

DEUTERIUM ARRAY MEMO #041

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To: Deuterium Array Group

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Subject: Output file format

The output files are ASCII. However, the spectral data for each individual element is base 64 encoded using the same scheme as e-mail attachments. Each line of the files starts with

Col	Entry	Desc.
0	YYY:DDD:HH:MM:SS	UT Time
1	Az	beam or element azimuth
2	El	beam or element elevation
3	Integ	integration secs
4	mode	format mode
5	frequency	MHz

The line format modes are:

0	element spectrum in ASCII
10	element spectrum in Base64
1	beam spectrum in ASCII
2	beam power
3	correlation coefficients
4	pulsar period spectrum
5	total power
6	beam map
7	temperature

The line format mode that are present depend on the record options in the d1.cat file (see memo #40).

The columns beyond 5 are mode dependent:

Modes 0 and 10 individual element spectra

Col	entry
6	frequency separation in Hz
7	channel (or element) number
8	scaling factor (normally 1024)
9	start of spectrum

For mode 0 then spectrum is straight ASCII with spaces between entries. i.e. the same format as the RFI monitor. For mode 10 the spectrum is encoded using base64 as follows:

```
For (i=0, i<64; i++){
  If(i>='A' && i<='Z') b64[i]=i-'A';
  If (i>='a' && i<='z') b64[i]= i-'a'+26;
  If (i>='0' && i<='9') b64[i]=i-'0'+52;
  If(i-'+' ) b64[i]=62;
  If(i=='/' ) b64[i] = 63;
}
```

each number is encoded with 3 ASCII symbols followed by the next number encoded in the next 3 symbols.

Mode 1 beam spectrum

Col entry
6 frequency separation in Hz
7 beam number
8 number of frequencies (normally 1024)
9 start of spectrum in ASCII with spaces as delimiters.

Mode 2 beam total power

Col entry
6 source name
7 az of beam (deg)
8 el of beam (deg)
9 scan angle (deg)
10 beam total power
11 b_beamnumber
12 data maximum
13 pulse maximum
14 number of elements

Mode 3 correlation coefficients

Col entry
6 baseline
7 normalized correlation
8 correlation phase
9-end above triplet repeats

Mode 4 pulsar period bin spectrum

Col entry
6 beam number
7 0
8 power in period averaging bin
9 number of pulses in first bin
10-775 above triplet repeats for next 255 bins
776 source name
777 computer ID

mode 5 total power for each element

col entry

6-29 total power 24 entries

30-53 cal phase 24 entries

54 "USB-errors" keyword

55-60 usb error count

Mode 6 beam map

Col entry

6 start of beam map

Mode 7 temperature data

col entry

6 "mbtem" keyword

7 motherboard temperature degC

8 CPU temperature degC

9 time difference between CPU clock and count of 1 second ticks since start of the program