1. The header of the file is always 1024 bytes long. The structure of the header is given in the table

|  |  |  |  |
| --- | --- | --- | --- |
| Field name | Size (Byte) | Type | Description |
| name | 32 | string | original Filename in format ddmmyy\_hhmmss.jds |
| time | 32 | string | Time of the file creation, for example:  Mon Jul 10 11:37:24 2006 |
| gmtt | 32 | string | The same as the previous field, but contains the GMT time of the file creation. |
| sysn | 32 | String | Operator name (or can be used for the system name, observatory name, etc.) |
| syst | 32 | SYSTEMTIME | This is binary data of the SYSTEMTIME structure, which contains the system time of the file creation including milliseconds. |
| place | 96 | string | Place of the observation. |
| desc | 256 | string | Some add-ons descriptions about saved data (for example, weather conditions or something else). |
| PP | 64 |  | Empty |
| FFT\_Size | 4 | DWORD (4 bytes - int) | For internal use in the DSPZ |
| MinDSPSize | 4 | DWORD | for using in the DSP |
| MinDMASize | 4 | DWORD | for using in the DSP |
| DMASizeCnt | 4 | DWORD | for using in the DSP |
| DMASize | 4 | DWORD | for using in the DSP |
| CLCfrq | 4 | FLOAT | Sampling ADC frequency |
| Synch | 4 | DWORD | 0 – without synchronization; 1 – with GPS synchronization. |
| SSht | 4 | DWORD | Snap-shot mode. Should be 1 always. |
| Mode | 4 | DWORD | 0 – Raw Data Mode; 1 – Spectrum Mode; 2 – Correlation mode |
| Wch | 4 | DWORD | 0 – channel **A** raw data transferred; 1 – channel **B** raw data transferred; 2 –channels **A** and **B** raw data transferred; |
| Smd | 4 | DWORD | 0 – both channel **A** and **B** spectrum transferred; 1 – one channel **A** spectrum and spectrum correlation **A\*B** transferred; 2 – one channel **B** spectrum and spectrum correlation **A\*B** transferred; 3 – sum of channels **A+B** and spectrum correlation **A\*B** transferred; |
| Offt | 4 | DWORD | 0 – full band spectrum (**8192** FFT points); 1 – low half of spectrum (**4096**); 2 – low half of spectrum (**4096**); 3 – tunable band of spectrum is transferred. |
| Lb | 4 | DWORD | Low bound of the spectrum in tunable mode (in FFT points) |
| Hb | 4 | DWORD | High bound of the spectrum in tunable mode (in FFT points) |
| Wb | 4 | DWORD | Spectrum width in tunable mode (in FFT points) |
| NAvr | 4 | DWORD | Number of averaged spectra. |
| packT | 4 | DWORD | Time resolution reducing factor (number of time samples accumulated in post processing) |
| packF | 4 | DWORD | Frequency resolution reducing factor (number of frequency channels accumulated in post processing) |
| DCRem | 4 | DWORD | DC compensation:  0 – switched off; 1 – switched on; |
| ExtSyn | 4 | DWORD | External CLC synchronization:  0 – switched off; 1 – switched on; |
| **Ch1** | 4 | DWORD | Channel **A**:  0 – switched on; 1 – switched off; |
| **Ch2** | 4 | DWORD | Channel **B**:  0 – switched on; 1 – switched off; |
| ExtWin | 4 | DWORD | External weighting coefficients.  0 – internal weighting window is used; 1 – external weighting window is used; |
| Clip | 4 | DWORD | bit 21:0 define **K** value for spectrum clipping before processing (accumulation or correlation)  Value in dB can be obtained: dB = 2^21\*10^K/20 |
| HPF0 | 4 | DWORD | Channel 1 High Pass Filter settings:  0 – 8MHz; 1-12MHz; 2-16MHz; 3-20MHz |
| HPF1 | 4 | DWORD | Channel 2 High Pass Filter settings:  0 – 8MHz; 1-12MHz; 2-16MHz; 3-20MHz |
| LPF0 | 4 | DWORD | not used |
| LPF1 | 4 | DWORD | not used |
| ATT0 | 4 | DWORD | Channel 1 attenuation: 0..31 dB |
| ATT1 | 4 | DWORD | Channel 2 attenuation: 0..31 dB |
| Unnamed | 328 |  | Empty |

The data block directly follows the header.

The original data produced by DSPZ receiver has usually the time resolution of 100ms and frequency resolution of 4kHz. This results in rather “heavy” data massive, 25-30Gb per day of observations. For convenience of preliminary data analysis data from URAN-2 radio telescope is “packed” by reducing the time and frequency resolution. Moreover, the data in the original files are stored in on-standard floating point format and for further processing should by brought to one of standard formats (Word, DWord or Float). This is done by the dedicated software created by URAN-2 staff in Delphi.

**Here is the description of the packed data block (so called “L-file”).**

The data block of the file consists of TNS (*Total Number of Samples*) time samples (TS) in such a way that:

TT=TNS\*dt, where TT – is total time covered by this file and dt is actual time resolution (different from the original).

Each TS consists of Nf frequency points in such a way that

FW=Nf\*df, where FW – the widths of frequency band of observations and df is the actual frequency resolution (different from the original).

And finally each frequency point has 2 fields, which store the sum power of two cross-dipoles (P(A+B)) and the degree of circular polarization. All values are DWord (4 bytes Integer).

Necessary calculations:

**df**=sps\*packF/16384.0 (actual frequency resolution)

widths= [8192,4096,4096,Wb] (original widths of spectrum in frequency channels)

Nmin=[0,0,4096, Lb]

**Fmin**=Nmin[Offt]\*df/PackF

**Nf**=widths[Offt]/packF

**FW**=Nf\*df

**dt**=8192./sps\*Navr\*packT

So the **S**ize of one **T**ime **S**ample equals STS= Nf\*2\*4 (bytes)

Calculation of Total Number of Samples (TNS) in the file

TNS=(File\_Size-1024)/STS (all values in bytes).

The structure of the data block in the file

Data block

Nch-1

b

Nch-1

c

TNS Time Samples

d

TS(1)

TS(2)

TS(0)

TS(TNS-2)

c

TS(TNS-1)

d

…..

a

Structure of the Time sample (TS)

P(A+B)/100

DWORD

Polariz/10000

DWORD

…..

a

Nf frequency points Fp

d

Fp(0)

Fp(2)

Fp(1)

Fp(Nf-2)

Fp(Nf-1)