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NBAA

# NBAA TRAINING GUIDELINES: SINGLE-PILOT OPERATIONS OF VERY LIGHT JETS AND TECHNICALLY AVANCED AIRCRAFT

# NBAA Training Guidelines: Single-Pilot Operations of Very Light Jets and Technically Avanced Aircraft

*(Version 2.0, January 2020)*

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# 1. Introduction

This document provides the National Business Aviation Association-recommended training guidelines for the next generation of very light jets (VLJ). For the purpose of this document, very light jets are jet aircraft weighing 10,000 pounds or less (a distinction from the traditional definition of large aircraft as more than 12,500 pounds, and light aircraft as 12,500 pounds or less) and certificated for single pilot operations. These aircraft will possess at least some of the following features: (1) advanced cockpit automation such as moving map GPS and multi-function displays; (2) automated engine and systems management; and (3) integrated autoflight, autopilot and flight-guidance systems. This document offers a training outline that represents the minimum curriculum necessary to satisfy a VLJ transition-training program.

These training guidelines do not mandate how VLJ training is to be implemented. Though the guidelines were developed with a simulator-based training program in mind, each training provider must best determine the most effective and efficient methods to meet the objectives in this document. All elements presented must be addressed in a training program for VLJs

### 1.1. BACKGROUND

The introduction of VLJs into the general aviation community marked the beginning of a new era in personal and business air travel. Applying what the industry has learned from the past, an extraordinary training process has been developed to ensure an orderly and safe transition for those who become owners or operators of this new generation of aircraft.

Traditionally, training has been conducted with the objective of passing the necessary Airmen Certification Standards (ACS), previously the Practical Test Standards (PTS), without regard to obtaining proficiency. With the advent of next generation very light jet aircraft, potential candidates have and will come from varied levels of experience ranging from the relatively inexperienced to the veteran professional aviator. It is imperative that all candidates successfully completing VLJ training demonstrate a level of proficiency and operational knowledge beyond that required to merely "pass the checkride." As a result, the concept of a mentor pilot is an integral part of the guidance contained within this document. Operators of very light jets must utilize the resources of a mentor pilot program until such time that they have acquired the necessary skills and proficiency for safe operation in all flight regimes.

Part of the challenge in developing these guidelines is defining what should be taught and how proficiency should be measured. To address this need, the NBAA Safety Committee formed a VLJ Working Group to formulate training guidelines. These guidelines have subsequently been revised to incorporate the learnings associated with ten years of operational experience with VLJ aircraft, and as a result of an NTSB recommendation to NBAA following the agency's investigation of a single-pilot business aviation accident in Gaithersburg, MD.

In order to establish the necessary curriculum and criteria, input was received and reviewed from the following in order to ensure completeness:

- NBAA Safety Committee
- FAA/industry
- Training standards
- Embraer
- Honda Aircraft Company
- One Aviation, formerly Eclipse Aviation
- Textron Aviation, formerly Cessna Aircraft Company
- Insurance underwriters
- Training providers

The final product reflects a compilation of identified areas of greatest risk associated with transitioning into VLJs, and how best to mitigate these risks with an appropriate training curriculum.

Very light jets will continue to be a dynamic force in the aviation community with the potential for hundreds more being delivered over the next decade. Safety is paramount and all stakeholders agree that training must be thorough and properly conducted in order to maintain the exemplary safety record of the industry and to ensure the viability of the product. It is with this in mind that these guidelines are offered.

## 1.2. SCOPE

This document is applicable to training programs designed for VLJs. It is recognized, however, that many of these elements will overlap and apply to current single-pilot operations in any complex aircraft.

Industry-accepted terminology, abbreviations and acronyms have been used throughout. Realizing that aircraft manufacturers may use different acronyms, abbreviations or trade names to describe certain components, it may be desirable to substitute the manufacturer's terminology in specific curricula.

## 1.3. PREREQUISITE KNOWLEDGE/CERTIFICATION

These guidelines assume the following prerequisite certification:

- Private pilot license
- Multi-engine rating, as necessary
- Instrument rating

In addition, preferred prerequisite knowledge, skill and experience in the following areas:

- Basic autoflight procedures
- Basic flight management system (FMS) procedures
- Weather radar
- High-performance aircraft endorsement
- High-altitude endorsement
- Advanced avionics checkout, commonly found in Technically Advanced Aircraft
- At least 50 hours in a high-performance, advanced avionics airframe for a more successful process

Information relating to automated flight decks, both training and operations, is available in the following publication: NBAA Automated Flight Deck Training Guidelines (PDF).

However, any knowledge and skill deficiency will be determined in Section 3.1 of this document, Initial Candidate Evaluation. Any deficiencies identified must be mitigated prior to Section 3.3 (Manufacturer's Training).

## 1.4. DEFINITIONS

**Aeronautical Decision-Making**
Decision-making in the aviation environment. It is a systematic approach to the mental process used by pilots to consistently determine the best course of action in response to a given set of circumstances.

**Aircraft Automation Management**
The demonstrated ability to control and navigate an aircraft by means of the automated systems installed in the aircraft.

**Airman Certification Standards**
Federal Aviation Administration documents designed to communicate the aeronautical knowledge, risk management, and flight proficiency standards for a given certificate or rating specific to an aircraft category and class.

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

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

**Candidate Evaluation**
A system of critical thinking and skill evaluations designed to assess a training candidate's readiness to begin training at the required level.

**Critical Safety Tasks/Event**
Mission-related tasks/events that, if not accomplished quickly and accurately, may result in damage to the aircraft or loss of life.

**Data Link Situational Awareness Systems**
Systems that feed real-time information to the cockpit on weather, traffic, terrain and flight planning. This information may be displayed on the primary flight display (PFD), multi-function display (MFD) or on other related cockpit displays.

**Large Aircraft**
Aircraft weighing more than 12,500 pounds maximum certificated takeoff weight.

**Light Aircraft**
Aircraft of 12,500 pounds or less maximum certificated takeoff weight.

**Mission Related Tasks**
Tasks required for the safe and effective accomplishment of the mission(s) that the aircraft is capable of and required to conduct.

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

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

**Operating Cycle**
One complete flight consisting of takeoff, climb, cruise, descent, approach and landing.

**Procedural Non-Compliance (PNC)**
Inadvertent or deliberate deviation from published or standard operating procedures.

**Proficiency Based Qualification**
Aviation task qualification based on demonstrated performance rather than flight time or experience.

**Scenario Based Training (SBT)**
A training system that uses a highly structured script of real-world experiences to address flight training objectives in an operational environment. 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.

**Single Pilot Resource Management (SRM)**
The process of managing resources available to the single pilot. These would include the pilot's resource of preflight planning, personal knowledge, materials and personnel onboard the aircraft, and additional resources beyond the cockpit.

**Technically Advanced Aircraft (TAA)**
A GA aircraft that combines some or all of the following design features: advanced cockpit automation system (moving map GPS/glass cockpit) for IFR/VFR flight operations, automated engine and systems management, and integrated auto flight/autopilot systems.

**Very Light Jet**
Jet aircraft weighing 10,000 pounds or less maximum certificated takeoff weight and certificated for single pilot operations. These aircraft will possess at least some of the following features: (1) advanced cockpit automation, such as moving map GPS and multi-function displays; (2) automated engine and systems management; and (3) integrated autoflight, autopilot and flight-guidance systems.

## 1.5. ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACARS | Aircraft Communications Addressing and Reporting System |
| ACS | Airman Certification Standards |
| ADM | Aeronautical Decision-Making |
| ADS-B | Automatic Dependent Surveillance – Broadcast |
| AFIS | (1) Airborne Flight Information System<br>(2) Automatic Flight Information System |
| ALAR | Approach and Landing Accident Reduction |
| ATC | Air Traffic Control |
| CAT | Clear Air Turbulence |
| CFIT | Controlled Flight Into Terrain |
| CRM | Crew Resource Management |
| CTAF | Common Traffic Advisory Frequency |
| EFIS | Electronic Flight Instrument System |
| EGPWS | Enhanced Ground Proximity Warning System |
| FBO | Fixed Base Operator |
| FGS | Flight Guidance System |
| FIS | Flight Information System |
| FITS | FAA/Industry Training Standards |
| FMA | Flight Mode Annunciator |
| FMS | Flight Management System |
| GPS | Global Positioning System |
| IOE | Initial Operating Experience |
| IRS | Inertial Reference System |
| LAHSO | Land and Hold Short |

| | |
|---|---|
| LOFT | Line Oriented Flight Training |
| MSL | Mean Sea Level |
| PIC | Pilot in Command |
| PNC | Procedural Noncompliance |
| Radar | Radio Detecting and Ranging |
| SBT | (1) Scenario Based Training<br>(2) Simulator Based Training |
| SIC | Second in Command |
| SOP | Standard Operating Procedure |
| SRM | Single Pilot Resource Management |
| TCAS | Traffic Collision Avoidance System |
| VLJ | Very Light Jet |
| VOR | Very High Frequency Omnidirectional Radio Range |

# 2. Areas of Greatest Risk

This document provides the National Business Aviation Association-recommended training guidelines for the next generation of very light jets (VLJ). For the purpose of this document, very light jets are jet aircraft weighing 10,000 pounds or less (a distinction from the traditional definition of large aircraft as more than 12,500 pounds, and light aircraft as 12,500 pounds or less) and certificated for single pilot operations. These aircraft will possess at least some of the following features: (1) advanced cockpit automation such as moving map GPS and multi-function displays; (2) automated engine and systems management; and (3) integrated autoflight, autopilot and flight-guidance systems. This document offers a training outline that represents the minimum curriculum necessary to satisfy a VLJ transition-training program.

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- Wake turbulence encounters
  - At altitude and in the traffic pattern
  - In-trail spacing and profile adjustments
  - Best recovery configuration
- Convective weather encounters
  - Preflight weather analysis
  - Alternate route identification
  - Contract flight planning and/or dispatch interaction
  - Circumnavigation fuel capability
- Microburst/windshear encounters
  - Area entrance rules or philosophy
  - Preflight weather analysis
  - Condition definition
  - Best recovery methods
  - Alternate airport identification
  - Alternate fuel capability
- Clear air turbulence/jet stream core or boundary encounters
  - Preflight weather analysis
  - Contract flight planning and/or dispatch interaction
  - Aircraft configuration in various levels of turbulence
  - Lower/higher altitude cruise capability
  - Fuel burn impact
- High-altitude upset
  - Performance capability
  - Coffin corner education
  - Recovery methods from low-speed/high-speed stalls
  - Straight/swept wing aerodynamics, as appropriate
- Mountain wave encounters

  - Thrust and speed adjustments
  - Preflight weather analysis
  - Inadequate knowledge of high-altitude weather
  - Winds aloft millibar charts
  - Tropopause levels
  - K index and lifted index chart
  - CAT forecasts
  - Icing levels
  - Severe weather charts
- Physiological effect of high-altitude operations
  - Altitude chamber or nitrogen simulator training
  - Personal health issues
  - Medication interaction
- Jet blast damage behind larger jets during ground operations
  - Proper spacing on taxiways
  - Advise/educate ATC
  - Close proximity operations in icing conditions
- Low-fuel arrivals trying to stretch range
  - Cruise chart education
  - Identification of maximum range and maximum endurance speeds
  - Identification of suitable intermediate airports
  - Altitude selection to reduce fuel consumption
- Incorrect/less-than-optimum cruise altitude selection
  - Contract flight planning and/or dispatch interaction
  - Cruise chart education
  - Wind/altitude trade capability
  - Rule-of-thumb or toolkit approach to altitude/range/fuel burn predictions
- Inadequate preparation for high-rate/high-speed climbs
  - Course/altitude overshoots
  - Excessive airspeed below 10,000 MSL or below Class B airspace
  - High deck angles and reduced traffic vigilance
  - Thrust-controlled vertical rate
  - Toolkit approach to thrust/speed/rate control
- Inadequate crosswind takeoff/landing preparation
  - Speed adjustments for steady and gust components
  - Roll and pitch airframe limits
  - Flap selection criteria
  - Maximum crosswind and gust limits
  - Crosswind landing techniques
- Inadequate "land and hold short" (LAHSO) preparation
  - Minimum pattern size and programmed drag profile
  - Advise/educate ATC
- VLJs misunderstood by ATC (pilot mitigations)
  - High speed in terminal airspace
  - High speed to final approach fix
  - Lack of respect for single pilot operation and associated workload
  - Improper spacing behind heavier traffic
  - Unreasonable requests for configuration or climb/descent performance
  - Single pilot adherence to checklists
  - Overcoming old habits
  - Patterns of discipline not developed
  - Complacency resulting from simplicity of VLJs
  - Degradation of systems knowledge
  - Risks of non-compliance with SOPs
- FMS programming and autoflight vs. manual flight control
  - Reluctance to abandon autoflight/reluctance to use autoflight
  - Inadequate FMS and/or autoflight skills
  - Inadequate manual flight skills
  - Raw data/manual flight and FMS/autoflight training
- Inadequate exercise of "command"
  - Inclusion of captain development training in program
  - Inclusion of CRM/SRM training in program
  - Inclusion of LOFT or scenario-based training in program
  - Inclusion of judgment contrast debriefings in program
  - Inclusion of command modeling in program
- Recognizing single pilot "red flags" (as an alternative to below)
  - **POPE**, which stands for:
    **P**sychological (overload, inexperience, emotional)
    **O**perational (aircraft-mechanical, weather, fuel, performance)
    **P**hysiological (fatigue, medical, pharmaceutical)
    **E**nvironmental (time, external pressure, business)
  - Procedural non-compliance (PNC)
- Lack of pilot self-evaluations
  - Use of available tools/personal minimums checklist
  - **PAVE**, which stands for:
    **P**ilot
    **A**ircraft
    En**V**ironment
    **E**xternal pressure
- Winter operations
  - Airframe contamination effects, prevention and resolution
  - Aircraft performance implications of de- and anti-icing systems
  - Airport contamination (takeoff + landing)
  - Decision making
- Takeoff/Landing Performance Implications
  - Contaminated runways
  - Rejected takeoff
  - Unstable approach and landing
- VLJ transition from transport category aircraft
  - Flying characteristic differences between large transport category aircraft and VLJ aircraft
  - Pilot norms used to operate large transport category aircraft could result in takeoff and landing incidents

# 3. Component Training Requirements

## 3.1. INITIAL CANDIDATE EVALUATION

VLJs appeal to a wide variety of pilots and operators — from highly experienced aviators to those relatively new to the industry. A critical consideration in the candidate evaluation process must be the availability of insurance and satisfying underwriting requirements. A candidate can invest significantly in both the planning and acquisition of a VLJ, but without the early input of the insurance underwriting community, he or she may find they are uninsurable when it comes time to take delivery of the aircraft.

Insurance underwriters have been keenly interested in the development of VLJs and have taken a proactive role in learning about the capabilities of these aircraft and the various markets for which they are intended. However, in spite of aircraft technology advances, unprecedented emphasis on proper training, and the concept of mentor pilots, the nature of aviation underwriting still does not lend itself to formulating universally accepted minimum candidate credential and experience levels for VLJ operations. There simply are too many variables to consider and any minimum guidelines may be outdated by the time they are published due to the dynamic nature of aviation underwriting.

Each candidate therefore must engage the insurance community early in the purchase process with the goal of finding mutually agreeable terms and conditions for transitioning into the VLJ. These NBAA training guidelines are designed to provide a common denominator for the candidate, underwriter and manufacturer to collaboratively tailor a training course for each candidate, based upon that candidate's unique background, experience and intended operations. The training course will need to be for a specific aircraft type, panel layout and installed equipment.

Before enlisting in a very light jet training course, the candidate should have an initial evaluation to determine proficiency in a number of areas. Elements of a flight skill assessment include but are not limited to:

- Practical inflight exam to test instrument skills and airmanship
- Oral exam to evaluate judgment skills
- Written exam to determine aeronautical knowledge

At the completion of a course, a PIC applicant must be able to pass ATP Standards. Therefore, performance on the oral and practical assessments prior to commencing training should be commensurate with an ability to meet or exceed Airline Transport Pilot Airman Certification Standards for the tasks assessed for an aircraft from which the candidate is transitioning, or for a suitable aircraft relative to the aircraft into which the candidate is transitioning. If deficiencies are detected, the manufacturer or training provider should arrange supplemental flight training to bring candidates up to the necessary flight skills level. The manufacturer should oversee this arrangement; however, the candidate may have the option of obtaining the supplemental flight training elsewhere provided a reassessment is undertaken.

In addition, the evaluation is to be used to determine those candidates most likely to succeed in the training program based upon experience and knowledge, recency of experience, background and type of experience.

## 3.2. PRE-TRAINING STUDY PACKAGE

Prior to arriving at a training facility, the candidate should become familiar with not only the specific aircraft on which they will train, but also all aspects of the new regime of flight they are about to undertake and ways in which they can operate safety. A pre-training study package is recommended to cover the following subject areas:

- Manufacturer's welcome to turbine-powered flight
  - New horizons
  - New challenges
  - New responsibilities
- Manufacturer's history and corporate mission
- Aircraft specifications and mission capability
  - Range
  - Useful load
  - Runway required
  - Single-engine performance
  - Comparison to cabin-class turbopropsThe meaning of pilot-in-command
  - Master of your fate
  - Knowledge is power
  - Nobody's perfect
  - Learning never ends
  - Achieve immortality – set a good example
  - Becoming a captain
- Professional aviator attitudes
  - Safety
  - Conservatism
  - Discipline
  - Currency
  - Responsibility
  - Decisions
  - Fitness for duty & fatigue
  - Security

- Armchair flight
  - Phase of flight review
  - Typical mission demonstration
- FAR Parts 91 and 91 Subpart K (plus FAR Part 135 differences)
- Airspace – Definition and usage
- Instrument procedures review
- High-altitude physiology
- High-altitude aerodynamics
  - Overspeeds
  - Underspeeds
  - Coffin corner
  - Wing loading
  - Straight wing vs. swept wing
- Characteristics of high-speed aircraft
- Operations in the high-speed regime
- The VLJ and the ATC system
- Flight planning resources
- Weight and balance computations
- Takeoff and landing performance charts
- Pinch hitter and passenger briefing plans (define role for pinch hitter)
- Communication
  - CTAF
  - Unicom
  - FBO
- Introduction of tool kits
  - Fly/No Fly (Personal health including fatigue, weather, time constraints)
  - Go/No Go (Rejected takeoff decision, balanced field length awareness)
  - Self-dispatching (Personal minimums checklist)
  - Dealing with emergencies and abnormalities
  - Performance (Contaminated runways)
  - Briefings – self (Departure, approach)
  - Weather:
    a) Visibility
    b) Wind
    c) Turbulence
    d) Icing
    e) Convective activity
    f) Clutter
- Elements of a diversion
- Aircraft systems overview
- Radar/Weather datalink basics
- Autoflight systems introduction
  - FMS
  - FGS
  - FMA
  - EFIS
  - AFIS/ACARS
  - Navigation sources (IRS/GPS/VOR)
  - TCAS
  - EGPWS
- Standard operational procedure overview
- CRM/SRM elements
  - Traditional
  - Single pilot differences
- Advanced maneuvers
  - Upset recovery
  - Noise-abatement procedure
  - Slam-dunk arrivals
- Windshear elements – avoidance and recovery
- Wake turbulence – recognition and avoidance
- Meteorology for jets
- Mountain flying
- RVSM
- Maintenance
  - Minimum equipment list
  - Deferrals
  - Placards
  - Logbooks
  - Documentation
  - International issues
- Accident/Safety training
  - Statistical review
  - Case studies
  - ALAR Tool Kit/CFIT Checklist
  - Threat/Error management
- Runway incursion risks and airport signage
- ATC phraseology
- Collision avoidance
  - ADS-B
  - FIS
- VLJ transition from large transport category aircraft
  - Handling and performance differences
  - Crosswind limitations
- Review of airman certification standard
- Practical test expectations

### 3.2.1. COCKPIT RESOURCE MANAGEMENT/SINGLE PILOT RESOURCE MANAGEMENT

Cockpit resource management (CRM) principles apply to the PIC of a personal jet or any other single-pilot certified aircraft. This is called single-pilot resource management (SRM) when applied to these types of operations. Pilots of these aircraft should be trained in, understand and apply CRM/SRM principles because accident/incident data has shown that CRM/SRM enhances the safety and efficiency of single-pilot operations. Pilots, dispatchers, maintenance personnel and safety-related personnel should receive CRM/SRM training on an initial and recurrent basis in the following areas:

- CRM/SRM Elements
  - Communication
  - Decision making
  - Situational awareness
  - Workload management
  - Resource management
- CRM/SRM Scenario-Based Training using an advanced aviation training device or flight simulation training device
  - Domestic flight operations
  - International flight operations
  - Normal procedures
  - Emergency and abnormal procedures
- Personality Grid Training
  - Personal management style recognition
  - Identification of personality extremes
  - Movement motivation toward norm
- CRM/SRM Toolkits
  - Decision making model
  - Workload management model
  - Flight safety model
  - Self-briefing mechanisms
  - Personal limits model
- Threat and Error Management
  - Red flags of overload
  - Red flags of weather encounters
  - Red flags of inexperience
  - Red flags of temporal pressure
  - Red flags of mission focus
  - Reversing adversity
- Automation Management
  - Autoflight vs. manual flight philosophy
  - Flight management systems
  - EFIS displays and symbology
  - Autopilot modes
  - Flight mode annunciations
  - Flight guidance systems

Information on CRM/SRM can be found in:

- FAA Advisory Circular 120-51E, Crew Resource Management Training
- ICAO Circular Human Factors Digest No. 2, Flight Crew Training: Cockpit Resource Management (CRM) and Line Oriented Flight Training (LOFT)
- FAA/Industry Training Standards (FITS) Single Pilot Resource Management Guide
- Ashgate Publishing (www.ashgate.com) for Aviation Psychology and CRM Publications

*A CRM/SRM Pre- and Post-Training Program is recommended to contain the following:*

| CRM/SRM TRAINING GUIDELINES | PRE-COURSE TRAINING | POST-COURSE/LOFT |
|---|---|---|
| **CRM/SRM ROLE Single Pilot Operations** | 1. CRM/SRM and safety<br>2. Professionalism<br>3. SOPs<br>4. Pilot-in-command<br>5. Precious cargo<br>6. Hostile environment | 1. Threat/Error management<br>2. Advanced auto-flight |
| **History of CRM/SRM** | 1. CRM/SRM beginnings<br>2. Five generations of CRM<br>3. Corporate<br>4. Airline<br>5. Military | 1. LOFT role<br>2. IOE and CRM/SRM |
| **CRM/SRM Elements** | 1. Communication<br>2. Decision making<br>3. Situational awareness<br>4. Workload management<br>5. Command | 1. CRM/SRM toolkit<br>2. Decision making model<br>3. Automation as SIC<br>4. Technical toolkit<br>5. Regulatory requirements |
| **Behavior Grid** | 1. Scenario review<br>2. CRM/SRM exercises<br>3. Situational awareness | 1. LOFT CRM/SRM exercises |
| **CRM/SRM Core Values** | 1. CRM/SRM definitions | 1. Video CRM/SRM summary |

### 3.3. MANUFACTURER'S TRAINING

The manufacturer's training can be described as the "nuts and bolts" portion of the training. It is technical in nature and designed to instruct the student on the specific aircraft. Candidates should expect a manufacturer's course to include the following:

- Pre-training study package review and testing
- Aircraft systems
- Autoflight skills
- Avionics and navigation
- Maneuvers and profiles
- Emergency and abnormal procedures
- Limitations and specifications
- MEL, placards and maintenance requirements
- Aircraft servicing
  - Fuel
  - Oil
  - Hydraulic fluid
  - Tires
  - Potable water
  - Oxygen
  - Lavatory

### 3.4. POST-RATING TRAINING

A critical element for the safe operation of a VLJ will be in the experience gained in this section. Although technically trained on the aircraft, the candidate may lack the experience necessary for safe operation in a variety of scenarios. It is the intent of this portion of training to expose the student to many different situations in anticipation of what will be experienced as the pilot gains initial operating experience. Post rating training should consist of the following:

- LOFT (SBT)
  - Domestic
  - Winter operations — Deicing/runway clutter (contamination) performance, such as Denver to Aspen
  - Summer operations — High elevation/terrain critical performance, such as Jackson Hole to Boise
  - International i.e., Western Atlantic (such as Teterboro to Bermuda) or Mexico (such as San Diego to La Paz)
- CRM/SRM applications
- Establishing personal operating minimums
- Fatigue

### 3.5. INITIAL OPERATING EXPERIENCE

Determining how much operating experience a pilot needs in order to be considered qualified will be at the discretion of the individual insurance company. The pilot may require differing amounts of operating experience, based on prior experience levels, recency of experience and previous types of training he/she has received. In addition, it may be determined that utilizing a mentor is necessary. These variables are combined into the following operating experience categories and requirements, which prepare the pilot for single pilot very light jet operations, and are **considered to be recommendations in the absence of specific insurance company requirements. The categories in and of themselves do not guarantee proficiency and regardless of the amount of operating experience and cycles employed, the IOE must yield candidates that are proficient.**

At a minimum, the following should be addressed during IOE:

- SOPs
- Procedures vs. techniques
- Ground handling issues
  - Aircraft geometry
  - Jet blast
- Cabin features
- Exit operation
- Emergency equipment
- Aircraft servicing
- IOE checklist to be determined
  - Minimum IOE time regardless of performance
  - Established by experience level
  - Set by underwriter
  - End level proficiency criteria
- End level proficiency areas (to be included on IOE checklist)
  - Flight planning
  - Performance
  - Taxi
  - Takeoff and climb
  - Cruise management
  - Descent and approach
  - Landing
  - Autoflight systems
  - Exterior inspection
  - Geometry awareness

An operating cycle is one complete flight operation, consisting of takeoff, climb out, cruise, descent, approach and landing phase of flight.

At the completion of any category (see table for definitions), it is expected that proficiency is required in the following areas:

- Flight planning
- Performance
- Taxi
- Takeoff and climb
- Cruise management
- Descent and approach
- Landing
- CRM
- Autoflight
- Basic FMS tasks
- Systems
- Exterior inspection
- Geometry demonstration

| CATEGORY 1 | CATEGORY 2 | CATEGORY 3 | CATEGORY 4 |
|---|---|---|---|
| Pilots transitioning from left seat of previous jet aircraft | Pilots transitioning from turboprop or cabin-class twin left seat | Pilots transitioning from single-engine turboprop or pressurized single-engine aircraft | Pilots transitioning from single-engine aircraft (recip) or as determined by insurance company |
| 15 hours operating experience | 35 hours operating experience | 50 hours operating experience | 100 hours operating experience |

### 3.5.1 MENTOR PROGRAM

Upon successful completion of the manufacturer's training program, the need for a mentor pilot must be determined. The decision should be collaborative with the pilot, training provider and insurance underwriter. Should a mentor be deemed necessary, the duration may be derived from the individual's progress, but it must be recognized that the mentoring period for each individual may be differed. The goal is to use a mentor pilot until such time that the single pilot operator acquires the necessary skills and proficiency for safe operation in all flight regimes. The categories listed above are solely a guide for the mentor in the absence of formal insurance provider guidance. It is important that the pilot is exposed to a variety of environments during the mentoring period, including traffic, weather, airspace and terrain. It is possible that a mentor may be utilized on specific flights throughout a calendar year in order to have the candidate experience all climactic conditions. Mentors are not meant to instruct on the specific aircraft, but to act as a coach. The mentor should not fly as a crewmember, but observe the pilot's aircraft handling, automation use and SRM, and provide feedback to the pilot.

**However, it is indeed possible that operational intervention by the mentor might become necessary**. This intervention may come in a verbal or physical form and there must be an understanding between the mentor and his/her client regarding intervention.

**If it is deemed by the underwriter that a VLJ buyer will need a mentor following IOE, then that mentor will most likely report when the buyer, in the opinion of the mentor, no longer requires an escort**. That point usually occurs when the mentor does not feel compelled to intervene.

Mentors also will have a role in recurrent training by providing recommendations, if applicable, for specific areas of emphasis.

Mentors should be selected from experienced pilots that have an Airline Transport Pilot Certificate and are type rated in jet aircraft that have technically advanced systems similar to the VLJ in which they will mentor. The prospective mentor needs to be recognized by both the aircraft manufacturer and the insurance underwriter as meeting these criteria. In addition, it is recommended that a training program on the specific aircraft in which they will mentor be completed.

## 3.6. ANNUAL RECURRENT TRAINING

In addition to the initial training, there is a requirement for an annual pilot-in-command proficiency check for turbojet-powered aircraft. This proficiency check is commonly accomplished in conjunction with recurrent training. Although individuals may elect to reduce the interval between recurrent training sessions, it is recommended that training be conducted on a yearly basis, as a minimum.

- Recurrent training should deal with the following:
- Pre-training study package review
- Mentor recommendations, if applicable

- Accident/iIncident & risk review of similar aircraft types
- Review of industry events, including regulatory and guidance changes
- Review of manufacturer's maintenance and operations bulletins, service bulletins, service difficulty reports and airworthiness directives and how that affects the performance of the aircraft
- Recurrent critical maneuvers training
- Review operating minimums
- Practical application of CRM/SRM
- LOFT (SBT) format
- Unsatisfactory result criteria
- Additional training plan

**A four-day recurrent training curriculum may consist of the following:**

| 1 DAY | DAY 2 | DAY 3 | DAY 4 |
|---|---|---|---|
| Emergency Procedures Training<br>• Exits<br>• Ditching<br>• Evacuation<br>• Emergency equipment<br>• CRM/SRM | Segmented LOFT Training<br>• Autoflight<br>• Cold weather operations<br>• Windshear<br>• Diversion<br>• Holding<br>• Flap irreg systems review | Maneuvers Training<br>• Crosswind T/O and landings<br>• High-altitude decompression<br>• Steep turns<br>• RTO<br>• V1 and V2 cuts<br>• Non-precision apps<br>• S/E ILS apps<br>• Visual apps | Line Oriented Evaluation<br>• Systems evaluation<br>• Operational evaluation<br>• Spot training |
| 4:00 hours classroom | 2:00 hours brief<br>4:00 hours simulator | 2:00 hours brief<br>4:00 hours simulator | 2:00 hours brief<br>4:00 hours simulator |

If deficiencies are detected during recurrent training, the training provider should recommend additional training, a mentor and/or additional supervised operational experience to bring the pilot up to the necessary flight & aeronautical skills level.

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## ABOUT NBAA

Founded in 1947 and based in Washington, DC, the National Business Aviation Association (NBAA) is the leading organization for companies that rely on general aviation aircraft to help make their businesses more efficient, productive and successful. Contact NBAA at 800-FYI-NBAA or info@nbaa.org. Not a member? Join today by visiting **nbaa.org/join.**