



GPS Comparison on a Cutter Suction Dredge

By Rob Baird

I recently got a call from a concerned dredge manager who didn't have faith in his GPS. He had some issues, last year, with the GPS heading, after which he decided to go back to using his older, "more reliable" satellite compass for position and heading.

He made this decision based on his observations from last year... his cutter suction dredge would not get steady heading, and would display in DREDGEPACK® as if it was constantly rotating around the trunnion. The result was that the cutterhead would pivot back and forth in DREDGEPACK®, despite the fact that the dredge was at the dock and barely moving. He thought his considerable investment in the dual-antenna head GPS system was a waste of money.

I told him to send me a picture of the GPS mount, plus his survey32.ini and several other items I thought might be helpful... It turns out, I didn't need to look any further than the picture he sent:

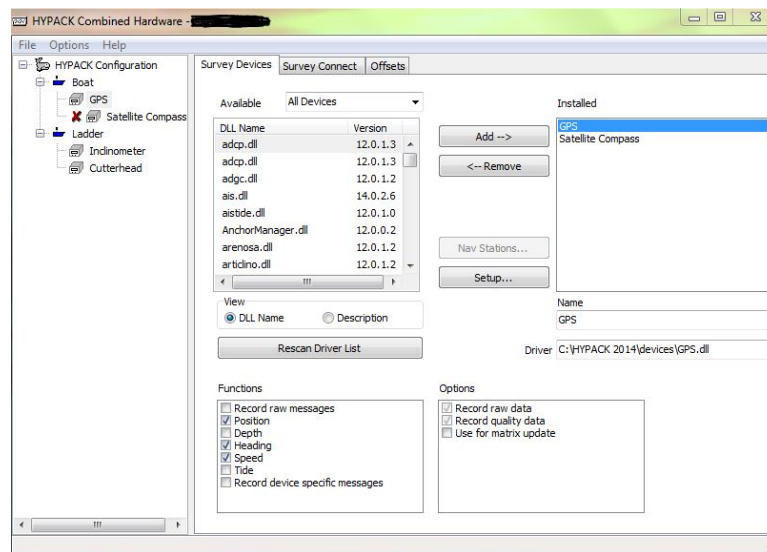
FIGURE 1. *GPS Mount*

The GPS antenna heads were mounted only a foot from each other, which made it impossible to receive a proper heading most of the time. I suggested that he move them farther apart to improve the heading. In the meantime, I also logged into his machine and tried an exercise to compare the two systems to each other.

His HYPACK HARDWARE configuration was built so as to allow for easy switching back and forth between the two positional devices. He would alternately enable and disable the drivers to make the change.



FIGURE 2.

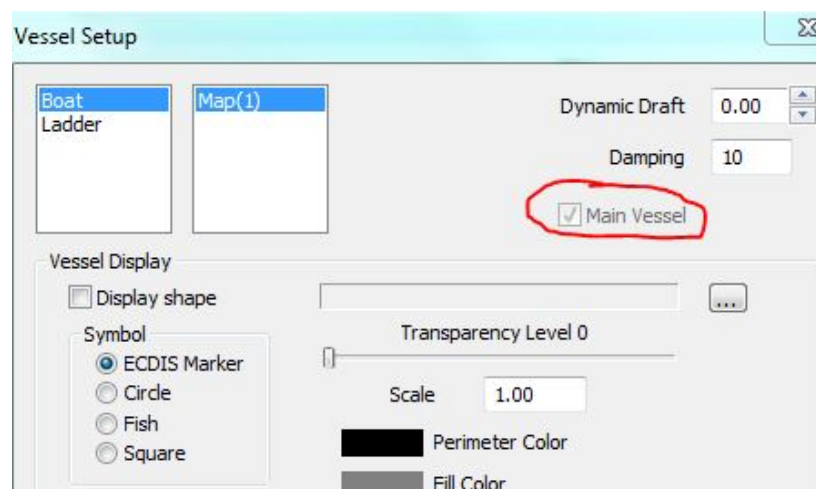


After looking through the HARDWARE setup and testing both devices, I explained what the HDOP (Horizontal Dilution of Precision) represented, and showed him that the GPS had a lower HDOP (1.4) than the satellite compass (1.9). Once again, I was reminded that the GPS just hadn't passed the eye test yet in DREDGEPACK®. So, I pushed forward with my exercise...

I started out in DREDGEPACK® by quick-marking (F5) five targets at the cutterhead with each system. The targets were marked 30 seconds apart from each other, so that we would have various positions taken over a couple minutes.

After this was finished, I went into the Vessels menu in DREDGEPACK® to change the Main Vessel from the Ladder to the Boat. By doing this, the cutterhead was no longer the tracking point, and all new target positions would be marked at the trunnion.

FIGURE 3. *Setting the Trunnion as the Main Vessel*



I proceeded to mark five more targets at 30-second intervals from each system. The results were not surprising to me, but they were to the dredge manager.

The satellite compass positions showed a horizontal shift between the targets that was nearly the same at both the cutterhead and the trunnion, so I could understand why he felt more comfortable with this system for heading.

FIGURE 4. *Targets Marked with a Satellite Compass*

However, when I measured the distance between each grouping of targets, I noticed that the satellite compass had output positions that varied by about three feet in just a two-minute period.

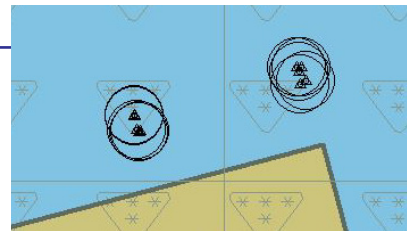
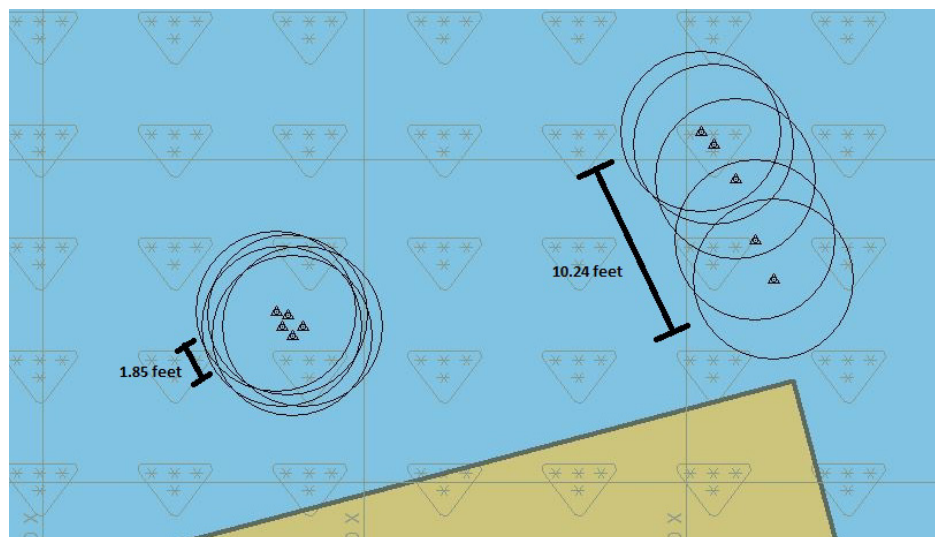


FIGURE 5. *Marked Targets with Satellite Compass – close up*



Next up, we measured the distance between the target positions taken with the dual-head GPS. The GPS positions at the cutterhead were much worse than those from the satellite compass, but they were spaced closer together at the trunnion:

FIGURE 6. *Marked Targets with Dual-Head GPS – BEFORE moving antenna heads*



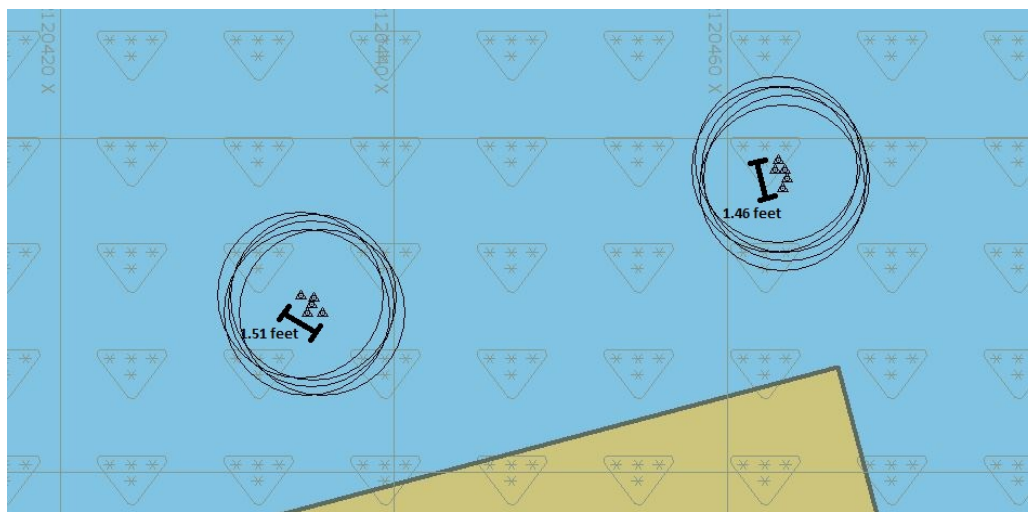
The test seemed to show that there was a definite issue with the heading of the GPS, but PERHAPS, it was more the accurate system for positioning... The greatest distance between trunnion target positions was less than those marked with the satellite compass. Hmm... At least I had enough information to convince our friend to reposition his GPS antenna heads.

The new mounts he built put the antenna heads about 20 feet from each other and immediately stopped the major rotation issue on the dredge.

But I hadn't yet convinced the dredge manager that the GPS would be better than his satellite compass in the long run, so I asked to log into his computer again to try to convince him to give the dual-head GPS another try.

I enabled the GPS one more time and marked targets at both the cutterhead and the trunnion. I measured the distance between the farthest-removed targets at each position and found them to be about the same.

FIGURE 7. *Marked Targets with Dual-Head GPS – AFTER Moving Antenna Heads*



After moving the antenna heads farther apart, the GPS showed no more signs of a heading issue AND proved to be the more accurate of the two systems for positioning. The dredge manager has made the full-time switch to the dual-head GPS and is now able to properly paint to his matrix.