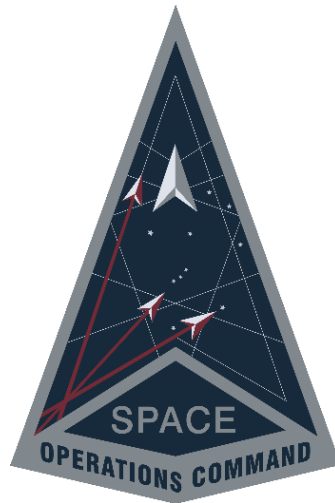


Astrodynamics Standards Shared Library



SP State Vectors (SPV_{ec})

Version 9.4

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1. Introduction

SpVec provides the users with library functions to load and manage SP satellite state vectors. The state vector format allowed to work with this library is the State Vector 1P/2P card format, see Data Description.

If you are on Windows, the shared library files will end in ".dll". For example, "SpVec.dll". If you are on Linux, the shared library will begin with "lib" and end in ".so", and will be all lowercase. For example, libspvec.so.

2. Prerequisites

The following libraries needed to be loaded before using SpVec:

- DllMain
- EnvConst
- TimeFunc
- AstroFunc

3. Getting Started

To get started, please read the README.txt file that came in the root directory of your distribution. In addition to an overall description contained in the distribution, it has a description of a "**wrapper**".

To get started with **SpVec**, there is a "wrapper" specific to SpVec, under the **SampleCode** directory. Under your language of choice, you will see a "**DriverExample/wrapper**" subdirectory. The files under this directory will have all the Application Programming Interfaces (APIs) available. For SpVec specific APIs, you should see a source file labelled with "SpVec" in the file name. This will be where you will find all the APIs for that specific library. The "DriverExample" directory will also contain several examples of applications that should run by simply running the runExample.bat or runExample.sh script. You can use these examples as a starting point for building your application.

If you do not see your programming language under "SampleCode", look in the HTML documentation for the APIs. Open a browser to the "Documentation/APIDocs/index.html" file. This document will show all the APIs regardless of programming language.

The Astrodynamics Standards libraries should work with any language capable of using Dynamic Link Library (on Windows) or Shared object (on Linux) files.

4. Terminology

The terminology "B1P record" is used to refer to the two SP-related forms of the 1P-Card state vector record, where the "B" and "D" refer to the value of column 78 (Vector Type field). See section 7.

In the documentation, the terms B1P, SpVec, and SP satellites are used interchangeably.

5. Understanding SpVec

Internally, the library stores the loaded SPVECs in its own binary tree. Each SPVEC, when added successfully to the binary tree, will receive a unique key. This unique key is commonly called 'satKey' in the documentation. The satKey is used to retrieve the SPVEC data.

The SP propagator, SPPROP, will have access to the root of the SpVec's binary tree. Therefore, the associated SPVEC data can be retrieved via its satKey.

6. Propagator

SPVECs only work with the SP propagator (SpProp).

7. Data Description

State Vector Formats

This section presents the formats of the state vector forms of the element set.

Element Set Line 1 - 1P Card Format (state vector):

Column	Format	Description
1-12	F12.4	x
13-24	F12.4	y
25-36	F12.4	z
37-49	F13.4	x-dot
50-62	F13.4	y-dot
63-75	F13.4	z-dot
77	A1	security classification where: U = unclassified C = confidential S = secret
78	A1	vector type; where B = (x,y,z) in km; (x-dot, y-dot, z-dot) in m/sec
79-80	1P	card type

Element Set Line 2 - 2P Card Format:

Column	Format	Description
1-5	I5	satellite number
7-14	A8	int'l designator
15-31	[yy]yydddhmmss.sss	epoch time of vector or elements (optional 4-digit year) or year of epoch in 17-18, where: 50-99 = years 1950-1999

		00-49 = years 2000-2049
33-38	I6	epoch revolution
40-43	I4	elset number
44-53	E10.0	ballistic coefficient (m ² /kg)
54-63	E10.0	radiation pressure coefficient (m ² /kg)
64-73	E10.0	Outgassing parameter/Thrust Acceleration (km/s ²)
74-78	A5	<p>Input coordinate systems</p> <p>'TMDAT' or 'TMEPO' : coordinates of epoch</p> <p>'MMB50' or 'MMJ2K': coordinates of J2000</p> <p>Note: This input, if not blank, takes precedence over SpProp 4P-Card/column 32 setting</p>
79-80	2P	card type