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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Flight Test Checklist .....................................................................................................................91
Section I: Computation Aids
Crosswind Components Computer
Density Altitude Chart

### DENSITY ALTITUDE CHART

#### Altimeter Setting (" Hg) | Pressure Altitude Conversion Factor
---|---
28.0 | 1,824
28.1 | 1,727
28.2 | 1,630
28.3 | 1,533
28.4 | 1,436
28.5 | 1,340
28.6 | 1,244
28.7 | 1,148
28.8 | 1,053
28.9 | 957
29.0 | 863
29.1 | 768
29.2 | 673
29.3 | 579
29.4 | 485
29.5 | 392
29.6 | 298
29.7 | 205
29.8 | 112
29.9 | 20
29.92 | 0
30.0 | -73
30.1 | **-165**
30.2 | -257
30.3 | -348
30.4 | -440
30.5 | -531
30.6 | -622
30.7 | -712
30.8 | -803
30.9 | -893
31.0 | -983

#### OUTSIDE AIR TEMPERATURE

<table>
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<tr>
<th>C</th>
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<td>38</td>
<td>100</td>
</tr>
<tr>
<td>43</td>
<td>110</td>
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</tbody>
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#### APPROXIMATE DENSITY ALTITUDE - THOUSANDS OF FEET

- 14,000
- 13,000
- 12,000
- 11,000
- 10,000
- 9,000
- 8,000
- 7,000
- 6,000
- 5,000
- 4,000
- 3,000
- 2,000
- 1,000
- Sea Level
- -1,000
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 male end, or tongue into the female 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.

(C) PERTINENT INFORMATION to include:
   a. Keep hands and feet away from the 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
     o Follow up by shutting off mixture, ignition, and anything else associated with fuel.
     o 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).
     o 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.
     o Follow up by shutting off mixture, ignition, and anything else associated with fuel.
o 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).
o 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 windsreen. Prepare for an emergency landing. Attempt emergency restart procedures as time permits - see checklist. Use flaps as necessary once landing is assured.
  o Follow up by shutting off mixture, ignition, and anything else associated with fuel.
  o Request assistance from ATC unless contact is lost, then try 121.5, and call OU at 405-325-7231.
  o Complete Engine Secure checklist.

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>Service</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Emergency</td>
<td>121.5</td>
</tr>
<tr>
<td>Max Westheimer AWOS</td>
<td>119.55</td>
</tr>
<tr>
<td>Max Westheimer Ground</td>
<td>121.6</td>
</tr>
<tr>
<td>Max Westheimer Tower</td>
<td>118.0</td>
</tr>
<tr>
<td>Max Westheimer Unicom</td>
<td>122.95</td>
</tr>
<tr>
<td>Cruise Aviation Unicom (Fuel)</td>
<td>122.95</td>
</tr>
<tr>
<td>OU Base &amp; OU Traffic</td>
<td>123.3</td>
</tr>
<tr>
<td>FSS Flight Service Station / RCO Remote Communications outlet</td>
<td>122.15</td>
</tr>
<tr>
<td>Unicom at Uncontrolled Airports</td>
<td>122.7</td>
</tr>
<tr>
<td></td>
<td>122.8</td>
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<tr>
<td></td>
<td>123.0</td>
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<td>122.9</td>
</tr>
<tr>
<td>Multicom at Uncontrolled Airports</td>
<td>122.9</td>
</tr>
<tr>
<td>Multicom Inflight</td>
<td>122.75</td>
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**OTHER FREQUENCIES IN THE OKC AREA**

<table>
<thead>
<tr>
<th>Service</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>OKC Approach (SE)</td>
<td>120.45</td>
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<tr>
<td>OKC Approach (SW - NW)</td>
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</tr>
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<td>OKC Approach (NE)</td>
<td>124.2</td>
</tr>
<tr>
<td>Will Rogers ATIS</td>
<td>125.85</td>
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<tr>
<td>Will Rogers Tower</td>
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<tr>
<td>Will Rogers Ground</td>
<td>121.9</td>
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<tr>
<td>Service</td>
<td>Frequency</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Will Rogers Clearance Deliver</td>
<td>124.35</td>
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<tr>
<td>Will Rogers VOT (VOR check)</td>
<td>108.8</td>
</tr>
<tr>
<td>Wiley Post ATIS</td>
<td>128.72</td>
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<td>126.9</td>
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<tr>
<td>Wiley Post Ground</td>
<td>121.7</td>
</tr>
<tr>
<td>Wiley Post Unicom</td>
<td>122.95</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."
"University parking."
"Taxi with AWOS."
"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."
"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 #)."
"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."
"Taxing 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."

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 nine, 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 A TIS 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."
Section IV: Cockpit Management

Cockpit Management

DESCRIPTION: A systematic method for organizing materials and equipment so they are ready, available and adequate for insuring 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) Insure 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 altitude 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 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 altitude is maintained during the takeoff roll in order to quickly transfer the airplane's weight to the wings and then to lift off as soon as possible. After lift off 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 stop 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 altitude 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 altitude and achieve a positive rate of climb.
7) Upon achieving a positive rate of climb and clear of obstacles establish and maintain Vy pitch altitude.
8) After reaching a safe airspeed and altitude retract the flaps.
9) Establish cruise climb above a minimum safe altitude.

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 altitude until just prior to rotation.
7) Accelerate to rotation speed and rotate to a pitch altitude that produces a Vx climb speed.
8) Maintain Vx until clear of obstacles.
9) After clearing obstacles, accelerate to Vy and retract the flaps.
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 path? twice flight path.

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

Procedures:

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 altitude? altitude 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:

FAA Private and Commercial Pilot Practical Test Standards (PTS)
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 altitude is begun in a manner that will allow the airplane to touch down in the proper power off stall pitch altitude. 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 altitude and power so that a touchdown can be made at 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 altitude 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 altitude reaches the power off stall altitude. 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 altitude.

References:  

FAA Private and Commercial Pilot Practical Test Standards (PTS)
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 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 remain on the proper glide path.

4) Make adjustments to the airplane pitch altitude to maintain the proper airspeed.

5) At the appropriate flare altitude, increase the pitch altitude to touchdown altitude 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:


FAA Private and Commercial Pilot Practical Test Standards (PTS)
**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, shot 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 altitude 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 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 altitude to maintain the proper airspeed.
5) At the appropriate flare altitude, increase the pitch altitude and reduce power at the? rate that will allow a slow decreases in rate of descent and airspeed so that touchdown occurs just as the power reaches idle and the pitch altitude reaches the power off stall altitude.
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.

**References:**
FAA Private and Commercial Pilot Practical Test Standards (PTS)
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 students 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 which is higher
5) Midfield select gear down
6) Abeam numbers – 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.

References:
FAA Commercial Pilot Practical Test Standards FAS-S-8081-12B
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 altitude to stop the descent
3) Retract the flaps gradually to the takeoff position, adjust the pitch altitude 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

References:
FAA Commercial Pilot Practical Test Standards FAS-S-8081-12B
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.
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 at a proper 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 altitude 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 to the downwind leg.

**Note:** the above procedures assume an ideal traffic pattern situation. Additional traffic, ATC, local pattern restrictions, noise abatement procedures, obstacles, etc., may dictate modification of these procedures. In all cases the pilot shall exercise good judgment and maintain positive airplane control at all times.

References:

- FAA Commercial Pilot Practical Test Standards FAS-S-8081-12B
- AIM (current Revision)
Max Westheimer Runway 03 Traffic Pattern

Rwy 3 - Left Traffic
(not to scale)
Max Westheimer Runway 21 Traffic Pattern

Runway 21 - Right Traffic
(not to scale)
Max Westheimer Runway 17 Traffic Pattern

(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.
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.**
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 altitude in the flare.

Emergency Approach (Downwind Approach to Field)

CIRCLE DOWN TO 1000-1500' AGL

WIND DIRECTION

KEY POINT
Emergency Approach (Upwind Approach to Field)
Unusual Flight Altitudes

Description: The instructor or student will place the airplane in an unexpected altitude. 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 altitudes 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 altitude.  
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 altitude 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.  
2) Level the wings.  
3) 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:  
FAA instrument Rating Practical Test Standards (PTS)
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 and airspeed.
3) Turn fuel pump on
4) Power idle
5) Pitch for flap operation speed 103KIAS
6) Configure flaps full (airspeed will decrease further)
7) Establish bang angle between 30°-45°
8) Allow for maximum descent
   **Note:** Airspeed not to exceed 103KIAS
9) Execute applicable checklist as appropriate (engine fire, electrical fire etc.)

Recovery

1) Roll wings level
2) Pitch for the horizon
3) Add full power
4) Retract flaps
5) Set power to cruise power
6) 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-8033-3A
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 fill 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
1) Roll wings level
2) Pitch for the horizon
3) Add full power
4) Retract flaps 40
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-8033-3A
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 any further increase in the angle of attack or load factor, or decrease in power would result in an immediate stall. 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) At or before the completion of the clearing turns, fuel tank selector appropriate position, mixture full rich, and fuel pump on.
3) After completing clearing turns, reduce power to 1500 RPM (15"MP); maintain heading and altitude while slowing to the critically slow airspeed.
4) Extend flaps below Vfe
5) As airspeed approaches Vso +5, power is adjusted to control altitude and pitch is adjusted to maintain airspeed.
6) Turn, climbs, and descents using bank angles of 30° or less are performed as directed by the instructor while maintaining a critically slow airspeed.
7) Recovery is initiated by applying takeoff power and adjusting pitch altitude to maintain altitude while retracting flaps.
8) Resume normal cruise or as directed.

References:
FAA Private and Commercial Practical Test Standards
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) While performing clearing turns, fuel tank selector appropriate position, mixture full rich, fuel pump on.
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) For turning stall, establish a 30° bank in either direction.
6) Smoothly adjust the pitch to an altitude that will induce an imminent stall.
7) Maintain coordinated flight
8) Maintain a pitch altitude that will induce an imminent or full stall (as directed). For imminent stalls maintain pitch altitude until the initial buffet or a rapid decay of control effectiveness is experienced. For full stalls maintain pitch altitude until a sudden loss of control effectiveness, excessive sink rate with fill up elevator, or uncontrollable pitch down occurs.
9) Recover by decreasing the angle of attack, leveling the wings with coordinated use of aileron, rudder and applying full power.
10) Retract the flaps while adjusting the pitch altitude to minimize altitude loss.
11) Accelerate to the normal cruise or climb as necessary to an appropriate altitude.

References: FAA Private and commercial Practical Test Standards

**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) While performing clearing turns, set the mixture rich, fuel tank selector appropriate position, fuel pump on.
2) Reduce power and maintain heading and latitude while establishing a takeoff or climb configuration and airspeed as directed.
3) At Vr, simultaneously increase the pitch altitude to a stall altitude and apply full power.
   **Note:** Avoid excessively high pitch altitudes.
4) For turning stalls establish a turn in either direction using a bank angle of 20°.
5) Maintain coordinated flight.
6) For imminent stalls maintain the stall pitch altitude until the initial buffet or a rapid decay of control effectiveness is experienced. For full stalls maintain the stall pitch altitude until a sudden loss of control effectiveness is experienced, excessive sink rate with full up elevator, or uncontrollable pitching occurs.
7) Recover by decreasing the angle of attack, leveling the wings with coordinated use of aileron and rudder and applying full power.
8) After recovery is complete, accelerate to normal cruise or climb as necessary.

**References:**
FAA Private and Commercial Practical Test Standards
**Spins**

*Note: This maneuver is not authorized in any 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 altitude 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:**

- FAA CFI Practical Test Standards (PTS)
- C-152A Information Manual
**Accelerated Stalls**

**Description:**
The Airplane is maneuvered to an airspeed that is below $V_a$. 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 altitudes.

**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 altitude 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 Practical Test Standards.
Airplane Flying Handbook FAA-H-8083-3A
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 for other traffic.
2) Establish an appropriate altitude and Va airspeed (mixture as required).
3) Check the fuel tank selector for proper position (normally fullest tank).
4) As the bank angle steepens, adjust back elevator pressure to maintain a level altitude and adjust power to maintain airspeed.
5) Maintain a 50° bank angle, altitude, and airspeed during the turn.
6) Be constantly alert for other traffic while performing this maneuver.
7) 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.
8) After completion of the second turn, return to straight and level flight at cruise airspeed.

References: FAA Private and Commercial Practical Test Standards
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 for other traffic.
2) Establish an appropriate altitude at or below Va.
3) Check the fuel tank selector for proper position and mixture as required.
4) Select a prominent reference point off the wing tip. Consider wind direction.
5) Enter a coordinated 30° bank turn into the direction of the reference point and wind.
6) Smoothly apply full power while simultaneously increasing the pitch altitude at a constant rate so as to obtain a maximum pitch altitude 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 through 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 altitude 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.

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

FAA Commercial Pilot Practical Test Standards (PTS)
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 student’s feel for varying control forces, and the ability to accurately maneuver the airplane while demonstrating good planning and orientation.

Procedures:

1) Clear the area for other traffic.
2) Establish an appropriate altitude at or below Va.
3) Check the fuel tank selector for proper position, mixture as required <doesn’t make sense.
4) Select reference points and consider wind direction.
5) 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 altitude and one-half the bank angle is rolled in with the bank slowly and steadily increasing.
6) The bank angle should continue to increase until it reaches a maximum at 90°. The pitch altitude should be slowly decreasing.
7) As the airplane passes through the 90° reference point on the horizon. The bank angle should be at its maximum and the airspeed should be 5-10 KIAS above stall.
8) Both the pitch altitude and the bank angle continue to decrease so that, at the 135° point, the pitch altitude reaches its lowest point and approximately one-half the bank angle remains.
9) As the airplane passes through the 135° point the roll out is continued and the pitch altitude is slowly increased so that the airplane returns to straight and level flight at the entry altitude and airspeed and the airplane reaches the 180° point.
10) 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-8083-3

FAA Commercial Pilot Practical Test Standards (PTS)
**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. Clear the area of other traffic.
2. Establish and altitude of at least 4500’ AGL.
3. Accomplish pre-landing checklist.
4. Check fuel selector for proper position.
5. Check gear and flaps up.
6. Determine wind direction.
7. Select a small but prominent reference in a sparsely populated area.
8. Crossing point, apply carb heat (Warrior only) reduce power to idle, slow to best glide (105 MPH Arrow, 73 KIAS Warrior) and roll into a maximum of 60° of bank.
9. Vary bank angle to maintain constant ground track of about 1/8 mile radius from your center point.
10. Make at least three turns recovering on the entry heading and an altitude of more than 1000’ AGL.
11. After each turn clear the engine by briefly advancing the throttle to at least 1700 RPM.
12. Be constantly on the alert for traffic while performing this or any maneuver.
13. Plan to depart on entry heading unless otherwise instructed.

**References:**

Airplane Flying Handbook FAA-h-8083-3

FAA Commercial Pilot Practical Test Standards (PTS)
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) Clear the area of other traffic.
2) Establish pivotal altitude (at least 500’ above obstacles) and Va, airspeed Mixture as required).
3) Check the fuel tank selector for the proper position.
4) Determine the wind direction.
5) 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.
6) Enter the “8” at the pivotal altitude by flying diagonally downwind between the pylons. The first turn is made into the wind.
7) As the line of sight reference approaches the pylon enter a bank as necessary to properly position the reference line on the pylon.
8) 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.)
9) Roll out diagonally downwind, crabbing as necessary, to set up for the next turn.
10) Be constantly alert for other traffic while performing this maneuver.
11) Perform the next turn exactly as the first, except in the opposite direction.

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-8083-3

FAA Commercial Pilot Practical Test Standards (PTS)
**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) Clear the area for other traffic.
2) Establish an altitude between 600’ and 1000’ feet that is at least 500’ above obstacles and establish cruise airspeed.
3) Check the fuel tank selector for proper position (normally fullest tank)
4) Select a prominent rectangular field bound by four section lines whose sides are approximately equal to a typical traffic pattern. The major axis of the rectangle should be approximately parallel to the wind direction at flight altitude. 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.
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-8083-3
- FAA Private Pilot Practical Test Standards (PTS)
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) Clear the area of other traffic.
2) Establish an altitude between 600’ and 1000’ AGL that is at least 500’ above obstacles and establish cruise airspeed.
3) Check the fuel tank selector for proper position (normally fullest tank).
4) Determine the wind direction.
5) Select a road or other straight reference line running approximately perpendicular to the wind (in a sparsely populated area).
6) Enter the maneuver downwind on a ground track perpendicular to the reference line.
7) 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.
8) 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.**
9) Be constantly alert for other traffic while performing this maneuver.
10) 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-8083-3

FAA Private Pilot Practical Test Standards (PTS)
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) Clear the area of other traffic.
2) Establish an altitude between 600’ and 1000’ AGL that is at least 500’ above obstacles and establish cruise airspeed (mixture as required).
3) Check the fuel tank selector for proper position (normally fullest tank).
4) Determine the wind direction.
5) Select a small but prominent reference point in a sparsely populated area.
6) Enter downwind and start a turn around the point.
7) Adjust the bank angle as necessary to correct for the effects of wind in order to maintain a constant radius.
8) Be constantly alert for other traffic while performing this maneuver.
9) Plan to depart on the entry heading unless otherwise instructed.

References:

Airplane Flying Handbook FAA-h-8083-3

FAA Private Pilot Practical Test Standards (PTS)
SECTION XII: Cross Country Flight Planning

VFR Cross Country Flight Planning

Materials Needed: Sectional, plotter, E6B, pencil, AFD, 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.
   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 = .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 your 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 leg 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.

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.

### Suggested Cross Country Destinations

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<td>83</td>
<td>Springfield-Branson Regional</td>
<td>Springfield, MO</td>
<td>SGF</td>
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Diversion Checklist
Reset Heading Indicator

Find Exact Location
Note Time ........................................

Turn to Approximate Heading
Draw Line and Figure Distance ..........
Determine True Course ..................

Check Altitude (Hemispherical Rule)
Find Magnetic Heading .................
Determine Ground Speed ............
Determine Time Enroute ..............
Determine Fuel Burn ..................

Contact FSS and Advise of
New Destination and ETA ..

Check A/FD for New Destination
AWOS / ASOS / ATIS ....
Approach / Center ........
CTAF / Tower ........
Ground ................
Airport Elevation ........
TPA ................

RUNWAYS
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.

**Flight Instruments check**

11) Clock operating and set to the correct time.
12) Airspeed indictor – 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

**Taxi Check**

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) Altitude 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 gage – proper indication.

FAA Instrument Rating Practical Test Standards (PTS)
Basic Altitude Instrument Flying

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 Practical Test Standards (PTS)
**Constant Airspeed Climbs**

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

**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 altitude, which will result in the desired climb airspeed.
2) Maintain the climb altitude by reference to the altitude 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 altitude 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 Practical Test Standards (PTS)
Constant Airspeed Descents

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

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 altitude, which will result in desired airspeed during the descent.
2) Maintain the pitch altitude by reference to the altitude 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 altitude indicator as necessary to achieve and maintain the desired airspeed.
5) Lead the level off by approximately 20% of the rate of descent, increasing the power to the cruise power setting as initiate the level off.

References:
- FAA Instrument Rating Practical Test Standards (PTS)
**Constant Rate Climbs**

**Description:** A constant rate and a constant airspeed is maintained during a climb by establishing and maintaining the appropriate pitch altitude 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 altitude and power setting which will result in the desired climb rate and airspeed.

2) Maintain the climb altitude by reference to the altitude 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 altitude 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 Practical Test Standards (PTS)
**Constant Rate Descents**

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

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

**Procedures:**

1) Simultaneously, establish the approximate altitude and power setting which will result in the desired descent rate and descent airspeed.

2) Maintain the descent altitude by reference to the altitude 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 altitude 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 off by approximately 20% of the rate of descent, increasing power to the cruise power setting as level off is initiated.

**References:**

- FAA Instrument Rating Practical Test Standards (PTS)
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°.
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 turned 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.


FAA Instrument Rating Practical Test Standards (PTS)
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 Practical Test Standards (PTS)
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 Practical Test Standards (PTS)
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 from” 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° in 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 Practical Test Standards (PTS)
**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 Practical Test Standards (PTS)
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°.


FAA Instrument Rating Practical Test Standards (PTS)
**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 Practical Test Standards (PTS)
- Current FAR/AIM
**ILS Approach**

**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 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 DH 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:**

- Instrument Flying Handbook FAA-h-8083-15
- FAA instrument Rating Practical Test Standards (PTS)
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:

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 fix.
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.

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) At the final approach fix note the time and descent 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.

FAA Instrument Rating Practical Test Standards (PTS)
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:**
Flying Handbook FAA-H-8083-15
FAA Instrument Rating Practical Test Standards (PTS)
FAR 91.175
**ASR 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.

**Procedures:**

1. Following heading and altitude instructions as given by ATC, initiate the pre-landing check when within 5 miles of the descent point as indicated by ATC.
2. Complete the pre-landing check when instructed by ATC to begin final descent to the MDA.
3. Course guidance is provided by ATC in the form of headings. For a PAR approach, glideslope information and instructions are also given.
4. As the airplane approaches the MDA, initiate a level-off so as to stay at or above the MDA until:
   a. The runway is in sight and a normal approach and landing can be made.
   b. The missed approach point is reached and the runway is not in sight (91.175). At this point, execute the missed approach procedure as instructed by ATC.
   c. If a circling approach is made, the airplane is in a position to make a normal approach and landing from the MDA.
5. If the runway is not in sight at the MAP execute the missed approach procedures as instructed by ATC.

**References:**

- Current FAR/AIM
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 practical Test Standards (PTS)
**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.

**References:** Instrument Flying handbook FAA-H-8083-15

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 where any further increase in the angle of attack or load factor would result in an immediate stall. 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 MAP
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 Practical Test Standards

**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 MAP
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 Practical Test Standards
**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) Full flaps inside the white arc
3) Propellers full forward below 90kts
4) Maintain 75kts of airspeed
5) Set power to 18”Hg MAP
6) 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 Practical Test Standards
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 Va
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 Practical Test Standards

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 Practical Test Standards
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 Practical Test Standards  
**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 Practical Test Standards
SECTION XV: Flight Test Checklist

Flight Test Checklist

Part 61 applicants, see PTS 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 PTS guides
4) Flight instructor certificate for those pursuing an additional rating
5) Model airplane
6) Lesson plans