTNAME keyword.

Explanatory Notes

1. Multiple keywords are chosen instead of the longer name string with separators for the following reasons: keywords are self-explanatory, no special symbols are required, and screen based editors with form fill in will make this just as simple to use.
2. The restriction to 12 characters is compatible with the present AIPS system and provides adequate field for good mnemonic content given the existence of the version number and the map classification.
3. The version number is the mechanism to insure a unique map specification and also provides the most concise form of user input.
4. This gives the user limited control over the version numbers generated without influencing the map name uniqueness. For example if two jobs are submitted for a map of the same name and the user wants to distinguish the outputs (to specify the inputs for the next task) input version numbers of 1 and 100 might be used.
5. This is not strictly speaking a part of the map name which is already uniquely specified by the name and version number. It is intended to provide a user tool which can, but need not be, used as part of the map selection process. It refers to attributes of the map which would be included in the map header but not necessarily in the map name catalog. The classification field conventions are fixed and system wide so they can be unambiguously generated by the program which generates the map. The classifications have been made as input map selection parameter (rather than just items in the map header) as a user convenience. For example a line observer would normally work only with the keyword CHANNEL and set (default) all other classes except CHANNEL to *.

6. The large number map classifications are necessary to provide for all possible combination. For example the imaginary V beam at 6 cm (WORD = IMAG, POL = V, TYPE = BEAM, BAND = 6cm) can be a useful diagnostic but cannot be specified in the existing DEC10 or AIPS structure. Since this is a user convenience rather than a formal part of the name it may not be necessary to be complete.

7. The best way to do this is worth further discussion hence options are given rather than a definitive proposal. My preference is for the column version.

8. This column heading text would be supplied to the command scanner by the application task.