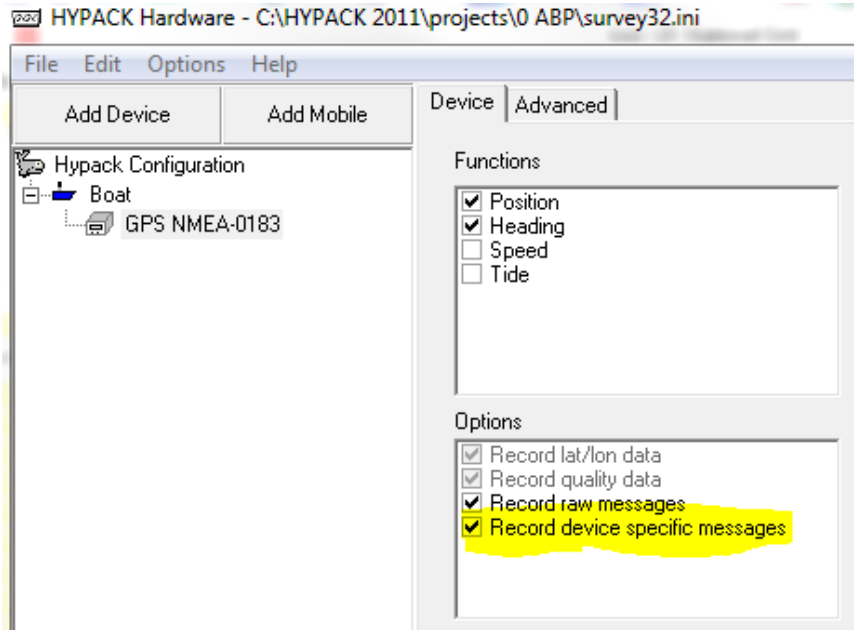
The KTC Record in HYPACK's RAW Format File

By John Lindberg

For those users brave enough to dig through a HYPACK® *.raw file (it's really not that hard! Just open it in Notepad!), you may notice a new record that appeared in HYPACK 2011. The "KTC" record was added to "demystify" the way HYPACK® records water levels (tide corrections) when using RTK. The gps.dll, posmv.dll and F180.dll all have the capability to output this record, provided you check the "RECORD DEVICE SPECIFIC MESSAGES" box in HYPACK® HARDWARE as shown below:

FIGURE 1. *Configuring the Driver to Record Device Specific Messages*



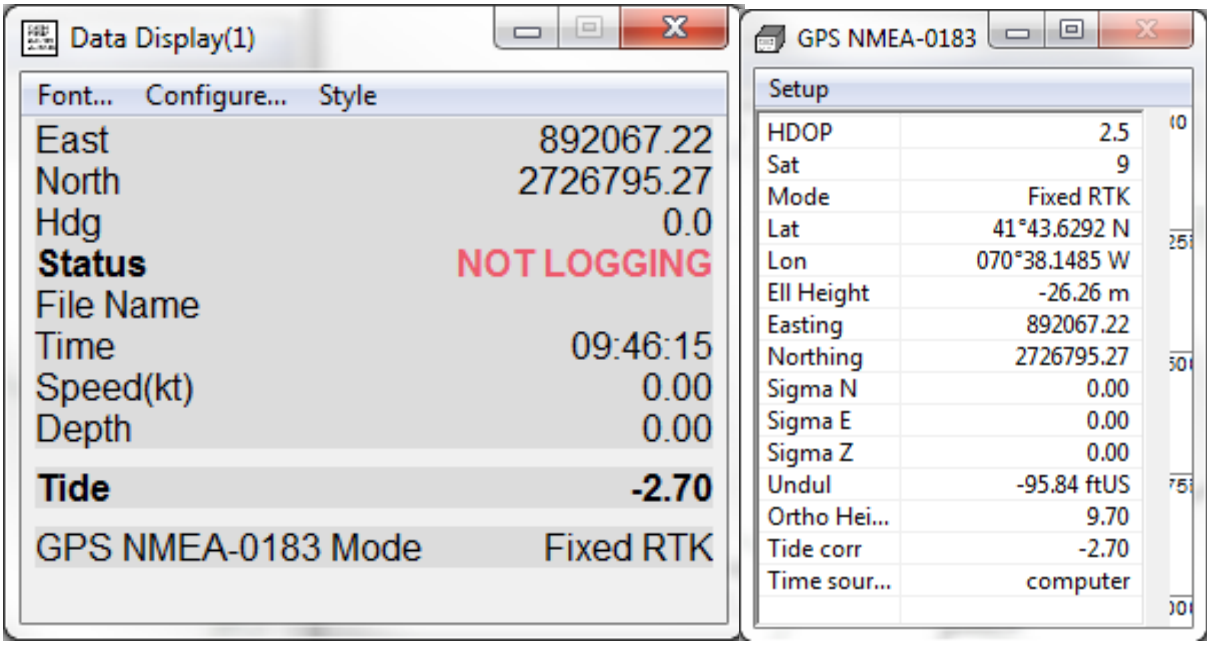
This is a sample and description of the KTC format:

```
KTC 0 34721.842 7 -28.360 -28.360 -29.994 0.585 0.000 0.100 2.318
 |  |     |       |     |       |       |      |      |     |
 |  |     |       |     |       |       |      |      |     +Final Tide
 |  |     |       |     |       |       |      |      + - Draft Correction
 |  |     |       |     |       |       |      + --------Antenna Offset
 |  |     |       |     |       |       + -------------- K Value
 |  |     |       |     |       + ------------------- Undulation
 |  |     |       |     + ------------------ Local Ellipsoidal Height
                                               (on local Ellipsoid)
 |  |     |       + ------------------------- WGS84 Ellipsoidal Height
                                               (from GPS)
 |  |     + ------------------------------- Number of Values
 |  + ------------------------------------- Time Tag
                                             (Matches GPS Position)
 + ---------------------------------------- Device Number
+ ----------------------------------------- Record Identifier
```

Though understanding RTK water levels in HYPACK® may seem somewhat daunting, it is a relatively simple concept provided you follow the HYPACK® formula for calculating real-time tides. Before the KTC record was available, you would have to shuffle through various records and header info within the *.raw file to figure out the calculations. So if you didn't have a good understanding the RAW file format, it was a bit tedious to figure out the math. The KTC record is designed to eliminate all that work.

In the example below, HYSWEEP® SURVEY is giving me an RTK tide correction of -2.7'.

FIGURE 2. *RTK Tide Correction Displayed in the Data Display (left) and in the GPS Device Window (right)*



If I open up the logged *.raw file in Notepad and search for the KTC record, I find the following:

```
POS 0 35078.599 892067.218 2726795.273 9.699
QUA 0 35078.599 7 7.500 2.500 9.000 3.000 0.000 0.000 0.000
RAW 0 35078.599 4 414362.92307 -703814.85083 -26.25600 133612.80000
TID 0 35078.599 -2.699
KTC 0 35078.599 7 -86.142 -86.142 -93.597 2.244 -7.000 0.000 2.699
```

In the example above the antenna ellipsoid height is -86.142, the undulation (from a geoid model, orthometric height correction and/or VDatum zone loaded in the project) is -93.597, and the antenna height above water (entered as a vertical offset in HYPACK® HARDWARE) is -7.0'.

The HYPACK® formula for RTK tides is:

T = N – K – A – H – D + OHC

Where:

T = Tide Correction

K = Height of the geoid above the chart datum

N = Height of the geoid above the ellipsoid reference

A = Height of the RTK antenna above the ellipsoid reference

H = Height of the RTK antenna above the static water line

D = Dynamic draft measurement

OHC = Orthometric height correction

So if we plug in the numbers from the KTC record:

T = N – K – A – H – D + OHC

T = (-93.587) – (2.224) – (-86.142) – (-7.000) – (0.000) + OHC (bundled in the “N” value)

T = -2.699 which matches the value in the TID record

You will also notice the Final Tide record in the KTC record is 2.699. Since the HYPACK® TID record is a “tide correction” rather than the actual tide level, the TID value is inverted from the “Final Tide” value in the KTC record.

With the KTC record in the *.raw file you can now clearly see how your real – time water levels are derived.