

Bearhawk #164 “Three Sigma” Checkout Report

Date: 17 Feb 08

Objective: Initial Fuel System Leak Check

Background: In preparation for the fuel flow check, the fuel system must be checked for leaks. As the fuel flow check is to be conducted with minimum fuel (worst case), filling the tanks at this point would require draining them later with the requisite logistics tail of containers. Thus, only three (3) gallons will be added per side.

Procedure:

1. Remove fuel tank covers
2. Remove front 4 sections of floor (exposes fuel system: fuel selector, gascolator, fuel flow sensor, check valve, fuel pump, fuel pressure sensor)
3. Install fuel selector handle
4. Turn fuel selector to OFF

With airplane outside

5. Add a small amount of fuel (3 gallons) to each tank
6. Check for leaks from tanks and tubes. If leaks found, drain fuel tanks back to Jerry cans
7. Turn fuel selector to BOTH
8. Check for leaks from fuel system.
9. Drain gascolator sump to confirm fuel in gascolator.

Results: Three gallons of fuel were added to each tank filtered through “Mr. Funnel”. Initial quick check showed no leaks. Detailed check included tank ends, bottom, sides, and connections. Fuel lines, rubber hoses at wing root, fuel lines, tee at front door post, and lines to fuel selector valve. No leaks found.

The fuel valve was turned from OFF to BOTH. Fuel was immediately heard flowing through the lines, filling the gascolator, and filling the carburetor bowl. The lines to the gascolator, fuel flow sensor, check valve, fuel pump, fuel pressure sensor were checked. No leaks found.

The firewall bulkhead fitting and fuel system forward of the firewall were not checked (oops). However, no fuel was noticed on the ground or smelled. Other people looking at airplane made no comments about fuel leaks.

Fuel drained normally from gascolator and both tanks. Drain valves closed securely.

Note: Three gallons of fuel in each tank showed about 1 inch of fuel in each sight gauge.

Conclusions: Fuel system as tested is free of leaks.

Recommendations: Inspect fuel lines at bulkhead fitting and forward of the firewall for leaks. Confirm no fuel leaking from carburetor (good float valve). Install fuse for fuel pump. Check fuel pressure on EDM-900, pump on and off.

Follow-up

Date: 18 Feb 08

Results: Fuel selector turned from OFF to BOTH. Fuel lines inspected for leaks from fuel pump, check valve, and fuel pressure sensor forward to firewall bulkhead fitting, primer valve, and carburetor inlet. No leaks found.

Carburetor air box inspected for dripping fuel indicating a leaking float valve. No leaks found.

Fuse was installed for fuel pump. EDM-900 was turned on. With fuel pump off, fuel pressure indicated 1.1 psi. For a fuel density of 6 pounds per gallon and a head of 33 inches in the tail down position, the expected pressure is 0.85 psi. Considering pressure sensor uncertainty at low pressures, this is a reasonable result.

With fuel pump on, the fuel pressure oscillated between 5.9 and 7.5 psi. No fuel leaks were found under fuel pump pressure.

While no leaks could be seen, it is possible that there are one or more leaks that are so slight that the fuel evaporates rather than dripping. This is suspected because of a latent smell of fuel noticed while re-installing the floor in the fuselage.

Conclusions: Fuel system as tested is free of visible leaks.

Recommendations: Look for evidence (stains) of fuel leaks during future inspections.

Date: 1 Mar 08

Results: When the floor was removed to service the brakes, more smells of fuel were noticed. Close inspection of the fuel lines found them to be dry except in the area around the gascolator. Some residue was noted on the inlet tube to the gascolator. Even more telling was a wire lacing by the outlet fitting, which was formerly white and now was stained blue. The B-nuts on both sides of the gascolator were tightened approximately 1/6 turn. The stained lacing was removed and replaced with a new white lacing. For good measure, another lacing was tied around then inlet fitting. Any further staining will indicate the presence of a fuel leak.

Conclusions: The rogue leak appears to have been stopped.

Recommendations: Look for evidence (stains) of fuel leaks during future inspections.