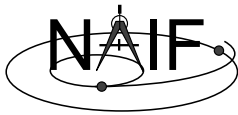




# Summary of Key Points

October 2007



## Which Pieces Do I Use?

---

Navigation and Ancillary Information Facility

- **There's no single answer**
  - Depends on what task you wish to accomplish
  - Depends on what mission you are working on
- **The next several charts highlight some key points**
  - We assume you have already looked at the major SPICE tutorials, or already have some familiarity with SPICE.
  - We assume you have successfully downloaded and installed the SPICE Toolkit.
- **Consider printing this tutorial and keeping it near your workstation**



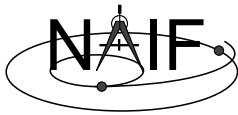
# Reminder of Key Subsystems

Navigation and Ancillary Information Facility

- **SPK:** Position (and velocity) of things
- **PCK:** Size/shape/orientation of target bodies
- **IK:** Instrument field-of-view geometry
- **CK:** Orientation of spacecraft or spacecraft structures that move
- **FK:** Definition/specification of non-core reference frames
- **LSK:** UTC (SCET)  $\longleftrightarrow$  ET time conversions
- **SCLK and LSK:** SCLK  $\longleftrightarrow$  ET time conversions

Summary of Key Points

3



## Primary Kernel Interfaces - 1

Navigation and Ancillary Information Facility

Which SPICE interface modules are most commonly called to use the data from a given kernel type?

<b>SPK</b>	SPKEZR, SPKPOS, SPKCOV, SPKOBJ	<b>FK</b>	SXFORM, PXFORM, SPKEZR, SPKPOS
<b>PCK</b>	SXFORM, PXFORM, SPKEZR, SPKPOS, BODVRD	<b>LSK</b>	STR2ET, TIMOUT
<b>IK</b>	G*POOL, GETFOV	<b>SCLK</b>	SCS2E, SCE2S, SXFORM, PXFORM, SPKEZR, SPKPOS
<b>CK</b>	SXFORM, PXFORM, SPKEZR, SPKPOS, CKCOV, CKOBJ (CKGPAV, CKGP)	<b>EK/ESQ</b>	EKFIND, EKG*

Notes: FURNSH is used to load (provide access to ) all SPICE kernels.

API names shown are for FORTRAN versions:

- use lower case and add an "\_c" when using C

- use lower case and prepend "cspice\_" when using Icy (IDL) and Mice (MATLAB)

Summary of Key Points

4



## Primary Kernel Interfaces - 2

Navigation and Ancillary Information Facility

**For a given module, which kind(s)  
of kernel(s) will or may be needed?**

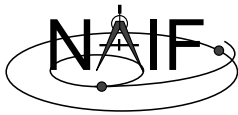
Module Name	Kernel Type(s) Needed						
	SPK	PCK	IK	CK	FK	LSK	SCLK
SPKEZR, SPKPOS	Y	M		M	M	M	M
SXFORM, PXFORM	M	M		M	M	M	M
CKGP, CKGPAV		M		Y	M	M	M
GETFOV			Y				
G*POOL			M				
STR2ET, TIMOUT						Y	
SCS2E, SCE2S						Y	Y
CHRONOS (time conversion app.)	M	M		M	M	Y	M

**Yes** = the indicated kernel type is needed

**Maybe** = the indicated kernel type may be needed

Summary of Key Points

5



## Kernel “Coverage” Cautions

Navigation and Ancillary Information Facility

- **Your set of kernels must:**
  - contain data for all “objects” of interest
    - » Sometimes you must include intermediary objects that provide a connection
  - contain data covering the time span of interest to you
    - » Watch out for data gaps within that time span
    - » Watch out for the difference of ~65 seconds between ET and UTC
  - contain all the kernel types needed by SPICE to answer your question
    - » As the previous charts allude, you may need one or more kernels that are not obvious
  - be managed (loaded) properly if there are overlapping (competing) data within the set of files you are using

Summary of Key Points

6



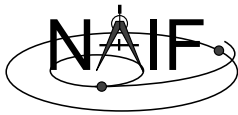
## How Can I Find Possibly Useful Toolkit Modules?

Navigation and Ancillary Information Facility

- Review the previous charts
- Look at the appropriate SPICE tutorial(s)
- Look at the “Most Useful SPICELIB Subroutines” document [.../doc/html/info/mostused.html](#)
- Search the permuted index:
  - [spicelib\\_idx](#) for the FORTRAN toolkits  
[.../doc/html/info/spicelib\\_idx.html](#)
    - » (This document also correlates entry point names with source code files)
  - [cspice\\_idx](#) for the C and Icy toolkits [.../doc/html/info/cspice\\_idx.html](#)
- Read relevant portions of a SPICE “required reading” reference document (e.g. “[spk.req](#)”)
  - [.../doc/html/req/spk.html](#) for the hyperlinked html version (best)
  - [.../doc/spk.req](#) for the plain text version

Summary of Key Points

7



## How Can I Understand How To Use Those Modules?

Navigation and Ancillary Information Facility

- The primary user-oriented documentation about each module is found in the “header” at the top of each source code file
  - (More documentation is found at the additional entry points for those FORTRAN modules that have multiple entry points.)
- Reference documentation for major subsystems is found in like-named “required reading” documents (e.g. [spk.req](#), [ck.req](#), etc.)
- The SPICE tutorials contain much helpful information
- See “SPICE Documentation Taxonomy” in the tutorials collection for additional reading suggestions

Summary of Key Points

8



# Does NAIF Provide Any Examples?

---

Navigation and Ancillary Information Facility

- **Nearly all module headers contain one or more working examples**
- **“Most Useful SPICELIB Subroutines” has code fragments**  
**.../doc/html/info/mostused.html**
- **The “required reading” reference documents often contain examples** .../doc/html/req/index.html
- **Three tutorials offer programming examples**
- **Some simple “cookbook” programs are found in the Toolkit**  
**.../src/cookbook/...**
- **Make use of the SPICE Programming Lessons available from the NAIF server**
  - **`ftp://naif.jpl.nasa.gov/pub/naif/toolkit_docs/Lessons/`**