

Accident Date: May 26, 2017

Aircraft: Amstutz BD-5B N604KA

Causal Report on Engine Stoppage submitted by Curt Amstutz

I determined that engine stoppage was caused by broken wires between the Engine Control Unit (ECU or computer) and the fuel injectors. When the throttle is advanced to 60% with the ECU on and the engine not running, the injectors should fire for one (1) second. This was not happening. I pulled the wiring plug from the #2 cylinder injector to check for continuity between the ECU and the plug and immediately found a broken wire at a splice connector that I had installed when replacing the injector plug in April. The #2 cylinder was the second cylinder to stop firing in the engine stoppage. I speculate that this wire broke as a result of the vibration caused by the #1 cylinder failing first.

I then pulled the #1 cylinder injector wiring plug and checked continuity from the ECU. I determined there was a short in the 12 volt red wire between the ECU and the #2 injector plug. Depending on how the plug was held, there was intermittent continuity in the red wire. I determined that the location of the short was within the first few inches of wire above the connector plug. I carefully removed the weather proof boot from the top of the connector to inspect the wire. Everything appeared to be intact. The wiring seemed to be terminated and crimped properly at the connector plug. I gave a little tug on the wire to see if the crimp was holding and about ½" of copper wire came out of the insulation as though it had been cleanly cut. The insulation had previously reached to the crimped connector. There were no marks, slices, abrasions, or indentations on the insulation, but the wiring (with the exception of about two strands) that had been inside the insulation appeared as though it had been cleanly cut with a tool. This area did not seem susceptible to vibration. The insulation was intact and was further reinforced for strain relief by the weather boot. I speculate that the builder of the wiring harness used a tool to hold the wire in place while crimping the connector. I speculate that this holding fixture could be responsible for the cut wiring that caused the #1 cylinder to stop firing. The vibration from running on just the #2 cylinder caused the wiring failure on the #2 cylinder, causing the engine stoppage.

Matt Dandar of Recreational Power Engineering, the US Distributor for Hirth Aircraft Engines, was very helpful to me in troubleshooting and pinpointing the cause of the engine stoppage. I spoke with him on the phone twice, describing my findings. On each occasion, he gave me important information that eventually led me to pinpoint the cause of the stoppage. He also told me my engine was 15 years old, having first been sold to Paladin Industries for very limited testing of their powered parachutes. They used the engine for just a few hours. The engine was then sold to Kent Leathers for use on his Avid Flyer, but he never used the engine. I purchased the engine from Mr. Leathers in April of 2003.

Explanation of Pictures:

IMG_2013: Cylinder #1 Injector plug with weather boot removed showing break in wiring and intact insulation.

IMG_2014: Another view of #1 cylinder injector wiring.

IMG_2016: Wider angle view of #1 cylinder injector plug, wiring, and weather boot.

IMG_2017: Close up of #1 wiring.

IMG_2019: #1 wiring insulation front

IMG_2020: #1 wiring insulation back

IMG_2023: #1 plug top view

IMG_2024: #2 cylinder injector plug and wiring with weather boot in place showing break at splice connector

IMG_2025: Another view of #2 wiring break

IMG_2026: #2 splice connector top view

IMG_2027: Another view of #2 wiring break-