N972RD AHRS Failure

Flown first under the registration N510TS and now under N972RD, the plane is a 2007 DA42 Twinstar. Fresh annual in May 2016, it had minor squawks that were addressed in the next two months and has been solid and flawless since.

In September, October, and November of 2016 it was at the Diamond factory in London, Ontario and had major upgrades including installation of ADS-B and GFC-700 autopilot. In the [hours] flown since it has had a few (six?) intermittent failures of the ADS-B unit. We figured that was just getting seated after installation (and not really sure if the ADS-B system in general might be the failure rather than the Garmin unit).

January 3rd Flight

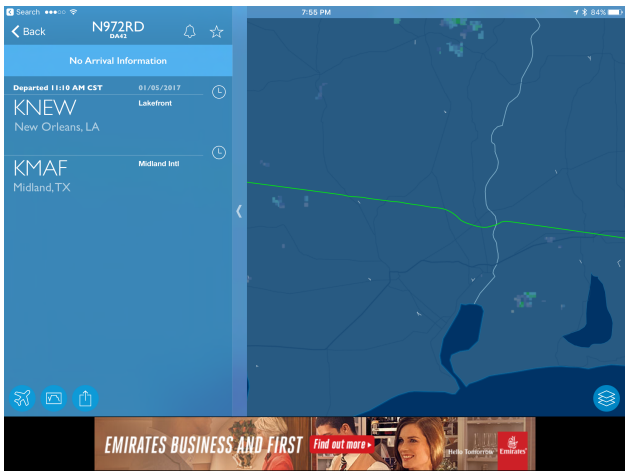
On a night flight from KEDC (Austin, Texas) to KNEW (New Orleans, Louisiana), with a 47 knot tailwind, abeam Houston, the PFD showed the following over a five minute period:

The GPS track didn't change, but the compass swung to compensate the unlikely winds. The conditions resolved in less than five minutes, so it was difficult to troubleshoot. Afterwards, everything returned to normal. There was no anomaly on the radar track, but it happened so quickly it's not a surprise there's no evidence on the course log.

January 5 Flight

On a daytime, VFR flight from KNEW to KODO (Odessa, Texas), the G1000 warned “CHECK ATTITUDE.” We were on a due west track, but the HSI was slowly sliding to the south,

Had to kick off the autopilot and grab the plane, but snapped a photo. Flicking on my iPad I used the synthetic vision and moving map there to get back on course. You can see the wiggle in my course on FlightAware’s track of me:



I made a quick stop at KARA and locked my fuel doors, which I had forgotten to do at KNEW. So I rebooted the system by shutting down for a moment. It was less than ten minutes on the ground at KARA and I was soon back at 8,500 cruising west. There were several hours where it was totally fine and I started to wonder if it was a magnetic anomaly that I had bumped into twice, once going East and once going West.

Then near Houston it went south again. And when it happened again in ten minutes it actually X’ed out the PFD synthetic vision entirely and complained with some warnings. The heading disappeared with a red X as well.

Over Orange, Texas:

Over San Angelo, Texas, really giving up:

Three times the AHRS failed and three times it rebooted and aligned itself. It was 4pm and I could make Midland, Texas by 5pm, which seemed like a good place to find a shop to fix it. I parked it at Signature FBO, hopped a 6:10pm flight to Dallas and then another flight home to LAX.

I can fly it back to KSMO if I am daytime VFR. I was headed into night, though, and weather for my last leg to Santa Monica was not definitely VFR. Heading into IMC with intermittent failures seemed like a bad idea. But if there is no good shop that can service it at Midland, I will bring it back to Long Beach.

Questions

1. Is there a mechanical attitude indicator that could be falling over?

2. The upgrades obviously involved a lot of work on the stack of avionics LRU's. Was the backplane replaced? Could it be a cooling issue (there was just one bag lying down in the extended baggage area, so no vents were blocked). If there was a cooling issue, wouldn't there be a different warning?

3. What could fail that would cause the erroneous readings? (This might be a question for a second-level Garmin tech.)

4. Obviously, an intermittent failure is difficult to diagnose. Is there an LRU we could send to Garmin for bench testing?