GPS Modes in HYPACK

By John Lindberg

One of the biggest sources of confusion I see with HYPACK® users are the GPS modes and how they relate to a NMEA output string. As most HYPACK® users know, all survey grade GPS receivers will output various NMEA strings, but understanding what is contained in these strings is always secondary. Depending on the receiver manufacturer and the age of the receiver, these NMEA output strings will vary. HYPACK® attempts to account for these differences, but it takes some knowledge of your GPS receiver to set it up properly in HYPACK®. This article will hopefully clear up some of this confusion, especially for customers who are using RTK for real-time water levels.

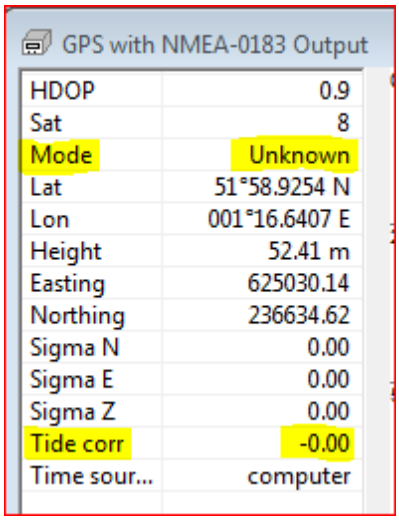
GPS Codes Standard Differences

Any GPS receiver should be interfaced to HYPACK® HARDWARE with the GPS.dll. That is, any GPS receiver that is capable of outputting a NMEA string via serial or ethernet interface. The most common, and most highly recommended, NMEA string to output from a GPS is the GGA string. Other strings that are commonly used are GGK and PTNL,GGK. These messages are considered “pseudo-NMEA” strings, because they look similar to a standard NMEA string but do not quite adhere to the NMEA specifications.

Sample Problem:

So here is the scenario. I have my GPS set up to output a GGA message. I know my GPS is in Fixed RTK mode, but when I test my GPS driver in HYPACK® HARDWARE, the mode says UNKNOWN and my tide correction is zero. What is the problem?

FIGURE 1. *GPS.dll Driver Window*



Troubleshooting the Problem:

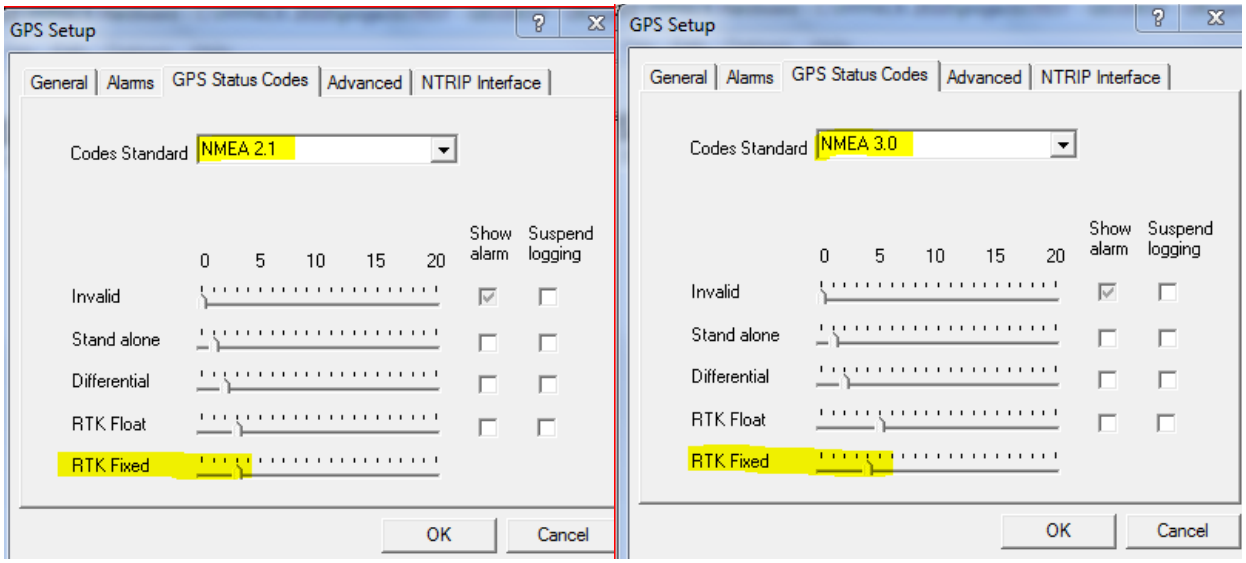
1. **Look at the NMEA string coming into the computer.** Run HyperTerminal, Wcom32, or any other terminal program and look at the string being output. For this example, look at the string below that I logged from my GPS receiver:

$GPGGA,102235.00,5158.9549,N,00116.5353,E,4,08,0.9,6.18,M,46.23,M,02,AAAA*6F

The GPS quality mode is always following the latitude and longitude in a GGA string. In this example the mode is 4.

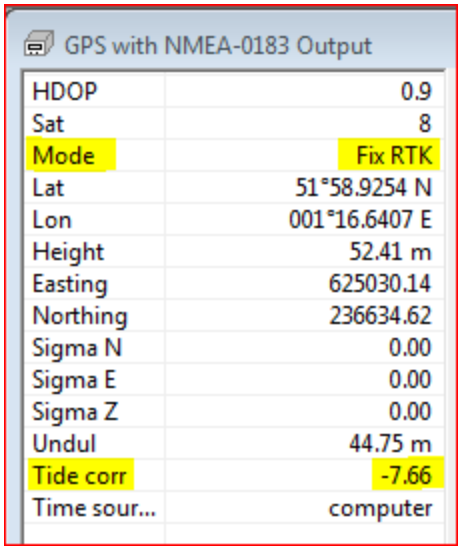
2. **Go to the GPS Status Codes tab in your gps.dll setup in HYPACK® HARDWARE.** In Figure 2, on the left, my Codes Standard is set up as NMEA 2.1 and the “RTK Fixed” value is set to 3.
3. **Change the Codes Standard to NMEA 3.0** (Figure 2 right), RTK fixed is now set to 4.

FIGURE 2. *GPS Status Code = NMEA 2.1 (left), NMEA 3.0 (right)*



4. **Click [OK] and test the driver**. Voila! I am now in Fixed RTK Mode and I am getting a tide correction!

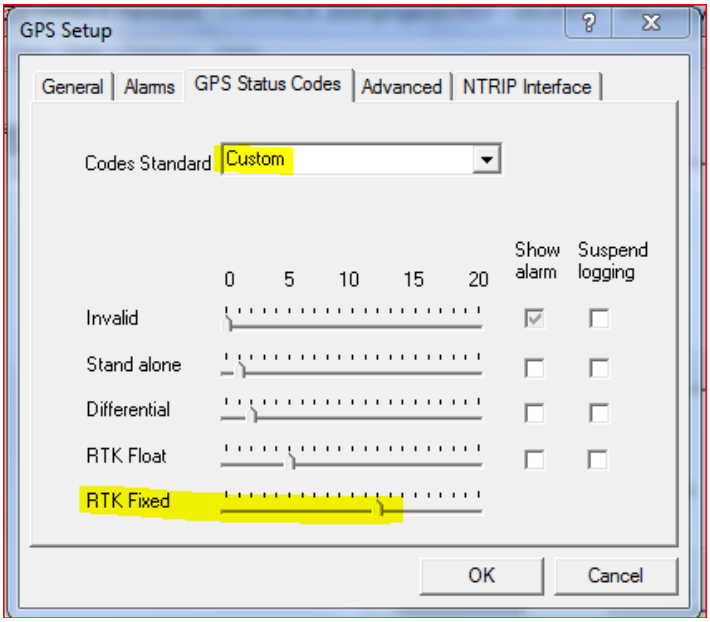
FIGURE 3. *GPS.dll Device Window with Codes Standard=NMEA 3.0*



And to throw a wrench into your spokes, some GPS manufacturers really twist the NMEA standards. For example, I have seen a differential GPS (normally mode 2) with a mode value of 9, an older RTK GPS that used mode 2 for Fixed RTK, and even some newer receivers output a slightly lower resolution “pseudo-RTK” with a mode of 12! So how do account for this in HYPACK?

Very simply! First consult your GPS manual for the proper modes. Then go back to the gps.dll Setup in HYPACK Hardware, and select CUSTOM for your Code Standard on the GPS Status Codes tab. Once you select CUSTOM you will notice that all the sliders become enabled, allowing you to pick the proper status code:

FIGURE 4. *Configuring Custom Code Standards*



STRING DIFFERENCES

Over the years I have seen quite a few variances of these GPS quality modes, but the most common are the differences between NMEA 2.1 and NMEA 3.0. Look at the sample strings below. Both strings are being output from the same GPS:

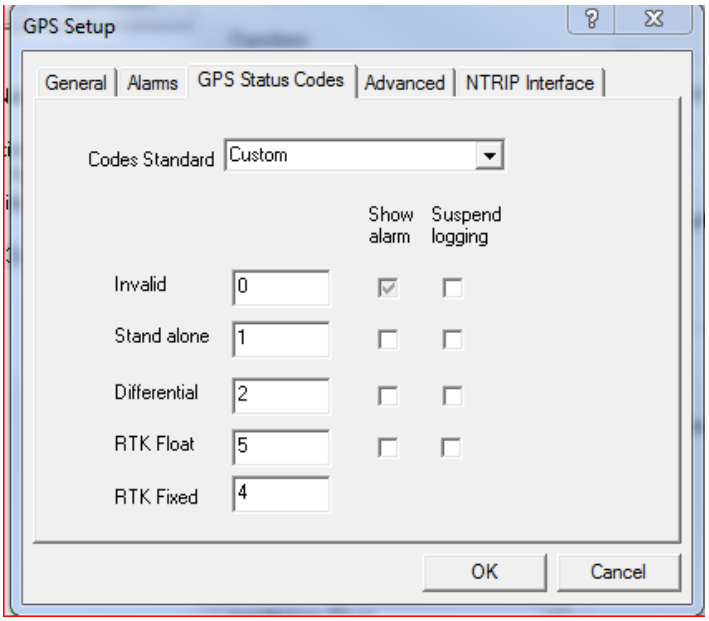
```
$GPGGA,123243.0,5253.12852098,N,00424.32586340,W,4,7,1.2,11.284,M,51
.769,M,0.0,0029*6E
$PTNL,GGK,123243.00,120503,5253.12852098,N,00424.32586340,W,3,07,2.4
,EHT63.053,M*5C
```

Notice that the GGA string has a mode of 4 while the PTNL,GGK string has a mode of 3!! In this example you should only select only one of those strings for an output – just make sure you select the proper code based on the receiver’s User Manual.

GPS.DLL CHANGE IN HYPACK® 2011

One notable change in HYPACK® 2011 will be the removal of the sliders in the GPS Status Codes tab of the gps.dll Setup dialog. This will make custom code adjustments easier for you. You can simply type in a status code value rather than attempting to choose the correct slider position.

FIGURE 5. *Setting GPS Status Codes in HYPACK® 2011*



In short, a little knowledge regarding your GPS output strings will save you a lot of down time when trying to properly configure them in HYPACK®. This includes a basic understanding of the NMEA strings you are outputting, in addition to the quality codes used in your GPS receiver.