9 August 2017

Title: N0066 SPICE Toolkit DSK API bug

Summary

NAIF has discovered a bug affecting the N0066 SPICE Toolkit
ray-DSK surface intercept subroutines

  DSKX02
  DSKXSI

The bug affects only applications that are linked to the N0066 SPICE
Toolkit, call the above routines directly, and make use of the plate
IDs returned by these routines. The bug does **not** affect geometric results.
The bug does **not** affect applications that load a single, correctly made,
single-segment DSK file.

NAIF expects that few SPICE Toolkit users will be affected by this bug.
However, users of the DSK subsystem of the N0066 SPICE Toolkit should
check to see whether the problem affects their software.

The bug does not exist in the Alpha DSK Toolkit version of DSKX02.

Bug Description

It is possible in some cases for the routines

  DSKX02
  DSKXSI

to return an invalid plate ID.

In the case where only one DSK file is loaded, the problem can occur
only if the DSK file is made incorrectly (for example, if it
contains degenerate plates: plates having vertices that coincide
or differ only by round-off-level amounts).

When multiple, valid DSK files are loaded, it's possible for the
plate ID to belong to a plate included in one segment's
"padding"---plates outside the segment's coordinate
bounds---while the returned intercept lies on a different plate.

The intercept point returned by these routines is valid as long as

the DSK files used to provide input data are valid as well. For this reason, DSK-based results from the high-level SPICE geometry routines

DSKXV
GFOCLT
ILLUMF
ILLUMG
ILUMIN
LATSRF
LIMBPT
OCCULT
SINCPT
SRFNRM
SUBPNT
SUBSLR
TERMPT

are not affected, provided they're used only with valid DSK files.

Code Patch

NAIF is providing corrected Fortran and C versions of the source code of the routine

DSKX02

DSKXSI is affected only because it returns the plate ID found by DSKX02; no code update is needed for this routine.

The updated code is available at:
ftp://naif.jpl.nasa.gov/pub/naif/misc/toolkit_N0066_patches/

Fortran users may have to change the extension on the dskx02 module to be consistent with their compiler. PC Fortran users will have to change the line terminators from UNIX/Mac style to PC style.

SPICE users who cannot make use of the corrected source code should contact NAIF for assistance.