# ***COMMERCIAL PILOT - PLAN of ACTION***

## *Multi-Engine Add-On*

## *CESSNA 310R*

## *AMEL*

***Ref: PTS FAA-S-8081-12B 08/2002***

Scott Tekell, DPE
Revised 09-27-2009

# A D M I N I S T R A T I V E

NAME:_____ PHONE:_____
Cell:_____DATE:_____

INSTRUCTOR'S NAME:_____
PHONE:_____Cell:_____

AIRCRAFT:_____ N#_____RETAKE Y/N:___

LOCATION:_____

APPLICANT FTN#_____

Overview of test
a. Approximate time required
   1. Ground phase, Flight phase, oral phase(oral is conducted throughout the evaluation).
b. Advise of note taking/use of POA.
c. Rules regarding PIC for the flight.
d. Rules for discontinuance of the test.

. Grading criteria
a. Practical Test Standards, maneuvers based on Commercial PTS.
b. Oral testing may take place during flight.

Ask for any questions from the applicant. **Collect fee** from applicant.

**Eligibility**

1. Application - 8710.1 Completed in IACRA
2. Identification - Picture ID, AC 61-65C.
3. Commercial Pilot Certificate
4. Medical certificate - third class medical.
5. Minimum age - 18, FAR 61.123
6. English - read, write, & converse fluently in English.
7. Be of good moral character.
8. Aeronautical Experience in accordance with FAR 61.159
9. Required equipment:
   a. Aircraft Documents - (AROW)(FAR 91.203)
   b. Aircraft Maintenance Records-
      1. Logbook record of airworthiness inspections
      2. AD compliance
   c. POH or FAA approved AFM.
   d. Personal Equipment
   e. View limiting device
   f. Current aeronautical charts
   g. Computer & plotter
   h. Current AIM, A/FD, AIM, CFRs, & PTS, NOTAMS, TFRs, PUBS
10. Pilot logbook endorsements.

***ANY QUESTIONS? "THE EVALUATION WILL BEGIN"***

# B. GROUND PHASE

# I. AREA OF OPERATION: PREFLIGHT PREPARATION

## F. Task: Performance and Limitations

[ ] Do a weight and balance for today's flight (use actual conditions and weights)

Max ramp weight? 5535 lbs
Max landing weight? 5400 lbs
Max take off wt? 5500lbs
Max zero fuel wt? 4900lbs

( ) compute 3 of the following using the aircraft POH

a. **accelerate-stop distance**-total distance required to accelerate the airplane to a specified speed and assuming failure of an engine at the instant that speed is attained, to bring the a airplane to a full stop on the remaining runway.
b. **take-off distance**-using the charts, what is you take off distance?
c. climb performance on two engines, on one engine
d. **service ceiling** on two engines- is the maximum density altitude at which the use of best rate of climb will result in a climb rate of 100 fpm. Single engine- is the maximum density altitude at which the single engine best rate of climb will produce 50 fpm rate of
e. **accelerate-go distance**-distance required to accelerate to liftoff speed and, assuming failure of an engine at the moment lift off speed is attained, to continue the takeoff on the remaining engine to a height of 50 feet..
f. fuel consumption, range and endurance-
g. **What is the landing distance at our take off weight & conditions for this flight?**

**( ) Vne-227kts, Va-148kts , Vmc-81kts, Vyse-107kts, Vx-85kts, Vy-107kts, Best glide-111-102kts, Flap speeds – 0-15, 160kts; 16 +, 140kts, Vlo 140kts, Vno 183kts, Vref 110kts, Vxse 95kts, Vsse 92kts, Vso 67kts, Va 150kts**
**Vr 83kts**

[ ] What are the adverse effect of exceeding the following limitations:

a. **Departing over gross weight**-higher takeoff speeds, longer takeoff run, reduced rate of climb, higher landing speed, longer landing roll,
b. Flight with the CG out of limits
    1. **to far forward**-higher stall speeds, slower cruise speed, lower Vmc
    2. **to far aft**. – lower stall speeds, less stable, higher Vmc,

[ ] c. **Describe the effects of Atmospheric conditions on the airplanes performance**. Why is the Vmc demo not conducted at very high altitudes? ie. 10,000' ? Airplanes with normally aspirated engines will lose power as altitude increases because of the reduced density of the air, this loss of power will result in a lower Vmc which is below the stall speed.

( ) For engine failure during T/O, speed above 80kts, no runway available for landing what should you do while acting as PIC of the C-310?

( ) What does the lower limit of the white arc on the airspeed indicator represent? Power off stalling speed in a landing configuration.

( ) The stalling speed of an aircraft will be highest when the aircraft is loaded how with respect to weight & CG? High gross wt and forward CG

## G. Task: Operation of Systems must ask at least 5

[ ] **Describe the landing gear system**. Each gear is connected to a single gear box aft of the pilots seat. During retraction the step is retracted into the right side of the fuselage. The electric landing gear motor will continue to run until the up/down limit switch disconnects. A safety (squat) switch is on the left main gear shock strut. 3 green is down and lock, 1 red is gear in transit, and no lights gear is up and locked. Gear warning horn come on if either throttle is below 12.0 in Hg. With the landing gear retracted or the flaps are past 15. It will also come on if the gear handle is placed up while the airplane is on the ground.
For manual gear extension only use the check list, not a memory item.

( ) Does this airplane have fowler flaps, plain flap, slotted flaps, or split flaps ? **split** The split flap creates the least, not greatest change in pitching moment. The slotted flap is similar to the plain flap thereby changing the chord line, angle of attack and camber of the wing.
Has electric flap motor with gear reduction for control. There are 2 flaps per side. It has preselect positions of 0, 15, & 35.

[ ] **Describe the engine(s)** IO-520, 285hp 6 cylinder, horizontally opposed, fuel injected engine rated at 285hp at 2700 rpm.

**( )** **Compass Errors:** In the northern Hemisphere if an aircraft is accelerated or decelerated the mag compass will normally indicate how? when on a north or south heading? No problem, it indicates Correctly
What if it is on an east or west heading and accelerated? Indicate a turn to the north.
If it is decelerated while on a east or west heading it will indicate a turn to the south.

( ) Deviation error of the mag compass is caused by what? Certain metals and electrical systems within the aircraft.

( ) Turning error occurs when turning from a northerly or southerly heading. When turning from a south heading the compass indicates the turn but at a faster rate that is actually occurring.

[ ] What is the determining factor for choosing the correct weight/grade of oil? the average ambient temperature

[ ] What is the minimum oil level for flight? 9 qts Min, 12 qts Max

[ ] In flight, what action would you take if the oil temperature exceeds the red line? Refer to the check list

[ ] Explain what takes place in the engine when the throttle(s) are moved forward. When the mixture(s) are moved forward. When the propeller control(s) are moved forward.

[ ] **Explain how the constant speed, full feathering propeller system works**. Explain the high pitch latch on the prop and how they work.

( ) What is the primary advantage of a constant speed Propeller? To obtain a pitch setting that is suitable for each flight situation and power setting.

**[ ]** **If the engine loses oil pressure in flight, what will happen to the propeller and why?** The prop uses governor oil pressure (engine oil boosted by the prop governor) to decrease blade angle (high RPM) and air pressure in the prop cylinder combined with spring tension centrifugal force acting on counterweights to feather the prop. If loss of oil pressure occurs, the prop will feather.

[ ] Why should the propellers be cycle occasionally during cold weather operations? a. keeps the oil warm in the prop hub preventing the oil from congeal

[ ] Explain what happens when the prop lever is moved to feather position.

[ ] **Describe the electrical system.** Battery, Low voltage light, Alternators, Regulators, over voltage relay, Alternator failure sensors,

[ ] **Describe the Alternator.** Two 50 or 60 or 100 amp engine driven alternators supply power to the electrical system and to recharge the battery. Each alternator has a voltage regulator, over-voltage relay, alternator failure sensor, alternator OUT indicator light, and a alternator switch.

[ ] **What type of battery and where is it located?** One 24 volt, 25 Amp lead acid battery is located in the left wing outboard the engine nacelle.

[ ] While in flight, you experience a electrical fire. What action are you going to take and how will you isolate the fire and return the electrical system back to normal?

[ ] **At what voltage is considered low voltage and how is it indicated?** Immediate detection of low voltage is provided by a red low voltage light on the instrument panel. The light will come on when the voltage drops below aprox 25 volts.

[ ] **Name one item that is on the hot battery bus.** Step light, it works with the master/battery off

[ ] **Describe the fuel system .** Each main tank contains an aux pump and constant transfer pump.
The top of each tank has a sniffle valve, it is normally spring loaded closed. If the tank becomes overfull the valve will off-seat and fuel will jettison overboard.
The Aux tanks are rubber bladder cells and they provide fuel to the engines during cruise flight.
The Aux tank fuel is unusable if the engine driven fuel pump fails and can only supply fuel to the respective engine side. (you can not crossfeed from the aux tanks)
There are 2 engine driven fuel pumps, 2 aux pumps, 2 main tank constant transfer pumps and 1 cabin heater pump. Each engine driven pump contains a bypass which returns excess fuel and vapor to the main tanks at all times.
The electric aux pumps are in the bottom of each main tank and are controlled by a 3 position switch. (High, Low, Off)
**High** supplies fuel if the engine driven pump fails.
**Low** prevents vapor lock by purging the fuel lines.
**Engine Priming-** when the primer switch is pressed toward the left, the aux fuel pump operates to prime thru the fuel injector. Same for right engine.
Each main tanks transfer pump is on any time the master is on ,they move fuel from the forward part of the tank to the center baffle area where the fuel is picked up and routed to either the engine driven or aux fuel pump during nose low steep angle descents.
2 color coded fuel selectors(one for each engine) they allow for selection of main fuel, aux fuel, crossfeed, and OFF.
Fuel drains – 1 on each main, 1 on each Aux, 1 for each selector valve, 1 for each crossfeed line. (8 total)
There is a fuel flow gage that indicates fuel flow in pounds per hour for the left and right engine.
There is a fuel quantity gage calibrated in pounds. Fuel weighs more on a cold day due to density.
The volume markings are predicated on 100 grade fuel, Reduce the indicated amount by 4% when 100LL is used.
The fuel gage indicates the fuel in the tank that the fuel selectors are on. When the fuel selectors are in the AUX position, the AUX lights will be on. You can also check the quantity by moving the 3 Position switch on the fuel qty indicator to the desired position.

[ ] What is the capacity of each fuel tank?
Main tanks: 50 gal each usable (51 gal in each tank) 100 gal usable total
Aux tanks: 31.5 gal usable each. (33 gal in each tank) 63 gal usable total

[ ] How are the fuel tanks vented? The main tank is vented by a flush vent on the lower aft portion of the main tank. The Aux tanks are vented thru the main tanks.

[ ] With the left engine is off and the prop feathered, explain how to get fuel from the left main tank to the right engine. Get out the check list! Can you get fuel from the left AUX tank to the right engine?

[ ] Describe how to prime the engine prior to start.

[ ] Describe the AUX fuel system. See fuel system

( ) **Describe the Angle of Attack System** – sensitive lift measurement device providing a continuous evaluation of lift performance regardless of weight, wing loading,attitude, air density or configuration. Normal approach should align with the center mark. When tested the pointer should move to the slow end and the stall warning should sound. Stall warning comes on between 4 & 9 knots above stall.

[ ] Describe your fuel managements techniques. **1.** Always take off on the main tanks. **2.** Run on main tanks for 90 mins. **3.** After 90 mins select the AUX tanks and run on them until fuel is almost gone. **4.** When AUX fuel is almost gone switch back to the mains.

( ) CAUTION: Should fuel priming or aux fuel pump operation exceed 60 seconds, the engine manifold must be purged.

( ) Describe the Heater operation. Does it have any overheat protection? Has overheat warning light, come on at 163C or 325F. Heater is in the nose and overheat can not be reset in flight. When nose gear comes down power is supplied to the vent fan.

( ) Describe the Alternate Air Control, its purpose and when to use it. And when not to use it? Should a decrease in Manifold pressure be experienced when flying in icing conditions, the alternate air doors should be manually opened..

( ) What is Max baggage capacity? 350lbs in nose (less optional equpt) 160 lbs in aft cabin compartment. 120lbs in each wing locker.

[ ] When should the pitot heat be turn on during ground operations? a. to test them and for short interval to remove ice or snow.

Autopilot?
[ ] How many ways can you disconnect the autopilot?
[ ] What is the lowest altitude that you can use the autopilot on during an ILS Approach?
[ ] Can you use the A/P on a single engine approach?
[ ] Explain the preflight check of the A/P

## H. Task: Principles of Flight – Engine Inoperative (Reference Commercial PTS)

[ ] Explain the term **"critical engine."** – the engine that would most adversely affect the performance or handling qualities of the airplane.

[ ] **What factors make an engine critical? ……..**

[ ] Describe $V_{MC}$. Is it always the same value? Why? What are the effects of angle of bank on Vmc?

[ ] **Explain how density altitude, weight, CG, and bank angle affect $V_{MC}$. –** Vmc decreses as altitude increases. This is because power decreases with altitude, the thrust moment of the operating engine lessens, thereby reducing the need for the yawing force of the rudder. Vmc is unaffected by Weight in straight and level flight. For a given bank angle, the greater the aircrafts weight, the lower the Vmc. Rearwrd CG would cause Vmc to be higher.

[ ] Describe the relationship between stall speed and $V_{MC}$.

[ ] Describe what planning factors/decisions you consider prior to each takeoff.

[ ] What configuration would give you the best combination of performance and control?

[ ] If you lost an engine on T/O at 100', what would you do? Including planning, decisions, and single-engine operations.

[ ] In the event of loss of directional control, what procedures would you use to recover? What indications would you have if you slowed below $V_{MC}$?

## SPECIAL EMPHASIS AREA

*EXAMINERS SHALL PLACE SPECIAL EMPHASIS UPON AREAS OF AIRCRAFT OPERATIONS CONSIDERED CRITICAL TO FLIGHT SAFETY, AMONG THESE ARE:*

( ) Positive aircraft control, positive exchange of the flight controls, stall/spin awareness, collilion avoidance, Wake turbulence avoidance, LAHSO, runway incursion avoidance, CFIT, ADM, checklist usage, And other areas deemed appropriate.

[ ] Describe some aerodynamic factors related to spins in a multi-engine airplane. A spin is a uncoordinated stall. The result is a stalled condition which the airplane is yawing in a helical pattern. Being that multi engine aircraft are not required to go through spin certification. Thus it is unknown if a spin in a multi engine airplane would be recoverable.

[ ] What flight situations would you be concerned about entering an unintentional spin? Anytime practicing $V_{MC,}$ Particularly at high density altitudes were stall sped and $V_{MC}$ are close or the same value. Anytime your SE or practicing SE. In the traffic pattern, were you're low to the ground is definitely a concern, and anytime you're turning/banking into the dead engine.

[ ] What would you do if you got into a spin?

## VIII. AOA: EMERGENCY OPERATIONS, F. Task: Emergency Equipment and Survival Gear

[ ] What type of survival gear must be on board your aircraft?
**ELT, Fire Extinguisher**, Life Vests with Strobe Light, Flare, or Pyrotechnic Device, Survival Kit If operation requires an ELT it must be inspected within 12 months after the last inspection. The batteries must be replaced or recharged if the ELT has been in use for 1 cumulative hour or 50% of their useful life. Date for replacing or recharging the battery must be legibly marked on the outside of the transmitter and entered in the aircraft maintenance record.

[ ] What additional equipment does your airplane have?
Medical Kit, Signaling Mirror, Snake Bite Kit, Waterproof Matches, Solar Blanket, Snap Lights, Sun Burn Cream, Chapstick, and Survival Manual.



NAME:_____ DATE:_____

AIRCRAFT M/M:_____ 'N':_____ TIME OFF:_____ ON:_____

# PRE-FLIGHT BRIEFING

[ ] PIC—YOU are the PIC. FAR 61.47.
[ ] Emergencies—Actual & simulated.(200' rule, Vsse-Vyse rule)
[ ] Transfer of flight controls—Positive, If I state, "I have the flight controls," you respond, "You have the flight controls," observe that I have them, then release. Any Questions?
[ ] Collision avoidance precautions.
[ ] Clearing area—clear the area before each maneuver.
[ ] Profile of flight test.
1. Normal takeoff
2. Airwork
3. Short T/O and landings at outlying field, SE pattern
4. Instrument approach(es)
5. RTB, normal landing

[ ] Oral questions during flight.
[ ] Unsatisfactory maneuvers—continue or discontinue.
[ ] Aircraft documents—return to aircraft.
[ ] QUESTIONS?

## II. AREA OF OPERATION: PREFLIGHT PROCEDURES (line check)

[ ] A. TASK: Preflight Inspection – verifies aircraft safe for flight.
[ ] B. TASK: Cockpit Management – organizes, and briefs occupants
[ ] C. TASK: Engine Starting – checklist usage
[ ] D. TASK: Taxiing – **Performs break check**, control position.
[ ] F. TASK: Before Takeoff Check – checklist, review takeoff data.

## IV. AREA OF OPERATION: TAKEOFF, LANDINGS, AND GO-AROUNDS(line check)

[ ] A. TASK: Normal and Crosswind Takeoff and Climb, center line, Vy+- 5kts,
[ ] B. TASK: Normal and Crosswind Approach and Landing, at or +200'of point
[ ] C. TASK: Short-Field Takeoff and Maximum Preformance Climb, Vx+5/-0kts
[ ] D. TASK: Short-Field Approach and Landing, at or+100' of point
( ) I. TASK: Go- Around/Rejected landing. Vy +-5

## V. AREA OF OPERATION: INFLIGHT MANEUVERS(line check)

[ ] A. TASK: Steep Turns, <50 angle bank, +- 100', +- 10kts, +-5 bank, +-10 heading. +3000" AGL

## VII. AREA OF OPERATION: SLOWFLIGHT AND STALLS(line check)

( no lower that 3000' AGL)
[ ] A.TASK: Maneuvering During Slow Flight , +- 50' alt, +-10 heading, +-5 bank, +5/-0 speed
[ ] B.TASK: Power-Off Stalls, +3000' AGL
[ ] C.TASK: Power-On Stalls, +3000' AGL
[ ] D.TASK: Spin Awareness (*Covered in Gnd phase*)

## VIII. AREA OF OPERATION: EMERGENCY PROCEDURES (line check)

[ ] A.TASK: Emergency Descent
[ ] B.TASK: Engine Failure During Takeoff Before $V_{MC}$ (Simulated)

never above 50% of Vmc.

[ ] C. TASK: Engine Failure After Lift-Off (Simulated) never below 400’ AGL
[ ] D. TASK: Approach and Landing With An Inoperative Engine (Simulated)
[ ] E. TASK: Systems and Equipment Malfunctions
[ ] F. TASK: Emergency Equipment and Survival Gear (*Covered in Oral*)

## X. AREA OF OPERATION: MULTIENGINE OPERATIONS (line check)

[ ] A. TASK; Maneuvering with One Engine Inoperative
[ ] B. TASK: Vmc Demonstration,+4000’ AGL
[ ] C. TASK: Engine Failure During Flight
[ ] D. TASK: Instrument Approach – One Engine

NOTES: