AT/25.1.1/037

Definition of terminology and quantities for the AT

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1.0 INTRODUCTION

At a meeting of the AT computer group recently it became clear that there were conflicting terminologies being used within the AT. We have therefore adopted the following standards, and recommend that they be adopted throughout the AT. Before adoption, however, it is clearly necessary to reach a consensus and resolve any conflicts, and so this document represents a draft of the proposed standards. Please study them and see if they conflict with your terminology, definitions, or assumptions, and let me have your response as soon as possible.

2.0 OBSERVATION STRUCTURE

2.1 Definitions

Figure 1 shows the structure of an observation. The largest unit is a PROJECT, which is defined by a proposal. This project may include many sources, frequencies, or array configurations. The project consists of a number of OBSERVATIONs. Each of these may typically be 12 hours long, and represents a continuous period of time assigned to a project on one array. Each observation consists of a number of SCANs, which may typically be 10 mins long. Each scan represents a continuous observation of one source. The scan in turn is divided into INTEGRATIONS, each of which is 5n (or sometimes 5/n) seconds long, where n is an integer, and an integration will typically be 10s long (but may be as short as 2ms). This is the fundamental data-collecting time unit, and should be distinguished from a CYCLE, which is the interval between updating the samplers and phase rotators, and is always 5n seconds long, where n is an integer. For many observations, a cycle and an integration will in fact be identical, and will typically be 10s long. A further interval occurs in connection with pulsar and other repetitive timing observations, and that is the WINDOW, which is typically a few ms long. A window occurs at a fixed phase of a pulsar cycle, and is therefore in general incommensurate with the cycle or integration. Data from many windows can be accumulated over the same period of time.

2.2 Assumptions

1. During an OBSERVATION (typically 12 hours), the project number and array configuration are unchanged.

2. During a SCAN (typically 10 mins), the source, bandwidth, and number of channels per baseline are unchanged, although the frequency may change.

3. During an INTEGRATION (typically 10 s), all observing parameters are held constant.

3.0 SOURCE NAMES AND POSITIONS

3.1 Positions

The AT will operate internally in J2000 coordinates only. However, observers may if they wish specify their source coordinates in B1950 or other frames, but these will immediately be precessed on input to J2000. All AT software will store and use RA and Dec in J2000 radians, stored internally as REAL*8.

3.2 Source Names

The need for, and the format of, an AT source name is still being debated. However, the following represents the current thinking.

Each source observed on the AT will be assigned a 15-character name in the format:

hhmmss.s±ddmmss

where hhmmss.s represents the J2000 RA, and ddmmss represents the J2000 dec. These names, which are consistent with the latest IAU recommendation, will be used within all AT software to define the source uniquely. The precision of this name (~ 1 arcsec) ensures that it is unique, but unfortunately also ensures that almost no 2 catalogues will give the same AT-name for the same source. This latter problem, however, cannot be circumvented whatever the precision (21:33:59.9999 and 21:34:00.000 will be called

2133 and 2134 respectively in the PKS catalogue), so that if you want to locate a source, you should always do a search in RA and DEC and never simply look for an identical IAU-type or PKS-type name.

Other names, such as 3C273, Orion-A, 2134+004, will be stored as aliases. In all software that communicates with the observer, the observer may refer to a source by its alias rather than the AT name. However, it is then the responsibility of the observer to ensure that he gets the correct source, since such aliases may not be unique, as in the following examples:

1. The position of Orion-A is not unique. The peak of the low frequency emission as measured in the early days of radio astronomy may be some tens of arcsec from the peak of the high frequency emission or from the strongest OH or H2O masers, all of which are referred to in the literature as 'Orion-A'.

2. The position of 3C273, although well-defined, is subject to revision as techniques and definitions of reference frames improve.

Three steps may be taken to minimise this problem:

1. Observers should try not to use ambiguous aliases. (e.g. use Orion-KL or Orion-BN rather than Orion-A).

2. The software will by default pick the most recent AT name for an alias, thus hopefully getting the best position.

3. AT calibrators (e.g. 3C273 !) have a special status, and their position is defined in a calibrator relation which cannot be updated casually.

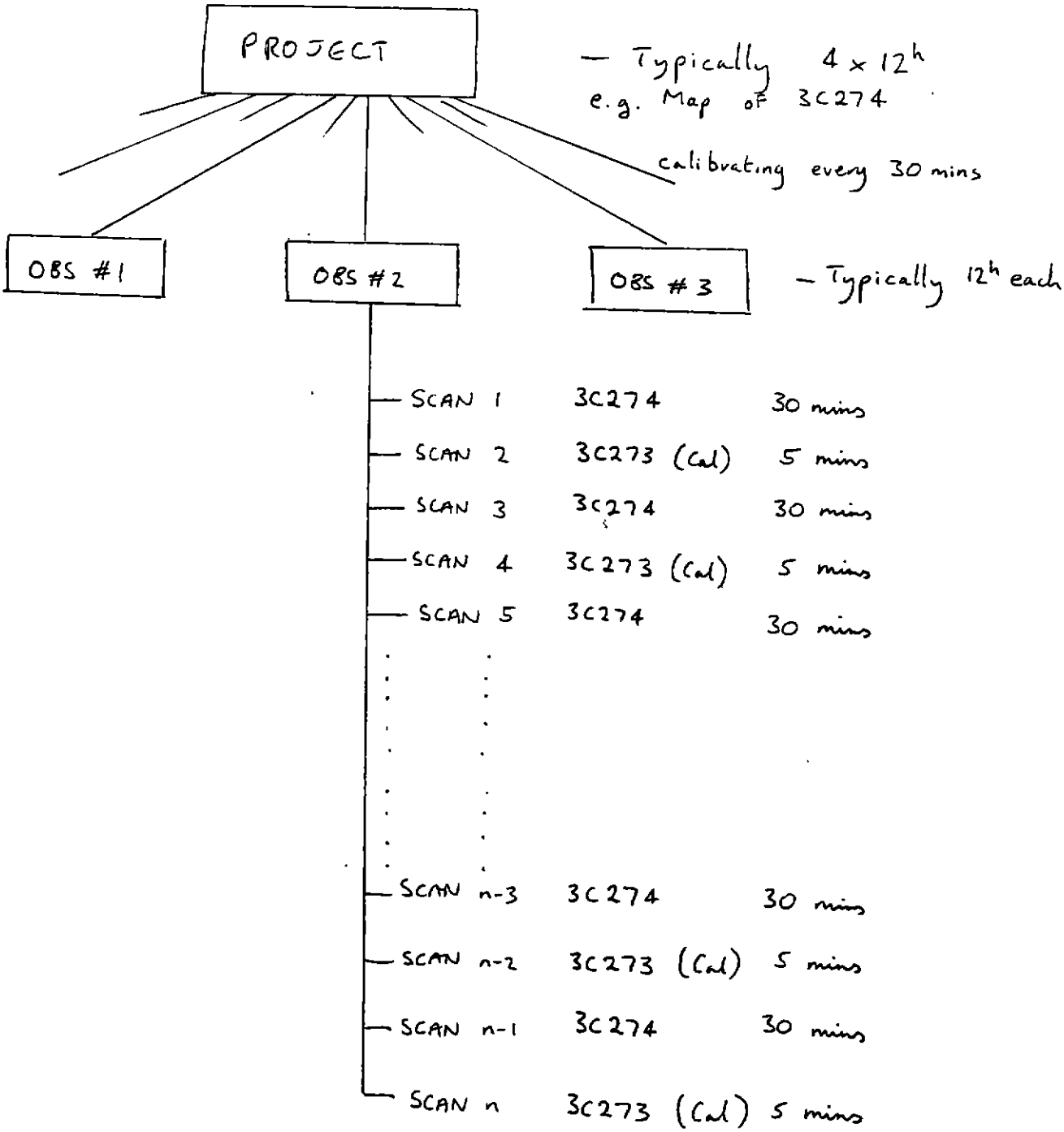
An alternative would be to insist that aliases be unique. However, for the general user, this is already effectively the case because of step (2) above. Furthermore, specialised software (in particular that dealing with other astronomical catalogues) needs to be able to access several positions for one object (e.g. the IRAS position for 3C273 differs from the PKS position).

4.0 UNITS

All quantities within AT software must be specified in SI units, and all angles must be specified in radians. Thus arcsec, mm, cm, minutes, deg/sec, etc., are all illegal. However, the quantities may be converted to 'friendly' units at the interface to the outside world, but this conversion must take place right at the i/o stage. Thus the observer may specify a 1 degree source offset (or the engineer a 1mm telescope location offset) into his terminal, but these must immediately be converted to SI units (radians and metres respectively) before being passed to other software.

5.0 ABBREVIATIONS

An AT dictionary database is being be set up. All abbreviations are to be entered into this, and this will ensure that all abbreviations and mnemonics are unique. Abbreviations (e.g. TID for Tidbinbilla, L/S for the 21cm/13cm receiver rack) will be no longer than 4 characters. Please contact RPN ASAP if you want to make entries in the initial dictionary.



NB Frequency and bandwidth might also be changed from Scan to Scan E.g. when observing different maser transitions.

Fig. 1: Structure of an Observation

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