

# Aircraft Type Rating Curriculum

Based on AC 61-89E, 14CFR 61.157(e)(1)(2); FAA-S-8081-5. AC 61-89E 8/4/2000

## 85 Hours Instruction.

This is a generic type rating curriculum to develop a training program outline to meet the requirements of 14CFR 61, 141, and 142. If used, this generic outline should be adopted to include specific data and characteristics of the aircraft for which the type rating is being issued.

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GROUND INSTRUCTION. Acceptable completion standards for each lesson and examinations should be established by the operator. Many operators use a pass/fail system, while others may prefer a minimum passing grade for written examinations.

## **SEGMENT 1- GENERAL OPERATIONAL SUBJECTS**

**OBJECTIVE:** The applicant will clearly understand operational requirements that are specific to the aircraft for which the type rating is required.

**COMPLETION STANDARDS:** The applicant must be able to demonstrate knowledge and understanding of the subject matter by passing a written examination to acceptable standards.

**NOTE:** Items indicated by an asterisk (\*) are instrument procedures that apply only to type ratings that are not restricted to VFR.

### ***Lesson #1- Introduction to the Aircraft and Operating Limitations (2 hours)***

A. Objective: The applicant will become familiar with the aircraft's history, background, operating limitations, and general characteristics.

B. Content:

1. Introduction and course overview.
2. General aircraft information - Manufacturer; other models; years of production; aircraft authorizations and specifications; equipment and furnishings; unique characteristics.
3. Operating limitations.
4. AFM/POH - General layout, content, and use.

C. Completion Standards: The applicant must be able to demonstrate, by oral testing and discussion, an understanding of the lesson content.

### ***Lesson #2 - Weight and Balance (2 hours)***

A. Objective: The applicant will become familiar with the weight and balance limitations of the aircraft and be able to ensure the aircraft is properly loaded.

B. Content:

1. Computations of center of gravity (CG) location for specified load conditions, including adding, removing, or shifting weight.
2. Determining if the computed CG is within the forward, aft, and lateral (if applicable) limits for takeoff and landing.
3. Effects of fuel burn on CG.

C. Completion Standards: The applicant must be able to demonstrate proficiency in using the aircraft weight and balance charts to solve loading problems.

### ***Lesson #3 - Adverse Weather Practices (2 hours)***

A. Objective: The applicant will become familiar with the manufacturer's recommended practices for operating in adverse weather conditions.

B. Content (as applicable):

1. Operations in ice, slush, and snow.
2. Operations in turbulence.,
3. Operations in heavy precipitation.
4. Low level windshear encounter. a. Takeoff under suspected windshear. b. Suspected windshear approach.
5. Thunderstorm avoidance.
6. Thunderstorm precautions.
7. Cold weather precautions.
8. Low visibility operations.

C. Completion Standards: The applicant must be able to demonstrate, by oral testing and discussion, knowledge of the manufacturer's recommended adverse weather practices.

### ***Lesson #4 - Aerodynamics, Performance, MEL, and Configuration Deviation List (CDL) (3 hours)***

A. Objective: The applicant will become familiar with the aerodynamic, performance characteristics, limitations, and MEL/CDL for the aircraft.

B. Content (as applicable):

1. Review of aerodynamic fundamentals.
2. Airflow-Airfoils; wing type; aerodynamic effect of spoilers, speed brakes, flaps, slats, and other configurations.

3. Low/high-speed aerodynamics and stability.
  4. Recommended airspeeds during specific phases of flight.
  5. Stall/spin characteristics and limitations.
  6. Performance charts, tables, tabulated data, and other related AFM/POH information -Accelerate-stop/accelerate-go distance; takeoff performance, with all engines and with engine(s) inoperative; climb performance, with all engines and with engine(s) inoperative; cruise performance; fuel consumption, range, and endurance; descent performance; and other performance data (appropriate to the aircraft).
  7. Normal, abnormal, and emergency performance characteristics.
  8. Meteorological and weight-limiting performance factors (e.g., temperature, pressure, contaminated runways, precipitation, climb/runway limits).
  9. Inoperative equipment performance limiting factors (e.g., MEL/CDL, inoperative antiskid).
  10. Special operational conditions (e.g., unpaved runways and high-altitude airports).
  11. Other information found in the approved AFM/POH on the aircraft's aerodynamics, performance, and limitations.
- C. Completion Standards: The applicant must be able to demonstrate use of the aircraft's performance charts to determine aircraft performance and limitations during all flight regimes. The applicant must also be familiar with a permitted inoperative component MEL/CDL as it affects aircraft operation.

### ***Lesson #5 - Segment 1 Written Examination***

The applicant must be able to pass the written examination on material covered during Segment 1.

## **SEGMENT 2 - AIRPLANE SYSTEMS AND COMPONENTS**

OBJECTIVE: The applicant will understand the aircraft system components, limitations, relevant controls, actuators, annunciators, and procedures for various system configurations.

COMPLETION STANDARDS: The applicant must be able to demonstrate knowledge of the aircraft's systems and components by passing a written examination to acceptable standards.

### ***Lesson #6 - Fuel and Oil Systems (3 hours)***

A. Objective: The applicant will become familiar with the fuel and oil systems, including AFM/POH normal operating procedures.

B. Content (as applicable):

1. Fuel system-Tank location(s) and venting systems; capacity; drains; pumps; distribution; fuel injectors, carburetors or fuel control; fuel heat; controls; indicators; crossfeeding; transferring; fuel grade, color, and additives; fueling and defueling procedures; emergency substitutions; fuel jettison system.
2. Oil system - Capacity; grade; quantities; indicators.
3. AFM/POH normal procedures, limitations, and operational considerations.

C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the aircraft's fuel and oil systems.

### ***Lesson #7 - Powerplant(s) (3 hours)***

A. Objective: The applicant will become familiar with the components and operation of the powerplant(s).

B. Content (as applicable):

1. Powerplant - Type and thrust/horsepower; controls and indicators; induction system; fuel injection/carburetion/fuel control; exhaust and turbocharging; cooling; fire detection/ protection; mounting points; turbine wheels; compressors; other applicable components (thrust reversers, engine synchronizer).
2. Propellers-Type; controls; allowable wear; feathering/unfeathering; autofeather negative torque sensing; synchronizing and synchrophasing.
3. Ignition system.
4. AFM/POH normal operating procedures and limitations.

C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the powerplant structure and operation.

### ***Lesson #8 - Electrical System (2 hours)***

A. Objective: The applicant will become familiar with the electrical systems and their operation.

B. Content (as applicable):

1. Fundamentals of AC/DC electricity.

- 2. AC/DC power; battery/emergency bus; alternators; generators; fuses; circuit breakers and current limiters; controls; indicators; external ground power; auxiliary power unit (APU).
- 3. Normal AFM/POH operation and limitations of electrical power system units.
- C. Completion Standards: The applicant must be able to demonstrate, by oral testing and discussion, knowledge and understanding of the electrical power systems, operation and limitations.

### ***Lesson #9 - Hydraulic System (2 hours)***

- A. Objective: The applicant will become familiar with the hydraulic system and its operation and limitations.
- B. Content (as applicable):
  - 1. Principles of hydraulics.
  - 2. System construction features - Capacity; pumps; pressure; reservoirs; fluid grade; regulators and accumulators.
  - 3. Use of hydraulics - Systems and subsystems.
  - 4. Normal AFM/POH operation and limitation of hydraulic system.
- C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the hydraulic systems.

### ***Lesson #10 - Landing Gear and Brakes (2 hours)***

- A. Objective: The applicant will become familiar with the landing gear and brake system, its operation and limitations.
- B. Content (as applicable):
  - 1. Landing gear system - Indicators; tires; nosewheel steering; skids; shocks.
  - 2. Brakes - Components; operation.
- C. Completion Standards: The applicant must be able to demonstrate knowledge, understanding and the operation of landing gear, brake systems and their limitations.

### ***Lesson #11- Pneumatics System (1 hour)***

- A. Objective: The applicant will become familiar with the pneumatic systems, their operation and limitations.
- B. Content (as applicable):
  - 1. Principles of pneumatics.
  - 2. Description of system elements - Engine-driven pumps; bleed-air sources, routing, venting, and controlling; pressure limiting devices.
  - 3. AFM/POH normal operating procedures and limitations.
- C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the airplane's pneumatic system, its operation and limitations.

### ***Lesson #12 - Environmental Systems (3 hours)***

- A. Objective: The applicant will become familiar with the environmental systems and their operation.
- B. Content (as applicable):
  - 1. Heating; cooling; ventilation.
  - 2. Air conditioning.
  - 3. Pressurization-Components; controls; indicators; regulating devices; system operation; emergency pressurization.
  - 4. AFM/POH normal operating procedures and limitations.
- C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the environmental systems and their operation.

### ***Lesson #13 - Flight Controls (4 hours)***

- A. Objective: The applicant will become familiar with and be able to operate the flight control systems.
- B. Content (as applicable):
  - 1. Primary flight controls (yaw, pitch, and roll devices).

2. Secondary flight controls (leading/trailing edge devices, flaps, trim, spoilers, speed brakes, and damping mechanisms).
  3. Associated devices such as stall or speed warning devices.
  4. AFM/POH normal operating procedures and limitations.
- C. Completion Standards: The applicant will be able to operate, demonstrate knowledge, and understand the flight control systems and their limitations.

### ***Lesson #14 - Ice and Rain Protection (2 hours)***

- A. Objective: The applicant will become familiar with and be able to operate the airplane's ice protection systems.
- B. Content (as applicable):
1. Ice detection.
  2. Anti-ice/deice systems.
  3. AFM/POH normal operating procedures and limitations.
- C. Completion Standards: The applicant will be able to demonstrate knowledge and understanding of the airplane's ice protection systems and their limitations.

### ***Lesson #15 - Fire and Overheat Protection (2 hours)***

- A. Objective: The applicant will become familiar with the fire and overheat protection systems, their operation and limitations.
- B. Content (as applicable):
1. Fire and overheat sensors, loops, modules, or other means of providing visual and/or aural indications of fire or overheat detection.
  2. Automatic extinguishing systems.
  3. Power sources necessary to provide detection of fire and overheat conditions in engines, APU, cargo bay/wheel well, cockpit, cabin, and/or lavatories.
- C. Completion Standards: The applicant will be able to demonstrate knowledge and understanding of the fire/overheat protection systems and their limitations.

### ***Lesson #16 - Flight Instruments (2 hours)***

- A. Objective: The applicant will become familiar with the location, operation and limitations of the flight instruments.
- B. Content (as applicable):
1. Panel arrangement.
  2. Pilot static system and instruments - Operation of the system, including drains, pilot heat, and alternate static sources; airspeed indicator bug settings, including markings; altimeter; vertical speed indicator.
  3. Vacuum system and instruments - Operation of the system, including gauges and malfunction indications; attitude indicator; heading indicator; turn and slip indicator.
  4. Electrically operated instruments - Turn and bank coordinator; attitude indicator; radio altimeter.
  5. Magnetic compass - Errors in and use of magnetic compass system.
  6. Air data computer.
  7. Stall avoidance and warning systems.
- C. Completion Standards: The applicant will be able to demonstrate knowledge and understanding of the flight instrument systems and their position on the panel.

### ***Lesson #17 - Navigation Equipment and Display Systems (4 hours)***

- A. Objective: The applicant will become familiar with and be able to operate the navigation equipment and display systems.
- B. Content (as applicable):
1. Aircraft transponders, radio altimeters, electronic flight instrumentation system (EFIS), or computer-generated displays of aircraft position and navigation information.
  2. Navigation receivers - VOR, NDB, RNAV, LORAN-C, GPS, DME, marker beacon.
  3. Inertial navigation systems (INS) - Functional displays, fault indications, comparator systems.
  4. Flight director (FD).
  5. Weather detection systems - Stormscope, radar.
  6. Traffic collision and avoidance system (TCAS).
  7. Flight management system (FMS).
  8. Low-altitude windshear system.

C. Completion Standards: The applicant must demonstrate knowledge and operation of the airplane's navigation equipment and display systems.

### ***Lesson #18 - Autoflight (2 hours)***

A. Objective: The applicant will become familiar with and be able to operate the airplane's autoflight system.

B. Content (as applicable): Autopilot/autothrottle - Interface with aircraft flight director and navigation systems, including automatic approach tracking, autoland, and automatic fuel or performance management systems.

C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the autoflight system.

### ***Lesson #19 - Conununications Equipment (1 hour)***

A. Objective: The applicant will become familiar with and be able to operate the airplane's communications equipment.

B. Content (as applicable): VHF/HF radios; audio panels; interphone and passenger address systems; voice recorder; ARINC communications addressing and reporting system.

C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the airplane's communications systems and equipment.

### ***Lesson #20 - Miscellaneous and Review (2 hours)***

A. Objective: The applicant will become familiar with the systems and components which have been covered and review Segment 2.

B. Content (as applicable):

1. All other systems included in the approved AFM/POH (e.g., stability augmentation devices, squat switch systems, drag chute).

2. Review any problem areas from Segment 2 in preparation for the segment examination.

C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the material covered during this segment to pass the written Segment 2 examination to acceptable standards.

### ***Lesson #21- Segment 2 Written Examination***

The applicant must be able to pass the written examination on material covered during Segment 2.

## **SEGMENT 3 - AIRCRAFT-SPECIFIC EMERGENCY TRAINING**

OBJECTIVE: The applicant will become familiar with emergency and abnormal procedures associated with aircraft systems, structural design, and operational characteristics.

COMPLETION STANDARDS: The applicant will have successfully completed Segment 3 when able to demonstrate knowledge and understanding of the emergency and abnormal procedures specified in the approved AFM/POH by passing a written examination.

### ***Lesson #22 - Emergency Equipment (2 hours)***

A. Objective: The applicant will become familiar with the location and use of emergency equipment.

B. Content (as applicable):

1. Survival gear. 2. Oxygen equipment and supply. 3. Emergency exits and escape slides. 4. Fire extinguisher(s). 5. Life vests and other personal flotation device(s). 6. Other emergency equipment.

C. Completion Standards: The applicant must be able to demonstrate knowledge of the location and use of the airplane's emergency equipment.

### ***Lesson #23 - Abnormal and Emergency Procedures (4 hours)***

A. Objective: The applicant will become familiar with the abnormal and emergency procedures in the AFM/POH.

B. Content (as applicable):

1. Abnormal starting procedures, including knowledge of external power source usage, abnormal starting limitations, and the proper corrective action required in the event of a malfunction.

2. Powerplant failure under circumstances, including but not limited to, prior to rotation, during climbout, during cruise flight, during approach, and in instrument meteorological conditions (IMC).

3. Rapid decompression and emergency descent.

4. Ditching and evacuation procedures.

5. Electrical failure.

6. Failure of navigation or communications equipment.
  7. Hydraulic failure.
  8. Landing gear and flap systems failure or malfunction.
  9. In-flight fire.
  10. Smoke control and removal.
  11. Ice and rain protection.
  12. Anti-icing or deicing system failure or malfunction.
  13. Runaway stabilizer/trim.
- C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the abnormal and emergency procedures.

### ***Lesson #24 - Segment 3 Written Examination***

The applicant must be able to pass the written examination on material covered during Segment 3.  
REVIEW AND FINAL EXAMINATION

### ***Lesson #25 - Review (3 hours)***

- A. Objective: The applicant will be prepared to successfully accomplish the final examination.
- B. Content: All material covered during Segments 1-3.
- C. Completion Standards: The applicant must be able to demonstrate knowledge and understanding of the material covered during ground training that is applicable to the aircraft.

### ***Lesson #26 - Final Examination***

## **SEGMENT 4 - SYSTEMS INTEGRATION TRAINING**

OBJECTIVE: The applicant will be able to operate the simulator or training device and understand the interrelation between the aircraft's systems and normal, abnormal, and emergency procedures.

COMPLETION STANDARDS: The applicant will have successfully completed Segment 4 when able to demonstrate proficiency, by performing the maneuvers and procedures of part 61, to PTS standards on the simulator/training device portion of the practical test.

### ***Lesson #27 - Cockpit Familiarization and Use of Checklists (2 hours)***

- A. Objective: The applicant will become familiar with the crew briefing, cockpit layout, checklists, and normal operating procedures and will be able to fly the aircraft, maintaining attitude and orientation.
- B. Content:
  1. Preflight familiarization.
  2. Introduction - Cockpit familiarization.
    - a. Airplane systems operation and location of systems indicators, gauges, and warning devices.
    - b. Activation of airplane system controls and switches.
    - c. Use of checklists - Safety checks, cockpit preparation, checklist sequence.
  3. Flight.
    - a. Normal procedures.
    - b. Pretakeoff checks, crew briefing, as appropriate to the airplane type.
    - c. Normal or crosswind takeoffs - Knowledge of airspeeds, configurations, and emergency procedures recommended by the manufacturer for existing conditions. Following takeoff, performance of required pitch changes, gear and flap retractions, power adjustments, and other required pilot-related activities at the required airspeed/Vspeeds within the tolerances established in the AFMIPPOH.
    - d. Airspeed /V-speed control.
    - e. Straight and level cruise flight.
    - f. Climbs.
    - g. Descents.
    - h. Level, climbing, and descending turns.
    - i. In-flight pressurization control.
    - j. Approach to landing and landings. (1) Appropriate configurations. (2) Normal or crosswind landings.
  4. Postflight critique and preview of next lesson.
- C. Completion Standards: At the completion of this lesson, the applicant shall demonstrate familiarity with the airplane checklists and normal operating procedures.

## **Lesson #28 - Flight Maneuvers and Display Systems (2 hours)**

A. Objective: The applicant will continue cockpit orientation and will review basic in-flight maneuvers and approaches (if applicable).

B. Content (as applicable):

1. Preflight discussion.
2. Introduction - Display systems operation (weather radar and other EFIS displays).
3. Flight.
  - a. Review of previous lesson.
  - b. Normal takeoffs.
  - c. Slow flight.
  - d. Approach to stalls and recovery. For the purpose of this maneuver, the required approach to a stall is reached when there is a perceptible buffet or other response (stall warning or stick shaker, depending on the airplane devices) to the initial stall entry. (1) Takeoff configuration.  
(2) Clean configuration.  
(3) Landing configuration.
  - e. Steep turns.  
Unusual attitudes.
  - g. Normal ILS approaches (coupled and manual).\*
4. Postflight critique and preview of next lesson.

C. Completion Standards: The applicant shall demonstrate competency in performing the maneuvers and procedures contained in this lesson to levels consistent with the PTS.

## **Lesson #29 - Flight Operations and Use of Autopilot (3 hours)**

A. Objective: The applicant will review instrument procedures (if applicable) and further develop the skills required for normal flight operations.

B. Content (as applicable):

1. Preflight discussion.
2. Introduction - Autoflight operation (autopilot, flight director, normal and abnormal indications and annunciators lights).
3. Flight.
  - a. Review of previous lesson.
  - b. Instrument Departure Procedure (DP) and Standard Terminal Arrival Routes (STAR).
  - c. Adherence to simulated air traffic control (ATC) clearances and to airspeed restrictions and adjustments required by regulations or the AFM/POH.
  - d. Use of autoflight system.
  - e. Performance of checklist items appropriate to the area of arrival.
  - f. Establishment, where appropriate, of a rate of descent consistent with the aircraft operating characteristics and safety.
  - g. Holding, including entering, maintaining, and leaving holding patterns.\*
  - h. Instrument approaches.\*
    - (1) Precision approaches.
    - (2) Nonprecision approaches, including circling approaches at the authorized minimum circling approach altitude.
    - (3) Missed approaches from precision and nonprecision approaches, including circling approaches.
4. Postflight critique and preview of next lesson.

C. Completion Standards: The applicant shall demonstrate competency in performing the maneuvers and procedures contained in this lesson to levels consistent with the PTS.

## **Lesson #30 - Emergency Procedures (2 hours)**

A. Objective: The applicant will practice the emergency procedures recommended in the approved AFM/POH. The applicant will demonstrate proper knowledge of the flight characteristics and controllability associated with maneuvering with powerplant(s) inoperative as appropriate to the airplane, including control of airspeed, configuration, direction, altitude, and attitude.

B. Content (as applicable):

1. Preflight discussion.
2. Introduction.
3. Flight.
  - a. Review of previous lesson.
  - b. Emergency procedures checklist familiarization.
  - c. Start malfunctions.
  - d. Instrument takeoff (simulated IMC at 100 feet).\*
  - e. Powerplant failure(s) in flight.
  - f. In-flight fire.
  - g. Rapid decompression emergency procedures.



h. ILS approach with a simulated failure of one powerplant. The failure should occur before initiating the final approach course and must continue to touchdown or through the missed approach procedure.\*

4. Postflight critique and preview of next lesson.

C. Completion Standards: The applicant shall display complete understanding of emergency and abnormal procedures as recommended by the manufacturer in the AFM/POH.

### **Lesson #31 - Normal/Abnormal Flight Operations Review; Use of Navigation Systems (2 hours)**

A. Objective: The applicant shall develop skills in normal flight operations and in abnormal flight situations with selected system malfunctions and gain skill in operating the airplane's navigation systems.

B. Content (as applicable):

1. Preflight discussion. 2. Introduction - Navigation systems. a. Preflight and operation of applicable receivers. b. Onboard navigation systems. c. Flight plan information input and retrieval. 3. Flight. a. Review of previous lesson. b. Cold weather operation. c. Rejected takeoff. d. Climb to and cruise at high altitude, both with and without autopilot. e. Use of navigation systems. f. Ice and rain protection system operation and malfunction procedures. g. Fuel systems malfunction.

Engine(s) inoperative landing from an ILS.\*

Engine(s) inoperative nonprecision approach, circle to land.\*

4. Postflight critique and preview of next lesson.

C. Completion Standards: The applicant shall display complete understanding of the airplane's navigation systems and of emergency and abnormal procedures as recommended by the manufacturer.

### **Lesson #32 - Normal/Abnormal Flight Operations (2 hours)**

A. Objective: The applicant shall further develop skills in normal and abnormal flight operations.

B. Content (as applicable):

1. Preflight discussion. 2. Flight. a. Review of previous lesson. b. Hot weather operation. c. Takeoff with engine failure after V1 and before V2. d. Inadvertent overspeed recovery procedures. e. Turbulence penetration. f. Hydraulic system malfunction. g. Flight control malfunctions. h. Emergency gear extension. i. No flap approach and landing. j. Precision and nonprecision instrument approaches (normal and engine(s) inoperative).\* 3. Postflight critique and preview of next lesson.

C. Completion Standards: The applicant shall demonstrate understanding of and proficiency in the aircraft's normal, abnormal, and emergency procedures to PTS standards.

### **Lesson #33 - Line Oriented Flight Training (LOFT) (2 hours)**

A. Objective: The applicant shall be able to conduct a cross-country flight using the airplane's available equipment. During the flight, the instructor shall evaluate the applicant's proficiency level in the maneuvers and procedures covered during the course as well as during earlier training (high-altitude enroute procedures, etc.). The instructor should identify and correct any maneuvers that may require additional instruction.

B. Content (as applicable):

1. Preflight discussion. 2. Introduction - Flight planning. a. Performance limitations (meteorological, weight, and MEL items). b. Required fuel loads. 3. Flight.

a. Preflight planning.

b. Instrument Departure Procedure (DP).

c. Compliance with manufacturer's recommendations for power settings; airspeeds; rate of climb; configuration.

d. Adherence to actual or simulated ATC clearances (including assigned radials) and to airspeed restrictions and adjustments required by regulations or the AFM/POH. e. Enroute.

(1) Appropriate use of oxygen and pressurization systems.

(2) Proper use of available navigation facilities and appropriate enroute procedures.

(3) Review of maneuvers and procedures from previous lessons, including simulated emergencies.

f. Standard Terminal Arrival Routes (STAR).

(4) Performance of checklist items appropriate to the area arrival.

(5) Establishment, where appropriate, of a rate of descent consistent with the aircraft operating characteristics and safety.

(6) Manually controlled ILS approach with a simulated failure of one powerplant. The simulated failure should occur before initiating the final approach course and continue to touchdown or through the missed approach procedure.

4. Postflight critique and preview of practical test.

C. Completion Standards: The applicant shall be able to demonstrate competency in performing the maneuvers and procedures required for the practical test to levels consistent with the PTS.

## **Lesson #34 - Crew Resource Management (2 hours)**

A. Objective: The applicant will become familiar with Crew Resource Management (CRM) techniques and be able to facilitate the smooth flow of information and application of skills between flight and ground crewmembers and ATC resulting in a safe, organized flight.

B. Content:

1. Human physiology. a. Rest, naps, and sleep. b. Effects of drugs and alcohol. c. Smoking. d. Other stresses; e.g., divorce, finance. e. Eating habits. f. Stress management.
2. Getting along with others. a. Hazardous attitudes. b. Communications skills.
3. Aeronautical decision making. a. Risk assessment. b. Risk management. c. How to develop decision making skills.
4. Standard Operating Procedures (SOPs). a. Use of checklists by the crew. b. Challenge/No response. c. Pilot flying vs. pilot not flying roles. d. Abnormal/Emergency procedures. e. First flight of the day.

Critical situations.

CG. Deviations from the SOP.

C. Completion Standards: This lesson is complete when the applicant is able to demonstrate satisfactory knowledge on a written examination on the lesson subject matter.

## **SEGMENT 5 - FLIGHT INSTRUCTION**

Time allocations are suggested only and should be adjusted according to the applicant's ability, the type of airplane and equipment, and the type of operation.

OBJECTIVE: The applicant shall apply the knowledge and skill acquired during ground training to the airplane. .

COMPLETION STANDARDS: The applicant shall demonstrate proficiency in handling and operating the airplane by passing the flight portion of the practical test to levels consistent with the PTS.

## **Lesson #35 - Introduction to the Airplane; Basic Maneuvers (4 hours)**

A. Objective: The applicant shall become familiar with the airplane and the local training environment, and will be able to apply the knowledge gained from ground training to the operation of the airplane.

B. Content:

1. Preflight discussion.
2. Introduction.
  - a. Airplane documentation-Registration; airworthiness certificate; maintenance logs; MEL/CDL.
  - b. Preflight inspection - Complete visual inspection of interior and exterior, using appropriate checklist.
- C. Flight.
  1. Prestart checklist.
  2. Control system checks.
  3. Normal starting procedures.
  4. Radio and electronic equipment checks.
  5. Systems operations familiarization and additional checks described in the approved AFM/POH, checklists, or other approved material appropriate to the airplane type and type of flight.
  6. Taxiing.
  7. Pretakeoff checks, crew briefing as appropriate to the airplane type.
  8. Normal or crosswind takeoffs.
  9. Airspeed/V-speed control.
  10. Straight and level cruise flight.
  11. Climbs.
  12. Descents.
  13. Level, climbing, and descending turns.
  14. Steep turns.
  15. Approach to stalls.
    - a. Takeoff configuration. ~~.
    - b. Clean configuration.
    - c. Landing configuration.
  16. Approach to landing and landings.
    - a. Appropriate configurations.
    - b. Normal or crosswind landings.
  17. Engine shutdown procedures.

D. Postflight critique and preview of next lesson.

E. Completion Standards: At the completion of this lesson, the applicant shall demonstrate basic airmanship qualities and understanding of flight characteristics of the aircraft.

### **Lesson #36 - Proficiency Training (4 hours)**

A. Objective: The applicant shall gain proficiency in takeoffs, landings, VFR patterns, and will begin instrument work, if applicable. This lesson should further acquaint the applicant with the local training area.

B. Content.

1. Preflight discussion. 2. Flight.

a. Review of previous lesson.

b. Practice takeoffs and landings to become proficient with power settings, airspeeds, and attitudes for flying a VFR pattern.

c. Takeoff with simulated IMC at or before reaching an altitude of 100 feet above the airport elevation.\*

d. ILS to missed approach.\*

e. ILS approach and landing.\*

f. Nonprecision approach to the circling minimum descent altitude (MDA), followed by a change in heading and the necessary visual maneuvering to maintain a flight path that permits a normal landing on a runway at least 90° from the final approach course of the simulated instrument portion of the approach.\*

C. Postflight critique and preview of next lesson.

D. Completion Standards: At the completion of this lesson, the applicant must be able to perform the maneuvers contained in this lesson to PTS standards and takeoff and land without assistance from the instructor.

### **Lesson #37 - Emergency Procedures; Proficiency (4 hours)**

A. Objective: The applicant shall be able to perform emergency procedures that can be safely simulated in the airplane. Although not all emergencies can be safely simulated in the airplane, those that can should be practiced in accordance with the manufacturer's recommendations.

B. Content (as applicable):

1. Preflight discussion.

2. Review of previous lessons.

3. Introduction - Emergency procedures review.

4. Flight.

a. Powerplant failure(s).

b. On takeoff roll, before reaching a specified airspeed/VI speed. The rejected takeoff should encompass using the recommended braking procedure; maintaining positive control; and accomplishing the appropriate powerplant failure procedures as recommended by the appropriate checklist.

c. In multiengine airplanes, on climbout with a simulated failure of the most critical powerplant at a point appropriate to the airplane type under the prevailing conditions and in normal cruise flight. The recovery procedures should be as specified in the AFM/POH and will include setting powerplant controls; reducing drag as necessary; correctly identifying and verifying the inoperative powerplant; maintaining positive aircraft control; attempting to determine the reason for the powerplant failure; and following the prescribed aircraft checklist to secure the inoperative engine. When the engine is actually shut down and feathered (if appropriate), the proper powerplant restart procedures should be followed in accordance with the manufacturer's recommended procedures and pertinent checklist items.

d. In single-engine airplanes, establishing and maintaining the recommended best glide airspeed; selecting a suitable airport or landing area that is within the performance capability of the aircraft; following the emergency checklist items appropriate to the aircraft; maintaining positive aircraft control throughout the maneuver; and using airplane configuration devices, such as landing gear and wing flaps, in a manner recommended by the manufacturer. Landings from a forward slip should be practiced, as should spot simulated emergency landings from 1,000 feet above ground level (AGL) with a 180° change of direction.

e. Runaway stabilizer.

f. Simulated loss of pressurization - Rapid decompression emergency procedures.

(1) Knowing the location and correct use of oxygen masks.

(2) Rapid descent.

g. Manually controlled ILS approach with a simulated failure of one powerplant. The

simulated failure should occur before initiating the final approach course and must continue to touchdown or through the missed approach procedure.\*

h. Zero-flap landing to simulate inoperable full or partial flaps, leading edge flaps, and other similar devices.

C. Postflight critique and preview of next lesson.

D. Completion Standards: At the completion of this lesson, the applicant will be proficient in the manufacturer's recommended emergency procedures for the airplane and will be able to competently demonstrate their execution in a simulated emergency situation.

### **Lesson #38 - Night Checkout; Review (3 hours)**

A. Objective: The applicant will become familiar with night operations in the airplane.

B. Content:

1. Preflight discussion.
2. Review of previous lessons.
3. Introduction - Night flying.

C. Flight:

1. Night aircraft inspection.
2. Use of cockpit and cabin lights.
3. Airplane lights (navigation; strobe; recognition beacon; landing; taxi and logo).
4. Takeoff and landing practice, including a simulated electrical failure.
5. Recovery from unusual attitudes in cruise flight.
6. Multiple instrument approaches.\*
7. Review of any areas needing additional work.

D. Postflight critique and preview of practical test.

E. Completion Standards: The applicant must be able to demonstrate the ability to accurately control all aspects of flying the airplane at night, including night emergency procedures.

## **PRACTICAL TEST**

OBJECTIVE: The applicant shall be able to demonstrate knowledge of operational proficiency in the airplane and its systems during the practical test.

CONTENT:

- A. Oral examination.
- B. Flight test.
  1. Simulator/training device.
  2. Airplane.
- C. Evaluation and critique.

COMPLETION STANDARDS: The applicant shall demonstrate the proficiency required to pass the practical test.

PILOT CERTIFICATE AIRCRAFT TYPE DESIGNATIONS-AIRPLANES

MANUFACTURER	MODEL DESIGNATION	PRIOR DESIGNATION	CURRENT DESIGNATION
Aero Commander Division	1121 Jet Commander	AC-1121	IA-JET
North American Rockwell Corp	Commodore Jet 1123	CJ-1123	
Aérospatiale, France	SN 601 Corvette		SN-601
Aérospatiale/Aeritalia, France	ATR-42, ATR-72		ATR-42, ATR-72
Armstrong Whitworth Aircraft, Ltd., UK	Argosy AW 650	Armstrong Whitworth AW-650	AW-650
Avions Dassault, General Aemautique Marcel, Dassault, France	Mystere 10 Falcon		DA-10
	Mystere 20 Falcon, Fan Jet	OAMUSUD-20	DA-20
	Falcon 50-A, DA 900, DA 900C, DA 900EX		DA-50
	Fan Jet Model 200		DA-200
	Falcon DA-2000		DA-2000
Beech Aircraft Corp., USA Wichita, KS	BE-200T/200TC (Restricted)		BE-200
	BE-300, BE-350, BE-300LW, BE-B300		BE-300
	BE-300OFF		BE-300OFF
	BE1900, BE1900C, BE1900D, C-12J (Military)		BE1900
	BE-20005 (single pilot)		BE-2000S
	BE-2000		BE-2000
	Diamond I, MU-300, MU-300-10, BE-400 and 400T (USAF T-1A Jayhawk)	MU-300	MU-300, BE-400
Boeing Co., USA	247-D	Boeing 247	B-247
	314	Boeing 314	B-314
	S-307, SA-307	Boeing 307	B-307
	377, C-97, YC-97	Boeing 377	B-377
	707, 720, C-135, VC-137, E3-A, E6-A/B	Boeing 707/720	B-707/B-720
	C-18B, EC-18B, EC-18D		
	727	Boeing 727	B-727
	737/100/200/300/400/500/600/700/800, T-43	Boeing 737	B-737
	T-747, E-4, 747SP	Boeing 747	B-747
	B-747-400		B-747-4
	757, 767, C-32A	Boeing 757, 767	B-757, B-767
	B-777-200		B-777
Boeing Commercial Airplane Company, USA	B-17	Boeing B-17	B-17
	DC-9, DC-9-50, C-9, DC-9-80, MD-80, MD-88, MD-90, MD-90(EFD)	Douglas DC-9	DC-9
Breguet, France	Fauvette 905A		BG 905
Bombardier Aerospace, Canada (Formerly Canadair Ltd.)	BD-700-1A10		BBD-700
Bristol Aircraft Ltd., UK	Britannia 305		BR-305
British Aerospace/Taiwanese Aerospace Corp.	BAE-146-70/85/100/115 Series	BAB-146	BAE-146, AVR-14
British Aerospace Corporation	BAE-ATP		BAE-ATP
	BAE-125-1000 HP.137, MK.1		BAE-125 BAE-3100
	Jetstream Series 200		
	Jetstream 3101, 3201		
	Jetstream 4100		BA-4100

	Concorde SST		CONCRD
British Aircraft Corp., UK	BAC 1-11	BAC-1-11	BA-111
Bushmaster Aircraft	Bushmaster 2000		BU-2000
Canadair, Ltd., Canada	CL-44 (Yukon)	Canadair	CL-44
	CL600-21319		CL-65
	CL-215-1A10	CL-21	CL-215
	CL-415		CL-415
	(Challenger) CL-600, CL-601, CL-6013A		CL-600
	CL-604, CL-600-21316		CL-604
Cessna Aircraft Corp., USA	CE-500, 501, 550, 552, 550S, 550B., 560, 560 ULTRA, US ARMY UC-35, T-47		CE-500
	CE-525, CE-525S		CE-525, CE-525S
	CE-560XL		CE-560XL
	Citation III, Model 650 Citation VI, VII		CE-650
	Model CE-750 (Citation X)		CE-750
Chase (also Roberts Aircraft Co.), USA	YC-122	Chase YC-122	YC-122
Consolidated Vultee Aircraft	(See General Dynamics Corp.)		
Convair	(See General Dynamics Corp.)		
Construccion Aeronautica S.A.	CASA (Model) C-212-CB		CA-212
	CN-235-100/200/300, C-295	CN-235	C-295
Curtiss-Wright Corp., USA	Commando CW-20	Curtiss-Wright, C-46	CW-46
Dart Aircraft Corp.	(See General Dynamics Corp.)		
deHavilland Aircraft of Canada Ltd., Canada	Caribou 4A USAF C7A, Army CV2	deHavilland Caribou DH-4	DH-4
	DHC-7		DHC-7
	DHC-8		UHC-8
Dee Howard Co., USA	Howard 500	Howard 500	HW-500
Dornier, Deutsche Aerospace, Friedrichshafen, Germany	DO-228-101 DO-328-100		DO-228 DO-328
	DO-328-300		DO-328JET
Douglas Aircraft Co.	(See McDonnell Douglas)		
Empresa Brasileira de Aeronautica, Brazil	EMB-110P1, P2, P3 EMB-120		EMB-110 EMB-120
	EMB-135, EMB-145		EMB-145
Fairchild Aircraft Corp., USA	Friendship F-27, F-227 SA 226-TC, SA 227-AT, TT, AC, BC, CC, DC, C-26AB	Fairchild F-27/227	F-27 SA-227
	C-119C		FA-119C
	C-123		FA-0123
Fairchild Hiller	C-82A		C-82A
Fokker, Netherlands	Fokker F27 Mark 100, 200, 300, 400, 500, 600, 700, and 800, Fairchild F-27, 27A, B, J, M Fairchild Hiller FH-227, FH- 227B/C/D/E Fellowship F-28 (Models 1000 & 4000)		F-27 FK-28
	Fokker 28 MK 0100, 0070		FK-100
Ford Motor Corp., USA	Tri-Motor 4-AT	Ford-5	FO-5
	5-AT, FO-S		
General Dynamics Corp., USA	PB2Y, PB2Y-5	Consolidated-Vultee PB2Y	CV-PB2Y
	PB4Y-2, QP-4B	Consolidated-Vultee NY	CV-P4Y
	PBY-5, SA, 6A, 28-4, 28-5	Consolidated-Vultee PBY-5	PBY-5
	28-SACF, AMC, OA-10, A		
	LB-30, C87A, RB-24	Consolidated-Vultee LB-30	CV-LB30
	240, 340, 440, T-29, C-131	Convair 240/340/440	CV-240/340/440
	22, 22M (880) (090)	Convair 880/990	CV-880, CV-990
	Napier-Eland	Napier-Eland	CV-N1, CV-N2
		Convair	
	Mark I, Mark II,	Mark III	

	Allison Project		
	Convair 340, 440, 580	Allison 340/440	CV-A340, CV-A4
	Dart Convair 240, 340, 440	Convair 600/640	CV-600, CV-640
Groupement d'Interet Economique Airbus Industries, France	A-3008 Airbus		A-300
	A-300-6008, A-310		A-310
	A-319, A320, A-321		A-320
	A-330-200/300 Series		A-330
	A-340-200/300 Series		A-340
Grumman Aircraft Engineering Corp., USA	TBF, TBM AF-2A (Ref. T.O.AR-36)	Grumman TBF	G-TBM
	G-64 Albatross, GSA16	-	G-111
	HU-16RD		
	G-73 Turbo Mallard (Frankes Conversion)	FA-73T	G-73T
	G-73 Mallard	Grumman G-73	G-73
	S2F/C1A, S2F-1, S2F-3		G-S2
Gulfstream Aerospace Corporation, USA	G-159 Gulfstream	Grumman G-159	G-159
	VC-4A, TC-4C		
	G-1159, A, B, C-20A, B, C, D, E	Grumman G-1159	G-1159
	G-1159C, C-20F, C-20G, C-20H		G-IV
	Variant G-1159 A&B, GIV		G-V
Hamburger FlugZeubau G.M.B.H., Germany	Hansa Jet 320		HF-320
Handley Page Aircraft Co., Ltd., UK	Herald 300	Handley Page 300	HP-300
Hawker Siddeley Aviation Ltd., UK	DH-106, Comet 4C	deHavilland 4C	HS-106
	DH-114 Heron	Hawker Sddeley 114	HS-114
(Also see Raytheon Hawker Corporate Jets)	DH-125, BH-125, HS-125 Series (Except 1000) & HS- 125/800XP		HS-125
	Hawker Siddeley 748 (See Dee Howard Co.)		HS-748
Howard Aero Corp. Israel Aircraft Ltd., Israel	IA-GALAXY		GALAXY
	Westwind 1124		IA-JET
	Astra IAI-1125		IA-1125
(See Aero Commander)	ARAVA IA IOIB		IA-101
Learjet Corp.	23, 24, 25, 28, 29, 31, 35, 36, 55, C21 -A	LR-23, LR-24, LR-25, LR-28, LR-29, LR-35, LR-36, LR-50	JR-JET
	45	LR45	LR45
	60		LR-60
LET as Corporation 686 04 Kundovice Czech Republic/ Ayres Corporation, Albany, GA	L-420		L-420
Lockheed Aircraft Corp., USA	Lightning P-38	Lockheed P-38	L-P38
	B-34, PV-1, PV-2	Lockheed B-34	L-B34
	Series 14	Lockheed 14	L-14
	18, C-57, C-60, R-50, Learstar	Lockheed 18	L-18
	P2V7 (Restricted), LP2V-5F		L-P2V
	Constellation )49, 149, 649, 749, 1049, 1946	Lockheed Constellation	L-1049
	Electra 188A/C, P-3, EA	Lockheed 188	L-188
	Jetstar, C-140, Jetstar II	Lockheed 1329	L-1329
	382, B/E/F/G, C-130A/B/E/H	Lockheed 382	L-382
	300, C-141	Lockheed 300	L-300
	L-1011 Tristar		L-1011
	T-33		T-33

Lockheed Martin Aero Systems	L-382J		L382J
Martin-Marietta Corp., USA	B-26 Marauder	Martin B-26C	M-B26
	PBM-5, C-162	Martin PBM-5	M-PBM-5
	Mariner 202/404	Martin 202/404	M-202, M-404
McDonnell Douglas Aircraft Corp., USA	AD-4N		AD-4N
	A-20	Douglas A-20	DC-A20
	A-24, SBD	Douglas A-24	DC-A24
	PB-26	Douglas B-26	DC-B26
	B-18	Douglas B-18	DC-B18
	B-23, UC-67	Douglas-23	DC-B23
	DC-2, C-32, C-34, C-39, C-42	Douglas DC-2	DC-2
	DC-3, C-47, C-117	Douglas DC-3	DC-3
	Super DC-3, C-117D	Douglas DC-3S	DC-3S
	DC-3 (Turboprop)		DC-3TP
	DC-4, C-54	Douglas DC-4	DC-4
	DC-6, DC-7, C-118	Douglas DC-6, DC-7	DC-6, DC-7
	DC-8	Douglas DC-8	DC-8
	DC-10, KC-10		DC-10
	MD-11		MD-11
Mitsubishi Aircraft International, Inc.	YS-11 -	YS-11	YS-11
Morane-Saulnier, France	MS760	Morane-Saulnier, MS-760	MS-760
Nihon Aeroplane Manufacturing Co., Ltd., Japan	YS-11	NAMC YS-11	YS-11
Nord Aviation	262A Super Broussard, Mohawk 298	Nord 262 ND 262/262FM	ND-262
North American Rockwell Corp., USA	B-25 Mitchell	North American	N-B25
	NA-265 Sabreliner, T-39	North American, NA-265	N-265
Northrop Corp., USA	P-61 Black Widow	Northrop P-61	NH-P61
Piaggio, Italy	Piaggio-Douglas 808	Piaggio Douglas PD-808	P-808
Piper Aircraft, USA	PA-42-720 (Restricted)		PA-42R
Raytheon Hawker Corporate Jets (Also see Hawker Siddeley)	BAE-125-11000 DH-125, BH-125, HS-125 Series (except -1000)	Hawker Siddeley 125	BAE-125 HA-125
SAAB-Fairchild International, S-58188 Linköping, Sweden	SAAB-Fairchild 340		SF-340
SAAB Aircraft AB, Sweden	SAAB-2000		SA-2000
Short Brothers and Harland Ltd., Northern Ireland (UK)	SD3-30, SD3-60 Variant 200	SD3-30	SD-3
Sikorsky Aircraft Division of United Aircraft Corp., USA	VS-44AC-32, C-34 S-43	Sikorsky VS-44 Sikorsky S-43	SK-44 SK-43
Sud Aviation, France	SE Caravelle I, II VIR	SUD 210	S-210
Swearingen Fairchild Aircraft Corp.	SA 226-TC, SA-227-AC, BC, AT, TT SA-227-DC		SA-227
	C-26A, C-26B, SA-227-CC		
Vickers-Armstrong British Aircraft Corp., UK	700 and 800 Series	Vickers Viscount	VC-700, VC-800



## OPERATIONAL RESTRICTIONS

Applicants for type ratings on aircraft for which a type rating is required under 14 CFR section 61.31, and which are not listed in appendix 2, will be required to present evidence that at least one aircraft of the type concerned has been issued an aircraft type certificate for civilian use.

NOTE: Since experimental aircraft are not issued type certificates, they are not eligible for pilot type ratings.

The following operational restrictions pertaining to type ratings will appear as limitations rather than as a part of the type rating on certificates:

1. Amphibian type ratings, such as CV-PBY5, will be repeated under limitations (Item XIII) with appropriate restrictions; i.e., CV-PBY5 LIMITED TO SEA, unless proficiency has been demonstrated on both land and water.
2. Type ratings restricted to VFR will be repeated under limitations (Item XIII) with appropriate restrictions; i.e., N-B25, VFR ONLY.

### Airplane Multiengine Class Rating Limited To Center Thrust

Airplane multiengine class ratings are issued based on either the successful completion of an FAA practical test or on military qualification. A class rating issued for an airplane for which no minimum control speed has been established by the manufacturer, shall be limited to center thrust. The aircraft listed below are aircraft which are center thrust limited. A listing of specific makes and models of military aircraft for which a center thrust limitation is not required is also provided.

The FAA General Aviation and Commercial Division, AFS-800, determines any modifications to these lists. When a determination is made by AFS-800, the manufacturer's data and 14 CFR part 23 or part 25 criteria are used.

#### With Center Thrust Limitation

1. Cessna 336/337, T-37
2. Fairchild Republic A-10 Thunderbolt
3. General Dynamics F-111
4. Grumman A6-E Intruder
5. McDonnell-Douglas F-4 Phantom
6. McDonnell-Douglas F-15 Eagle
7. Northrop/McDonnell-Douglas F-18A Hornet
8. Northrop T-38 Talon
9. Rockwell International T2 Buckeye

#### Without Limitation

1. Cessna A-37 Dragonfly
2. Grumman American F-14 Tomcat

In the case of an applicant who requests the issuance of a multiengine class or type rating based on military qualification in an aircraft not listed herein, but for which the manufacturer has not provided documentary evidence of a minimum control speed for that aircraft, all available data shall be forwarded to AFS-800 for review and evaluation to determine the limitations necessary. It is expected that aircraft models will be added to, or deleted from, this list by AFS-800 as circumstances warrant in the future.