

LANCAIR ES (ES, SUPER-ES, AND ES-P)

# TRAINING GUIDE

VERSION 2.0



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VERSION HISTORY

Version Number	Implemented By	Revision Date	Approved By	Approval Date	Description of Change
2.0	<i>Matt Speare</i>	<i>09/04/2023</i>	<i>LOBO Board</i>	<i>&lt;mm/dd/yy&gt;</i>	<i>Revamp of dated material to include breakdown of both initial (transition) and recurrent training tasks</i>



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## 1.0 INTRODUCTION AND AIRFRAME OVERVIEW

The Lancair ES is a family of 4-seat American amateur-built aircraft that were designed by Lance Neibauer and produced by his company, Lancair of Redmond, Oregon. Derived from the award-winning, world record setting Lancair IV, the ES and Super ES were the result of nearly 10 years of research, innovation and pilot input. These aircraft have high climb rates, long endurance, slow landing speeds and premium comfort, all packaged in a very elegant, streamlined design. The custom airfoil sections used in the high performance Lancair IV were ideally suited for Lancair's ES models.

The Lancair ES was originally equipped with an IO-360, and the introduction of the TSIO-550 or IO-550 was dubbed the Super ES. Several builders created an ES-P, allowing for a pressurized cabin. The Super ES cruises at 225 mph using a 310-hp Continental IO-550 engine. The ES can easily reach 200 mph with its 210-hp Continental IO-360 engine. The climb rate (up to 2000 fpm) and takeoff distance (600 ft.) ranks high for its power and performance. Plus, fuel consumption is 10-15% less than other similarly powered engines, the result of a finely tuned induction system.

The wingspan is 35 ft 6 in (10.82 m), and the length is 25 ft (7.62 m). The approximate performance numbers (Super ES) are:

- Cruise speed: 187 kn (215 mph, 346 km/h)
- Stall speed: 61 kn (70 mph, 110 km/h)
- Never exceed speed: 235 kn (270 mph, 435 km/h)
- Range: 1,200 nm (1,400 mi, 2,300 km)
- g limits: +9/-4.5 g ultimate load
- Rate of climb: 1,700 ft/min (518 m/s)

## 1.1 BACKGROUND AND SCOPE

This document is intended for use by Certified Flight Instructors and Lancair Pilots for use in a course of instruction to train pilots in the Lancair series aircraft. The documentation for this course material is not complete without:

- LOBO Training Guide (this document)
- Aircraft Specific Pilots Operating Handbook (POH)

The material contained herein is designed to either transition a current, proficient and qualified certificated pilot into the Lancair ES Series amateur built experimental aircraft or to conduct annual recurrent training to an experienced Lancair pilot. This manual covers a variety of topics related to high performance single pilot, single engine flying, including: weather, aerodynamics, aircraft performance, physiology, navigation, and Lancair aircraft systems.

This manual does not cover every conceivable instrument or radio installation or engine or airframe modification. For example, early serial number Lancair ES Series were equipped by owner/ builders with steam gauge cockpits whereas today most are finished with EFIS cockpits. Many modifications to the basic airframe have also occurred both with builders and at the factory.

While this manual covers many technical aspects of flying the Lancair ES Series, it does not ignore the most important and most often the weakest link in airplane—the pilot. Flying is an extremely hazardous activity. The risk of flight can be managed to an acceptable level if the pilot is willing to invest the time, effort and financial resources to stay proficient. Like any other extreme sport, flying demands continuous study, training, practice and review. This is especially true of flying aircraft like the Lancair ES Series.

This Lancair initial transition flight training syllabus is based on modern FAA/Industry Training Standards (FITS) that train to proficiency utilizing scenario-based training modules as well as classic maneuver-based training. Sound aeronautical decision making, single pilot resource management and risk management is emphasized throughout this program. This training syllabus provides initial flight and ground transition training for a pilot who has no prior Lancair experience. This training prepares a proficient certificated pilot to fly the Lancair series aircraft. It does not teach basic flying skills.

This training program teaches normal as well as emergency procedures with an emphasis on sound aeronautical decision making.

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**NOTE:** *This syllabus does not teach VFR-only pilots the instrument flying skills necessary to safely fly in*



*Instrument Meteorological Conditions (IMC). VFR-only pilots are encouraged to seek appropriate instruction to earn an instrument rating.*

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## 1.2 POINTS OF CONTACT

For more information, contact:

### LANCAIR OWNERS AND BUILDERS ORGANIZATION

www.lancairowners.com  
info@lancairowners.com

## 1.3 TRAINING PREREQUISITES

The PT must hold at least a private pilot airplane single engine land certificate and have a current valid airman's medical certificate. The PT must complete all prerequisite course material before beginning the flight and ground training syllabus below. The PT will be the Pilot in Command per 14 CFR 91.3 for all flights, if qualified.

## 1.4 TRAINING GUIDE STRUCTURE

This training guide provides the task lists for the instructor and PT to utilize for both Initial (Transition) and Recurrent Training, and provides a scenario-based guide for the instructor to use to ensure that the PT exits the training with a demonstrated competence to operate the airframe safely throughout all appropriate modes of flight.

This structure uses a Learner Centered Grading methodology. **Desired Pilot in Training (PT) Scenario Outcomes-** The object of scenario-based training is a change in the thought processes, habits, and behaviors of the PT during the planning and execution of each scenario. Since the training is learner centered, success is measured in the following desired PT outcomes:

### **Maneuver, Skill or Task Grading**

- **Not Observed (NO)** - Any activity not accomplished or required.
- **Not Applicable (NA)** – Any activity which is not applicable to the airframe/systems or for which the PT is not rated.
- **Manage/Describe (MD)** – At the completion of the scenario, the PT will be able to describe the physical characteristics and cognitive elements of the

scenario activities. *Instructor assistance is required to successfully execute the maneuver.*

- **Perform (P)** - At the completion of the scenario, the PT will be able to perform the activity without assistance from the instructor. Errors and deviations will be identified and corrected by the PT in an expeditious manner. At no time will the successful completion of the activity be in doubt. "Perform" will be used to signify that the PT is satisfactorily demonstrating proficiency in piloting and systems operation skills.
- **Explain (E)** – At the completion of the scenario the PT will be able to describe the scenario activity and understand the underlying concepts, principles and procedures that comprise the activity. *Instructor assistance is required to successfully execute the maneuver.*
- **Discussed (D)** – The instructor will discuss the topic and/or demonstrate the maneuver in preparation for the PT to perform the task.

## 1.5 FITS TERMINOLOGY

In an effort to develop a common training vocabulary, below you will find several terms describing known, but perhaps not previously defined, training concepts.

**Aircraft Automation Management** – The demonstrated ability to control and navigate an aircraft by means of on-board automated systems.

**Automated Navigation Leg** – A flight of 30 minutes or more conducted between two airports in which the aircraft is controlled primarily by the autopilot and the on-board navigation systems.

**Automation Competence** – The demonstrated ability to understand and operate the automated systems installed in the aircraft.

**Automation Surprise** – An automated system's ability to provide different cues to pilots when compared to the analog systems they replace, especially in time-critical situations.

**Automation Bias** – The relative willingness of the pilot to trust and utilize automated systems.

**Candidate Assessment** – A system of critical thinking and skill evaluations designed to assess a PT's readiness to begin training at the appropriate level.

**Critical Safety Tasks/Events** – Those mission-related tasks/events that if not accomplished quickly and accurately, may result in aircraft damage, injury, or loss of life.

**Datalink Situational Awareness (SA) Systems** – Systems that provide real-time weather, traffic, terrain, and/or flight planning information to the cockpit. This information may be displayed on the Primary Flight Display (PFD), Multi-Function Display (MFD), or other related cockpit displays.



**Emergency Escape Maneuver** – A maneuver (or series of maneuvers) performed manually or with the aid of the aircraft's automated systems that allows a pilot to successfully escape from an unanticipated flight into Instrument Meteorological Conditions (IMC) or other life-threatening situation.

**FAA/Industry Training Standards (FITS)** – A non-regulatory system of training jointly developed by the FAA and training experts in the general aviation industry. Instead of training pilots to pass a practical test, FITS trains pilots to manage real-world challenges with scenario-based training. The primary goals of FITS-based training scenarios is to enhance GA pilots' aeronautical decision making, risk management, and single pilot resource management skills without compromising basic stick and rudder skills.

**Generic FITS** – These standards cover broad categories of training functions, such as flight reviews, complex/high-performance training, tail wheel training, and instructional exercises. Individual training entities (e.g. flight instructors, pilot schools) may adapt them for a particular aircraft or other scenarios.

**Mission Related Tasks** – Those tasks required for the safe and effective accomplishment of the flight.

**Multi-Function Display (MFD)** – A device that combines primarily navigation, systems, and situational awareness (SA) information onto a single electronic display.

**Primary Flight Display (PFD)** – A device that combines the primary six flight instruments plus other related navigation and situational awareness (SA) information into a single electronic display.

**Proficiency Based Qualification** – A qualification based on demonstrated performance rather than other flight time or experience.

**Pilot in Training (PT)** – The qualified pilot receiving training in a specified training program. Also referred to as "learner".

**Scenario-based Training (SBT)** – Training programs built around highly structured scripts of "real-world" experiences to address flight-training objectives in an operational environment. Such training can include initial training, transition training, upgrade training, recurrent training, and special training. The appropriate term should appear with the term "Scenario-based," e.g., "Scenario-based Transition Training," to reflect the specific application.

**Simulation** – The use of animation and/or actual representations of aircraft systems to faithfully replicate the flight environment.

**Single-Pilot Resource Management (SRM)** – The "art and science" of managing all available resources to ensure the successful outcome of the flight.

**Specific FITS** – A FITS program tailored for a specific aircraft or technology.

**Technically Advanced Aircraft (TAA)** – A general aviation aircraft that must be equipped with an electronically advanced avionics system that includes the following installed components:



- a. An electronic Primary Flight Display (PFD) that includes, at a minimum, an airspeed indicator, turn coordinator, attitude indicator, heading indicator, altimeter, and vertical speed indicator.
- b. An electronic Multifunction Display (MFD) that includes, at a minimum, a moving map using Global Positioning System (GPS) navigation with the aircraft position displayed.
- c. A two-axis autopilot integrated with the navigation and heading guidance system.
- d. The display elements described in paragraphs (a) and (b) of this section must be continuously visible.

**Training-Only Tasks** – Training maneuvers that while valuable to the pilot's ability to understand and perform a mission related task, are not required when demonstrating proficiency. Flight instructors are required to be proficient in Training-Only Tasks.

## 2.0 TRAINING REQUIREMENTS

### 2.1 GROUND TRAINING TASKS

*This section defines the topics and tasks which should be completed during the course of ground training.*

Training Element	Required Transition Tng	Required Recurrent Tng	Not Observed	Not Applicable	Manage/Decide	Performed	Explained	Discussed	Not Graded
<b>Airframe Description/Layout</b>	Y	Y							
<b>Airframe/Aircraft Operating Limitations</b>	Y	Y							
<b>Engine &amp; Propeller</b>	Y	Y							
<b>Engine Management</b>	Y	Y							
<b>Normal Procedures</b>	Y	Y							
<b>Emergency Procedures</b>	Y	Y							
<b>Automation/Avionics Management</b>	Y	Y							
<b>Radio Communication</b>	Y	Y							
<b>Hazard &amp; Risk Analysis</b>	Y	Y							
<b>Situational Awareness</b>	Y	Y							
<b>Task Management</b>	Y	Y							
<b>Checklist Use</b>	Y	Y							
<b>Personal Minimums</b>	Y	Y							
<b>Advanced Avionics Management</b>	Y	Y							
<b>High Performance Systems</b>	Y	Y							
<b>Systems Unique to this Aircraft</b>	Y	Y							
<b>Instrumentation Unique to this Aircraft</b>	Y	Y							

<b>Performance &amp; Limitations</b>	Y	Y							
<b>Weight &amp; Balance for this Aircraft</b>	Y	Y							
<b>IFR Operations</b>	Y	Y							
<b>Weather &amp; Night Experience Minimums</b>	Y	Y							
<b>Backup Systems on this Aircraft</b>	Y	Y							
<b>Emergency Procedures/Operations</b>	Y	Y							
<b>Emergency Descent/Forced Landing</b>	Y	Y							
<b>Lancair Accident Statistics Review</b>	Y	N							
<b>Experimental Amateur-Built Aircraft Issues</b>	Y	N							
<b>Airworthiness Inspections &amp; Certification</b>	Y	N							
<b>Airworthiness of Experimental Aircraft</b>	Y	N							
<b>Controlled Flight into Terrain (CFIT)</b>	Y	N							
<b>Loss of Control</b>	Y	N							
<b>Time in Type</b>	Y	N							
<b>Single-Pilot Resource Management</b>	Y	N							
<b>Aeronautical Decision Making</b>	Y	N							
<b>Risk Management</b>	Y	Y							
<b>High Altitude Operations (ESP)</b>	Y	N							

## 2.2 FLIGHT TRAINING TASKS

*This section defines the topics and tasks which should be completed during the course of flight training.*

<b>Training Element</b>	<b>Required Transition Tng</b>	<b>Required Recurrent Tng</b>	<b>Not Observed</b>	<b>Not Applicable</b>	<b>Manage/Decide</b>	<b>Performed</b>	<b>Explained</b>	<b>Discussed</b>	<b>Not Graded</b>
<b>Checklist Use</b>	Y	Y							
<b>Preflight</b>	Y	Y							
<b>Performance &amp; Limitations</b>	Y	Y							
<b>Hazard &amp; Risk Analysis</b>	Y	Y							
<b>Situational Awareness</b>	Y	Y							
<b>Aeronautical Decision Making</b>	Y	Y							
<b>Automation/Avionics Management</b>	Y	Y							
<b>Radio Communication</b>	Y	Y							
<b>Engine Start</b>	Y	Y							
<b>Before Taxi</b>	Y	Y							

<b>Taxi</b>	Y	Y							
<b>Before Takeoff</b>	Y	Y							
<b>Rejected Takeoff</b>	Y	Y							
<b>Normal/Crosswind Takeoff</b>	Y	Y							
<b>No-Flap Takeoff</b>	Y	Y							
<b>Climb</b>	Y	Y							
<b>Initial Cruise</b>	Y	Y							
<b>Enroute Cruise</b>	Y	Y							
<b>GPS Navigation</b>	Y	Y							
<b>EFIS/Autopilot Operation</b>	Y	Y							
<b>EFIS/PFD/AHARS Malfunction</b>	Y	Y							
<b>Partial Panel</b>	Y	Y							
<b>Unusual Attitude Recovery</b>	Y	Y							
<b>Descent Planning/Arrival Procedures</b>	Y	Y							
<b>Traffic Pattern</b>	Y	N							
<b>Normal/Crosswind Landing</b>	Y	N							
<b>TAWS Escape Maneuver</b>	Y	N							
<b>Go Around</b>	Y	N							
<b>After Landing</b>	Y	N							
<b>Shutdown</b>	Y	N							
<b>Post Flight Critique &amp; Discussion</b>	Y	N							
<b>Electrical/Landing Gear Malfunction</b>	Y	N							
<b>Engine Failure/Power Off Landing</b>	Y	N							
<b>Emergency Landing</b>	Y	N							
<b>High Altitude Operations (ESP)</b>	Y	N							
<b>Loss of Pressurization/Emergency Decent</b>	Y	N							

## 2.3 PERSONAL MINIMUMS

14 CFR 61 comprise FAA regulations concerning airmen training, certification, and currency. Part 91 concerns general flight operation rules. While these rules comprise the core of today's aeronautical standards, they are the absolute floor in many situations regarding safety of flight.

A review of accident statistics shows the majority of serious and fatal accidents occur while a pilot new to Lancair aircraft accumulates their first 100 hours in type. Prudence dictates limiting exposure to high-risk operations during this time.



LOBO offers the following matrix to help the PT develop appropriate personal minimums. Pilots with more flight time and/or professional experience may wish to use this matrix as a starting point to develop their own for use while flying Lancair aircraft. Pilots with less overall experience and/or no professional flying experience should adhere to the personal minimums recommended here, or adopt more conservative ones.

**NOTE:** Night and IFR flight **not recommended** for pilots with less than 100 hours of time in type.

QUALIFICATION	DAY		NIGHT	
	TIME IN TYPE (hours)			
	Less than 100	More than 100	Less than 100	More than 100
<b>VMC</b>				
VFR-ONLY (Not-IFR Rated) or IFR RATED -- not proficient	Minimum 3000' Ceiling & 5 SM Visibility		Not Recommended	Minimum 5000' Ceiling & 10 SM Visibility
<b>IMC</b>				
IFR RATED & PROFICIENT	Not Recommended	Minimum 500' Ceiling & 1 SM Visibility	Not Recommended	Minimum 600' Ceiling & 1 SM Visibility
IFR RATED & PROFICIENT CAT 1 MINS (within 60 days)	Not Recommended	Minimum 200' Ceiling & ½ SM Visibility	Not Recommended	Minimum 400' Ceiling & ¾ SM Visibility
<b>NOTE: FILE IFR ANYTIME WEATHER IS BELOW 3000'/5 SM</b>				
TIME IN TYPE (hours)	<b>MAXIMUM WIND</b>			
Less than 25	20 KNOTS SUSTAINED AND/OR 10 KNOT CROSSWIND		20 KNOTS TOTAL SUSTAINED AND/OR 10 KNOT CROSSWIND	
From 25 – 100	25 KNOTS SUSTAINED AND/OR 15 KNOT CROSSWIND		25 KNOTS SUSTAINED AND/OR 15 KNOT CROSSWIND	
More than 100	35 KNOTS SUSTAINED AND/OR 20 KNOT CROSSWIND OR MAX DEMONSTRATED <u>WHICHEVER IS LESS</u>		35 KNOTS SUSTAINED AND/OR 20 KNOT CROSSWIND OR MAX DEMONSTRATED <u>WHICHEVER IS LESS</u>	
<b>FLIGHT INTO KNOWN ICING PROHIBITED</b>				

## 3.0 INSTRUCTIONAL METHODS

### 3.1 RECOMMENDED SEQUENCE OF TRAINING SESSIONS

The purpose of the recommended sequence of scenario-based training outlined in the subsequent sections is to establish a baseline of safe operations and then build more complex tasks upon the baseline.



## 3.2 GROUND AND FLIGHT SESSION OUTLINES – TRANSITION (INITIAL) TRAINING

### Lesson G1 – Ground (approximately 4.0 hours)

#### Text Reference

- Lancair Training Manual
- Airplane Flight Manual
- FAR/AIM
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- The Aviation Instructor's Handbook (FAA-H-8083-9, as amended)
- Certification and Operation of Amateur-Built Aircraft AC 20-27, as amended
- Aerodynamics For Naval Aviators (NAVIAR 00-80T-80)

#### Lesson Objectives

This is an opportunity to discuss, examine, and learn about the systems in your Lancair. You will complete the lesson with a detailed understanding of all systems and also the checklist you intend to use for flight.

#### Training Elements

<i>Training Program</i>	<i>Normal Procedures</i>	<i>Emergency Procedures/ Flight Safety</i>	<i>High-Perf. Systems(if installed)</i>
FITS & SBT ADM, Risk Mgmt, SRM Systems Airframe Description Fuel Electrical Flight Controls Landing Gear Flaps Speed Brakes Hydraulic Wheel & Brakes Avionics Pitot Static Propeller Engine Pressurization & Air Conditioning (if installed)	Checklist Usage Preflight Taxi Before Takeoff Takeoff Climb Cruise Descent Before Landing After Landing Chocks	Engine Failure/Forced Landings Fires Icing T/O & Landing EP's Brake Failure Electrical Single-pilot Resource Management Aeronautical Decision Making Risk Management	Turbo Engine Operation Turbine Engine Operation Autopilot Operation Pressurization & Air Conditioning

## Lesson F1 – Flight (approximately 1.5- 2.0 Hours)

### Reference

- Lancair Flight Training Manual
- Airplane Flight Manual
- FAR/AIM
- Airplane Flying Handbook (FAA-H-8083-3, as amended)

### Lesson Objectives

The student pilot will observe and practice normal procedures in the Lancair. The instructor will start, taxi, takeoff, and fly to the airspace as a demonstration before transferring aircraft control to the student once in the practice area. The student will run the checklist to keep them engaged in the flow of normal procedures. This is the instructor’s opportunity to describe Lancair specific control inputs (starting with maximum right rudder deflection on takeoff) and systems to manage (like cylinder head temperatures on departure), then demonstrate the maneuvers (like noticing the extreme pitch sensitivity at cruise speeds) before transferring control.

### Training Elements

Single-pilot Resource Management Aeronautical Decision Making Risk Management Checklist Use Operation of Airplane Systems Determining Performance & Limitations Emergency Procedures Ground Operations Engine Starting and warm-up Taxiing: Normal & Crosswind Normal Takeoff	Climb Engine Operations/Monitoring/Cooling Steep Turns Slow Flight Straight and Level Turns Descents Straight and Turning Straight & Turning Stall Recognition/Recovery Traffic Pattern Procedures Normal Landing After Landing Procedures Stall Recognition
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### Scenario

After a long break in flying you need to go re-gain proficiency in your Lancair. You choose a forgiving day and focus on basic aircraft handling.

### Completion Standards

At the completion of this lesson the PT can perform the listed ground & flight operations with a minimum of instructor assistance. The PT will demonstrate knowledge of the power, attitude, and configuration (PAC) necessary to perform the listed maneuvers and procedures while maintaining altitude within the 200 feet, heading within 15 degrees and airspeed within 10 knots. The PT will learn how to manage the aircraft using sound ADM skills.



## Lesson G2 – Ground (approximately 2.0- 2.5 hours)

### Reference Text

- Airplane Flight Manual
- Lancair Training Syllabus
- Instrument Flying Handbook (FAA-H-8083-15, as amended)

### Lesson Objective

The PT will gain a fundamental understanding of the flight and engine instruments with emphasis on their use and limitations. The instructor will enhance the PT's understanding of the practical use of advanced avionics, the practical application of aircraft performance, weight and balance computation and aircraft limitations. Additionally, the instructor will familiarize the PT with experimental/amateur- built aircraft issues with emphasis on the value and necessity of proper aircraft inspections.

### Training Elements

<i>Experimental/Amateur-built Aircraft</i>	<i>Aircraft Performance</i>	<i>Advanced Avionics</i>
Condition Inspection Repairman Maintenance Issues Flight Tests Aircraft inspections	Weight and Balance Performance Factors Performance Charts Aircraft Limitations V <sub>n</sub> Diagram	GPS Understanding & Use EFIS, AHARS & ADHARS Autopilot Use

### Completion Standards

The PT demonstrates a working knowledge of aircraft avionics, instruments, systems and their limitations. The PT demonstrates an understanding of weight and balance calculations, aircraft limitations and performance. Additionally, the PT will demonstrate understanding of experimental/amateur-built aircraft issues.

## Lesson F2—Flight (approximately 1.5- 2.0 hours)

### **Text Reference**

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)

### **Lesson Objectives**

During this lesson the student will build on normal procedures and practice emergency procedures. Some students will be ready to move on to instrument flying after this lesson, but most of us will require additional practice. The Airman Certification Standards for private pilots will be used to determine competency. Additionally, the PT will learn the power, attitude, and configurations required for the performance of the listed maneuvers and procedures. The PT will demonstrate how to conduct the necessary preflight activities. The flight will originate at a local field and proceed via day VMC, cross-country flight to a nearby non-towered airport (approximately 50-80 nm / 30-45 minutes leg length). The PT will complete all start, taxi, takeoff and departure, cruise, arrival and landing checklists as well as utilize advanced GPS navigation skills. The instructor will review practical use of EFIS (if installed) and/or autopilot (if installed). The instrument-rated PT will complete an instrument approach and full-stop landing at destination #1. The non-instrument-rated PT will complete a VFR arrival to a full-stop landing. The PT will depart destination #1 and proceed to destination #2 using the above procedures. Repeat to point of origin.

### **Training Elements**

Single-pilot Resource Management Risk Management Systems Operation  Determining Performance & Limitations Performance Maneuvers Ground Operations Engine Start & Warm-up  Taxiing: Normal and Crosswind Takeoff  Climb, V <sub>x</sub> , V <sub>y</sub> Engine Operation/Monitoring/Cooling Oil Pressure/Temp Out of Limits Cruise Climb EFIS/Autopilot Operation (if installed)	Cruise Alternator Failure Total Electrical Failure Landing Gear Malfunctions/Emergency Gear Extension Descent & Descent Planning Approach (instrument-rated pilots) Turbulent air penetration (V <sub>a</sub> ) After Landing Procedures  Normal Landings No-flap Takeoff Go Around/Rejected Landing Rejected Takeoff Emergency 180° Turn
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## **Scenario**

As the proud owner and operator of a high performing aircraft you will maintain higher levels of proficiency than your peers in more forgiving aircraft. With higher proficiency your will maintain a higher safety margin. This is your opportunity to practice in a controlled environment.

## Lesson G3 – Ground approximately 1.5- 2.0 hours

### **Text Reference**

- Airplane Flight Manual
- Lancair Training Syllabus
- Lancair Aircraft Accident Review
- Aeronautical Decision Making AC 60-22, as amended
- FAR/AIM

### LESSON OBJECTIVES

At the end of the lesson the PT will have gained a fundamental understanding of Lancair accident statistics and the hazard of improper risk assessment. Additionally, the instructor will introduce single- pilot resource management concepts including practical risk management and aeronautical decision making.

### TRAINING ELEMENTS

<b><i>Accident Statistics</i></b>	<b><i>Single-pilot Resource Management</i></b>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Weather (Thunderstorms, icing, IMC)</li> <li><input type="checkbox"/> Controlled Flight into Terrain (CFIT)</li> <li><input type="checkbox"/> Loss of Control</li> <li><input type="checkbox"/> Maneuvering Flight</li> <li><input type="checkbox"/> Time in Type</li> <li><input type="checkbox"/> Airworthiness</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Aeronautical Decision Making</li> <li><input type="checkbox"/> Risk Management</li> </ul>

### **Completion Standards**

The PT will demonstrate knowledge of the Lancair accident history and causes, and single-pilot resource management including aeronautical decision making and risk management strategies.

## Lesson F3 – Flight (approximately 1.5 -2.0 hours)

### Text Reference

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)

### LESSON OBJECTIVE

The PT will review VFR maneuvers and normal procedures in the aircraft. The lesson will introduce and practice Lancair emergency procedures. The flight will originate at a local field proceeding via day VMC, cross-country flight to a nearby airport (approximately 50- 80 nm away). The PT will complete all start, taxi, takeoff and departure, cruise, arrival and landing checklists as well as utilize advanced GPS navigation skills including complex flight plan routing, departure and arrival procedures. EFIS skills will be reviewed (if equipped). Autopilot functions will be practiced (if equipped). A simulated en route emergency will require diversion. The instrument-rated PT will make an approach and full stop landing at destination #1. The non instrument rated pilot will make a VFR arrival and landing. The PT will depart destination #1 and proceed to destination #2 using the above procedures. A second enroute emergency will develop requiring a demonstration of degraded aircraft systems operation. Repeat to point of origin.

### TRAINING ELEMENTS

<i><b>SRM</b></i>	<i><b>Operations</b></i>	<i><b>Emergency Procedures</b></i>	<i><b>Arrival Procedures</b></i>
<input type="checkbox"/> Risk Management <input type="checkbox"/> Aeronautical Decision Making	<input type="checkbox"/> Autopilot Use <input type="checkbox"/> Normal/Crosswind Takeoff <input type="checkbox"/> Normal/Crosswind Landing	<input type="checkbox"/> Loss of Cabin Pressure/ Smoke in Cockpit <input type="checkbox"/> Engine Failure—Takeoff <input type="checkbox"/> Recovery from Unusual Attitudes <input type="checkbox"/> Cabin/Wing Fires <input type="checkbox"/> Engine Fire <input type="checkbox"/> Propeller Governor Malfunction <input type="checkbox"/> Engine Out Landing <input type="checkbox"/> Vacuum Failure <input type="checkbox"/> Autopilot Malfunctions	<input type="checkbox"/> Visual/Instrument Approaches <input type="checkbox"/> Power & Speed Mgmt <input type="checkbox"/> Basic VFR Procedures <input type="checkbox"/> Communication Procedures

## Training Scenario

You are flying to a neighboring manufacturing facility to meet with the company – a potential customer for your patented *tagnite* metal coating process. But, you must first pick up a division manager from the company at a nearby airport. He will ride with you to the neighboring manufacturing facility. Once at the facility, the CEO will meet you at the airport. Obviously, you wish to impress your passenger and the CEO with your professionalism – both in the air, and on the ground.

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### COMPLETION STANDARDS

At the completion of this flight lesson the PT will demonstrate the skill commensurate with the certificate held while using sound judgment in operation of the aircraft. The PT will apply the appropriate PAC in accomplishing all flight maneuvers while maintaining altitude within 100 feet, airspeed within 10 knots and heading within 10 degrees. The PT should complete all emergency procedures with limited assistance from the instructor.

## Lesson F3(I) – Flight (approximately 1.5 -2.0 hours)

### **Text Reference**

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Instrument Flying Handbook (FAA-H-8083-15, as amended)
- Instrument Procedures Handbook (FAA-H-8261-1, as amended)

### **Lesson Objective**

The instrument-rated PT will review and practice the principles of attitude instrument flying and how to correlate the flight instruments to maintain precise aircraft control. The instrument-rated PT will review and practice use of advanced avionics within complicated airspace/ATC environment. The instrument-rated PT will review and practice ILS, GPS (including LPV), VOR instrument approaches, holds and demonstrate radial tracking. The flight will originate at a local field and proceed via day IFR cross-country flight to a nearby non towered airport with an instrument approach (approximately 50-80 nm away). The PT will complete all start, taxi, takeoff and departure, cruise arrival and landing checklists as well as utilize basic IFR GPS navigation skills. IFR EFIS skills will be emphasized (if equipped). Autopilot functions will be reviewed and practiced (if equipped). An instrument approach and full stop landing will be made at destination #1. The PT will depart destination #1 and proceed to destination #2 using the above procedures. Repeat to point of origin.

### **Training Elements**

Single-pilot Resource Management Risk Management/Aeronautical Decision Making Instrument preflight Departure checklist Normal takeoff into IMC Climbs Clearance Adherence Straight and Level EFIS/Autopilot usage (if installed) Turns (Level) Electrical Failure	Descents & Descent Planning Partial Panel Holding TAWS Escape Maneuver IMC Emergency Landing Precision Approach Non-precision Approach GPS Approaches Missed Approach Circling Approach Advanced Avionics
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## ***Training Scenario***

Your planned cross country crosses several areas of marginal VFR and IFR conditions. You develop a robust plan to safely manage the weather to include identifying areas of prevailing VMC, sensible divert options, and studying your intended approaches.

## ***Completion Standards***

The instrument-rated PT will demonstrate an understanding of power, attitude and configuration control by reference to the flight and power instruments while maintaining altitude within 100 feet, airspeed within 10 knots, and heading within 5 degrees.

## **Lesson F4(I) – Flight (approximately 1.5 -2.0 hours)**

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### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Instrument Flying Handbook (FAA-H-8083-15, as amended)
- Instrument Procedures Handbook (FAA-H-8261-1, as amended)

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**Note:** *Non-instrument-rated PTs will complete lesson **F4V** (see page 31) instead of **F4I**.*

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### LESSON OBJECTIVE

The instrument-rated PT will review and practice the principles of attitude instrument flying and how to correlate the flight instruments to maintain precise aircraft control. The instrument-rated PT will review and practice use of advanced avionics within complicated airspace/ATC environment. The instrument-rated PT will review and practice ILS, GPS (including LPV), VOR instrument approaches, holds and demonstrate radial tracking. The flight will originate at a local field and proceed via day IFR cross-country flight to a nearby non towered airport with an instrument approach (approximately 50-80 nm away). The PT will complete all start, taxi, takeoff and departure, cruise arrival and landing checklists as well as utilize basic IFR GPS navigation skills. IFR EFIS skills will be emphasized (if equipped). Autopilot functions will be reviewed and practiced (if equipped). An instrument approach and full stop landing will be made at destination #1. The PT will depart destination #1 and proceed to destination #2 using the above procedures. Repeat to point of origin.

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## TRAINING ELEMENTS

<ul style="list-style-type: none"> <li><input type="checkbox"/> Single-pilot Resource Management</li> <li><input type="checkbox"/> Risk Management/Aeronautical Decision Making</li> <li><input type="checkbox"/> Instrument preflight</li> <li><input type="checkbox"/> Departure checklist</li> <li><input type="checkbox"/> Normal takeoff into IMC</li> <li><input type="checkbox"/> Climbs</li> <li><input type="checkbox"/> Clearance Adherence</li> <li><input type="checkbox"/> Straight and Level</li> <li><input type="checkbox"/> EFIS/Autopilot usage (if installed)</li> <li><input type="checkbox"/> Turns (Level)</li> <li><input type="checkbox"/> Electrical Failure</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Descents &amp; Descent Planning</li> <li><input type="checkbox"/> Partial Panel</li> <li><input type="checkbox"/> Holding</li> <li><input type="checkbox"/> TAWS Escape Maneuver</li> <li><input type="checkbox"/> IMC Emergency Landing</li> <li><input type="checkbox"/> Precision Approach</li> <li><input type="checkbox"/> Non-precision Approach</li> <li><input type="checkbox"/> GPS Approaches</li> <li><input type="checkbox"/> Missed Approach</li> <li><input type="checkbox"/> Circling Approach</li> <li><input type="checkbox"/> Advanced Avionics</li> </ul>
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### ***Training Scenario***

It is homecoming weekend at Tippacanoe U., your alma mater and you and your two fraternity buddies are going to the big game. Kick off is at 1 pm so don't be late. Even though the forecast calls for rain you are still a go since you have that coveted instrument rating. If you can't get a hotel room you three are planning on returning after dinner at the old frat house.

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## COMPLETION STANDARDS

The instrument-rated PT will demonstrate an understanding of power, attitude and configuration control by reference to the flight and power instruments while maintaining altitude within 100 feet, airspeed within 10 knots, and heading within 5 degrees.

## **Lesson F4V – Flight (approximately 1.5 -2.0 hours)**

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### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Aeronautical Information Manual )

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### LESSON OBJECTIVE

The non-instrument-rated PT will review and practice the principles of flying and how to correlate the flight instruments to maintain precise aircraft control. The non-instrument-rated PT will review and practice use of advanced avionics within complicated airspace/ATC environment. The non-instrument-rated PT will review and practice VFR cross-country skills including pilotage, dead-reckoning, VOR and GPS navigation. The flight will originate at a local field and proceed via day VFR cross-country flight to a nearby non towered airport (approximately 50-80 nm away). The PT will complete all start, taxi, takeoff and departure, cruise arrival and landing checklists as well as utilize basic VFR GPS navigation skills. VFR EFIS skills will be emphasized (if equipped). Autopilot functions will be reviewed and practiced (if equipped). A visual pattern entry and full stop landing will be made at destination #1. The PT will depart destination #1 and proceed to destination #2 using the above procedures. Repeat to point of origin.

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### TRAINING ELEMENTS

<ul style="list-style-type: none"> <li><input type="checkbox"/> Single-pilot Resource Management</li> <li><input type="checkbox"/> Risk Management/Aeronautical Decision Making</li> <li><input type="checkbox"/> Checklist</li> <li><input type="checkbox"/> Normal takeoff</li> <li><input type="checkbox"/> Climbs</li> <li><input type="checkbox"/> Cruise</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> EFIS/Autopilot Use (if installed)</li> <li><input type="checkbox"/> VFR Navigation</li> <li><input type="checkbox"/> Electrical Failure</li> <li><input type="checkbox"/> Descents &amp; Descent Planning</li> <li><input type="checkbox"/> Inadvertent IMC Recovery</li> <li><input type="checkbox"/> Advanced Avionics</li> <li><input type="checkbox"/> GPS Navigation</li> <li><input type="checkbox"/> VOR Navigation</li> </ul>
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### ***Training Scenario***

It is homecoming weekend at Tippacanoe U., your alma mater and you and your two fraternity buddies are going to the big game. Kick off is at 1 pm so don't be late. Even though the forecast calls for rain you are still a go. If you can't get a hotel room you three are planning on returning after dinner at the old frat house.

---

## COMPLETION STANDARDS

The non-instrument-rated PT will demonstrate an understanding of power, attitude and configuration control by reference to the flight and power instruments while maintaining altitude within 100 feet, airspeed within 10 knots, and heading within 5 degrees.

## **Lesson F5I – Flight (approximately 1.5 -2.0 hours)**

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### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Instrument Flying Handbook (FAA-H-8083-15, as amended)
- Instrument Procedures Handbook (FAA-H-8261-1, as amended)

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**Note:** *Non-instrument-rated PTs will complete lesson **F5V** (see page 39) instead of **F5I**.*

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### LESSON OBJECTIVE

The instrument-rated PT will plan and execute an instrument cross-country (100-200 nm in distance) flight to an agreed upon destination above FL180 (if turbocharged and pressurized or O2 equipped). En route the PT will practice a loss of cabin pressurization (if equipped) and perform an emergency descent terminating in an approach to a missed and a hold followed by another approach. The PT will emphasize weather evaluation and risk management. The elements learned in the previous flights will be practiced as part of a FITS scenario planned and executed by the instrument-rated PT.

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TRAINING ELEMENTS

<ul style="list-style-type: none"> <li><input type="checkbox"/> Weight &amp; Balance</li> <li><input type="checkbox"/> TOLD Planning</li> <li><input type="checkbox"/> File Flight Plan</li> <li><input type="checkbox"/> Instrument Preflight</li> <li><input type="checkbox"/> Departure Procedure</li> <li><input type="checkbox"/> High-altitude En route Navigation/Communication</li> <li><input type="checkbox"/> Fuel Calculation/Reserve Planning/Diversion</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Arrival Procedure &amp; Descent Planning</li> <li><input type="checkbox"/> Holding</li> <li><input type="checkbox"/> Precision or Non-precision Approach</li> <li><input type="checkbox"/> Loss of Pressurization/Emergency Descent</li> <li><input type="checkbox"/> Normal Takeoff &amp; Landing</li> </ul>
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**Training Scenario**

You promised your spouse that you would take the family to the grandparents for the holidays. The weather outside is frightful.

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COMPLETION STANDARDS

The instrument-rated PT demonstrates skill commensurate with the certificate(s) held and sound judgment in operation of the aircraft while maintaining altitude within 100 feet, heading within 5 degrees and airspeed to within 5 knots. The PT performs all emergency procedures such that a successful outcome is never seriously in doubt. The PT will adhere to checklist use at all times. All instrument approaches are performed to instrument rating practical test standards. The PT will demonstrate a mastery of IFR single-pilot proficiency.

## **Lesson F5V – Flight (approximately 1.5 -2.0 hours)**

### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)

### LESSON OBJECTIVE

The non-instrument-rated PT will plan and execute a 100-200 nm VFR cross-country flight to an agreed upon destination at 14,500-17,500' MSL (if O2 equipped and/or pressurized). Enroute the PT will practice a loss of cabin pressurization (if equipped) followed by an emergency descent. The PT will emphasize proper weather evaluation and risk management. The PT will practice elements learned on previous flights as part of a FITS scenario planned by the non-instrument-rated PT.

### TRAINING ELEMENTS

<ul style="list-style-type: none"> <li><input type="checkbox"/> Weight &amp; balance</li> <li><input type="checkbox"/> TOLD planning</li> <li><input type="checkbox"/> File Flight Plan</li> <li><input type="checkbox"/> Preflight</li> <li><input type="checkbox"/> VFR Departure Procedure</li> <li><input type="checkbox"/> High-altitude En route Navigation/Communication</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Fuel Calculation/Reserve planning/Diversion</li> <li><input type="checkbox"/> Arrival Procedure &amp; Descent Planning</li> <li><input type="checkbox"/> VFR Approach</li> <li><input type="checkbox"/> Loss of Pressurization/Emergency Descent</li> <li><input type="checkbox"/> Normal takeoff and landing</li> </ul>
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### ***Training Scenario***

You promised your family you would go to the grandparents for the holidays. Its not the best time of year for flying, but your spouse really enjoys time with the family. Will all those presents fit in the baggage area?

### COMPLETION STANDARDS

The non-instrument-rated PT demonstrates skill commensurate with the certificate(s) held and sound judgment in operation of the aircraft while maintaining altitude within 100 feet, heading within 5 degrees and airspeed within 5 knots. The PT performs emergency procedures such that the successful outcome is never seriously in doubt. The PT adheres to checklist use at all times while demonstrating a mastery of VFR single-pilot proficiency in the Lancair aircraft.

## Lesson F6I – Flight (approximately 1.5 -2.0 hours)

### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Instrument Flying Handbook (FAA-H-8083-15, as amended)
- Instrument Procedures Handbook (FAA-H-8261-1, as amended)

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**Note:** *Non-instrument-rated PTs will complete lesson **F6V** (see page 47) instead of **F6I**.*

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### LESSON OBJECTIVE

The instrument-rated PT will plan and execute a return instrument cross-country flight to airport of origin for flight F5I. Enroute the PT will practice selected emergency procedures.

### TRAINING ELEMENTS

<ul style="list-style-type: none"> <li><input type="checkbox"/> Weight &amp; Balance</li> <li><input type="checkbox"/> Flight &amp; Weather Planning</li> <li><input type="checkbox"/> File Flight Plan</li> <li><input type="checkbox"/> TOLD Planning</li> <li><input type="checkbox"/> Instrument Preflight</li> <li><input type="checkbox"/> Departure Procedure</li> <li><input type="checkbox"/> En route Navigation/Communication</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Fuel calculations/ reserve planning/ diversion</li> <li><input type="checkbox"/> Arrival Procedure &amp; Descent Planning</li> <li><input type="checkbox"/> Holding</li> <li><input type="checkbox"/> Precision or Non-precision Approach (GPS, VOR)</li> <li><input type="checkbox"/> Selected Emergency</li> <li><input type="checkbox"/> Normal Takeoff &amp; Landing</li> </ul>
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### **Training Scenario**

You just finished building the aircraft and really want to journey to Oshkosh for Airventure. The trip is long but the reward is the admiration your friends and fellow Lancair pilots will show when they see this beauty on the line. You are hoping the judges agree.

### COMPLETION STANDARDS





The instrument-rated PT demonstrates skill commensurate with the certificate(s) held and sound judgment in operation of the aircraft while maintaining altitude within 100 feet, heading within 5 degrees and airspeed within 5 knots. The PT performs all emergency procedures such that the successful outcome is never seriously in doubt. The PT adheres to checklist use at all times. Instrument approaches are performed to instrument rating standards while the PT demonstrates a mastery of IFR single-pilot proficiency.

## **Lesson F6V – Flight (approximately 1.5 -2.0 hours)**

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### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)

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### LESSON OBJECTIVE

The non-instrument-rated PT will plan and execute a VFR cross-country flight. The PT will practice selected emergency procedures en route. The PT will practice elements learned from all previous flights as part of a FITS scenario planned and executed by the PT.

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### TRAINING ELEMENTS

<ul style="list-style-type: none"><li><input type="checkbox"/> Weight &amp; Balance</li><li><input type="checkbox"/> Flight &amp; Weather Planning</li><li><input type="checkbox"/> File Flight Plan</li><li><input type="checkbox"/> TOLD Planning</li><li><input type="checkbox"/> Preflight</li><li><input type="checkbox"/> Departure Procedure</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> En route Navigation/Communication</li><li><input type="checkbox"/> Fuel Calculation/Reserve planning/Diversion</li><li><input type="checkbox"/> Arrival &amp; Descent Planning</li><li><input type="checkbox"/> VFR Approach</li><li><input type="checkbox"/> Selected Emergency</li><li><input type="checkbox"/> Normal Takeoff &amp; Landing</li></ul>
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### ***Training Scenario***

You just finished building the aircraft and really want to journey to Oshkosh for Airventure. The trip is long but the reward is the admiration your friends and fellow Lancair pilots will show when they see this beauty on the line. You are hoping the judges agree.

---

### COMPLETION STANDARDS

The non-instrument-rated PT demonstrates skill commensurate with the certificate(s) held and sound judgment in operation of the aircraft while maintaining altitude within 100 feet, heading within 5 degrees and airspeed within 5 knots. The PT performs emergency procedures such that the successful outcome is never seriously in doubt. The PT adheres to checklist use at all times while demonstrating a mastery of VFR single-pilot proficiency in the Lancair aircraft.

## 3.2 GROUND AND FLIGHT SESSION OUTLINES – RECURRENT TRAINING

### Lesson RG1 – ground (approximately 4.0 hours)

#### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- FAR/AIM
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Certification and Operation of Amateur-Built Aircraft AC 20-27E, as amended
- The Aviation Instructor's Handbook (FAA-H-8083-9, as amended)
- Aerodynamics For Naval Aviators (NAVAIR 00-80T-80)

#### LESSON OBJECTIVES

During this ground training session the PT and instructor will review sound aeronautical decision making, risk management and single pilot resource management. Further discussion will include emphasis on aircraft systems, weight & balance computation, situational awareness, performance issues, and the unique handling qualities of Lancair aircraft as they pertain to operations and limitations unique to experimental amateur built aircraft. All discussion topics will include implications for both normal and emergency operations.

#### TRAINING ELEMENTS

<b><i>Systems</i></b>	<b><i>Normal Procedures</i></b>	<b><i>Emer Procedures/ Flight Safety</i></b>	<b><i>High-Perf Systems</i></b>
<input type="checkbox"/> Airframe Description <input type="checkbox"/> Fuel <input type="checkbox"/> Electrical <input type="checkbox"/> Flight Controls <input type="checkbox"/> Landing Gear <input type="checkbox"/> Flaps <input type="checkbox"/> Speed Brakes <input type="checkbox"/> Hydraulic <input type="checkbox"/> Wheel & Brakes <input type="checkbox"/> Avionics <input type="checkbox"/> Pitot Static <input type="checkbox"/> Propeller <input type="checkbox"/> Engine	<input type="checkbox"/> Checklist Use <input type="checkbox"/> Preflight <input type="checkbox"/> Taxi <input type="checkbox"/> Before Takeoff <input type="checkbox"/> Takeoff <input type="checkbox"/> Climb <input type="checkbox"/> Cruise <input type="checkbox"/> Descent <input type="checkbox"/> Before Landing <input type="checkbox"/> After Landing <input type="checkbox"/> Chocks	<input type="checkbox"/> Engine Failure/ Forced Landings <input type="checkbox"/> Fires <input type="checkbox"/> Icing <input type="checkbox"/> T/O & Landing EP's <input type="checkbox"/> Brake Failure <input type="checkbox"/> Electrical <input type="checkbox"/> Single-pilot Resource Management <input type="checkbox"/> Aeronautical Decision Making <input type="checkbox"/> Risk Management	<input type="checkbox"/> Turbo-Engine Operation <input type="checkbox"/> Autopilot Operation <input type="checkbox"/> Pressurization & Air- Conditioning

<i>Experimental Aircraft</i>	<i>Performance</i>	<i>Weather</i>	<i>GPS</i>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Condition Inspection</li> <li><input type="checkbox"/> Repairman Certificate</li> <li><input type="checkbox"/> Maintenance Issues</li> <li><input type="checkbox"/> Flight Tests</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Weight and Balance</li> <li><input type="checkbox"/> Performance Factors</li> <li><input type="checkbox"/> Performance Charts</li> <li><input type="checkbox"/> Aircraft Limitations</li> <li><input type="checkbox"/> V<sub>n</sub> Diagram</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Icing</li> <li><input type="checkbox"/> Thunderstorms</li> <li><input type="checkbox"/> Data Link Weather</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> RAIM, RNP, WAAS Approaches</li> </ul>

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#### COMPLETION STANDARDS

The PT will demonstrate a fundamental understanding of aircraft operation, systems, description and operation of the constant-speed propeller, engine cooling, weight & balance and aircraft limitations and performance. Additionally, the PT will demonstrate understanding of experimental amateur built aircraft issues.

## Lesson RF1 – Flight (approximately 2.0- 2.5 hours)

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### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)

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### LESSON OBJECTIVES

During the lesson the PT will enhance their understanding of the Lancair through review of the power, attitude, and configuration (PAC) required to perform the listed maneuvers and procedures. The mission will originate at a local field and proceed via day VMC cross-country flight to a nearby airport (approximately 50 nm away). The PT will complete all start, taxi, takeoff and departure, cruise, arrival and landing checklists as well as utilize advanced GPS navigation skills. EFIS and autopilot operation will be reviewed (if equipped). The PT will make a full-stop landing at the first destination. The second leg will mirror the flight profile of the first leg with the PT accomplishing any maneuvers requiring further practice. Additionally, the instructor will introduce a simulated emergency situation requiring a diversion. The PT will review and accomplish emergency landing procedures at one or more of the destination airports during the mission. The instructor will use the return flight to the point of origin to further practice maneuvers or procedures requiring additional training.

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### TRAINING ELEMENTS

- |  |  |
|--|--|
| <input type="checkbox"/> Operation of airplane systems                 | <input type="checkbox"/> Abnormal and Emergency Procedure Demo & practice (selected) |
| <input type="checkbox"/> Determining Performance and Limitations       | <input type="checkbox"/> Full/Partial In-Flight Engine Failure                       |
| <input type="checkbox"/> Performance Maneuvers                         | <input type="checkbox"/> Loss of Cabin Pressure                                      |
| <input type="checkbox"/> Ground Operations                             | <input type="checkbox"/> Engine Failure After Takeoff                                |
| <input type="checkbox"/> Engine Start & Warm-up                        | <input type="checkbox"/> Recovery from unusual attitudes                             |
| <input type="checkbox"/> Taxiing: Normal & Crosswind                   | <input type="checkbox"/> Cabin/Wing Fires  |
| <input type="checkbox"/> Takeoff                                       | <input type="checkbox"/> Engine Fire   |
| <input type="checkbox"/> Climb – $V_x$ , $V_y$                         | <input type="checkbox"/> Landing Gear Malfunction/Emergency Gear   Extension         |
| <input type="checkbox"/> Engine Operations/Monitoring/Cooling          | <input type="checkbox"/> Oil Pressure/Temp Out of Limits                             |
| <input type="checkbox"/> Cruise Climb                                  | <input type="checkbox"/> Propeller Governor Malfunction                              |
| <input type="checkbox"/> Straight & Level Turns                        | <input type="checkbox"/> Engine-Out Landing Procedures                               |
| <input type="checkbox"/> Steep Turns                                   | <input type="checkbox"/> Alternator Failure  |
| <input type="checkbox"/> Slow Flight                                   | <input type="checkbox"/> Total Electrical Failure                                    |
| <input type="checkbox"/> Straight & Turning Stall Recognition/Recovery | <input type="checkbox"/> Vacuum Failure  |
| <input type="checkbox"/> Descents & Descent Planning                   | <input type="checkbox"/> Autopilot Malfunctions                                      |
| <input type="checkbox"/> After Landing Procedures                      | <input type="checkbox"/> No-Flap Take Off  |
| <input type="checkbox"/> Normal Landings                               | <input type="checkbox"/> Flight at Slow Airspeeds (high AOA)                         |
| <input type="checkbox"/> Emergency Landing                             | <input type="checkbox"/> Go Around/Rejected landing                                  |
|  | <input type="checkbox"/> Rejected Takeoff  |
|  | <input type="checkbox"/> Emergency 180° Turn   |

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## TRAINING SCENARIO

You have a friend who is also a pilot. He is considering the purchase of an airplane. The friend has less flight experience than you, so he asks you to conduct an airplane performance flight and give him a recommendation. In order to help your friend make the best decision you will really have to put the airplane through its paces – exploring some specific areas of flight performance in particular. The areas you have special interest in are: slow flight characteristics, stall recognition, and takeoff and landing performance. You get started when the current owner of the airplane allows you to take the airplane for a “test drive.”

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**NOTE:** *Due to the experimental, amateur-built nature of the Lancair, stall characteristics – and more importantly stall recovery techniques – have not been determined for each and every Lancair. Therefore, **at no time will the instructor or PT intentionally stall the aircraft!***

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## INSTRUCTOR NOTES

Lesson RF1 is planned as a three-leg cross-country flight incorporating traditional maneuver-based training demonstrating and practicing PTS maneuvers including slow flight, steep turns, stall recognition and takeoffs and landings. The Lancair pilot should be given a thorough review of the aircraft takeoff and landing characteristics.

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## COMPLETION STANDARDS

The PT shall demonstrate knowledge and skill commensurate with the certificate(s) held, and sound judgment in operation of the aircraft. At a minimum, the PT should maintain heading within 5 degrees, altitude to within 100 feet, and airspeed to within 5 knots. The PT will perform all Emergency procedures such that the successful outcome is never seriously in doubt. The PT must use checklists at all times. The PT must demonstrate proficiency in single-pilot operation of the aircraft and installed systems.

## **Lesson RFI2 – Flight (approximately 2.0- 2.5 hours)**

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### TEXT REFERENCE

- Lancair Training Manual
- Airplane Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Instrument Flying Handbook (FAA-H-8083-15, as amended)
- Instrument Procedures Handbook (FAA-H-8261-1, as amended)

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### LESSON OBJECTIVE

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*NOTE: This training flight is aimed specifically at the instrument-rated PT. VFR-only pilots will complete lesson RFV2 (described in the next section).*

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The PT will review and practice the principles of attitude instrument flying and the correlation of flight instruments to maintaining precise aircraft control during a three-leg cross country flight. The PT will review and practice use of advanced avionics within the airspace/ATC environment. The PT will review and practice ILS, GPS and VOR instrument approaches, holds and demonstrate radial tracking. The flight will originate at a local field and proceed via day or night IFR cross-country flight to a nearby airport (approximately 50-80 nm away). The PT will complete all start, taxi, takeoff and departure, cruise, arrival and landing checklists, as well as utilize advanced GPS navigation skills. EFIS and autopilot operation will be reviewed (if installed). The PT will accomplish a full-stop landing at the first destination. The second and third legs will mirror the flight profile of the first leg with the PT accomplishing any maneuvers requiring further practice.



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## LESSON CONTENT

<ul style="list-style-type: none"> <li><input type="checkbox"/> Instrument Preflight</li> <li><input type="checkbox"/> Normal Takeoff into IMC</li> <li><input type="checkbox"/> Climbs</li> <li><input type="checkbox"/> Straight &amp; Level</li> <li><input type="checkbox"/> Turns (Level)</li> <li><input type="checkbox"/> Descents &amp; Descent planning</li> <li><input type="checkbox"/> Steep Turns</li> <li><input type="checkbox"/> Standard Rate Turns</li> <li><input type="checkbox"/> Partial Panel</li> <li><input type="checkbox"/> Holding</li> <li><input type="checkbox"/> IMC Emergency Landing</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Constant Airspeed Descents</li> <li><input type="checkbox"/> Constant Rate Descents</li> <li><input type="checkbox"/> Constant Airspeed Climbs</li> <li><input type="checkbox"/> Constant Rate Climbs</li> <li><input type="checkbox"/> Precision Approach</li> <li><input type="checkbox"/> Non-Precision Approach</li> <li><input type="checkbox"/> GPS Approaches</li> <li><input type="checkbox"/> Missed Approach</li> <li><input type="checkbox"/> Circling Approach</li> <li><input type="checkbox"/> Advanced Avionics</li> </ul>
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## TRAINING SCENARIO

It is homecoming weekend at Tippacano U., your alma mater. You and two fraternity buddies are going to the big game. Kick off is at 1 pm so don't be late. Even though the forecast calls for rain you are still a go since you have that coveted instrument rating. If you can't get a hotel room you three are planning on returning after dinner at the old frat house.

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## INSTRUCTOR NOTES

Lesson RF12 is a scenario-based, three-leg short cross-country flown under simulated IMC conditions. The PT will program a GPS course to another airport allowing 20 to 30 minutes enroute. Following a normal takeoff and departure the PT should navigate to the destination at a median altitude. If installed, the PT should program and use the autopilot and GPS for all phases of flight including the climb and level off, autopilot/GPS-coupled navigation and a GPS approach at the destination. The PT will execute a missed approach to a hold to prepare for another instrument approach of the instructor's choosing. The second approach should terminate with a full-stop landing. The second leg will mirror the flight profile of the first with the instructor adding a simulated TAWS warning on approach requiring the PT to perform an appropriate escape maneuver. The third leg (a return to the originating airport) will mirror the first two legs with the instructor adding an AHARS failure (if installed).

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## COMPLETION STANDARDS

The PT will demonstrate an understanding of PAC flight management and aircraft control by reference to the flight and power instruments. The PT should maintain altitude within 100 feet, airspeed within 10 knots, and heading within 5 degrees. The PT will perform all Emergency Procedures such that the successful outcome is never seriously in doubt. The PT must use checklists at all times. The PT must demonstrate proficiency in single-pilot IFR operation of the aircraft and installed systems.

## Lesson RFV2 – Flight (approximately 2.0- 2.5 hours)

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### TEXT REFERENCE

- Lancair Training Manual
- Aircraft Flight Manual
- Airplane Flying Handbook (FAA-H-8083-3, as amended)
- Instrument Flying Handbook (FAA-H-8083-15, as amended)
- Instrument Procedures Handbook (FAA-H-8261-1, as amended)

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### LESSON OBJECTIVE

*NOTE: This training flight is aimed specifically at the VFR PT.*

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The PT will review and practice the principles of VFR cross country flying and the correlation of flight instruments to maintaining precise aircraft control during a three-leg cross country flight. The PT will review and practice use of advanced avionics within the airspace/ATC environment utilizing ATC flight following where available. The PT will review and practice visual, GPS and VOR navigation and demonstrate radial tracking. The flight will originate at a local field and proceed via day or night VFR cross-country flight to a nearby airport (approximately 50-80 nm away). The PT will complete all start, taxi, takeoff and departure, cruise, arrival and landing checklists, as well as utilize advanced GPS navigation skills. EFIS and autopilot operation will be performed (if installed). The PT will accomplish a full-stop landing at the first destination. The second and third legs will mirror the flight profile of the first leg with the PT accomplishing any maneuvers requiring further practice.

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### LESSON CONTENT

<ul style="list-style-type: none"> <li><input type="checkbox"/> Preflight</li> <li><input type="checkbox"/> Normal Takeoff</li> <li><input type="checkbox"/> Climbs</li> <li><input type="checkbox"/> Straight &amp; Level</li> <li><input type="checkbox"/> Turns (Level)</li> <li><input type="checkbox"/> Descents &amp; Descent planning</li> <li><input type="checkbox"/> Steep Turns</li> <li><input type="checkbox"/> Emergency Landing</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Constant Airspeed Descents</li> <li><input type="checkbox"/> Constant Rate Descents</li> <li><input type="checkbox"/> Constant Airspeed Climbs</li> <li><input type="checkbox"/> Constant Rate Climbs</li> <li><input type="checkbox"/> Advanced Avionics</li> <li><input type="checkbox"/> VOR Navigation</li> <li><input type="checkbox"/> GPS Navigation</li> </ul>
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## TRAINING SCENARIO

It is homecoming weekend at Tippacano U., your alma mater. You and two fraternity buddies are going to the big game. Kick off is at 1 pm so don't be late. Even though the forecast calls for rain, the weather is VFR, so you are still a go. If you can't get a hotel room you three are planning on returning after dinner at the old frat house.

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## INSTRUCTOR NOTES

Lesson RFV2 is a scenario-based, three-leg short cross-country flown under VMC conditions. The PT will program a GPS course to another airport allowing 20 to 30 minutes enroute. Following a normal takeoff and departure the PT should navigate to the destination at a median altitude. If installed, the PT shall program and use the autopilot and GPS for all phases of flight after takeoff including the climb and level off, autopilot/GPS-coupled navigation and a VFR pattern entry at the destination. Abnormal and emergency procedures will be practiced including an electrical system malfunction. The second leg will mirror the flight profile of the first with the instructor adding a simulated TAWS warning on approach requiring the PT to perform an appropriate escape maneuver. The third leg (a return to the originating airport) will mirror the first two legs with the instructor adding an AHARS failure (if installed).

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## COMPLETION STANDARDS

The PT will demonstrate an understanding of PAC flight management and aircraft control by reference to the flight and power instruments. The PT should maintain altitude within 100 feet, airspeed within 10 knots, and heading within 5 degrees. The PT will perform all Emergency Procedures such that the successful outcome is never seriously in doubt. The PT must use checklists at all times. The PT must demonstrate proficiency in single-pilot operation of the aircraft and installed



## 4.0 TRAINING RESOURCES

### 4.1 COURSE ADMINISTRATION

The Lancair Training guides are produced and maintained by the Director of Training for the Lancair Owners and Builders Organization (LOBO).

### 4.2 QUALIFIED INSTRUCTORS

The Lancair Owners and Builders Organization maintains a current list of qualified and endorsed Lancair instructors in its website (<https://www.lancairowners.com/find-an-instructor>). These instructors offer Lancair-specific Transition and Recurrent training and have agreed to use the FITS-approved training materials.

### 4.3 PROVEN SAFETY RECORD

On a periodic basis, the Lancair Owners and Builders Organization (LOBO) will conduct a review of the accident statistics for Lancair owner/pilots who have been trained by LOBO instructors utilizing this training guide. The latest study was published in 2022 based upon data from 2009 thru 2021.

After the data was compiled, it was sent to a third-party expert to review and validate the results. The review found no significant errors, and a summary of this data was drafted for presentation to the insurance industry and LOBO Membership.

The study confirmed three significant things:

There was a significantly lower accident rate within the LOBO-trained pilot pool, and an even more significantly lower accident rate when analyzing those pilots undertaking recurrent training.

The accidents that were recorded within the LOBO-trained pilot pool were nearly all mechanical failures. None of the resulting accidents caused major injury to pilot or passengers. This finding contrasted significantly to the serious and sometimes fatal injuries found within the general Lancair pilot group that experienced the same types of mechanical failures.

The overall Lancair group of pilots experienced more than 130 fatalities during the period of this study (2009 through 2021), with total fatalities exceeding 200 over the 33-year history of Lancair aircraft. There was not a single fatal accident within the LOBO-trained pilot group. This finding includes all pilots that completed any type of LOBO training, whether they undertook recurrent training or not.

It was evident the vetting of highly-qualified flight instructors with model-specific experience and ensuring their trainees “check every box” of the syllabus before a completion certificate was earned has had a very positive effect on the accident AND fatality record of Lancair pilots. We



hope this data will help in providing affordable insurance (or in some cases, available insurance) to owners who are committed to serious training. We are actively taking this information to the insurance brokers and underwriters.

## 6.0 SUPPLEMENTAL INFORMATION

The Lancair ES family of aircraft are fun and rewarding to fly, and one of the finest experimental airplanes ever produced. The airplane is simple to fly, has incredible range and useful load, easy to maintain, and with the fixed gear is affordable to insure.

It is a wonderful cross-country airplane the ability to truly seat four and take their luggage on long distant flights. It is quite capable in moderate IFR conditions.

With the above considerations in mind the pre-requisites for training are complex and varied. Thousands of hours in jet aircraft are not necessarily useful. An ideal Lancair ES owner would have

- 100's of hours in complex aircraft
- General aviation experience within the last year
- Commercial pilot license