



EAA Chapter 21 **NEWSLETTER**

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Test Flying your Aircraft

Now that I have my own homebuilt project, one of the things I've been interested in finding out about is how to test fly an aircraft. I've known that the test pilots of experimental research aircraft, such as those developed by NASA, have a "test card" or list of goals to accomplish during each test flight. Since the FAA usually requires a test flight period of 40 hours for new homebuilt aircraft, I figured there must be such a list of goals for test flying your homebuilt, so I've been doing a little research. I found quite a bit of information on the subject.

In the June, 1997 issue of *Experimenter* Magazine, Ben Owen wrote an article on test flights. Here are a couple of his points:

- Look at your piloting skills. When you are building a plane, you're probably not going to be flying a plane very often, so your piloting skills are probably degraded from lack of proficiency. It may be wise to have someone more experienced, capable, and/or proficient than you to conduct the test flights.
- Check your insurance. Do you have the necessary insurance to cover damage to your new plane, damage that may occur to surrounding property, and personal injury to the test pilot?

While at AirVenture, I attended a forum on test flying your homebuilt. Included in the presentation was a list of about 12 goals to accomplish, in order, while in the test flight period. This list of goals come from an FAA advisory circular (AC90-89A) I was later able to download from the internet. I'll try to summarize the important points from that circular here:

Before the first flight:

- Preparation— This includes things like airport selection, in-flight emergency plan and ground emergency plan.
- Test Pilot— Qualifications of the test pilot.
- Transporting the aircraft to the airport where the test flights will occur. This is not necessarily the same airport as where the aircraft will be based.
- Final assembly and inspection of the aircraft. The aircraft must be inspected *thoroughly* prior to any test flights. This includes a weight and balance check.
- Paperwork— All documentation and paperwork must be completed prior to first flight.
- Powerplant tests— The engine must be thoroughly tested to insure reliability prior to flight.
- Taxi tests— The taxi tests should begin with a taxi speed no faster than a man can walk. The pilot should spend this time getting acquainted with the aircraft's low speed handling characteristics by practicing 90, 180, and 360 degree turns and braking action. Each taxi run should be 5 mph faster than the last run until the aircraft is within 80 percent of the predicted stall speed. The pilot should test elevator, aileron, and rudder effectiveness. As taxi speeds increase, the rudder becomes more responsive and directional control will improve.

(Continued on page 2)



The First Test Flight

- After take-off, climb to 3,000 feet above ground level.
- Limit the cruise speed to no more than 1.5 the predicted stall speed of the aircraft.
- Each control input should be gentle and small. Start with the rudder first. Yaw the nose of the aircraft 5 degrees left and right.
- Raise the aircraft's nose 3 degrees up. After the aircraft is stabilized, level off and try three degrees nose down, trim, and note the response.
- Try a gentle bank of no more than 5 degrees to the left, then one to the right. Try a few 90 degree clearing turns, followed by two 360 degree turns: one to the left and one to the right at a bank angle of 10 degrees.
- If the aircraft is responding to the prescribed specifications, increase the bank angle in succeeding turns to 20 degrees. If no problems are encountered, climb to 5,000 feet AGL, level off, fly an imaginary landing pattern.
- Practice approach to landing by descending to 4,000 feet AGL first, then to 3,000 feet. Climb slowly back up to 5,000 feet.
- Two questions must be answered before landing: Is the aircraft controllable at low speeds? What is the approximate stall speed? These questions can be answered with an approach to a stall maneuver. Do NOT perform a FULL STALL check at this time!
- With the aircraft airspeed approximately 1.4 mph/knots times (X) the predicted stall speed, raise the nose slowly. It is desirable for the aircraft to start decelerating slowly, about 1/2 mph/ knot a second. A 30 mph/knot deceleration at 1/2 mph/knot per second will take only a minute.
- As the aircraft slows down, note all the things that happen as the speed bleeds off. Observe the changing nose attitude and how the stick force changes. Keep the turn coordinator or turn and bank "ball" in the middle.
- Keep making small control inputs at intervals to check the aircraft's responses. At approximately 5 mph/knots before the predicted stall speed, or at the first sign of a pre-stall buffet, note the airspeed and stop the test. Recover and write down the pre-stall indicated airspeed. This airspeed should be the reference stall speed for the first landing.
- The FLIGHT TEST PLAN for the first flight should call for a maximum of 1 hour of actual flight time. This is to reduce pilot fatigue and the possibility of an engine failure or airframe malfunction occurring due to vibration or construction errors.

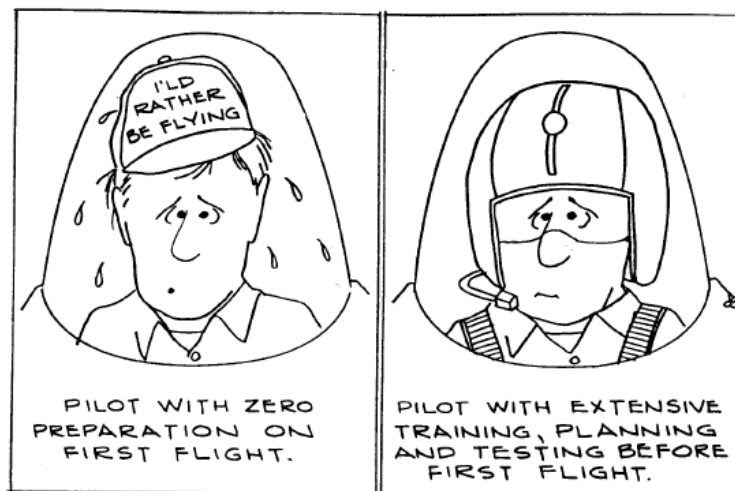
The Second Flight

- **Before the second flight**, the pilot should ensure that all discrepancies noted on the first flight are corrected. It is probable that more ground runups, rigging adjustments, or taxi tests will be required. Under no circumstances should a pilot takeoff in an aircraft with known airworthiness problems. The Law of Aerodynamics does not often forgive these types of mistakes.

The Third Flight

- The third flight should concentrate on engine performance. Do not forget to record the engine's response to any application of carb heat, leaning of the fuel mixture, changes to airspeed, and its response to switching fuel tanks.

These are just a small sample of the suggestions. The Advisory Circular goes on in very great detail. It's a 99-page document.



Submitted by Pete Wiggin

This cartoon is one of many in the Advisory Circular

Message from EAA Chapter 21 President

Our agenda for Sept. meeting is for Wednesday, the 10th at John Bizal's hangar (behind Dairy Queen on Highway 41 near Evansville airport) starting with Stearman flights for Jerry Euler and Don Taylor at 6 PM. After pilots, John Bizal and Bill Spurling and treasured passengers return we will follow with our regular meeting. Our program for the evening will be a timely discussion on Spatial Disorientation by John Bizal.

Everyone is encouraged to arrive early and witness the flights given to our selected top EAA 21 members -- Don Taylor and Jerry Euler.

Don Taylor was chosen because of his never ending enthusiasm and work in building experimental airplanes, and for his many contributions to the chapter over the years in taking photos and video and making them available to all members. Don is a tireless individual and is most deserving of this award and flight in the Stearman.

Jerry Euler has served in the EAA chapter in many officer positions over many, many years. Jerry at one time or another has just about done everything there is to do for the chapter and is an outstanding example of untiring enthusiasm and efforts for our EAA chapter activities.

Without the contribution of these two gentlemen, our chapter would not be what it is today. Thank you Jerry and Don for your efforts and contributions. We look forward to looking up to you as your fly over head in the Stearmans.

Everyone, Bring along your cameras and a guest and the chapter will provide for some cold soda pops.

Please note the flights will begin at 6 PM. Please plan to arrive early.

Larry Helming, EAA 21 president 2007-2008

Minutes of August 12, 2008 EAA 21 Chapter Meeting

Meeting was started at 6:50pm with a presentation given by our local Indiana River City Cadet Squadron of the Civil Air Patrol, which put on a video and gave report on what CAP represents.

After CAP report we heard from people who flew to Oshkosh and what their trip was like, and whether any new items caught their attention. After that Steve Eberhart told us all about the new autopilot he got.

Meeting concluded at 8:20pm

Submitted by Gary Zimmerman.

Chapter 21 Monthly Treasurer's Report		
August-08		
August 1, 2008 Beginning Balance		\$2,387.42
Receipts		
Interest	\$0.10	
Dues - 1@\$15 ea.	<u>\$15.00</u>	
Total	\$15.10	
Disbursements		
Newsletter Printing	<u>\$16.00</u>	
Total	\$16.00	
August 31, 2008 Ending Balance		\$2,386.52
Balance ONB 08-31-08		\$2,386.52
Bill Gowin, Treasurer		

EAA Chapter 21

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Upcoming Chapter 21 Events

EAA21 Chapter Meeting: Wednesday Sept. 10, 6:00 PM, Dr. John Bizal's Hangar

This month's meeting will be at 6:00 PM at Dr John Bizal's hangar, behind Dairy Queen on Highway 41 near Evansville airport. Note this is one hour earlier than usual. Our program for the evening will be a timely discussion on Spatial Disorientation by Dr. Bizal.

Sep 12-14, 2008	Sport Aviation Weekend	Falls Of Rough, KY	64 miles
Sep 13, 2008	EAA Chapter 622 Breakfast Fly-in	Danville, IL, USA	145 miles
Sep 13-14, 2008	Blue Ash Airport Days	Cincinnati, OH	180 miles
Sep 19-20, 2008	KR Annual Gathering 2008	Mount Vernon, IL	77 miles
Sep 20, 2008	15th Annual Fall Classic Fly-In	Lebanon, TN, USA	142 miles
Sep 20-21, 2008	Airpower Over The Midwest	Scott AFB, IL	138 miles
Sep 21, 2008	EAA Chapter 1315 Fly-In Breakfast	Taylorville, IL, USA	142 miles
Sep 26-28, 2008	B-17 Rides	Cincinnati, OH	184 miles
Sep 27, 2008	Wood, Fabric, & Tailwheels Fly-In	Hanover, IN, USA	121 miles
Oct 3-5, 2008	Fifth Annual American Sonex Association Fly In	Crossville, TN, USA	199 miles
Oct 5-6, 2008	Skyfest Tennessee	Jackson, TN	182 miles
Oct 11, 2008	EAA Ultralight Chapter 91 BUG Flyin	Millville, KY, USA	153 miles
Oct 12, 2008	EAA Chapter 67 Fly-In/Drive-In BBQ	Noblesville, IN	161 miles
Oct 19, 2008	EAA Chapter 1315 Fly-In Breakfast	Taylorville, IL, USA	142 miles