Amendments

Added:

- Arrival and Departure Procedure pg. 9
- Checkpoint ID pg. 10
SUPPLEMENTARY INFORMATION
FOR
FLIGHT STUDENTS

This pamphlet provides information to assist flight students in learning standardized procedures at the University of Oklahoma Aviation Department and guidance on performing procedures and maneuvers that are a part of flight training.

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- Slow Flight
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- Drag Demonstration
- Vmc Demonstration

SECTION XV: Flight Test Checklist

- Flight Test Checklist
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Example: The winds are 30° off the runway heading at 27 KTS. The crosswind component is approximately 13 KTS.
Density Altitude Chart

**DENSITY ALTITUDE CHART**

<table>
<thead>
<tr>
<th>Altimeter Setting (&quot; Hg)</th>
<th>Pressure Altitude Conversion Factor</th>
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<tr>
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<td>1.727</td>
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<td>28.2</td>
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<td>1.533</td>
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<td>1.436</td>
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<td>28.8</td>
<td>1.053</td>
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<td>-893</td>
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<td>31.0</td>
<td>-983</td>
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</table>
OU Departure / Arrival Procedures

**Outbound Traffic:**

- Contact tower and advise direction of flight (Southeast for checkpoints 1-6, Southwest for checkpoints 7-12)
- After takeoff, fly to waypoint Y or Z, per your training checkpoint assignment. Tower will assign a departure turn appropriate for your direction of flight.
- On departure, climb to at-or-above 3,500 MSL and proceed from waypoint Y or Z directly to your assigned training area.

**Inbound Traffic:**

- Complete “In-Range Checklist” and contact Tower prior to leaving your assigned training area.
- Initial contact should include aircraft identification, position relative to OUN, and intentions. (i.e. “inbound for landing”)
- Circle over your training area until Tower gives you instructions.
Once you have instructions proceed inbound to OUN at an altitude of 2,500 MSL, regardless of arrival routing. This increases aircraft separation with departing traffic.

Checkpoint Identification

• Routing Checkpoints
  - **Y** = Highway 9 and May Ave.
  - **Z** = “Postal Training Center”

• Training Checkpoints
  - **1** = West Lake Thunderbird
  - **2** = East Lake Thunderbird
  - **3** = McCaslin
  - **4** = Lexington
  - **5** = Thunder Valley
  - **6** = Purcell
  - **7** = Washington
  - **8** = Cole
  - **9** = Dibble
  - **10** = West Dibble -- 19 DME off the IRW 220 radial
  - **11** = Blanchard
    - **12** = Good Life - (17OK) 18 DME off the IRW 203 radial
45 Degree entry procedures

Dispatch and Solo Sign out procedures
When students arrive for their flight they shall meet with their CFI and review weight and balance and syllabus ticket for the days flight. Once complete, they shall present their signed syllabus ticket to the dispatcher and sign out the appropriate aircraft by following the checklist provided with the aircraft. The dispatcher will review the ticket for both signatures, assign a practice area if applicable, and issue the aircraft key.

**SOLO Sign out procedures.**

For ALL Solo flights the student will also need to complete a “solo sign out form”.

For ALL Solo XC flights the student must also complete the “solo Cross-Country form”

---

**SOLO SIGN OUT FORM**

THIS FORM MUST BE COMPLETED AND TURNED INTO THE DISPATCHER - IN ADDITION TO ANY OTHER PAPERWORK NECESSARY FOR THE FLIGHT PRIOR TO STUDENT BEING RELEASED.

**STUDENT NAME:**

**COURSE AND LESSON NUMBER:**

**DATE OF FLIGHT:**

**INSTRUCTOR NAME:**

**INSTRUCTOR SIGNATURE:**

*** If this is a Cross Country, you will also need to fill out the Cross Country Sign Out form ***

---

**CROSS COUNTRY SIGN OUT**

Date: A/C#: Stage: Lesson:

Student: Instructor:

Student Phone: Instructor Phone:

**ROUTE AND SCHEDULE**

O/G: Departure Time:

Destination #1: ETA: Depart:

Destination #2: ETA: Depart:

Destination #3: ETA: Depart:

Destination #4: ETA: Depart:

O/G: ETA:

Lesson Objectives from Syllabus Sheet:

Airport #1: Leg Distance: Runway Length:

Airport #2: Leg Distance: Runway Length:

Airport #3: Leg Distance: Runway Length:

Airport #4: Leg Distance: Runway Length:

**NAV AIDS:**

YES - NO Will fuel be purchased during this flight?

Airport: FBO Name: 

Method of Payment (Circle One): Credit Card or BILL OUT

YES - NO Hangared? Location: FBO Phone:

YES - NO Tied Down? Location: FBO Phone:

*Trips planned for more than one day or extended layovers should be explained by attaching additional details and documentation to this form and initial then your CFI in the chief flight instructor.

---

**Aircraft V-Speeds:**
### PA-28R-200 (MPH)

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<td>$1.1 \ V_{SO}$</td>
<td>70</td>
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<tr>
<td>$1.2 \ V_{SO}$</td>
<td>77</td>
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<tr>
<td>$1.3 \ V_{SO}$</td>
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</tr>
<tr>
<td>$V_{SL}$</td>
<td>71</td>
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<tr>
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<td>$V_Y$</td>
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<tr>
<td>$V_{NO}$</td>
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</table>

### CA-152 (KIAS)

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<td>47</td>
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<tr>
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<tr>
<td>$V_{SL}$</td>
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<td>$V_Y$</td>
<td>67</td>
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<tr>
<td>$V_{FE}$</td>
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<tr>
<td>$V_A \ (MGW)$</td>
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<tr>
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<td>$V_{NE}$</td>
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<tr>
<td>Best Glide</td>
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<tr>
<td>Cruise Climb</td>
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<tr>
<td>&quot;$V_{REF}$&quot;</td>
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<tr>
<td>Max X-Wind</td>
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</tr>
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</table>

### Other Calculations:

#### Va:

$$V_a = (V_a \text{ at max weight}) \sqrt{\text{weight / max weight}}$$
Weight Shift Formula:

\[
\frac{\text{Weight of Item shifted}}{\text{Total Weight}} = \frac{\Delta \text{C.G.}}{\text{Distance item is moved}}
\]

Pivotal Altitude:

\[
\text{Knots}^2 / 11.3 \quad \text{or} \quad \text{mph}^2 / 1
\]
FAA Safety Airworthiness Information Bulletin

SPECIAL AIRWORTHINESS
INFORMATION BULLETIN

SAIB: CE-14-22
Date: July 10, 2014

SUBJ: Fuel Selector/Shut-Off Valve

This is information only. Recommendations aren’t mandatory.

Introduction

This Special Airworthiness Information Bulletin (SAIB) alerts you, owners and operators of certain Piper Aircraft, Inc. (Piper) Models PA-28-140, PA-28-150, PA-28-160, PA-28-180, PA-28R-180, and PA-28R-200 airplanes of an airworthiness concern, specifically that the fuel selector valve can be inadvertently switched off and/or may bind when switching fuel tanks and can cause a loss of power in flight. This SAIB also recommends the installation of a fuel selector valve cover designed to prevent inadvertently selecting the off position and the maintenance of fuel selector valves to prevent their binding.

At this time, this airworthiness concern has not been determined to be an unsafe condition that would warrant AD action under Title 14 of the Code of Federal Aviation Regulations (14 CFR) part 39.

Background

The Federal Aviation Administration (FAA) has received a report of a pilot inadvertently switching off a fuel selector valve while landing a Piper Model PA-28-180C airplane, in December 2011, resulting in a crash with one serious injury and substantial airplane damage. The incident was attributed to the pilot inadvertently selecting the off position of the fuel selector valve and a lack of fuel selector valve maintenance.

Recommendations

To reduce the possibility of inadvertent shutoff and/or binding of fuel selector valves in flight, we recommend that owners and operators of Piper Models PA-28-140, PA-28-150, PA-28-160, PA-28-180, PA-28R-180, and PA-28R-200 airplanes:

1. become fully familiar with the operation of their airplane’s fuel selector valve:
   a. the clock locations of the left tank, right tank and off positions; and
   b. the feel of a fuel selector valve, when the valve handle is rotated, free from the onset of binding and arresting only at the detent for each tank and off position.

2. replace fuel selector valve covers with a design that utilizes a lockout device for the selection of a valve’s off positions, as addressed by Piper Service Bulletin (SB) 840A, dated 7 November 2013; and

3. inspect and maintain fuel selector valves in accordance with Piper SB 355, dated 5 Jun 1972.

To reduce the possibility of a crash when switching a fuel selector valve, ensure a flat landing site is available whenever switching fuel tanks and check before landing to ensure that an airplane’s fuel selector valve is positioned on the fullest tank.
Carbon Monoxide and General Aviation Aircraft

An ‘Unconscious’ Landing
Plane Lands Itself in Hayfield as Pilot Slumbers

Physician Robert Frayer had lifted off in his Comanche 400 from the North Bend, Kansas, airport at 7 a.m., on a route for a meeting in Topeka. He was flying alone, cruising at 5,500 feet on autopilot, with the sun coming up on a clear, beautiful day. Per established routine, he switched the fuel selector to the auxiliary tank and set up the navigation system for nearby Topeka.

About 90 minutes later, Dr. Frayer found himself in a hay field. The engine was silent. He was confused, disoriented, and groggy as he struggled to rouse himself from a deep sleep. His head was throbbing.

Thinking he was still in the air, he went through his landing checklist. As he became more oriented to his surroundings, a new reality dawned: The airplane’s right wing was nearly torn off from an impact with a tree, but the plane was otherwise intact. Aside from a fractured wrist, minor cuts, and bruises, he seemed to be relatively uninjured. But he had no idea where he was. He had no memory of landing.

Dr. Frayer stated that there were no early warnings or symptoms to alert him “I just went to sleep.” The plane, trimmed for cruise flight and on autopilot, flew a perfectly straight course over Kansas and into Missouri until it ran out of fuel, and then the autopilot gently brought the Comanche in for landing.

Since the engine had stopped, no one heard the aircraft glide to a landing on the open field. “I was alone, disoriented, injured, and had a severe headache and ringing in my ears,” he said.

Extracting himself from the aircraft, he struggled a quarter of a mile through snow-covered fields for help, finally stumbling onto a farmhouse. Dr. Frayer was taken by ambulance to a hospital, where the emergency room physician put him on 100 percent oxygen to overcome near-fatal blood levels of carboxyhemoglobin.

Carbon monoxide poisoning from a cracked muffler had allowed the deadly, odorless gas to seep into the cabin through the heater and caused him to fall asleep. The crack, which had apparently opened after the last annual inspection, was concealed by the heat shield and could not be detected during the pre-flight inspection. “The crack could have been there for a long time, just waiting for someone to turn on the heater,” he said. Frayer did not have a carbon monoxide detector on board to alert him of its presence.

Another 30 minutes in the air might have been fatal. Carbon monoxide poisoning would have claimed another victim.

Overlooked Safety Issue

Carbon monoxide poisoning is a safety issue that pilots tend to ignore, even though it is the most common industrial poisoning accident in the United States. When carbon monoxide poisoning occurs, it can have significant and fatal consequences for aircraft occupants.

Carbon monoxide is a by-product of the incomplete combustion of carbon-containing materials. Aviation fuel contains carbon and is a ready source of carbon monoxide when burned. Expect carbon monoxide whenever an internal combustion engine is operating, and even though piston engines produce the highest concentrations of carbon monoxide, exhaust from turbine engines could also cause carbon monoxide poisoning. In addition, expect carbon monoxide whenever a fire occurs, as commonly happens in a post-crash environment.

Carbon monoxide is truly a hidden menace because by itself, it is both a colorless and odorless gas. An individual would not be aware of its presence until symptoms developed, or during treatment it was determined exposure had occurred. The least desirable situation would be incapacitation. In this case, the victim is powerless to do anything about the
exposure. Fortunately, because it is a by-product of combustion, carbon monoxide is frequently associated with other gases that do have an odor and color.

By avoiding an environment with known combustion fumes, you will also avoid carbon monoxide. The true problem comes when exposure is so gradual that you don't perceive it. You can become incapacitated before you can vacate the environment. In an airplane, the result most likely will be a fatal accident.

**Why Carbon Monoxide Poisoning Should Concern Pilots**

What is not known is the full extent of carbon monoxide poisoning in aviation. Analysis of toxicology samples from fatal U.S. aircraft accidents between 1967 and 1993 showed that at least 360 victims had been exposed to sufficient carbon monoxide before or after the crash to impair their abilities. Non-fatal carbon monoxide poisoning in aviation is likely a more common occurrence than currently believed. No one is sure how many times pilots or passengers became ill, not realizing they had been exposed to carbon monoxide. Because no significant incident or incapacitation occurred, the matter was not reported and, hence, not investigated. Symptoms that could be attributed to airsickness, altitude hypoxia, fatigue, or a variety of other conditions actually could have been carbon monoxide poisoning.

Exposure and symptoms may occur repeatedly over several flights until, finally, someone suspects carbon monoxide or, tragically, an accident claims a victim. No database presently exists that accurately collects or tracks non-fatal aviation carbon monoxide exposure information.

**Toxicity Mechanism**

Carbon monoxide has a very high affinity for hemoglobin, the molecule in blood responsible for transporting oxygen through the body. Carbon monoxide has affinity of 240 times that of oxygen. Carbon monoxide tightly attaches to the hemoglobin, creating the compound carboxyhemoglobin, which prevents oxygen from binding, thereby blocking its transport. The result is hypoxia but through a mechanism different from that produced by altitude. However, with respect to symptoms, the end-effects can be very similar.

There should be little or no carbon monoxide in the blood of individuals who have not been exposed to smoke or other by-products of combustion. People living in polluted urban environments may have between 3-10% carboxyhemoglobin concentrations because of the carbon monoxide contained in the smoke and fumes they inhale, while a cigar smoker could have up to 15%. People in certain occupations such as foundry workers, welders, mechanics, firefighters, and tollbooth or tunnel attendants that expose them to products of combustion may also have elevated carbon monoxide baseline levels.

**Symptoms**

The most common symptoms of carbon monoxide exposure are shown in Table 1. These symptoms are typical for an individual with normal hemoglobin at sea level. You can expect these symptoms to worsen at altitude and/or appear sooner than they otherwise would. Wide personal variations may also occur, depending on the circumstances and whether or not the individual smokes.

<table>
<thead>
<tr>
<th>Percent CO in Blood</th>
<th>Typical Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>None</td>
</tr>
<tr>
<td>10-20</td>
<td>Slight headache</td>
</tr>
<tr>
<td>21-30</td>
<td>Headache, slight increase in respirations, drowsiness</td>
</tr>
<tr>
<td>31-40</td>
<td>Headache, impaired judgment, shortness of breath, increasing drowsiness, blurring of vision</td>
</tr>
<tr>
<td>41-50</td>
<td>Pounding headache, confusion, marked shortness of breath, marked drowsiness, increasing blurred vision</td>
</tr>
<tr>
<td>&gt;51</td>
<td>Unconsciousness, eventual death if victim is not removed from source of CO</td>
</tr>
</tbody>
</table>
Protection From Carbon Monoxide Exposure

First and foremost is pilot education and awareness. Pilots must understand the danger posed by carbon monoxide poisoning and should be alert to the symptoms.

Any unusual cabin smell or sensation of illness should call for immediate troubleshooting.

- Turn the cabin heat fully off.
- Increase the rate of cabin fresh air ventilation to the maximum.
- Open windows if the flight profile and aircraft's operating manual permit such an action.
- If available (provided it does not represent a safety or fire hazard), consider using supplemental oxygen.
- Land as promptly as possible.
- Do not hesitate to let Air Traffic Control know of your concerns, and ask for vectors to the nearest airport.
- Once on the ground, seek medical attention.
- Before continuing the flight, have the aircraft inspected by a certified mechanic.

Safeguards

- The best protection against carbon monoxide poisoning is to avoid exposure.
- Aircraft operators and pilots must ensure that heating/ventilation systems and exhaust manifolds in their aircraft are all in good working order, as specified by the manufacturer and the Federal Aviation Administration.
- Certified mechanics must conduct all required inspections.
- Special attention should be paid to older aircraft because of corrosion or simple wear and tear.
- A certified mechanic should verify firewall and aircraft structural integrity and seal any defects.

- Finally, several devices are available to monitor for carbon monoxide. The least expensive are handheld or stick-on colorimetric devices that change color in the presence of carbon monoxide. While effective, they are not perfect or foolproof. Powered detectors for aviation use are available as either portable or panel-mounted units and provide greater reliability.

Don’t become a statistic.
Learn to prevent and avoid this deadly threat to your flying safety.

MEDICAL FACTS FOR PILOTS
Written by G.J. Salazar, M.D.

Prepared by:
Federal Aviation Administration
Civil Aerospace Medical Institute
Aerospace Medical Education Division

To order copies of this brochure, contact:
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Shipping Clerk, AAM-400
P.O. Box 25082
Oklahoma City, OK 73125
Telephone: (405) 954-4831

Aerospace Medical Education
A Key to Aviation Safety
**OU Flight Risk Assessment Tool (FRAT)**

Each OU Flight (dual or solo) WILL have a FRAT tool filled out and analyzed by the PIC and their CFI. The FRAT will be provided to the dispatcher upon dispatch and the dispatcher will review “before” handing the pilot the aircraft key.

The current OU FRAT is available on the OU Student Resources website as a “combo FRAT/Wt and Balance form”

A paper combo form is also available by the Department Pilot Read File (PRF) and over at preflight planning areas of the Director’s hangar lobby and the preflight room in the terminal lobby.

The OU FRAT allows each PIC and CFI to assess key aspects of RISK before flight and then to seek ways to reduce risk before the flight.

The FRAT should be started the “day before the flight” - much of the FRAT can be completed BEFORE showing up at the airport (and should be) and then “updated as necessary” upon show at airport with final review of preflight items.

OU pilots should be familiar with aspects of Risk Management/FRAT out of the FAA Risk Management Handbook pages 4-2 thru 4-4.
## OU Flight Risk Assessment Tool – RISK FORM (FRAT)

<table>
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<th>3</th>
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<tr>
<td>Crew</td>
<td>Dual w/CFI</td>
<td>Two Pilots</td>
<td>Solo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rest in last 24 hours</td>
<td>&gt;8 hours</td>
<td>6.1 to 8 hours</td>
<td>5.1 to 6 hours</td>
<td>4.1 to 5 hours</td>
<td>&lt;4 hours</td>
<td></td>
</tr>
<tr>
<td>Sleep was restful</td>
<td>Yes</td>
<td>Partially</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>No issues</td>
<td>Recovering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last use of medicine</td>
<td>&gt;48 hours</td>
<td>25 to 48</td>
<td>12 to 24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-12 hrs Alcohol</td>
<td>None</td>
<td>Some 9-12</td>
<td>Some 8-9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Index</td>
<td>&lt;95</td>
<td>95 to 99</td>
<td>100 to 104</td>
<td>105 to 109</td>
<td>&gt;109</td>
<td></td>
</tr>
<tr>
<td>External stressors</td>
<td>Few</td>
<td>Several</td>
<td>Many</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flight Type</td>
<td>VFR</td>
<td>MMFR</td>
<td>IFR</td>
<td>LFR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day or Night</td>
<td>Day</td>
<td>Night Full Moon</td>
<td>No Moon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visibility</td>
<td>&gt; 5 Miles</td>
<td>3-5 Miles</td>
<td>&lt; 3 Miles</td>
<td>&lt; 1 Mile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling</td>
<td>&gt;10,000</td>
<td>9K - 9K</td>
<td>3K - 4K</td>
<td>1K - 2K</td>
<td>&lt;1K</td>
<td></td>
</tr>
<tr>
<td>Winds</td>
<td>&lt;10 kts</td>
<td>10-15 kts</td>
<td>&gt;15 kts</td>
<td>&gt;20 kts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X wind actual</td>
<td>0-5 kts</td>
<td>6-10 kts</td>
<td>&gt;16 kts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X wind fct</td>
<td>* If increasing with time beyond 15 kts must talk with CFI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WX Stability</td>
<td>Stable</td>
<td>Slow deter</td>
<td>Possible Rapid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Destination</td>
<td>Familiar</td>
<td>Unfamiliar</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>OU Variant acft</td>
<td>Crm 1-11, 13</td>
<td>Crm 12, 14, 21</td>
<td>Crm 36, 37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aircraft Mx Status</td>
<td>Clean</td>
<td>Recent Write up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours in type</td>
<td>&gt;200</td>
<td>151-200</td>
<td>100-150</td>
<td>50-99</td>
<td>&lt;50</td>
<td></td>
</tr>
<tr>
<td>Flight hrs last 90 days</td>
<td>&gt;20</td>
<td>15 to 20</td>
<td>10 to 14</td>
<td>5 to 9</td>
<td>&lt;5</td>
<td></td>
</tr>
<tr>
<td>Total Flight Time</td>
<td>&gt;500</td>
<td>251-500</td>
<td>100-250</td>
<td>20-99</td>
<td>&lt;20</td>
<td></td>
</tr>
</tbody>
</table>

### TOTAL RISK SCORE

Pilots Personal Crosswind Limit: ________

No unusual hazards. Use normal flight planning & establish personal mins & operating procedures ________

Some additional Risk - Talk to Your CFI and Dispatcher about Risk areas. Conduct flight planning with extra care. Review personal mins and operations procedures - mitigate risk areas if possible. (change airport/change planes/etc) ________

YELLOW AREA

Higher Risk. Must get approval of Sup. of Ops/fleet for flight. Conduct flight planning w/extra care. Review elements to ID those that could be modified to reduce risk. Develop contingency plans before takeoff for items. Decide before flight on alt. and consider special precautions to take. Consider delaying flight until risk conditions are reduced. ________

RED AREA

Reference FAA.Gov Risk Management Handbook

PIC Signature: ____________________________  If Yel or Red: CFI or Super of Ops Sign: ____________________________

Dispatcher Initials: ____________________________
Fuel Procedures

OU Single Engine Aircraft

- During the Summer months when daytime highs routinely climb into the 90s, ramp fuel will be filled to “aircraft fuel tank TABS”. Once high temps are not climbing into the 90s, ramp fuel loads will be “FULL”.
- A PRF will be posted to inform when the change occurs.
- PICS should properly accomplish their weight and balance.
- During transition for a few days it is possible that you may find a different fuel load on an airplane - be flexible and be safe and conservative in airworthiness decisions.

Fuel Leaning Procedures on Single Engine Warriors and Arrows

- OU checklists require fuel mixture to be set FULL RICH for takeoffs and landings. Except for exceptions found in the POH (high density altitude above 5,000 Density).
- Inflight leaning, when operating at cruise for extended periods may be accomplished after the procedure has been taught by your CFI.
- Lycoming prescribes inflight leaning by utilizing the “rich of peak” method.
  - This is accomplished by decreasing mixture very slowly until a slight change (decrease) of engine RPM is noted (visual/hear).
  - Normally this is associated with a peak EGT but since our single engine Warrior do not have an EGT gauge it must be done by carefully watching the TAC gauge and listening to the engine.
  - After reaching peak lean, the MIXTURE SHOULD BE INCREASED slightly until noise and RPM are back to normal.
  - NOTE: Operation to close to the PEAK LEAN results in high engine temperatures and can cause engine damage.
  - Over leaning in flight can cause engine stoppage.

This leaning is NOT NECESSARY for normal operations in the practice area for a nominal one hour flight. Leaning should not be performed by students in cross country flights unless they have had through prior instruction on this procedure by their flight instructor. Understanding the “why’s and hows” is essential to proper leaning.
Crimson 71 (N371T) Arrow Weight and Balance Information

Crimson 71 has a larger fuel tank capacity than Crimson 46 and 76. Crimson 71 carries 27 more gallons is heavier and has a different max takeoff gross weight

With a FULL fuel load, it is nearly impossible to obtain a CG within the flight envelope according to the POH (88.9 to 91.5 at 2750 lbs). Even at 2650 lbs the CG is still far forward.

It is imperative to operate this aircraft IAW its POH (performance tables and power settings). Crimson 71 is a PA28R-201 not a PA28R-200. They are different aircraft and different POHs

OU Pilot in Command and OU Operations will ensure the following:

- Crimson 71 is to be fueled to NO MORE than tabs (year around) (tabs is 25 gallons per side)
- If Cruise has refueled/filled to top – contact Supervisor of Ops for guidance
- 50 lbs of Tub of Rocks are strapped into the baggage compartment to assist with CG.

CFI’s will review Crimson 71 operating characteristics with their students and ensure they are completing a proper weight and balance based upon the above criteria.
Aircraft Operations – Pilot Preventive Maintenance

Checking Engine Oil

When checking engine oil in the Warriors normal engine quantity is 6 to 8 quarts according to Lycoming.

- Each OU Aircraft has written in black magic marker the “refill to quantity” on the inside of the engine cowl near the dipstick. **DO NOT OVERFILL from this amount!**

CFI’s will assist students with oil refill.

- Fill once an engine is a quart low – do not fill if ½ quart low or ¾ quart low. (you should only use one full quart)
- Example: Cowl says engine oil 7.5 quarts of 15W50
- If 7.0 – ok to fly
- If 6.75 – ok to fly
  **If 6.5 - ADD ONE Quart**

- One must be careful not to spill oil into engines. If you do spill YOU MUST do a maintenance form write up and inform a CFI so next pilots and maintenance are aware of where the oil came from.

There are also “different oil weights” - The oil weight to use is also written on the cowl.

Ensure you use the CORRECT engine oil weight!

- Even though CFI’s should accompany private pilot students on adding oil ALL primary students and OU pilots **will be shown by CFI’s on how to refill** and know how to refill.
- Primary students and all OU students will know where “preventive maintenance oil is kept and the procedures to use to fill oil, replace landing lights and clean sticky yoke

STICKEY YOKES

Although the yokes are cleaned and lubed every 100 hour and 50 hours sometimes they can become dirty and slightly stick (when you check flight control movement). If the yoke is sticky. Obtain a CFI and ask them to clean / lubricate the yoke.

Extra Aircraft Equipment Items:

Extra items are located on the “night key drop box table”

- Yellow Maintenance Required Signs
- GATS fuel strainer jars
- Tie Down Straps
- Instrument Hoods
- Sun visors
Care of Aircraft:

There are several areas which with proper operation by the pilot will reduce wear and tear and thus reduce maintenance down time on the aircraft. CFI’s will ensure each pilot is aware of these areas for all new flight students.

- How to open and close the top Warrior door latch
  - Use separate hand to put inward pressure on door before moving plastic latch
  - From “inside” – ensure ample pulling in of door before moving latch.
- How to open and close the Baron passenger door latches
- Engine Cowl gascolator
  - Do NOT use the GATS JAR “on the metal” – use gentle push in with your fingers to flow fuel into the GATS jar
    - Using the GATS jar puts undo torque stress on the gascolator unit causing the inside parts to start to leak excessively
  - Place gascolator back in seat pouch to avoid melting in hot sun
  - Always close the side window and place sun screen in window
Bird Strikes and or Wildlife Strikes
During Aircraft Post Flight Walk Around pay attention for any “strikes”

Any bird strike or other wildlife strike will be reported to the OU MOBILE and Supervisor of FLEET immediately and the aircraft will be red lined.

A Safety report will be filled out and the FAA wildlife strike report also filled out.

Abnormal Events During Flight
sUAS sightings or interference
- If sighting occurs simply continue to fly your aircraft and avoid as necessary
- Report ASAP to nearest ATC facility - approx. height/location/description if able
- Upon landing call Super of Ops, complete an OU safety report form and an FAA sUAS Sighting report form

Degradation of NAV AID or GPS (not for internal aircraft nav issues)
- If degradation occurs during flight report to nearest ATC facility when traffic allows
- Upon landing - complete an OU safety report and complete an FAA NAVAID degradation form and / or a GPS degradation form
- If unsure - do a complete maintenance write up of the situation and department will troubleshoot

Laser event toward Your Aircraft
- If you encounter a laser event - first and foremost DO NOT LOOK OUTSIDE OR AT IT - come inside and “fly the airplane - attempt to fly away from the location
- Contact nearest ATC facility and report your location and any other information you have
- If your eyesight is degraded at all - inform ATC, declare an emergency and ask for nearest airport to land at.
- Upon landing call OU Mobile (in all cases). Complete an OU Safety Report form and complete an FAA Laser event online report
Section II: Briefings

Passenger Briefing

PASSENGER BRIEFING
(To be performed on every flight)

(A) SEATBELTS
a. Explain how to use them. They should plug the receptor end into the receiving end and pull snugly across the hips. Show passengers how to latch and unlatch. Also show them how to pull the harness over their shoulder, across the chest, and attach it.
b. Explain that seatbelts must be worn AT ALL TIMES.

(B) EXITS
a. Explain how to lock and unlock the door and overhead latches.
b. In the event of an emergency, the baggage door could be used as an emergency exit.
c. Advise your passengers that in the event of a forced landing, they should wait for the aircraft to come to a complete stop, then the door should be unlatched to allow the passengers in the rear to exit first, followed by those sitting up front.
d. Window to the left and right can be kicked out if door gets jammed.

(C) PERTINENT INFORMATION to include:
a. Positive exchange of flight controls
b. A sterile cockpit will be imposed during critical phases of flight (i.e. only flight-related conversations will take place).
c. In the event of an emergency, follow my instructions and remain calm.
Pre-Takeoff Briefing

PRE-TAKEOFF BRIEF
(To be performed on every flight)

Make a final review of your aircraft performance sheet including VR, takeoff distance, and landing distance. Then brief your crew members on the following scenarios:

*First, brief who will be the PIC in an actual emergency and who will back up the PIC with the appropriate checklists.

Engine failure on takeoff roll:
- Explain that you will bring the power to idle and apply brakes as necessary
  - Follow up by shutting off mixture, ignition, and anything else associated with fuel.
  - Request assistance from tower (this will likely be in the form of towing as you DO NOT want to attempt restarting the aircraft to move it).
  - Complete Engine Secure checklist.

Engine failure on takeoff with runway remaining:
- Explain that you will pitch for best glide (_ kts) and land on the remaining runway. Use flaps as necessary.
  - Follow up by shutting off mixture, ignition, and anything else associated with fuel.
  - Request assistance from tower (this will likely be in the form of towing as you DO NOT want to attempt restarting the aircraft to move it).
  - Complete Engine Secure checklist.

Engine failure on takeoff without runway remaining and without adequate altitude to turn back for the runway:
- Explain that you will pitch for best glide (_ kts) and land straight ahead within the windscreens. Prepare for an emergency landing. Attempt emergency restart procedures as time permits - see checklist. Use flaps as necessary once landing is assured.
  - Follow up by shutting off mixture, ignition, and anything else associated with fuel.
  - Complete Engine Secure checklist.
  - Request assistance from ATC unless contact is lost, then try 121.5, and call OU Mobile at (405) 919-6319

Engine failure on takeoff without runway remaining but possibly enough altitude to turn back for the airport:
Generally, this is not a recommended procedure and requires judgment. The usual problem is you don’t have enough altitude to make the turn back to the field, so you would have a plan of action ahead of time and have an idea where open areas are so you can land straight ahead, or with minimal maneuvering left or right. Should you be high enough (we won’t say what high enough is), you should pitch for best glide, turn towards any runway, set up for an emergency landing, and naturally communicate your intentions on the radio to ATC. Again, it is strongly emphasized that MANY PILOTS GET THEMSELVES KILLED BY THINKING THEY CAN MAKE THE TURN BACK TO THE AIRPORT AND LAND THE AIRPLANE AFTER LOSING AN ENGINE.
Section III: Radio Procedures

Frequencies to Know

FREQUENCIES TO KNOW!

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>121.5</td>
<td>Emergency</td>
</tr>
<tr>
<td>119.55</td>
<td>Max Westheimer AWOS</td>
</tr>
<tr>
<td>121.6</td>
<td>Max Westheimer Ground</td>
</tr>
<tr>
<td>118.0</td>
<td>Max Westheimer Tower</td>
</tr>
<tr>
<td>122.95</td>
<td>Max Westheimer Unicom</td>
</tr>
<tr>
<td>122.95</td>
<td>Cruise Aviation Unicom (Fuel)</td>
</tr>
<tr>
<td>123.3</td>
<td>OU Base &amp; OU Traffic</td>
</tr>
<tr>
<td>122.9</td>
<td>Multicom at Uncontrolled Airports</td>
</tr>
<tr>
<td>122.75</td>
<td>Multicom Inflight</td>
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</table>

OTHER FREQUENCIES IN THE OKC AREA

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>120.45</td>
<td>OKC Approach (081°-171°)</td>
</tr>
<tr>
<td>124.6</td>
<td>OKC Approach (111°-360°)</td>
</tr>
<tr>
<td>124.2</td>
<td>OKC Approach (001°-080°)</td>
</tr>
<tr>
<td>125.85</td>
<td>Will Rogers ATIS</td>
</tr>
<tr>
<td>119.35</td>
<td>Will Rogers Tower</td>
</tr>
<tr>
<td>121.9</td>
<td>Will Rogers Ground</td>
</tr>
<tr>
<td>124.35</td>
<td>Will Rogers Clearance Deliver</td>
</tr>
<tr>
<td>112.15</td>
<td>Will Rogers VOT (VOR check)</td>
</tr>
<tr>
<td>128.72</td>
<td>Wiley Post ATIS</td>
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<td>126.9</td>
<td>Wiley Post Tower</td>
</tr>
<tr>
<td>121.7</td>
<td>Wiley Post Ground</td>
</tr>
<tr>
<td>122.95</td>
<td>Wiley Post Unicom</td>
</tr>
</tbody>
</table>

General Radio Procedures

A. Basic radio calls contain (in order):
   a. Who you are calling
b. Who you are
c. Where you are
d. Your intentions

B. Listen to what is said to you and respond appropriately.

C. If in doubt about what was said in whole, or in part, ask the controller to “Say again,” or “Say again, (misunderstood item).”

D. Always use correct phraseology (AIM glossary). Read Section 2 of the *AIM Basic Flight Information and ATC Procedures*.

E. Be ADAPTABLE, be ready to respond as the situation dictates, and always listen for the controller’s call. Respond promptly, accurately, and as tersely as possible.

Radio Procedures at Max Westheimer Airport

Prior to taxi, monitor AWOS and note information.

**TAXI CALL:**
"Westheimer Ground."
"Crimson 5."
"At the South ramp (or North ramp)"
"With the number ready to taxi."

*Geographical direction* of departure. (i.e. *North* departure, *Southwest* departure)

The controller will respond with a clearance to taxi to the active runway. Should the taxi path cross an active runway, you may be instructed to “hold short” of the runway.

Always read back your clearance including any “hold short” instructions.

**TAKE-OFF CALL:**
"Westheimer Tower."
"Crimson 5."
"Holding short or (enter appropriate runway number) Ready for take-off, runway (insert appropriate number)."

*(Direction)* departure.

The controller will respond with a clearance to depart unless other traffic requires him/her to instruct you to “hold short.”

After cleared for take-off, monitor the tower frequency until out of the Class D airspace or call tower to request a frequency change.

**INBOUND CALL:**
"Westheimer Tower."
"Crimson 5."
"Number of miles, geographic direction." (i.e. 8 miles, southwest) - this information describes your position relative to the airport of intended landing.

*Inbound (type of landing).” (i.e. full stop, touch and go)*

This call should be made within 10 miles of the airport, but prior to reaching 5 miles. The controller will respond with directions to enter the traffic pattern for a specific runway, and advise of the current winds and altimeter.

He/she will also instruct you to report your position at a certain point during your approach to the airport.
Again, always read back your clearances, including reporting positions.

**LANDING CALL:**
"Westheimer Tower."
"Crimson 5."
"Your position." (in the traffic pattern - i.e. on the 45, left/right downwind, base - always report your actual position even if it differs from where you were told to report)
"Runway #." (the runway for which you were advised to report)
"Type of landing." (i.e. full stop, touch and go)
The controller will clear you for the type of landing requested, unless unable or misunderstood. Ensure you do not touch down without a clearance to do so!

**AFTER - LANDING CALL:**
"Westheimer Ground."
"Crimson 5."
"Clear of runway (runway #) at (taxiway location)"
"Taxi to University parking." (Listen carefully for any hold-short instructions)

All approaches to an airport will be made so as to enter the downwind leg of the traffic pattern at a 45° angle to the midpoint of the downwind leg. Straight-in approaches will not be requested. Instructions from the air traffic controller on entering the airport traffic pattern will be obeyed. Question the controller if you believe he/she has misunderstood your radio call.

Ensure that you are aware of what the different clearance phraseology means:
- **Cleared to land** - you will land, roll straight ahead and exit the runway on the first suitable taxiway.
- **Cleared for touch and go** - you will land, continue your roll, apply power and take off again.
- **Cleared for stop and go** - you will land, come to a full stop, apply power and take off again.
- **Cleared for the option** - you may do any of the above at your discretion.

Remember that a clearance to "taxi to" a runway gives the pilot the permission to taxi to the assigned runway, crossing any runways and taxiways enroute. The exception to these instructions is the addition of the term "hold-short." Then you are only cleared to a certain position at which you must hold short until advised to cross. In all situations the pilot in command must maintain vigilance for other traffic and make all decisions with safety in mind.

It is highly recommended that you read Ch. 4, Sections 1, 2, and 3 in the *Airman's Information Manual: Basic Flight Information and ATC Procedures*.

**Radio Procedures at Uncontrolled Airports**

Prior to taxi, monitor AWOS and note information.

**TAXI CALL:**
"(Airport name) Traffic."
"Crimson 5."
"Taxiing to runway (insert appropriate number)."
"(Airport name)."
Example: "Purcell Traffic, Crimson 5, taxiing to runway one seven, Purcell."
TAKE-OFF CALL:
"(Airport name) Traffic."
"Crimson 5."
"Departing runway (insert appropriate number)."
"(Direction) departure."

Listen to CTAF and visually scan the approach area for other traffic. Make position reports on CTAF while in the traffic pattern and departing.

INBOUND CALL:
"(Airport name) Traffic."
"Crimson 5."
"Number of miles, geographic direction" (i.e. 8 miles, southwest) - this information describes your position relative to the airport of intended landing.
"Inbound for (type of landing)"

The inbound radio call should first be made when within 10 statute miles of the airport. If the airport is served by a "Unicom" facility, the pilot should address the inbound call to "Unicom" instead of "Traffic" and add the statement "request airport advisory" to the final line of the inbound radio call, after the word "Inbound."

TRAFFIC PATTERN AND LANDING CALLS:
"(Airport name) Traffic."
"Crimson 5."
"(Turn direction) (leg of traffic pattern) (runway number)."
Example: "Purcell Traffic, Crimson 5, on the forty-five to a left-downwind, runway, one-seven, Purcell." (followed by a report on each leg of the pattern)

- When established on final approach, change the third line of the landing radio call to read: "(Distance from the runway) final, runway (number), (type of landing)."

Example: "Purcell Traffic, Crimson 5, one mile final, runway one seven, touch and go, Purcell."

AFTER - LANDING CALL:
"(Airport name) Traffic."
"Crimson 5."
"Clear of runway (insert appropriate number)"
"(Airport name)."

Radio Procedures at Major Airports

I. ATIS
   a. Before calling Tower or Approach Control,
   b. Listen for the following:
      1. Ceiling & visibility: Do you need a SVFR or IFR clearance?
      ii. Winds: Visualize crosswind and landing runway
      iii. Altimeter setting: Check and set
      iv. Instrument approach: Review which runway and approach to expect
      v. Frequencies: Set appropriate frequencies for comm and nav
      Vi. Notams: Listen and determine how they will affect you
      VII. Alphabetical code: Listen for broadcast name

II. OKE CITY APPROACH
   a. Initial call:
      i. "Oke city approach."
      ii. "Crimson 5."
iii. "(Distance) miles (direction from airport) at (altitude)."
iv. "With (state ATIS broadcast name)."
   Example: "Oke City approach, Crimson 5, 15 miles northwest, four thousand, with Bravo."
v. The controller will acknowledge your call and assign you a transponder (squawk) code. Respond by repeating the code and your call sign.

b. Follow-up call:
   i. The controller will call and acknowledge that radar contact has been established. Give the controller your intentions, direction of flight, and altitude to which you are climbing or descending.
c. On subsequent calls:
   i. Answer or acknowledge any request from ATC, and end transmission with your call sign as ATC uses it (it may be abbreviated).
   ii. Example: "Right turn, three five zero, Crimson 1."

III. FINAL CONTROLLER
   a. ATC will initiate hand off to the final controller
      i. Example: "Crimson 5, contact Oke City approach on 124.6."
      ii. The proper response is "one two four six, Crimson 5."
   b. Switch to the assigned frequency.
   c. "Oke City approach."
   d. "Crimson 5."
   e. "With you at (state altitude and change, if any)."

IV. WILL ROGERS TOWER
   a. ATC will initiate the hand off:
      i. "Crimson 5, contact Rogers Tower on 119.35."
      ii. The proper response is "one, one, niner, three, five, Crimson 5."
   b. To call tower, use a standard inbound radio call:
      i. "Rogers tower."
      ii. "Crimson 5."
      iii. "Inbound."
      iv. "(State type) landing."
   c. When the tower responds, or makes requests, the pilot should respond and acknowledge with the aircraft call sign.

V. GROUND CONTROL
   a. Do not contact ground control until advised by tower and you are clear of the active runway (past the hold line).
   b. Make a taxi call to the ground controller:
      i. "Rogers ground."
      ii. "Cherokee three niner one zero uniform."
      iii. "Clear of runway (insert appropriate number)." (i.e. three five right)
      iv. "Taxi to (state desired location on airport, such as name of FBO)."
   c. Follow the controller's instructions in his response. Acknowledge your understanding by repeating, and hold short instructions and your call sign.

VI. CLEARANCE DELIVERY
   a. Listen to ATIS first, and be ready to write down information and clearance. If VFR, know your departure direction (heading) and altitude.
      i. "Rogers Clearance Delivery."
      ii. "Crimson 5."
      iii. "VFR/IFR to (state destination), with (ATIS broadcast name)."
   b. Clearance Delivery will provide your IFR clearance or departure instructions for a VFR departure, including a transponder code and departure frequency.
   c. Read back your clearance and get affirmation from controller that your read-back was correct. Then switch to ground control for taxi instructions.
VII. DEPARTURE CONTROL

a. After take-off, the tower will advise when to contact departure control and the appropriate frequency. Do not change frequencies without being instructed to do so. However, if you believe your hand off may have been forgotten, query the tower controller.

b. Initial call:
   i. "Oke City approach."
   ii. "Crimson 5."
   iii. "With you, (state current altitude and what you're climbing to per your clearance)."

   1. Example: "Oke City approach, Crimson 5, with you at two thousand two hundred, climbing three thousand."
OU FLIGHT OPERATIONS AFTER 10:00 p.m.

CFI's may ask on a case by case bases for "exceptions / time extensions" to the Supervisor of Flight (OU mobile) by 9:00 p.m. Such cases must have training time line reasoning and exceptions will be limited.

Any OU Dual flight (local or cross country planning to return to OU after midnight WILL be called in to the OU MOBILE before departure.

Solo students will be landed at KOUN by midnight on any flight day.

Solo students "awake day" should never exceed 16 hours before end of flight (assess in FRAT).

CFI's "awake day" should never exceed 16 hours before end of flight (assessed in FRAT).

CFI's or students should never show for a local training flight until 12 hours has passed since last landing (confirmed in FRAT).

The Follow are OU Department of Aviation Operating Hours for local airports:

OU Airport:

Solo:
- 5 AM to 11 PM: no restrictions
- 11 PM - Midnight: one touch and go/stop and go or full stop
- Midnight: no operations - all solos must be landed by midnight

Dual:
- 5 AM to 11:00 p.m. no restrictions
- 11 PM to Midnight: one touch and go/stop and go or full stop termination.
- Midnight to 2:00 a.m.: full stop termination.

Any flight staying out past midnight must call Super of Ops prior to departure.

No KOUN local flights or student cross countries will take off after 11:00 p.m.

All dual aircraft should plan to be back by midnight but if necessary can land as late as 2:00 a.m.

DJ Perry / Goldsby:

Solo:
- 5:00 a.m. to 10:00 p.m.: no restrictions.
10:00 p.m. to 11:00 p.m.  no OU solo operations.
After 11:00 p.m.  no OU solo operations.
Dual:
5:00 a.m. to 10:00 p.m.  no restrictions.
10:00 p.m. to 11:00 p.m.  one touch and go/stop and go.
After 11:00 p.m.  no OU operations.

**KOKC Will Rogers and Chickasha**

Solo:
5:00 a.m. to 10:00 p.m.  no restrictions.
After 11:00 p.m.  one touch and go/stop and go or full stop then depart to KOUN.
-All solos must be landed back at KOUN by midnight.

Dual
5:00 a.m. to Midnight  no restrictions.
Midnight to 1:30 a.m.  avoid multiple transitions.
Must land back at KOUN by 2:00 a.m.

**Cross Countries:**
Airports on the OU approved cross country list should be utilized

Solo
Only to destinations approved by CFI in flight plan (unless executing PIC authority to divert for safety).
Follow restrictions for airports listed above as listed above.
Must land back at KOUN by midnight.
At any time, If you will land 30 minutes past your flight planned arrival time back to OU you must call the OU Mobile from an enroute location.

Dual
Any local or cross-country landing after midnight must call the OU mobile before takeoff.

All dual cross countries should be on the ground no later than 2:00 a.m.
Section IV: Cockpit Management

Cockpit Management

DESCRIPTION: A systematic method for organizing materials and equipment so they are ready, available and adequate for ensuring crew coordination and briefing of passengers.

OBJECTIVE: To develop the ability to efficiently organize and manage the cockpit environment both prior to and during flight.

PROCEDURES:

1) Arriving at the airplane, verify that all equipment and materials needed for the flight are accounted for. This may include: operating manual, pen and paper, charts, cross-country materials, hood, survival kit, navigation equipment (radios), checklists, airplane certificates, flashlight, flight case, baggage, etc.

2) Verify that all required inspections (100 hr., annual, IFR, MEL, VORs) as appropriate for the flight are current.

3) Organize and carefully secure all items, making sure they are readily available.

4) Brief all occupants on seat adjustment. Seat belt use, airplane exits, emergency equipment, air vents and if appropriate oxygen.

5) Ensure that all occupants are properly seated and doors closed properly.

6) Carefully adjust your seat and seat belts so as to allow easy access to all controls and equipment.

7) If appropriate determine who will be PIC and what, if any, duties you expect the co-pilot to perform.

8) During the flight, remain well-organized and alert to the needs of the passengers.

Section V: Takeoffs

Normal and Crosswind Takeoff and Climb

Description: The airplane will be aligned with the runway centerline and the ailerons held into the wind. Takeoff power will be applied and the airplane is allowed to accelerate to rotation speed at which time the pitch attitude is increased to establish a positive lift-off and a Vy airspeed. Once airborne a crab angle will be established to maintain a ground track that is aligned with the runway centerline.

Objective: To develop the student's ability to safely accomplish a takeoff and departure under normal and crosswind conditions.

Procedures:
1) Set the flaps to the manufacturer’s recommended takeoff position, check for traffic (clear final and runway for obstructions) and taxi into position on the runway.
2) Align the airplane with the runway centerline and apply full aileron into the wind with the elevator in the neutral position.
3) Smoothly apply full power and check the engine instruments.
4) As the airplane accelerates, adjust the ailerons as necessary to control drift and maintain runway alignment with the rudder.
5) At manufacturer’s recommended airspeed apply back elevator pressure to liftoff and then adjust the pitch altitude to establish the proper initial climb speed.
6) If a significant crosswind exists, the airplane should be kept on the ground slightly longer than normal and a firm and definite liftoff accomplished.
7) As the airplane leaves the runway, Aileron deflection into the wind might result in the downwind wing and main gear lifting off first.
8) After liftoff in crosswind conditions initiate a crab angle into the wind.
9) At a safe flap retraction speed and altitude, retract flaps (if extended) and establish by airspeed.
10) During climb out, maintain a ground track aligned with the runway centerline.

**Soft-Field Takeoff and Climb**

**Description:**
A nose high pitch attitude is maintained during the takeoff roll in order to quickly transfer the airplane's weight to the wings and then lift off as soon as possible. After liftoff, the airplane is flown in ground effect until a safe climb out speed is attained.

**Objective:**
To develop the student's ability to obtain maximum performance from the airplane when taking off from a soft or rough field.

**Procedure:**
1) Extend the flaps to the recommended takeoff setting.
2) Hold the elevator control full up and use aileron to correct for crosswind.
3) Check for traffic and keep the airplane moving at a brisk pace while taxiing on to the runway and don't use brakes unless it is necessary.
4) Smoothly apply full power and check the engine instruments. Hold full up elevator until the nose begins to rise. As the pitch attitude approaches approximately Vx, adjust elevator control pressure to maintain this altitude.
5) Once airborne, adjust the pitch altitude as necessary in order to remain in ground effect while the airplane accelerates to a safe climb speed.
6) As the airplane speed approaches Vx, establish a Vx or Vy airspeed and achieve a positive rate of climb.
7) Upon achieving a positive rate of climb and clear of obstacles establish and maintain Vy pitch attitude.
8) After reaching a safe airspeed and altitude retract the flaps.
9) Establish cruise climb above a minimum safe altitude.

**Reference:**
Short-Field Takeoff and Climb

Description: The airplane is accelerated to liftoff speed in the shortest distance possible and established in a maximum angle climb until all obstacles are cleared.

Objective: To develop the students ability to obtain maximum performance from the airplane while executing a short field takeoff and safely clearing all obstacles in the departure path.

Procedure:
1) Extend the flaps to the recommended take off setting.
2) Check for traffic and taxi into position at the end of the runway so that maximum runway length is available for takeoff. Use appropriate control deflections to correct for crosswind conditions.
3) Hold the brakes and apply full power.
4) Check the engine instruments.
5) Release the brakes after obtaining full power indications.
6) Adjust the elevator control approximately neutral to maintain a level pitch attitude until just prior to rotation.
7) Accelerate to rotation speed and rotate to a pitch attitude that produces a Vx climb speed.
8) Maintain Vx until clear of obstacles.
9) After clearing obstacles, accelerate to Vy and retract the flaps (one at a time).
10) Maintain Vy until a safe altitude is reached (normally 500’ AGL) then accelerate to cruise climb and set climb power.

SECTION VI: Landings

Forward Slips to Landing

Description: During a forward slip, one wing on the airplane is lowered and the airplane is yawed in the opposite direction so that the airplane’s longitudinal axis is at an angle to the airplane’s flight path.

Objective: To teach the student a method of steepening the final approach path without increasing airspeed.

Procedures: Note: CONSULT THE PILOT’S INFORMATION HANDBOOK FOR INFORMATION REGARDING USE OF FLAPS OR ANY OTHER LIMITATIONS WHILE PERFORMING SLIPS.

1) One wing is lowered (normally the upwind wing when a crosswind exists) using aileron.
2) Adjust airspeed to compensate for airspeed indicator error caused by static air disturbances.
3) Use enough rudder to maintain the original ground track.
4) The airplane is now flying at an angle to the relative wind and is in a high drag situation. Therefore, an appropriate pitch attitude must be maintained so that an approach to a stall is avoided and sufficient control is available to make the round out and flare safely.
5) Prior to the flare, the forward slip must be discontinued and the longitudinal axis must be aligned with the runway.
6) After discontinuing the forward slip, execute the appropriate landing procedure.

References:
Airplane Flying Handbook FAA-H-8083-3B

FAA Private and Commercial Pilot Airmen Certification Standards (ACS)

Advanced Pilot’s Flight Manual- Kershner
Normal and Crosswind Approach and Landing

Description: After entering the traffic pattern, the airplane is aligned with the runway centerline on final approach. The landing flap setting is made and a crab angle is established if necessary. A stabilized (airspeed, approach descent angle, and airplane configuration) final approach is established. At an appropriate altitude, a transition to landing pitch attitude is begun in a manner that will allow the airplane to touch down in the proper power off stall pitch attitude. After touchdown, the airplane is slowed to a normal taxi speed on the runway centerline and then taxied clear of the runway. Appropriate crosswind control is maintained throughout the final approach, landing, and rollout.

Objective: To develop the student's ability to safely and accurately execute an approach, landing, and rollout, in normal and crosswind conditions.

Procedures:

1) Complete the appropriate traffic pattern.

2) Achieve a stabilized, power on approach and the final flap setting prior to descending below 300' AGL. Use normal approach speed plus ½ the wind gust factor, if appropriate.

3) Make coordinated changes in pitch attitude and power so that a touchdown can be made at the appropriate point on the runway.

NOTE: Crosswind conditions may require a reduced flap setting for approach and landing. Care must be exercised to ensure adequate runway length.

4) Prior to beginning the round out and flare, correct for drift by using the wing-low method and establishing a sideslip. Use aileron to correct for drift and use rudder to keep the airplane’s longitudinal axis aligned with the runway.

5) At the appropriate flare altitude, increase the pitch attitude and reduce power at a rate that will allow a slow decrease in rate of descent and airspeed so that touchdown occurs just as the power reaches idle and the pitch attitude reaches the power off stall attitude. Use of proper crosswind technique will result in touchdown on the upwind main gear first, followed by the downwind main gear, and then the nose gear.

6) Gusty wind conditions may require a touchdown at a slightly higher speed than normal (5-10 KIAS above power off stall speed) and a slightly lower than normal pitch attitude.

References:

Airplane Flying Handbook FAA-H-8083-3B

FAA Private and Commercial Pilot Airmen Certification Standards (ACS)
Soft-Field Approach and Landing

Description: An approach to, and landing on, a soft or rough runway. Power is used during the round out and flare to provide a high degree of control so that the touchdown is as gentle and slow as possible. The nose gear can be lowered gently to the runway surface after the main gear is on the runway.

Objective: To develop the student's ability to obtain maximum performance from the airplane so that a soft touchdown at the slowest possible airspeed can be made.

Procedures:

1) Establish a stabilized power on approach and the final flap setting prior to descending below 300’ above runway elevation at normal or short field approach speed, as appropriate, with flaps extended to the landing position. Add the wind gust factor to the approach speed as appropriate.
2) Select the touchdown area on the runway.
3) Make adjustments in the power setting to remain on the proper glide path.
4) Make adjustments to the airplane pitch attitude to maintain the proper airspeed.
5) At the appropriate flare altitude, increase the pitch attitude to touchdown as descent is continued to a height of 1 to 2 feet above the runway. Use power throughout the flare so that a smooth and gentle touchdown on the main gear can be achieved at the slowest possible airspeed.
6) After touchdown, keep the weight off the nose gear as long as possible, and then gently lower the nose gear to the runway while maintaining back elevator pressure.
7) Use power as necessary to taxi.
8) Use brakes only as necessary.
9) Slow to normal taxi speed before clearing the runway.
10) Complete the after landing checklist when clear of the runway.

References:
Airplane Flying Handbook FAA-H-8083-3B
FAA Private and Commercial Pilot Airmen Certification Standards (ACS)
Short-Field Approach and Landing

Description: An approach and landing is accomplished at an airport with a restricted runway length due to obstacles on the approach path, short runway, unfavorable runway gradient, required downwind landing, high density altitude, or a combination of these factors. The approach is stabilized no lower than 300' above runway elevation. The round out and flare is accomplished in a manner that allows the airplane to reach the power off stall pitch attitude as the main landing gear touches the runway with power reaching idle at the same time. The roll out is minimized by proper use of aerodynamic deceleration and airplane wheel brakes.

Objective: To develop the student's ability to safely and accurately accomplish maximum performance approaches and landings.

Procedures:

1) Select and plan the appropriate flight path and touchdown point on the runway.
2) Establish a stabilized power on approach prior to descending below 300' above runway elevation at the manufacturer's recommended short field approach speed with flaps extended to the landing position. Add ½ the wind gust factor to the approach speed as appropriate.
3) Make adjustment in the power setting to remain on the proper glide path and to avoid obstacles.
4) Make adjustments to the airplane pitch attitude to maintain the proper airspeed.
5) At the appropriate flare altitude, increase the pitch attitude and reduce power to a setting that will allow a slow decrease in rate of descent and airspeed so that touchdown occurs just as the power reaches idle and the pitch attitude reaches the power off stall attitude.

(NOTE: Touchdown point for a runway that has threshold markings should be the numbers. Touchdown point for a runway that does not have threshold markings should be the first centerline stripe beyond the numbers)

6) After touchdown, and after achieving maximum aerodynamic deceleration, retract the flaps and apply full aft stabilator to achieve maximum aerodynamic braking without skidding the tires.
7) Slow to normal taxi speed before clearing the runway.
8) Complete the after landing checklist after the airplane clears the runway and comes to a complete stop.

FAA Private and Commercial Pilot Airmen Certification Standards (ACS)
Power-Off 180 Degree Accuracy Approach and Landing

Description: In the landing configuration, with the power at idle, the airplane is maneuvered from downwind, abeam the touchdown point to a landing no more than 200 feet beyond a point specified by the examiner.

Objective: To develop the student’s ability to maneuver with the power at idle, from downwind, abeam the touchdown point to a landing no more than 200 feet beyond a point on the runway specified by the examiner.

Procedures:
1) Enter the traffic pattern at a 45 degree to the downwind
2) Make all appropriate radio calls
3) Clear the base and final for any traffic
4) Establish an altitude of 1000’ AGL or TPA, whichever is higher
5) Before midfield, select gear down
6) Abeam touchdown point - Power idle
7) Slow to best glide speed (105 MPH arrow, 73KIAS Warrior)
8) Adjust glide path with flaps and/or by slipping and/or adjusting airspeed
9) Base and final - Verify GUMPS
10) Short final slow to touchdown airspeed of approx. 1.2Vso
11) Touch down no more than 200’ beyond predetermined point.
12) After touchdown, take a deep breath, retract flaps and then begin applying brakes as necessary.

References:
Airplane Flying Handbook FAA-H-8083-3B
FAA Commercial Pilot Airmen Certification Standards FAA-S-ACS-7
(Changes 1&2)
Go Around From a Rejected (Balked) Landing

Description: The landing approach is abandoned and the airplane is transitioned to a climb.

Objective: To develop the student’s ability to safely perform a go-around/rejected landing procedure.

Procedures:

1) Smoothly, apply full power (mixture as required)
2) Adjust the pitch attitude to stop the descent
3) Retract the flaps gradually to the takeoff position, adjust the pitch attitude to climb at Vy or Vx as appropriate
4) Trim the aircraft
5) After clearing obstacles establish a Vy climb
6) Use appropriate collision avoidance techniques throughout the entire procedure
7) Radio intentions as appropriate


FAA Commercial Pilot Airmen Certification Standards FAA-S-ACS-7 (Changes 1&2)
SECTION VII: Traffic Patterns

Traffic Pattern Operations
Description: The traffic pattern is used to establish an orderly flow of traffic for airplanes arriving, departing and operating in the vicinity of airports. The pattern consists of arrival to and departure from an airport while executing proper cockpit duties.

Objective: To develop the ability to conduct safe and efficient airport arrival and departure procedures.
Procedures:

1) Determine the active runway by an appropriate method. (wind direction or NOTAMs)

2) Establish the airplane on a 45° ground track toward the midpoint of the downwind leg unless otherwise directed by the control tower. Pattern altitude must be established 2 miles prior to reaching the downwind entry point. Slow to traffic pattern airspeed before turning downwind.

3) Maintain strict vigilance for other airplanes established in the pattern or in the vicinity of the airport.

4) Complete the pre-landing checklist.

5) Turn the airplane onto the downwind leg approximately ½ miles to 1 mile out from the active runway. Estimate wind direction and velocity by observing the windsock and make appropriate pattern adjustments. Maintain pattern altitude and airspeed unless traffic separation or ATC instructions dictate otherwise.

6) When abeam the point of intended landing check speed below Vfe, extend the flaps to an appropriate position and begin descent at an appropriate point considering traffic, terrain, obstacles, traffic pattern size, and ATC instructions.

7) Clear for traffic and turn base leg when 45° from touchdown point.

8) Coordinate the pitch and power to maintain the desired approach angle and base leg airspeed.

9) Visually clear the final approach path and turn on to final approach with the airplane aligned with the runway.

10) Extend flaps to the landing position (normally full down). Make coordinated pitch attitude and power adjustments to maintain the desired approach angle and final approach airspeed.

11) Adjust the final approach airspeed by adding ½ the gust factor if appropriate.

12) Achieve a stabilized final approach no lower than 300’ AGL.

13) Execute the appropriate landing procedure.

14) After liftoff, maintain runway alignment and appropriate climb airspeed (Vx if obstacle or Vy).

15) After reaching a safe airspeed and altitude, retract the flaps if extended.

16) Upon reaching a safe altitude, clear of obstacles but not less than 500’ AGL, accelerate to cruise climb airspeed.

17) Continue straight out or exit with a 45° turn in the direction of the traffic pattern when beyond the departure end of the runway and at or above traffic pattern altitude.

18) Continue climb to appropriate altitude and proceed on course when clear of the airport and traffic.

19) **Closed pattern operation:** clear for traffic and begin the turn to the crosswind leg beyond the departure end of the runway and within 300 feet of pattern altitude.

20) Upon reaching traffic pattern altitude, accelerate to traffic pattern airspeed and set power.

21) Initiate the pre-landing checklist after completing the turn.
References:

- Airplane Flying Handbook FAA-H-8083-3B
- FAA Commercial Pilot Airmen Certification Standards FAA-S-ACS-7 (Changes 1&2)
- AIM (current Revision)
Max Westheimer Airport Diagram
Max Westheimer Runway 36 Traffic Pattern

Rwy 36 - Left Traffic

(not to scale)
Max Westheimer Runway 18 Traffic Pattern

Runway 18 - Right Traffic
(not to scale)
SECTION VIII: Emergencies

Emergency Approach and Landing

Description: The airplane is maneuvered, power-off, to the best available landing site. Time and altitude permitting, cockpit procedures are completed.

Objective: To develop the skill and proficiency necessary to accomplish a power-off emergency approach and landing to the best available site.

Procedures:
1) Establish and trim for best glide speed.
2) Select best available landing site within glide range
   -- Look first for a site downwind—this will extend your glide range.
   -- Pick a site as close as possible. (preferably plowed in the direction of landing)
3) Maneuver the airplane to the “key position” left or right downwind, abeam the touchdown point.
4) Complete the engine failure check list TIME AND ALTITUDE PERMITTING. (unless there is an actual emergency, this step is simulated)
5) Squawk 7700 and declare an emergency on frequency 121.5 (or to ATC if in contact with ATC)
   Note: Unless there is an actual emergency, this step is simulated.
6) Upon arrival at the “key position” execute 360° turns at 30° of bank until reaching an altitude of 1000-1500’ AGL
7) Ignition off, fuel selector off, mixture lean Note: unless there is an actual emergency, this step is simulated.
8) Master switch off when radio communication is no longer required. Note: unless there is an actual emergency, this step is simulated.
9) Unlatch door. Note: unless there is an actual emergency, this step is simulated.
10) From the “key position” fly an abbreviated downwind base and final to the field.
11) When landing is assured, extend flaps and gear if appropriate and touch down at the slowest possible airspeed using a nose high attitude in the flare.
12) *Initiate recovery to avoid descent below 500’ AGL unless over an approved landing point (i.e. runway)

Emergency Approach (Downwind Approach to Field)

CIRCLE DOWN TO 1000-1500' AGL

KEY POINT

WIND DIRECTION
Emergency Approach (Upwind Approach to Field)
Unusual Flight Attitudes

Description: The instructor or student will place the airplane in an unexpected attitude. When told to recover, the student will assume control, stabilize the airplane, and return it to its original flight path by reference to available flight instruments.

Objective: To learn to recognize and properly recover from unusual attitudes by reference to both full and partial instrument panels.

Procedures:

1) The student is instructed to take her/his hands and feet off the controls and close her/his eyes.
2) The instructor clears the area for other airplane traffic and ensures that the altitude is adequate for the safe conduct of the maneuvers.
3) The instructor then puts the airplane into a critical flight attitude.
4) Then, the instructor will clearly say, “open your eyes and recover.”
5) The student will look at the flight instruments to determine what kind of critical attitude the airplane is in, and how best to recover.
6) Recovery is initiated and the airplane is stabilized.
7) Return to original flight path and altitude as rapidly as practicable.

Note: while space does not allow for a discussion of all possible situations, two common situations and their respective recovery procedures are:

Nose High - airspeed low, trend decreasing:
1) Lower the nose and simultaneously apply full power while leveling the wings.
2) Establish straight and level flight at cruise power on original flight path and altitude.

Nose Low - airspeed high, trend increasing:
1) Reduce power.
2) Level the wings.
3) Smoothly raise the nose to level flight altitude.
4) Establish straight and level flight at cruise power on original flight path and altitude.

References:

Airplane Flying Handbook FAA-H-8083-3B
FAA instrument Rating Airmen Certification Standards (ACS)
Emergency Descent (PA28-161 Warrior)

Description: A descent from a higher altitude in the case of an emergency such as: incapacitated passenger, smoke filling the cockpit, and fire.

Objective: To descend from a higher altitude in the shortest amount of time as safely as possible.

Procedures:
1) Perform clearing turns
2) Position report including: location, altitude, heading, airspeed, and intentions.
3) Power idle
4) Pitch for flap operation speed 103KIAS
5) Configure flaps full (airspeed will decrease further, continue pitching for 103 kts)
6) Establish bang angle between 30°-45°
7) Allow for maximum descent

Note: Airspeed not to exceed 103KIAS
8) Execute applicable checklist as appropriate (engine fire, electrical fire etc.)

Recovery (500 AGL)
1) Roll wings level
2) Pitch for the horizon
3) Add full power
4) Retract flaps (one by one as necessary)
5) Continue to climb to desired altitude
6) Set power to cruise power
7) Fuel pump off

Note: transition to emergency approach and landing procedures if required.

Note: steps 1-3 are designed to maximize safety and avoid collisions with aircraft at lower altitudes. In a real world situation requiring an emergency descent, the priority is to initiate the descent as soon as possible while still practicing anti-collision precautions to maximum extent possible.

Note: In real world engine fire situation, the fuel pump would not be turned on.

References: Airplane Flying Handbook FAA-H-8033-3B
Emergency Descent (PA-28R-200 Arrow)

Description: A descent from a higher altitude in the case of an emergency such as: incapacitated passenger, smoke filling the cockpit, and fire.

Objective: To descend from a higher altitude in the shortest amount of time as safely as possible.

Procedures:
1) Perform clearing turns
2) Position report including: location, altitude, heading and airspeed.
3) Turn fuel pump on
4) Power idle
5) Propeller forward
6) Extend the landing gear below 150MPH
7) Pitch for flap operation speed 125MPH
8) Configure full flaps (airspeed will decrease further)
9) Establish bank angle between 30° - 45°
10) Allow for maximum descent

Note: Airspeed not to exceed 125MPH

11) Execute applicable checklist as appropriate (engine fire, electrical fire etc.)

Recovery (500 AGL)
1) Roll wings level
2) Pitch for the horizon
3) Add full power
4) Retract 3rd notch of flaps
5) Retract gear
6) Retract remaining flaps
7) Set power to cruise power
8) Fuel pump off

Note: transition to emergency approach and landing procedures if required.

Note: steps 1-3 is designed to maximize safety and avoid collisions with aircraft at lower altitudes. In a real world situation requiring an emergency descent, the priority is to initiate the descent as soon as possible while still practicing anti-collision precautions to maximum extent possible.

Note: In real world engine fire situation, the fuel pump would not be turned on.

References: Airplane Flying Handbook FAA-H-8033-3B
SECTION IX: Slow Flight, Stalls and Spins

Maneuvering During Slow Flight

Description: After clearing turns are completed, the airplane is maneuvered at an airspeed such that controllability is minimized to the point where the aircraft is operated in the area of reverse command, typically 5-10 knots above 1G stall speed. The maneuver should be accomplished in straight flight, turns, climbs, and descents using various flap configurations.

Objective: To teach the student to recognize changes in airplane flight characteristics and control effectiveness at critically slow airspeeds in various configurations while maintaining positive airplane control at all times.

Procedures:

1) Clear the area by performing clearing turns.
2) After completing clearing turns, reduce power to 1500 RPM (or 15”MP in Arrow); maintain heading and altitude while slowing to the critically slow airspeed.
3) Extend flaps below Vfe
4) As airspeed approaches Vso +5-10, power is adjusted to control altitude and pitch is adjusted to maintain airspeed.
5) Turn, climbs, and descents using bank angles of no greater than standard rate are performed as directed by the instructor while maintaining a critically slow airspeed.
6) Recovery is initiated by applying takeoff power and adjusting pitch attitude to maintain altitude while retracting flaps.
7) Resume normal cruise or as directed.

References:

FAA Private and Commercial Airmen Certification Standards
Airplane Flying Handbook FAA-H-8083-3B

Note: Flight with continued or repeated stall horn/annunciator alerts will be avoided. Upon stall horn/annunciator activation, stall recovery procedures will be implemented.
Power-Off Stalls

Description: The airplane is maneuvered to a critically slow airspeed in straight flight or turning flight in a power-off configuration. A descent is established and the angle of attack is then increased until an imminent stall (initial buffet or loss of control effectiveness) or the full stall occurs.

Objective: To develop the student’s ability to recognize the indications leading to an imminent or full stall while making an approach to landing and to make prompt, positive and effective recoveries with a minimum loss of altitude.

Procedures:

1) Perform clearing turns and make a radio call on OU traffic prior to starting the maneuver
2) Reduce power to 1300-1500 RPM (15” MP), maintain heading and altitude while slowing to normal approach speed.
3) Extend flaps to the landing position below Vfe.
4) Upon reaching normal approach speed, establish 400-600fpm descent.
5) Smoothly adjust the pitch to an attitude that will induce an imminent stall.
6) Maintain coordinated flight
7) Maintain a pitch attitude that will induce an imminent or full stall (as directed). For imminent stalls, maintain pitch attitude until the initial buffet or a rapid decay of control effectiveness is experienced. For full stalls, maintain pitch attitude until a sudden loss of control effectiveness, excessive sink rate with full up elevator, or uncontrollable pitch down occurs.
8) Recover by decreasing the angle of attack, leveling the wings with coordinated use of aileron, rudder, and applying full power.
9) Retract the flaps while adjusting the pitch attitude to minimize altitude loss.
10) Accelerate to the normal cruise or climb as necessary to an appropriate altitude.

References: FAA Private and commercial Airmen Certification Standards
Airplane Flying Handbook FAA-H-8083-3B
Power-On Stalls

Description: The airplane is maneuvering to a critically slow airspeed in straight flight or turning flight in a power-on configuration. The angle of attack is then increased until an imminent stall (initial buffet or loss of control effectiveness) or the full stall occurs.

Objective: To develop the student’s ability to recognize the indications leading to an imminent or full stall in power on situations and to make prompt and effective recoveries with a minimum loss of altitude.

Procedures:

1) Perform clearing turns and make a radio call on OU traffic prior to starting the maneuver
2) Reduce power and maintain heading and altitude while establishing a takeoff or climb configuration and airspeed as directed.
3) At Vr, simultaneously increase the pitch attitude to a stall attitude and apply full power.

Note: Avoid excessively high pitch attitudes.
4) Maintain coordinated flight.
5) For imminent stalls, maintain the stall pitch attitude until the initial buffet or a rapid decay of control effectiveness is experienced. For full stalls maintain the stall pitch attitude until a sudden loss of control effectiveness is experienced, excessive sink rate with full up elevator, or uncontrollable pitching occurs.
6) Recover by decreasing the angle of attack, leveling the wings with coordinated use of aileron and rudder and applying full power.
7) After recovery is complete, accelerate to normal cruise or climb as necessary.

References: FAA Private and Commercial Airmen Certification Standards
Airplane Flying Handbook FAA-H-8083-3B
**Spins**

**Note:** This maneuver is not authorized in any OU airplane except the Cessna A152 aerobat and on dual flights only.

**Description:**

The airplane is maneuvered into an aggravated stall condition during which uncoordinated control use is accomplished in a manner that produces a spin entry.

**Objective:**

To develop the student’s ability to recognize flight situations that lead to spin entries and to recover from spin entries and spins.

**Procedures:**

**Entry Procedures:**

1) Climb to at least 6000’ AGL and clear the area by performing clearing turns.
2) Set up a power off stall entry (power on stall entry may also be used)
3) As the airspeed and pitch attitude approach stall conditions, smoothly apply full aft elevator control with ailerons neutral.
4) Just prior to stall “break”, apply full rudder in desired direction of spin.
5) A slight burst of power may assist spin entry.
6) Hold the rudder and elevator fully deflected until initiating recovery.
7) Initiate recovery after one to three turns.

**Note:** Recovery must be completed no lower than 4000’ AGL

**Recovery Procedures:**

1) Retard power to idle.
2) Neutralized ailerons.
3) Apply and hold full opposite rudder.
4) Briskly apply positive forward-elevator movement to break the stall.
5) Hold these control inputs until rotation stops.
6) As rotation stops, neutralize the rudder.
7) Smoothly return to level flight from the resulting dive.

**References:**

Airplane Flying Handbook FAA-H-8083-3B

FAA CFI Airmen Certification Standards (ACS)

C-152A Information Manual
Accelerated Stalls

Description: The Airplane is maneuvered to an airspeed that is below Va. A constant bank is established and angle of attack is adjusted to maintain altitude inducing an imminent stall.

Objective: To develop the students ability to determine the stall characteristics of the airplane and develop the ability to instinctively recover at the onset of a stall at other-than-normal stall speeds or flight attitudes.

Procedure: 1) Select altitude that allows maneuver to be completed no lower than 3000’ AGL.
   2) Perform clearing turns, fuel selector to appropriate position.
   3) Reduce power to 19”MP (arrow)/2000RPM(warrior) slowing down to 100MPH (arrow)/85kts (warrior).
   4) Upon reaching entry speed, establish a 45° bank either direction.
   5) Smoothly and firmly adjust pitch to maintain altitude and induce stall.
   6) Maintain coordinated flight.
   7) Maintain stall pitch attitude until the initial buffet or rapid decay of control effectiveness is experienced.
   8) Recover by simultaneously decreasing back pressure, increasing power, and leveling the wings.
   9) After recovery is complete, accelerate to normal cruise or climb as necessary.

Reference: FAA Commercial Airmen Certification Standards.

Airplane Flying Handbook FAA-H-8083-3B
SECTION X: Performance Maneuvers

Steep Turns

Description: 360° turns are performed in both directions using a steep bank angle.

Objective: To develop the student’s smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns.

Procedures:
1) Clear the area of other traffic.
2) Establish an appropriate altitude and Va airspeed (mixture as required).
3) As the bank angle steepens, adjust back elevator pressure to maintain a level altitude and adjust power to maintain airspeed.
4) Maintain a 50° bank angle, altitude, and airspeed during the turn.
5) Be constantly alert for other traffic while performing this maneuver.
6) Plan to lead the rollout so the turn is stopped after 360° of heading change and immediately initiate a 360° turn in the opposite direction.
7) After completion of the second turn, return to straight and level flight at cruise airspeed.

References:
FAA Private and Commercial Airmen Certification Standards
Airplane Flying Handbook FAA-H-8083-3B
Chandelles

Description:  
A 180° maximum performance climbing turn.

Objective:  
To develop the student’s control techniques at varying airspeeds and altitudes while remaining oriented and coordinated.

Procedures:  
1) Clear the area of other traffic.
2) Establish an appropriate airspeed at or below Va.
3) Select a prominent reference point off the wing tip. Consider wind direction.
4) Smoothly apply full power
5) Enter a coordinated 30° bank turn into the direction of the reference point and wind.
6) Once a 30° bank is established, simultaneously increase pitch attitude at a constant rate so as to obtain a maximum pitch attitude at the 90° point which, when maintained, will result in the airplane slowing to just above stalling speed at the completion of 180° turn.
7) Maintain coordinated control inputs throughout maneuver.
8) Maintain a constant 30° bank angle during the first 90° of the turn.
9) After passing the 90° point, begin a slow, constant rate roll out in order to arrive at the wings-level position just as the 180° turn is completed.
10) After the 90° point, back pressure should be added as required to maintain a constant pitch attitude until reaching the 180° point.
11) Upon reaching the 180° point, the airplane should be held momentarily within 5 knots of stalling speed with the wings level.
12) Maintain altitude and accelerate to cruise by decreasing pitch attitude to the horizon.

Note: This maneuver should be done into the wind to avoid drifting away from the reference point and/or the practice area.

References:  
Airplane Flying Handbook FAA-H-8083-3B

FAA Commercial Pilot Airmen Certification Standards (ACS)
Lazy Eights

Description: Two 180° turns are completed in opposite directions. Each turn includes a climb and a descent in a symmetrical pattern; the nose of the airplane scribing a horizontal eight on the horizon.

Objective: To develop the proper coordination of the flight controls across a wide range of airspeed and attitudes.

Procedures:

1) Clear the area for other traffic.
2) Establish an appropriate attitude at or below Va.
3) Select reference points and consider wind direction.
4) Begin a gradual climbing turn in the direction of the 45° reference point. Plan a climbing turn so that at the 45° point, the airplane is at its maximum pitch attitude and a 15° bank angle is rolled in with the bank slowly and steadily increasing.
5) The bank angle should continue to increase until it reaches a 30° bank angle at the 90° visual reference point. The pitch attitude should be slowly decreasing.
6) As the airplane passes through the 90° reference point on the horizon. The bank angle should be at 30° and the airspeed should be 5-10 KIAS above stall.
7) Both the pitch attitude and the bank angle continue to decrease so that, at the 135° point, the pitch attitude reaches its lowest point and approximately 15° bank angle remains.
8) As the airplane passes through the 135° point, the roll out is continued and the pitch attitude is slowly increased so that the airplane returns to straight and level flight at the entry altitude and airspeed at the 180° point.
9) Continue immediately into a similar turn in the opposite direction.

Note: this maneuver should be done into the wind to avoid drifting away from the reference point and/or the practice area.

References:

Airplane Flying Handbook FAA-H-8083-3B

FAA Commercial Pilot Airmen Certification Standards (ACS)
Steep Spirals

Description: The airplane is maneuvered in a descending turn, around a point on the ground that causes the ground track to be a circle.

Objective: To develop the student’s ability to make a descending turn maneuvering the airplane around a point on the ground in a manner that causes the ground track to be a circle.

Procedures:
1) Perform clearing turns and radio calls
2) Establish an altitude of at least 4500’ AGL.
3) Check gear and flaps up.
4) Determine wind direction and set-up for downwind entry
5) Select a small but prominent reference in a sparsely populated area.
6) Crossing point, apply carb heat (Warrior only, as required) reduce power to idle, slow to best glide (105 MPH Arrow, 73 KIAS Warrior) and roll into a maximum of 60° of bank.
7) Vary bank angle to maintain constant ground track of about 1/8 mile radius from your center point.
8) Make at least three turns recovering on the entry heading and an altitude of more than 1500’ AGL.
9) During each up-wind turn clear the engine by briefly advancing the throttle to at least 1700 RPM
10) Be constantly on the alert for traffic while performing this or any maneuver.
11) Plan to depart on entry heading unless otherwise instructed.

References:
Airplane Flying Handbook FAA-h-8083-3B

FAA Commercial Pilot Airman Certification Standards (ACS)
SECTION XI: Ground Reference Maneuvers

Eights-On-Pylons

Description: The airplane is maneuvered between and then around two prominent reference points (pylons) in the form of a figure “8”. During the turn portion the pylon is kept in the same position relative to the airplane’s lateral axis by adjusting both altitude and bank angle.

Objective: To develop the student’s ability to maneuver the airplane accurately while dividing his/her attention between the flight path and the selected points on the ground.

Procedures: 

Note: consideration must be given to the possibility of a low altitude engine failure while performing this maneuver. Select an area with an adequate landing site.

1) Perform clearing turns and make radio calls
2) Establish pivotal altitude and airspeed below Va
3) Determine the wind direction.
4) Select two prominent reference points (pylons). They should be on a line perpendicular to the wind and far enough apart to allow 3-5 seconds of straight-and-level flight between turns.
5) Enter the “8” at the pivotal altitude by flying diagonally downwind between the pylons. The first turn is made into the wind.
6) As the line of sight reference approaches the pylon enter a bank as necessary to properly position the reference line on the pylon.
7) As the turn is continued, hold the line of sight reference on the pylon by adjusting bank and altitude. (lower altitude upwind and higher altitude downwind.)
8) Begin rolling out from the left when diagonally downwind to the right.
9) Once wings level, fly 3-5 seconds until reference line crosses right wing.
10) Complete maneuver to the right.
11) Be constantly alert for other traffic and obstacles while performing this maneuver.
12) To complete the maneuver, exit on 45 degrees downwind to the left.

Note: pivotal altitude may be approximated by squaring ground speed, then dividing by 15 for MPH, or 11.3 for Knots.

References: Airplane Flying Handbook FAA-h-8083-3B
FAA Commercial Pilot Airman Certification Standards (ACS)
Rectangular Course

Description: The airplane is maneuvered over a predetermined rectangular ground path. The pilot will maneuver the airplane utilizing necessary wind corrections so as to parallel the sides of the rectangle at a uniform distance. Turns at the corners of the rectangle are constant radius turns.

Objective: To develop the student’s ability to maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

Procedures: Note: consideration must be given to the possibility of a low altitude engine failure while performing this maneuver. Select an area with adequate landing site available.

1) Perform clearing turns and radio calls
2) Establish an altitude between 600’ - 1000’ AGL and establish cruise power and airspeed.
3) Select a prominent rectangular field bound by four section lines whose sides are approximately equal to a typical traffic pattern.
4) The field should be in a sparsely populated area.
5) Enter the maneuver on downwind.
6) Establish the proper crab angle to maintain a uniform distance from the field boundaries. (about ½ - ¾ mile)
7) Be constantly alert for other traffic while performing this maneuver.
8) Vary the bank angle to maintain a constant radius during the turns.

References: Airplane Flying Handbook FAA-h-8083-3B

FAA Private Pilot Airman Certification Standards (ACS)
S-Turns Across a Road

Description: The airplane is maneuvered through a series of 180° turns in opposite directions over a predetermined reference line. The ground path should be a series of half circles of equal size alternately executed on the upwind side and the downwind side of the reference line.

Objective: To develop the student’s ability to maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

Procedures: **Note:** consideration must be given to the possibility of low altitude engine failure while performing this maneuver. Select an area with adequate landing site available.

1) Perform clearing turns and radio calls.
2) Establish an altitude between 600’ and 1000’ AGL that is at least 500’ above obstacles and establish cruise airspeed.
3) Determine the wind direction.
4) Select a road or other straight reference line running approximately perpendicular to the wind (in a sparsely populated area).
5) Enter the maneuver downwind on a ground track perpendicular to the reference line.
6) At a point directly over the reference line, initiate a 180° constant radius turn, modifying the bank angle as necessary to compensate for wind drift. At the completion of the turn, the airplane will be directly over and perpendicular to the reference line with wings level.
7) Immediately upon completion of the first turn, an identical turn is begun on the upwind side of the reference line in the opposite direction. (The airplane should roll through level flight as the reference line is passed).

**Do not stop in the wings level position.**

8) Be constantly alert for other traffic while performing this maneuver.
9) The bank angle should be adjusted as necessary throughout the maneuver to achieve two complete semicircles of equal radius. Bank angle should not exceed 45°.

References: Airplane Flying Handbook FAA-h-8083-3B

FAA Private Pilot Airman Certification Standards (ACS)
Turns Around a Point

Description: The airplane is maneuvered around a point on the ground in a manner that causes the ground track to be a circle.

Objective: To develop the student’s ability to maneuver the airplane over a predetermined ground path while dividing attention inside and outside the airplane.

Procedures: Note: consideration must be given to the possibility of low altitude engine failure while performing this maneuver. Select an area with an adequate landing site available.

1) Perform clearing turns and radio calls.
2) Establish an altitude between 600’ and 1000’ AGL that is at least 500’ above obstacles and establish cruise airspeed (mixture as required).
3) Determine the wind direction.
4) Select a small but prominent reference point in a sparsely populated area.
5) Enter downwind and start a turn around the point.
6) Adjust the bank angle as necessary to correct for the effects of wind in order to maintain a constant radius.
7) Be constantly alert for other traffic while performing this maneuver.
8) Plan to depart on the entry heading unless otherwise instructed.

References: Airplane Flying Handbook FAA-h-8083-3B

FAA Private Pilot Airman Certification Standards (ACS)
SECTION XII: Cross Country Flight Planning

PRF 30

OU Aviation Department Cross Country Procedures                                         Chg 2 – 21 Mar 1430L

ADDED to Those Found in Student Procedures Handout

The purpose of cross country flying with OU Aviation Department is for training. Within our Procedures handout we have published procedures on all phases of flight through aircraft key turn-in and down safe call to OU Mobile. These procedures exist because they are either required by the FAA, AABI criteria, or our Safety / Risk Management program.

OU aircraft will be used strictly in support of syllabus training for all cross-country flights. All existing procedures will be followed but this PRF is to further clarify some processes and articulate reasons behind them.

1) Cross country scheduling will be allowed the following flight slots in AIMS:

   1. Hour 1 Slot
   2. Hour 2 Slots
   3. Hour 3 Slots
   4. Hour 4 Slots
   5. Hour 4 Slots
   6. Hour 5 Slots

All cross-country flights will follow the cross-country procedures in the student procedures handout plus follow all checklist steps in the Dept cross country Sequence of Events for Cross Country checklists (Day before; Day of; Arrival at Airport – checklists). These were issued on March 18, 2018 and a copy is in each hand held checklist and also paper copies are available for students by the PRF file for personal use at home.

Flight students should always arrive **on time and prepared** and then proceed to update the items that must be checked at the airport. i.e. Weather update, risk assessment update, etc. Timely departures require proper time management of preparing for the cross country flight per the Department’s published SOE for cross country flights checklists. There are ample areas at the airport for your pre flight planning upon your arrival to include:

   - 3 computers and desks in the airport lobby hallway (across the men’s restroom)
   - 3 computers and desks in the Director Hangar lobby
   - 4 computers and desks in NC210 Student Study Area
   - Upstairs terminal classroom (when not in use)

**Critical Sequence of Events:** Students should arrive early enough to have all planning task items complete by the beginning of their first scheduled slot. **This is a student’s professional responsibility.**
Flight students must have engine running by 30 minutes after the start of their first flight slot. If they are unable to have engine started by the first 30 minutes, they should:

1) Contact **Supervisor of Ops** – in person or via OU Mobile to ask for extension.
   a. Many times there may be reasons out of the student’s control (plane not available; time to make a plane available etc). CFI, Dispatchers and Dept leadership “desire” for you to fly so we will do what we can to accommodate – but it is a two way street for preparedness.
   b. During M-F duty hours – coordination should be through “CFI Dispatcher or the students CFI”
   c. If due to student not being prepared /ready to go and gets behind the SOE – student / CFI will cancel the sortie/mission.

2) The following ground times apply to all cross countries:

   1, 2, & 3-hour flights – 0 ground time should be planned.
   4-hour flight - .5 hours maximum
   5-hour flight – 1.0 hour maximum
   6-hour flight – 1.0 hour maximum

The **CFI dispatching solo cross-country flights is responsible for ensuring** take-off times, flight planning, ground times and, down times can be met. It is the responsibility of the PIC to ensure to fly the plan. Obviously, if one must go to the bathroom for 2 or 3 hour flights this is understood.

One should “fly the plan” as approved by the CFI…unless PIC needs to divert for weather, or other explainable reasons, etc.

Once the plan is set – that plan should be followed. Any planned change for non emergency reasons would require Supervisor of Ops approval. Any divert from plan – for whatever reason -- a call will be made to OU mobile. If at any time a PIC must land divert because of a concern or need they should.

Students failing to…..

- make down times,
- have late departures,
- have excessive ground times,
- or fail to call supervisor of ops for deviations or down safe, in addition to published procedures, will be placed on “flight hold” until the Chief Flight Instructor has reviewed the (mission infractions/deviations)

These measures are no way intending to encourage or require any unsafe practices, discourage fuel stops or place undue time pressure on students. In fact – through a disciplined, time management approach one improve predictability and thus safety and performance. As a professional training school, we will teach
and enforce; time management, policy and procedure adherence, proper use of aircraft for training mission, and proper flight/fuel planning.

A weak area which we have identified over the last few semesters is thorough and timely preflight preparation by students and a focus on a commitment to preparedness – using their time wisely.

We are a professional, AABI accredited, University Aviation Department, not a private flying club. Scheduling, Dispatching and the pilots/crew following Sequence of Event rigor is part of any professional flight organization (airline, armed forces, corporate). Our Sequence of Events and timeliness expectations are representative of what professional pilots must manage and aspire to.

As such a PRF was released releasing a new SOE for all cross country flight planning and flight execution. Using such SOE ensures:

1) standardization of procedures across all of our CFIs and students
2) but most importantly emboldens safety by having an orderly and predictable flow of pre departure activity tasks / events.

Remember: It is the responsibility of the PIC to visually confirm fuel load before every takeoff from any airport. You should leave OU with “full tanks” on cross country flight requiring such. Visually checking fuel would be one of the first things you check when you arrive at the aircraft (per the OU “Arriving at the Aircraft” SoE checklist)
Subject: OU Aviation Sequence of Events (SoE) for Cross Country Flights

Replaces “Dispatch Checklist Cross Country flights”

All OU students and CFI’s will use our OU SOE to help ensure PICs are prepared for missions/flights in a safe and orderly manner. Just like the championship excellence found in OU athletics and other programs - excellence in our flight lab comes from practice and following established sequence of events before flight. Championship Excellence comes from taking care of the “little things” in an orderly plan and sequence (which pilots have done since WWII - using checklists). Our OU SOE allows you to most efficiently plan your missions while ensuring all required and optionally required items are done and or considered. The goal of mission planning is to properly conduct preparation considering all factors of the flight coupled with an orderly flow so that time is not wasted once you show at the airport on preflight items one should / could have done sooner.

These checklists will be located in each aircraft handheld checklist but they will also be included as an attachment in the Student Procedures Handout each semester. Students should USE this checklist at home. Extra copies are found by the PRF file.

The OU SOE is not necessarily inclusive of all required FAA preflight planning. The Pilot in Command is always the sole person responsible for the planning and execution of a flight/mission.

All Flight students are reminded there are 9 spots where you can access a computer and desk/table to do pre flight activity at any time M-F 7 AM to 6 PM

- 3 computers & tables in the auxiliary student computer room (across from men’s bathroom/coke machine) in terminal lobby
- 3 computers and 5 tables in Director Lobby (available 24/7)
- 3 computers and tables in NC210 Student Study Room

Dressing and Preparing Oneself for HEAT and COLD (Heat Stress and Frost bite)

Students should always be considering the environment they will be flying in and should consider the possibility of having to make a forced landing. Adequate diet, sleep, mental preparation for flight is essential at all times as well as dressing appropriately for the flight / day. Water is always considered an essential on all flights. No other liquids will be taken on OU flights.

The PIC will take a cross country bag on all cross country flights if one is available (per the Sequence of Events checklists). The Supervisor of Ops / Director may elect to curtail flight operations as weather conditions prevail. Such curtailment options include but are not limited to:

- Normal Ops
- Dual only ops
- Dual only ops cross country/ solo only locals
- Solo only OUN pattern

Weather Recall and or Flight Ops Stoppage
In the event The Supervisor of Ops or Fleet note hazardous weather situation developing - an “all call announcement of the situation’ will be made out on OU common radio frequency with advice on operations.

Additionally, we will ask OUN tower to also advise OU traffic of status. In all cases the Pilot in Command makes the final determination of how to proceed in a divert/recovery situation.
DAY BEFORE Cross Country FLIGHT

Before you start flight planning:

1. Confirm airport is on Master OU airport list (master list on AVIA website)
2. Call the FBO and CONFIRM via talking to them that the FBO will be:
   1) Open for REFUELING at your transient times
   2) Has AV100 LL fuel
   3) Can Take the OU credit card - Multi-Serve or EPIC
3. Coordinate with your Flight Instructor if you require/need a specific aircraft (for instance glass)
4. Look at Weather
5. Check NOTAMS
6. Confirm Personal Documents & Nav Personal Bag
   Photo ID; Medical, FAA lic, Syllabus, Flashlight; Extra batteries/back up light; headset,
7. Assess temperatures/precip for dress
8. Weight and Balance
9. Do the cross country flight plan
   - Determine “suitable alternates”
   - Is alternate on the OU airport list and does it have an FBO?
10. Complete Risk Assessment Checklist Phase #1 of 3 and Review
    If red or yellow - confer with CFI
11. Review PRF*
12. Confirm FOREFLIGHT and NAV products
    - Chart Supp; Charts; Xerox of Airfield diagrams
    - IFR - Low charts and Approach plates (check TCN if half way through cycle)
13. Ensure FOREFLIGHT data base is current (if used)
14. Ensure battery on any EFB devices are charged and you have backup battery
    - What is your backup plan if EFB dies/fails? Ensure you have paper back ups for destination and key alternate airports
15. Possibly Meet with or talk to CFI

* NOTE: As a personal technique many students take a photo of each PRF so they have their own handy PRF file they can reference 24/7

Personal Reminders (list):
Day of flight (before showing up to airport)

Optimally just before leaving your residence for the airport:

1. Confirm Personal Documents & Nav Personal Bag
   
   Photo ID; Medical, FAA lic, Syllabus
   
   Flashlight; Extra batteries/back up light; headset,

2. Look at temperature – dress appropriately (layers if cold)

3. Check Master Schedule / Confirm Aircraft

4. Recheck weather – get official weather brief

5. (re) Check NOTAMS

6. Refine -cross country flight plan if necessary

7. Finalize Weight and Balance

8. Complete Flight Plan

9. Complete Risk Assessment Checklist Phase #2 of 3 and Review
   
   If red or yellow - note: May call CFI

10. Confirm FOREFLIGHT and NAV products

    - Chart Supp; Charts; Xerox of Airfield diagrams

    - IFR – Low charts and Approach plates (TCN if half way through cycle)
Get to airport as early as you can before your scheduled time block.

- **RECHECK WEATHER!**
  - call and get Abbreviated / update brief if necessary
  - Look at “Dispatch Weather Boards”
- **Review REAL TIME WX TOOLS -- OK Mesonet winds, local radar, satellite photo**

- **DISPATCH AIRCRAFT/MISSION:**
  - Fill out cross country SIGN OUT SHEET
  - Obtain FUEL CARD
  - Solo flights (instructor sign syllabus)
  - File Flight Plan
  - Complete / Fill out OU PLASTIC Flight Plan CARD & post SIGN OUT SHEET to clip
  - Sign out DISPATCH SHEET
  - Personal BAG & Equipment
  - GET AIRCRAFT KEY (turn in risk mgt checklist)
  - TAKE OU CROSS COUNTRY BAG (on way out)

- Risk Mgt Checklist #3 of 3 – sign off
  - Finalize Weather and other PAVE elements
  - Sum total for Risk Score
  - If yellow or Red – Discuss high risk areas with CFI
    - If RED – must get Supervisor of Ops “OK” to launch

**NOTES:**

- Students must FILE, ACTIVATE and CLOSE VFR flight plans
- All flights will utilize “VFR Flight Following” with ATC
- OU aircraft will NOT fly through an ACTIVE MOA (military operations areas)
PRF 16

Time/Distance/Fuel calculation procedures for the Warrior III. The procedure shown below. Please tape into page 5-21 in your POH

TIME/DISTANCE/FUEL TO DECEND

Parameters:

- Descent Rate: 500 FPM
- Descent Speed: 90 KTS
- Power Setting: 2100 RPM
- Time: \(\frac{(\text{Cruise ALT} - \text{TPA})}{500}\)
- Distance: \(90\text{kts} \times \text{Descent time} + 2 \times \)
- Fuel burn \((9.2 \text{ GPH}) \times \text{Descent time}\)

*Allows traffic pattern entry 2 miles from airport

Example: Cruise ALT = 4500 feet TPA = 2200 feet

- Time: \(\frac{(4500-2200)}{500 \text{ fpm}} = 4.6 \text{ min}\)
- Distance E6B: Set speed at 90, Above 4.6 read 7 NM, add 2 to get 9 NM
- Fuel Set Fuel to 9.2, Above 4.6 read .7 gallons

WHY this method?

The POH has you begin your descent fairly far out from the destination. The OU method has the pilot maintain cruise airspeed until closer to the destination and then descent at a slower airspeed. The OU method also keep the aircraft at or under Va for all phases of flight.
VFR Cross Country Flight Planning

Materials Needed: Sectional, plotter, E6B, pencil, Chart supplement, X-C log, aircraft POH, and W&B

I) Sectional Chart
   a. Plan to use a new flight log for each leg of your cross country
   b. Plot a straight - line course from center of the departure airport to the center of the arrival airport.
   c. Select checkpoints along the course, preferably on your side of the aircraft, within 5 nm of the course, about every 10-15 miles (warrior). Good checkpoints are easily identifiable; i.e. towns, hard-surface airports, industrial plants, major highways, large rivers and lakes. Bad checkpoints would be using the windfarm which has no identifiable boundary.
   d. Record checkpoints, nm between them and total leg lengths on the flight log.
   e. Choose the best altitude based on the hemispherical rule, winds, and elevation along the route.
   f. Record wind direction and speed and temperature at chosen altitude (may require interpolation)
   g. Find an intersection of the course and a line of longitude and measure the true course.
   h. Using an E6B, determine TH, MH, CH, GS.
   i. Using the calculated GS, fill in the ETE between checkpoints and total for the leg.
   j. Using the ETE and leg lengths, fill in GPH between checkpoints and total for the leg

II) Airport Facility Directory
   a. Note the following information on the flight log for each airport you will be flying to:
      i) All communication frequencies in order of their use
      ii) All navigation frequencies in order of their use (Ex: VORs along your route)
      iii) Arrival airport field elevation, traffic pattern altitudes (and if it is standard or non-standard)
      iv) All other pertinent data such as runway lengths, FSS frequencies, TFRs, forecast weather, remarks, etc.

III) Weight and Balance
   a. Calculate a complete weight and balance using the assigned aircraft, ensure you are within CG and weight limits (remember that is not always possible to completely fill the fuel tanks on every flight)
   b. Use actual passenger weights when possible, otherwise use standard weight values.
   c. Fill in all values on the weight and balance form

IV) Weather briefings
   a. Call FSS at 1-800-WX-BRIEF(992-7433)
   b. Dial 1 at the end of the recording to speak to a briefer.
   c. Ask for a “standard” weather briefing, and give him/her to following information: (having a completed flight plan form in front of you will simplify this process)
      i) Type of flight plan (VFR/IFR)
      ii) Aircraft identification
      iii) Aircraft type
      iv) Departure airport
      v) Route of flight
      vi) Destination
      vii) Altitude to be flown
      viii) Estimated departure time
      ix) Estimated time en route
Advise the briefer you are a student pilot (note during poor weather conditions the briefer will be reluctant to provide a complete briefing - if this happens just tell them your instructor requires you to receive a “full” briefing).

d. Obtain actual weather conditions and forecasts for your departure airport, en route and destination airport

e. Obtain winds aloft at 3000’ MSL, 6000; MSL, and 9000’ MSL and temperatures aloft at 6000’ MSL and 9000’ MSL (use higher if necessary)

f. Obtain current altimeter setting and surface temperature closest to your departure airport

g. Ask for NOTAMs, PIREPs, and military advisories

V) Pressure/density altitude

a. Obtain current altimeter setting and surface temperature from Westheimer AWOS if possible ((405)325-7302), Cruise Aviation’s WSI terminal, or a briefer

b. Compare the current altimeter setting with 29.92 in hg. and compute the difference

   i) If the current altimeter setting is less than 29.92 in hg, a positive correction factor exists. Multiply the difference by 1000 and add this value to your planned cruise altitude to determine pressure altitude aloft. Add this value to the field elevation to determine field pressure altitude.

   ii) Example: today’s altimeter setting is 28.79 in hg

      (1) Subtract this from 29.92 in hg = 1.13, then multiply this by 1000 =1130, and add this number to 1182 to get pressure altitude of 2300 at the surface

   iii) If the current altimeter setting is greater than 29.92 in hg, a negative correction factor exists. Multiply the difference by 1000 and subtract this value from you planned cruise altitude to determine pressure altitude aloft. Subtract this value from the field elevation to determine field pressure altitude.

   iv) Example: Today’s altimeter setting is 30.27 in hg

      (1) Subtract this from 29.92 =.35 then multiply this by 1000 = 350 and subtract this number from 1182 to get a pressure altitude of 800 at the surface (note these figures are rounded for simplicity)

c. Compare the field temperature with the temperature aloft and determine if the temperature lapse rate is standard or non-standard. If nonstandard compute/interpolate the temperatures at the altitudes to be used and use these temperatures in your planning.

d. Be sure to include density altitude computations in your aircraft performance calculations if temperature is above standard

e. Density altitude can be determined by using pressure altitude and today's temperature from an E6B or a density altitude chart

VI) Aircraft Performance

a. Take-off Distance

   i) Add or subtract your pressure altitude correction factor to/from field elevation to get field pressure altitude

   ii) Determine surface temperature and headwind/crosswind component.

   iii) Determine density altitude

   iv) Compute take-off distance using the chart which best computes take-off performance over a 50’ barrier using zero degrees flaps.

   v) Note computed distance on sheet

b. True airspeed

   i) Add or subtract your pressure altitude correction factor to/from your cruising altitude to get pressure altitude in cruise flight

   ii) Correct surface temperature or the winds aloft temperature to get an outside air temperature at your cruising altitude. (Remember air temperature decreases 2 degrees Celsius or 3.5 degrees Fahrenheit per 1000’ of altitude gain.) Determine density altitude at your cruising altitude.
iii) Compute true airspeed using a 65% power setting
iv) Note calculated true airspeed on flight log and weight & balance form
v) Compute fuel flow from chart using 65% power and record on flight log
c. Power Setting
i) Using a flight computer, determine the density altitude at your cruising level based on previously computed pressure altitude and temperature at your cruising altitude. Use this density altitude figure if outside air temperature is not a computed variable on chart.
ii) From the power setting/engine performance chart, compute power setting in cruise flight at 65% power and note on flight log.
d. Landing Distance
i) Add or subtract correction factor to the field elevation to get field pressure altitude. Compute field density altitude if necessary, or if large temperature rise is expected before landing.
ii) Use known/estimated surface temperature and surface winds
iii) Using the landing distance 50’ obstacle chart, compute the landing distance required.
iv) Note distance on weight and balance form
VII) Flight Computer
a. Wind side
i) Using True course and True airspeed, compute WCA (wind correction angle) and ground speed for each leg of the flight
ii) Note ground speed and wind correction angle for each let on flight log
b. Calculator Side
i) Determine time for each leg using G.S. and distance, and note on flight log
ii) Determine time between each checkpoint for ETE and note on flight log
iii) Add 5 minutes for each takeoff and landing to allow for pattern entry
iv) Determine total time for each leg and note on flight log
v) Determine total fuel to be used using previously computed total time and GPH; note on flight log
vi) Determine endurance using usable gallons on board and GPH; note on flight log
VIII) Flight Plan
a. Fill out remainder of flight plan form (see AIM Ch. 5)
b. Call FSS at 1-800-WX-BRIEF. Advise the briefer you want to file a VFR flight plan and read the information from the flight plan from to him/her.
IFR Cross Country Flight Planning

Note: the pilot should monitor weather information during the 12 hours prior to the flight. Develop a mental picture of the weather covering the area of the flight. Determine, using the 1-2-3 rule, if an alternate airport will be needed. If so, including the alternate airport in your flight planning.

I) Route Planning/Enroute Chart
   a) Use the Airport Facility Directory to determine if a preferred route exists for your route of flight. If so, this should be your 1st choice for your route of flight. (Note: whether it is a High or Low altitude route.)
   b) Review your departure and destination airport for DPs and STARs. These should be your 2nd choice for your route of flight.
   c) Should a preferred route or DP/STAR not be available, determine route to be used using airway routes whenever available. Use the most direct route when possible and/or practical.
   d) List the fixes/checkpoints for each leg along the route on a flight log. Note each one that is also a compulsory reporting point.
   e) Determine the course for each leg and note on flight log. Also note the navigation aid and frequency to be used for each leg.
   f) Note the distance between each fix or checkpoint on the flight log.
   g) Note any en route weather service facilities and their frequencies along the route of flight on flight log.
   h) Check all NOTAMs thoroughly ensuring no navigation aid outages or approach plate changes.

II) Approach Plates
   a) Determine which approach plates are necessary and verify you have a current set.
   b) Study the plates for your departure, arrival, and alternate airports.
      i) Note the IAF for your desired approaches, missed approach procedures, initial altitudes, approach facilities, and their frequencies, approach category and times for your aircraft, directions for each approach, and minimum altitude and visibility for each approach.
   c) Note any en route facilities and frequencies as well as feeder routes shown on the chart.
   d) Be familiar with fixes along your route and the expected approaches based on the most recent weather data available.

III) Follow steps II-III under CFR cross-country planning
Lost Procedures

Description: The pilot becomes aware that the airplane is off course and in an unknown position. Procedures are initiated that will determine the new location and correct back on course.

Objective: To develop the skills and proficiency necessary to determine airplane position and the corrections needed to re-establish the airplane on the proper course.

Lost procedures:
- Confess
- Climb
- Conserve
- Communicate
- Comply

Procedures:
1) Maintain positive airplane control at all times.
2) Use topographical features and/or nav aids to determine position:
   Topographical features:
   1) Reset the heading indicator.
   2) Turn the sectional chart to match airplane heading.
   3) Look outside the airplane for prominent landmarks.
   4) Match the landmarks to the chart.
   Nav aids:
   1) Reset the heading indicator to the magnetic compass while in straight and level flight.
   2) Tune and identify available stations VOR/NDB.
   3) Locate the airplane's current position using radials/bearings/DME.
   4) Plot a course to proceed directly to the destination or to intercept the planned course as appropriate.
   3) In the event the above procedures fail to determine airplane position, contact the nearest ATC facility or FAA for radar assistance or DF steer.

Note: Consideration must be given to alternatives other than continuing to the planned destination considering the amount of time that has elapsed and the distance off course. Remaining fuel available and weather conditions must also be considered when determining action to be taken.

Diversion Checklist

1. Find Location and New Destination. Connect Dots
2. Turn to Approx Heading and Record Time _______
3. Check DG
4. Adjust Altitude for Hemispherical Rule
   (CLIMB OR DESCEND 1000 FEET IF REQUIRED)
5. Record TAS _______
6. Measure TC ______ & Distance _______
7. WCA ______ & GS _______
8. VAR ______ & ETE _______
9. MH ______ & FUEL _______
10. ETA _______
11. Airport Info: CTAF ______ AWOS ______
    (Sectional) FIELD ELEV ______
12. Advise ATC and APS
13. COMPLETE IN-RANGE CHECK
14. RUNWAY IN USE ______ Length ______
    (APD) TPA ______
15. Determine Best Pattern Entry

Diversion Checklist

1. Find Location and New Destination. Connect Dots
2. Turn to Approx Heading and Record Time _______
3. Check DG
4. Adjust Altitude for Hemispherical Rule
   (CLIMB OR DESCEND 1000 FEET IF REQUIRED)
5. Record TAS _______
6. Measure TC ______ & Distance _______
7. WCA ______ & GS _______
8. VAR ______ & ETE _______
9. MH ______ & FUEL _______
10. ETA _______
11. Airport Info: CTAF ______ AWOS ______
    (Sectional) FIELD ELEV ______
12. Advise ATC and APS
13. COMPLETE IN-RANGE CHECK
14. RUNWAY IN USE ______ Length ______
    (APD) TPA ______
15. Determine Best Pattern Entry
SECTION XIII: Instrument Procedures

Instrument Cockpit Check

Description: The instrument cockpit check starts prior to taxi with a systematic check of all radios and navigation equipment. The magnetic compass and gyro instruments are checked while taxiing to the active runway.

Objective: To ensure the proper operation of all instruments, avionics and navigation equipment prior to flight.

Procedures: **Avionics and Navigation equipment check**

1) Turn the avionics switch on.
2) Test the marker beacon lights and check the audio panel.
3) Check both communication radios (transmit and receive).
4) Set a navigation frequency in the #1 nav. to check for identifier and proper needle deflection.
5) Repeat step #4 with the #2 navigation receiver.
6) Test the transponder and return to “standby”
7) Set a frequency in the ADF receiver and check for the identifier, proper needle indication and proper test function. Turn the ADF off or to the receive position while not in use.
8) Check the DME for LED operation and proper remote switch settings.
9) Check function of standby vacuum pump.
10) Check the HSI and RMI if installed.
11) Clock operating and set to the correct time.
12) Airspeed indicator - Check proper indication.
13) Altimeter - set to current altimeter setting with a maximum error ±75’.
14) Vertical speed indicator - should indicate zero, any deviation should be noted.
15) Circuit Breakers - check.
16) Alternate static source - normal position
17) Magnetic compass - bowl full of fluid, card moves freely, checked on known heading, deviation card intact.
18) Check the gyro instruments in left and right turns:
   a) Attitude indicator - no more than 5° bank precession.
   b) Turn and slip indicator - needle operating properly, ball moves freely and the race is filled with fluid.
   c) Heading indicator - checked with the magnetic compass and operating properly.
   d) Suction gauge - proper indication.

FAA Instrument Rating Airman Certification Standards (ACS)
Description: Straight and level flight climbs, descents, and turns are accomplished by establishing and maintaining appropriate control forces by reference to the control instruments and cross-checking the airplane’s performance by reference to the performance instruments.

Objective: To develop the student’s ability to maintain airplane control solely by reference to instruments.

Procedures:

1) Properly cross-check the instruments.
   a. Consider control, performance, primary, and supporting instruments when cross-checking.
   b. Include engine and navigation instruments.
   c. Avoid fixation, omission, and emphasis.

2) Properly interpret the instruments that were cross-checked.
   a. Interpret instrument indications/trends/rates.
   b. Recognize malfunctioning instruments.
   c. Understand the instrument limitations and errors.

3) Effectively control the airplane.
   a. Set the control instruments using pitch, bank, power and trim.
   b. Monitor the performance instruments.
   c. Make corrections/modifications as necessary by reference to the control instruments.

References:
- FAA Instrument Rating Airman Certification Standards (ACS)


**Constant Airspeed Climbs**

**Description:** A constant airspeed is maintained during a climb at a fixed power setting by establishing and maintaining the appropriate pitch attitude.

**Objective:** To develop the Student’s proficiency in the basic skills required for instrument flight.

**Procedures:**

1) Simultaneously apply climb power and establish the approximate pitch attitude, which will result in the desired climb airspeed.

2) Maintain the climb attitude by reference to the attitude indicator and cross-check the airspeed indicator for the desired performance.

3) Adjust the pitch trim to neutralize control pressures.

4) Make small pitch adjustments by reference to the attitude indicator as necessary to achieve and maintain the desired airspeed.

5) Lead the level off by approximately 10% of the rate of climb, reducing the power to the cruise power setting when the airspeed increases to within 5 knots of the cruise airspeed.

**References:**

- FAA Instrument Rating Airman Certification Standards (ACS)
Constant Airspeed Descents

Description: A constant airspeed is maintained during a descent at a fixed power setting by establishing and maintaining the appropriate pitch attitude.

Objective: To develop the student’s proficiency in the basic skills required for instrument flying.

Procedures:
1) Simultaneously reduce the power and establish the approximate pitch attitude, which will result in desired airspeed during the descent.
2) Maintain the pitch attitude by reference to the attitude indicator and cross-check the airspeed indicator for the desired performance.
3) Adjust the pitch trim to neutralize control pressures.
4) Make small pitch adjustments by reference to the attitude indicator as necessary to achieve and maintain the desired airspeed.
5) Lead the level off by approximately 10-20% of the rate of descent, increasing the power to the cruise power setting as initiate the level off.

References:
FAA Instrument Rating Airman Certification Standards (ACS)
Constant Rate Climbs

Description: A constant rate and a constant airspeed is maintained during a climb by establishing and maintaining the appropriate pitch attitude and power setting.

Objective: To develop the student’s proficiency in the basic skills required for instrument flight.

Procedures:

1) Simultaneously establish the appropriate climb attitude and power setting which will result in the desired climb rate and airspeed.
2) Maintain the climb attitude by reference to the attitude indicator, and cross-check the airspeed indicator and the vertical speed indicator for the desired performance.
3) Adjust the pitch trim to relieve elevator control pressure.
4) Make small pitch adjustments by reference to the attitude indicator as necessary to achieve and maintain the desired climb rate. Make small power changes by reference to the tachometer to achieve and maintain the desired climb airspeed.
5) Lead the level off by approximately 10% of the rate of climb, reducing power to the cruise power setting when the airspeed increases to within 5 knots of cruise airspeed.

References:


FAA Instrument Rating Airman Certification Standards (ACS)
Constant Rate Descents

Description: A Constant rate and a constant airspeed are maintained during a descent by establishing and maintaining the appropriate pitch attitude and power setting.

Objective: To develop the student's proficiency in the basic skills required for instrument flights

Procedures:
1) Simultaneously, establish the approximate attitude and power setting which will result in the desired descent rate and descent airspeed.
2) Maintain the descent attitude by reference to the attitude indicator, and crosscheck the airspeed indicator and the vertical speed indicator for the desired performance.
3) Adjust the pitch trim to relieve elevator control pressure.
4) Make small pitch adjustments by reference to the attitude indicator as necessary to achieve and maintain the desired descent rate. Make small power adjustments by reference to the tachometer to achieve and maintain the desired airspeed.
5) Lead the level of by approximately 10-20% of the rate of descent, increasing power to the cruise power setting as level off is initiated.

FAA Instrument Rating Airman Certification Standards (ACS)
Magnetic Compass Turns

Description:  Turns to specific headings are accomplished by reference to the magnetic compass.

Objective:  To develop the student’s proficiency in making turns to specific headings by reference to the magnetic compass.

Procedures:  
1) Determine the amount of northerly turning error that is appropriate to your desired heading. The amount of error reaches a maximum on headings of north and south and is roughly equivalent to the airplane’s latitude. The amount of error decreases to approximately zero on headings of east or west.

2) Establish a turn in the appropriate direction using a bank angle of 15°-18°. (standard rate)

3) When turning to a northerly heading, lead the roll-out by the amount of the turning error plus the lead needed to roll out of the bank.

4) When turning to a southerly heading, roll-out past the desired heading by an amount equivalent to the turning error minus the lead needed to roll out of the bank.

5) Check the accuracy of the new heading and correct if necessary.

Timed Turns to Magnetic Compass Headings

Description: Turns to specific magnetic compass headings will be accomplished by accurately timing standard or half-standard rate turns.

Objective: To develop proficiency in making timed turns to specific compass headings with and without the use of altitude indicator or the heading indicator.

Procedures:
1) Determine the number of degrees to be turned.
2) Compute the time needed to accomplish the turn at a standard rate (3 degrees per second) or half-standard rate (1 and ½ degrees per second).
3) Begin the timing as the roll is started. Establish the appropriate rate or turn.
4) Maintain a standard or half-standard rate of turn as appropriate.
5) When the appropriate time has elapsed, roll-out at the same rate as the roll-in.
6) Check the new heading and correct if necessary.

References:
- FAA Instrument Rating Airman Certification Standards (ACS)
IFR Departure Procedures

Description: The airplane is maneuvered after takeoff to proceed on course as directed by ATC.

Objective: To develop the skills and proficiency necessary to depart an airport under IFR conditions and transition to the en route phase of the flight.

Procedures:

1) Prior to takeoff set navigation and communication radios as needed to comply with the departure clearance.
2) Record the takeoff time.
3) After receiving takeoff clearance, follow the departure clearance and any special ATC instructions. If cleared for a “SID”, refer to the chart for procedures.
4) When departing from an uncontrolled airport, adhere to the “clearance void time” and contact ATC as appropriate.
5) Maintain geographic orientation and verify navigation frequency identification as soon as possible.
6) Note the time passing designated checkpoints.
7) Intercept the appropriate en route course.

Current FAR/AIM
VOR Tracking

Description: The airplane is maneuvered along a VOR radial solely by reference to flight instruments. Heading adjustments will be made to correct for the effect of wind.

Objective: To develop the student’s proficiency in following a VOR radial while correcting for wind effect.

Procedures:

1) When the desired course has been intercepted, with the CDI centered, maintain a heading corresponding to the OBS setting.

2) When a definite off-course indication occurs, turn 20° in the direction of the CDI deflection.

3) Maintain the new heading until the CDI begins to center.

4) As the CDI centers, turn 10° back toward the selected course. This establishes a wind correction angle of 10°. If the CDI remains centered, maintain the heading. The wind correction angle is correct.

5) If the CDI begins to show deflection in the direction opposite the initial deviation, the 10° wind correction was too great. Turn to a heading parallel to the course selected and allow the airplane to drift back onto the desired radial. When the CDI centers, establish a 5° wind correction angle.

6) 5° corrections are normally adequate to keep the CDI centered after the initial wind corrections. However, exact center needle accuracy may require corrections less than 5°.

NOTE: If the first 20° of heading change fails to change the direction of the CDI movement within a reasonable period of time, an additional 20° heading change should be made (a strong crosswind is indicated). As the CDI re-centers, establish a 20° correction angle. Adjust this angle as necessary, using the bracketing technique described above.

References:

- FAA Instrument Rating Airman Certification Standards (ACS)
VOR Intercepts

Description: The airplane is maneuvered to intercept and track a predetermined VOR radial either inbound or outbound.

Objective: To develop proficiency in intercepting and tracking predetermined VOR radials inbound or outbound.

Procedures:
1) Reset the heading indicator by reference to the magnetic compass
2) Tune and identify the VOR station.
3) Turn the airplane to a heading parallel to the desired course.
4) Center the course deviation indicator (CDI) with a “TO” or “FROM” indication as appropriate and note the course “TO” or “FROM” the facility as indicated by the Omni bearing selector (OBS).
5) Set the OBS to the desired course.
6) To intercept a course 30° or less from the present course, turn 45° in the direction of CDI deflection. To intercept a course more than 30° from the present course turn 90° in the direction of the CDI deflection.
7) Maintain the intercept heading until the CDI starts to center.
8) As the CDI centers, turn on course and begin tracking procedures to correct for wind.

Note: as proficiency is gained and familiarity with the relationship between intercept angle, distance from the station and the magnitude of off course deviation is developed, the course parallel orientation method may be omitted and intercept angles other than 45° and 90° should be used as appropriate.

References:
FAA Instrument Rating Airman Certification Standards (ACS)
NDB Tracking

Description: The airplane is maneuvered so as to compensate for the effect of wind along an NDB “bearing from” or a “course to” solely by reference to flight instruments.

Objective: To develop proficiency in maneuvering along an NDB “bearing form” or a “course to” while correcting for the effects of wind.

Caution: course accuracy while using NDB information depends on maintaining an accurate magnetic ground track. Care must be exercised to ensure proper setting of the gyroscopic heading indicator.

Procedures:

1) Upon intercepting the desired “bearing from” or “course to”, with the ADF pointer centered on the “nose” or “tail”, maintain a heading corresponding to the course to be flown.

2) When a definite off-course deviation is indicated by a 5° pointer deflection, turn the airplane 20° the direction of pointer deflection.

3) Maintain the new heading until the correction angle is equal to the angle between the ADF pointer and the “nose” or “tail”.

4) Turn 10° back towards the original heading. This establishes a 10° wind correction angle.

5) If the ADF pointer deviates towards the “nose” (or further away from the “tail”), the 10° wind correction angle is insufficient. Turn an additional 10° in the direction of needle deflection, and after re-intercepting the course; establish a 15° wind correction angle.

6) If the ADF pointer deviates further away from the “nose” (or towards the “tail”) the 10° wind correction angle is too great. In this case, turn parallel to the “bearing from” or “course to” and allow the airplane to drift back on course. Once established on course, establish a 5° wind correction angle.

7) 5° corrections are normally adequate to keep the airplane on course after the initial wind-drift corrections are made. However exact course accuracy may require heading corrections of less than 5°.

Note: If the first 20° heading change fails to change the direction of ADF pointer movement in a reasonable period of time, an additional 20° correction should be made (a strong crosswind is indicated). As the ADF pointer indicates a proper on course indication, establish a 20° wind correction angle. Adjust this angle as necessary, using the bracketing technique described above.


FAA instrument Rating Airman Certification Standards (ACS)
NDB Intercepts

Description: The airplane is maneuvered to intercept and track a predetermined NDB “bearing from” or “course to” solely by reference to instruments.

Objective: To develop proficiency in intercepting and tracking predetermined NDB “bearing from” or “course to”

Procedures:
1) Reset the heading indicator by reference to the magnetic compass.
2) Turn and identify the station.
3) Parallel the desired “bearing from” or “course to”.
4) Note the number of degrees between zero (course to) or 180 (course from) on the ADF azimuth ring and the ADF pointer.
5) For a difference of 30° or less, turn 45° in the direction of pointed deflection from the “nose” or “tail”. For a difference of more than 30°, turn 90° in the direction of the pointer deflection.
6) Maintain the intercept heading until the course interception is imminent. Course interception is accomplished when the angle between the ADF pointer and the “nose” or “tail” is equal to the intercept angle.
7) Lead the points as required to roll out on course and begin tracking procedures to correct for wind.

Note: As proficiency is gained and familiarity with the relationship between intercept angle, distance to the station, and the magnitude of off-course deviation is developed, the course parallel orientation method may be omitted and intercept angles other than 45° and 90° should be used as appropriate.

References:
FAA Instrument Rating Airman Certification Standards (ACS)
DME Arc Procedures

Description: The airplane will be maneuvered to intercept and follow a predetermined circular course at a set distance from a VORTAC/VOR-DME facility. The DME distance is maintained until intercepting the desired approach course.

Objective: To develop the skill and proficiency necessary to maneuver the airplane along a DME arc and intercept final approach courses from DME arcs.

Procedures:

1) Fly inbound or outbound on the selected course/heading to intercept the arc.
2) Tune and identify the VORTAC/VOR-DME frequency in the #2 Nav. and set the DME mode switch to the #2Nav. The #1 Nav. should be set up for the approach.
3) Determine the proper direction to turn when intercepting the arc. Use the 90° wing tip position on the OBS or HSI to determine the initial heading to fly after intercepting the arc.
4) Start the turn to fly the arc when the airplane is ½ mile from the arc intercept.
5) Rotate the OBS 10° ahead of your present position.
6) Turn the airplane 10° so that the next selected radial is crossed at a 90° angle.
7) When the OBS centers, turn the airplane and the OBS another 10°.
8) Wind correction for arc deviation is accomplished by:
   a. A wind causing the arc distance to increase requires a heading correction of approximately 10° for each 1 mile deviation.
   b. A wind causing the arc distance to decrease requires you to maintain the present heading until the arc is intercepted.
9) Approach course interception is accomplished by turning to an appropriate intercept heading upon crossing the depicted lead radial. For procedures not depicting a lead radial, lead the turn by approximately 5°.

References:

- FAA Instrument Rating Airman Certification Standards (ACS)
Holding Procedures

Description: The airplane is maneuvered to enter a standard or non-standard pattern using the AIM recommended entry procedure. Wind correction is applied to keep the airplane in protected airspace and on the inbound course. The straight and level legs are timed in order to establish the desired inbound leg length.

Objective: To develop the skill and proficiency necessary to enter and become established in a published or non-published holding pattern.

Procedures:
1) Determine the type of entry to be used based on the airplane heading upon arrival over the holding fix.
2) Slow to the desired airspeed and establish the proper configuration when within 3 minutes of the holding fix.
3) Upon crossing the holding fix execute the appropriate entry procedure recommended by the AIM and report to ATC as appropriate.
4) Intercept the inbound course and establish the wind correction angle as soon as possible.
5) Start outbound timing when abeam the fix or at the completion of the outbound turn if the abeam point cannot be determined.
6) Adjust the outbound heading (normal 2x the inbound wind correction angle) so that the course intercept occurs at the completion of the inbound turn.
7) Adjust outbound timing so that the inbound leg is one minute long.
8) Begin inbound timing at the completion of the inbound turn.
9) Leave holding according to ATC instructions.

Note: DME holding- DME holding is the same as above except that the legs are measured in miles. Timing is not required but wind correction angles must still be used. If the inbound course is towards the NAVAID and the fix distance is 16NM and the leg length is specified as 4NM, then the end of the outbound leg will be reached when the DME reads 20NM. If the inbound course is away from the NAVAID the end of the outbound leg will be reached when the DME reads 12NM.

References:
FAA instrument Rating Airman Certification Standards (ACS)
Current FAR/AIM
ILS Approach

Description: The airplane is established on the final approach course and at glideslope intercept the descent to the DA or circling minimum is begun. The approach is terminated either with a landing or missed approach as appropriate.

Objective: To develop the skills and proficiency necessary to execute ILS approaches.

Procedures:

1) Prior to reaching the IAF, select, tune, identify, and confirm the operational status of ground and airplane navigation equipment to be used for the approach.
2) Brief the approach plate and check frequencies, courses, altitudes and missed approach procedures.
3) Initiate the pre-landing checklist and slow to final approach course speed after reaching one of the following positions as appropriate:
   a. Crossing the initial approach fix.
   b. Within 30° of the final approach course.
   c. With 5 miles of the final approach fix.

   Note: these are guidelines designed to get the airplane properly set up for the final approach. ATC requirements may dictate modification of these guidelines.

4) Complete a procedure turn, if appropriate
5) Intercept the final approach course at the proper altitude and airspeed.
6) Upon intercepting the glideslope begin descent to the DH.
7) Note the time crossing the outer marker.
8) Use 5°-10° wind correction angles to track the localizer outside the outer marker and 2°-5° after crossing the outer marker inbound.
9) Adjust pitch altitude to maintain the glideslope and power to maintain the correct airspeed.
10) Be alert for equipment malfunctions or course/glideslope deviations that may require executing a missed approach.
11) Upon reaching the DA or circling minimums as appropriate:
    a. Make a normal landing if the provisions of FAR 91.175 are met
    b. Execute the missed approach.

References:

FAA instrument Rating Airman Certification Standards (ACS)
RNAV Approach - Precision

Description: The airplane is established on the final approach course and at glideslope intercept the descent to the DH or circling minimum is begun. The approach is terminated either with a landing or missed approach as appropriate.

Objective: To develop the skills and proficiency necessary to execute RNAV approaches.

Procedures:

1) Prior to reaching the IAF, load the approach on the GPS through the procedures page, ensure the correct approach and initial fix (or vectors to final) are selected, finally activate the approach procedure. Ensure the CDI is set to GPS and set the final approach course on the CDI.

2) On the bottom left of the GNS430 ensure the GPS is in LPV or LNAV/VNAV mode, if still in terminal mode monitor the screen to ensure the correct mode is displayed prior to the FAF.

2) Brief the approach plate and check courses, altitudes and missed approach procedures.

3) Initiate the pre-landing checklist and slow to final approach course speed after reaching one of the following positions as appropriate:
   d. Crossing the initial approach fix.
   e. Within 30° of the final approach course.
   f. With 5 miles of the final approach fix.

   **Note:** these are guidelines designed to get the airplane properly set up for the final approach. ATC requirements may dictate modification of these guidelines.

4) Complete a procedure turn, if appropriate
5) Intercept the final approach course at the proper altitude and airspeed.
6) Upon intercepting the glideslope begin descent to the DH.
7) Note the time crossing the outer marker.
8) Use 5°-10° wind correction angles to track the localizer outside the outer marker and 2°-5° after crossing the outer marker inbound.
9) Adjust pitch altitude to maintain the glideslope and power to maintain the correct airspeed.
10) Be alert for equipment malfunctions or course/glideslope deviations that may require executing a missed approach.
11) Upon reaching the DH or circling minimums as appropriate:
   c. Make a normal landing if the provisions of FAR 91.175 are met
   d. Execute the missed approach.

References:

* FAA instrument Rating Airman Certification Standards (ACS)
RNAV Approach - Non Precision

Description: The airplane is established on the final approach course and at the final approach fix or the beginning of the final approach segment, descent to the MDA or circling minimum is begun. The approach is terminated either with a landing or a missed approach as appropriate.

Objective: To develop the skill and proficiency necessary to execute RNAV approaches.

Procedures:

1) Prior to reaching the IAF, load the approach on the GPS through the procedures page, ensure the correct approach and initial fix (or vectors to final) are selected, finally activate the approach procedure. Ensure the CDI is set to GPS and set the final approach course on the CDI.

2) Brief the approach plate and check courses, altitudes and missed approach fix.

3) On the bottom left of the GNS430 ensure the GPS is LNAV mode, if still in terminal mode monitor the screen to ensure the correct mode is displayed prior to crossing the FAF.

4) Initiate the pre-landing checklist and slow to final approach course speed after reaching one of the following positions as appropriate:
   a. Crossing the initial approach fix.
   b. Within 30° of the final approach course.
   c. Within 5 miles of the final approach fix.

Note: ATC requirements may dictate modification of these guidelines.

5) Complete a procedure turn, if appropriate.

6) Intercept the final approach course at the proper altitude and airspeed.

7) At the final approach fix note the time and descent to the MDA or step-down fix as appropriate.

8) Be alert for equipment malfunctions or course deviations that may require executing a missed approach.

9) Initiate a level-off to stay at or above the MDA until the requirements listed in FAR 91.175 are met and a normal landing can be made.

10) If the requirements of FAR 91.175 cannot be met, execute the missed approach.

References:


FAA Instrument Rating Airman Certification Standards (ACS)

FAR 91.175
VOR Approach

Description: The airplane is established on the final approach course and at the final approach fix or the beginning of the final approach segment, descent to the MDA or circling minimum is begun. The approach is terminated either with a landing or a missed approach as appropriate.

Objective: To develop the skill and proficiency necessary to execute VOR approaches.

Procedures:

11) Prior to reaching the IAF, select, tune, identify, and confirm the operational status of ground and airplane navigation equipment to be used for the approach.
12) Brief the approach plate and check frequencies, courses, altitudes and missed approach fix.
13) Initiate the pre-landing checklist and slow to final approach course speed after reaching one of the following positions as appropriate:
   a. Crossing the initial approach fix.
   b. Within 30° of the final approach course.
   c. Within 5 miles of the final approach fix.

Note: these are guidelines designed to get the airplane properly set up for the final approach. ATC requirements may dictate modification of these guidelines.

14) Complete a procedure turn, if appropriate.
15) Intercept the final approach course at the proper altitude and airspeed.
16) At the final approach fix note the time and descent to the MDA or step-down fix as appropriate.
17) Be alert for equipment malfunctions or course deviations that may require executing a missed approach.
18) Initiate a level-off to stay at or above the MDA until the requirements listed in FAR 91.175 are met and a normal landing can be made.
19) If the requirements of FAR 91.175 cannot be met, execute the missed approach.

References:

FAA Instrument Rating Airman Certification Standards (ACS)
FAR 91.175
NDB Approach

Description: The airplane is established on the final approach course and, at the final approach fix or the beginning of the final approach segment, descent to the MDA or circling minimum is begun. The approach is terminated either with a landing or a missed approach as appropriate.

Objective: To develop the skill and proficiency necessary to execute NDB approaches.

Procedures:

1) Prior to reaching the IAF, select, tune, identify, and confirm the operational status of ground and airplane navigation equipment to be used for the approach.
2) Brief the approach plate and check frequencies, courses, altitudes and missed approach procedures.
3) Initiate the pre-landing checklist and slow to final approach course speed after reaching one of the following positions as appropriate:
   a. Crossing the initial approach fix.
   b. Within 30° of the final approach course.
   c. Within 5 miles of the final approach fix.

Caution: course accuracy during an NDB approach depends on maintaining an accurate magnetic ground track. Care must be exercised to ensure proper setting of the gyroscopic heading indicator.

4) Complete a procedure turn, if appropriate.
5) Intercept the final approach course at the proper altitude and airspeed.
6) At the final approach fix, note the time and descend to the MDA or step-down fix as appropriate.
7) Be alert for equipment malfunctions or course deviations that may require executing a missed approach.
8) Initiate a level-off to stay at or above the MDA until the requirements listed in FAR 91.175 are met and a normal landing can be made.
9) If the requirements of FAR 91.175 cannot be met, execute the missed approach. Instrument

References:
FAA instrument Rating Airman Certification Standards (ACS)
FAR 91.175
Terminal Approach

Description: An instrument approach using a navigation aid located on the airport. Normally there is not a final approach fix associated with the approach. The approach may be conducted in either a radar or non-radar environment. Upon completing a procedure turn or being radar vectored to the final approach course, a descent to the MDA is begun when course guidance is assured. Final approach timing is not necessary since a missed approach is initiated at station passage.

Objective: To develop the skill and proficiency necessary to execute terminal approaches.

Procedures: 1) Prior to reaching the IAF, select, tune, identify, and confirm the operational status of ground and airplane navigation equipment to be used for the approach.

2) Review the approach plate and check frequencies, courses, altitude and missed approach procedures.

3) Initiate the pre-landing checklist and slow to the final approach course speed after reaching one of the following positions as appropriate:
   a. Crossing the initial approach fix.
   b. Within 30° of the final approach course.
   c. Within 10 miles of the airport.

Note: these are guidelines designed to get the airplane properly set up for the final approach. ATC requirements may dictate modifications of these guidelines.

4) Complete the procedure turn, as appropriate.

5) Intercept the final approach at the proper altitude and airspeed.

6) Upon achieving proper on-course indication and at the proper distance from the airport begin the descent to the MDA.

7) Be alert for equipment malfunctions or course deviations that may require executing a missed approach.

8) Initiate a level-off to stay at or above the MDA until the requirements of FAR 91.175 are met and a normal landing can be made.

9) If the requirements of FAR 91.175 cannot be met, execute the missed approach.


FAA instrument Rating Airman Certification Standards (ACS)
No-Gyro Radar Vector Approach

Description: The airplane is established on the final heading as assigned by ATC and at the desired approach speed. The descent to the MDA is begun when instructions are received from ATC. The approach is terminated either with a landing or a missed approach as appropriate.

Objective: To develop the skill and proficiency necessary to execute radar instrument approach procedures during operations with an inoperative heading indicator.

Procedures:
1) Comply with turn, heading and altitude instructions as assigned by ATC.
2) Initiate the pre-landing checklist and slow to final approach course speed upon reaching a point 5 miles from the final descent point.
3) ATC will advise when to make heading changes by issuing turn instructions such as “turn left”, “stop turn”.
4) Upon receiving instructions from ATC to begin final descent, initiate a descent to the MDA.
5) Course guidance is provided by ATC in the form of heading and turn instructions. If executing a PAR approach, glideslope instructions are also provided by ATC.
6) Be alert for equipment malfunctions or course deviations that may require executing a missed approach.
7) Initiate a level-off to stay at or above the MDA until the requirements listed in FAR 91.175 are met and a normal landing can be made.
8) If the requirements of FAR 91.175 cannot be met, execute the missed approach.

Current FAR/AIM
SECTION XIV: Multi-Engine Maneuvers

Slow Flight

Description: After clearing turns are completed the airplane is maneuvered at an airspeed such that controllability is minimized to the point just above the stall warning horn. The maneuver should be accomplished in straight flight, turns, climbs and descents using various flap configurations.

Objective: To teach the student to recognize changes in airplane flight characteristics and control effectiveness at critically slow airspeeds in various configurations while maintaining positive airplane control at all times.

Procedures:

Pre-Maneuver Flow

1) Perform clearing turn
2) Announce altitude, heading and airspeed

Procedure

1) Set power to 13”-15”Hg MP
2) Extend landing gear below 140kts
3) Full flaps inside the white arc
4) Propellers full forward below 90kts
5) Maintain 60kts of airspeed
6) Set power to 20” Hg MAP
7) Pitch for airspeed/power for altitude

Recovery

1) Set full power
2) Retract flaps
3) Retract the landing gear before reaching 109kts

Note: Landing gear cannot be retracted above 109kts
4) Set normal cruise power.

References:

FAA Commercial Airman Certification Standards (ACS)
Airplane Flying Handbook FAA-H-8083-3B
Power-Off Stall

Description: The airplane is maneuvered to a critically slow airspeed in straight flight or turning flight in a power off configuration. A descent is established and the angle of attack is then increased until an imminent stall (initial buffet or loss of control effectiveness) or the full stall occurs.

Objective: To develop the student’s ability to recognize the indications leading to an imminent or full stall while making an approach to landing and to make prompt, positive and effective recoveries with a minimum loss of altitude.

Procedures: Pre-Maneuver Flow

1) Perform clearing turn
2) Announce altitude, heading and airspeed

Procedure

3) Set power to 13”-15”Hg MP
4) Extend landing gear below 140kts
5) Full flaps inside the white arc
6) Propellers full forward below 90kts
7) Maintain 85kts of airspeed
8) Set power to idle
9) Maintain a descent at 85kts and 500 fpm
10) Pitch up to induce imminent stall

Recovery

1) Set full power
2) Pitch for 82kts
3) Set flaps to 25°
4) Retract the landing gear before reaching 109kts

Note: Landing gear cannot be retracted above 109kts
5) Retract remaining flaps
6) Set normal cruise power.

References: FAA Commercial Airman Certification Standards (ACS)
Airplane Flying Handbook FAA-H-8083-3B
Power-On Stall

Description: The airplane is maneuvering to a critically slow airspeed in straight flight or turning flight in a power on configuration. The angle of attack is then increased until an imminent stall (initial buffet or loss of control effectiveness) or the full stall occurs.

Objective: To develop the student’s ability to recognize the indications leading to an imminent or full stall in power-on situations and to make prompt and effective recoveries with a minimum loss of altitude.

Procedures: 

Pre-Maneuver Flow

1) Perform clearing turn
2) Announce altitude, heading and airspeed

Procedure

1) Set power to 13”-15”Hg MAP
2) Propellers full forward below 90kts
3) Maintain 75kts of airspeed
4) Set power to 18”Hg MAP
5) Pitch up to induce imminent stall

Recovery

1) Maintain power at 18”Hg MAP
2) Pitch for 82kts
3) Set normal cruise power.

References: 

FAA Commercial Airman Certification Standards (ACS)

Airplane Flying Handbook FAA-H-8083-3B
Steep Turn

**Description:** 360° turns are performed in both directions using a steep bank angle.

**Objective:** To develop the student’s smoothness, coordination, orientation, division of attention, and control techniques while executing high performance turns.

**Procedures:**

1) Reduce power
2) Verify airspeed below $V_a$
3) Establish a 50° bank
4) Power 20"-21"Hg MAP to maintain airspeed
5) Pitch for altitude during the turn
6) Relax back pressure and reduce power as you transition from one turn to the other in order to maintain PTS tolerances
7) To recover set power to 21"Hg MAP and 2400 RPM

**References:**

FAA Commercial Airman Certification Standards (ACS)

Airplane Flying Handbook FAA-H-8083-3B
Emergency Descent

Description: A descent from a higher altitude in the case of an emergency such as an incapacitated passenger, smoke filling the cockpit, or fire.

Objective: To descend from a higher altitude in the shortest amount of time as safely as possible.

Procedures:
1) Preform clearing turns
2) Announce altitude, heading, and airspeed
3) Set power to flight idle
4) Propellers full forward
5) Extend landing gear below 140 kts.
6) Pitch for 140 kts to maximize descent rate
7) To recover raise the nose
8) Retract landing gear below 109 kts.
9) Set power to 21” Hg MAP 2400 RPM

References:
FAA Commercial Airman Certification Standards (ACS)
Airplane Flying Handbook FAA-H-8083-3B
Drag Demonstration

Description: The aircraft will be configured in different high and low drag configurations and the performance will be monitored.

Objective: For the student to know how different configurations effect aircraft performance.

Procedures:  

**Note:** Zero thrust is considered to be 10”Hg MAP and 2000RPM

1) Power between 13”-15” Hg MAP  
2) Propellers full forward below 90 kts  
3) Airspeed intercept Vyse  
4) Right cowl flap open  
5) Left cowl flap closed  
6) Right throttle set to full power  
7) Left throttle set to 10” Hg MAP  
8) Set up a 5° bank and use rudder as required to maintain directional control  
9) Airspeed Vyse... note VSI  
10) Airspeed Vyse-10 kts... note VSI  
11) Airspeed Vyse +10 kts... note VSI  
12) Airspeed Vyse  
13) Extend landing gear... note VSI  
14) Extend full laps... note VSI  
15) Retract landing gear... note VSI  
16) Retract flaps... note VSI  
17) Left throttle to idle... note VSI  

**Recovery**

18) Airspeed Vyse  
19) Left throttle advance slowly to warm engine  
20) Right throttle decrease slowly  
21) Power set to 21” Hg MAP 2400 RPM  
22) Right cowl flap closed

References:  

FAA Commercial Airman Certification Standards (ACS)  
Airplane Flying Handbook FAA-H-8083-3B
Vmc Demonstration

Description: The aircraft will be maneuvered into an engine-out high angle of attack and low airspeed situation. Recovery will occur at the first sign of stall or VMC, whichever occurs first.

Objective: For the student to recognize a stall or VMC situation and recover properly.

Procedures:

Pre-Maneuver

1) Gear up
2) Rudder trim neutral
3) Flaps up
4) Cowl flaps open

Procedure

5) Set power 13”-15”Hg MAP
6) Propellers full forward below 90 kts
7) Airspeed intercept Vyse
8) Right throttle full power
9) Left throttle set to idle
10) Set up a 5° bank and use rudder as required to maintain directional control
11) Increase pitch (airspeed reduction of 1 kt per second)
12) At first sign? of stall or loss of directional control
13) Lower pitch
14) Reduce right throttle
15) Lower pitch until above Vmc
16) Right throttle full power
17) Establish airspeed at Vyse

Recovery

18) Airspeed Vyse
19) Left throttle advance slowly to warm engine
20) Right throttle decrease slowly
21) Power set to 21” Hg MAP 2400 RPM
22) Right cowl flap closed

References:

FAA Commercial Airman Certification Standards (ACS)

Airplane Flying Handbook FAA-H-8083-3B
SECTION XV: Flight Test Checklist

Flight Test Checklist
Part 61 applicants, see ACS for complete list

Bring to oral:

1) Pilot certificate
2) Medical certificate
3) Logbook (with instructor’s endorsement)
4) Government issued photo ID
5) Syllabus ticket
6) Ground School graduation certificate for 141 course
7) Written test results
8) Current Aeronautical Chart
9) Airplane Information Manual
10) Current FAR/AIM
11) E6B flight computer
12) Plotter
13) Calculator
14) Weight and Balance (completely filled out)
15) Cross-Country log (completely filled out)
16) Flight plan form (completely filled out)
17) Notice or disapproval from failed written or flight test, if applicable

In the Aircraft:

18) IFR Hood
19) Ensure proper documents are in the airplane

Additional items for instruments applicants:

1) Current instrument en-route charts
2) Current instrument approach charts

Additional items for CFI Applicants:

1) Flight instructor’s Handbook
2) Airplane Flying Handbook
3) Appropriate ACS guides
4) Flight instructor certificate for those pursuing an additional rating
5) Model airplane
6) Lesson plans
7) Any additional teaching aids deemed necessary.