

Bearhawk #164 “Three Sigma” Checkout Report

Date: 6 Apr 06

Objective: Initial Ground Engine Run and Checkout

Background: Since the engine was overhauled, it needed a certain amount of run-in before flying. The run-in procedures used were developed from Lycoming Service Instruction No. 1427B, 8 February 1993 and Lycoming Service Instruction No. 1241C, 18 April 1997.

Procedure: According to [Ground Engine Run Cards](#).

Results:

Engine pre-oil was done according to the procedures. The top spark plugs were removed to minimize the load on the starter. The cowling was secured closed.

SkyTec stated that the starter could be run for 10 seconds at a time with a 30 second cool-down period between crankings. After 6 crankings, the starter would have to be allowed to cool down for 30 minutes. It was not established if this was just for cranking the engine against compression or cranking with the spark plugs removed.

Prior to cranking, the oil cooler and oil filter were empty. The oil leaves the oil pump and goes immediately to the oil cooler and then the oil filter before entering the oil galleys of the engine. As such, it was expected to take a fair amount of cranking before building oil pressure.

Prior to cranking, the Low Oil Pressure Light was ON, signifying no significant oil pressure at the oil pressure switch. The engine was cranked (fuel selector OFF, Mixture IDLE CUT-OFF, Ignition OFF) five times for 10 seconds each with no indication of oil pressure. During cranking, the EDM-900 shut down, presumably because of the voltage drop. When the cranking was stopped, the EDM-900 immediately re-booted. On the sixth cranking, the Low Oil Pressure Light turned OFF about halfway through the cranking. When the EDM-900 rebooted, oil pressure was indicated.

The other side of the oil pressure switch turns on the Hobbs meter. The Hobbs meter was verified as operating properly.

The spark plugs were replaced and torqued. The spark plug wires were connected and the cowlings secured. The oil quantity was checked showing about 9.5 quarts. Because the oil is still new, it was almost transparent and very difficult to find the level on the dipstick. This would indicate that about 2.5 quarts were used filling the oil cooler and oil filter.

The engine was started according to the checklist. The primer was actuated for approximately three seconds. Fuel flow to the primer was verified by the change in the sound of the fuel pump while the primer solenoid was open.

The engine started after 2-3 blades. A quick rise in RPM alerted me that I had forgotten which way the throttle works, having moved it 1/2 inch back from full instead of 1/2 inch forward from idle. The throttle was quickly repositioned to approximately 1000 RPM. Approximately because a quick check of the tachometer on the EDM-900 showed an indicated RPM of zero.

An observer commented that the engine ran very smoothly.

The voltmeter showed about 12 volts and the loadmeter showed 2 amps (which is what it shows when the alternator isn't on). This implied that the alternator was not working. Turning the alternator field switch on and off had no effect, indicating that for some reason the alternator is not alternating. A later check showed voltage at the regulator from the alternator switch when on. A check for field voltage will be made after a test wire is constructed.

Each ignition system was turned off individually. In both cases, the engine continued to run on the remaining ignition system with good EGTs on all cylinders, thus showing that all twelve spark plugs were firing.

Fuel pressure with the pump ON varied between 5.1 and 8.6 psi. When the fuel pump was turned OFF, the fuel pressure dropped to 1.1 psi. The engine continued to run with the fuel pump OFF.

CHTs continued to rise during the engine run. They all remained well below the 435°F limit, and appeared to be stabilizing by the end of the engine run, although this cannot be verified.

Oil temperature was verified to be increasing. OAT and Carburetor temperature appeared to be working properly. Fuel flow was indicating in the neighborhood of 2.0 gallons per hour, which was assumed to be correct. Manifold pressure was indicating a low value as expected near idle, and jumped back up to local pressure after shutdown. Oil pressure was within limits.

The throttle was pulled to the idle stop, and the engine sounded as though it couldn't decide whether to quit or not, running on about two cylinders. The idle stop screw was subsequently adjusted to increase the idle RPM setting slightly, but this has not been tested yet.

Engine shutdown was according to the checklist, stopping the engine by pulling the Mixture to IDLE CUT-OFF.

Inspection of the engine compartment after shut-down found no indications of any fluid leaks.

Engine data were downloaded from the EDM-900 post-engine run.

Conclusions: The engine ran successfully. The tachometer and the alternator were not working. All other systems appear to be functioning properly.

Recommendations: Troubleshoot and repair the tachometer and alternator systems.