

## Commercial Oral Exam

### **Basic Aerodynamics/Flight Characteristics**

#### **-What causes a stall to occur?**

-As the angle of attack is increased, separation of smooth airflow over the upper surface of a wing occurs, thus decreasing lift. Upon reaching the critical angle of attack, the airplane is no longer producing enough lift to continue flight, resulting in a stall

-\*An airplane can stall at any airspeed or altitude, but will always stall at the same critical angle of attack\*

#### **-Stall speed is affected by:**

-Weight, load factor, and power

#### **-What causes an airplane to spin?**

-A spin occurs as the result of an uncoordinated stall. An airplane must (1) stall and be in (2) uncoordinated flight to produce a stall. An airplane will continue to spin as long as one wing is producing more lift than the other and the airplane remains in a stall

#### **-What is the purpose of flaps?**

-Flaps provide the same amount of lift at a slower airspeed as well as allow the pilot to make steeper approaches without an increase in airspeed. Flaps decrease stall speed as well

#### **-“I attempted to make a landing in a 172 without touching the yoke. I found that I could not land the airplane with flaps extended, but could land it without flaps. Why would this be?”**

-With flaps extended, the plane would not be able to flare without the use of elevator control. This would result in the nose wheel touching down first.

Without flaps extended, the plane is configured to come in nosed slightly higher, thus allowing a normal touchdown

### **Cross Country**

**-Flight over water rules (part 91)** = 50NM or more away from shore/out of power off glide range, each occupant must be provided with a floatation device (PFD, inflatable raft, etc.)

**-MOA** = Restricted for IFR flights when active

**-Restricted airspace** = May not fly through without permission (Legend on sectional)

**-Prohibited airspace** = May not fly through, must fly around or over indicated altitude

**-SFRA** = (Special Flight Rules Area; ie-Washington DC) Need prior permission to enter (waiver?)

**-ADIZ** = off coast areas, need Mode C to operate in

**-TRSA** = Grey rings found around certain airports; indicate radar coverage

**-How to get AWOS at certain airports (ex.-Vandalia, IL)**

**-Pilot controlled lighting (if normal procedure does not work, consult AFD)**

**-Mode C required** = 30NM ring around B airspace and within B airspace, C airspace, above 10,000 MSL, ADIZ (off coast)

### **-Privileges and Limitations**

- May fly for compensation or for hire
- May not supply pilot and aircraft. If in doubt, call AOPA or a FSDO or look up in FAR- AIM 119.1

### **-Commercial Pilot License**

- Does a commercial pilot license expire?** –“NO, it is issued without an expiration date.”
- What must a commercial pilot do to stay current?** –Biennial Flight Review, 3 takeoffs/landings in preceding 90 days if passengers are carried, 3 takeoffs/landings to full stops at night in preceding 90 days if passengers are carried at night (1hr after sunset to 1hr before sunrise)
- What medical does a commercial pilot need to exercise privileges?** -2nd class medical
- How long does a 2nd class medical last under each circumstance?**
  - Under 40?** -60 months
  - Over 40?** -24 months
  - While acting as a commercial pilot?** -12 months

### **-Common Carriage vs. Private Carriage**

- Common Carriage must include each of the following:**

- 1) Holding out/Willingness to take anyone/anything
- 2) Carrying people or property
- 3) Transporting from Place A to Place B (ex.-KLVN to KEAU)
- 4) For Compensation or Hire

- Private Carriage** includes 3 or less of the above items

- ex.-Crop dusting, Sky diving, Flight school

- What does “Holding out” mean?**

- a willingness to take on anyone/anything. Commonly involves advertising such services.

- Can you charge to fly people around in YOUR airplane with just a commercial license?**

- No, you may not provide the pilot and the plane

- Can you be compensated to fly someone around in HIS or HER own airplane?**

- Yes, as long as it is not your airplane

### **-Oxygen Requirements**

- 12,500-14,000ft = If at this altitude for 30min or more, flight crew requires supplemental O<sub>2</sub>
- More than 14,000ft-15,000ft = Flight crew requires supplemental O<sub>2</sub>
- More than 15,000ft = Flight crew requires O<sub>2</sub>, passengers must be offered/provided O<sub>2</sub>

### **-Aeromedical Factors**

#### **-Hypoxia**

- Causes:** Lack of O<sub>2</sub> to the brain

- Symptoms:** Headache, Euphoria, Visual Impairment, Drowsiness, Lightheaded

- Remedy:** Descend to lower altitude

### **-CO Poisoning**

**-Causes:** CO gases leaking into the cabin area. Most likely a leak inside the muffler shroud that travels through the heat vents

**-Symptoms:** Headache, Blurred Vision, Drowsiness, Dizziness

**-Remedy:** Open outside air vents, crack windows if able, turn off cabin heat

### **-Motion Sickness**

**-Causes:** Condition is worsened by anxiety and turbulence (throws off balance in ears)

**-Symptoms:** Sick feeling, dizziness, feeling of vomiting

**-Remedy:** Land as soon as practical, stare outside/close eyes

### **-Spatial Disorientation**

**-Causes:** Eyes giving erroneous information due to offsets in ear and nerve functions (most common in IMC, darkness, hazy conditions, or over water.)

**-Remedy:** Focus on the airplane instruments and rely on what they are telling you

### **-Hyperventilation**

**-Causes:** Too much O<sub>2</sub>, not enough CO<sub>2</sub>, due to stress/anxiety

**-Symptoms:** increased breathing rate, shortness of breath, feeling of suffocation

**-Remedy:** Breath into a bag, slow breathing rate, talk or sing a simple song

## **Constant Speed Propeller**

### **-How does it work?**

-Prop control lever controls the prop governor which changes prop pitch through increase/decrease in oil pressure inside the oil hub

### **-How come RPM's do not increase when in a nose down attitude?**

-flyweights – explain:

**-Overspeed Condition:** Low pitch, High RPM; power setting is too much for airplane

**-Underspeed Condition:** High pitch, Low RPM; not enough power for airplane

## **Retractable Landing Gear**

### **-How does it work?**

-Electrically activated, hydraulically actuated. Gear Actuating Switch controls an electrical reversible hydraulic pump. This forces hydraulic fluid through hydraulic lines, ultimately to/from a hydraulic cylinder, thus moving the gear into "UP" or "DOWN" position.

**-Emergency gear extension** lever manually releases hydraulic pressure to extend gear when emergency lever is held in down position.

### **-Where are the pressure switches, and how many are there?**

-9 in N9659K

- 1) 3 microswitches for down gear position (1 in each gear)
- 2) 3 microswitches for up gear position (1 in each gear)
- 3) 1 squat switch (in left main gear)
- 4) 2 throttle safety switches (in throttle quadrant)

5) \*Some aircraft have a flap safety switch as well\*

-**What keeps the gear from being retracted on the ground? How does that system work?**

-Squat Switch (located in left main gear). When on the ground, the squat switch is activated by gravity, forcing the weight of the airplane on the ground.

-**What gear conditions produce each of the following light conditions on the panel?**

1) **Three Green** = all three gear are in down position and locked

2) **Gear Unsafe** = Red light warning gear is not in position for landing in current config.

3) **Gear in transit** = Gear is in motion, moving from up to down position; vice versa

4) **Lights Out** = Gear is in up position or has failed to lock in down position

### **Emergency Gear Procedures**

1) Fly the Airplane (if in traffic pattern, fly to area away from traffic and to safe altitude)

2) Consult the checklist:

1) Master Switch – “ON”

2) Gear Circuit Breaker – “CHECK”

3) Panel Lights – “OFF”

4) Gear Indicator Lights – “CHECK”

5) Airspeed – 100mph

6) Gear Selector – “DOWN”

7) Backup Gear Extender – “ OVERRIDE”

\*If gear still not locked down\*

8) Emergency Gear Lever – “DOWN”

\*If gear still not locked down\*

9) Yaw airplane side to side with rudder

-**What would you do if you put the gear down and there are no lights?**

-fly the airplane and run though emergency checklist (see above)

-**What might you do if you followed the emergency gear extension checklist and still did not have 3 green lights?**

-Fly to towered airport and ask if they can see all 3 gear

-**What would you do if one of the gear failed to lock down?**

-Slow down the airplane, yaw left and right, pull some G's to kick out the nose gear, etc.

-\*Might pull the gear CB during eights-on-pylons and fail the engine\*

### **Carburetor Ice**

-**How and when do you get carburetor ice?**

-The Arrow is not carbureted, it is fuel injected. However, carb ice forms in conditions of high humidity and temps below 70°F. May consult a carb ice probability chart for likelihood of encountering carb ice during a flight.

## **-Minimum Equipment List (MEL)**

### **-What is an MEL?**

-An extensive checklist including items onboard a specific aircraft that, in the event of a malfunction, would result in a "GO"/"NO GO" decision

### **-Hierarchy of aircraft "lists"**

- 1) MEL (minimum equipment list)
- 2) Kinds list
- 3) Equipment list
- 4) Part 91 VFR day and night required equipment list (TOMATO FLAMES / FLAPS)

**T** = Tachometer

**O** = Oil Pressure Gauge

**M** = Manifold Pressure Gauge

**A** = Airspeed Indicator

**T** = Temperature Gauge

**O** = Oil Temp Gauge

**F** = Fuel Quantity Indicator

**L** = Landing Gear Indicator

**A** = Altimeter

**M** = Magnetic Compass

**E** = ELT

**S** = Seat Belts

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**F** = Fuses

**L** = Landing Light (if for hire)

**A** = Anti-collision Lights

**P** = Position Lights

**S** = Source of Power

### **-What holds to a higher: MEL or Part 135 Mandatory?**

-An MEL supercedes a Part 135 Mandatory

### **-Can you create your own MEL?**

-Yes, must be submitted and reviewed by a FSDO

## **Airspace/Weather Minimums**

**-Class A** = No weather minimums, need an IFR rating and need to be on an IFR flight plan  
-Begins at 18,000ft up to 60,000ft

**-Class B** = 3mi vis, clear of clouds

**-Class C** = 3-1-5-2 (3 mi vis; 1,000ft above, 500ft below, 2,000ft horizontal of clouds)

**-Class D** = 3-1-5-2 (3 mi vis; 1,000ft above, 500ft below, 2,000ft horizontal of clouds)

**-Class E** = 3-1-5-2 (3 mi vis; 1,000ft above, 500ft below, 2,000ft horizontal of clouds)  
-Begins at 700ft AGL over airports with fuzzy magenta line, 1,200ft AGL elsewhere

**-Class G** = 1mi vis, clear of clouds

**-Above 10,000ft MSL** = 5-1-1-1 (5mi vis; 1,000ft above and below, 1 mi horizontal of clouds)

**-\*Take-Off and Landing Minimums\***

- Class B, C, D, and E = 3mi vis, 1,000ft ceiling
- Class G = 1mi vis, Clear of Clouds
- SVFR (Special VFR) = 1mi vis, Clear of Clouds

**-Pilot Documents to be Legal**

- 1) Photo ID
- 2) Current Medical
- 3) Government Issued Photo ID

**-Aircraft Documents to be Legal**

- A** = Airworthiness Certificate
- R** = Registration Certificate
- O** = Operating Handbook
- W** = Weight and Balance

**-Aircraft Inspections to be Legal**

- A** = Annual Inspection, every 12 calendar months
- V** = VOR Test, every 30 days for IFR flights
- I** = 100hr Inspection, if for hire
- A** = Altimeter/Pitot Static Test, every 24 calendar months
- T** = Transponder Check, Every 24 calendar months
- E** = ELT/Battery, every 12 calendar months

**-Medical Requirements**

**-1st Class**

- Under 40yrs = 12 calendar months
- Over 40yrs = 6 calendar months

**-2nd Class**

- commercial privileges for 12 calendar months

**-3rd Class**

- Under 40yrs = 60 calendar months
- Over 40yrs = 24 calendar months

### **Flight Portion**

-He will have to pick a card for the following maneuvers (you will have to do 1 from each set)

Maneuver A: Steep Turns / Steep Spiral

Maneuver B: Chandelle Left / Chandelle Right / Lazy 8's

-Order of Manuevers:

1) Cross Country- calculate groundspeed based off time between first 2 points of your planned cross-country route. He will tell you to divert to a different airport and you must calculate how long it will take to get there based off your groundspeed calculation.

-Note: this is based off of pilotage and dead reckoning. He will not let you use the GPS and had me turn my I-pad to airplane mode. He did allow me to use Foreflight to find the airport he diverted me to and approximate distance to it

2) Slow Flight (plus or minus 50ft)

3) Power on/Power off Stalls in various configurations

4) Accelerated Stall

5) Steep Turns (Maneuver A)

6) Lazy 8's (Maneuver B)

7) Emergency Decent

8) Simulated Engine Out (while looking for my eights on pylons points)

9) Eights on Pylons

10) Emergency Gear Extension (en route back to departure airport)

11) Soft Field Landing

12) Soft Field Takeoff

13) Short Field Landing

14) Short Field Takeoff

15) Power Off 180 Landing