2022 EAA PPC AirVenture Clinic Lesson Plan

Provide educational resources and opportunities to develop better, safer pilots.

Clinic Title: The Amateur-Built Flight Test Experience

Subtitle: Experimental Amateur-Built Aircraft

Description: This clinic is designed to provide valuable training experience for the homebuilt aircraft owner. Breakout session subjects focus on methods and tools for flight testing, engine management, data recordation and analysis, as well as flight simulation exercises that replicate common emergency situations. Participants are pilots either building E-AB aircraft, current owners, or non-builder owners of E-AB aircraft.

Clinic Objectives: An introduction to a real-life flight test task and an opportunity to learn about best practices for flight testing

Schedule:

Time	Group 1	Group 2	Group 3	Duration
1230-1300	Check-In/Lunch (with large group)			30
1300-1330	Keynote (with large group)			30
1345-1435	Simulator	Breakout A	Breakout B	50
1435-1525	Breakout A	Breakout B	Simulator	50
1525-1615	Breakout B	Simulator	Breakout A	50
1620-1700	Debrief and checkout			40

Time	Large Group
1230-1300	Lunch
1300-1330	Keynote (Dick VanGrunsven)
1330-1405	Overview of Phase 1, task-based, APP, FTM, and EFIS setup (Tom Charpentier)
1405-1425	Data Analysis (Cloud Ahoy)
1425-1435	Break
1435-1515	Flight testing an RV-14 (Steve Thorne and Dave Carrick)
1515-1540	Flight testing and being a good test pilot, emergencies, and AoA (Chris Glaeser)
1440-1555	Output of flight testing, POH, thorough testing, entering Phase II (Tom Charpentier)

About the Participants:

- Pre-registered, 72 slots
- Participants must be building E-AB aircraft, current owners, or a non-builder owner of E-AB aircraft

Handouts for Participants:

- Test card
- V_g calculation worksheet
- Breakout session slide decks
- Flight Sim briefing and Scenario Packets

Prepared by

Equipment:

- 12 Redbird LD Sims with a combination of glass and steam gauges

PPC Volunteer Qualifications:

Wings Credit:

Presenter Bios

Dick VanGrunsven is the founder and CEO of Van's Aircraft of Aurora, Oregon, which has become one of the largest kit aircraft manufacturers in the world with more than 8,500 airplanes completed worldwide. An EAA member since 1964, Dick has received EAA's Freedom of Flight Award and August Raspet Memorial Award, and is a member of the Society of Experimental Test Pilots.
Dick is also a founding member of the Aircraft Kit Manufacturers Association (AKIA), an industry group created in 2012, and an enthusiastic sailplane pilot. He lives in Hillsboro, Oregon.

Dave Forster has built three airplanes, one helicopter, and 1.5 cars. He lives on an airpark in Texas with his wife and Australian Kelpie, where he is trying to figure out what to build next and what he wants to be when he grows up.

Paul Dye has more than 40 years of aviation experience as an engineer, builder, and pilot. His scope has ranged from restoring J-3 Cubs to planning and leading manned spaceflights. His love of flying machines dates back to early childhood, and he became involved with full-sized aircraft as a teenager, rebuilding J-3 Cubs with an FBO in Minnesota. He earned his degree in aeronautical engineering with a specialization in aircraft design and flight testing from the University of Minnesota in 1982. Mr. Dye has owned a number of aircraft over the years, and is currently deeply involved in the experimental aircraft movement.

Mark Giron works at FAA headquarters as an operations inspector and amateur-built subject matter expert in Flight Standards General Aviation and Commercial Division (AFS-800). He writes policy related to amateur-built aircraft safety and training.

Keynote

Title: *The Importance of Flight Testing*

Description: Learn about the best practices for flight testing, data collection and analysis, and use of Angle of Attack

Objectives:

- Prime the students for the afternoon course

Keynote Presenter: Dick VanGrunsven

Breakout Session 1

Title: *The EAA Flight Testing Manual (FTM)*

Description: This is an introduction to the EAA FTM, including EFIS setup

Key Objectives: Introduction to the EAA FTM, brief/debrief of scenario test card

Type of Presentation: Lecture with PowerPoint

Presenter: Dave Forster

Equipment: Computer, screen

Instructor Mindset:

- Lay the foundation for the lesson by reviewing key concepts.
- Facilitate deep thinking by posing questions rather than lecturing.
- Bring your unique style, techniques, and experiences to the lesson.

Participant Mindset:

- Be engaged and interactive.
- Visualize and simulate.
- Do the mental and physical work needed to answer the questions being posed.

Breakout Session 2

Title: *Emergencies and How to Deal with Them*

Description: This session focuses on tips for being a good test pilot and dealing with emergencies and includes a discussion of the Additional Pilot Program

Key Objectives:

- Lessons learned from experienced homebuilder and test pilot
- Introduction to and use of APP from FAA representative

Type of Presentation: Lecture with PowerPoint

Presenter: Paul Dye and Mark Giron

Equipment: Computer, screen

Instructor Mindset:

- Lay the foundation for the lesson by reviewing key concepts.
- Facilitate deep thinking by posing questions rather than lecturing.
- Bring your unique style, techniques, and experiences to the lesson.

Participant Mindset:

- Be engaged and interactive.
- Visualize and simulate.
- Do the mental and physical work needed to answer the questions being posed.

Breakout Session: Flight Scenario(s)

Title(s): *E-AB Test and Emergency Procedures*

Description: Provide simulator training to develop test flying skills and data reduction using the EAA FTM and using the 12 Redbird simulators located in the new PPC building. Provide emergency training using the simulators for potential problems that might be encountered during flight testing of a new aircraft

CFI lesson(s):

- Mission Summary

Two tests from the EAA Flight Test Manual: V_G and V_Y

- Objective

Develop a rough figure for V_G and V_Y, practice test techniques, data collection, and airspeed hold.

- Instructor Notes

Before the tests, brief the participants on the test cards and include the purpose and procedures of each test. Confirm that both participants understand what they will be doing while in the simulator and answer any questions they may have before they start the simulation. Brief "if something goes wrong, fly the airplane."

Due to limitations in the simulator's flight model, we have specified a deliberately high range of speeds for both tests. Note to the pilot that under normal circumstances the pilots would continue to make repeated runs at speeds above and below the initial best run until they can confidently say what V_Y and V_g are down to the knot.

Determine which pilot will be flying the V_g test and which pilot will be flying the V_Y test.

The V_g test will be performed first. Start the simulator at an altitude of 7000' MSL and an airspeed of 90 knots in a clean configuration. Allow the pilot to work through the IAS speeds that are indicated in the chart. Once the pilot has collected data for the first speed, reset the simulator and run the tests again, repeating for all airspeeds.

After data collection, pilots will determine V_g using the ratio method outlined in the worksheet provided. Have both pilots record their V_g speed on their test cards.

The second participant will be flying the V_Y test. Start the simulator at an altitude of 5000' MSL and an airspeed of 90 knots. Allow the pilot to work through all of the target IAS listed in the chart, resetting the simulator after every run.

During one of the runs at your discretion, fail the engine while the pilot is established in the climb. Ideally, the pilot will promptly pitch for best glide using the V_g calculated in the previous test. After the failure, either return to the initial altitude or reset the scenario and continue the tests.

Did the student: (circle Yes/No)

Promptly lower the nose?	Yes	No
Pitch for V_g?	Yes	No
Avoid a stall?	Yes	No
Approximate reaction time	_____ seconds	

After data collection, pilots will determine which of the runs is closest to V_Y, which will be the run with the most altitude gained.

Ask students not to share experience with any students who have yet to fly the scenario.

Training Elements

- Multitasking (timing, data collection, airspeed and heading control)
- The experimental nature of flight testing (hypothesize expected aircraft performance, run repeated, controlled tests, evaluate data)

Common Errors

- Poor airspeed control
- Heading deviation
- Mis-timing

CFI Training Needs

- Familiarity with testing tasks
- Familiarity with limitations of sim flight model
- Ability to use sim's reposition function

Debrief

Objectives:

Key Participant Take-aways:

- The conduct and rigor of a flight test task
- Understanding of how to use the FTM
- Knowledge of the Additional Pilot Program
- Proper prep work for flight testing

Leading Questions/Group Discussion Ideas:

- What will you study or practice before flight testing
- Are there any test tasks that concern you or give you questions?
- Do you plan to use the Additional Pilot Program? Why or why not?

Presenters: TBD, from presenter group

Equipment: None

List of Resources/Reference Materials: