AVIA 4313
TURBINE TRANSITION
UNIVERSITY OF OKLAHOMA

_____ _____, 20_____

I, _____, have acquired and have in my possession a copy of the training course outline, training syllabus, and safety procedures and practices for AVIA 4313, Turbine Transition.

_____
Student Signature

_____
Flight Instructor Signature

_____
Chief Flight Instructor Signature

UNIVERSITY OF OKLAHOMA
TURBINE TRANSITION

COURSE OBJECTIVE: The student will obtain knowledge of gas generators, turbofans and turboprops. The student will also gain knowledge about various electrical, environmental, hydraulic, and fuel systems including theory of operations and calculations. Additionally, the student will be introduced to the principles, operation and limitations of advanced electronic navigation, flight director and automatic flight control systems, including flight management systems.

COURSE COMPLETION STANDARD: The student will demonstrate through oral discussion, written and oral quizzes, written tests, and records a minimum of a 70% passing grade throughout the turbine transition course. The course is complete when the student can fly the aircraft within the standards set forth in each lesson.

AIRPORT: Max Westheimer Airport is the operations base for training in this course. Max Westheimer Airport has a hard surface runway and meets the requirements of Section 141.38 of FAR's for day and night operation. Fuel is available from 7:00 A.M. to 10:00 P.M. daily. Maintenance is available from 6:30 A.M. to 3:00 P.M. Monday through Friday and at other times on call. Training will originate at Max Westheimer Airport.

AIRPORT FACILITIES: The Department of Aviation of the University of Oklahoma is located in the Max Westheimer Airport terminal building and the Aero Mechanical and Nuclear Engineering (AMNE) building on the North Campus area of the University of Oklahoma. The facilities available for student training are described in Appendix E of this Training Course Outline.

AIRCRAFT: The aircraft to be used in this course of training meet the requirements of Section 141.39 of the FAR. VFR airplanes are equipped for day and night VFR as specified in Section 91.205 of the FAR. Radio equipment will consist of at least one VHF transceiver and at least one VOR receiver. The aircraft used in this course of training are the BE 90, King Air Model C90/B.

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CHIEF FLIGHT INSTRUCTOR: The Chief Flight Instructor will meet the requirements of Section 141.35 and 61.187(b) of the FAR. He/she must be the holder of at least a Commercial Pilot certificate with an airplane category multiengine land class rating, airplane multiengine instrument rating and be qualified to fly high performance, complex and pressurized aircraft. In addition, (s)he must be the holder of a Flight Instructor certificate with an airplane category rating and a multiengine class rating and instrument airplane rating and have at least a second class medical certificate. See Appendix A of this Training Course Outline for Chief Flight Instructor designation.

ASSISTANT CHIEF FLIGHT INSTRUCTOR: The Assistant Chief Flight Instructor will meet the requirements of Section 141.36 and 61.187(b) of the FAR. He/she must be the holder of at least a Commercial Pilot certificate with an airplane category multiengine land class rating, airplane multiengine instrument rating and be qualified to fly high performance, complex and pressurized aircraft. In addition, (s)he must be the holder of a Flight Instructor certificate with an airplane category rating and a multiengine class rating and instrument airplane rating and have at least a second class medical certificate. See Appendix A of this Training Course Outline for Assistant Chief Flight Instructor designation.

FLIGHT INSTRUCTORS: Each flight instructor must be the holder of at least a Commercial Pilot certificate with an airplane category multiengine land class rating, airplane multiengine instrument rating and be qualified to fly high performance, complex and pressurized aircraft. In addition, (s)he must be the holder of a Flight Instructor certificate with an airplane category rating and a multiengine class rating and instrument airplane rating and have at least a second class medical certificate.

CHIEF GROUND INSTRUCTOR: The Chief Ground Instructor will meet the requirements of Section 141.35(e) and 61.187(b) of the FAR. See Appendix A of this Training Course Outline for Chief Ground Instructor designation.

ASSISTANT CHIEF GROUND INSTRUCTOR: The Assistant Chief Ground Instructor will meet the requirements of Section 141.36(e) and 61.187(b) of the FAR. See Appendix A of this Training Course Outline for Assistant Chief Ground Instructor designation.

GROUND INSTRUCTORS: Each instructor used for ground training must hold a Flight or Ground Instructor certificate with airplane single engine and basic or advanced ratings respectively.

OFFICE AND CLASSROOM FACILITIES USED FOR AVIATION STUDENTS: The office and classroom facilities used for the training of aviation students of the University of Oklahoma are described in Appendix D of this Training Course Outline.

COURSE ENROLLMENT: To be enrolled in this course of training you must possess a Commercial Pilot certificate with airplane – multiengine class and instrument ratings. You must also possess at least a third class medical certificate.

REQUIREMENTS FOR GRADUATION: You must satisfactorily complete the training outlined in this syllabus.

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TURBINE TRANSITION

LESSON DESCRIPTION AND STAGES OF TRAINING: Each lesson is fully described within the syllabus, including the objectives, standards, and measurable units of accomplishment and learning. You are expected to complete at least one stage approximately every 90 days. The stage objectives and standards are described at the beginning of each stage within the syllabus.

COURSE POLICY: The course policies for this course of training are outlined in Appendix B of this Training Course Outline.

TESTS AND CHECKS: The syllabus incorporates stage checks in accordance with FAR 141, Appendix F. These checks are given by the chief instructor or the designated assistant at the end of each stage. You will complete the appropriate stage exams, oral briefings, and final examinations described in the syllabus.

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TURBINE TRANSITION
RULES OF OPERATIONS

DISPATCH PROCEDURES -. The instructor will provide a preflight briefing to the student. The instructor's signature on the syllabus sheet for that lesson constitutes permission to dispatch the aircraft. The student will complete the information on the aircraft sign out sheet, the plastic flight plan form, and the Aircraft Information Sheet in the aircraft check out binder. A flight plan will be filed with the appropriate Automated Flight Service Station for all cross country flights. Aircraft keys are kept in a lock box in the dispatch area and will be issued upon completion of the above procedures. The provisions of 14 CFR, Section 91.103 will be met.

STARTING PROCEDURES - All aircraft will be started within the ramp area of the Department of Aviation unless otherwise designated by the Chief Flight Instructor or his designee. All starting procedures will comply with the procedures stated in the Pilots Operating Handbook for that aircraft.

TAXIING PROCEDURES - Taxi on yellow depicted taxi routes and at a slow and reasonable speed (use 10 miles per hour as a guide). Spacing between aircraft on taxi routes will be a minimum of two ship lengths. During the day, operate the anti-collision lights while taxiing. Use position lights and the landing light at night. To minimize the chance of runway incursion, read back taxi instructions, particularly hold short, position and hold, runway crossing and takeoff clearances. When obtaining complex taxi clearances at unfamiliar airports write down the clearance, have an airport diagram available and request progressive taxi if needed.

FIRE PRECAUTIONS - During fueling operations the aircraft involved will be unoccupied. Fire extinguishers will be present when fueling is in progress. In the event of aircraft fire during engine start or taxiing, follow the emergency procedures in the aircraft POH. If there is any doubt about whether emergency procedures are working to extinguish the fire, evacuate the aircraft immediately.

REDISPATCH PROCEDURES – Given that all flight lessons have an instructor on board, in the event of a diversion and landing at an unscheduled destination, the instructor may continue the lesson without notification to the aviation department. The instructor will notify the aviation department at 405-325-7231 (Long Distance in-state toll free 1-800-522-0772, ext. 7231) or the OU mobile phone 405-919-6319, if the unscheduled stop will delay the return of the aircraft to the point of impacting the flight schedule.

AIRCRAFT DISCREPANCIES: Upon noticing a discrepancy the pilot in command will take the following actions:

- Place the plastic "Maintenance Required" sign in the windshield of the aircraft (this sign is in a loose leaf binder in the aircraft).
- Complete Form OUAVMAIN #2 (copies of this form are in a loose leaf binder in the aircraft). When filling out the "Maintenance Problem" section, be as specific as possible. Provide the top copy to the mechanics in the hangar and place the yellow copy on the Aircraft Sign Out Sheet. If the mechanics are not available, place the top copy of the form in the maintenance in-box in the dispatch section. If the main office is closed, put both copies of the form in the envelope slot in the hangar door.

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TURBINE TRANSITION
RULES OF OPERATIONS

APPROVAL FOR RETURN OF AIRCRAFT TO SERVICE: The mechanics will take whatever corrective actions are required to return the aircraft to service. Upon returning the aircraft to service the mechanics will place the "Maintenance Required" sign back in the lose leaf notebook and notify the main office. At that time the plastic flight plan will be turned back over and the yellow copy of OUAVMAIN #2 placed in the mechanics in-box. If the discrepancy can't be corrected immediately, but the mechanics determine the aircraft is still airworthy, this information will be noted in the "Maintenance Performed" section along with any required operating limitations due to the discrepancy. Inoperative equipment will be removed or deactivated and placarded IAW 14 CFR, Section 91.213. If the MEL permits, the aircraft may then be returned to service and flown within any operating limitations required by the MEL.

SECURING AIRCRAFT - The pilot in command is responsible for securing aircraft on the ramp. Only aviation department personnel and contract personnel from the FBO may hangar aircraft. Students may assist in hangaring aircraft under the supervision of these personnel. All university aircraft will be secured with tie-down ropes or chocks while unattended on the Department of Aviation ramp. On cross country flights, the pilot in command will make tie-down arrangements with the local FBO for securing the aircraft. At no time will an aircraft be left unattended without it being secured by wheel chocks or tie-down ropes. When returning aircraft to the ramp in front of the terminal, solo students will not park the aircraft in the first row by the fence.

AIRCRAFT AVOIDANCE - No person may operate an aircraft so close to another aircraft as to create a collision hazard either on the ground or in the air. At all times, the Pilot-in-Command will be responsible for, and actively use "See and Avoid" procedures as described in the AIM, Chapter 7, Section 5 and comply with the right of way rules specified in 14 CFR, Section 91.113.

FUEL RESERVES - At no time will a department aircraft depart on a flight without the minimum fuel required by 14 CFR, Section 91.151 for VFR flights or 91.169 for IFR flights.

MINIMUM ALTITUDES - Minimum altitude for instrument training under VFR with the exception of landing practice is 600' AGL or higher if the minimum altitude applicable in 14 CFR, Section 91.119 is higher than 600' AGL. Minimum altitudes for IFR operations will be in accordance with 14 CFR, Sections 91.175 and 91.177. Minimum altitude for failing an engine and feathering its propeller is 3000 feet AGL. At altitudes lower than 3000 feet AGL, engine failures will be simulated by reducing torque and feather will be simulated by establishing zero thrust (100 ft-lbs torque, 1800 RPM). Simulated engine failures will be initiated above 500 feet AGL.

PRACTICE AREAS - The University utilizes several practice areas for flight training. These areas are depicted in Appendix C of this Training Course Outline.

WEATHER MINIMUMS

Instrument training under VFR will be in accordance with the basic VFR weather minimums in 14 CFR, Section 91.155. For IFR operations, minimum weather for landings will be in accordance with 14 CFR, Section 91.175. For takeoffs, the ceiling and visibility will be equal to or greater than the lowest Category A aircraft instrument approach minimums at the departure airport. If prevailing winds dictate a circling procedure, the lowest Category A circling minimums will apply. Determination of the requirement for an alternate airport will be in accordance with 14 CFR, Section 91.169.

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TURBINE TRANSITION
RULES OF OPERATIONS

WIND LIMITS:

Dual: Maximum 35 knots - Maximum 15 knots gust spread

Crosswind: Crosswind limits will not exceed those specified by the Pilots Operating Handbook for the aircraft to be flown.

AIRCRAFT CHECKLIST/KEY TURN IN: After completing the flight and securing the aircraft, the student will record the hobbs time on the Aircraft Information Sheet and return the aircraft checklists and keys to the dispatch area. Give the keys to a staff member for return to the lock box and complete the information on the Aircraft Sign Out Sheet. Return the syllabus sheet to the instructor for further processing.

ATTENDANCE - TARDINESS:

Students are expected to attend all scheduled ground and flight training lessons. In the event of sickness or accident, call the Aviation Department at 325-7231. Do not make a determination of attendance due to weather. If in doubt, call the Aviation Department. Excessive absences or tardiness, are grounds for removal from the course.

UNIVERSITY OF OKLAHOMA
TURBINE TRANSITION
GROUND TRAINING AND READING ASSIGNMENTS

STAGE	LESSON	ASSIGNMENTS	HOURS	
STAGE I	1	- TPFM Chapter 3 - KASM, Ch 7	3.0	
	2	- TPFM, Chapter 3 - KASM, Chapter 7	3.0	
	3	- TPFM, Chapter 4 - KASM, Chapter 2 - KAPOH, Sections 4 & 5	3.0	
	4	**Review & Exam**		1.0
STAGE II	1	- TPFM, Chapter 4 - KASM, Chapter 9	1.5	
	2	- TPFM, Chapter 5 - KASM, Chapter 15	1.5	
	3	- AIM, Chapter 8, - TPFM, Chapter 5 - KASM, Chapters 11 & 12 &16 - KAPOH, Sections 4 & 5	3.0	
	4	- TPFM, Chapter 5 - KASM, Chapter 5 - KAPOH, Sections 4 & 5	1.5	
	5	**Review & Exam**		1.0
STAGE III	1	- TPFM, Chapter 6 - KASM, Chapter 10 - KAPOH, Sections 4 & 5	1.5	
	2	- TPFM, Chapter 6 - KASM, Chapters 4 and 14 - KAPOH, Sections 4 & 5	1.5	
	3	- TPFM, Chapters 7 & 10 - KAPOH, Sections 2 & 5	3.0	
	4	- TPFM, Chapter 11 - KAPOH, Section 6	1.5	
	5	**Review & Exam**		1.0
STAGE IV	1	- TPFM, Chapter 14 - KASM, Chapter 16 - KAPOH, Avionics Supplement	1.5	
	2	- TPFM, Chapter 13 - KASM, Chapter 16 - KAPOH, Avionics Supplement	3.0	
	3	- TPFM, Chapter 9 - KAPOH, Sections 3 & 4	1.5	
	4	- TPFM, Chapter 15	1.5	
	5	- TPFM, Chapter 16	1.5	
	6	**Review & Exam**		1.0
TOTALS			**33.0**	**4.0**

Note: The readings referred to in this syllabus are based on The Turbine Pilots Flight Manual (TPFM), King Air Systems Manual (KASM), King Air POH (KAPOH) and the Aeronautical Information Manual (AIM). The hours designated for each lesson are suggested guidelines only, and may vary at the instructor's discretion. In no case will the total hours of instruction be less than the total number of hours defined in this syllabus.

STAGE I

STAGE OBJECTIVE

During this stage, the student will be introduced to the various types of gas generators, turbofans, and turboprops, along with the different types of thrust reversers. Additionally, the student will obtain knowledge of the various propeller systems. The student will also become familiar with the various types of electrical systems. The student will also become knowledgeable about the BE90 engines, propeller system and electrical system.

STAGE COMPLETION STANDARD

This stage is complete when the student has taken the Stage I written exam with a minimum passing score of 70%, and the instructor has reviewed each incorrect response to ensure complete understanding before the student progresses to Stage II.

STAGE I, GROUND LESSON 1

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: During this lesson, the student is introduced to gas generators, turbofans, and turboprops, along with the various types of thrust reversers. The student is also introduced to the BE90 turboprop engine.

CONTENT:

Gas Turbine Engines
- gas generators
- compressors
- turbines

Compressors
- centrifugal flow
- axial flow

Multi Stage/Multi Spool Engines
- low pressure turbines
- N1 Shaft≅
- high pressure turbine
- N2 Shaft≅

Turbojet Engines
- principles of operations
- advantages
- disadvantages

Turbofan Engines
- principles of operations
- advantages
- disadvantages

Turboprop Engines
- principles of operation
- direct-drive turboprop
- free-turbine turboprop

Engine Operating Parameters
- engine pressure ratios (EPR)
- exhaust gas temperatures (EGT)
- interstage turbine temperatures (ITT)

Turbine Engine Starting
- hot start
- igniters

Thrust Reversers
- purpose
- types used on jets
  - -clamshell
  - -cascade
  - -petal door
- reverse thrust on turboprops
- use of reversers

BE90 Engines
- Gas Generation Module
- Power Module
- Engine Gauges
- Engine Controls
- Engine Limitations
- Starting Procedures

COMPLETION STANDARDS:

The student will exhibit knowledge of turbine engines in general and BE90 engines in particular through guided discussion before progressing to lesson 2.

STAGE I, GROUND LESSON 2

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE:
During this lesson, the student learns the various types of propeller systems found on turbine aircraft. Additionally, the student will become thoroughly familiar with the propeller system found on the BE90. The student will also review basic multi-engine aerodynamics including critical engine concepts and V-speeds.

CONTENT:
Multi-engine Aerodynamics Review
- Critical Engine
- Vmc and Factors Affecting Vmc
- Vyse and Factors Affecting Vyse
- Impact on Performance When Shutting Down an Engine

Turboprop Propeller Systems
- Propeller Controls and Governors
  - primary governor
  - overspeed governor
  - fuel topping governor
  - Beta governor
- Propeller Auto-Feather System
- Propeller Synchrophasers

BE90 Propeller System
- Propeller Controls
- Governor Systems
- Auto-Feather System
- Synchophaser System
- Propeller Systerm Checklists

COMPLETION STANDARDS:
The student will exhibit thorough knowledge of multi-engine aerodynamics, the various types of propeller systems and terminology as well as the BE90 propeller system through guided discussion before continuing to the next lesson.

STAGE I, GROUND LESSON 3

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE:
During this lesson, the student will learn the basic principles of powered aircraft systems, basic electrical system concepts and the electrical system of the BE90.

CONTENT:
Basics of Aircraft Power Systems (Source, Supply, Storage, Transmission, Output Devices, Directional Control and Regulation)
Electrical Power Sources
- Generator - Direct Current(DC) vs. Alternating Current(AC)
- Battery - Ni-cad vs. Lead Acid

Transmission and Grounding
Control Devices
- Generator Control Units (GCU)
- Relays
- Solenoid

Electrical Conversion Devices
- Transformer-Rectifier Units (TRU)
- Inverters

Electrical Faults
- Shorts
- Opens
- Logic

Circuit Protection Devices
- Circuit Breakers
- Current Limiters and Fuses
- Diodes
- Hall Effect Devices

Bus Bar Systems
- Battery Bus
- Hot Bus
- AC and DC Busses
- Bus Ties and Bus Isolation

BE90 Electrical System
- Battery
- Starter/Generator
- Bus Bar System
- Circuit Breakers
- Controls and Gauges
- Electrical System Checklists

COMPLETION STANDARDS:
The student will demonstrate thorough knowledge of the basic concepts of aircraft power systems, electrical systems in general and the BE90 electrical system through a guided discussion before progressing to the next lesson.

STAGE I, GROUND LESSON 4 STAGE I EXAM

LESSON OBJECTIVE:
This exam evaluates the student's comprehension of the material presented in Stage I.

CONTENT:
Stage I Exam

COMPLETION STANDARDS:
This lesson and stage are complete when the student has completed the exam with a minimum passing score of 70%, and the instructor has reviewed the exam with the student to ensure complete understanding before progressing to the next stage.

STAGE II

STAGE OBJECTIVE

During this stage, the student will be introduced to the various hydraulic systems, control inputs, and pressurization and fuel systems found with turbine aircraft. The student will also receive thorough knowledge of the related systems for the BE90.

STAGE COMPLETION

This stage is complete when the student has taken the Stage II written exam with a minimum passing score of 70%, and the instructor has reviewed each incorrect response to ensure complete understanding before the student progresses to Stage III.

STAGE II, GROUND LESSON 1

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE:
During this lesson, the student is introduced to turbine aircraft hydraulic systems as well as the various pneumatic systems. The student will also receive a thorough understanding of the related systems in the BE90.

CONTENT:
Hydraulic Power Systems
- Hydraulic Pumps
- Hydraulic Motors
- Hydraulic Cylinders
- Hydraulic Lines
- Valves
- Reservoirs
- Hydraulic Accumulators

Pneumatic Power Systems
- High-Pressure Bleed Air
- Pressure Regulator
- Low-Pressure Air
- Equipment that uses low pressure air

Auxiliary Power Units
BE90 Hydraulic Systems
- Landing Gear
- Brakes

BE90 Pneumatic System
- Bleed Air
- Vacuum Ejector
- Instruments
- Door Seal
- Wing Deice
- Ruder Boost

COMPLETION STANDARDS:
The student will exhibit knowledge of the hydraulic and pneumatic systems and Auxiliary Power Units as well as the BE90 hydraulic and pneumatic systems through a guided discussion before continuing to the next lesson.

STAGE II, GROUND LESSON 2

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE:
During this lesson, the student will be introduced to the various flight control systems found with turbine aircraft. Additionally, the student will become familiar with the flight control systems in the BE90.

CONTENT:
Control Surfaces
- Flaps and Leading Edge Devices
- Ailerons
- Roll Spoilers
- Ground Spoilers and Lift Dump Mechanisms
- Flight Spoilers and Speed Brakes
- Control Tabs

Flight Control Redundancy
Flight Control Actuation
- Manual
- Hydraulic
- Fly-By-Wire

Flight Control Position Indicating Systems
Computer Interface
BE90 Primary Flight Controls and Actuation
    - Rudder
    - Elevator
    - Ailerons

BE90 Secondary Flight Controls and Actuation
- Trim (Elevator, Rudder, Ailerons
- Flaps
- Rudder Boost

COMPLETION STANDARDS:
The student will exhibit knowledge of the different control surfaces found with turbine aircraft and the flight control systems of the BE90 through a guided discussion before progressing to the next lesson.

STAGE II, GROUND LESSON 3

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE:
In this lesson, the student will be introduced to high altitude physiology, pressurization and environmental systems found with turbine aircraft. In addition, the student will learn the specific pressurization and environmental control systems on the BE90.

CONTENT:
High Altitude Physiology
- Environment at High Altitude (Pressure and Temperature)
- Respiration
- Effects of Prolonged Use of Supplemental Oxygen
    - Hypoxia (Causes, Symptoms, Effect On the **B**ody- Time Of Useful Consciousness, Corrective Actions)
- Trapped Gas (Causes, Symptoms, Effect On the Body, Corrective Actions)
- Evolved Gas (Causes, Symptoms, Effect On the Body, Corrective Actions)

Pressurization
    -Components (Pressure Vessel, Air Source, Exhaust Valve, Safety Valve)
    - Indicators (Cabin Altitude, Cabin Rate of Climb, Pressure Differential)
    - High Cabin Altitude Warming System and Indicator
    - Pressure Controller Operation (Altitude and Rate of Climb)
    - Emergency Situations - Rapid Decompression

Environmental Systems
    - Heat Exchangers
    - Air Cycle Machines (ACM)
    - Vapor Cycle Machines (VCM)

BE90 Pressurization and Environmental Systems
- Air Sources (Bleed Air and Ram Air)
- Basic Plumbing (Heat Exchangers, VCM and Electric Heating Unit)
- Operation of Pressure Controller
- Operation of Environmental Controls (Automatic Mode Control, Manual Mode Control, Bleed Air Control, Vent Blower Control, Pilot/Copilot Air and Defrost Control Knobs
- System Checks
- Supplemental Oxygen System

COMPLETION STANDARDS:
The student will exhibit knowledge of high altitude physiology, pressurization and environmental systems of turbine aircraft as well as the pressurization and environmental systems of the BE90 through a guided discussion before continuing to the next lesson

STAGE II, GROUND LESSON 4

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE:
During this lesson, the student will learn the various types of fuel systems found with turbine aircraft. In addition, the student will learn the specific systems found on the BE90.

CONTENT:
Fuel Systems
- Fuel Tanks and Vents
- Fuel Pumps (High Pressure, Low Pressure, Auxiliary
- Fuel Controller Unit
- Fuel Valves (Check, Selector, Crossfeed, Dump, Firewall Shutoff)
- Fuel Heaters
- Fuel Management

- Fuel Measurement (Pounds vrs. Gallons, Converting Gallons to Pounds)

BE90 Fuel System
- Tanks (Wing and Nacelle)
- Vents
- Pumps (Boost, Engine Driven, Transfer and Crossfeed)
- Firewall Shutoff Valves
    - Fuel Controller
- Fuel Gauging System
- Fuel Pressure, No Fuel Transfer and Crossfeed Annunciator Lights
- Boost Pump Failure
- System Checks

COMPLETION STANDARDS:
The student will exhibit thorough knowledge on the various types of fuel systems found on turbine aircraft and the fuel system of the BE90through guided discussions before progressing to the next lesson.

STAGE II, GROUND LESSON 5 STAGE II EXAM

LESSON OBJECTIVE: This exam evaluates the student's comprehension of the material presented in Stage II.

CONTENT:
Stage II Exam

COMPLETION STANDARDS:
This lesson and stage are complete when the student has completed the exam with a minimum passing score of 70%, and the instructor has reviewed the exam with the student to ensure complete understanding before progressing to the next stage

STAGE III

STAGE OBJECTIVE

During this stage, the student will gain knowledge of various methods of ice and rain protection, landing gear systems, annunciator systems, fire protections systems as well as limitations, determining performance and weight and balance in turbine aircraft.

STAGE COMPLETION STANDARDS

This stage is completed when the student has taken the Stage III written exam with a minimum passing score of 70%, and the instructor has reviewed each incorrect response to ensure complete understanding before the student progressed to Stage IV.

STAGE III, GROUND LESSON 1

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: During this lesson the student will review environmental factors leading to the formation of structural icing, type of structure icing, impact of structural icing on control and performance and danger of using the autopilot during flight in icing conditions. The student learns the methods of ice and rain protection with turbine aircraft as well as the ice and rain protection systems in the BE90

CONTENT:

Icing Review
- Types of Structural Icing and Environmental Factors Causing Its Formation
- Impact of Structural Icing on Control and Performance
- Dangers of Autopilot Usage During Icing Conditions

Ice Protection
- De-Ice vs. Anti-Ice
    - Ground Icing (Type I, II and IV)
    - Structural (Boots, Bleed Air Thermal, Liquid - Weeping Wing)
    - Propeller (Electric Boots)
    - Engine (Inlet and Inertial Separators)
    - Fuel System (Additives, Heat Exchangers, electric vent heaters)
    - Windshield (Electric, Heated Air-Defrost, Liquid)
    - Pitot/Static and Stall Warning

Rain Protection
- Windshield (Wipers and Chemical Treatment)
- Engine (Auto-Igniters)

Pilot’s Role in Operations of De-Ice/Anti-Ice Systems

BE90 Ice/Rain Protection Systems (Including Controls, Annunciators, Gauges)
- Engines (Ice Vanes, Auto-Ignition, Engine Air Inlet Lip Heat)
- Structure (Boots and Wing Ice Lights
- Fuel System (Prist, oil-to-fuel heat exchanger – fuel controller, electric fuel vent heat)
- Propellers (electric boots)
- Windshield (electric heat, defrost and wipers)
- Pitot/Static and Stall Warning

COMPLETION STANDARDS:

The student will exhibit adequate knowledge structural icing dangers, systems available for ice and raing protection and ice and rain protection systems on the BE90 through a guided discussion before continuing to the next lesson.

STAGE III GROUND LESSON 2

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: During this lesson, the student learns about the landing gear systems, annunciator and warning systems, and about fire protection systems. The student will become familiar with the related subjects dealing with the BE90.

CONTENT:

Landing Gear Systems
- Gear Squat Switchs
- Emergency Gear Extensions
- Brakes and Anti-skid System
- Nosewheel Steering

Annunciator and Warning Systems
- Annunciator or Advisory Panels (Warning, Caution and Status Lights)

Fire Protection Systems
- Fire Detection and Extinguishing Systems
- Cockpit Controls
- Cabin and Cockpit Protection
- Fuel Tank
- Cargo Hold

BE90 Landing Gear, Steering and Brake Systems
- Gear Operation and Controls (Status Lights, Unsafe Light/Horn, Hydraulic Fluid Light/Test
- Steering (Operation, Use of Control Lock)
- Brakes (Operation, Parking Brake)

BE90 Annunciator Panel

COMPLETION STANDARDS:

The student will exhibit adequate knowledge of the landing gear systems, annunciator and warning systems, fire detection and extinguishing systems found with turbine aircraft as well as these systems on the BE90 through guided discussion before continuing to the next lesson.

STAGE III, GROUND LESSON 3

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: This lesson introduces the student to Limitations and performance factors dealing with turbine aircraft. The student will also learn the limitations and how to determine performance for the BE90.

CONTENT:
Limitations
- Airspeeds
- Engines
- Other Systems

Takeoff and Climb Performance
- V1 (Takeoff Decision Speed)
- VR (Rotation Speed)
- V2 (Minimum Takeoff Safety Speed)
- Engine Out Climb

En route Engine Out Performance
Landing Performance
- VREF (Landing Reference Speed)
- Braking Performance

Routine Performance Planning
- TOLD Cards
- Airport Analysis Tables

Cruise Performance: Fuel Planning
BE90 Limitations
- Airspeeds
- Engines
- Other Systems

BE90 Performance
- Takeoff
- Climb
- Enroute
- Descent
- Landing
- Single-Engine

COMPLETION STANDARDS:
The student will exhibit thorough knowledge of limitations and performance factors dealing with turbine aircraft as well as limitations and computation of performance in the BE90 through guided discussion before continuing to the next lesson.

STAGE III, GROUND LESSON 4

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: During this lesson, the student learns the various weight and balance considerations with turbine aircraft. The student will also learn how to compute the weight and balance for the BE90.

CONTENT:

Weight and Balance Terminology
- Maximum Ramp Weight
- Maximum Zero-Fuel Weight (MZFW)
- Maximum Takeoff Weight (MTOW)
- Maximum Landing Weight (MLW)
- Fuel Dump Valves
- Aircraft Weight Categories
- Percent MAC

Weight and Balance Considerations
- CG as Percent MAC
- Aft CG Advantages
- In-flight CG Shift

Determining Weight and Balance in the BE90

COMPLETION STANDARDS:

The student will exhibit adequate knowledge of weight and balance terminology and the considerations dealing with turbine aircraft and how to determine weight and balance in the BE90 through guided discussions.

STAGE III, GROUND LESSON 5 STAGE III EXAM

LESSON OBJECTIVE: This exam evaluates the student's comprehension of the material presented in Stage III

CONTENT:
Stage III Exam

COMPLETION STANDARDS:
This lesson and stage are complete when the student has completed the exam with a minimum passing score of 70%, and the instructor has reviewed the exam with the student to ensure complete understanding before progressing to the next stage.

STAGE IV

STAGE OBJECTIVE

During this stage, the student will be introduced to the performance factors, weight and balance, and the advanced weather and navigation equipment found on turbine aircraft.

STAGE COMPLETION STANDARD

This stage is complete when the student has taken the Stage IV written exam with a minimum passing score of 70%, and the instructor has reviewed each incorrect response to ensure complete understanding.

STAGE IV, GROUND LESSON 1

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: During this lesson, the student is introduced to the various types of weather, terrain and traffic hazard warning systems found on turbine aircraft. In addition the student will learn the hazard avoidance systems on the BE90.

CONTENT:

Weather Avoidance Systems
- Airborne Weather Radar
- Storm scopes
- Satellite Weather Downlink

Traffic Warning and Avoidance Systems – TCAS
Ground Proximity Warning Systems
BE90 Hazard Avoidance Systems
- Airborne Radar
- Satellite Weather Downlink (Text and Radar)
- TCAS
- GPWS

COMPLETION STANDARDS:

The student will exhibit thorough knowledge of hazard avoidance systems in general and the systems on the BE90 through a guided discussion prior to proceeding to the next lesson.

STAGE IV, GROUND LESSON 2

TEST REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: During this lesson the student will be introduced to advanced GPS concepts and Flight Management Systems. Students will also learn the avionics, autopilot and flight directors system of the BE90.

CONTENT:
Advanced GPS Concepts
- Wide Area Augmentation System (WAAS)
- Local Area Augmentation System (LAAS)

Flight Management Systems (FMS)
- Basic Components (Flight Management Computer, Control Display Unit)
- Basic Operation (Identification, Alignment, Route and Performance Pages)

BE90 Avionics
- Radios
- Electronic ADI and HSI
- Flight Director System
- Autopilot System
- Navigation equipment (GPS, VOR, ADF)
- Multi-Function Display (MFD)

COMPLETION STANDARDS:
The student will demonstrate thorough knowledge of GPS WAAS and LAAS, FMS concepts as well as the avionics, autopilot and flight director systems of the BE90 through a guided discussion prior to proceeding to the next lesson.

STAGE IV, GROUND LESSON 3

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: The student will learn checklist design and execution for abnormal and emergency situations in turbine aircraft as well as the abnormal and emergency checklists for the BE90.

CONTENT:
Checklist Execution
-- Memorized Items (Boldface)
-- Cleanup
BE90 Abnormal and Emergency Procedures
-- Abnormal (Air Start, Oil System, Nacelle Tank Switch Failure, Electrical Abnormalities Avionics Switch Failure, Landing Gear, Ice Protection, Static Air, Cracked Windshield
-- Emergency (Airspeeds, Engine Failures, Fuel System, Smoke/Fumes, Electrical Fire, Emergency Descent, Flight Controls, Pressurization, Emergency Exit)

COMPLETION STANDARDS:
The student will demonstrate thorough knowledge of the philosophy behind abnormal and emergency checklist design and execution. The student will also demonstrate understanding of the abnormal and emergency procedures of the BE90 through a guided discussion.

STAGE IV, GROUND LESSON 4

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: The student will learn high altitude aerodynamics and IFR considerations for high altitude operations

CONTENT:

Aerodynamics of High-Speed/High Altitude Aircraft

- -- High-Speed and the Sound Barrier
- -- Swept Wing Aerodynamics
- -- Dutch Roll
- -- Winglets
- -- Stalls

High Altitude IFR Operations

-- Profile Descents
-- Jet Routes
-- Altimetry
-- Reduced Vertical Separation Minimums (RVSM)

COMPLETION STANDARDS:

The student will demonstrate thorough knowledge of high altitude aerodynamics and IFR operations through a guided discussion prior to proceeding to the next lesson

STAGE IV, GROUND LESSON 5

TEXT REFERENCE: See Ground Training and Reading Assignments

LESSON OBJECTIVE: The student will learn high altitude weather and its impact on turbine operations.
The Tropopause
The Jet Stream
Cirrus Clouds
Clear Air Turbulence
Condensation Trails
Thunderstorms

COMPLETION STANDARDS
The student will demonstrate thorough knowledge of high altitude weather and its impact on turbine operations through a guided discussion.

STAGE IV, GROUND LESSON 6 STAGE IV EXAM

LESSON OBJECTIVE: This exam evaluates the student's comprehension of the material presented in Stage IV.

CONTENT:
Stage IV Exam

COMPLETION STANDARDS:
This lesson and stage are complete when the student has completed the exam with a minimum passing score of 70%, and the instructor has reviewed the exam with the student to ensure complete understanding.

FLIGHT TRAINING

LESSON	DUAL	INST DUAL	XC DUAL	PRE/POST FLIGHT
1	1.5			1.0
2	2.0	1.0	1.0	1.0
3	1.5	1.0		1.0
TOTAL	**5.0**	**2.0**	**1.0**	**3.0**

*The individual lesson times shown on this table are for instructor/student guidance only, they are not mandatory for a given lesson. However, by the end of lesson 3, the total hour requirements in each category will be met.

During each lesson the instructor will also assume the role of non-flying pilot and will assist the student with execution of checklists, radios and navigation.

FLIGHT LESSON 1

LESSON OBJECTIVE: To develop the student's skill in basic aircraft operations. The student will perform normal checklists including normal starts and ground operations, as well as, basic air work. The student will also be introduced to emergency descents and single engine landings.

CONTENT:

PREFLIGHT PREPARATION
- Preflight
- Performance Figures and Limitations

GROUND OPERATIONS
- Before Engine Start
- Engine Starting
- Before Taxi
- Taxi
- Before Takeoff
- After Landing
- Shutdown and Securing

AIR OPERATIONS
- Normal Takeoff and Climb
- Turns
- Minimum Controllable Airspeed
- Imminent Stalls
- Steep Turns
- Single Engine Maneuvering
- Emergency Descent
- Normal Approach and Landing
- Engine Failure During Takeoff, Climb, Cruise and Approach to Landing
- Single Engine Approach and Landing

COMPLETION STANDARDS

At the completion of this lesson the student will be able to perform all normal checklists and engine failure checklists. During takeoff and landing the student will demonstrate good directional control. Liftoff, climb, approach, and touchdown speeds will be within 10KIAS of that desired. All other maneuvers will be done with +/- 150 feet of altitude, 10 degrees of heading, +/- 10KIAS of that desired.

UNIVERSITY OF OKLAHOMA

STUDENT NAME _____ ID# _____

INSTRUCTOR NAME _____ CERT# _____

AIRCRAFT # **CRM 37** STAGE # **TURBINE** LESSON # **1**

SAT _____% UNSAT _____% INCOMPLETE ____% CANCELLATION_____

HOMEWORK COMPLETE: Y / N (% grade is normally part of the lesson grade.)
Note:
1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.

REMARKS: _____
FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS

_____
_____
_____
_____

FOR XC FLIGHTS, LIST DESTINATIONS: _____

DI	Dnt	Dxc	Idl	AATD	CA	PP	GI
?					?	?	

DATE: _____

TIME: IN _____ ENTERED BY _____
OUT _____ SYLL. LESSON _____
TOTAL _____ PROCESSED ON _____

HOBBS: IN _____ REMARKS: _____
OUT _____ _____
TOTAL _____ _____

STUDENT SIGNATURE _____

INSTRUCTOR SIGNATURE _____

FLIGHT LESSON 2

LESSON OBJECTIVE: To develop the student's skill with cross country preparation and planning, high altitude operations, and flying precision and non-precision approaches. The student will plan a cross country flight of at least one hour duration. The remainder of this 2 hour flight will then be available for instrument approaches. The student will be able to identify abnormal and emergency situations presented by the instructor and call for the appropriate checklist.

CONTENT:

LESSON REVIEW

- Execution of checklists
- Taxiing
- Normal takeoff and climb
- Normal Landings

CROSS COUNTRY PROCEDURES

- Enroute Climb and Cruise (VR and IR)
- Use of autopilot and flight director
- Use of pressurization system
- Use of flight director and autopilot
- Use of De-Ice and Anti-Ice Systems
- Use of Radar
- Use of Multi-Function Display, Including Receipt of Weather Information
- Descent

TERMINAL PROCEDURES

- Precision Approach – coupled (IR)
- Non-Precision Approach (IR)
- Single Engine Instrument Approach, Non-Precision (IR)
- Normal Landing
- Engine Shutdown and Secure

COMPLETION STANDARDS

The student will demonstrate knowledge of BE90 performance and limitations in preflight planning. The student will perform the aircraft preflight without assistance. The appropriate checklists will be called for and executed correctly. The student will demonstrate proper usage of aircraft systems and will correctly execute one precision and one non-precision approach and a single engine non-precision approach. The student will maintain altitude +/- 100 feet and headings +/-100 feet and airspeeds within +/- 10 knots.

UNIVERSITY OF OKLAHOMA

STUDENT NAME _____ ID# _____

INSTRUCTOR NAME _____ CERT# _____

AIRCRAFT # **CRM 37** STAGE # **TURBINE** LESSON # **2**

SAT _____% UNSAT _____% INCOMPLETE ____% CANCELLATION_____

HOMEWORK COMPLETE: Y / N (% grade is normally part of the lesson grade.)
Note:

1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.

REMARKS: _____
FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS

_____

_____

_____

_____

FOR XC FLIGHTS, LIST DESTINATIONS: _____

DI	Dnt	Dxc	Idl	AATD	CA	PP	GI
?		?	?		?	?	

DATE: _____

TIME: IN _____ ENTERED BY _____
OUT _____ SYLL. LESSON _____
TOTAL _____ PROCESSED ON _____

HOBBS: IN _____ REMARKS: _____
OUT _____ _____
TOTAL _____ _____

STUDENT SIGNATURE _____

INSTRUCTOR SIGNATURE _____

FLIGHT LESSON 3 FINAL STAGE CHECK

OBJECTIVE:

During this stage check the student will demonstrate knowledge of BE90 systems, normal procedures, precision and non-precision approaches as well as abnormal and emergency procedures as selected by the evaluator. The evaluator will also perform the duties of an FO to assist the student with execution of checklists, set u and brief instrument approaches* and handle radio communications. The student will demonstrate proficiency at flying the aircraft, executing approaches and using the flight director and autopilot.

* For an phase of the flight in which the autopilot is engaged the student will be responsible to set up and brief instrument approaches.

CONTENT:

Preflight
Taxiing
Takeoff and Climb
Precision Instrument Approaches (Coupled and Non-Coupled) (IR)
Non-Precision Approaches (IR)
Simulated Engine Failure During Takeoff, Climb, Approach and Landing (VR/IR)
Normal Landing
Engine Shutdown and Secure

COMPLETION STANDARDS

The student will demonstrate knowledge of the BE90 systems, performance and limitations. During flight, altitudes will be maintained +/- 100 feet and headings +/- 10 degrees and airspeeds within +/- 10 knots. Instrument approach procedures will be performed to the standards proscribed by the Instrument (Airplane) Practical Test Standards. The student will demonstrate proficiency in use of the flight director and autopilot systems.

UNIVERSITY OF OKLAHOMA

STUDENT NAME _____ ID# _____

INSTRUCTOR NAME _____ CERT# _____

AIRCRAFT # **CRM 37** STAGE # **TURBINE** LESSON # **3C**

SAT _____% UNSAT _____% INCOMPLETE ____% CANCELLATION_____

HOMEWORK COMPLETE: Y / N (% grade is normally part of the lesson grade.)
Note:

1. Circle appropriate status/grade and put number (%) grade on line.
2. If cancellation state reason.

REMARKS: _____
FOR I OR U: SUBJECTS THAT ARE NOT COMPLETE/INSTRUCTOR COMMENTS

_____

_____

_____

_____

FOR XC FLIGHTS, LIST DESTINATIONS: _____

DI	Dnt	Dxc	Idl	AATD	CA	PP	GI
?			?		?	?	

DATE: _____

TIME: IN _____ ENTERED BY _____
OUT _____ SYLL. LESSON _____
TOTAL _____ PROCESSED ON _____

HOBBS: IN _____ REMARKS: _____
OUT _____ _____
TOTAL _____ _____

STUDENT SIGNATURE _____

INSTRUCTOR SIGNATURE _____

APPENDIX B
UNIVERSITY OF OKLAHOMA
COURSE POLICIES

1. At the discretion of the instructor, students who progress rapidly within a specific stage, may within reasonable variances, continue to the next lesson with less time than is specified in the specific lesson curriculum, provided all content and completion standards are satisfactorily completed. The time stated in the lesson is the approximate minimum time that a student would need to meet the lesson objectives and completion standards; not absolute required times. The lesson time could be slightly more or slightly less. These reduced hours must be included in other lessons to complete the total ground or flight time specified by category in the training course outline in order to satisfactorily complete the course.

2. At no time will a student be allowed to continue to the next stage without having successfully completed all of the lessons and the required tests or stage checks related to the completion of the previous stage.

3. Any lesson stated as a FTD lesson may be flown in an aircraft, ATC-710 or PCATD. The lesson will include the required pre- and post-flight procedures.

4. Flight training for this course will be done in accordance with the F.A.A approved syllabus. Deviations from the syllabus due to student training requirements, weather related factors, or other items as necessary will be allowed as long as the following requirements are met:

1.) A notation will be made in the student training record as to the lesson covered and the reason for the deviation.

2.) The student will complete all syllabus requirements before a graduation certificate is issued.

5. To satisfactorily complete the course of training, the student must meet all course objectives and completion standards. The student must have satisfactorily completed all required ground school courses and have completed the minimum flight time stated at the end of the course for each category as well as total flight time.

APPENDIX C
UNIVERSITY OF OKLAHOMA
PRACTICE AREAS

The University of Oklahoma Department of Aviation has three (3) practice areas used for normal flight training operations on a daily basis. They are designated practice area 'A', 'B', and 'C'.

Practice area 'A is described as an area southwest of Max Westheimer Airport bounded on the north by State Highway 9, on the south by the 35° line of latitude, on the west by the line extending north and south along a similar direction road extending south from the town of Blanchard, and on the east by the line formed by the railroad tracks running southeast from Norman, OK along and near Interstate Highway 35.

Practice area 'B' is described as an area southeast of Max Westheimer Airport bounded on the north by State Highway 9, on the south by State Highway 33, on the west by the railroad tracks extending southeast from Norman, OK, and on the east by an imaginary line extending south from the east side of Lake Thunderbird and ending at State Highway 33.

Practice area 'C' is described as an area west of Max Westheimer Airport bounded on the north by an imaginary line extending west from State Highway 9 southwest of Norman, Ok. to the town of Pocasset, OK., on the south by the 35° line of latitude, on the west by the line extending north and south along a similar direction road extending north from the town of Chickasha, OK. and on the east by the line extending north and south along a similar direction road extending south from the town of Blanchard, OK.