

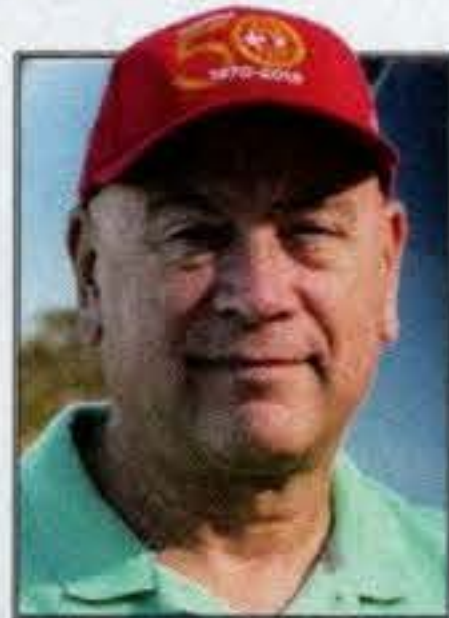


Once altitude permits, I like to turn 45 degrees left or right of centerline so that in case of an engine failure it is a shorter turn back to the runway. Leveling off at 2,000-3,000 feet above the airport is a safe altitude and will allow for enough power to break in the engine (except for high-altitude airports).

First Flights

Make sure you and your airplane are ready

BY VIC SYRACUSE



I AM GOING TO break from maintenance this month and spend a little time on a critical part of keeping the fun factor alive — first flights. After all, we typically build and fly the airplane for a while before we have to do any maintenance.

We spend a fair amount of time in the EAA safety committee meetings discussing the accident rate for experimental aircraft. The data show we have made huge progress in the last 10 years. However, we are still not on par with general aviation as a whole, and the first 8-10 hours seem to be the highest contributors to the accident rate. Having made a bit more than three dozen first flights myself, I thought I'd share with you some best practices that should help reduce the risks.

There's no doubt that many of us tell our friends and family that we really aren't flying experimental aircraft. They are just amateur-built aircraft. In fact, some of the more popular and proven kits on the

market today border on assembly projects, with everything included except the battery and paint. So, it's not really a stretch to say we aren't flying experimental aircraft. I pretty much agree with that frame of thought after the Phase I test flying is complete, and then I still tell everyone to not trust their aircraft until it has flown at least 100 hours.

Why? Even though the kits are pretty complete, there is still a lot of room for customization, especially in the area of avionics and interiors. There's also room for mistakes during the building process — dare I say loose jam nuts and lack of proper travel on engine controls? So, most definitely the first flight should be categorized as experimental.

A best practice I have always used is to think about how your airplane might be different from the prototype or other flying aircraft.

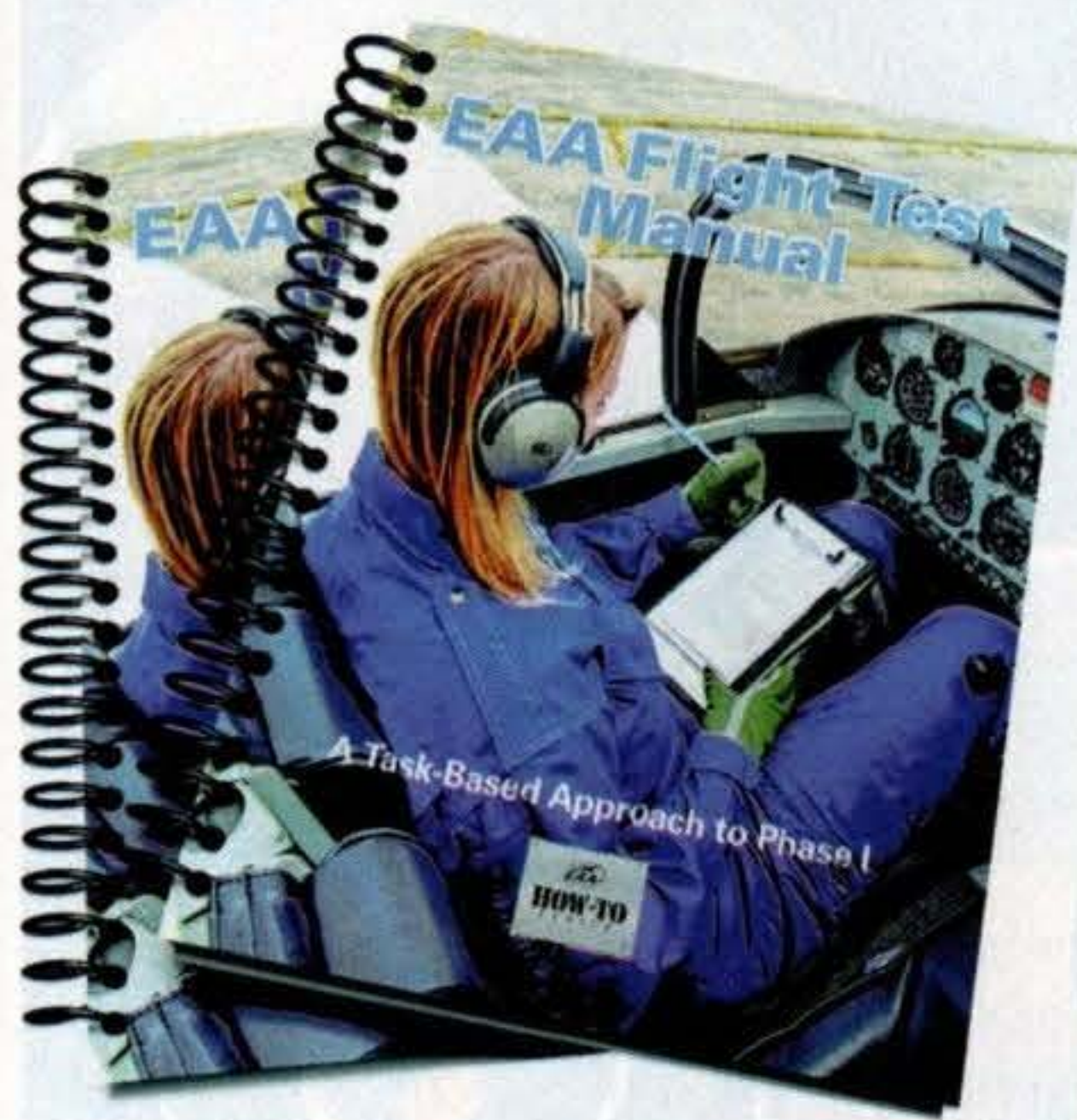
There's a lot going on during the first flight, especially during the initial climb. Most likely, it's the first time the engine has been under full power for that length of time. Once you are off the ground, there is the opportunity for a whole host of other distractions, and they will come at you pretty fast. This is especially true with some of the lighter and higher-powered aircraft, such as the RVs. If you haven't taken the time to practice by doing some "chair flying" and simulating some of the distractions, there's a good chance that your reaction could be wrong, and even fatal. In the 12 years I have been a designated airworthiness representative, I have seen a real change in this area when certificating new airplanes. Early on, it seemed as though the vast majority of builders couldn't wait until I left so they could reassemble the airplane and go fly it. In the last few years I have seen a greater majority ask for help by using the Additional Pilot Program, making use of the *EAA Flight Test Manual*, and even getting transition training. I do remind all of

them that it is no longer a project. It is now an airplane and needs to be treated as such.

So, what can you do to help with preparation? Well, take the time to make a list of everything that might be working for the first time and consider various failure scenarios and how you should react. Have the discipline to create a "Before Takeoff" checklist — and use it! It could save your life.

Let's walk through some examples. No doubt by

now you have been playing with the control system on the ground. Once those controls get airflow over them, they are going to feel different. How should you react if the pitch trim seems too heavy at rotation, or perhaps is even reversed? Yes, it happened to me on one early test flight. I really thought I had checked the trim operation. Sure enough, I started trimming for more nose-up on



Every builder should procure a copy of the EAA Flight Test Manual prior to the first flight and use it for Phase I testing. The data that you will collect will be invaluable in putting together a pilot's operating handbook for your aircraft, along with drastically increasing the safety factor during the test program.

EXPERIMENTER

CHECKPOINTS



Left: This is the time for the final checklist and a quick review of the Emergency Action Checklist. I make it a habit to have everything in the cockpit prepped prior to engine start, especially with a new engine, so that ground time is minimal. Coordination with ATC at towered fields is a must prior to engine start.

The next thing you might feel right after takeoff if you haven't balanced your tires is some shaking in the airframe as the tires slow down. It doesn't usually last long, but it can be a distraction. Right about this time is when an unlatched door or canopy will come open. You did use that checklist, right? I lost a friend last year to this scenario. The passenger door on his RV-10 came open right after takeoff.

Speaking of checklists, many other facets of flying, such as airline and military, have what are called "Emergency Action Checklists." They have to be committed to memory and demonstrated before you even get to fly the aircraft. There's a reason for them. Some things do require immediate action — such as engine fire, smoke in the cockpit, etc. — but the most paramount thing is to *fly* the aircraft. Know before you begin your takeoff roll those items for which you will *abort* the takeoff if runway permits; if not, then know the correct action to take. Practice these scenarios sitting in the cockpit until they become second nature. You should be able to activate all controls blindfolded, such as turning the fuel off, cycling ignitions, opening air vents, using the fire extinguisher, etc. Think about having smoke in the cockpit that is burning your eyes and nose at the same time.

takeoff, and the stick force continued to increase in the opposite direction than I was expecting. My reaction — STOP using trim and fly the aircraft. I also reduced power to make certain it was a controllable out-of-trim scenario. Once I got some altitude, I verified it was reversed.

So, what can you do to help with preparation?
Well, take the time to make a list of everything that might be working for the first time and consider various failure scenarios and how you should react.

With all of the electronics in our cockpits, it is super easy to get distracted by noncritical items, and that is a primary reason why I am a firm believer in the Additional Pilot Program (assuming you use someone who is familiar with your airplane and perhaps even an instructor). I have witnessed how builder pilots react on first flights when alarms start going off because they are so primed for a potential problem. Every alarm that I have seen so far has been due to limits not being set correctly in the configuration or simple things such as an alternator failure that don't require any immediate action. In one case, the pilot noticed the stick force was increasing as we leveled off from climb, and the trim was no longer functioning. The proper action is to reduce speed or continue the climb, so as to relieve the stick force. That worked, and we realized that the trim

didn't work above a certain speed. Since it was the first flight, and breaking in the engine is an important part of the first flight, we just adjusted the trim while we were slow for what we thought it should be at a faster airspeed. That worked great, and of course, we knew it worked for slower speeds, so trimming for approach and landing was no problem.

A best practice I have always used is to think about how your airplane might be different from the prototype or other flying aircraft. This approach saved my life one day when it came time to make the



Many electronic flight instrument systems allow the creation of a checklist customized to your airplane. Strict adherence to the checklist will minimize the risk during the stress of a first flight.

first flight of my Prescott Pusher. Mine was the first customer-built aircraft to fly. I realized that the factory test pilot was about 30 pounds heavier than I was. So, I placed a 25-pound bag of lead shot in the seat next to me. When the aircraft broke ground for the first time and I had the yoke all the way forward and the nose pitch was still increasing, I realized I had a CG problem. I grabbed that bag of lead and threw it up underneath the co-pilot's rudder pedals, and it dramatically made a difference! I am lucky to be here to share that experience with you.

EXPERIMENTER

CHECKPOINTS

Right: At this point in the rotation, you should start to recognize an out-of-trim or CG problem. Hopefully, you have enough runway to abort the takeoff. Aborts should be deliberate and practiced. Don't forget the brakes are new and may not be thoroughly broken in yet, meaning stopping distance could be longer than expected.

Another best practice I would encourage you to do is to make that first flight without a lot of fanfare. It will take the pressure off you to meet a schedule. Plus, on the off chance there is an incident or accident, you really don't need a bunch of people to see it. Have only the necessary people present, and make sure to inform those who are there what to do in case of an accident. When I do test flights at towered fields, I always place a call to the tower to let controllers know it is a first flight and to ask when is the best time for them to accommodate it. By the way, I am against having chase planes on first flights. I know it's done in other facets of aviation, but most of them are professionals and familiar with formation flights and the added risks of being in close proximity to other aircraft. In our amateur-built world, it is not a best practice.

The last thing I will recommend is that the cowlings should come off after the first flight and everything should be inspected closely. Of course, you used a torque seal indicator on all of the nuts and fittings, so you should be able to quickly identify any loose fittings.



Now it's time to go have more fun! Use the *EAA Flight Test Manual*, and the rest of the flights in Phase I should be controlled testing. **EAA**

Vic Syracuse, EAA Lifetime 180848 and chair of EAA's Homebuilt Advisory Council, is a commercial pilot and A&P/IA, DAR, and EAA flight advisor and technical counselor. He has built 11 aircraft and has logged more than 9,500 hours in 72 different types. Vic also founded Base Leg Aviation and volunteers as a Young Eagles pilot and an Angel Flight pilot.