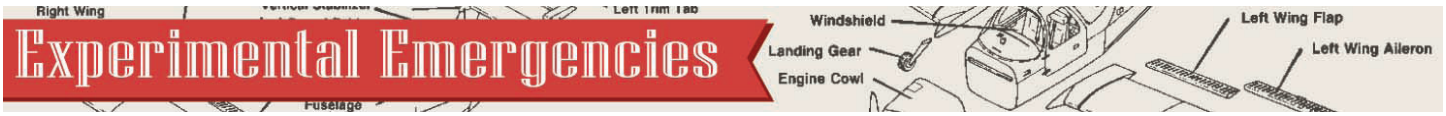
CALLBACK

From NASA's Aviation Safety Reporting System

Issue 413 June 2014



Experimental Emergencies

Experimental Amateur-Built aircraft (aircraft limited to recreational, non-commercial purposes and which must have at least 51 percent of their assembly completed by an amateur builder) represent about 10 percent of the U.S. General Aviation fleet. However, according to a 2012 study by the NTSB, Experimental Amateur-Built (EAB) aircraft accounted for approximately 15% of the total and 21% of the fatal U.S. general aviation (GA) accidents.

The NTSB also noted that EAB aircraft accidents usually happen very early in the airplane's life, often on the first flight and frequently involve engine failure or loss of power.

The first two reports in this month's *CALLBACK* deal with aircraft fuel issues that led to loss of engine power in the initial flight testing phases. Two additional EAB aircraft reports remind us that unexpected things can happen in any type aircraft after many trouble-free hours. A successful outcome relies in large part on the pilot being ready for anything — no matter how unusual the emergency.

"Two Miles Short"

This Pilot of an EAB aircraft learned the hard way that, although an engine issue was a major concern, proper fuel planning should always be a priority.

■ *Aircraft was being flown under Part 91 on a Special Airworthiness Certificate for Experimental (Amateur-Built) aircraft. The purpose of the flight was to conduct Phase I flight limitations issued for this aircraft. Two miles short of the intended landing field (the airfield specified as home base in the aircraft's Phase I operating limitations) the engine stopped due to fuel starvation. I landed uneventfully in a field. There was no damage to the aircraft or to property on the ground. I refueled and, with the permission of the farmer who owns the field, took off to return to base.*

At the time of the flight, the aircraft had flown fewer than five of the Phase I flight hours. As the aircraft had experienced cylinder-head cooling issues, most flight time to date had focused on getting the cylinder head temperatures within limits. This flight was meant to test a new, enlarged cooling baffle that had been installed for that purpose. Because of the need to address the cooling issues, I had not yet had time to perform the planned test flights to verify expected fuel flow, nor to cross-check expected fuel-quantity indications (as shown on the ground with the aircraft in flight attitude) with the actual indications airborne. As a result, actual fuel quantity was less than expected. When I realized that, about twenty miles from base, I immediately began my return to home field; the fuel supply ran out just outside of glide range.

Test flights to determine actual fuel flow and to crosscheck airborne fuel quantity indications are planned. The information derived will provide planning data that will prevent a recurrence of this incident.

Crossed Fuel Lines

The Pilot of another EAB aircraft was also performing initial flight testing when fuel starvation resulted in an off-field landing. Rather than a misjudgment of the fuel available, the culprit in this case was a fuel plumbing issue. There was no mention of selecting the other tank after the engine stopped or of correlating fuel usage with tank selection prior to the loss of power.

■ *I departed on a local flight to do some air work checking engine cooling, magnetic heading calibration, autopilot operation, and VOR operation. We proceeded on course to a nearby airport at 2,500 feet MSL and then maneuvered over the airport at 3,000 feet performing standard rate turns…. We then exercised the autopilot operation for altitude hold, vertical speed control, and bank command. After several circuits over the airport, we started to return to my departure airport after approximately 45 minutes of flight time.*

After listening to automated weather, I contacted Approach and proceeded inbound for landing. About 15 NM from the airport, I noted that the fuel pressure indication was flashing and the value read approximately 3.0 PSI (6-7 PSI is normal). The electric fuel pump was ON, but I cycled the switch in an attempt to restore fuel pressure, to no avail. The Fuel Tank Selector switch (Electric) had been set on the right tank since takeoff. The right tank contained approximately nine gallons and the left tank had five gallons.

The engine eventually stopped. I declared an emergency and looked for a field to set the airplane down. I set the mixture full rich and attempted a start but, as I recall, I did not get the prop to even turn over. At one point in the descent, the aircraft got a little slow on airspeed (~75 knots) and started to roll right (heavy wing) while a left turn was being commanded. I kept the left turn in, increased airspeed, and eventually the aircraft rolled left for the desired field. I set up to land into the wind.

I now recommend checking fuel pressure values between engine driven pump and electric fuel pump. Monitor fuel quantities to match expected consumption. Consider some sensing means and indication to determine that fuel is being withdrawn from the selected tank. The fuel tank selector valve had been replaced due to what appeared to be a leak from the original valve. The primary concern would be that fuel lines are correctly installed on the proper ports of the selector valve. Testing five days later confirmed that: 1) The fuel valve was powered. 2) When the fuel pump was powered and the right tank (containing approx. 9 gal.) was selected, no fuel was pumped through the line to the carburetor. 3) When the fuel pump was powered and the left tank (empty) was selected, fuel was pumped through the line to the carburetor. The fuel lines had been reversed when the new valve was installed.

"We Were in a Steep Nose Down Attitude"

Luckily, there was a passenger along to "uncover" the Pilot of a pressurized EAB aircraft when a door opened to a world of excitement.

■ *After departing, we were being vectored around traffic during the climb sequence of the flight. Upon receiving clearance to FL230, I noticed the cabin pressure light begin to flash intermittently. I increased the cabin inflow and adjusted the cabin altitude, with only a slight improvement of the annunciator panel. The door lock and door seal lights were in their normal lit configuration at this time. I recycled the door seal to test its integrity. Shortly thereafter, the door flew open, with resultant depressurization.*

Cabin contents were flying about the cabin, my headset and glasses departed the plane…. A blanket from the back seat covered my head and face and was pulling my head out of the cabin into the slipstream. My passenger pulled the blanket off my head and I saw we were in a steep nose down attitude. I pulled back power and eased the descent. The plane was very difficult to control at this point.

I elected to try to get the plane under control before considering an attempt at landing. I asked my passenger to place a headset onto my head and I was able to communicate with ATC, informing them that we had lost our door. At some point, the door completely departed the plane, improving the flight characteristics considerably. After slowing down and aggressively trimming, I was able to get back control of the plane and said we would return to the departure airport since the plane was now flyable and the runway environment was familiar….

I asked for permission to change to Tower frequency and requested a downwind approach since it would give me a chance to test the flight characteristics in the landing configuration at pattern altitude. Tower immediately cleared us to land. With flaps and gear down, the plane was more stable, and the landing was uneventful.

"I Probably Should Have Told You…"

Communication problems are often cited as contributing factors in ASRS incident reports. The following report from a Pilot who was instructing the new owner of an EAB aircraft has to be one of the better examples of the consequences of poor communication. There are some things a trainee just shouldn't keep from the instructor.

■ *I was providing transition training to a Private Pilot who had recently purchased the aircraft. The flight was to be just over two hours long. The evening prior I was with the owner and witnessed him refuel the aircraft with 20 gallons of fuel. I told the owner that there were already six gallons of fuel aboard based on our previous flying, our observed fuel burn of 8.2 GPH, and the fact that we started with full tanks and kept very careful track of fuel burned, added, or removed.*

The next morning I arrived at the airport, watched the owner perform the pre-flight and asked him about our fuel state. He told me, "The gas is fine."

We made an uneventful takeoff, climbed to altitude for a short cross-country trip so he could practice descents and perform traffic pattern work. We departed for a second airport using the same training profile and then headed back home.

Approximately 16 miles from the airport at 2.1 hours into the planned mission, the engine coughed. The owner correctly reacted and switched fuel tanks using the proper procedures. I remarked to him that the event was strange because according to my watch we should have a little over eight gallons of fuel remaining.

At this point the owner said, "Oh." I asked, "Oh what?" He tells me, "I probably should have told you before, but early this morning before you got to the airport, I drained eight gallons of gas out of the airplane into my gas cans." The owner told me he had been concerned that we might be too heavy with so much gas on the airplane. He had no explanation for why he did not tell me that he had removed fuel from the airplane.

Concerned that we could experience fuel exhaustion, I opted to make a precautionary landing in a field about 12 miles northwest of the airport. The landing was uneventful.

The owner refueled the airplane with the eight gallons he had removed and I flew the aircraft back to the airport.

ASRS Alerts Issued in April 2014	
Subject of Alert	**No. of Alerts**
Aircraft or Aircraft Equipment	4
Airport Facility or Procedure	3
ATC Equipment or Procedure	9
Hazard to Flight	1
TOTAL	**17**

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A Monthly Safety Bulletin from

The NASA Aviation Safety Reporting System

P.O. Box 189 Moffett Field, CA 94035-0189

http://asrs.arc.nasa.gov

April 2014 Report Intake	
Air Carrier/Air Taxi Pilots	4,195
General Aviation Pilots	1,179
Controllers	708
Flight Attendants	405
Mechanics	195
Dispatchers	128
Military/Other	89
TOTAL	**6,899**