

# STANDARDIZING ACCESS TO EPHEMERIDES

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## 1. DISCUSSION

As reported in Hilton (2012), the IAU Working Group on Ephemeris Access has tentatively agreed to standardize on the SPICE Toolkit's Spacecraft and Planet Kernel (SPK) format. The Navigation and Ancillary Information Facility (NAIF), the group at JPL that maintains the SPICE Toolkit, has agreed to assign body identification numbers for  $TT - TDB$  and the lunar orientation angles so they may be included in SPK format files. A type to handle the Russian Institute of Applied Astronomy's velocity-based Chebyshev polynomials and stand alone SPK file format reading software are being addressed. A specification of the file format for fixed length Chebyshev polynomial formats is also currently being written. Other details, such as whether to include the SPK Type 14 (Chebyshev polynomials with unequal time steps) for highly eccentric orbits or to develop a type for planetary theories, may be extensions to this initial package of ephemeris file format and software.

The purpose of this recommendation is not only to have a common format for the ephemeris files, but to make available software to evaluate the ephemeris files without requiring the user to have any knowledge of the details of the ephemeris structure. Therefore, both the software and format are required to be flexible enough to handle a variety of applications and formats. The file format and software should also be extensible to additional ephemeris formats. The SPK format and software are both designed around this concept.

The primary discussion on this recommendation was that the working group had not taken into account the possibility that an ephemeris might be stored as a planetary theory. This is true. Such a possibility has not been discussed by the working group. The software and file format, however, are structured in a manner that would allow such a format to be added at a later date.

The working group also recognizes that there will be those users with requirements that will compel the development of their own reading software. Thus, a widely available file format specification is required. Hilton, in consultation with C. Acton<sup>1</sup>, is drafting a specification of those parts of the SPK format required for the ephemerides of solar system bodies from the SPICE Toolkit documentation and software comments.

Finally, the author suggested that the use of the ephemeris file format and software should not be formalized as an IAU recommendation. That is, he suggested that its use not be compelled by the imposition of a recommendation. This suggestion has not been formally discussed by the working group, but has arisen from informal one-on-one talks between Hilton and other members of the working group. Instead, the availability of the software and ephemerides would be advertised, likely through a working group report. Other possible places to advertise its availability are: the IAU Commission 4 web site, the web and ftp sites of the three producers of high accuracy planetary ephemerides.

## 2. REFERENCES

Hilton J.L. 2012, in The Proceedings of the Journées 2011, N. Capitaine, ed. (Paris: Observatoire de Paris), in this volume

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<sup>1</sup>Manager of the NAIF Group at JPL.