The structure description of the ephemeris binary file, serial number 2731, based on the StePPeD database release 3.3.

(the latest version of this document can be found at: https://pad2.astro.amu.edu.pl/StePPeD in available downloads)

1. The header (see Fig.1)

A) Two integer numbers: ephemeris **serial** number (version) and the total **number** of bodies (the Sun plus stars) [total size is 4+4 bytes]

B) A table with the bodies names and masses. In each row we have 8 characters of the body name (including a terminating null byte '\0') and a double number containing the mass of the body. [total size is **number** * (8+8) bytes]
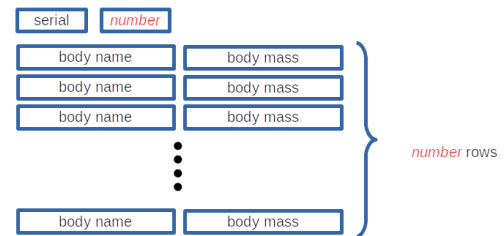
There are 31 bodies in the backward ephemeris and 31 bodies in the forward one.

Figure 1: Header structure

2. The set of the step data, see Fig.2. Each step data block consists of two parts:

A) Two double numbers containing start and end epochs of the particular step [total size 8+8 bytes]

B) The set of **number** blocks of data, each containing all coefficients for one body (see Fig.3). Each body block contains 30 double numbers (10 for each component) [total size **number** * 240 bytes]
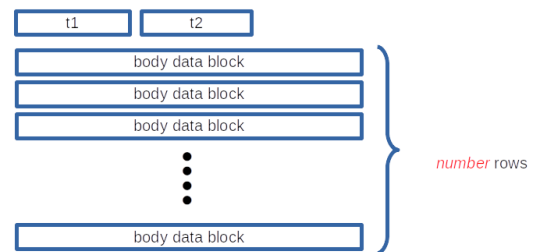
The total size one step block of data equals 16 + **number** * 240 bytes.

Figure 2: one step data block

There are 833 steps in the backward ephemeris and 903 in the forward one.

```
typedef struct {
        double x,        //  x component of the position
               vx,       //  x component of the velocity
               ax,       //  x component of the acceleration
               bx[7],    //  polynomial coeffcients for the x component
               y,        //  y component of the position
               vy,       //  y component of the velocity
               ay,       //  y component of the acceleration
               by[7],    //  polynomial coeffcients for the y component
               z,        //  z component of the position
               vz,       //  z component of the velocity
               az,       //  z component of the acceleration
               bz[7];    //  polynomial coeffcients for the z component
        } STAR;          //  the size of this structure equals: 3 * 10 * 8 = 240 bytes
```

Figure 3: The body data block structure - an excerpt from the ephemeris reading code.