

On-line software II.

mjk, 19 oct. 1984  
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In this note we examine the nature of the files needed for the on-line AT software. This analysis is based on AT,,, (PTR and RHW); some slight reorganization of the task structure and nomenclature is suggested.

There are 3 phases to the problem of making an observation with the AT:

- defining the program;
- initialization of hardware and software;
- controlling the hardware and collecting the data.

#### Defining the program

Every observing program will be fully specified in a PROGRAM file, whether it be a simple 12 hour uninterrupted synthesis, a complicated set of interleaved source/cal scans, or a multi-day synthesis.

OBS will operate exclusively from a SCHEDULE file which will contain a time-ordered list of programs. OBS may wish to check that a program is still suitable and consistent with the current array configuration and hardware, but otherwise there is no choice.

There are thus 3 types of files needed at this phase:

- PROGRAM files;
- the SCHEDULE file;
- the hardware availability file.

#### Initialization

A program will have a number of specific requirements which will require some hardware and software reconfiguration. There will be two stages of initialization: program, setting up the basic requirements, and a scan initialization, when the precise source position is specified to the antennas and to the LO and delay tracking task.

Files needed:

- PROGRAM file;
- CALIBRATION SOURCE file;
- hardware availability file;
- parameters files : station coordinates, IF phase and gain, polarization characteristics, etc.

OBS will pick up the appropriate data from these files, and transmit the relevant configuration information to ANTCON, CORCON and TRACK (which looks after the LO and delay tracking).

Making/controlling the observations

Once a scan has started the process will be largely self-contained. That is,

TRACK will produce, every integration interval, the LO and delay tracking information (telescope based), as well as the (U,V,W) for each baseline.

ANTCON will pick up the LO data.

CORCON will get the delay data and pass it along to the correlator.

The processing of the correlator products will be dealt with in the correlator itself (the correlator group solution), or in the vax (computer group solution). In either case, various streams of data must be merged: the correlator products, the (U,V,W) values, the monitor and calibration data. I think that all this data could easily flow through common areas.

current hardware file

Three sections (at least) to this text file:

1. Telescopes available to the compact array and the LBA, and the array code. for example:

CA : telescopes A,B,C,D,E; array 3km, 4 day; sub 2;  
LBA: telescopes F

or

CA : telescopes F ; nonstandard array  
LBA: telescopes A,B,C,D,E; tied array

2. Stations currently occupied

for example:

A : 5  
B : 12

etc.

3. Hardware restrictions

eg.

A : no L band  
C : X band noisy

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This file would be written to by the system manager whenever the array is reconfigured, and possibly by the operator if some hardware change occurs.

It would be read by OBS in order to determine which programs are possible; OBS would also read it in order to perform the program initialization. Clearly, OBS will be assuming that the data in this file is applicable for the duration of the program; if any changes are made to the data, it might be advisable for OBS to be informed, so that it can reevaluate the situation.

### parameter files

These files will all be text files. They will contain the parameters that need calibrating. These files will be updated at irregular intervals, by the system manager, only after mature deliberation.

These files will be consulted by OBS during the initialization phase.

### ANTENNA parameters

This file will contain the coefficients defining the pointing curve for each antenna; the coefficients describing the phase change with elevation; the position offset from the pedestal target. This file will be essentially a permanent - ie., modified only after serious calibration considerations.

### ARRAY parameters

This file will list the coordinates of every station in the array: 3 coordinates and 2 angles. Presumably, these will initially be the survey values. A practical calibration difficulty will be the separation of the antenna contribution and the station contribution. This file will also be a semi-permanent file.

### ARRAY CONFIGURATION parameters

Whenever the array is reconfigured a calibration run will be made to determine the station errors. These errors will be listed here. Subsequent analysis will distribute these errors between the antennas and the stations - thus the task TRACK will consult 3 files in order to determine the station coordinates: the antenna, array and array configuration parameter tables. For the calibration run after reconfiguration, the array configuration table will be set to zero.

### POLARIZATION parameters

For each frequency band, for each antenna, for each IF,  $\theta$  and  $\phi$  - that is, the polarization characteristics.

RECEIVER/IF parameters

For each frequency band, for each antenna,  $A_v$ ,  $A_h$  and  $R$ , the gains (magnitudes) and relative phase. These are the quantities referenced by the "complex relative gain monitor".

PROGRAM files

Text files, containing a number of cards.

Each card contains all the information necessary to run a scan:

- sidereal start/stop times;
- RA and Dec of the field centre, or the name of a calibration source (\*);
- Frequency band(s);
- Channels (in frequency);
- Offsets in velocity;
- Polarizations;
- Array configuration;

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Tasks requiring access:

SCHED write access  
OBS readonly

\* Although we will maintain a source catalogue, it is not obvious that source names, other than calibration sources, should be allowed in the program files -

REQUESTS file.

Text file.

Each record is a summary of the associated program:

- program name (this is also the file name);
- frequency bands;
- array configuration - full description:  
1.5/3/6km/LBA  
number of days  
redundancy?
- number of days already allocated;
- start time
- stop time
- a code to indicate the sensitivity to hardware faults:  
must it have all the telescopes, for example.
- submission date.

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Tasks requiring access:

SCHED needs write access, in order to append new requests;  
OBS for bookkeeping purposes, needs write access.

SCHEDULE file.

Text file, containing a time-ordered list of programs.

There will be one SCHEDULE file for each process (CA, LBA)

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- program name (this is also the file name);
- frequency bands;
- array configuration - full description:  
1.5/3/6km/LBA  
number of days  
redundancy?
- number of days already allocated;
- start time
- stop time
- a code to indicate the sensitivity to hardware faults:  
must it have all the telescopes, for example.

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Tasks requiring access:

OPER to make, add or delete entries.  
OBS read/write - picks up the information, and performs  
bookkeeping (status reports).