TECNAM P-MENTOR

STANDARDIZATION MANUAL

VERSION 1

EFFECTIVE 01/2025

Introduction:

This manual is a compilation of standardized flight training maneuvers and procedures for the Tecnam P-Mentor. It is designed to provide standardized procedures for each flight maneuver listed in the respective flight course syllabus. We strongly suggest other references be used to help develop a complete understanding of each maneuver prior to attempting the maneuver in flight.

The purpose of the standardization manual is to provide flight instructors and students with standard procedures related to each flight maneuver. The pitch attitudes and power settings are approximate, and some changes may be required to get the expected performance. The individual flight instructor is required to demonstrate to the student the referenced pitch attitudes using the natural horizon during all visual maneuvers. The student is expected to use outside references. Collision avoidance during these maneuvers cannot be understated. While performing instrument maneuvers under simulated meteorological conditions, the student is expected to set the pitch attitudes in reference to the attitude indicator.

All students must use a combination of the airplane standardization manual, FAA Airman Certification Standards, Practical Test Standards, FAA Flight Training handbook and other approved aviation sources to guide them through each maneuver.

A summary of completion standards is provided with applicable maneuvers to assist in learning the standards that are required for different certificates and ratings. These summaries are provided for convenience and are not inclusive of all the requirements for each maneuver. The Airman Certification Standards or Practical Test Standards, for the certificate or rating being sought, are controlling, and should be referred to as the original source of this information. When a more advanced certificate or rating has higher completion standards for certain elements of a maneuver, only the elements that have a higher standard than the lower certificate or rating are shown in the summary. Completion standards for the CFI rating are based on the ability to demonstrate and simultaneously explain the key elements of a Task at the Commercial Pilot skill level.

Passenger Safety Briefing

Passenger Briefing

When giving a Passenger Briefing, using the acronym “SAFETY” can be a useful memory aid.

- **S-**seat belts
- **A-**air ventilation
- **F-**fire extinguisher
- **E-**emergency procedures
- **T-**traffic/talking
- **Y-**your questions

Example:

(S) We are flying a Tecnam P-Mentor. The canopy in this aircraft is operated by _____. The seat belts in this aircraft are operated by _____.

(A) There are air vents located _____, which are operated by _____.

(F) There is a fire extinguisher on board the aircraft mounted _____. *If there is an engine fire on the ground, we will switch off all switches and put fuel selector in the OFF position. Then we will evacuate the aircraft and retrieve a fire extinguisher from the side of the hangar.

(E) In the event of an emergency please remain calm and wait for further instructions. If there is a cockpit fire during flight, I will be getting the airplane on the ground; you will be discharging the fire extinguisher. Do you know how to operate a fire extinguisher? We will close all windows and vents, take a deep breath in, and hold it. You will discharge the fire extinguisher. Once empty or the fire is extinguished, we will open all windows and vents and begin to breathe again.

(T) If you see traffic that has not been discussed and you believe it to be cause for alarm, call it out using reference to the clock face, 12 (Point to Nose) 3 (Right Wing) 6 (Tail) or 9 (Left Wing).

Please observe a sterile cockpit, so during taxi, takeoff, landing, and any other time I deem appropriate, please do not discuss any items non-pertinent to flight safety.

(Y) Lastly if you feel sick at any time, please let me know as soon as possible. Focus outside and open any air vents that point at you. Do you have any questions?

***You only need to discuss what you are doing for engine fire procedures if you are training with a CFI. A non-pilot passenger does not need to know all the steps, just the plan of how to evacuate and what is expected of them.*

Takeoffs and Traffic Pattern Operations

Before Take-off Briefing

Objective
To develop the student's ability to prepare for a normal take-off and brief any unexpected events which could occur

Normal Take-off

- Confirm departure runway is the runway you are holding short
- Confirm wind direction and state whether it will be a right or left crosswind
- State rotation speed and climb out speed
- State the point at which a rejected landing will be executed if rotation speed has not been reached

Abnormalities

Engine Abnormality During Takeoff Roll

- Reduce power to idle
- Apply sufficient braking to prevent overrun
- If able, exit runway at next available taxiway and alert tower

Engine Abnormality Just After Liftoff with Available Runway Remaining

- Reduce power to idle
- Pitch down to maintain glide speed
- Land back on runway
- Apply sufficient braking to prevent overrun
- Brace for overrun

Engine Abnormality with no Available Runway Remaining Below 1000 ft AGL

- If sufficient power available to maintain altitude or climb
    - Maintain full power
    - Pitch for Vx
    - Determine ability to return to the airport and alert ATC or local traffic you are returning to the airport

- If insufficient power remains to maintain altitude or climb
    - Pitch for best glide
    - Determine most suitable landing area
        - 30 degrees either side of nose and within gliding distance
    - Execute emergency landing

Engine Abnormality Above 1000 ft AGL

- If sufficient power available to maintain altitude or climb
  - Maintain full power
  - Pitch for Vx
  - Alert ATC or local traffic you are returning to the airport
- If insufficient power remains to maintain altitude
  - Maintain best glide
  - Execute a turn back to the airport environment
    - Note: Generally, this turn should be made into the wind to maintain a closer proximity to the airport, state in your brief which direction you will turn if returning to the airport. In some cases, a turn with the wind may be the best option because of runway orientation.
  - Alert ATC or local traffic you are returning to the airport

Takeoff Briefing Example:

This will be a normal take-off from runway 33, which we are currently holding short of. The wind is from 360@8kts, so we will have a light right crosswind. Our rotation speed will be 60 KIAS and our climb out speed will be 70 KIAS to 1000 feet AGL.

If we have not reached 60 KIAS before the 2000-foot markers we will abort the takeoff. If we have an engine abnormality during the takeoff roll, we will reduce power to idle, brake and if able exit at the next available taxiway. Alert ATC.

If we have an engine abnormality just after liftoff with sufficient runway remaining, we will reduce the power to idle, pitch down for best glide and execute a landing back on the runway. We will apply sufficient braking to prevent an overrun, if an overrun is imminent, we will brace for impact.

If we have an engine abnormality after liftoff with no runway remaining and we are below 1000 feet AGL, we will determine if we have sufficient power to maintain altitude or climb. If we can do either of those, maintain Vx and alert ATC we are returning. If no power is available, we will pitch for best glide, determine the best suitable landing area within 30 degrees either side of the nose, within gliding distance and we will execute an emergency landing.

If we have an engine failure above 1000 feet AGL, we will determine if we have sufficient power to maintain altitude or climb. If we can do either of those, maintain Vx and alert ATC we are returning. If no power is available, we will pitch for best glide, execute a right 45-degree bank turn back towards the airport environment and alert ATC we are returning. Runway 19 will be our best option for a landing.

Normal and Crosswind Takeoff

Objective
To develop the student's ability to safely takeoff and depart the area during both normal and crosswind conditions

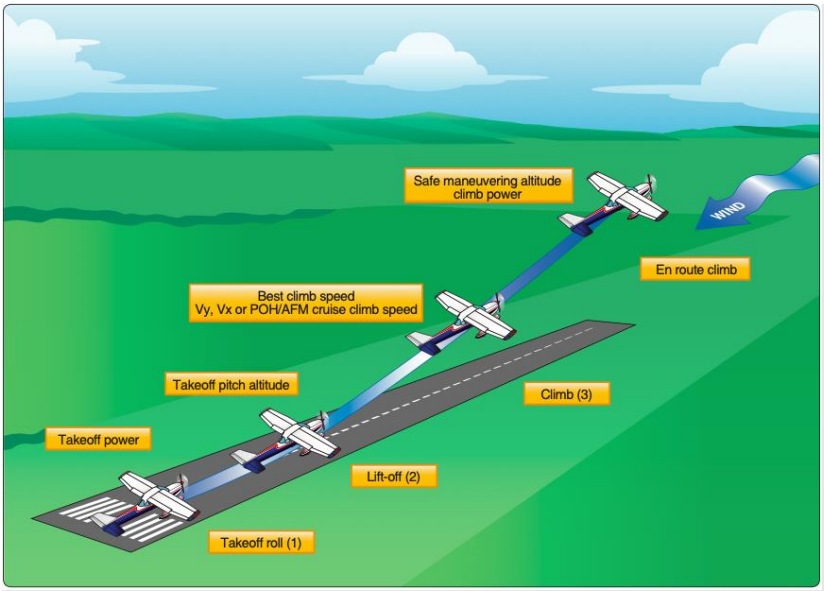
Setup
- Complete Pre-Takeoff Checklist, confirm flaps set to T/O
- Align aircraft with runway centerline
- Center rudder pedals
- Apply appropriate crosswind correction

Execution
- Smoothly apply full power
- Check and announce:
  - "*Engine instruments green, airspeed alive*"
- Use rudder as necessary to maintain runway centerline
- Reduce crosswind correction as needed
- Rotate at 60 KIAS
  - Environmental conditions may require a higher rotation speed
- Accelerate to and maintain Vy
- Maintain runway centerline during initial climb-out
- At or above 1000 ft AGL complete the Climb Checklist

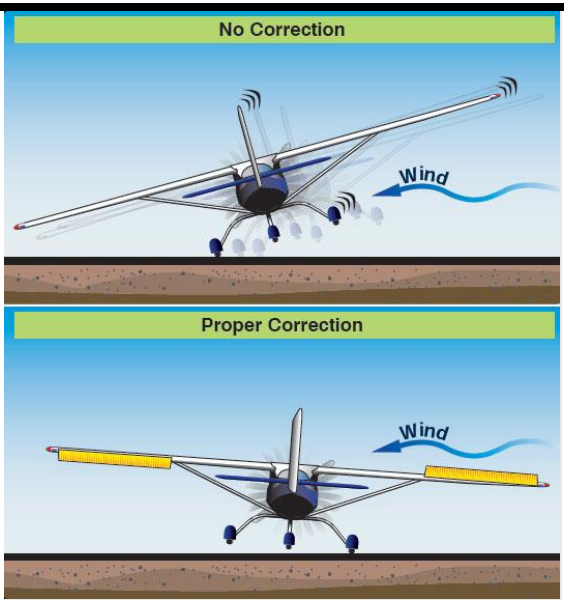
Common Errors
- Improper crosswind correction
- Improper application of power
- Poor directional control
- Improper pitch attitude during liftoff
- Failure to establish and maintain proper climb configuration and airspeed
- Drift from centerline during climb-out

Completion Standards

- **Private:**
  - Establish a pitch attitude to maintain the manufacturer's recommended speed or VY, +10/-5 knots.
  - Configure the airplane in accordance with manufacturer's guidance.
  - Maintain VY +10/-5 knots to a safe maneuvering altitude.
  - Maintain directional control and proper wind-drift correction throughout takeoff and climb.
  - Maintain directional control and proper wind-drift correction throughout takeoff and climb.
- **Commercial:**
  - Maintain VY ±5 knots to a safe maneuvering altitude.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 5-1 Takeoff and Climb



FAA Airplane Flying Handbook Figure 5-5 Crosswind effect

Short-Field Takeoff

Objective
To teach the student to obtain maximum performance during the takeoff phase to minimize runway length required for takeoff

Setup
- Complete Pre-Takeoff Checklist, confirm flaps setting T/O
- Taxi to beginning of takeoff area and align aircraft with runway centerline while utilizing all available runway
- Center rudder pedals
- Apply appropriate crosswind correction.

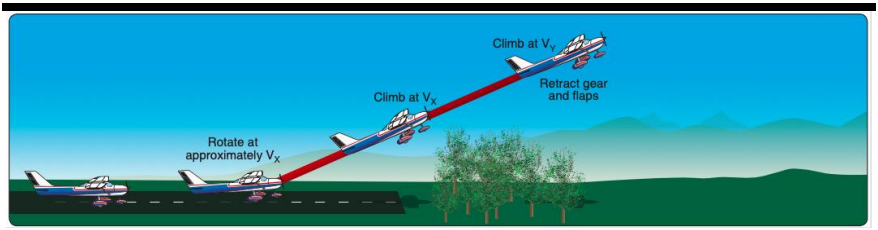
Execution
- Apply full brakes and smoothly apply full power
- Verify and announce:
  - *"Engine instruments green"*
- Release brakes, verify and announce:
  - *"Airspeed alive"*
- Use rudder as necessary to maintain runway centerline
- Reduce crosswind correction as needed
- Rotate at 53 KIAS
  - Environmental conditions may call for a higher rotation speed
- **With Obstacle:**
  - Climb at and maintain a minimum of the obstacle clearance speed from checklist
  - When obstacle clearance is assured:
    - Accelerate to Vx
  - When clear of obstacle:
    - Retract flaps
    - Accelerate to Vy
- **Without Obstacle:**
  - Accelerate to Vx
  - At a safe altitude:
    - Retract flaps
    - Accelerate to Vy
- Maintain runway centerline during initial climb-out
- At or above 1,000 ft AGL complete the Climb Checklist

Common Errors
- Failure to utilize maximum takeoff area
- Improper crosswind correction
- Improper application of power and brakes

- Poor directional control
- Improper pitch attitude during liftoff
- Failure to establish and maintain proper climb configuration and airspeed to clear obstacle
- Drift from centerline during climb-out

Completion Standards

- **Private:**
  - Rotate and lift off at the recommended airspeed and accelerate to the recommended obstacle clearance airspeed or VX, +10/-5 knots.
  - Establish a pitch attitude that will maintain the recommended obstacle clearance airspeed or VX, +10/-5 knots until clearing the obstacle or until the airplane is 50 feet above the surface.
  - Establish a pitch attitude for VY and accelerate to VY+10/-5 knots after clearing the obstacle or at 50 feet AGL if simulating an obstacle.
  - Configure the airplane in accordance with the manufacturer's guidance after a positive rate of climb has been verified.
  - Maintain VY +10/-5 knots to a safe maneuvering altitude.
  - Maintain directional control and proper wind-drift correction throughout takeoff and climb.
  - Comply with noise abatement procedures.
- **Commercial:**
  - Rotate and lift off at the recommended airspeed and accelerate to the recommended obstacle clearance airspeed or VX, ±5 knots.
  - Establish a pitch attitude that will maintain the recommended obstacle clearance airspeed or VX, ±5 knots until the obstacle is cleared or until the airplane is 50 feet above the surface.
  - Establish a pitch attitude for VY and accelerate to VY ±5 knots after clearing the obstacle or at 50 feet AGL if simulating an obstacle.
  - VY ±5 knots to a safe maneuvering altitude.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 5-8 Short Field take-off

Soft-Field Takeoff and Climb

Objective
To develop the student's ability to properly transfer the aircraft's weight to the wings as quickly as possible when taking off from other than a smooth hard surface runway

Setup
- Complete Pre-Takeoff Checklist, confirm flaps set to T/O
- Apply full back pressure
- Align aircraft with runway centerline with minimal brake application
- Center rudder pedals
- Apply appropriate crosswind correction

Execution
- Roll onto runway surface with full back pressure applied and smoothly add full power once aligned with centerline
- As full power is added, back pressure will need to be reduced
- Check and announce:
    - "*Engine instruments green*, *airspeed alive*"
- Use rudder as necessary to maintain runway centerline
- Reduce crosswind correction as needed
- Maintain proper nose high attitude to allow aircraft to fly itself off the ground
- Allow aircraft to remain in ground effect to accelerate
- **With Obstacle**: (***only if obstacle is specified by instructor or examiner)
    - Accelerate to obstacle clearance climb speed (OCS) from checklist in ground effect
    - Upon reaching OCS, climb at OCS
    - When obstacle clearance is assured:
        - Accelerate to Vx
    - When clear of obstacle:
        - Retract flaps
        - Accelerate to Vy
- **Without Obstacle:**
    - Accelerate to Vx or Vy in ground effect
    - Upon reaching specified Vx/Vy, climb at Vx/Vy
    - At a safe altitude:
        - Retract flaps
        - Climb at Vy
- Maintain runway centerline during initial climb-out
- At or above 1,000 ft AGL complete the Climb Checklist

Common Errors

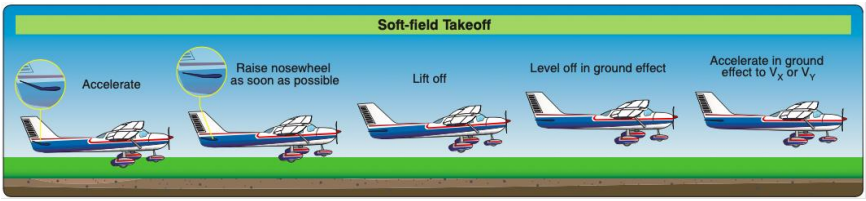
- Allowing aircraft to stop on takeoff surface
- Improper positioning of ailerons
- Improper application of power
- Poor directional control
- Improper pitch attitude during liftoff
- Failure to achieve proper airspeed before leaving ground effect
- Drift from centerline during climb-out

Completion Standards

- **Private:**
  - Establish and maintain a pitch attitude that will transfer the weight of the airplane from the wheels to the wings as rapidly as possible.
  - Lift off at the lowest possible airspeed and remain in ground effect while accelerating to VX or VY, as appropriate.
  - Establish a pitch attitude for VX or VY, as appropriate, and maintain selected airspeed +10/-5 knots during the climb.
  - Configure the airplane after a positive rate of climb has been verified or in accordance with airplane manufacturer's instructions.
  - Maintain VX or VY, as appropriate, +10/-5 knots to a safe maneuvering altitude.
  - Maintain directional control and proper wind-drift correction throughout takeoff and climb.
- **Commercial:**
  - Establish and maintain a pitch attitude that will transfer the weight of the airplane from the wheels to the wings as rapidly as possible.
  - Lift off at the lowest possible airspeed and remain in ground effect while accelerating to VX or VY, as appropriate.
  - Establish a pitch attitude for VX or VY, as appropriate, and maintain selected airspeed ±5 knots during the climb.
  - Configure the airplane after a positive rate of climb has been verified or in accordance with airplane manufacturer's instructions.
  - Maintain VX or VY, as appropriate, ±5 knots to a safe maneuvering altitude.
  - Maintain directional control and proper wind-drift correction throughout takeoff and climb.

- Comply with noise abatement procedures.

- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 5-10 Soft Field Take-off

Traffic Pattern Operations

Objective
To develop the student's ability to conduct safe and efficient arrival and departure procedures at controlled and uncontrolled airports.

Setup

- Complete the Before Landing Checklist
- Determine traffic pattern altitude (approx. 1,000 ft above field elevation)
- Check local weather conditions and determine active runway
- Establish traffic pattern altitude at least 3 miles prior to entering the pattern
- Slow the aircraft to 80-90 KIAS (approx. 18" MP 2250 RPM)
- Enter at a 45º angle to the midpoint of the downwind leg or as advised by ATC
- If approaching field from opposite side of downwind leg, position the aircraft to overfly the mid-field of the active runway at a perpendicular angle 500 ft above traffic pattern altitude
- Once the aircraft has passed the desired downwind leg, continue flying for 1 mile
- Then begin descent to pattern altitude while making a 270º turn in the appropriate direction to join the downwind leg at the midfield point

Execution

- Turn onto downwind leg approx. ½ to 1 mile from the active runway (runway should be halfway up wing strut) and maintain 80-90 KIAS
- Maintain parallel ground track to runway by correcting for wind drift
- Complete Downwind Flow at mid-field
    - G - Gas (fullest tank selected)
    - U - Undercarriage Fixed
    - P – Prop Full Forward(on final)
    - S - Seatbelts and Switches (lights) On
    - When abeam the point of intended landing, reduce power setting to approx. 14-16" MP and 2250 RPM
    - Maintain altitude to slow to Vfe
    - Set flaps to T/O
    - Lower nose and trim to achieve approx. 500 fpm descent rate
    - Continue slowing to 70-75 KIAS

- When the touchdown point is positioned 45º behind the wing of the aircraft, and/or there has been a 200-300 ft decrease in altitude from pattern altitude, turn onto base leg
- When on base:
    - Maintain 70-75 KIAS
- Turn to final so that the aircraft is aligned with runway centerline, add final flaps, prop full forward and slow to:
    - Flaps Up: 65-75 KIAS
    - Full Flaps: 60-70 KIAS

Closed Traffic Pattern Procedures

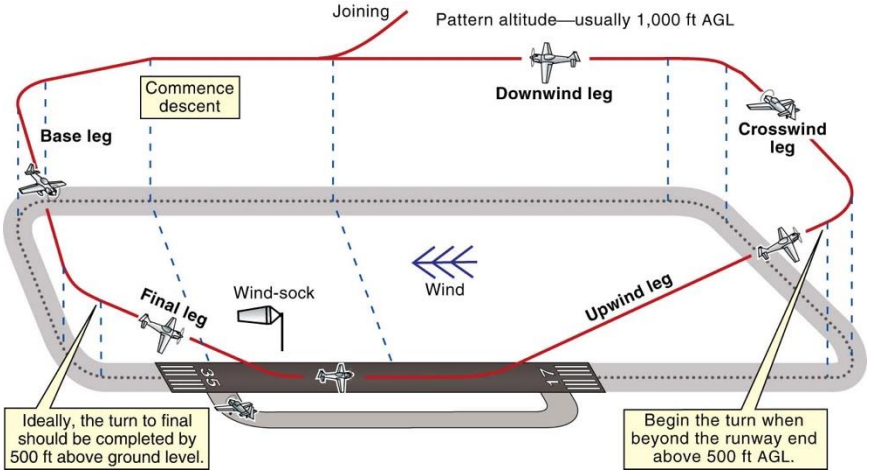
- Clear area for traffic and turn crosswind when:
    - Beyond departure end of the runway
    - AND within 300 ft of pattern altitude
- Level wings for 3-5 seconds in crosswind
- Clear area for traffic, then turn downwind
- Continue with Traffic Pattern Execution steps

Common Errors

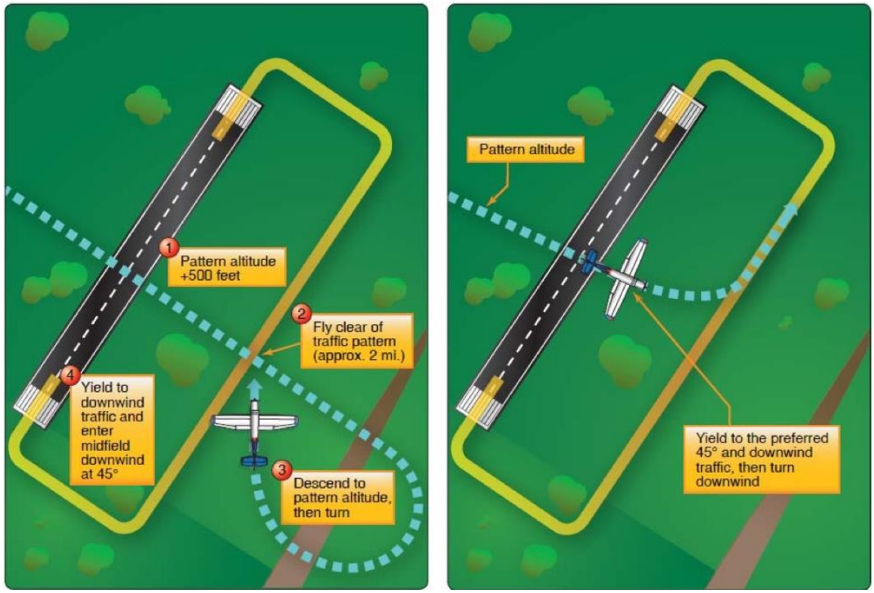
- Failure to maintain adequate separation between other traffic
- Failure to maintain proper airspeed
- Failure to maintain proper wind correction
- Failure to maintain proper distance (1/2 mi) from runway
- Failure to maintain patten altitude
- Inadequate division of attention

Completion Standards

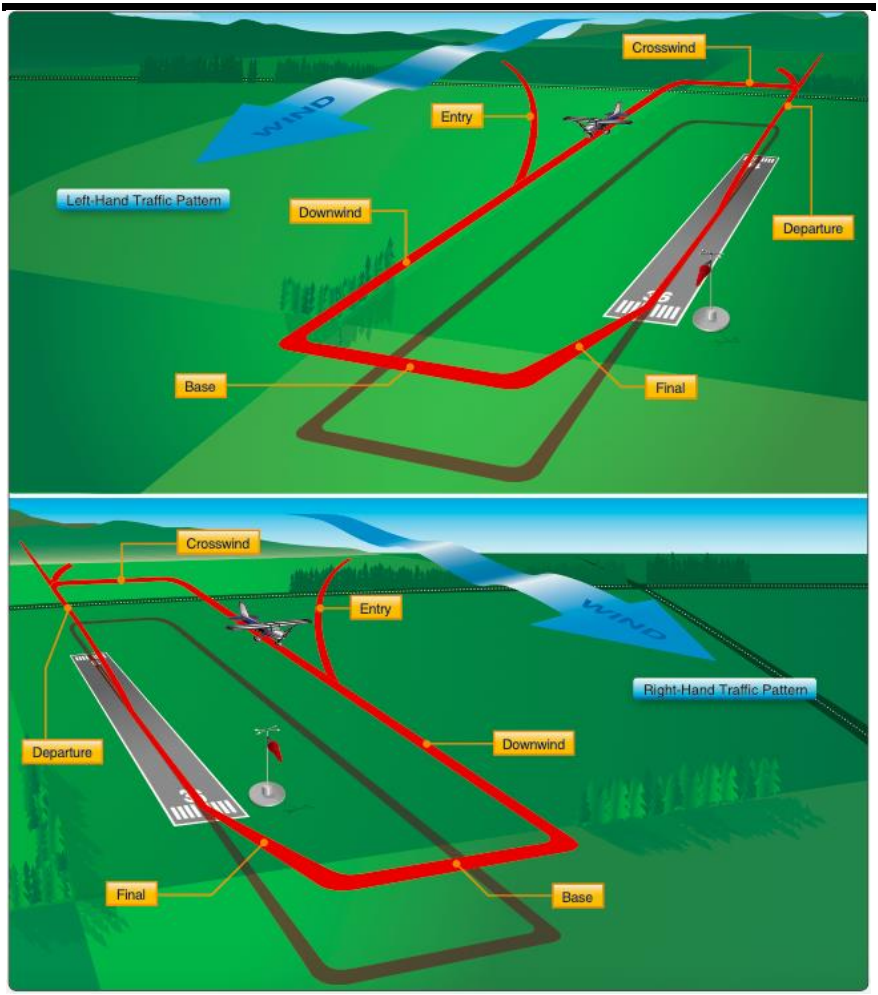
- **Private:**
    - Identify and interpret airport runways, taxiways, markings, signs, and lighting.
    - Comply with recommended traffic pattern procedures.
    - Correct for wind drift to maintain the proper ground track.
    - Maintain orientation with the runway/landing area in use.
    - Maintain traffic pattern altitude, ±100 feet, and the appropriate airspeed, ±10 knots.
    - Maintain situational awareness and proper spacing from other aircraft in the traffic pattern.
- **Commercial:** See Private Above
- **CFI:** See Private Above



ASA School Figure Traffic Pattern Operations



FAA Airplane Flying Handbook Figure 7-4 Preferred entry from upwind leg side of airport (A). Alternate midfield entry from upwind leg side of airport (B).



FAA Airplane Flying Handbook Figure 7-1 Traffic Pattern

Approach Briefing

VFR Approach Briefing

"We are approximately ___ miles from _____ airport, which is (towered/non-towered). We will be landing on runway _____, which is _____ feet long. We will enter the pattern by _____. We will be conducting a (normal/short field/soft field/crosswind/power-off) landing."

IFR Approach Briefing

"We are flying the ILS 15 into Burlington Airport. The approach plate is current, expiring _____. The localizer frequency is 110.3, which has been tuned and identified. Our approach course is 146, the runway length is 7820, the touchdown zone elevation is 326, and the airport elevation is 335.

The notes depict that we have non-standard takeoff minimums (Burlington One Departure). This does not apply to us as we are going missed. There are also non-standard alternate minimums, which do not apply since this is not our alternate. There is also a cold weather conversion, which does not apply since it is warmer than -10 degrees Celsius. We have pilot controlled MALSR lighting, with sequenced flashing. Our missed approach is to climb to 800 then make a climbing right turn to 3000, direct BTV VOR, then fly the 202 radial to WINLA at 6.4 DME and hold.

We're on Approach, we have Tower and Ground tuned in.

We are starting this approach by getting vectors to FOVES (could do procedure turn, etc.). We will maintain 2000 (or whatever ATC assigned) until intercepting the glideslope, then descend to our minimums, which are 576 for the ILS. Once we reach minimums, we will execute our missed approach procedure.

Landings

Normal and Crosswind Approach and Landing

Objective
To develop the student's proficiency in normal and crosswind approaches and landings

Setup

- Select the correct entry procedure and altitude for the runway in use (refer to traffic pattern operations)
- Select an appropriate touchdown point, 200 ft past the threshold and within the first 1/3 of the runway

Execution

- Select a visual aiming point (runway threshold recommended)
- Apply proper wind correction / side slip for landing
- Maintain 60-65 KIAS on final approach
    - If the winds are gusting or LLWS conditions exist, increase final approach speed by ½ of the gust factor, not to exceed 10 KIAS
    - For strong crosswinds use the minimum required flap setting required for the field length
- Prior to 500 ft AGL:
    - Set flaps as appropriate
- Establish appropriate final approach airspeed based on the desired Landing Checklist and flap setting
- Verify and announce:
    - "*Approach stabilized*" by 500 ft AGL
    - A stabilized approach is defined as being fully configured, maintaining a constant airspeed, constant descent rate, and in a safe position to land
- Begin to round out approximately 10 ft above the ground transitioning to a landing pitch attitude
- Maintain the longitudinal axis of the aircraft aligned with the runway centerline without drift using opposite rudder to keep the longitudinal axis aligned with the centerline and crosswind correction to lower the upwind wing
- Touchdown with the main wheels first (for crosswind, upwind main wheel should touch first)
- During rollout maintain runway centerline and apply proper crosswind correction
- After clear of active runway, complete After Landing Checklist

Recovery

- If necessary, a go-around may be initiated at any time during the landing phase of flight, however, a go-around must be initiated if approach is not stabilized by 500 ft AGL

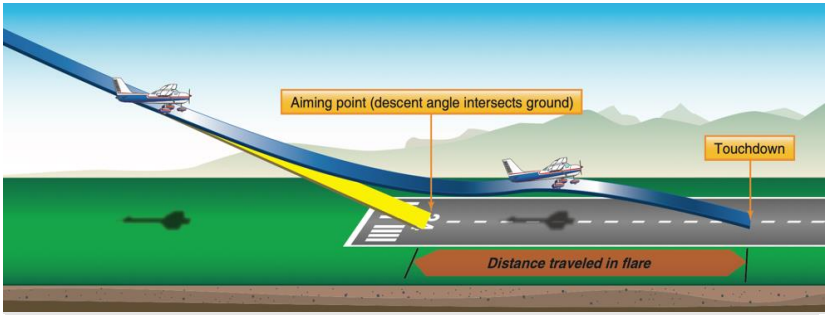
Common Errors

- Failure to calculate proper performance data and limitations
- Failure to establish a stabilized approach by 500 ft AGL
- Failure to execute a go-around as needed
- Improper control of your rate of descent
- Improper use of flaps during the landing phase
- Failure to correct for wind drift
- Rounding out too high or low
- Touching down further than the first 1/3 of the runway
- Failure to keep the longitudinal axis of the aircraft aligned with the runway, resulting in a side load condition on the main gear
- Poor directional control after touchdown
- Improper use of brakes during the rollout

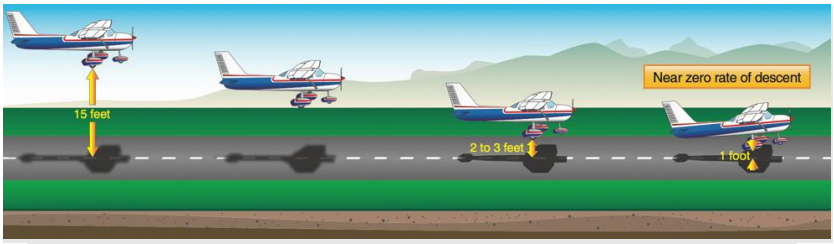
Completion Standards

- **Private:**
  - Ensure the airplane is aligned with the correct/assigned runway or landing surface.
  - Scan runway or landing surface and the adjoining area for traffic and obstructions.
  - Select and aim for a suitable touchdown point considering the wind, landing surface, and obstructions.
  - Establish the recommended approach and landing configuration and airspeed and adjust pitch attitude and power as required to maintain a stabilized approach.
  - Maintain manufacturer's published approach airspeed or in its absence not more than 1.3 VSO, +10/-5 knots with gust factor applied.
  - Maintain directional control and appropriate crosswind correction throughout the approach and landing.
  - Make smooth, timely, and correct control application during round out and touchdown.
  - Touch down at a proper pitch attitude, within 400 feet beyond or on the specified point, with no side drift, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
  - Execute a timely go-around if the approach cannot be made within the tolerances specified above or for any other condition that may result in an unsafe approach or landing.
  - Utilize runway incursion avoidance procedures

- **Commercial:**
  - Maintain manufacturer's published approach airspeed or in its absence not more than 1.3 VSO, ±5 knots with gust factor applied.
  - Touch down at a proper pitch attitude, within 200 feet beyond or on the specified point, with no side drift, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 8-9 Stabilized Approach



FAA Airplane Flying Handbook Figure 8-8 A Well Executed Round-out

Forward Slip to a Landing

Objective
To develop the student's proficiency on a forward slip to a landing, and to explain the situations for which a forward slip is useful

Setup
- Aircraft should be set up for the chosen landing configuration (normal, short, soft)
- Avoid prolonged slips in excess of 2000 ft altitude loss
- A slip may be executed at any point in the descent portion of the traffic pattern
- Establish desired final approach at a higher altitude than normal

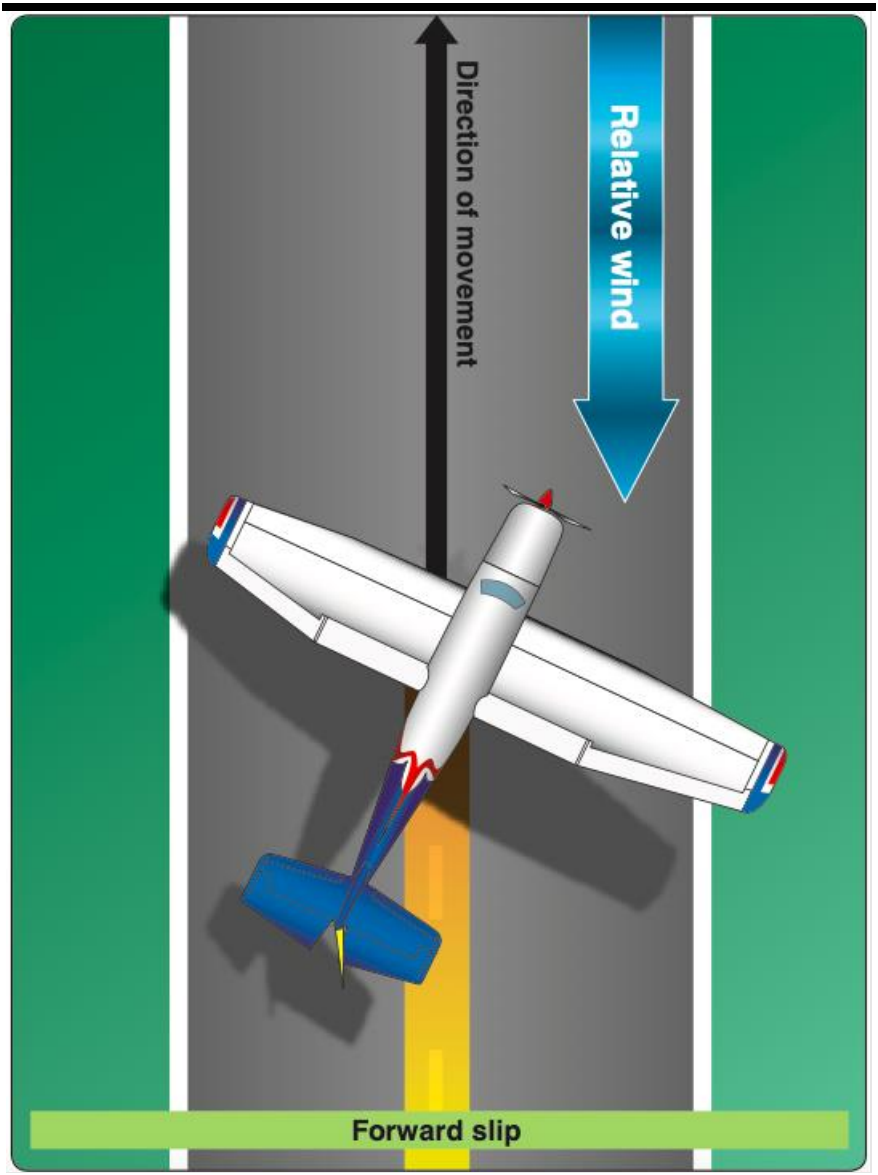
Execution
- Reduce power to idle
- Lower upwind wing
- Apply full opposite rudder to place the side of the airplane into the relative wind creating excess drag
- Allow the nose of the aircraft to point away from the runway while the aircraft track maintains alignment with runway centerline
- Maintain centerline by varying bank as necessary
- Maintain final approach airspeed for specific landing
- Once an acceptable altitude is reached, the slip may be discontinued
- Continue with your predetermined landing

Recovery
- If necessary, a go-around may be initiated at any time during the landing phase of flight, however, a go-around must be initiated if approach is not stabilized by 500 ft AGL

Common Errors
- Failure to calculate proper performance data and limitations
- Failure to establish a stabilized approach by 500 ft AGL
- Failure to execute a go-around as needed
- Improper control of your rate of descent
- Failure to apply correct aileron and or rudder inputs
- Improper technique during transition from slip to landing
- Failure to maintain a safe airspeed during the slip

Completion Standards

- **Private:**
  - As necessary, correlate crosswind with direction of forward slip and transition to sideslip before touchdown.
  - Touch down at a proper pitch attitude, within 400 feet beyond or on the specified point, with no side drift, and with the airplane's longitudinal axis aligned with and over the runway center/landing path.
  - Maintain a ground track aligned with the runway center/landing path.
- **Commercial:** See Private Above
- **CFI:** See Private Above



FAA Airplane Flying Handbook Figure 8-13 Forward Slip

Soft-Field Approach and Landing

Objective
To develop the student's ability to properly transfer the aircraft's weight from the wings to the ground as gradually as possible when landing on a soft runway surface at the slowest possible landing speed

Setup
- Select the correct entry procedure and altitude for the runway in use (refer to traffic pattern operations)
- A touchdown point is not required to be selected as the entire runway may be used

Execution
- Select a visual aiming point
- Apply proper wind correction / side slip for landing
- Maintain appropriate airspeed on final approach
    - If the winds are gusting or LLWS conditions exist, increase final approach speed by ½ of the gust factor, not to exceed 10 KIAS and reduce use of flaps
- Prior to 500 ft AGL:
    - Set full flaps
- Verify and announce:
    - "*Approach stabilized*" by 500 ft AGL
    - A stabilized approach is defined as being fully configured, maintaining a constant airspeed, constant descent rate, and in a safe position to land
- Establish soft-field approach airspeed before crossing the runway threshold
- Begin to round out approximately 10 ft above the ground, transitioning to a landing pitch attitude
- Apply a very slight amount of power during the round out just before touching the ground
- Maintain the longitudinal axis of the aircraft aligned with the runway centerline without drift
- Touchdown with the main wheels first
- After touchdown, hold sufficient back pressure to keep weight off the nose wheel
- Use aerodynamic braking only to slow the aircraft
- During rollout maintain runway centerline and apply proper crosswind correction
- After clear of active runway, complete After Landing Checklist

Recovery

- If necessary, a go-around may be initiated at any time during the landing phase of flight, however, a go-around must be initiated if approach is not stabilized by 500 ft AGL

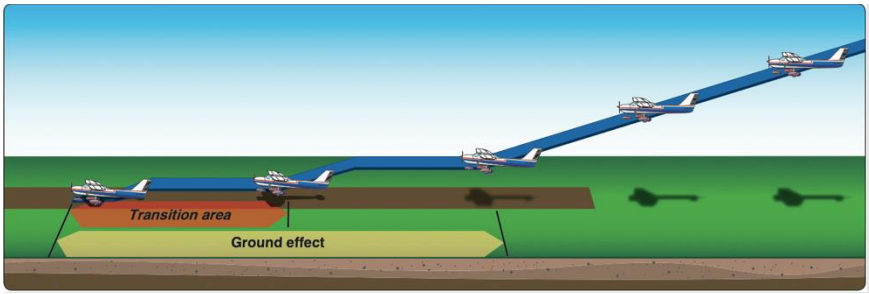
Common Errors

- Failure to calculate proper performance data and limitations
- Failure to establish a stabilized approach by 500 ft AGL
- Failure to use proper back pressure in order to keep weight off the nose wheel
- Failure to execute a go-around as needed
- Improper control of your rate of descent
- Improper use of flaps during the landing phase
- Failure to correct for wind drift
- Rounding out too high or low
- Touching down further than the first 1/3 of the runway
- Failure to keep the longitudinal axis of the aircraft aligned with the runway, resulting in a side load condition on the main gear
- Poor directional control after touchdown
- Improper use of brakes during the rollout

Completion Standards

- **Private:**
  - Maintain manufacturer's published approach airspeed or in its absence not more than 1.3 VSO, +10/-5 knots with gust factor applied
  - Make smooth, timely, and correct control inputs during the round out and touchdown, and, for tricycle gear airplanes, keep the nose wheel off the surface until loss of elevator effectiveness.
  - Touch down at a proper pitch attitude with minimum sink rate, no side drift, and with the airplane's longitudinal axis aligned with the center of the runway.
  - Maintain elevator as recommended by manufacturer during rollout and exit the "soft" area at a speed that would preclude sinking into the surface.
  - Execute a timely go-around if the approach cannot be made within the tolerances specified above or for any other condition that may result in an unsafe approach or landing.
  - Maintain proper position of the flight controls and sufficient speed to taxi while on the soft surface.
- **Commercial:**
  - Maintain manufacturer's published approach airspeed or in its absence not more than 1.3 VSO, ±5 knots with gust factor applied.

CFI: See Commercial Above



FAA Airplane Flying Handbook Figure 8-24 soft/rough field approach and landing

Short-Field Approach and Landing

Objective
To develop the student's ability to perform a maximum performance maneuver during the landing phase to minimize runway usage and land on a desired aiming point

Setup
- Select the correct entry procedure and altitude for the runway in use (refer to traffic pattern operations)
- Select an appropriate touchdown point, 200 ft past the threshold and within the first 1/3 of the runway

Execution
- Select a visual aiming point
- Apply proper wind correction / side slip for landing
    - If the winds are gusting or LLWS conditions exist, increase final approach speed by ½ of the gust factor, not to exceed 10 KIAS and reduce use of flaps
- Prior to 500 ft AGL set final flaps
- Verify and announce:
    - "*Approach stabilized*" by 500 ft AGL
    - A stabilized approach is defined as being fully configured maintaining a constant airspeed, constant descent rate, and in a safe position to land
- Establish short-field approach airspeed before crossing the runway threshold
- Begin to round out approximately 10 ft above the ground, transitioning to a landing pitch attitude
- Maintain the longitudinal axis of the aircraft aligned with the runway centerline without drift
- Touchdown with the main wheels first
- After touchdown retract flaps to 0º, apply maximum back pressure on the yoke and maximum braking to stop in the shortest distance consistent with safety
- After clear of active runway, complete After Landing Checklist

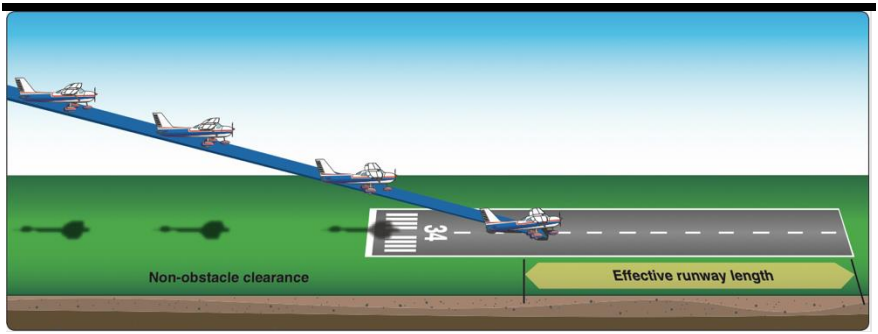
Recovery
- If necessary, a go-around may be initiated at any time during the landing phase of flight, however, a go-around must be initiated if approach is not stabilized by 500 ft AGL

Common Errors
- Failure to calculate proper performance data and limitations

- Failure to establish a stabilized approach by 500 ft AGL
- Failure to execute a go-around as needed
- Improper control of your rate of descent
- Improper use of flaps during the landing phase
- Failure to correct for wind drift
- Rounding out too high or low
- Touching down further than 200 ft from desired touchdown point
- Failure to apply maximum disc and aerodynamic braking
- Failure to keep the longitudinal axis of the aircraft aligned with the runway, resulting in a side load condition on the main gear
- Poor directional control after touchdown
- Improper use of the brakes during the rollout

Completion Standards

- **Private:**
  - Maintain manufacturer's published approach airspeed or in its absence not more than 1.3 VSO, +10/-5 knots with gust factor applied.
  - Touch down at a proper pitch attitude within 200 feet beyond or on the specified point, threshold markings, or runway numbers, with no side drift, minimum float, and with the airplane's longitudinal axis aligned with and over runway centerline.
  - Use manufacturer's recommended procedures for airplane configuration and braking.
  - Execute a timely go-around if the approach cannot be made within the tolerances specified above or for any other condition that may result in an unsafe approach or landing.
- **Commercial:**
  - Maintain manufacturer's published approach airspeed or in its absence not more than 1.3 VSO, ±5 knots with wind gust factor applied.
  - Touch down at a proper pitch attitude within 100 feet beyond or on the specified point, threshold markings, or runway numbers, with no side drift, minimum float, and with the airplane's longitudinal axis aligned with and over runway centerline.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 8-21 Landing on a Short Field

Short-Field Approach and Landing (50 ft Obstacle)

Objective
To develop the student's ability to perform a maximum performance maneuver while executing a short-field landing over a 50 ft obstacle and touching down in a normal landing attitude, at or within 200 ft beyond the specified touchdown point

Setup
- Select the correct entry procedure and altitude for the runway in use (refer to traffic pattern operations)
- Select an appropriate touchdown point, 200 ft past the threshold and within the first 1/3 of the runway

Execution
- Select a visual aiming point that will allow you to clear the 50 ft obstacle and touchdown within the first 1/3 of the runway
- Remain slightly higher on final approach and establish a steeper angle of descent in order to clear obstacle
- Apply proper wind correction / side slip for landing
- Maintain appropriate airspeed on final approach
    - If the winds are gusting or LLWS conditions exist, increase final approach speed by ½ of the gust factor, not to exceed 10 KIAS
- Prior to 500 ft AGL:
    - Set final flaps
- Verify and announce:
    - "*Approach stabilized*" by 500 ft AGL
    - A stabilized approach is defined as being fully configured, maintaining a constant airspeed, constant descent rate, and in a safe position to land
- Establish short-field approach airspeed before crossing the runway threshold
- Begin the round out approximately 10 ft above the ground, transitioning to a landing pitch attitude
- Maintain the longitudinal axis of the aircraft aligned with the runway centerline without drift
- Touchdown with the main wheels first
- After touchdown retract flaps to 0º, apply maximum back pressure on yoke and maximum braking to stop in the shortest distance consistent with safety
- After clear of active runway, complete After Landing Checklist

Recovery

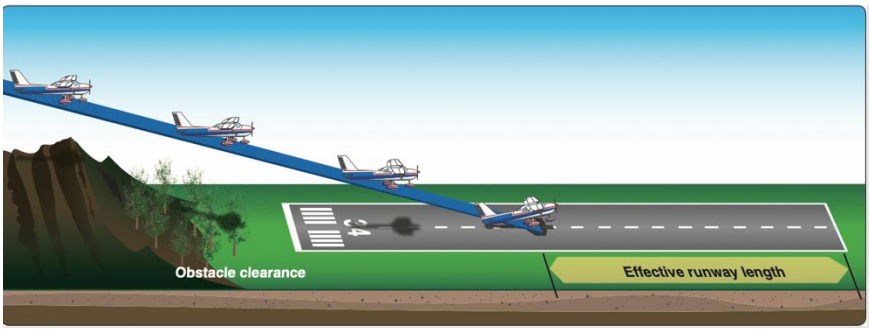
- If necessary, a go-around may be initiated at any time during the landing phase of flight, however, a go-around must be initiated if approach is not stabilized by 500 ft AGL

Common Errors

- Failure to calculate proper performance data and limitations
- Failure to establish a stabilized approach by 500 ft AGL
- Failure to execute a go-around as needed
- Improper control of your rate of descent
- Improper use of flaps during the landing phase
- Failure to correct for wind drift
- Rounding out too high or low
- Touching down further than the first 1/3 of the runway
- Failure to apply maximum disc and aerodynamic braking
- Failure to keep the longitudinal axis of the aircraft aligned with the runway, resulting in a side load condition on the main gear
- Poor directional control after touchdown
- Improper use of brakes during the rollout

Completion Standards

- **Private:** See Short-Field Approach & Landing Above
- **Commercial:** See Short-Field Approach & Landing Above
- **CFI:** See Short-Field Approach & Landing Above



FAA Airplane Flying Handbook Figure 8-20 Landing over an Obstacle

Power-Off 180° Accuracy Approach and Landing

Objective

To develop the student's knowledge and proficiency of the elements related to a power-off 180º accuracy approach and landing and touching down in a normal landing attitude, at or within 200 ft beyond the specified touchdown point

Setup

- Select the correct entry procedure and altitude for the runway in use (refer to traffic pattern operations)
- Select an appropriate aiming point suitable to land at the touchdown point

Execution

- When abeam the point of intended landing, select carb heat (as installed), reduce power to idle and pitch for Vg
- Wait about 8-10 seconds after glide is established, then begin a turn towards final
    - The amount of time before turning may vary depending on wind
    - This may be a 45°, 90° or 135° turn, depending on wind velocity
    - Maneuver as necessary to maintain a good sight picture and desired glide
- Add flaps, when necessary, if the aircraft is too high
    - It is advisable to use a slip to lose altitude before the use of flaps
- Plan the turn to final leg so that the aircraft is aligned with runway centerline and maintain desired glide on final approach
- Apply proper wind correction / side slip for landing on final
- Maneuver as necessary to safely bring the aircraft to the point of intended landing while maintaining Vg and terrain/obstacle clearance.
- Begin the round out approximately 10 ft above the ground transitioning to a landing pitch attitude
- Maintain the longitudinal axis of the aircraft aligned with the runway centerline without drift
- Touchdown with the main wheels first
- During the rollout, maintain runway centerline and apply proper aileron deflection into the wind
- After clear of active runway, complete After Landing Checklist

Recovery

- If necessary, a go-around may be initiated at any time during the landing phase of flight, however, a go-around must be initiated if the successful outcome of a landing within standards is in doubt.

Note

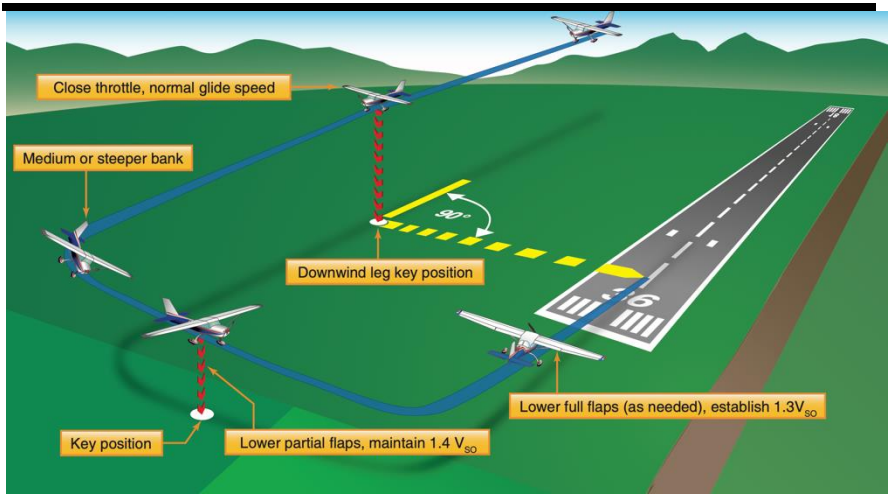
- Never try to stretch glide; it is better to execute a go-around and demonstrate good aeronautical decision making than to risk landing short

Common Errors

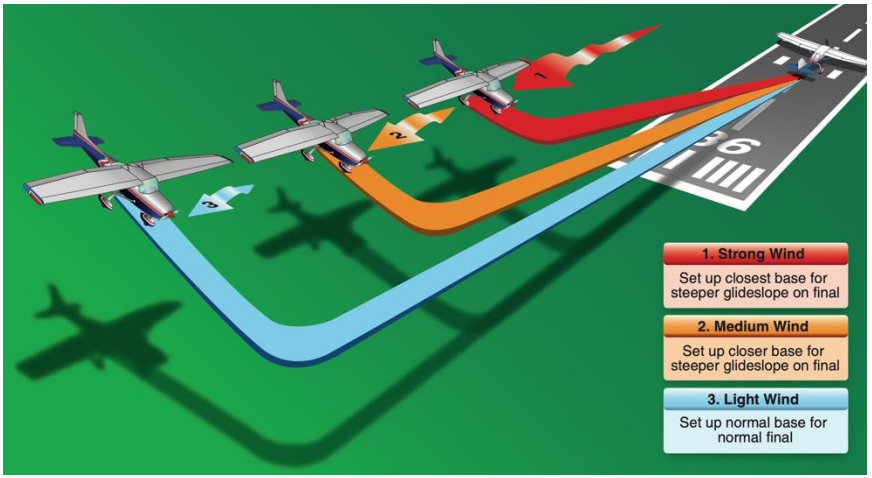
- Failure to calculate proper performance data and limitations
- Failure to execute a go-around as needed
- Improper control of your rate of descent
- Improper use of flaps during the landing phase
- Failure to correct for wind drift
- Rounding out too high or low
- Failure to keep the longitudinal axis of the aircraft aligned with the runway, resulting in a side load condition on the main gear
- Poor directional control after touchdown

Completion Standards

- **Commercial:**
  - Select the most suitable touchdown point based on wind, landing surface, obstructions, and aircraft limitations.
  - Position airplane on downwind leg, parallel to landing runway.
  - Correctly configure the airplane.
  - As necessary, correlate crosswind with direction of forward slip and transition to side slip for landing.
  - Touch down at a proper pitch attitude, within 200 feet beyond or on the specified point with no side drift and with the airplane's longitudinal axis aligned with and over the runway centerline or landing path, as applicable.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 8-27 180º Power-Off Approach



FAA Airplane Flying Handbook Figure 8-25 Plan the Base Leg for Wind Conditions

Go-Around and Rejected Landing

Objective
To develop the student's ability to recognize the need to go-around and the importance of making good, timely decisions in relation to flaps, pitch, and coordination during a go-around

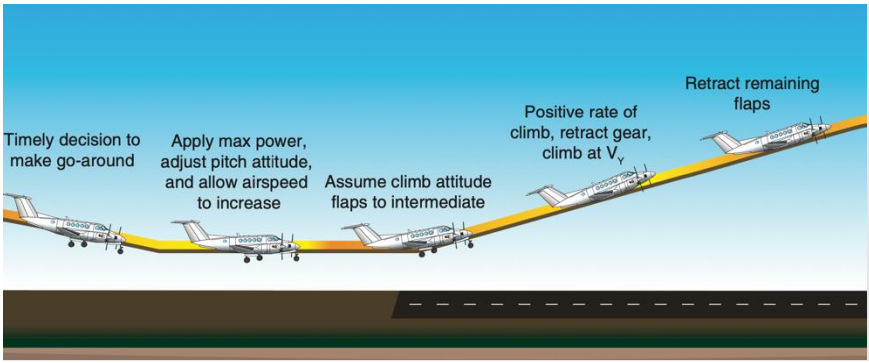
Setup
- If necessary, a go-around may be initiated at any time during the landing phase of flight, however, a go-around must be initiated if approach is not stabilized by 500 ft AGL

Execution
- Smoothly add full power
- Retract flaps to T/O
- Level the wings and transition to a climb pitch attitude of approximately 7º
- Climb at Vx
- Verify and announce:
- *"Positive rate"*
- Accelerate to Vy
- Retract flaps to UP
- At or above 1,000 ft AGL complete the Climb Checklist

Common Errors
- Failure to execute a go-around when necessary
- Improper power application
- Failure to maintain coordination
- Improper trim technique / incorrect pitch
- Improper wing flap retraction
- Poor division of attention

Completion Standards
- **Private:**
  - Make a timely decision to discontinue the approach to landing.
  - Apply takeoff power immediately and transition to climb pitch attitude for VX or VY as appropriate +10/-5 knots.
  - Configure the airplane after a positive rate of climb has been verified or in accordance with airplane manufacturer's instructions.
  - Maneuver to the side of the runway/landing area when necessary to clear and avoid conflicting traffic.
  - Maintain VY +10/-5 knots to a safe maneuvering altitude.

- **Commercial:**
  - Apply takeoff power immediately and transition to climb pitch attitude for VX or VY as appropriate ±5 knots.
  - Maintain VY ±5 knots to a safe maneuvering altitude.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 8-14 Go-around Procedure

VFR Maneuvers

Clearing Turns

Objective
To teach the student to exercise continuous surveillance of the airspace prior to the performance of a maneuver, and to provide the student with a means to configure the aircraft prior to each maneuver

Setup
- Select an altitude, which will assure recovery above minimum recovery altitude for selected maneuver
- Select a heading/visual landmark to initiate maneuver

Execution
- First 90º clearing turn:
  - Visually clear the area to the left and the right
  - Announce:
    - "*Clear left, center, and right*"
  - Pick a visual reference point off the wingtip in the direction of turn to roll out on
  - Clear area by entering a 20-30º bank turn while looking for traffic and maintaining altitude
  - After 90º turn is complete, roll out wings level on your selected heading / visual landmark
  - Reduce power as needed
- Second 90º clearing turn: OBJ
  - Visually clear the area to the left and the right
  - Announce:
    - "*Clear left, center, and right*"
  - Pick a visual reference point off the wingtip in the direction of turn to roll out on
  - Clear area by entering a 20-30º bank turn while looking for traffic and maintaining altitude
  - Roll out on original heading / visual landmark
  - Complete pre-maneuver flow
    - G- Gas (fullest tank selected)
    - P- Pump ON

Common Errors
- Failure to maintain selected altitude during clearing turns
- Over or under banking during clearing turns
- Failure to select or rollout on proper heading / visual landmark
- Failure to continually scan the area above, below, and ahead of the flight path for traffic

Slow Flight

Objective
To teach the student to recognize changes in aircraft flight characteristics and control effectiveness at minimum controllable airspeeds in various configurations

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL
- Set prop to approximately 2250 RPM and manifold pressure to 12" to slow the aircraft while maintaining altitude
- Set flaps based on configuration specified by instructor

Execution
- Adjust pitch and power to maintain minimum controllable airspeed (approximately 5 KIAS above stall horn) and altitude
- Trim aircraft as necessary
- While maintaining coordinated flight, practice climbs, turns and descents as specified by instructor

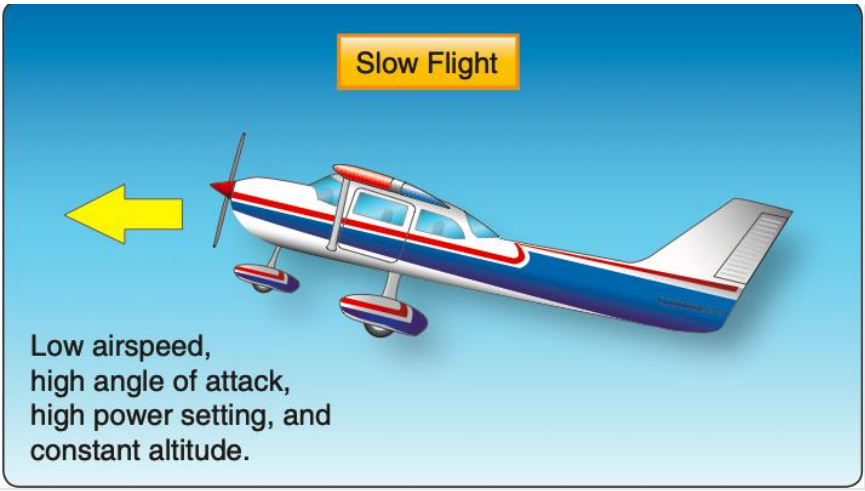
Recovery
- Apply full power
- Adjust pitch to maintain altitude
- Retract flaps to TO (if extended)
- Let aircraft stabilize, then,
- Retract flaps to 0º (if extended)
- As cruise airspeed is obtained, set cruise power
- Complete Cruise Checklist

Common Errors
- Excessive variations of altitude, heading and or bank
- Poor coordination of flight controls
- Entering a stalled condition
- Failure to maintain minimum controllable airspeed

Completion Standards
- **Private:**
  - Select an entry altitude that will allow the Task to be completed no lower than 1,500 feet AGL (ASEL, ASES) or 3,000 feet AGL (AMEL, AMES).

- Establish and maintain an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in a stall warning (e.g., airplane buffet, stall horn, etc.).
- Accomplish coordinated straight-and-level flight, turns, climbs, and descents with the airplane configured as specified by the evaluator without a stall warning (e.g., airplane buffet, stall horn, etc.).
- Maintain the specified altitude, ±100 feet; specified heading, ±10°; airspeed, +10/-0 knots; and specified angle of bank, ±10°.

- **Commercial:**
  - Maintain the specified altitude, ±50 feet; specified heading, ±10°; airspeed, +5/-0 knots; and specified angle of bank, ±5°.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 4-3 Slow flight—low airspeed, high angle of attack, high power, and constant altitude.

Power-On Stall

Objective
To teach the student to recognize the flight conditions that are conducive to a power on stall and how to apply the necessary corrective action for a prompt, positive and effective recovery with a minimum loss of altitude

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL
- Set prop to approximately 2250 RPM and MP to 18" to slow the aircraft while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
    -

Execution
- While maintaining altitude, slow aircraft to Vy
- Once Vy has been obtained, add full power(or manifold pressure of 22") and pitch up to obtain an attitude which will induce a power on stall (approx. 25°)
- Apply proper rudder correction to maintain coordination
- Continue to increase back pressure until either a full or imminent stall occurs (instructor specified)

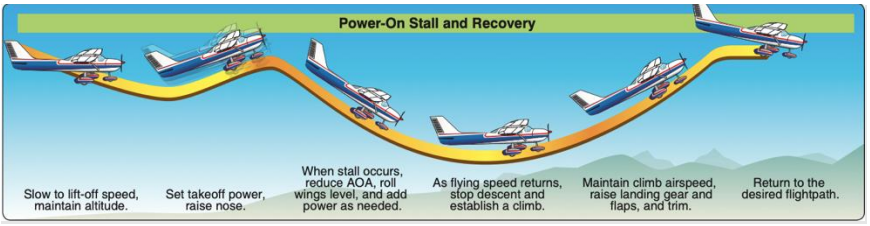
Recovery
- Immediately reduce the angle of attack by positively releasing back-elevator pressure
- Use rudder to prevent a spin and keep wings level
- Lower the nose to regain flying speed and maintain Vy, with a minimum loss of altitude
- Return aircraft to straight and level flight
- Complete Cruise Checklist

Common Errors
- Failure to maintain coordinated flight
- Delayed stall recovery
- Excessive altitude loss
- Improper pitch and bank control
- Inability to recognize an approaching stall condition through feel for the airplane

Completion Standards

- **Private:**
  - Select an entry altitude that will allow the Task to be completed no lower than 1,500 feet AGL (ASEL, ASES) or 3,000 feet AGL (AMEL, AMES).
  - Establish the takeoff, departure, or cruise configuration, as specified by the evaluator, and maintain coordinated flight throughout the maneuver.
  - Set power (as assigned by the evaluator) to no less than 65 percent power.
  - Transition smoothly from the takeoff or departure attitude to the pitch attitude that will induce a stall.
  - Maintain a specified heading ±10° if in straight flight; maintain a specified angle of bank not to exceed 20°, ±10° if in turning flight, while inducing the stall.
  - Acknowledge cues of the impending

  stall and then recover promptly after a full stall occurs.
  - Execute a stall recovery in accordance with procedures set forth in the POH/AFM.
  - Configure the airplane as recommended by the manufacturer and accelerate to VX or VY.
  - Return to the altitude, heading, and airspeed specified by the evaluator.
- **Commercial:** See Private Above
- **CFI:** See Private Above



FAA Airplane Flying Handbook Figure 4-8 Power on stall

Power-Off Stall

Objective
To teach the student to recognize the flight conditions that are conducive to a power off stall and how to apply the necessary corrective action for a prompt, positive and effective recovery with a minimum loss of altitude

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 2,500 ft AGL
- Set prop to approximately 2250 RPM and MP to 12" to slow the aircraft while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
- Incrementally lower flaps to full (or as specified by instructor)

Execution
- Maintain altitude until 65 KIAS
- Establish a stabilized descent at 65 KIAS
- Once descent is stabilized, reduce throttle to idle
- Slowly raise the aircraft's nose to an attitude that will induce either a full or imminent stall (instructor specified)

Recovery
- Immediately reduce the angle of attack by positively releasing back pressure
- Apply full power and initiate a climb
    - Retract flaps to T/O
- Verify and announce:
    - *"Positive rate"*
- Accelerate to Vx or Vy
    - Retract flaps to UP
- Return aircraft to straight and level flight
- Complete Cruise Checklist

Common Errors
- Failure to maintain coordinated flight
- Delayed stall recovery
- Excessive altitude loss
- Improper pitch and bank control
- Inability to recognize an approaching stall condition through feel for the airplane

Completion Standards

- **Private:**
  - Select an entry altitude that will allow the Task to be completed no lower than 1,500 feet AGL (ASEL, ASES) or 3,000 feet AGL (AMEL, AMES).
  - Configure the airplane in the approach or landing configuration, as specified by the evaluator, and maintain coordinated flight throughout the maneuver.
  - Establish a stabilized descent.
  - Transition smoothly from the approach or landing attitude to a pitch attitude that will induce a stall.
  - Maintain a specified heading ±10° if in straight flight; maintain a specified angle of bank not to exceed 20°, ±10° if in turning flight, while inducing the stall.
  - Acknowledge cues of the impending stall and then recover promptly after a full stall occurs.
  - Execute a stall recovery in accordance with procedures set forth in the POH/AFM.
  - Configure the airplane as recommended by the manufacturer and accelerate to VX or VY.
  - Return to the altitude, heading, and airspeed specified by the evaluator.
- **Commercial:**
  - Maintain a specified heading, ±10° if in straight flight; maintain a specified angle of bank not to exceed 20°, ±5°, if in turning flight, until an impending or full stall occurs, as specified by the evaluator.
- **CFI:** See Commercial Above

FAA Airplane Flying Handbook Figure 4-7 Power Off Stall

Secondary Stall (Demonstration Only)

Objective

To demonstrate to the student the negative effects of improper stall recovery procedures

Setup

- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 2,500 ft AGL
- Set prop to approximately 2250 RPM and MP to12" to slow the aircraft while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
- Set flaps as required (0 – Full)

Execution

- Maintain altitude until 65 KIAS
- Establish a hard deck 200 ft below your current altitude
- Maintain a stabilized approach at 65 KIAS for up to 150 ft
- At 50 ft above your established hard deck:
    - Reduce power to idle
    - Slowly raise the aircraft's nose to an attitude that will induce either a full or imminent stall (instructor specified)
- Recognize the indications of a full stall and initiate a recovery by decreasing the angle of attack and leveling the wings
- Prior to regaining flying speed, increase back-elevator pressure to induce a secondary stall

Recovery

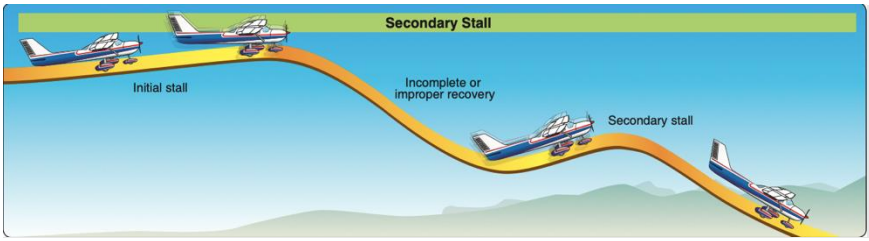
- Immediately reduce the angle of attack by positively releasing back pressure
- Apply full power and initiate a climb
    - Retract flaps to T/O (if extended)
- Verify and announce:
    - *"Positive rate"*
- Accelerate to Vx or Vy
    - Retract flaps to UP (if extended)
- Return aircraft to straight and level flight
- Complete Cruise Checklist

Common Errors

- Failure to set up the aircraft recovery
- Failure to recognize and recover from a secondary fall
- Failure to provide adequate instruction concerning the "what," "why" and "how" of a secondary stall

Completion Standards

- **CFI:**
  - Demonstrates and simultaneously explains secondary stalls, in selected landing gear and flap configurations, from an instructional standpoint.
  - Analyzes and corrects simulated common errors related to secondary stalls in selected configurations



FAA Airplane Flying Handbook Figure 4-9 Secondary Stall

Accelerated Stall (Demonstration Only)

Objective
To teach the student the factors of an accelerated stall and to demonstrate that a stall is a function of angle of attack rather than airspeed

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 3,000 ft AGL
- Set prop to approximately 2250 RPM and 12" of MP to slow the aircraft to 80 KIAS while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)

Execution
- Roll aircraft into at a 45º bank (do not exceed 50º)
- Firmly increase back elevator pressure until an imminent or full stall occurs

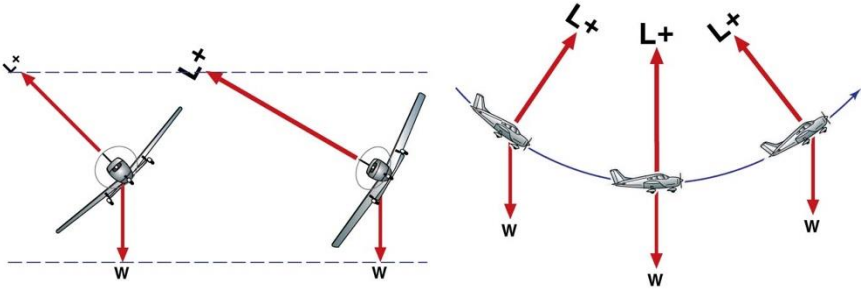
Recovery
- Immediately reduce the angle of attack by positively reducing back-elevator pressure
- Use coordinated ailerons and rudder to return to a wings level attitude
- Apply full power
- Pitch to an attitude necessary to regain flying speed and maintain Vy, with a minimum loss of altitude
- Return aircraft to straight and level flight
- Complete Cruise Checklist

Common Errors
- Failure to decrease airspeed below maneuvering speed
- Bringing aircraft to a full stall
- Improper coordination during the maneuver and recovery
- Excessive loss of altitude

Completion Standards
- **Commercial:**
    - Select an entry altitude that will allow the Task to be completed no lower than 3,000 feet AGL.
    - Establish the configuration as specified by the evaluator.

- Set power appropriate for the configuration, such that the airspeed does not exceed the maneuvering speed (VA) or any other applicable POH/AFM limitation.
- Establish and maintain a coordinated turn in a 45° bank, increasing elevator back pressure smoothly and firmly until an impending stall is reached.
- Acknowledge the cue(s) and recover promptly at the first indication of an impending stall (e.g., aircraft buffet, stall horn, etc.).
- Execute a stall recovery in accordance with procedures set forth in the POH/AFM.
- Configure the airplane as recommended by the manufacturer and accelerate to VX or VY.
- Return to the altitude, heading, and airspeed specified by the evaluator.

- **CFI:** See Commercial Above



ASA Flight School Figure 24-1 Increased Wing Loading Causes Increased Stalling Speed

Cross Controlled Stall (Demonstration Only)

Objective
To demonstrate to the student the effect of improper control technique and to emphasize the importance of using coordinated control pressures when making turns

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 3,000 ft AGL
- Set prop to approximately 2250 RPM and 12" of manifold pressure to slow the aircraft while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)

Execution
- Pitch and trim the aircraft for Vg – DO NOT EXTEND THE FLAPS
- Roll into a medium banked turn (approximately 30°) to simulate a base to final leg in the traffic pattern
- Reduce power to idle
- During the turn, excessive rudder pressure should be applied in the direction of the turn, but bank should be held constant by applying opposite aileron pressure
- Increase back-elevator pressure as needed to keep the nose from lowering
- Slowly increase all of these control pressures until the aircraft approaches an imminent or full stall

Recovery
- Immediately reduce the angle of attack by positively reducing back pressure
- Use coordinated ailerons and rudder to return to a wings level attitude
- Apply full power
- Pitch to an attitude necessary to regain flying speed and maintain Vy with minimum loss of altitude
- Return aircraft to straight and level flight
- Complete Cruise Checklist

Common Errors
- Failure to configure the aircraft correctly
- Failure to establish a cross-controlled turn which will adequately demonstrate the hazards of a cross-controlled stall

- Improper recovery techniques

Completion Standards

- **CFI:**
  - Demonstrates and simultaneously explains a cross-controlled stall, with the landing gear extended, from an instructional standpoint.
  - Analyzes and corrects simulated common errors related to a cross-controlled stall with the landing gear extended.

Elevator Trim Stall (Demonstration Only)

Objective
To teach the student to recognize the importance of making smooth power applications, overcoming strong trim forces and maintaining positive control of the airplane to hold safe flight attitudes while using proper and timely trim techniques

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 3,000 ft AGL
- Set prop to approximately 2250 RPM and 12" of MP to slow the aircraft while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
- Set full flaps

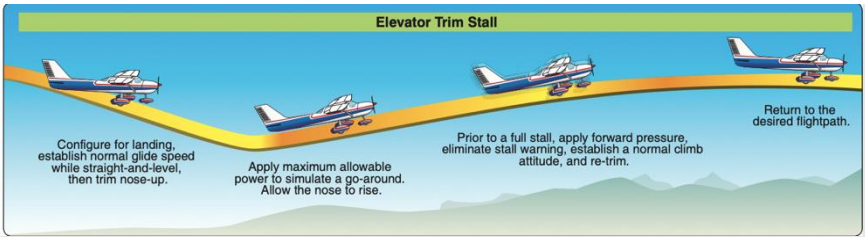
Execution
- Maintain altitude to 65 KIAS
- Establish a hard deck 200 ft below your current altitude
- Trim to maintain a stabilized approach at 65 KIAS for up to 150 ft
- At 50 ft above your established hard deck:
    - Add full power
    - Allow the nose to pitch to an attitude that will induce an imminent stall

Recovery
- Immediately reduce the angle of attack by releasing back pressure
- Retrim the aircraft to climb at Vx or Vy
    - Retract flaps to T/O
- Confirm and announce:
    - *"Positive rate"*
- Retract flaps to UP
- Return aircraft to straight and level flight
- Complete Cruise Checklist

Common Errors
- Failure to maintain coordinated flight
- Delayed stall recovery
- Excessive back-elevator pressure resulting in an exaggerated nose-up attitude during entry
- Inability to recognize an approaching stall condition through feel for the airplane

Completion Standards

- **CFI:**
  - Demonstrates and simultaneously explains elevator trim stalls, in selected landing gear and flap configurations, from an instructional standpoint.
  - Analyzes and corrects simulated common errors related to elevator trim stalls in selected configurations.



FAA Airplane Flying Handbook Figure 4-10 Elevator Trim Stall

Recovery From Unusual Flight Attitudes

Objective
To teach the student to recognize and promptly recover from both nose high and nose low unusual attitudes

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 3,000 ft AGL
- Complete pre-maneuver flow
    - G – Gas (fullest tank selected)
- Positive exchange of controls to instructor
- Students closes their eyes and puts their chin on their chest
- Instructor positions the aircraft in either a nose high or nose low attitude

Execution

Nose High
- Recognition:
    - Airspeed – decreasing
    - Turn coordinator – direction of turn
- Recovery:
    - Elevator forward to reduce angle of attack
    - Apply full throttle
    - Level the wings using coordinated aileron and rudder
    - Cross-check instruments

Nose Low
- Recognition:
    - Airspeed – increasing
    - Turn coordinator – direction of turn
- Recovery:
    - Reduce manifold pressure to 12”-14” MP prop 2250 RPM
    - Level the wings using coordinated aileron and rudder
    - Raise the nose to level flight attitude by applying smooth back pressure
    - Cross-check instruments

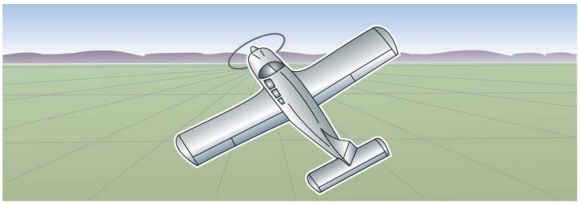
Recovery
- Return to coordinated straight and level flight
- Complete Cruise Checklist

Common Errors

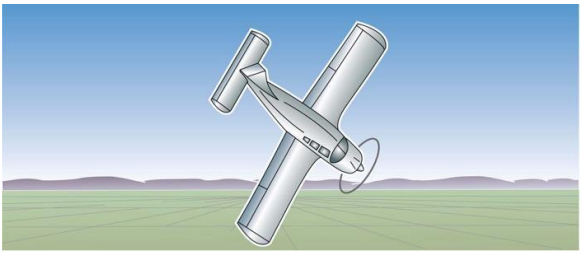
- Failure to recognize the unusual attitude
- Attempting to recover solely by feel instead of instrument interpolation and visual references
- Failure to follow the correct sequences during the recovery
- Failure to cross-check the instruments

Completion Standards

- **Private:**
  - Recognize unusual flight attitudes; perform the correct, coordinated, and smooth flight control application to resolve unusual pitch and bank attitudes while staying within the airplane's limitations and flight parameters.
- **Instrument:**
  - Use proper instrument cross-check and interpretation to identify an unusual attitude (including both nose-high and nose-low), and apply the appropriate pitch, bank, and power corrections, in the correct sequence, to return to a stabilized level flight attitude.
- **CFI:**
  - Demonstrates and simultaneously explains recovery from a nose-high and a nose-low unusual flight attitude from an instructional standpoint.
  - Analyzes and corrects simulated common errors related to recovery from unusual flight attitudes.



ASA Flight School Figure 43-1 Nose High Unusual Attitude



ASA Flight School Figure 43-2 Nose Low Unusual Attitude

Rectangular Course

Objective
To teach the student to maneuver the aircraft over a predetermined ground path while dividing attention inside and outside the cockpit

Setup
- Confirm clearing turns have been completed
- Select appropriate altitude for the maneuver (600–1,000 ft AGL)
- Determine wind direction
- Set power to obtain maneuvering speed (about 90 KIAS), approximately prop to 2250 RPM and 22" manifold pressure, while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
    - P- Pump ON
- Select reference point that is near an area where an emergency landing can be made

Execution
- Enter at a 45º angle to the downwind leg
- Establish a crab angle to maintain a uniform distance from the area boundaries (approximately ½ mile)
- During the "base" leg:
    - The nose of the aircraft should be positioned towards the reference
- During the "crosswind" leg:
    - The nose of the aircraft should be positioned away from the reference
- Vary bank angle to maintain a constant radius during turns

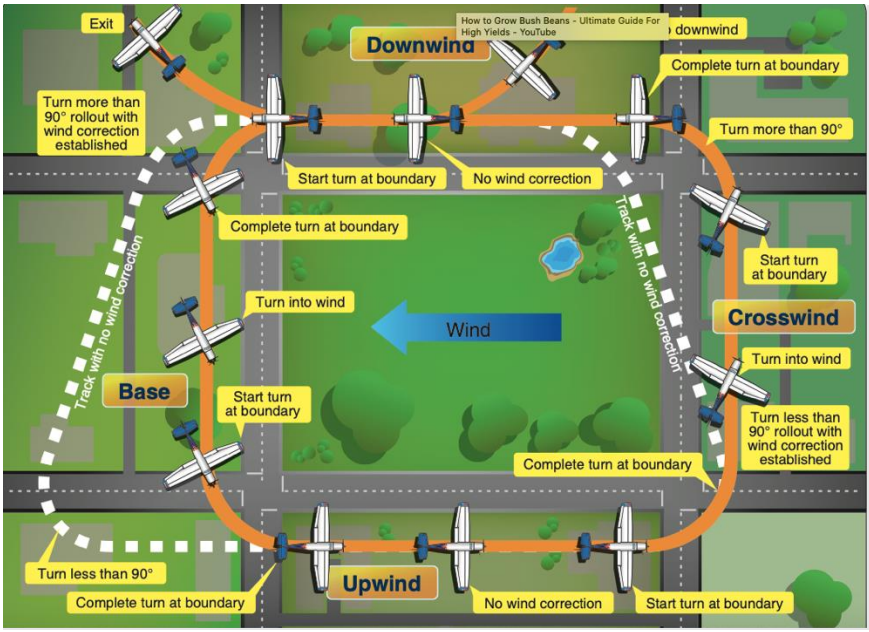
Recovery
- Depart the maneuver on the downwind leg
- Complete Cruise Checklist

Common Errors
- Poor division of attention
- Use of uncoordinated flight controls
- Failure to maintain proper correction for wind drift
- Failure to maintain altitude and airspeed

Completion Standards
- **Private:**

- Rectangular course: enter a left or right pattern, 600 to 1,000 feet above ground level (AGL) at an appropriate distance from the selected reference area, 45° to the downwind leg
- Apply adequate wind-drift correction during straight and turning flight to maintain a constant ground track around a rectangular reference area, or to maintain a constant radius turn on each side of a selected reference line or point.
- Divide attention between airplane control, traffic avoidance and the ground track while maintaining coordinated flight.
- Maintain altitude ±100 feet; maintain airspeed ±10 knots.

- **CFI:** See Private Above



FAA Airplane Flying Handbook Figure 6-4 Rectangular Course

S-Turns

Objective
To teach the student to maneuver the aircraft over a predetermined ground path, while dividing attention inside and outside the airplane

Setup
- Confirm clearing turns have been completed
- Select appropriate altitude for the maneuver (600 – 1,000 ft AGL) ideally 800 ft AGL.
- Determine wind direction
- Set power to obtain maneuvering speed, (about 90 KIAS) approximately prop to 2250 RPM and manifold pressure to 22", while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
- Select a reference line (road, shoreline, utility lines, etc.) that is perpendicular to the wind and near an area where an emergency landing can be made

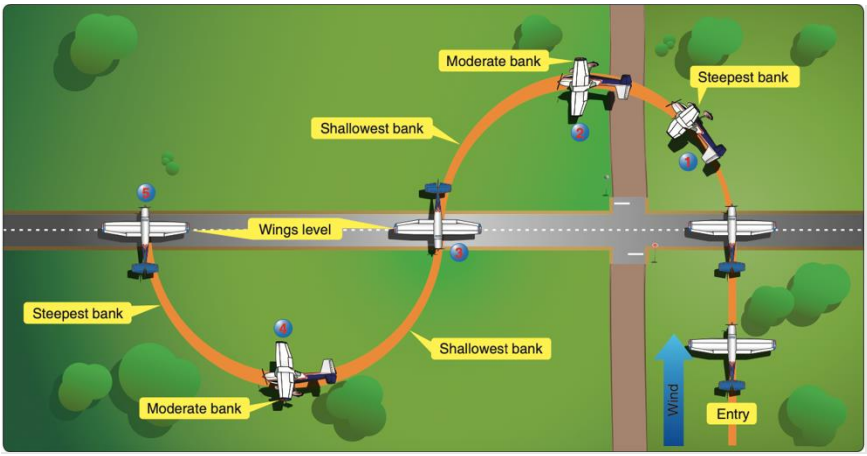
Execution
- Enter maneuver on downwind, perpendicular to the reference line
- Cross the reference line wings level and begin 180º turn to the left, back towards the line, depending on wind velocity this turn may require steep bank initially
- Adjust bank angle to maintain a constant radius
- Plan to rollout wings level just as the aircraft crosses the reference line in the opposite direction
- Begin the next 180º turn in the opposite direction, depending on wind velocity this turn may require very shallow bank initially
- Adjust bank angle to maintain a constant radius
- Continue turns as assigned

Recovery
- Depart maneuver on entry heading
- Complete Cruise Checklist

Common Errors
- Poor division of attention
- Use of uncoordinated flight controls
- Failure to maintain proper correction for wind drift
- Failure to maintain altitude and airspeed

Completion Standards

- **Private:**
  - S-turns: enter perpendicular to the selected reference line, 600 to 1,000 feet AGL at an appropriate distance from the selected reference area
  - Apply adequate wind-drift correction during straight and turning flight to maintain a constant ground track around a rectangular reference area, or to maintain a constant radius turn on each side of a selected reference line or point.
  - If performing S-Turns, reverse the turn directly over the selected reference line; if performing turns around a point, complete turns in either direction, as specified by the evaluator.
  - Divide attention between airplane control, traffic avoidance and the ground track while maintaining coordinated flight.
  - Maintain altitude ±100 feet; maintain airspeed ±10 knots.
- **CFI:** See Private Above



FAA Airplane Flying Handbook Figure 6-6 S-turns

Turns Around a Point

Objective
To teach the student to maneuver the aircraft over a predetermined ground path while dividing attention inside and outside the cockpit

Setup
- Confirm clearing turns have been completed
- Select appropriate altitude for the maneuver (600 – 1,000 ft AGL) ideally 800 ft AGL
- Determine wind direction
- Set power to obtain maneuvering speed (about 90 KIAS), approximately prop to 2250 RPM and 22" manifold pressure, while maintaining altitude
- Complete pre-maneuver flow
    - G – Gas (fullest tank selected)
- Select a reference point that is near an area where an emergency landing can be made

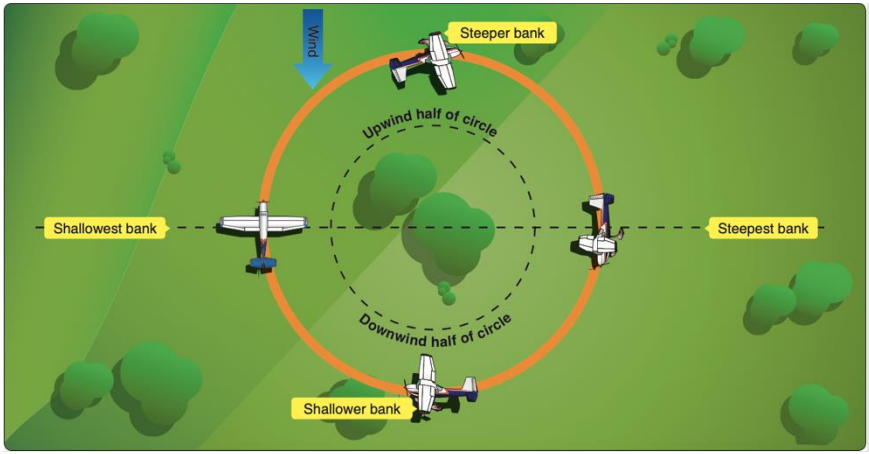
Execution
- Enter maneuver on downwind approximately ¼ - ½ mile from the reference point (just off the wingtip)
- Apply adequate wind drift correction by varying bank to track a constant radius turn around the selected reference point
- Steepest bank angle cannot exceed 55º

Recovery
- Depart maneuver on assigned heading
- Complete Cruise Checklist

Common Errors
- Poor division of attention
- Use of uncoordinated flight controls
- Failure to maintain proper correction for wind drift
- Failure to maintain altitude and airspeed

Completion Standards
- **Private:**
    - Turns around a point: enter at an appropriate distance from the reference point, 600 to 1,000 feet AGL at an appropriate distance from the selected reference area
    - Apply adequate wind-drift correction during straight and turning flight to maintain a constant ground track around a rectangular reference area, or to maintain a constant

radius turn on each side of a selected reference line or point.
    - Divide attention between airplane control, traffic avoidance and the ground track while maintaining coordinated flight.
    - Maintain altitude ±100 feet; maintain airspeed ±10 knots.
- **CFI:** See Private Above



FAA Airplane Flying Handbook Figure 6-5 Turns around a point

Steep Turns

Objective
To develop the student's smoothness, coordination, orientation, division of attention and control techniques, while executing high performance maneuvers

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL
- Set power to obtain maneuvering speed, (about 90 KIAS) approximately 22" MP and 2250 RPM, while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)

Execution
- Note an external reference point off the nose and take note of the entry heading
- Roll into left or right turn, as specified by instructor
- Passing through 30º of bank:
    - Add power as needed to maintain altitude and maneuvering speed (approx. 2" MP)
    - Increase back-pressure
- Upon reaching appropriate bank angle (45º private, 50º commercial):
    - Maintain level flight by referencing the nose of the aircraft to the horizon
    - Trim the aircraft as necessary during the turn to relieve back pressure
- Lead roll-out by ½ your bank angle
    - Private: about 20º
    - Commercial: about 25º
- Upon rolling out:
    - Reduce power back to original setting (approx. 22" MP)
    - Release back pressure and retrim aircraft
    - Return to level flight at maneuvering speed on original heading
- For Commercial Students: after completion of first turn immediately start a steep turn in the opposite direction, repeating the above steps

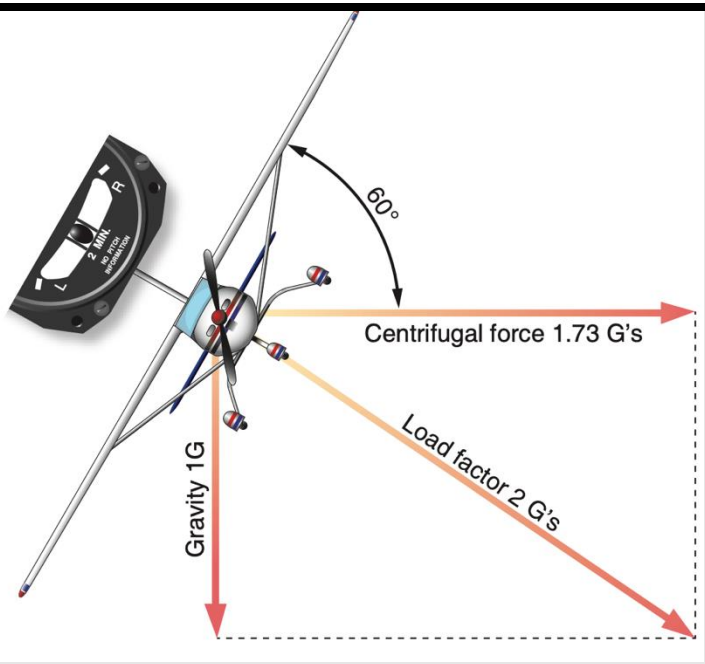
Recovery
- Complete Cruise Checklist

Common Errors

- Failure to use correct pitch, bank and power settings during entry and rollout
- Failure to release back-pressure, or trim, and remove power during rollout, resulting in a gain of altitude
- Improper bank angle
- Improper use of power during the maneuver
- Improper coordination of the flight controls, resulting in a skid or slip
- Failure to choose and reference outside visual cues during the maneuver
- Failure to lead rollout by at least ½ your bank angle

Completion Standards

- **Private:**
  - Establish the manufacturer's recommended airspeed; or if one is not available, an airspeed not to exceed VA.
  - Roll into a coordinated 360° steep turn with approximately a 45° bank.
  - Perform the Task in the opposite direction, as specified by evaluator.
  - Maintain the entry altitude ±100 feet, airspeed ±10 knots, bank ±5°, and roll out on the entry heading ±10°.
- **Commercial:**
  - Roll into a coordinated 360° steep turn with approximately a 50° bank.
  - Maintain the entry altitude ±100 feet, airspeed ±10 knots, bank ±5°, and roll out on the entry heading ±10°.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 4-1 Coordinated Flight in a Turn

Chandelle (Commercial)

Objective
To develop the pilot's coordination, orientation, planning, and feel for maximum performance flight and to develop positive control techniques at varying airspeeds and attitudes

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL
- Set power to obtain maneuvering speed, (about 90 KIAS) approximately 22" MP 2250 RPM, while maintaining altitude
- Complete pre-maneuver flow
    - G – Gas (fullest tank selected)
- Pick a 90º reference point off the wingtip

Execution
- Roll into a 30º bank
- Apply full throttle, prop stays at 2250
- Smoothly and slowly increase back pressure to achieve a maximum pitch up attitude by the 90º reference point (approximately 15-20° nose up)
- When the nose is pointed at the reference point, slowly start to roll the bank out at a constant rate while maintaining constant maximum pitch attitude
- Smoothly roll wings level at the 180º point
- Note pitch attitude and airspeed (minimum controllable airspeed) and maintain this airspeed momentarily while avoiding a stall

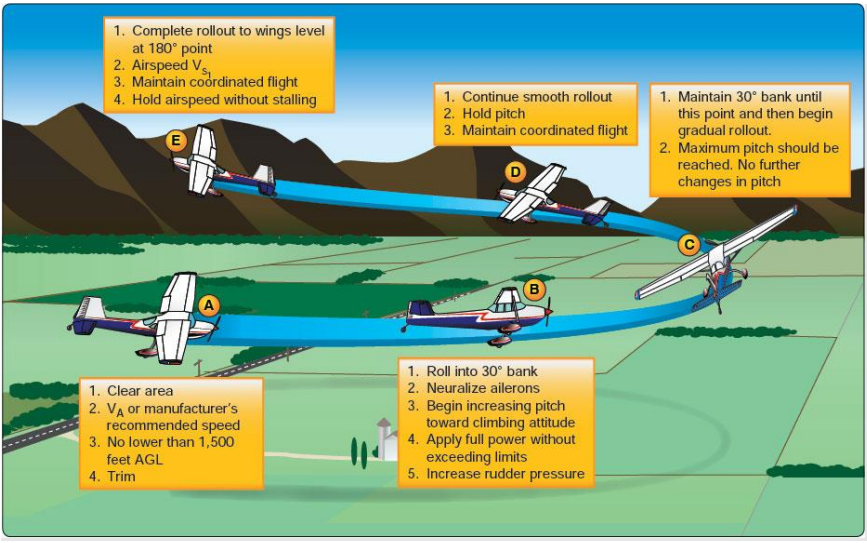
Recovery
- Maintain altitude and heading as airspeed increases to cruise airspeed
- Complete Cruise Checklist

Common Errors
- Failure to establish proper pitch, bank, or power coordination during entry or rollout
- Uncoordinated use of flight controls
- Improper timing for changes in pitch and bank
- Allowing the aircraft to stall during the maneuver

Completion Standards
- **Commercial:**

- Select an altitude that will allow the maneuver to be performed no lower than 1,500 feet above ground level (AGL).
- Establish the appropriate entry configuration, power, and airspeed.
- Establish the angle of bank at approximately 30°.
- Simultaneously apply power and pitch to maintain a smooth, coordinated climbing turn, in either direction, to the 90° point, with a constant bank and continuously decreasing airspeed.
- Begin a coordinated constant rate rollout from the 90° point to the 180° point maintaining power and a constant pitch attitude.
- Complete rollout at the 180° point, ±10° just above a stall airspeed, and maintaining that airspeed momentarily avoiding a stall.
- Resume a straight-and-level flight with minimum loss of altitude.

- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 10-3 Chandelle

Lazy Eight (Commercial)

Objective
To develop the pilot's feel for varying control forces and the ability to plan and remain oriented, while maneuvering the airplane with positive, accurate control

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL
- Set power to obtain maneuvering speed, (about 90 KIAS) approximately 22" MP 2250 RPM, while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
    - P- Pump ON
- Pick 45, 90 and 135º reference points in the direction the maneuver is being performed

Execution
- Gradually increase bank and pitch to achieve approximately 15º of bank and maximum pitch up at the 45º reference point
- While passing the 45º point, gradually increase bank, and decrease pitch to achieve approximately 30º of bank and nose level at the 90º reference point, this will be the point with the slowest airspeed
- Gradually decrease bank and continue decreasing pitch to achieve approximately 15º of bank and maximum pitch down at the 135º reference point
- While passing the 135º point, continue decreasing bank and gradually begin to pitch up to achieve level flight at the 180º reference point
- Repeat maneuver in the opposite direction

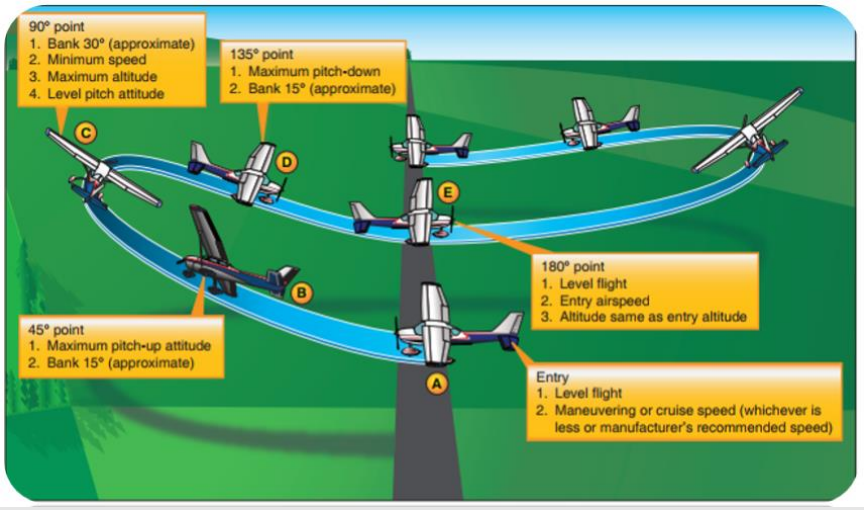
Recovery
- Complete Cruise Checklist

Common Errors
- Failure to establish proper pitch, bank, or power coordination during entry or rollout
- Uncoordinated use of flight controls
- Improper timing for changes in pitch and bank
- Poor selection of reference points

- Failure to achieve the proper attitude in relation to each reference point

Completion Standards

- **Commercial:**
  - Select an altitude that will allow the maneuver to be performed no lower than 1,500 feet above ground level (AGL).
  - Establish the recommended entry configuration, power, and airspeed.
  - Maintain coordinated flight throughout the maneuver.
  - Complete the maneuver in accordance with the following:
    - a. Approximately 30° bank at the steepest point
    - b. Constant change of pitch and roll rate and airspeed
    - c. Altitude at 180° point, ±100 feet from entry altitude
    - d. Airspeed at the 180° point, ±10 knots from entry airspeed
    - e. Heading at the 180° point, ±10°
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 10-4 Lazy Eight

Steep Spiral (Commercial)

Objective
To improve pilot techniques for power off turns, wind drift control, planning, orientation, and division of attention

Setup
- Confirm clearing turns have been completed
- Select and entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL (recommended starting altitude of at least 5,000 ft AGL to successfully complete 3 turns)
- Determine wind direction
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
- Select a suitable ground reference point
- Position aircraft on downwind with reference point ahead in view of pilot's side of aircraft

Execution
- Approximately 10 seconds prior to reaching the point, reduce power to idle and establish Vg
- The point should pass directly under the pilot side main tire
    - Once this occurs, roll into a bank to the left and begin the descending turn
- Apply wind drift correction to track a constant radius around selected reference point with bank not exceeding 60º at the steepest point
- Clear engine after each 360º of turn by adding and then reducing power back to idle

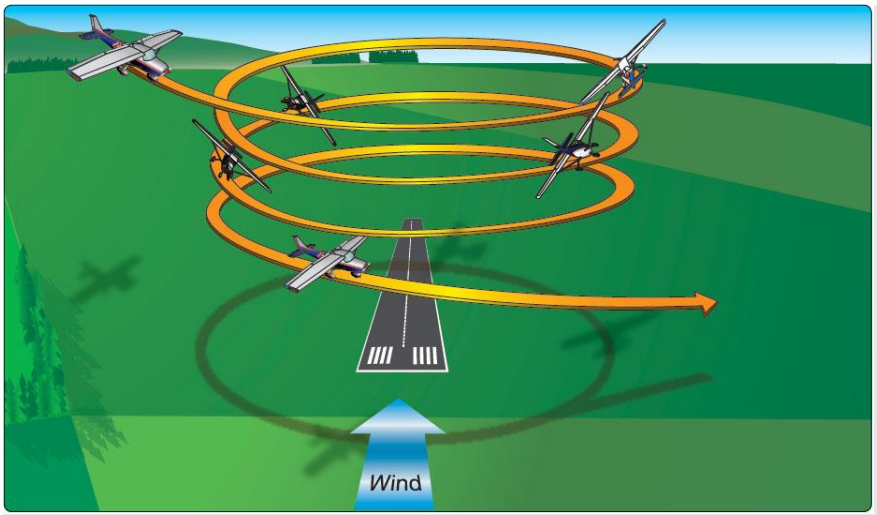
Recovery
- After completion of three 360º turns, rollout on entry or specified heading
- Complete Cruise Checklist

Common Errors
- Poor selection of reference point
- Failure to maintain constant radius around selected reference point
- Failure to maintain proper airspeed
- Poor division of attention between aircraft control and ground track
- Failure to properly clear the engine and manage power changes

- Failure to complete 3 turns before reaching 1500ft AGL

Completion Standards

- **Commercial:**
  - Select an altitude sufficient to continue through a series of at least three 360° turns.
  - Establish and maintain a steep spiral, not to exceed 60° angle of bank, to maintain a constant radius about a suitable ground reference point.
  - Apply wind-drift correction to track a constant radius circle around selected reference point with bank not to exceed 60° at steepest point in turn.
  - Divide attention between airplane control, traffic avoidance, and the ground track, while maintaining coordinated flight.
  - Maintain the specified airspeed, ±10 knots and roll out toward an object or specified heading, ±10°, and complete the maneuver no lower than 1,500' AGL.
- **CFI:** See Commercial Above



FAA Airplane Flying Handbook Figure 10-2 Steep Spiral

Eights-On-Pylons (Commercial)

Objective
To teach the student to maneuver the airplane in a way which will keep a desired point directly off the end of the wingtip while dividing attention inside and outside the cockpit

Setup
- Confirm clearing turns have been completed
- Determine wind direction
    - Set power to obtain maneuvering speed, (about 90 KIAS) approximately 22" MP 2250 RPM, while maintaining altitude
- Select appropriate altitude for the maneuver
    - Pivotal altitude may be approximated by squaring groundspeed, then dividing by 11.3
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
    - P- Pump ON
- Select two reference points that lie along a line perpendicular to the wind, where an emergency landing can be made

Execution
- Enter on a 45º angle to the downwind halfway between both points
- When abeam first pylon, lower the appropriate wing to place pilot's line of sight reference on the pylon
- Maintain reference line on pylon
    - Groundspeed decreasing (pylon forward) – decrease pivotal altitude (pitch down)
    - Groundspeed increasing (pylon aft) – increase pivotal altitude (pitch up)
- Maintain coordinated flight: DO NOT use rudder to "hold" pylon
- After completing turn around first pylon, depart on a 45º angle towards second pylon and allow 3 to 5 seconds of straight and level flight
- When abeam second pylon, repeat maneuver in opposite direction

Recovery
- When maneuver is completed, depart on entry heading
- Complete Cruise Checklist

Common Errors

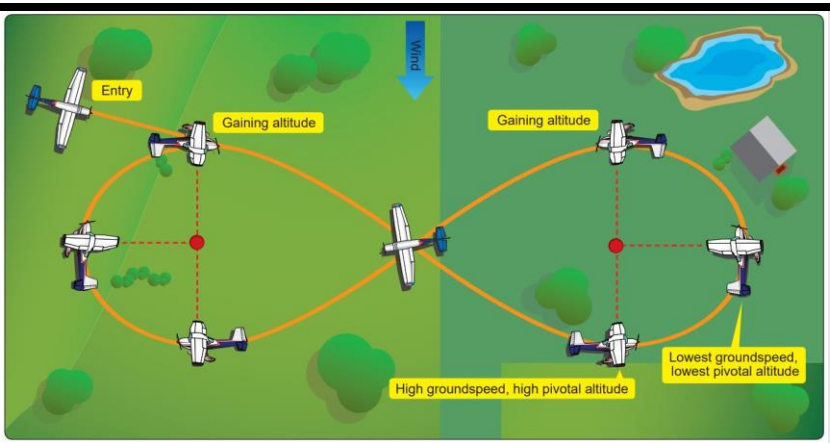
- Poor selection of pylons and pivotal altitude
- Poor division of attention
- Use of uncoordinated flight to maintain reference points
- Failure to apply necessary corrections so that the line-of-sight reference line remains on the pylon

Completion Standards

- **Commercial:**
  - Determine the approximate pivotal altitude.
  - Select suitable pylons that will permit straight-and-level flight between the pylons.
  - Enter the maneuver in the correct direction and position using an appropriate altitude and airspeed.
  - Establish the correct bank angle for the conditions, not to exceed 40°.
  - Apply smooth and continuous corrections so that the line-of-sight reference line remains on the pylon.
  - Divide attention between accurate, coordinated airplane control and outside visual references.
  - Maintain pylon position using appropriate pivotal altitude, avoiding slips and skids.
- **CFI:** See Commercial Above

Figure 6-11. *Line of sight.*

FAA Airplane Flying Handbook Figure 7-11 Line of Sight



FAA Airplane Flying Handbook Figure 7-10 Eights on Pylons

Emergencies

Aborted Take-off Prior to Lift-off

Objective
To develop the student's ability to recognize an emergency during the take-off role and take the necessary actions to prevent a hazard from occurring

Setup
- Ensure there is sufficient runway to accomplish the maneuver
- If maneuver is to be completed at a towered airport, request with tower
- If at a non-towered airport, alert local traffic
- Determine point at which the abort will occur, providing enough runway to come to a complete stop without excessive braking
- Align aircraft on runway centerline

Execution
- Smoothly apply full throttle
- Allow aircraft to accelerate to 5-10 knots slower than flying speed
- Instructor announce "abort take-off"
- Rapidly reduce power to idle
- Apply sufficient braking to prevent overrun
- Apply sufficient back pressure on yoke, to reduce pressure on nose gear

Recovery
- Bring aircraft to a full stop
- Exit runway as directed by ATC

Common Errors
- Failure to recognize the need to abort the take-off
- Failure to reduce power rapidly enough to prevent risk of overrun
- Failure to maintain aircraft control after abort decision has been made

Aborted Take-off After Lift-off (DUAL ONLY)

Objective
To develop the student's ability to recognize an emergency after lift-off and take the necessary actions to prevent a hazard from occurring

Setup
- Ensure there is sufficient runway to accomplish the maneuver
- If maneuver is to be completed at a towered airport, request with tower (NOT RECCOMENDED)
- If at a non-towered airport, alert local traffic
- Align aircraft on runway centerline

Execution
- Smoothly apply full throttle
- Rotate at 55 KIAS
- Establish Vy climb pitch
- At 200 feet AGL rapidly reduce power to idle
- Instructor announce "abort climb out"
- Reduce pitch attitude rapidly to maintain best glide and land back on the departure runway

Recovery
- Bring aircraft to a full stop
- Exit runway as directed by ATC

Common Errors
- Failure to recognize the need to abort the climb out
- Failure to reduce pitch attitude rapidly enough to maintain best glide
- Failure to maintain aircraft control after abort decision has been made

Emergency Descent

Objective
To develop the student's ability to descend the airplane as rapidly as possible, within the structural limitations of the airplane

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL
- Set power to obtain maneuvering speed, (about 90 KIAS) approximately 22" MP and 2250 RPM, while maintaining altitude
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
    - P- Pump ON
- Brief passengers and altitudes

Execution
- Smoothly bring throttle to idle
- Roll into a 30-45° bank
- Lower pitch to maintain 5 KIAS lower than Vno (105 KIAS)
- Complete circling maneuver

Note: Maneuver can also be completed by verifying airspeed below Vfe and set flaps to FULL. Lower pitch to maintain 5 KIAS below Vfe with full flaps (96 KIAS). However, it depends on the situation, if the aircraft is on fire, no attention needs to be given to over speeding the flaps

Recovery
- Plan to level off at assigned altitude
- Smoothly advance power to cruise
- Complete Cruise Checkout

Common Errors
- Failure to adequately clear area below descent path
- Failure to maintain proper airspeed
- Failure to level off at assigned altitude

Completion Standards
- **Commercial:**
    - Establish and maintain the appropriate airspeed and configuration appropriate to the scenario specified by the

evaluator and as covered in POH/AFM for the emergency descent.
    - Maintain orientation, divide attention appropriately, and plan and execute a smooth recovery.
    - Use bank angle between 30° and 45° to maintain positive load factors during the descent.
    - Maintain appropriate airspeed, +0/-10 knots, and level off at specified altitude, ±100 feet.
    - Complete the appropriate checklist.
- **CFI:** See Commercial Above

Emergency Approach and Landing (Simulated) (DUAL ONLY)

Objective

To develop the skills and risk management associated with a power failure at altitude and associated emergency approach and landing procedures

Setup

- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,000 ft AGL if simulating an off-airport landing or a successful approach to landing at an open public use airport
- Complete pre-maneuver flow
    - G– Gas (fullest tank selected)
- Brief recovery altitude

Execution

- Smoothly reduce power to simulate partial or full power loss and declare a simulated loss of engine power has occurred
- Establish V_g
- Select suitable landing site and a heading direct to the field to either spiral down overhead or enter a pattern to land depending on altitude remaining
- Confirm all actions complete with Engine Failure Checklist
- Simulate communicating with ATC (if appropriate)
- Simulate entering 7700 Transponder Code
- Simulate engine restart
- Complete No Restart – Forced Landing Checklist
- Continue to maneuver to setup for landing at selected landing site
- When landing is assured, configure airplane as necessary to complete a safe landing either simulated 1,000 ft AGL or full landing to an open public use airport

Recovery

- Plan to either go around at specified altitude or attempt a successful landing at the selected airport
- Go around as necessary
    - Smoothly add full power, select carb heat cold (as installed)
        - Retract flaps to T/O

- Level the wings and transition to a climb pitch attitude of approximately 7º
- Climb at Vx
- Verify and announce:
  - *"Positive rate"*
- Accelerate to Vy
  - Retract flaps to UP
- At or above 1,000 ft AGL complete the Climb Checklist

Common Errors

- Improper airspeed control
- Selecting an inadequate landing site
- Failure to consider altitude, wind, terrain, obstructions, gliding distance, and available landing distance
- Failure to plan and follow a flightpath to the selected landing area
- Improper airplane configuration
- Distractions, loss of situational awareness, or improper task management

Completion Standards

- **Private:**
  - Establish and maintain the recommended best glide airspeed, ±10 knots
  - Configure the airplane in accordance with the POH/AFM and existing conditions
  - Select a suitable landing area considering altitude, wind, terrain, obstructions, and available glide distance
  - Plan and follow a flightpath to the selected landing area considering altitude, wind, terrain, and obstructions
  - Prepare for landing as specified by the evaluator
  - Complete the appropriate checklist
- **Commercial:** See Private Above

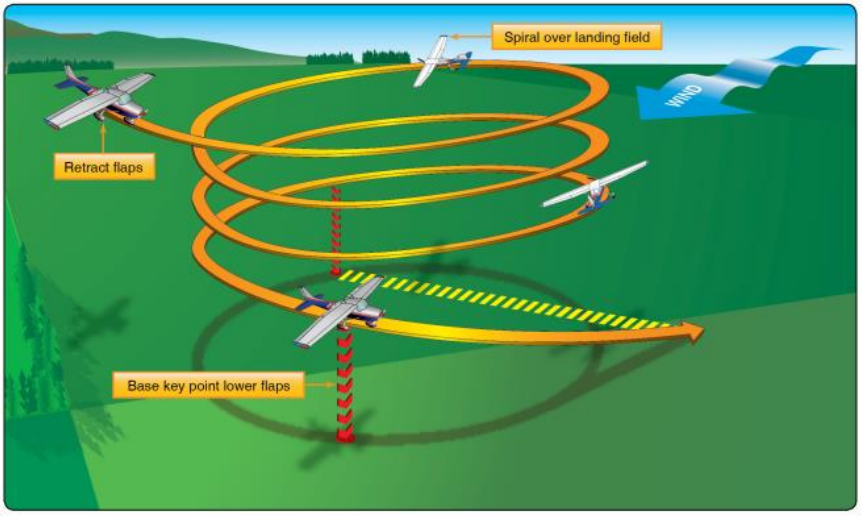


Figure 9-28. *Remain over intended landing area.*

FAA Airplane Flying Handbook Figure 9-28 Remain over intended landing area

Diversion

Objective
To develop the skills necessary for plotting a new course and determining a new ETA while enroute

Execution

NOTE: When diverting to a nearby airport (25 miles or less) and fuel is not critical, students will be expected to make estimates within a reasonable degree of accuracy rather than actual computations

- Determine present position and location of new destination
- Turn to an estimated heading that will avoid any restricted airspace, obstructions, or adverse weather
- Note starting position and time
- Select some prominent landmarks to aid in flying the new course
- Determine distance and magnetic heading
- Compute compass heading, ETA and fuel required
- Amend flight plan with Flight Service Station (FSS)
- Notify ATC if required

Common Errors

- Improper division of attention
- Failure to complete diversion procedures in a timely manner
- Inaccurate calculations for heading, ETA and fuel required
- Failure to maintain proper altitude and heading

Completion Standards

- **Private:**
  - Select a suitable destination and route for diversion.
  - Make a reasonable estimate of heading, groundspeed, arrival time, and fuel consumption to the diversion airport.
  - Maintain the appropriate altitude ±200 feet and heading ±15°.
  - Update/interpret weather in flight.
  - Utilize flight deck displays of digital weather and aeronautical information, as applicable.
- **Commercial:**
  - Maintain the appropriate altitude ±100 feet and heading ±10°.

Lost Procedures

Objective
To develop the student's proficiency in determining aircraft position and the corrections needed to reestablish the aircraft on its proper course
Execution

- Use topographical features and/or navaids to determine position
    - Topographical features:
        - Reset heading indicator
        - Turn sectional chart to match your heading
        - Look outside to find prominent landmarks
        - Match landmarks to chart
    - Navaids:
        - Reset heading indicator
        - Use GPS to reference nearest airport or navaid
        - Tune and identify available stations
            - VOR: Center CDI with FROM indication

          (Two stations or VOR/DME are required to determine approximate position)
- If location is determined, return to original course
- If still unable to locate position, complete the 5 C's:
    1. Confess – Admit to yourself that you are lost
    2. Climb – Climb to avoid obstructions, clouds and to achieve better visibility and/or radio reception
    3. Circle – Pick a nearby landmark and remain in the general vicinity
    4. Communicate – Talk to ATC or FSS and ask for help
    5. Comply – Follow ATC or FSS instructions
        - Conserve can also be used – Reduce RPM and lean mixture to reduce fuel consumption

Common Errors

- Failure to maintain situational awareness
- Failure to admit that you are lost

Completion Standards

- **Private:**
    - Use an appropriate method to determine position.
    - Maintain an appropriate heading and climb, as necessary.
    - Identify prominent landmarks.
    - Use navigation systems/facilities or contact an ATC facility for assistance.
- **Commercial:** See Private Above

IFR Maneuvers

Instrument Takeoff

Objective
To develop the student's proficiency and confidence necessary for use of flight instruments during departures under conditions of low visibility, rain, low ceilings, or disorientation at night

Setup
- Complete Pre-Takeoff Checklist
- Put on view limiting device
- Align aircraft with runway centerline and apply brakes
- Center rudder pedals
- Set the heading indicator and bug to the runway magnetic heading and confirm with the magnetic compass
- Apply appropriate crosswind correction

Execution
- Release brakes and smoothly apply full power
- Maintain directional control by maintaining the runway magnetic heading using the heading indicator
- Check and announce:
    - "*Engine instruments green, airspeed alive*"
- Use rudder as necessary to maintain runway heading
- Apply back pressure to obtain normal takeoff attitude
- Rotate at specified checklist speed
    - Environmental conditions and pilot experience level may call for a higher liftoff speed
- Maintain appropriate pitch attitude for acceleration to Vy
- Maintain runway magnetic heading during initial climb-out
- At 1,000 ft AGL complete the Climb Checklist

Common Errors
- Improper positioning of ailerons
- Failure to perform an adequate cockpit check before the takeoff
- Improper application of power
- Poor directional control
- Improper alignment on runway
- Improper pitch attitude during liftoff
- Failure to establish and maintain proper climb configuration and airspeed

Steep Turns (Instrument Reference)

Objective
To develop the student's skill required to enter and recover from turns that are greater than standard rate when operating under instrument conditions

Setup
- Confirm clearing turns have been completed
- Select an entry altitude which will allow for recovery no lower than minimum recovery altitude of 1,500 ft AGL
- Set power to obtain maneuvering speed, (about 90 KIAS) approximately 22" MP and 2250 RPM, while maintaining altitude
- Complete pre-maneuver flow
    - G – Gas (fullest tank selected)

Execution
- Note pitch attitude for level flight
- Begin roll into turn
- Passing through 30º of bank:
    - Add power to maintain airspeed
    - Increase back-pressure to maintain altitude
- Maintain a 45º bank
- Trim as necessary to relieve back-pressure
- Lead roll out by half the bank angle
- Passing through 30º of bank:
    - Decrease power to maintain airspeed (approximately 2300 RPM)
    - Decrease back-pressure to maintain altitude
- Repeat turn in opposite direction as specified

Recovery
- Retrim airplane for cruise
- Complete Cruise Checklist

Common Errors
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim corrections when needed

Magnetic Compass Turns

Objective
To develop the student's ability to make turns to specific headings by reference to the magnetic compass

Execution

- Estimate the amount of northerly turning error which corresponds to your desired heading
  - The amount of error reaches a maximum on heading of north and south and is roughly equivalent to the aircraft's latitude (Vermont is approximately 45º north latitude)
  - The amount of error decreases to approximately zero on headings of east or west
- Enter a standard rate turn in the appropriate direction
- When turning to a northerly heading:
  - LEAD roll out by the amount of northerly turning error PLUS half the bank angle
- When turning to a southerly heading:
  - Roll out PAST your heading by the amount of southerly turning error MINUS half the bank angle

Remember: Undershoot
North
Overshoot
South

Recovery

- Re-trim airplane for cruise
- Complete Cruise Checklist

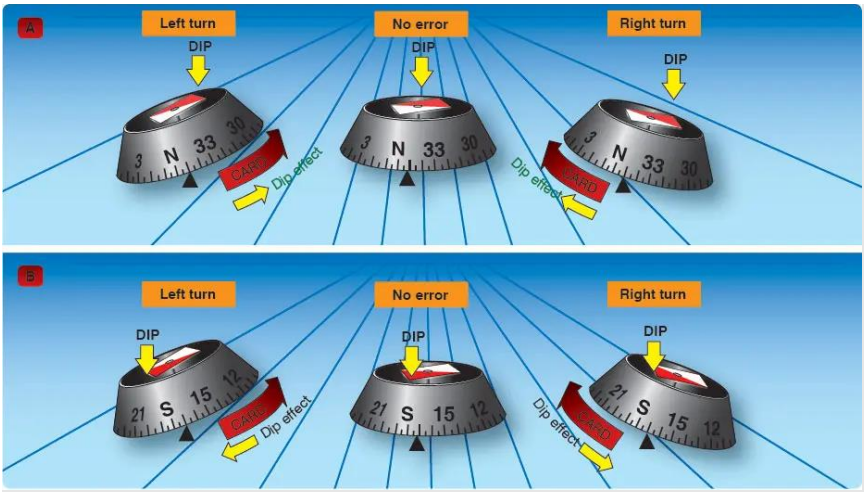
Common Errors

- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim corrections when needed
- Incorrect calculation of northerly or southerly turning error

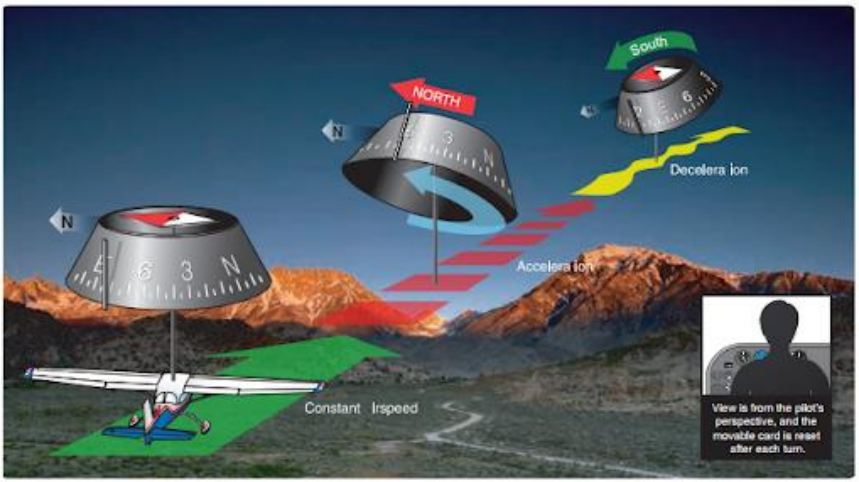
Completion Standards

- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.
  - Recognize navigational system or facility failure, and when required, report the failure to ATC.

- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness



FAA PHAK Figure 8-36 Northerly and Southernly Turning Errors



FAA PHAK Figure 8-37 The effects of acceleration error

Timed Turns to Magnetic Compass Headings

Objective
To develop the student's ability to accomplish timed turns to specific compass headings without use of the heading indicator

Execution

- Determine the number of degrees to be turned
- Compute the time needed to accomplish the turn using a standard rate turn (3º per second)
- Begin timing as you initiate the roll in
- Roll to the proper bank angle for a standard rate turn
- Begin roll out when the computed number of seconds has elapsed
- Check accuracy of the new magnetic heading and make corrections as needed

Note: When making turns less than 20º, use half standard rate turns (1 ½º per second)

Recovery

- Re-trim airplane for cruise
- Complete Cruise Checklist

Common Errors

- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim corrections when needed
- Failure to compute required time

Completion Standards

- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.
  - Recognize navigational system or facility failure, and when required, report the failure to ATC.
  - Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness

Navigation and Holding Procedures

VOR Course Interception

Objective
To teach the student to establish the airplane on a predetermined VOR radial

Setup
- Tune and identify appropriate VOR facility

Execution
- Turn to a heading to parallel the desired course in the same direction as the course to be flown
- Determine the difference between the radial to be intercepted and the radial on which you are located
- Double the difference to determine the intercept angle, which will not be less than 20º nor greater than 90º
- Set the course to the desired radial or inbound course
- Turn to the interception heading
- Hold this heading constant until the CDI centers
- Turn to the magnetic heading corresponding to the selected course and follow tracking procedures inbound or outbound

Note: The first three steps may be omitted if aircraft is turned directly to intercept the course without initially turning to parallel the desired course.

Common Errors
- Improper turning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking

Completion Standards
- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.
  - Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.
  - Recognize navigational system or facility failure, and when required, report the failure to ATC.
  - Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.

- Use the autopilot to make appropriate course intercepts, if installed.

VOR Tracking

Objective
To develop the student's proficiency in tracking a VOR radial while making necessary corrections for wind

Setup
- Tune and identify appropriate VOR facility
- Intercept assigned radial

Execution
- Once course has been intercepted, maintain a heading which corresponds to the course setting
- When the CDI indicates an off-course deviation, turn 10-20º toward the deflection of the CDI
- Maintain the new heading until the CDI centers, then take out half the intercept angle (5-10º)
- If the CDI remains centered, maintain heading
- If the CDI does not remain centered, make a 10º turn in the direction of the CDI
- When the CDI centers, take out half the correction (5º)

Example:
Tracking outbound on the 180º radial (heading 190)

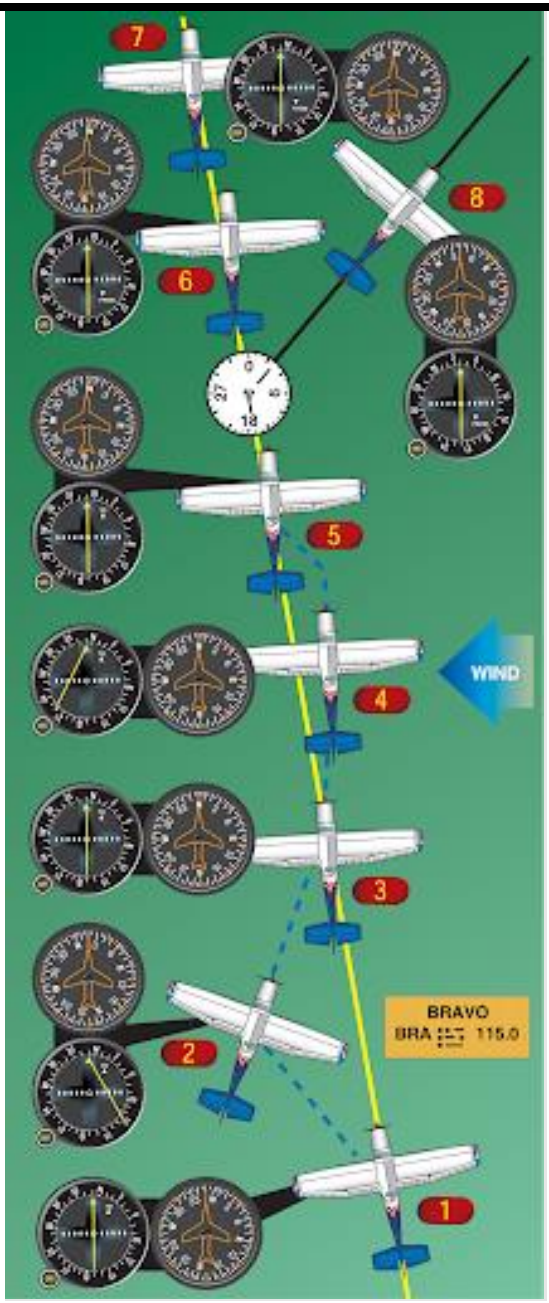
If CDI drifts to the right:
- Turn to a heading of 200º
- CDI centers
- Turn to a heading of 195º

If CDI drifts to the left
- Turn to a heading of 180º
- CDI centers
- Turn to a heading of 185º

Common Errors
- Over controlling corrections during tracking
- Failure to divide attention

Completion Standards
- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.

- Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.
- Recognize navigational system or facility failure, and when required, report the failure to ATC.
- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.
- Use the autopilot to make appropriate course intercepts, if installed.



FAA PHAK Figure 16-32 Tracking a radial in a crosswind

VOR Time and Distance Check

Objective
To develop proficiency in the use of the VOR while making computations for determining time and distance to the station

Setup
- Slow to 90 KIAS
- Reset the heading indicator by reference to the magnetic compass
- Tune and identify appropriate VOR facility

Execution
- Center the CDI with a TO indication
- Turn to the heading indicated on the selected course and re-center the CDI
- Rotate the course 10º to the right or left
- Turn the airplane to a heading 90º in the direction of CDI deflection
- Maintain heading and note the time when the CDI centers
- Rotate the OBS/course selector 10 more degrees in the same direction as previously turned
- Note the time when the CDI re-centers
- Turn the airplane to track directly to the station
- Compute time and distance to the station using the following formulas:

$$\text{Minutes to station} = \frac{60 \times \text{Minutes between radials}}{\text{º of radial change}}$$

$$\text{Distance to station} = \frac{\text{TAS} \times \text{Minutes between radials}}{\text{º of radial change}}$$

Common Errors
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim corrections when needed
- Failure to tune and identify appropriate VOR facility
- Poor VOR orientation

Time-Distance Check Example

$$\frac{\text{Time in seconds between bearings}}{\text{Degrees of bearing change}} = \text{Minutes to station}$$

For example, if 2 minutes (120 seconds) is required to fly a bearing change of 10 degrees, the aircraft is—

$$\frac{120}{10} = 12 \text{ minutes to the station}$$

FAA PHAK Figure 16-33 Time-distance Check Example

GPS Direct Navigation

Objective
To teach the student to establish the airplane on a course to a selected waypoint

Setup
- Ensure the CDI is in (External Source) GPS mode

Execution
- Push direct to button on the right side of the GPS (GTN 650/750 or GNS 430)
    - Type in your desired waypoint (GTN 650/750)
    - Use the big and small knobs to scroll through the letters to select your waypoint (GNS 430)
- Select enter to confirm waypoint, then enter again to activate the course
- To go direct to a waypoint in a flight plan
    - Open FPL page
    - Select the desired way point and push the direct to soft key
        - On GNS 430 push in small knob to active the curser and highlight the desired waypoint
    - Then push enter
- Turn to the magnetic heading corresponding to the desired track (DTK) as indicated on the GPS
- Track the GPS course using GPS tracking procedures

Common Errors
- Improper tuning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking

Completion Standards
- **Instrument:**
    - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.
    - Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.
    - Recognize navigational system or facility failure, and when required, report the failure to ATC.

- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.
- Use the autopilot to make appropriate course intercepts, if installed.

GPS Flight Planned Route Interception

Objective
To teach the student to establish the airplane on a predetermined GPS route

Setup
- Input the desired flight plan or waypoints into the flight plan page on the GPS

Execution
- Receive ATC or instructor vector onto flight planned route
- Verify the CDI is in GPS mode
- Set the course to the desired track (DTK) of the planned route on the GPS
- Hold the intercept heading until the CDI centers
- Turn to the magnetic heading corresponding to the desired track (DTK) as indicated on the GPS

Note: The first three steps may be omitted if aircraft is turned directly to intercept the course without initially turning to parallel the desired course.

Common Errors
- Improper tuning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking

GPS Tracking

Objective
To develop the student's proficiency in tracking a GPS course while making necessary corrections for wind

Setup
- Program GPS course
- Intercept assigned course

Execution
- Once course has been intercepted, maintain a heading which corresponds to the DTK on the GPS
- When the CDI indicates an off-course deviation, turn 20º toward the deflection of the CDI
- Maintain the new heading until the CDI centers, then take out half the intercept angle (10º)
- If the CDI remains centered, maintain heading
- If the CDI does not remain centered, make a 10º turn in the direction of the CDI
- When the CDI centers, take out half the correction (5º)
- **Tip:** When the CDI is centered use the GPS track function to maintain the same TRK as DTK. This ensures the aircraft stays on course no matter the current winds

Example:

Tracking outbound on a 180º track

If CDI drifts to the right:
- Turn to a heading of 200º
- CDI centers
- Turn to a heading of 195º

If CDI drifts to the left
- Turn to a heading of 180º
- CDI centers
- Turn to a heading of 185º

Common Errors
- Over controlling corrections during tracking
- Failure to divide attention

Completion Standards
- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.

- Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.
- Recognize navigational system or facility failure, and when required, report the failure to ATC.
- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.
- Use the autopilot to make appropriate course intercepts, if installed.

DME Arcs (Turn 10, Twist 10)

Objective
To develop the student's skill to track a predetermined DME arc at a specified distance

Setup
- Tune and identify the navaid (and DME if equipped or enter 'Direct to' navaid in GPS)
- Reset heading indicator to magnetic compass
- Set prop to approximately 2250 RPM and MP to 22"to maintain 90 KIAS while maintaining altitude

Execution
- Track the course to the navaid/DME fix
- Calculate when to begin turn:
    - If less than 150 KIAS groundspeed, use 0.5% of the groundspeed (for example 100 KIAS times 0.5% = 0.5 NM)
- Determine whether the arc will be a left or right turn
- Start the turn to intercept the arc by the distance calculated
- Continue turning to a heading that is 90º from the radial you are on
- Note the DME distance after the turn is completed
    - If the distance is 0.1 greater than the arc turn 10º towards the arc
    - If the distance is 0.1 less than the arc maintain your current heading
- At the lead radial turn to an appropriate intercept heading for the final approach course
    - For arcs without a lead radial, lead the turn 5 to 10º prior to the final approach course

Note: This procedure is based on a 90º intercept. If being radar vectored to the arc at an intercept angle less than 90º the distance required to lead the turn will be less than the value calculated for the degree intercept

Common Errors
- Incorrectly tuning and identification of navaid
- Improper interception of arc
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim corrections when needed

Completion Standards

- **Instrument**
  - Sets and correctly orients the course to be intercepted into the course selector or correctly identifies the course on the RMI.
  - Tunes and correctly identifies the navigation facility.
  - Intercepts the specified course at a predetermined angle, inbound or outbound from a navigational facility.
  - Maintains the airspeed within ±10 knots, altitude within ±100 feet, and selected headings within ±5°.
  - Applies proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI or within ±10° in case of an RMI.
  - Determines the aircraft position relative to the navigational facility or from a waypoint in the case of GPS.
  - Intercepts a DME arc and maintains that arc within ±1 nautical mile.
  - Recognizes navigational receiver or facility failure, and when required, reports the failure to ATC.
  - Uses MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and other parameters to intercept and maintain the desired flightpath.

DME Arcs (Bearing Pointer/RMI)

Objective
To develop the student's skill to track a DME arc by use of the GPS bearing pointer

Setup
- Go direct to the intended GPS waypoint
- Activate bearing pointer 1 or 2 depending upon nav source in use
- Set prop to approximately 2250 RPM and MP to 22"to maintain 90 KIAS while maintaining altitude

Execution
- Track the course to the waypoint/DME fix
- Calculate when to begin turn:
    - If less than 150 KIAS groundspeed, use 0.5% of the groundspeed (for example 100 KIAS times 0.5% = 0.5 NM)
- Determine whether the arc will be a left or right turn
- Start the turn to intercept the arc by the distance calculated
- Continue turning to a heading that is 90º from the radial you are on
- Note the DME distance after the turn is completed
    - Aim to keep the bearing pointer 90º off the wing in the direction of the arc
    - If the distance is greater than the arc, turn slightly towards the arc
    - If the distance is less than the arc, maintain your current heading
- When the DME increases to the assigned distance, turn 10º toward the arc
- To help maintain situational awareness use course to suspend the waypoint and adjust the CDI course selection to determine your position along the arc

Common Errors
- Improper interception of arc
- Poor wind correction
- Improper instrument crosscheck and interpretation

Completion Standards

- **Instrument**
  - Sets and correctly orients the course to be intercepted into the course selector or correctly identifies the course on the RMI.
  - Tunes and correctly identifies the navigation facility.
  - Intercepts the specified course at a predetermined angle, inbound or outbound from a navigational facility.
  - Maintains the airspeed within ±10 knots, altitude within ±100 feet, and selected headings within ±5°.
  - Applies proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI or within ±10° in case of an RMI.
  - Determines the aircraft position relative to the navigational facility or from a waypoint in the case of GPS.
  - Intercepts a DME arc and maintains that arc within ±1 nautical mile.
  - Recognizes navigational receiver or facility failure, and when required, reports the failure to ATC.
  - Uses MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and other parameters to intercept and maintain the desired flightpath.

Hold Entry Procedures

Objective
To teach the student to determine and execute the proper holding entry procedure based upon their position in relation to the holding fix

Setup

- Proceed direct to the holding fix by use of the appropriate navigational source
- Inbound
- Outbound
- Cardinal Direction
- Turns
- Expect Further Clearance

Determining the Appropriate Hold Entry

- Once established on course to the holding fix take note of the aircrafts present heading
- Determine the **outbound** course of the required hold
- To determine the proper entry the pencil method may be used. Hold a pencil up in front of the heading indicator and move it accordingly:
  - Left Turns: Raise the left side of the pencil 20º
  - Right Turns: Raise the right side of the pencil 20º
- The heading indicator can now be visually divided into three sectors: 70º, 110º and a 180º sector. See figures bellow:

Left Hand Hold Entry *Right Hand Hold Entry*

- Determine where the outbound course of the hold lies on the heading indicator, and this indicates the desired hold entry
  - 70º Sector: Teardrop

- 110º Sector: Parallel
- 180º Sector: Direct

- Sometimes the outbound course lies within 5º of these lines and in those instances either procedure turn is acceptable

Direct Entry Procedure

- If a direct entry procedure is determined to be appropriate continue to the holding fix and enter hold
- Sometimes a direct entry may be appropriate, but the aircraft is approaching the hold nearly 90º from the inbound course
  - Fly over the fix and continue the present heading for approximately 20 seconds before turning to the outbound heading
  - This provides enough distance on the outbound leg for a proper intercept inbound
  - Time should be modified as necessary based on present wind conditions

Parallel Entry Procedure

- When over the holding fix complete the 5 T's:
  - Turn – To parallel the inbound course
  - Time – Start timer
  - Twist – Set course to the inbound course
  - Throttle – Verify power is set to maintain 90 KIAS
  - Talk – Report time and altitude entering the hold
- Continue outbound for approximately 1 minute, winds permitting
- After flying outbound for the appropriate amount of time execute a 225º back to intercept the inbound course
  - Right Turn Hold: Left 225º turn
  - Left Turn Hold: Right 225º turn
- Track the inbound course and enter the hold

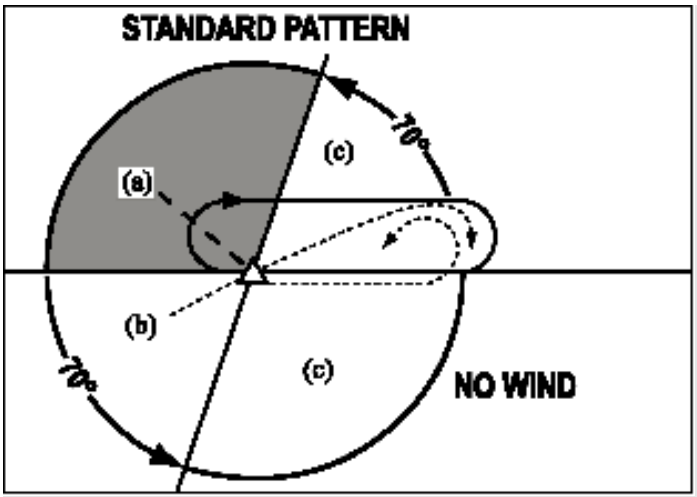
Teardrop Entry Procedure

- When over the holding fix complete the 5 T's:
  - Turn – To a heading approximately 30º off the outbound course
    - Right Turn Hold: Left 30º turn
    - Left Turn Hold: Right 30º turn
  - Time – Start timer
  - Twist – Set course to the inbound course
  - Throttle – Verify power is set to maintain 100 KIAS
  - Talk – Report time and altitude entering the hold
- Continue outbound for approximately 1 minute, winds permitting

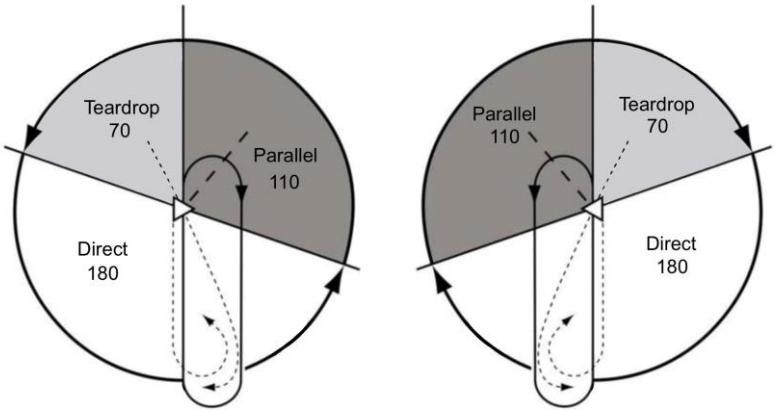
- After flying outbound for the appropriate amount of time turn to intercept the inbound course to the holding fix
- Track the inbound course and enter the hold

Common Errors

- Improper tuning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking



FAA AIM Figure 5-3-4 Holding Entry Procedures



Holding Procedures

Objective
To develop the student's ability to determine the recommended entry and maneuver the aircraft over a predetermined fix, while correcting for the effects of wind

Setup
- Tune and identify the necessary navaid(s)
- Reset heading indicator to magnetic compass
- Determine appropriate hold entry
- Within 3 minutes of the holding fix, slow to 90 KIAS (approximately prop 2250 RPM, MP to 22")

Timed Hold Execution
- When over the holding fix complete the 5 T's:
  - Turn – To appropriate entry heading
  - Time – Start timer
  - Twist – Set course to the inbound course
  - Throttle – Verify power is set to maintain 100 KIAS
  - Talk – Report time and altitude entering the hold
- After one minute outbound, or as necessary based on ground speed, turn to intercept the inbound course
- Start the inbound time:
  - When wings are level OR intercepting inbound course whichever happens FIRST
- When over the fix turn to the outbound heading
- Start the outbound time:
  - When wings are level OR abeam the fix, whichever happens LAST
- Adjust the outbound time to achieve a one-minute inbound leg
- Adjust outbound heading considering wind so that course intercept occurs at the completion of the inbound turn
- Departing the hold:
  - Report leaving the hold
  - Resume cruise speed or maintain 100 KIAS if executing an approach

Distance Hold Execution
- Perform the required procedure turn or enter the hold direct
- When over the holding fix complete the 5 T's:
  - Turn – To appropriate entry heading
  - Time – Start timer
  - Twist – Set course to the inbound course

    - Throttle – Verify power is set to maintain 100 KIAS
    - Talk – Report time and altitude entering the hold
- When over the fix after the procedure turn, turn to the outbound heading
- Fly the outbound heading until reaching the required holding DME
- Adjust outbound heading considering wind so that course intercept occurs at the completion of the inbound turn
- Departing the hold:
    - Report leaving the hold
    - Resume cruise speed or maintain 80 KIAS if executing an approach

Unpublished GPS Hold Execution

- Go direct to the holding waypoint or continue along planned route till reaching the holding waypoint
- Open the flight plan page on the GTN650 or 750 and click on the holding waypoint. Select hold at waypoint and put in the requirements given by ATC or the instructor
    - Perform the required procedure turn or enter the hold direct
- For GNS 430 go direct or continue along the flight planned route and determine holding entry, based off of information provided by ATC or instructor
    - 0.5nm from the holding waypoint
        - Suspend the navigation using the OBS soft key
    - Select inbound course Upon reaching waypoint perform the required procedure turn or enter the hold direct
- When over the holding fix complete the 5 T's:
    - Turn – To appropriate entry heading
    - Time – Start timer
    - Twist – Set course to the inbound course
    - Throttle – Verify power is set to maintain 100 KIAS
    - Talk – Report time and altitude entering the hold
- When over the fix after the procedure turn, turn to the outbound heading
- Fly the outbound heading until reaching the required holding DME or time as indicated on the GPS
- Adjust outbound heading considering wind so that course intercept occurs at the completion of the inbound turn
- Departing the hold:
    - Report leaving the hold
    - Resume cruise speed or maintain 80 KIAS if executing an approach

Common Errors

- Failure to slow to holding airspeed prior to arriving at holding fix
- Improper entry procedure
- Failure to complete the 5 T's
- Improper wind correction
- Incorrect pitch, bank, power, and trim control
- Failure to maintain situational awareness

Completion Standards

- **Instrument:**
  - Explain and use an entry procedure that ensures the airplane remains within the holding pattern airspace for a standard, nonstandard, published, or non-published holding pattern.
  - Change to the holding airspeed appropriate for the altitude or airplane when 3 minutes or less from, but prior to arriving at, the holding fix and set appropriate power as needed for fuel conservation.
  - Recognize arrival at the holding fix and promptly initiate entry into the holding pattern.
  - Maintain airspeed ±10 knots, altitude ±100 feet, selected headings within ±10°,and track a selected course, radial, or bearing within ¾-scale deflection of the CDI.
  - Use proper wind correction procedures to maintain the desired pattern and to arrive over the fix as close as possible to a specified time and maintain pattern leg lengths when specified.
  - Use an MFD and other graphical navigation displays, if installed, to monitor position in relation to the desired flightpath during holding.
  - Comply with ATC reporting requirements and restrictions associated with the holding pattern.
  - Demonstrate SRM.

Reference

Instrument Procedures Handbook – FAA-H-8083-16B (Chapter 3)

IFR Approach Procedures

Precision Approach (ILS)

Objective
To develop the student's ability to maneuver the airplane vertically and laterally safely and accurately on a precision approach

Setup (ABC's)

- When instructed by ATC to "expect" an approach, complete the ABC's
  - **A**TIS - obtain the latest ATIS information
  - **B**uild - the expected approach in the GPS
  - **B**rief - the expected approach plate
  - **B**ug - the approach minimums, applicable headings, and altitudes (identify nav source)
  - **C**hecklist - complete Before Landing Checklist

Execution

- When cleared for the approach maintain cleared altitude until established on a published segment of the approach
- When CDI/HSI begins to indicate final approach course interception, call:
  - *"Localizer alive"*
- Verify missed approach altitude set in altitude select before FAF
- When glideslope indicator begins to move, call:
  - *"Glideslope alive"*
- When Glideslope is 1/4 dot high:
  - Reduce MP to 18", set prop to 2250 RPM
  - Slow to V_{FE}
  - Set flaps to T/O
- Intercept the Glideslope
- Maintain 80 KIAS
- Pitch and trim for computed descent rate
- Check and confirm the aircraft altitude at the published Glideslope intercept altitude
- At 1000 ft above DA, announce:
  - "*1,000 ft*"
  - *G-"Gas fullest tank"*
  - *P-"Prop full forward"*
  - *P- "Fuel Pump ON"*
- At 500 ft above DA, announce:
  - "*500 ft", stabilized*"
- At 100 ft above DA, announce:
  - *"100 ft, approaching minimums"*
- At the DA:

- Announce "*Minimums*"
- Announce "*Continue or Go Around*"
  - Continue the approach to landing if the runway environment is in sight
  - OR execute the missed approach

Common Errors

- Incorrectly tuning and identification of navaid
- Failure to set up approach in a timely manner
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control
- Failure to execute missed approach at DH when required
- Failure to maintain situational awareness

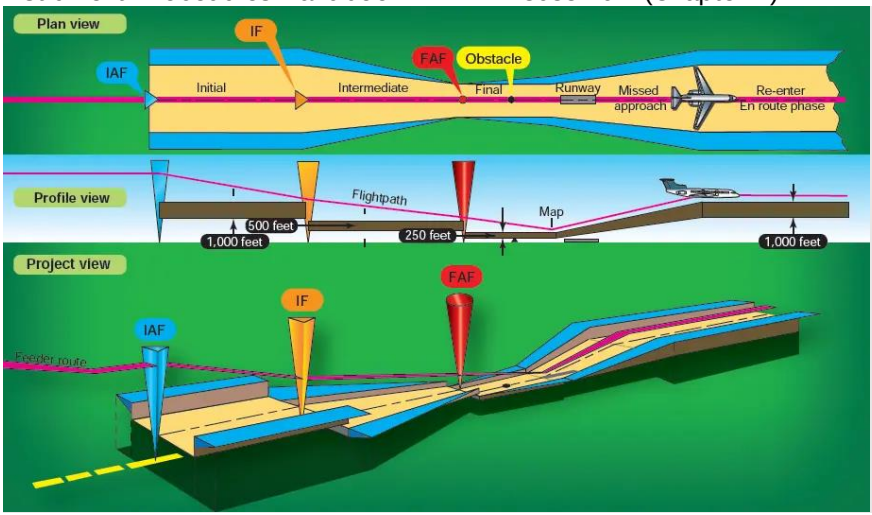
Completion Standards

- **Instrument:**
  - Maintain altitude ±100 feet, selected heading ±10°, airspeed ±10 knots, and accurately track radials, courses, and bearings, prior to beginning the final approach segment.
  - Adjust the published DA/DH and visibility criteria for the aircraft approach category, as appropriate, to account for NOTAMs, Inoperative airplane or navigation equipment, or inoperative visual aids associated with the landing environment.
  - Establish a predetermined rate of descent at the point where vertical guidance begins, which approximates that required for the airplane to follow the vertical guidance.
  - Maintain a stabilized final approach from the Final Approach Fix (FAF) to DA/DH allowing no more than ¾-scale deflection of either the vertical or lateral guidance indications and maintain the desired airspeed ±10 knots.
  - Immediately initiate the missed approach procedure when at the DA/DH, and the required visual references for the runway are not unmistakably visible and identifiable.
  - Transition to a normal landing approach (missed approach for seaplanes) only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.
  - Maintain a stabilized visual flight path from the DA/DH to the runway aiming point where a normal landing may be accomplished within the touchdown zone.

- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.

Reference

Instrument Procedures Handbook – FAA-H-8083-16B (Chapter 4)



FAA Instrument Procedures Handbook Figure 4-28 Approach Segments and Obstacle Clearance

Approach with Vertical Guidance (LPV, LNAV/VNAV)

Objective
To develop the student's ability to maneuver the airplane vertically and laterally safely and accurately on an approach with vertical guidance

Setup (ABC's)

- When instructed by ATC to "expect" an approach, complete the ABC's
  - **A**TIS - obtain the latest ATIS information
  - **B**uild - the expected approach in the GPS
  - **B**rief - the expected approach plate
  - **B**ug - the approach minimums, applicable headings, and altitudes (identify nav source)
  - **C**hecklist - complete Before Landing Checklist

Execution

- When cleared for the approach maintain cleared altitude until established on a published segment of the approach
- When CDI/HSI begins to indicate final approach course interception, call:
  - *"Lateral Guidance alive"*
- Verify missed approach altitude set in altitude select before FAF
- When glideslope indicator begins to move, call:
  - *"Glidepath alive/Vertical Guidance alive"*
- When Glideslope is 1/4 dot high:
  - Reduce MP to 18", set prop to 2250 RPM
  - Slow to V_{FE}
- Set flaps to T/O Intercept the Glideslope
- Maintain 80 KIAS
- Pitch and trim for computed descent rate
- Check and confirm the aircraft altitude at the published Glideslope intercept altitude
- At 1000 ft above DA, announce:
  - "*1,000 ft*"
  - *G-"Gas fullest tank"*
  - *P-"Prop full forward"*
  - *P- "Fuel Pump ON"*
- At 500 ft above DA, announce:
  - "*500 ft", stabilized*"
- At 100 ft above DA, announce:
  - *"100 ft, approaching minimums"*
- At the DA:

- Announce "*Minimums*"
- Announce "*Continue or Go Around*"
  - Continue the approach to landing if the runway environment is in sight
  - OR execute the missed approach

Common Errors

- Incorrectly tuning and identification of navaid
- Failure to set up approach in a timely manner
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control
- Failure to execute missed approach at DH when required
- Failure to maintain situational awareness

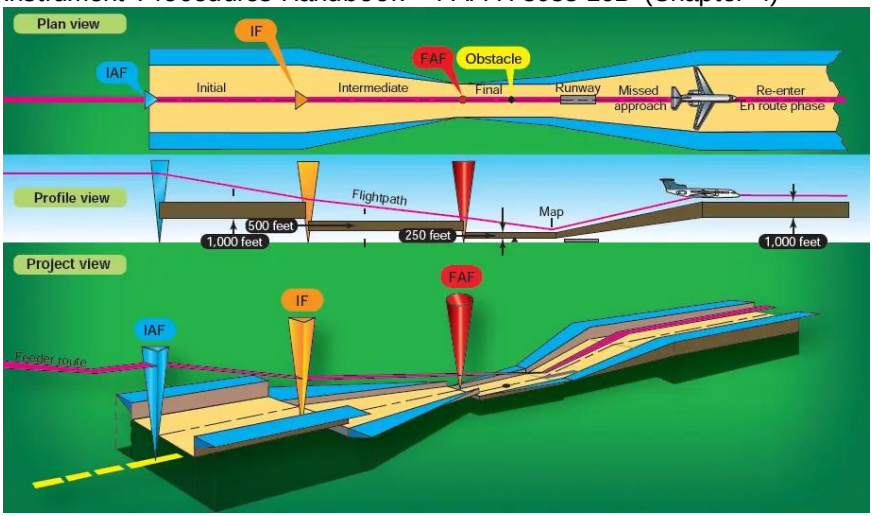
Completion Standards

- **Instrument:**
  - Maintain altitude ±100 feet, selected heading ±10°, airspeed ±10 knots, and accurately track radials, courses, and bearings, prior to beginning the final approach segment.
  - Adjust the published DA/DH and visibility criteria for the aircraft approach category, as appropriate, to account for NOTAMs, Inoperative airplane or navigation equipment, or inoperative visual aids associated with the landing environment.
  - Establish a predetermined rate of descent at the point where vertical guidance begins, which approximates that required for the airplane to follow the vertical guidance.
  - Maintain a stabilized final approach from the Final Approach Fix (FAF) to DA/DH allowing no more than ¾-scale deflection of either the vertical or lateral guidance indications and maintain the desired airspeed ±10 knots.
  - Immediately initiate the missed approach procedure when at the DA/DH, and the required visual references for the runway are not unmistakably visible and identifiable.
  - Transition to a normal landing approach (missed approach for seaplanes) only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.
  - Maintain a stabilized visual flight path from the DA/DH to the runway aiming point where a normal landing may be accomplished within the touchdown zone.

- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.

Reference

Instrument Procedures Handbook – FAA-H-8083-16B (Chapter 4)



FAA Instrument Procedures Handbook Figure 4-28 Approach Segments and Obstacle Clearance

Lateral Navigation Approach (LOC, VOR, LNAV)

Objective
To develop the student's ability to maneuver the airplane vertically and laterally safely and accurately on a lateral navigation approach

Setup (ABC's)

- When instructed by ATC to "expect" an approach, complete the ABC's
  - **A**TIS - obtain the latest ATIS information
  - **B**uild - the expected approach in the GPS
  - **B**rief - the expected approach plate
  - **B**ug - the approach minimums, applicable headings, and altitudes (identify nav source)
  - **C**hecklist - complete Before Landing Checklist

Execution

- When cleared for the approach, descend to published altitude or maintain cleared altitude
- When established inbound
  - Reduce MP to 16" and prop set to 2250 RPM
  - Slow to V_{FE}
  - Set flaps to T/O
- At the FAF:
  - Maintain 80 KIAS (approximately 1700 RPM)
- Pitch and trim for computed descent rate
- Verify missed approach altitude set in altitude select before FAF
- At 1000 ft above MDA, announce:
  - "*1,000 ft*"
  - *G-"Gas set to fullest tank"*
  - *P-"Prop Full Forward"*
  - *P- "Fuel Pump ON"*
- At 500 ft above MDA, announce:
  - "*500 ft", stabilized*"
- At 100 ft above MDA, announce:
  - *"100 ft, approaching minimums"*
- Level off at the MDA,
  - Announce: "*Minimums*"
  - Maintain 80 KIAS
- At the Visual Descent Point (VDP)
  - Visual references in sight:
    - Announce: *"Continue"*
    - Begin descent for landing
    - Set flaps as needed

- Visual references not in sight:
  - Continue to the Missed Approach Point (MAP) maintaining MDA
  - If references in sight before MAP:
    - Announce: *"Landing"*
    - Continue to land if in a safe position to land
  - If reference not in sight by MAP:
    - Announce: *"Go Around"*
    - Execute a missed approach

Common Errors

- Incorrectly tuning and identification of navaid
- Failure to set up approach in a timely manner
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control
- Failure to execute missed approach at MDA when required
- Failure to maintain situational awareness

Completion Standards

- **Instrument:**
  - Maintain altitude ±100 feet, selected heading ±10°, airspeed ±10 knots, and accurately track radials, courses, and bearings, prior to beginning the final approach segment.
  - Adjust the published MDA and visibility criteria for the aircraft approach category, as appropriate, for factors that include NOTAMs, inoperative aircraft or navigation equipment, or inoperative visual aids associated with the landing environment, etc.
  - Establish a stabilized descent to the appropriate altitude.
  - For the final approach segment, maintain no more than a ¾-scale deflection of the CDI, maintain airspeed ±10 knots, and altitude, if applicable, above MDA, +100/-0 feet, to the Visual Descent Point (VDP) or Missed Approach Point (MAP).
  - Execute the missed approach procedure if the required visual references are not distinctly visible and identifiable at the appropriate point or altitude for the approach profile; or execute a normal landing from a straight-in or circling approach.
  - Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.

Circling Approach

Objective
To develop the student's ability to maneuver the aircraft safely and accurately to the runway when the runway is not aligned with the approach course

Execution
- Maneuver the shortest path to the base or downwind leg
- Remain within the designated circling area for the approach category (see approach plate)
- Maintain circling minimums or higher until in a position to make a final descent for landing
- Continue with appropriate landing procedure

Common Errors
- Failure to comply with appropriate circling approach procedure
- Allowing aircraft to descend below circling altitude before appropriate
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control

Completion Standards
- **Instrument:**
  - Comply with the circling approach procedure considering turbulence, windshear, and the maneuvering capability and approach category of the aircraft.
  - Confirm the direction of traffic and adhere to all restrictions and instructions issued by ATC or the evaluator.
  - Demonstrate SRM.
  - Establish the approach and landing configuration. Maintain a stabilized approach and a descent rate that ensures arrival at the MDA, or the preselected circling altitude above the MDA, prior to the missed approach point.
  - Maintain airspeed ±10 knots, desired heading/track ±10°, and altitude +100/-0 feet until descending below the MDA or the preselected circling altitude above the MDA.
  - Visually maneuver to a base or downwind leg appropriate for the landing runway and environmental conditions.

- If a missed approach occurs, turn in the appropriate direction using the correct procedure and appropriately configure the airplane.
- If landing, initiate a stabilized descent. Touch down on the first one-third of the selected runway without excessive maneuvering, without exceeding the normal operating limits of the airplane, and without exceeding 30° of bank.

	APPROACH CATEGORY AND CIRCLING RADIUS (NM)				
CIRCLING MDA IN FEET MSL	CAT A	CAT B	CAT C	CAT D	CAT E
1000 or less	1.3	1.7	2.7	3.6	4.5
1001-3000	1.3	1.8	2.8	3.7	4.6
3001-5000	1.3	1.8	2.9	3.8	4.8
5001-7000	1.3	1.9	3.0	4.0	5.0
7001-9000	1.4	2.0	3.2	4.2	5.3
9001 and above	1.4	2.1	3.3	4.4	5.5

FAA Instrument Procedures Handbook 4-2 Construction of circling approach area

Missed Approach Procedure

Objective
To develop the student's ability to comply with published or ATC directed missed approach procedures while maintaining positive control

Execution

- At the DA or Missed Approach Point (MAP):
  - Smoothly apply full throttle
  - Pitch nose up 10º
  - Retract Flaps to T/O
  - Verify and announce:
    - "*Positive Rate*"
  - Retract flaps
  - Maintain 80 KIAS
- Activate GPS Missed approach
- Report the missed approach
- Follow published or ATC directed missed approach procedures
- Complete the Climb Checklist at or above 1,000 ft AGL, or as safety permits

Note: Special consideration should be given to traffic established in the pattern. Initiate early missed approach procedures as directed or as needed if VFR conditions exist

Common Errors

- Failure to initiate the missed approach promptly
- Failure to report the missed approach to ATC
- Failure to comply with the published or alternate missed approach procedure
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control

Completion Standards

- **Instrument:**
  - Promptly initiate the missed approach procedure and report it to ATC.
  - Apply the appropriate power setting for the flight condition and establish a pitch attitude necessary to obtain the desired performance.
  - Configure the airplane in accordance with airplane manufacturer's instructions, establish a positive rate of climb, and accelerate to the appropriate airspeed, ±10 knots.

- Follow the recommended checklist items appropriate to the missed approach/go-around procedure.
- Comply with the published or alternate missed approach procedure.
- Advise ATC or the evaluator if unable to comply with a clearance, restriction, or climb gradient.
- Maintain the heading, course, or bearing ±10°; and altitude(s) ±100 feet during the missed approach procedure.
- Use an MFD and other graphical navigation displays, if installed, to monitor position and track to help navigate the missed approach.
- Demonstrate SRM or CRM, as appropriate.
- Request ATC clearance to attempt another approach, proceed to the alternate airport, holding fix, or other clearance limit, as appropriate, or as directed by the evaluator.

Autopilot Usage – Garmin GFC 500

GMC 507 Controls

Objective
To develop the student's knowledge on how to control the GFC 500 autopilot with GMC 507 controls.

Execution

Lateral modes:

- **ROL** – default, holds current roll attitude
- **HDG** – holds selected heading (blue hdg bug)
- **TRK** – holds selected ground track (magenta wind diamond)
- **NAV** – holds active navigation course and non-precision approach (lateral) (GPS/VOR/LOC)
- **APR** – holds precision approach (lateral and vertical) (GPS, ILS, BC)

Vertical modes:

- **PIT** – default, holds current pitch attitude
- **ALT** – holds current altitude
- **VS** – maintains vertical speed in descents (fpm)
- **IAS** – maintains aircraft speed in climbs (kts)
- **VNAV** – tracks vertical descent profile

Control softkeys:

- **AP** - engages the autopilot with the lateral/vertical modes selected
- **FD –** activates the flight director guidance with the lateral/vertical modes selected
- **LVL –** engages the autopilot in level lateral/vertical modes
- **YD –** engages the yaw damper (not installed)

Common Errors

- Incorrect altitude and heading bugs
- Failure to engage the autopilot effectively
- Failure to select the proper lateral and/or vertical mode
- Failure to recognize incorrect mode selected prior to engaging the autopilot
- Improper instrument crosscheck and interpretation

Figure 2-1 – GMC 507

Figure 2-1: Garmin G5 Electronic Flight Instrument Pilot's Guide for Certified Aircraft (190-01112-12 Rev. C)

Figure 3-1 Autopilot Status Box

Figure 3-1: Garmin G5 Electronic Flight Instrument Pilot's Guide for Certified Aircraft (190-01112-12 Rev. C)

Autopilot Limitations

Objective
To develop the student's knowledge on the limitations of the GFC 500 autopilot.

Limitations

- Maximum engagement speed – 150 KIAS
- Maximum fuel imbalance – 10 gallons
- May not be engaged when using more than 10 degrees flaps
- Must be disengaged below 200 ft AGL during approach operations
- Must be disengaged below 800 ft AGL for all other operations (not approach ops)
- Approved for Category 1 precision and non-precision approaches only
- Not approved for autopilot or yaw damper use during takeoff and landing

Disengaging the Autopilot

Objective
To develop the student's knowledge on the various methods of disengaging the autopilot.

Execution

- Press the red AP DISC/TRIM button on yoke
- Press the TOGA button
- Deselect the AP softkey on the GMC 507
- Actuating the Electric Trim switch on the yoke
- In states of autopilot malfunction – pull the AP circuit breaker

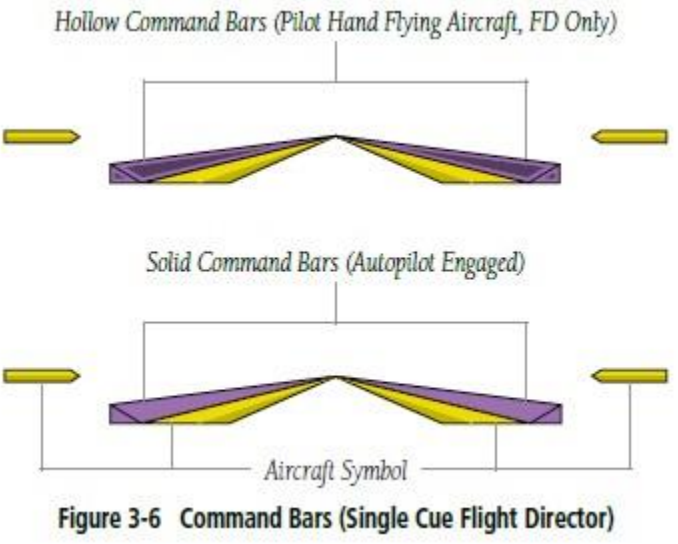


Figure 3-6: Garmin G5 Electronic Flight Instrument Pilot's Guide for Certified Aircraft (190-01112-12 Rev. C)

Preflight Autopilot Check

Objective
To further develop the student's preflight check to include all aspects of the avionics, including the autopilot.

Execution

- PFT – Autopilot preflight test
    - This should happen automatically. When the test is complete, an aural alert will sound and the "PFT" annunciator above the attitude indicator will flash and disappear.
    - If the aural alert and "PFT" does not disappear, this means the autopilot test was not completed and **the autopilot cannot be used**.
- Manual autopilot test
    - During runup, the autopilot should be engaged to test if the servos are working correctly
    - Engage HDG mode and turn the heading bug left, then right
        - The yoke should turn in the correct direction
    - Engage VS mode and set a climb, then descent
        - The yoke should add pressure in the correct direction
    - Test the AP DISC button
        - AP should disengage
    - Test the AP softkey on the GMC 507
        - AP should disengage
    - Test the TOGA button
        - FD should set up for climb
- Overpower test
    - Engage the autopilot, then exert back pressure with a bank until it disconnects

VOR Course Interception

Objective
To teach the student to establish the airplane on a predetermined VOR radial via the autopilot.

Setup
- Tune and identify appropriate VOR facility

Execution
- Bug a heading to parallel the desired course in the same direction as the course to be flown, then select HDG mode and engage the autopilot (assuming ALT mode is already active)
- Determine the difference between the radial to be intercepted and the radial on which you are located
- Double the difference to determine the intercept angle, which will not be less than 20º nor greater than 90º
- Rotate the course selector to the desired radial or inbound course
- Rotate your heading bug to the interception heading
- Hold this heading constant until the CDI centers
- Turn your heading bug to the magnetic heading corresponding to the selected course and follow tracking procedures inbound or outbound

Note: The first three steps may be omitted if aircraft is turned directly to intercept the course without initially turning to parallel the desired course.

Common Errors
- Improper tuning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking

Completion Standards
- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.
  - Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.

- Recognize navigational system or facility failure, and when required, report the failure to ATC.
- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.
- Use the autopilot to make appropriate course intercepts, if installed.

VOR Tracking

Objective
To develop the student's proficiency in tracking a VOR radial while making necessary corrections for wind via the autopilot.

Setup
- Tune and identify appropriate VOR facility
- Intercept assigned radial using HDG mode

Execution
- When the CDI indicates one dot deviation, select NAV mode
- The autopilot should intercept and maintain a heading which corresponds to the course selector
- Bug heading

Common Errors
- Failure to divide attention

Completion Standards
- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.
  - Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.
  - Recognize navigational system or facility failure, and when required, report the failure to ATC.
  - Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.
  - Use the autopilot to make appropriate course intercepts, if installed.

GPS Direct Navigation

Objective
To teach the student to establish the airplane on a course to a selected waypoint via the autopilot.

Setup
- Ensure the CDI is in (External source) GPS mode

Execution
- Push direct to button on the right side of the GPS (GTN 650/750 or GNS 430)
- GTN 650/750:
  - Type in your desired waypoint
- GNS 430:
  - Use the big and small knobs to scroll through the letters to select your waypoint
- Select enter to confirm waypoint, then enter again or push activate the course
- To go direct to a waypoint in a flight plan
  - Open FPL page
  - Select the desired way point and push the direct to softkey
  - Push activate
- Track the GPS course using NAV mode
- Bug heading

Note: if you are greater than one dot CDI deviation, NAV mode will be armed, not active. It is good practice to select HDG mode first, then NAV. This way the lateral mode will not default to ROL when greater than one dot.

Common Errors
- Improper tuning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking

Completion Standards
- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.

- Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.
- Recognize navigational system or facility failure, and when required, report the failure to ATC.
- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.
- Use the autopilot to make appropriate course intercepts, if installed.

GPS Flight Planned Route Interception

Objective
To teach the student to establish the airplane on a predetermined GPS route via the autopilot.

Setup
- Input the desired flight plan or waypoints into the flight plan page on the GPS

Execution
- Receive ATC or instructor vector onto flight planned route
- Verify the CDI is in GPS mode
- Set the heading bug to the desired track (DTK) of the planned route on the GPS
- Select HDG mode to maintain heading until one dot CDI deflection
- Select NAV mode to track and maintain the GPS course
- Bug heading

Note: The first three steps may be omitted if aircraft is turned directly to intercept the course without initially turning to parallel the desired course.

Common Errors
- Improper tuning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking

GPS Tracking

Objective
To develop the student's proficiency in tracking a GPS course while making necessary corrections for wind via the autopilot.

Setup
- Program GPS course
- Intercept assigned course using HDG mode

Execution
- When the CDI indicates one dot deviation, select NAV mode
- The autopilot should intercept and maintain a heading which corresponds to the GPS course
- Bug heading

Common Errors
- Failure to divide attention

Completion Standards
- **Instrument:**
  - Maintain airspeed ±10 knots, altitude ±100 feet, and selected headings ±5°.
  - Apply proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI. If a DME arc is selected, maintain that arc ±1 nautical mile.
  - Recognize navigational system or facility failure, and when required, report the failure to ATC.
  - Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.
  - Use the autopilot to make appropriate course intercepts, if installed.

DME Arcs (Turn 10, Twist 10)

Objective
To develop the student's skill to track a predetermined DME arc at a specified distance via the autopilot.

Setup
- Tune and identify the navaid (and DME if equipped or enter 'Direct to' navaid in GPS)
- Set prop to approximately 2250 RPM and MP to 22"to maintain 90 KIAS while maintaining altitude

Execution
- Track the course to the navaid/DME fix using HDG or NAV mode
- Calculate when to begin turn:
    - If less than 150 KIAS groundspeed, use 0.5% of the groundspeed (for example 100 KIAS times 0.5% = 0.5 NM)
- Determine whether the arc will be a left or right turn
- Start the turn to intercept the arc by the distance calculated using the heading bug in HDG mode to turn to a heading that is 90º from the radial you are on
- Note the DME distance after the turn is completed
    - If the distance is 0.1 greater than the arc, turn 10º towards the arc
    - If the distance is 0.1 less than the arc, maintain your current heading
- At the lead radial, turn the heading bug to an appropriate intercept heading for the final approach course
    - For arcs without a lead radial, lead the turn 5 to 10º prior to the final approach course

Note: This procedure is based on a 90º intercept. If being radar vectored to the arc at an intercept angle less than 90º the distance required to lead the turn will be less than the value calculated for the degree intercept

Common Errors
- Incorrectly tuning and identification of navaid
- Improper interception of arc
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim corrections when needed

Completion Standards

- **Instrument**
  - Sets and correctly orients the course to be intercepted into the course selector or correctly identifies the course on the RMI.
  - Tunes and correctly identifies the navigation facility.
  - Intercepts the specified course at a predetermined angle, inbound or outbound from a navigational facility.
  - Maintains the airspeed within ±10 knots, altitude within ±100 feet, and selected headings within ±5°.
  - Applies proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI or within ±10° in case of an RMI.
  - Determines the aircraft position relative to the navigational facility or from a waypoint in the case of GPS.
  - Intercepts a DME arc and maintains that arc within ±1 nautical mile.
  - Recognizes navigational receiver or facility failure, and when required, reports the failure to ATC.
  - Uses MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and other parameters to intercept and maintain the desired flightpath.

DME Arcs (Bearing Pointer/RMI)

Objective
To develop the student's skill to track a predetermined GPS DME arc at a specified distance via the autopilot.

Setup
- Use NAV mode to fly direct to the intended GPS waypoint
- Activate bearing pointer 1 or 2 depending upon nav source in use
- Set prop to approximately 2250 RPM and MP to 22"to maintain 90 KIAS while maintaining altitude

Execution
- Track the course to the waypoint/DME fix using HDG or NAV mode
- Calculate when to begin turn:
  - If less than 150 KIAS groundspeed, use 0.5% of the groundspeed (for example 100 KIAS times 0.5% = 0.5 NM)
- Determine whether the arc will be a left or right turn
- Start the turn to intercept the arc by the distance calculated using the heading bug in HDG mode to turn to a heading that is 90º from the bearing pointer head
- Note the DME distance after the turn is completed
  - If the distance is 0.1 greater than the arc, turn the heading bug 10º towards the head of the RMI
  - If the distance is 0.1 less than the arc, maintain your current heading
- Continue the arc keeping the heading bug perpendicular to the bearing pointer/RMI head

Common Errors
- Improper interception of arc
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim corrections when needed

Completion Standards
- **Instrument**
  - Sets and correctly orients the course to be intercepted into the course selector or correctly identifies the course on the RMI.
  - Tunes and correctly identifies the navigation facility.

- Intercepts the specified course at a predetermined angle, inbound or outbound from a navigational facility.
- Maintains the airspeed within ±10 knots, altitude within ±100 feet, and selected headings within ±5°.
- Applies proper correction to maintain a course, allowing no more than ¾-scale deflection of the CDI or within ±10° in case of an RMI.
- Determines the aircraft position relative to the navigational facility or from a waypoint in the case of GPS.
- Intercepts a DME arc and maintains that arc within ±1 nautical mile.
- Recognizes navigational receiver or facility failure, and when required, reports the failure to ATC.
- Uses MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and other parameters to intercept and maintain the desired flightpath.

Hold Entry Procedures

Objective
To teach the student to determine and execute the proper holding entry procedure based upon their position in relation to the holding fix via the autopilot.

Setup

- Proceed direct to the holding fix by use of the appropriate navigational source (GPS, VOR/DME) via HDG or NAV mode
- Inbound
- Outbound
- Cardinal Direction
- Turns
- Expect Further Clearance

Determining the Appropriate Hold Entry

- Once established on course to the holding fix, take note of the aircraft's present heading
- Determine the **outbound** course of the required hold
- To determine the proper entry the pencil method may be used. Hold a pencil up in front of the heading indicator and move it accordingly:
    - Left Turns: Raise the left side of the pencil 20º
    - Right Turns: Raise the right side of the pencil 20º
- The heading indicator can now be visually divided into three sectors: 70º, 110º and a 180º sector. See figures bellow:

Left Hand Hold Entry *Right Hand Hold Entry*

- Determine where the outbound course of the hold lies on the heading indicator, and this indicates the desired hold entry

  - 70º Sector: Teardrop
  - 110º Sector: Parallel
  - 180º Sector: Direct
- Sometimes the outbound course lies within 5º of these lines and in those instances either procedure turn is acceptable

Direct Entry Procedure

- If a direct entry procedure is determined to be appropriate continue to the holding fix using HDG or NAV mode and enter hold
- Sometimes a direct entry may be appropriate, but the aircraft is approaching the hold nearly 90º from the inbound course
  - Fly over the fix and continue the present heading for approximately 20 seconds before turning the heading bug to the outbound heading
  - This provides enough distance on the outbound leg for a proper intercept inbound
  - Time should be modified as necessary based on present wind conditions
- **Note**: If using NAV mode to proceed to and enter a hold, the autopilot will turn to intercept the fix on its own, following the published hold (timed or distance).

Parallel Entry Procedure

- When over the holding fix complete the 5 T's using HDG or NAV mode:
  - Turn – To parallel the inbound course (using hdg bug)
  - Time – Start timer
  - Twist – Set course selector to inbound course
  - Throttle – Verify power is set to maintain 90 KIAS
  - Talk – Report time and altitude entering the hold
- Continue outbound for approximately 1 minute, winds permitting
- After flying outbound for the appropriate amount of time execute a 225º back to intercept the inbound course
  - Right Turn Hold: Left 225º turn
  - Left Turn Hold: Right 225º turn
- Track the inbound course and enter the hold
- **Note**: If using NAV mode to enter a hold, the autopilot will proceed outbound for 1 minute in a timed hold. In a distance hold, the AP will go to the outer corner of inbound leg before turning inbound.

Teardrop Entry Procedure

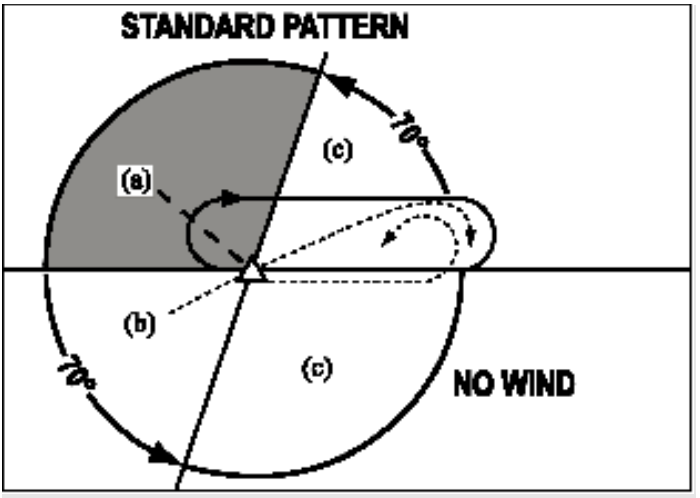
- When over the holding fix complete the 5 T's using HDG mode:

- Turn – The heading bug to approximately 30º off the outbound course
  - Right Turn Hold: Left 30º turn
  - Left Turn Hold: Right 30º turn
- Time – Start timer
- Twist – Set course selector to inbound course
- Throttle – Verify power is set to maintain 90 KIAS
- Talk – Report time and altitude entering the hold

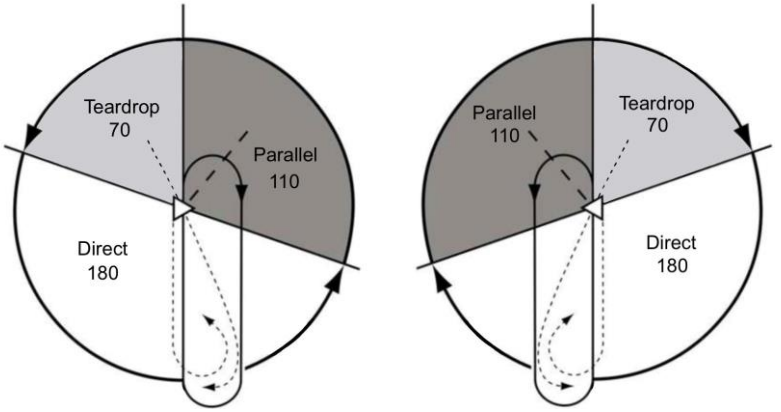
- Continue outbound for approximately 1 minute, winds permitting
- After flying outbound for the appropriate amount of time turn to intercept the inbound course to the holding fix
- Track the inbound course and enter the hold
- **Note**: If using NAV mode to enter a hold, the autopilot will proceed outbound for 1 minute in a timed hold. In a distance hold, the AP will go to the outer corner of outbound leg before turning inbound.

Common Errors

- Improper tuning and identification of station
- Turning in wrong direction during orientation
- Overshooting or undershooting radials during interception
- Over controlling corrections during tracking



FAA AIM Figure 5-3-4 Holding Entry Procedures


Teardrop
70
Parallel
110
Direct
180
Parallel
110
Teardrop
70
Direct
180

Holding Procedures

Objective
To develop the student's ability to determine the recommended entry and maneuver the aircraft over a predetermined fix, while correcting for the effects of wind via the autopilot.

Setup
- Tune and identify the necessary navaid(s)
- Determine appropriate hold entry
- Within 3 minutes of the holding fix, slow to 90 KIAS (approximately prop to 2250 RPM and MP to 22")

Timed Hold Execution
- Perform the required procedure turn or enter the hold direct using HDG or NAV mode
    - **Note**: When using NAV mode, the autopilot will execute the hold as published (timed or distance), but the heading bug should still be utilized in case of AP disengagement, etc.
- When over the holding fix complete the 5 T's:
    - Turn – To appropriate entry heading (using hdg bug)
    - Time – Start timer
    - Twist – Set course selector to inbound course
    - Throttle – Verify power is set to maintain 90 KIAS
    - Talk – Report time and altitude entering the hold
- After one minute outbound, or as necessary based on ground speed, turn heading bug to intercept the inbound course
- Start the inbound time:
    - When wings are level OR intercepting inbound course whichever happens FIRST
- When over the fix turn the heading bug to the outbound heading
- Start the outbound time:
    - When wings are level OR abeam the fix, whichever happens LAST
- Adjust outbound time to achieve a one-minute inbound leg
- Adjust outbound heading considering wind so that course intercept occurs at the completion of the inbound turn
- Departing the hold:
    - Report leaving the hold
    - Resume cruise speed or maintain 80 KIAS if executing an approach

Distance Hold Execution

- Perform the required procedure turn or enter the hold direct using HDG or NAV mode
    - **Note**: When using NAV mode, the autopilot will execute the hold as published (timed or distance), but the heading bug should still be utilized in case of AP disengagement, etc.
- When over the holding fix complete the 5 T's:
    - Turn – To appropriate entry heading (using hdg bug)
    - Time – Start timer
    - Twist – Set course selector to inbound course
    - Throttle – Verify power is set to maintain 90 KIAS
    - Talk – Report time and altitude entering the hold
- When over the fix after the procedure turn, turn the heading bug to the outbound heading
- Fly the outbound heading until reaching the required holding DME
- Adjust outbound heading considering wind so that course intercept occurs at the completion of the inbound turn
- Departing the hold:
    - Report leaving the hold
    - Resume cruise speed or maintain 80 KIAS if executing an approach

Unpublished GPS Hold Execution

- Go direct to the holding waypoint or continue along planned route till reaching the holding waypoint using HDG or NAV mode
    - **Note**: When using NAV mode, the autopilot will execute the hold as it was built in the GPS (timed or distance), but the heading bug should still be utilized in case of AP disengagement, etc.
- Open the flight plan page on the GTN650 and click on the holding waypoint. Select hold at waypoint and put in the requirements given by ATC or the instructor
- Perform the required procedure turn or enter the hold direct
- When over the holding fix complete the 5 T's:
    - Turn – To appropriate entry heading (using hdg bug)
    - Time – Start timer
    - Twist – Set course selector to inbound course
    - Throttle – Verify power is set to maintain 90 KIAS
    - Talk – Report time and altitude entering the hold
- When over the fix after the procedure turn, turn the heading bug to the outbound heading
- Fly the outbound heading until reaching the required holding DME or time as indicated on the GPS

- Adjust outbound heading considering wind so that course intercept occurs at the completion of the inbound turn
- Departing the hold:
    - Report leaving the hold
    - Resume cruise speed or maintain 80 KIAS if executing an approach

Common Errors

- Failure to slow to holding airspeed prior to arriving at holding fix
- Improper entry procedure
- Failure to complete the 5 T's
- Improper wind correction
- Incorrect pitch, bank, power, and trim control
- Failure to maintain situational awareness

Completion Standards

- **Instrument:**
    - Explain and use an entry procedure that ensures the airplane remains within the holding pattern airspace for a standard, nonstandard, published, or non-published holding pattern.
    - Change to the holding airspeed appropriate for the altitude or airplane when 3 minutes or less from, but prior to arriving at, the holding fix and set appropriate power as needed for fuel conservation.
    - Recognize arrival at the holding fix and promptly initiate entry into the holding pattern.
    - Maintain airspeed ±10 knots, altitude ±100 feet, selected headings within ±10°,and track a selected course, radial, or bearing within ¾-scale deflection of the CDI.
    - Use proper wind correction procedures to maintain the desired pattern and to arrive over the fix as close as possible to a specified time and maintain pattern leg lengths when specified.
    - Use an MFD and other graphical navigation displays, if installed, to monitor position in relation to the desired flightpath during holding.
    - Comply with ATC reporting requirements and restrictions associated with the holding pattern.
    - Demonstrate SRM.

Precision Approach (ILS)

Objective
To develop the student's ability to maneuver the airplane vertically and laterally safely and accurately on a precision approach via the autopilot.

Setup

- When instructed by ATC to "expect" an approach, complete the ABC's
  - **A**TIS - Obtain the latest ATIS information
  - **B**uild - the expected approach in the GPS
  - **B**rief - the expected approach plate
  - **B**ug - the approach minimums, applicable headings, and altitudes (identify nav source)
  - **C**hecklist - complete Before Landing checklist

Execution

- Use HDG mode to maintain intercept vectors from ATC or CFI
- If instructed to descend to published altitude, use VS mode to descend 500 fpm. Otherwise, maintain cleared altitude until cleared for the approach and on a published segment of the approach
- When cleared for the approach, arm APR mode
- When Localizer needle begins to indicate course interception, call:
  - "*Localizer alive*"
- When established inbound
  - Reduce power to 1700 RPM and begin to slow to V_{FE}
- Verify missed approach altitude set in altitude select before FAF
- When glideslope indicator begins to move, call:
  - "*Glideslope alive"*
- When Glideslope is 1 dot high
  - Set flaps to T/O
  - Maintain 80 KIAS (approximately prop 2250 RPM MP to 18")
- Intercept the Glideslope using APR mode
- Check and confirm the altitude at the published Glideslope intercept altitude
- At 1000 ft above DA, announce:
  - "*1,000 ft*"
  - *G-"Gas set to fullest tank"*
  - *Prop-"Prop Full Forward"*
  - *P- "Fuel Pump ON"*

- At 500 ft above DA, announce:
  - "*500 ft, stabilized*"
- At 100 ft above DA, announce:
  - "*100 ft, approaching minimums*"
- At the DA:
  - Announce "*Minimums*"
  - Announce *"Continue or Go Around"*
    - Continue the approach to landing if the runway environment is in sight, disengaging the autopilot at or above 200 ft AGL
    - OR execute the missed approach, selecting the TOGA button when initiating climb out

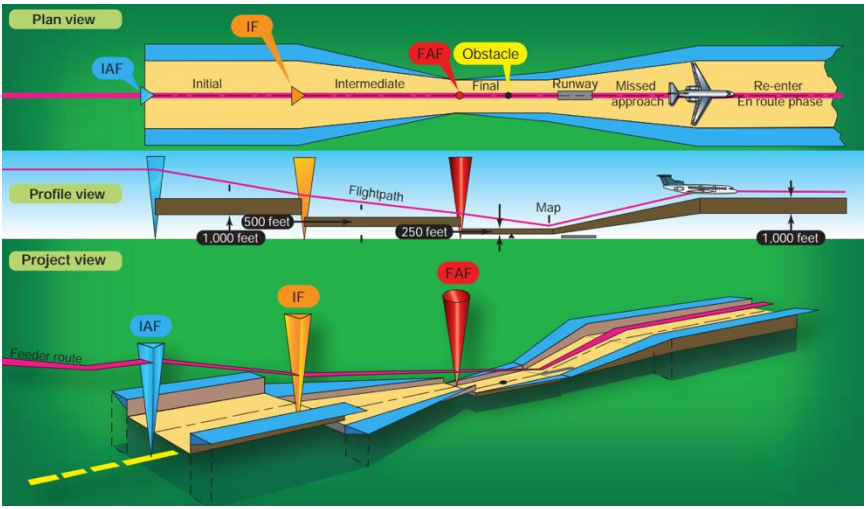
Common Errors

- Incorrectly tuning and identification of navaid
- Failure to set up approach in a timely manner
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control
- Failure to execute missed approach at DH when required
- Failure to maintain situational awareness

Completion Standards

- **Instrument:**
  - Maintain altitude ±100 feet, selected heading ±10°, airspeed ±10 knots, and accurately track radials, courses, and bearings, prior to beginning the final approach segment.
  - Adjust the published DA/DH and visibility criteria for the aircraft approach category, as appropriate, to account for NOTAMs, Inoperative airplane or navigation equipment, or inoperative visual aids associated with the landing environment.
  - Establish a predetermined rate of descent at the point where vertical guidance begins, which approximates that required for the airplane to follow the vertical guidance.
  - Maintain a stabilized final approach from the Final Approach Fix (FAF) to DA/DH allowing no more than ¾-scale deflection of either the vertical or lateral guidance indications and maintain the desired airspeed ±10 knots.
  - Immediately initiate the missed approach procedure when at the DA/DH, and the required visual references for the runway are not unmistakably visible and identifiable.

- Transition to a normal landing approach (missed approach for seaplanes) only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.
- Maintain a stabilized visual flight path from the DA/DH to the runway aiming point where a normal landing may be accomplished within the touchdown zone.
- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.



FAA Instrument Procedures Handbook Figure 4-28 Approach Segments and Obstacle Clearance

Approach with Vertical Guidance (LPV, LNAV/VNAV)

Objective
To develop the student's ability to maneuver the airplane vertically and laterally safely and accurately on an approach with vertical guidance via the autopilot.

Setup

- When instructed by ATC to "expect" an approach, complete the ABC's
  - **A**TIS - Obtain the latest ATIS information
  - **B**uild - the expected approach in the GPS
  - **B**rief - the expected approach plate
  - **B**ug - the approach minimums, applicable headings, and altitudes (identify nav source)
  - **C**hecklist - complete Before Landing checklist

Execution

- Use HDG mode to maintain intercept vectors from ATC or CFI
- If instructed to descend to published altitude, use VS mode to descend 500 fpm. Otherwise, maintain cleared altitude until cleared for the approach and on a published segment of the approach
- When cleared for the approach, arm APR mode
- When Localizer needle begins to indicate course interception, call:
  - "*Lateral Guidance alive*"
- When established inbound
  - Reduce prop to 2250 RPM, MP to 18"-20" and begin to slow to V_{FE}
- Verify missed approach altitude set in altitude select before FAF
- When glideslope indicator begins to move, call:
  - "*Glidepath alive/Vertical Guidance alive"*
- When Glideslope is 1 dot high
  - Set flaps to T/O
  - Maintain 80 KIAS (approximately prop to 2250 RPM, MP to 18")
- Intercept the Glideslope using APR mode
- Check and confirm the altitude at the published Glideslope intercept altitude
- At 1000 ft above DA, announce:
  - "*1,000 ft*"

- *G-"Gas set to fullest tank"*
- *Prop-"Prop Full Forward"*
- *P- "Fuel Pump ON"*

- At 500 ft above DA, announce:
  - "*500 ft, stabilized*"
- At 100 ft above DA, announce:
  - "*100 ft, approaching minimums*"
- At the DA:
  - Announce "*Minimums*"
  - Announce *"Continue or Go Around"*
    - Continue the approach to landing if the runway environment is in sight, disengaging the autopilot at or above 200 ft AGL
    - OR execute the missed approach, selecting the TOGO button when initiating climb out

Common Errors

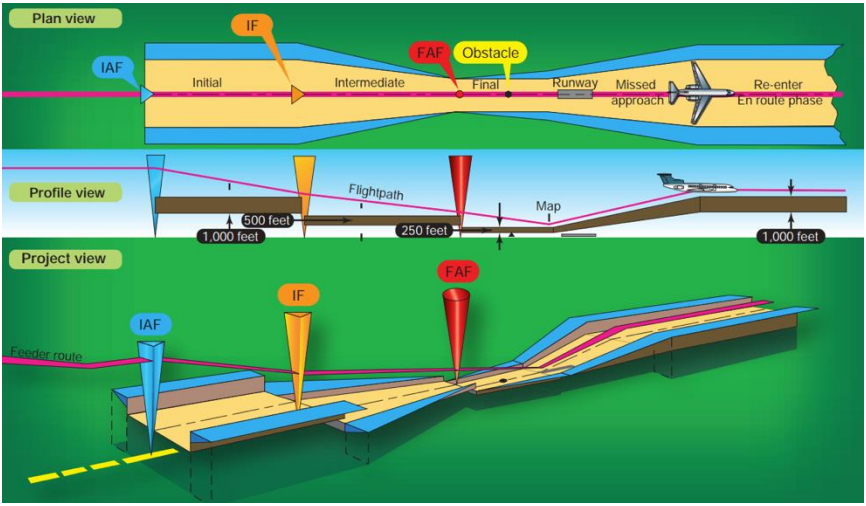
- Incorrectly tuning and identification of navaid
- Failure to set up approach in a timely manner
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control
- Failure to execute missed approach at DH when required
- Failure to maintain situational awareness

Completion Standards

- **Instrument:**
  - Maintain altitude ±100 feet, selected heading ±10°, airspeed ±10 knots, and accurately track radials, courses, and bearings, prior to beginning the final approach segment.
  - Adjust the published DA/DH and visibility criteria for the aircraft approach category, as appropriate, to account for NOTAMs, Inoperative airplane or navigation equipment, or inoperative visual aids associated with the landing environment.
  - Establish a predetermined rate of descent at the point where vertical guidance begins, which approximates that required for the airplane to follow the vertical guidance.
  - Maintain a stabilized final approach from the Final Approach Fix (FAF) to DA/DH allowing no more than ¾-scale deflection of either the vertical or lateral guidance indications and maintain the desired airspeed ±10 knots.
  - Immediately initiate the missed approach procedure when at the DA/DH, and the required visual references

for the runway are not unmistakably visible and identifiable.

- Transition to a normal landing approach (missed approach for seaplanes) only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.
- Maintain a stabilized visual flight path from the DA/DH to the runway aiming point where a normal landing may be accomplished within the touchdown zone.
- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.



FAA Instrument Procedures Handbook Figure 4-28 Approach Segments and Obstacle Clearance

Lateral Guidance Approach (LOC, VOR, LNAV)

Objective
To develop the student's ability to maneuver the airplane vertically and laterally safely and accurately on a lateral guidance approach via the autopilot.

Setup

- When instructed by ATC to "expect" an approach, complete the ABC's
  - **A**TIS - Obtain the latest ATIS information
  - **B**uild - the expected approach in the GPS
  - **B**rief - the expected approach plate
  - **B**ug - the approach minimums, applicable headings, and altitudes (identify nav source)
  - **C**hecklist - complete Before Landing checklist

Execution

- Use HDG mode to maintain intercept vectors from ATC or CFI
- If instructed to descend to published altitude, use VS mode to descend 500 fpm. Otherwise, maintain cleared altitude until cleared for the approach and on a published segment of the approach
- When cleared for the approach, arm NAV mode
- When established inbound:
  - Reduce prop to 2250 RPM, MP to 16"-20" and begin to slow to V_{FE}
  - Set flaps to T/O
- At the FAF:
  - Maintain 80 KIAS (approximately prop to 2250 RPM and MP to 16")
- Set computed descent rate (approximately 500 fpm) using VS mode
- Verify missed approach altitude set in altitude select before FAF
- At 1000 ft above MDA, announce:
  - "*1,000 ft*"
  - *G-"Gas set to fullest tank"*
  - *Prop-"Prop Full Forward"*
  - *P- "Fuel Pump ON"*
- At 500 ft above MDA, announce:
  - "*500 ft, stabilized*"
- At 100 ft above MDA, announce:
  - "*100 ft, approaching minimums*"
- Level off at the MDA

- Announce "*Minimums*"
- Maintain 80 KIAS

- At the Visual Descent Point (VDP)
  - Visual references in sight:
    - Announce: "*Continue"*
    - Begin descent for landing, disengaging the autopilot at or above 200 ft AGL
    - Set flaps as needed
  - Visual references not in sight:
    - Continue to the Missed Approach Point (MAP) maintaining MDA
    - If references in sight before MAP:
      - Announce *"Landing"*
      - Continue to land if in a safe position to land
    - If references not in sight by MAP:
      - Announce: *"Go Around"*
      - Execute the missed approach, selecting the TOGO button when initiating climb out

Common Errors

- Incorrectly tuning and identification of navaid
- Failure to set up approach in a timely manner
- Poor wind correction
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control
- Failure to execute missed approach at MDA when required
- Failure to maintain situational awareness

Completion Standards

- **Instrument:**
  - Maintain altitude ±100 feet, selected heading ±10°, airspeed ±10 knots, and accurately track radials, courses, and bearings, prior to beginning the final approach segment.
  - Adjust the published MDA and visibility criteria for the aircraft approach category, as appropriate, for factors that include NOTAMs, inoperative aircraft or navigation equipment, or inoperative visual aids associated with the landing environment, etc.
  - Establish a stabilized descent to the appropriate altitude.
  - For the final approach segment, maintain no more than a ¾-scale deflection of the CDI, maintain airspeed ±10 knots, and altitude, if applicable, above MDA, +100/-0

feet, to the Visual Descent Point (VDP) or Missed Approach Point (MAP).

- Execute the missed approach procedure if the required visual references are not distinctly visible and identifiable at the appropriate point or altitude for the approach profile; or execute a normal landing from a straight-in or circling approach.
- Use an MFD and other graphical navigation displays, if installed, to monitor position, track wind drift, and to maintain situational awareness.

Circling Approach

Objective
To develop the student's ability to maneuver the aircraft safely and accurately to the runway when the runway is not aligned with the approach course via the autopilot.

Execution

- Maneuver the shortest path to the base or downwind leg using HDG mode
- Remain within the designated circling area for that particular approach category (see diagram)
- Maintain circling minimums or higher until in a position to make a final descent for landing, using VS mode to descend
- Continue with appropriate landing procedure, disengaging the autopilot at or above 200 ft AGL

Common Errors

- Failure to comply with appropriate circling approach procedure
- Failure to maintain minimums until final descent for landing
- Improper instrument crosscheck and interpretation
- Incorrect pitch, bank, power, and trim control

Completion Standards

- **Instrument:**
  - Comply with the circling approach procedure considering turbulence, windshear, and the maneuvering capability and approach category of the aircraft.
  - Confirm the direction of traffic and adhere to all restrictions and instructions issued by ATC or the evaluator.
  - Demonstrate SRM.
  - Establish the approach and landing configuration. Maintain a stabilized approach and a descent rate that ensures arrival at the MDA, or the preselected circling altitude above the MDA, prior to the missed approach point.
  - Maintain airspeed ±10 knots, desired heading/track ±10°, and altitude +100/-0 feet until descending below the MDA or the preselected circling altitude above the MDA.
  - Visually maneuver to a base or downwind leg appropriate for the landing runway and environmental conditions.

- If a missed approach occurs, turn in the appropriate direction using the correct procedure and appropriately configure the airplane.
- If landing, initiate a stabilized descent. Touch down on the first one-third of the selected runway without excessive maneuvering, without exceeding the normal operating limits of the airplane, and without exceeding 30° of bank.

	APPROACH CATEGORY AND CIRCLING RADIUS (NM)				
CIRCLING MDA IN FEET MSL	CAT A	CAT B	CAT C	CAT D	CAT E
1000 or less	1.3	1.7	2.7	3.6	4.5
1001-3000	1.3	1.8	2.8	3.7	4.6
3001-5000	1.3	1.8	2.9	3.8	4.8
5001-7000	1.3	1.9	3.0	4.0	5.0
7001-9000	1.4	2.0	3.2	4.2	5.3
9001 and above	1.4	2.1	3.3	4.4	5.5

FAA Instrument Procedures Handbook 4-2 Construction of circling approach area

Missed Approach Procedure

Objective
To develop the student's ability to comply with published or ATC directed missed approach procedures while maintaining positive control via the autopilot.

Execution

- At the DA or Missed Approach Point (MAP):
  - Smoothly apply full power
  - Press the TOGA button
  - Retract flaps to T/O
  - Activate the missed approach on GPS
    - Verify CDI is in the correct mode
- Verify and announce:
  - *"Positive rate"*
  - Retract flaps to UP
  - Report the missed approach
- Follow published or ATC directed missed approach procedures
- Make sure missed approach procedure is activated on the GPS and the CDI is in the correct mode
- Above 600 ft AGL
  - Select the appropriate lateral mode (HDG or NAV)
  - Set a 80 KIAS climb using IAS mode
- Complete the Climb Checklist at or above 1,000 ft AGL, or as safety permits

  Note: Special consideration should be given to traffic established in the pattern. Initiate early missed approach procedures as needed if VFR conditions exist

Common Errors

- Incorrect pitch, bank, power, and trim control
- Failure to initiate the missed approach promptly
- Failure to report the missed approach to ATC
- Failure to comply with the published or alternate missed approach procedure
- Improper instrument crosscheck and interpretation

Completion Standards

- **Instrument:**
  - Promptly initiate the missed approach procedure and report it to ATC.

- Apply the appropriate power setting for the flight condition and establish a pitch attitude necessary to obtain the desired performance.
- Configure the airplane in accordance with airplane manufacturer's instructions, establish a positive rate of climb, and accelerate to the appropriate airspeed, ±10 knots.
- Follow the recommended checklist items appropriate to the missed approach/go-around procedure.
- Comply with the published or alternate missed approach procedure.
- Advise ATC or the evaluator if unable to comply with a clearance, restriction, or climb gradient.
- Maintain the heading, course, or bearing ±10°; and altitude(s) ±100 feet during the missed approach procedure.
- Use an MFD and other graphical navigation displays, if installed, to monitor position and track to help navigate the missed approach.
- Demonstrate SRM or CRM, as appropriate.
- Request ATC clearance to attempt another approach, proceed to the alternate airport, holding fix, or other clearance limit, as appropriate, or as directed by the evaluator.