**DSP** **FILE HEADER (one per FILE)**

boot: 0L, $ ;type of boot (0=EPROM)

tag: 0L, $ ;number of processors

acq\_period: 0L, $ ;number of machine cycles between acquisitions

acq\_delay: 0L, $ ;number of machine cycles before the first acquisition

acq\_apert: 0L, $ ;number of samples per acquisition

fft\_dist: 0L, $ ;number of overlap samples

**fft\_points: 0L, $ ;number of FFT points (256 or 1024)**

spec\_pre: 0L, $ ;number of pre-integrations

spec\_post: 0L, $ ;number of post-integrations

spec\_burst: 0L, $ ;number of spectra per burst-DMA via the VME-bus

mode\_comp: 0L, $ ;compression type

**mode\_acq: 0L, $ ;number and type of channels (1,2 or 3)**

irq\_vector: 0L, $ ;interruption vector defined in vmeplus.conf

**start\_time: 0L, $ ;start time**

host\_int: 0L, $ ;number of integrations on the station

**millisec: 0L, $ ;duration of a spectrum in milliseconds** **(integer part)**

**FLow: 0L, $ ;frequency of the spectrum point 0 in Hz**

**FHigh: 0L, $ ;frequency of the spectrum point 1023 (or 255) in Hz**

microsec: 0L, $ ;fractional part of the spectrum duration

19 Long (32) – ;not used

**Total length of DSP FILE HEADER is 64 LONG[32] words**

**SPECTRUM HEADER No1 (one per spectr)**

error: 0L, $ ;error code of SHARC

**count: 0L, $ ;number of the spectrum (in the current file)**

pId: 0L, $ ;number of processor

pTag: 0L, $ ;identifier of the processor

**spcount: 0L, $ ;absolute spectra counter (from the beginning of observations)**

empty: lonarr(11) ;not used

**Total size of one spectrum header is 16 LONG[32] words**

If DSP mode is 1 or 2 then the Spectrum Header is followed by data in the format of

**SPECTRUM No1**

**a: fltarr(1024), ;power spectrum input 1(2) (channel 1)**

# Total length of one instant spectrum in 1 channel mode is 1024 LONG[32] words

If DSP mode is 3 then the Spectrum Header is followed by data in the format of

**SPECTRUM No1**

**a1: fltarr(1024), ;power spectrum input 1 (channel 1)**

**a2: fltarr(1024), ;power spectrum input 2 (channel 2)**

**xR: fltarr(1024), ;correlation (Real part) (channel 3)**

**xI: fltarr(1024) ;correlation (Imaginary part) (channel 4)**

# Total length of one instant spectrum in 2 channels mode is 4096 LONG[32] words

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**SPECTRUM HEADER No (N-1)**

**SPECTRUM No (N-1)**

**Remarks.**

Items marked with bold font are only important for file reading and processing. Other items are of internal use by DSP.

Number of FFT points is always 1024. We have never used 256 point FFT.

N – is the total number of individual spectra in the file (i.e. total number of time samples).

**Numbers and type of channels**. DSP has two inputs. And it can operate in three regimes: 1 – the power spectrum from the input 1 is written, the file consists of only one field; 2- the power spectrum from the input 2 is written, the file consists of only one field; 3 – the power spectrum from input 1, power spectrum from input 2, real part of cross-correlation spectrum and imaginary part of cross-correlation spectrum are written, the file consists of four fields.

AFAIR we never used correlation mode in DSP (mode 3). Mode 1 was always used in 2001-2002.

The field ***millisec*** actually is the time resolution.

The **start time** in the Header is written in the form of **Unix Timestamps**. Actually the number in this field represents the number of seconds passed since January 01, 1970 (UTC). So to get current date and time you need to extract them from that UNIX Julian time.

When reading numbers from the DSP files be aware of correct byte ordering. The DSP was created on the base of Sun Workstation Computer, which used BIG ENDIAN ordering of multi-byte numbers. The numbers start with Most Significant Byte followed by the less significant ones. Intel-based computers have opposite byte ordering – LITTLE ENDIAN (the Least Significant byte is followed by more significant ones). Since I use standard Intel-based PC, I have to swap bytes order when reading. If you have for example MAC computer, possibly you won’t have to swap bytes. I don’t know.