Intro to

STALLED FLIGHT 2.0

Training for the Rest of Your Flying Career™

Trainee Material – June 25, 2025

Contents

Note: All times are approximate.

From the Optimal Learning Lab at Caldwell

Simulator / Visualization Exercises (00:30)

Slow flight: Sensing yaw

- ❑ Level flight at 1.1–1.2V_S
- ❑ Maintain constant pitch attitude and wings level (use ailerons as needed)
  1. Take both feet off the rudder pedals, sense the yaw
  2. Put both feet on the pedals, cancel the yaw
  3. Smoothly apply more right rudder than needed and hold, sense the yaw
  4. Smoothly readjust the rudder to cancel the yaw

Slow flight: Dutch rolls

- ❑ Level flight at 1.1–1.2V_S
  1. Take both feet off the rudder pedals
     a. Look over the nose, smoothly twist the yoke once left & right
     b. Look at the left wing, smoothly twist the yoke once left & right
  2. Put both feet on the pedals
     a. Look over the nose, smoothly apply aileron & rudder together
        i. Left, right, left, right, then wings level
        ii. Relative to you, the nose should stay on a point; see rolling/banking as a head-to-hip movement
     b. Look at the left wingtip only, smoothly apply aileron & rudder
        i. Left, right, left, right, then wings level
        ii. Relative to you, see the wingtip move head-to-hip

Tips & Techniques

- In 2a and 2b, rock the wings smoothly and continuously at least 30° of bank side to side. *This is a coordinated maneuver — no crossed controls*.
  - Aileron & rudder move at the same time and in the same direction — *no crossed controls*.
  - The aileron input should be larger than the rudder input.

Slow flight: S-turn

- ❑ Level flight at 1.1–1.2V_S
  1. Do the steepest, coordinate left turn followed by the steepest, coordinated right turn you can control with 180° heading change in each direction

Tips & Techniques

- *Control* means without stalling or spiraling out of the turns. Adjust as needed to maintain control.
  - Focus on outside references (i.e., sight), sound, and feel.
  - Coordinated Dutch roll into and out of the turns — *no crossed controls*.
- Lightly wiggle your feet to fine tune yaw control once established in the turns.
- The S-turn doubles as simulated clearing turns for the stalls.

Stalls: Power-off & power-on

- ❑ Power-off stall series using visual references 1 thru 3 below
  - Trim for wings-level flight at 1.1–1.2V_S with flaps UP
  - Reduce power to idle (carburetor heat as required)
  - Trade speed to hold altitude all the way to the stall (Energy Management)
  - Recover in a glide – *do not add power*
  - Smoothly return to level flight in a glide, *keeping stall warning silent*
  - Should be able to do 2–3 stalls in a row before needing to climb
- ❑ Power-on stall series using visual references 1 thru 3 below
  - Trim for wings-level flight at 1800–2000 rpm – *do not change the setting*
  - Smoothly, slowly pitch to the stall
  - Recover to a level flight attitude, *keeping stall warning silent*

Visual references: Stall and recover 2–3 times per reference

1. Looking over the nose
   a. Active rudder use: hold heading, maintain wings level throughout
   b. Recover at the first indication of the stall (e.g., stall buffet, pitch change)
      i. Just enough push to reattach airflow and silence stall warning
2. Looking at the left wingtip only (if able in the sim; otherwise, visualize this)
   a. Active rudder use: hold heading, maintain wings level throughout
   b. No matter what, keep looking at the wingtip – stall entry, stall break, stall recovery, level flight
   c. R-e-l-a-x, feel your way through the process
3. Looking at a reference like a car on a road, or a lake, etc.
   a. Active rudder use: hold heading, maintain wings level throughout
   b. No matter what, keep looking at the reference – stall entry, stall break, stall recovery, level flight
   c. R-e-l-a-x, feel your way through the process

Tips & Techniques

- The more relaxed you can be, the better — guide the airplane into and out of the stalls.
- The purpose here is to focus on sensing the stall and then feeling the airflow grab onto the wing again during recovery. Hence, the reason for not messing with flap and power settings.
- Rather than going from power-off stalls to full power-on stalls, the intermediate power setting makes things less dramatic and more manageable en route to full power-on stalls later.
- If you feel resistance against applying forward elevator, push however much you need to push for stall recovery.
- You should be able to do 4–6 power-off and 4–6 power-on stalls before moving on.
- Think about being more active with your feet! Higher frequency, smaller amplitude rudder movements will give you a better sense of feel for what's needed, especially prior to and during stall recovery.
- Be mindful of the tendency to deflect ailerons during stalls. If you have a habit of flailing the ailerons, your instructor might penalize you monetarily every time you move the ailerons!

Stalls: In climbing turns	
❑ Trim for wings-level flight at 1800–2000 rpm – *do not change the setting* ❑ Do climbing turning stalls twice to the left and twice to the right 1. Using outside references, begin a coordinated, climbing turn a. Smooth, steady pitch all the way to the stall b. Look in the direction of the turn, not over the nose c. Maintain a constant angle of bank up to the stall (≈ 30° or less) d. Active rudder work to cancel yaw throughout (sight, sound, feel) e. Recover at the first indication of stall (buffet, pitch change, roll off) i. Just enough push to reattach airflow <u>and</u> silence stall warning ii. Do not chase roll off/changes in bank angle with the ailerons f. Set a level flight attitude, *keeping stall warning silent*	

Tips & Techniques

- Airplane behavior during climbing stalls can be more variable than during wings-level stalls. Differences in airplane design, pilot technique, angle of bank, and rudder coordination can affect the behavior. Assuming coordinated, climbing flight at a constant and shallow angle of bank, airplanes will *usually* roll toward wings level at the stall. This is called “over-the-top” stall behavior as the outside wing stalls first. The rate of roll “over the top” depends on things like left turning tendencies (faster roll to the left than to the right), as well as the pilot’s pitch rate into the stall (faster roll with a faster pitch rate/increased load factor).
- Even if the airplane rolls at the stall, you must still push forward on the elevator control while using rudder to cancel yaw. If you get distracted by the roll, you’ll probably forget to push on the elevator. Maintain good stall recovery discipline: *ignore the roll*; focus on forward elevator along with proper rudder use first. Reattach the airflow (i.e., push), then worry about fixing the angle of bank if necessary.
- As in the previous stall exercises, the purpose is to focus on sensing the stall and feeling the airflow grab the wing again during recovery. Hence, the reason for not messing with flap and power settings. And rather than doing full power-on stalls, the intermediate power setting makes things less dramatic and more manageable at this point.

Simulated go-around; engine failure in the climb without airspeed or slip-skid	
❑ Trim for a wings-level, power-off glide with flaps UP (carb heat as needed) 1. Memorize the glide attitude using nose and wingtip (if able) references 2. Smoothly add full power to simulate a go-around a. Pitch to and set the V_Y climb attitude b. Cancel yaw using sight, sound, feel c. Retrim for the climb 3. Instructor fails/covers the airspeed and slip-skid indicators, simulates an engine failure during the climb a. Smoothly push and set the glide attitude using nose and wingtip references b. Cancel yaw throughout c. Retrim for hands-off gliding 4. Reveal airspeed and slip-skid, compare them with your perceptions of the glide attitude and yaw control	
Tips & Techniques • This is a complex exercise requiring a good visual sense of attitude and heading. • In an engine failure during a climb, pushing to and setting the glide attitude is a key first step. It is also a dynamic maneuver; thus, airspeed and even slip-skid will lag. There's no time to chase the airspeed. Set the attitude (push) and control the heading (active feet), then fine tune as airspeed catches up. • It's better to "miss" the glide attitude by being a bit steeper than it should be rather than too shallow. Airspeed and hence, energy for an impeding landing, will increase faster if a bit steeper.	
Dive to V_{TRIM} + 30	
1. Trim for wings-level slow flight at 1.2–1.3V_S ("V_{TRIM}" for this exercise) 2. Smoothly, steadily push to increase airspeed to V_{TRIM} + 30 a. Cancel yaw / hold heading with rudder b. Overcome the trim pressure and *make the speed increase* c. Adjust power if needed 3. Smoothly, steadily release the push and return to slow flight at V_{TRIM} a. Continue to cancel yaw / hold heading with rudder	
Tips & Techniques • Have confidence that the airplane wants to be at its trim speed. Note that it becomes more and more difficult to accelerate beyond the trim speed without intentionally increasing the push force. • As it relates to stall recovery, this exercise shows that there's no need to yank back on the elevator immediately upon stall recovery. When trimmed for slow flight, the airplane naturally seeks trimmed flight. In most cases, you only must guide the airplane back to level flight once stall recovery has occurred.	

In-airplane Exercises (00:45–01:00)

Slow flight: Sensing yaw

- ❑ During the climb to the practice area
- ❑ Maintain constant pitch attitude and wings level (use ailerons as needed)
  1. Take both feet off the rudder pedals, sense the yaw
  2. Put both feet on the pedals, cancel the yaw
  3. Smoothly apply more right rudder than needed and hold, sense the yaw
  4. Smoothly readjust the rudder to cancel the yaw

Slow flight: Dutch rolls

- ❑ During the climb to the practice area
  1. Take both feet off the rudder pedals
     a. Look over the nose, smoothly twist the yoke once left & right
     b. Look at the left wing, smoothly twist the yoke once left & right
  2. Put both feet on the pedals
     a. Look over the nose, smoothly apply aileron & rudder together
        i. Left, right, left, right, then wings level
        ii. Relative to you, the nose should stay on a point; see rolling/banking as a head-to-hip movement
     b. Look at the left wingtip only, smoothly apply aileron & rudder
        i. Left, right, left, right, then wings level
        ii. Relative to you, see the wingtip move head-to-hip

Tips & Techniques

- In 2a and 2b, rock the wings smoothly and continuously at least 30° of bank side to side. This is a coordinated maneuver — *no crossed controls*.
  - Aileron & rudder move at the same time and in the same direction — *no crossed controls*.
  - The aileron input should be larger than the rudder input.

Slow flight: S-turn

- ❑ Level flight at 1.1–1.2V_S
  1. Do the steepest, coordinate left turn followed by the steepest, coordinated right turn you can control, with 180° heading change in each direction

Tips & Techniques

- *Control* means without stalling or spiraling out of the turns. Adjust as needed to maintain control.
  - Focus on outside references (i.e., sight), sound, and feel.
  - Coordinated Dutch roll into and out of the turns — *no crossed controls*.
- Lightly wiggle your feet to fine tune yaw control once established in the turns.
- The S-turn doubles as clearing turns for the stalls.

Stalls: Power-off & power-on

- ❑ Power-off stall series using visual references 1 thru 3 below
  - Trim for wings-level flight at 1.1–1.2V_S with flaps UP
  - Reduce power to idle (carburetor heat as required)
  - Trade speed to hold altitude all the way to the stall (Energy Management)
  - Recover in a glide – *do not add power*
  - Smoothly return to level flight in a glide, *keeping stall warning silent*
  - Should be able to do 2–3 stalls in a row before needing to climb
- ❑ Power-on stall series using visual references 1 thru 3 below
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Visual references: Stall and recover 2–3 times per reference

1. Looking over the nose only
   a. Active rudder use: hold heading, maintain wings level throughout
   b. Recover at the first indication of the stall (e.g., stall buffet, pitch change)
      i. Just enough push to reattach airflow and silence stall warning
2. Looking at the left wingtip only
   a. Active rudder use: hold heading, maintain wings level throughout
   b. No matter what, keep looking at the wingtip – stall entry, stall break, stall recovery, level flight
   c. R-e-l-a-x, feel your way through the process
3. Looking at a reference like a car on a road, or a lake, or over the shoulder at the right rear seat in airplanes like a Cessna 172
   a. Active rudder use: hold heading, maintain wings level throughout
   b. No matter what, keep looking at the reference – stall entry, stall break, stall recovery, level flight
   c. R-e-l-a-x, feel your way through the process

Tips & Techniques

- The more relaxed you can be, the better — guide the airplane into and out of the stalls.
- The purpose here is to focus on sensing the stall and then feeling the airflow grab onto the wing again during recovery. Hence, the reason for not messing with flap and power settings.
- Rather than going from power-off stalls to full power-on stalls, the intermediate power setting makes things less dramatic and more manageable en route to full power-on stalls later.
- If you feel resistance against applying forward elevator, push however much you need to push for stall recovery.
- You should be able to do 4–6 power-off and 4–6 power-on stalls before moving on.
- Think about being more active with your feet! Higher frequency, smaller amplitude rudder movements will give you a better sense of feel for what's needed, especially prior to and during stall recovery.
- Be mindful of the tendency to deflect ailerons during stalls. If you have a habit of flailing the ailerons, your instructor might penalize you monetarily every time you move the ailerons!

Stalls: In climbing turns	
❑ Trim for wings-level flight at 1800–2000 rpm – *do not change the setting* ❑ Do climbing turning stalls twice to the left and twice to the right 1. Using outside references, begin a coordinated, climbing turn a. Smooth, steady pitch all the way to the stall b. Look in the direction of the turn, not over the nose c. Maintain a constant angle of bank up to the stall (≈ 30° or less) d. Active rudder work to cancel yaw throughout (sight, sound, feel) e. Recover at the first indication of stall (buffet, pitch change, roll off) i. Just enough push to reattach airflow <u>and</u> silence stall warning ii. Do not chase roll off/changes in bank angle with the ailerons f. Set a level flight attitude, *keeping stall warning silent*	

Tips & Techniques

- Airplane behavior during climbing stalls can be more variable than during wings-level stalls. Differences in airplane design, pilot technique, angle of bank, and rudder coordination can affect the behavior. Assuming coordinated, climbing flight at a constant and shallow angle of bank, airplanes will *usually* roll toward wings level at the stall. This is called “over-the-top” stall behavior as the outside wing stalls first. The rate of roll “over the top” depends on things like left turning tendencies (faster roll to the left than to the right), as well as the pilot’s pitch rate into the stall (faster roll with a faster pitch rate/increased load factor).
- Even if the airplane rolls at the stall, you must still push forward on the elevator control while using rudder to cancel yaw. If you get distracted by the roll, you’ll probably forget to push on the elevator. Maintain good stall recovery discipline: *ignore the roll*; focus on forward elevator along with proper rudder use first. Reattach the airflow (i.e., push), then worry about fixing the angle of bank if necessary.
- As in the previous stall exercises, the purpose is to focus on sensing the stall and feeling the airflow grab the wing again during recovery. Hence, the reason for not messing with flap and power settings. And rather than doing full power-on stalls, the intermediate power setting makes things less dramatic and more manageable at this point.

Simulated go-around with engine failure in the climb	
❑ Trim for a wings-level, power-off glide with flaps UP (carb heat as needed) 1. Memorize the glide attitude using nose and wingtip references 2. Smoothly add full power to simulate a go-around a. Pitch to and set the V_Y climb attitude b. Cancel yaw using sight, sound, feel c. Retrim for the climb 3. Instructor simulates an engine failure during the climb a. Smoothly push and set the glide attitude using nose and wingtip references b. Cancel yaw throughout c. Retrim for hands-off gliding	
Tips & Techniques • This is a complex exercise requiring a good visual sense of attitude and heading. • In an engine failure during a climb, pushing to and setting the glide attitude is a key first step. It is also a dynamic maneuver; thus, airspeed and even slip-skid will lag. There's no time to chase the airspeed. Set the attitude (push) and control the heading (active feet), then fine tune as airspeed catches up. • It's better to "miss" the glide attitude by being a bit steeper than it should be rather than too shallow. Airspeed and hence, energy for an impeding landing, will increase faster if a bit steeper.	
Dive to V_{TRIM} + 30	
❑ Heading back to the airport 1. Trim for wings-level slow flight at 1.2–1.3V_S ("V_{TRIM}" for this exercise) 2. Smoothly, steadily push to increase airspeed to V_{TRIM} + 30 a. Cancel yaw / hold heading with rudder b. Overcome the trim pressure and make the speed increase c. Adjust power if needed 3. Smoothly, steadily release the push and return to slow flight at V_{TRIM} a. Continue to cancel yaw / hold heading with rudder	
Tips & Techniques • Have confidence that the airplane wants to be at its trim speed. Note that it becomes more and more difficult to accelerate beyond the trim speed without intentionally increasing the push force. • As it relates to stall recovery, this exercise shows that there's no need to yank back on the elevator immediately upon stall recovery. When trimmed for slow flight, the airplane naturally seeks trimmed flight. In most cases, you only need to guide the airplane back to level flight once stall recovery has occurred.	

Land without airspeed or slip-skid	
❑ If conditions permit, set up for a no-flap landing ❑ Somewhere in the traffic pattern, instructor covers up airspeed and slip-skid 1. Use sight, sound, and feel cues, as well as recent experience in the practice area to maneuver and land the airplane a. Set and hold a specific pitch attitude(s) i. Make small pitch changes as needed ii. Don't let the wind push you around b. Trim the airplane; let it do most of the work c. Coordinate aileron and rudder inputs d. Be light, loose, and active on the rudder pedals all the way through the approach, landing, and rollout e. R-e-l-a-x, guide the airplane where you want it to go f. Need to go around? Recall the simulated go-around exercise	

Tips & Techniques

- Setting and trimming for a specific pitch attitude(s) is key. Let the elevator trim do as much of the work as possible.
  - If it feels like the airplane is sinking, it is! Just like stall recovery, ease the elevator control forward. Then consider adding power if or as needed.
  - If it feels like the airplane is speeding up, relax some of the forward elevator. Then consider reducing power if or as needed.
- The more relaxed you can be, the easier it'll be to sense what's happening.
  - When in doubt, relax your grip on the stick / yoke and wiggle your feet a little.
- You know more than you think you know.
  - You don't look at airspeed or slip-skid during the last part of landings anyway — it's all sight, sound, and feel. All you're doing here is relying on those same senses earlier in the process.

Supplemental Simulator / Visualization Exercises (00:30)	
Slow flight: Sensing yaw	
❑ Level flight at 1.1–1.2V_S ❑ Maintain constant pitch attitude and wings level (use ailerons as needed) 1. Take both feet off the rudder pedals and watch the instrument indications 2. Put both feet on the pedals, cancel the yaw 3. Smoothly apply more right rudder than needed and hold, sense the yaw 4. Smoothly adjust the rudder to cancel the yaw	
Slow flight: Dutch rolls	
❑ Level flight at 1.1–1.2V_S 1. Take both feet off the rudder pedals a. Smoothly twist the yoke once left & right 2. Put both feet on the pedals a. Smoothly apply aileron & rudder together i. Left, right, left, right, then wings level ii. Relative to the student, see the symbolic airplane of the turn coordinator roll head-to-hip	
Tips & Techniques • In 2a, rock the wings smoothly and continuously at least 30° of bank side to side. *This is a coordinated maneuver — no crossed controls*. ○ Aileron & rudder move at the same time and in the same direction — *no crossed controls*. ○ The aileron input should be larger than the rudder input.	
Slow flight: S-turn	
❑ Level flight at 1.1–1.2V_S 1. Student does the steepest, coordinated left turn followed by the steepest, coordinated right turn they can control; 180° heading change in each direction a. Describe any illusions or disorientation, especially when switching from the left turn to the right turn b. If the turn is botched, abort using Power-Push-Roll and return to level flight.	
Tips & Techniques • *Control* means without stalling or spiraling out of the turns. Adjust as needed to maintain control. ○ Maintain a consistent scan without fixating on any one instrument. ○ Coordinated Dutch roll into and out of the turns — *no crossed controls*. • Lightly wiggle your feet to fine tune yaw control once established in the turns.	

Stalls: Power-off & power-on	
❑ Power-off stall series ○ Trim for wings-level flight at 1.1–1.2V_S with flaps UP ○ Reduce power to idle (carburetor heat as required) ○ Trade speed to hold altitude all the way to the stall (Energy Management) ○ Recover in a glide – *do not add power* ○ Recover at the first indication of the stall (e.g., stall buffet, pitch change) ○ Smoothly return to level flight in a glide, *keeping stall warning silent* ○ Should be able to do 2–3 stalls in a row before needing to climb ❑ Power-on stall series ○ Trim for wings-level flight at 1800–2000 rpm – *do not change the setting* ○ Smoothly, slowly pitch to the stall ○ Recover at the first indication of the stall (e.g., stall buffet, pitch change) ○ Recover to a level flight attitude, *keeping stall warning silent*	

Tips & Techniques

- The more relaxed you can be, the better — guide the airplane into and out of the stalls.
- The purpose here is to focus on sensing the stall and then feeling the airflow grab onto the wing again during recovery. Hence, the reason for not messing with flap and power settings.
- Rather than going from power-off stalls to full power-on stalls, the intermediate power setting makes things less dramatic and more manageable en route to full power-on stalls later.
- If you feel resistance against applying forward elevator, push however much you need to push for stall recovery.
- You should be able to do 4–6 power-off and 4–6 power-on stalls before moving on.
- Think about being more active with your feet! Higher frequency, smaller amplitude rudder movements will give you a better sense of feel for what's needed, especially prior to and during stall recovery.
- Be mindful of the tendency to deflect ailerons during stalls. If you have a habit of flailing the ailerons, your instructor might penalize you monetarily every time you move the ailerons!

Stalls: In climbing turns (e.g., simulated missed approach)	
❑ Trim for wings-level flight at 1800–2000 rpm – *do not change the setting* ❑ Do 1a thru 1e once or twice to the left and once or twice to the right 1. Begin a coordinated, climbing turn a. Smooth, steady pitch all the way to the stall b. Maintain a constant angle of bank up to the stall (≈ 30° or less) c. Active rudder work to cancel yaw throughout d. Recover at the first indication of stall (buffet, pitch change, roll off) i. Just enough push to reattach airflow and silence stall warning ii. Do not chase roll off/changes in bank angle with the ailerons e. Set a level flight attitude, *keeping stall warning silent* ❑ Describe any illusions or disorientation	

Tips & Techniques

- Airplane behavior during climbing stalls can be more variable than during wings-level stalls. Differences in airplane design, pilot technique, angle of bank, and rudder coordination can affect the behavior. Assuming coordinated, climbing flight at a constant and shallow angle of bank, airplanes will *usually* roll toward wings level at the stall. This is called “over-the-top” stall behavior as the outside wing stalls first. The rate of roll “over the top” depends on things like left turning tendencies (faster roll to the left than to the right), as well as the pilot’s pitch rate into the stall (faster roll with a faster pitch rate/increased load factor).
- Even if the airplane rolls at the stall, the student must still push forward on the elevator control while using rudder to cancel yaw. When students get distracted by the roll, invariably they forget to push on the elevator. Emphasize good stall recovery discipline: *ignore the roll*; focus on forward elevator along with proper rudder use first. Reattach the airflow (i.e., push), then worry about fixing the angle of bank if necessary.
- As in the previous stall exercises, the purpose is to focus on sensing the stall and feeling the airflow grab the wing again during recovery. Hence, the reason for not messing with flap and power settings. And rather than doing full power-on stalls, the intermediate power setting makes things less dramatic and more manageable at this point.

Exploded view of skidded turns	
❑ Trim for a wings-level slow flight with flaps UP (carburetor heat as required) 1. Start a coordinated, level turn at a comfortable angle of bank (e.g., 20°) 2. Confirm the turn is proceeding "as it should" 3. Begin skidding the turn a. Smoothly feed in rudder in the direction of turn b. Observe and call out the instrument indications 4. Instructor calls, "Try to pull the nose up" a. Smoothly apply more aft elevator pressure b. Observe and call out the instrument indications c. Acknowledge an increase in G-load, if able 5. Instructor calls, "Stop skidding" a. Smoothly release the aft elevator and actively move your feet to remove the skid/cancel the yaw b. Smoothly Dutch roll to wings level c. Smoothly return to the level flight attitude	
Tips & Techniques • Apply the inputs smoothly and in sequence so you can see their individual effects on the turn and the recovery • Key takeaway: don't ever do this again!	
Spiral dives & recoveries	
❑ Trim for wings-level slow flight, flaps UP at 1.3V_S 1. Roll to a medium-steep bank AND ALLOW THE NOSE TO FALL BELOW THE HORIZON (don't fight it, let the nose fall!) 2. As the nose falls, instructor calls, "Try to pull the nose up" a. Smoothly apply more aft elevator pressure b. Observe and call out the instrument indications c. Feel the increase in G-load 3. Instructor calls, "Recover" a. Apply Power-Push-Roll recovery actions in sequence: i. Call "Power" as you reduce throttle to idle ii. Call "Push" as you release the aft elevator pressure iii. Call "Roll" as you smoothly but positively Dutch roll 4. Stop rolling as you approach wings level, then pitch to level flight a. You may need some forward pressure to slow the pitch rate to level flight since airspeed is now faster than the trim speed 5. Repeat in the opposite direction.	
Tips & Techniques • The instructor will talk you into and out of the first spiral or two, then talk you into a spiral or two, call "Recover" and have you talk-and-do your way out of them. • The "Roll" action is the main event in the recovery sequence; make it a coordinated Dutch roll.	

Supplemental In-airplane Exercises (00:45–01:00)	
Slow flight: Sensing yaw	
❑ Level flight at 1.1–1.2V_S ❑ Maintain constant pitch attitude and wings level (use ailerons as needed) 1. Take both feet off the rudder pedals and watch the instrument indications 2. Put both feet on the pedals, cancel the yaw 3. Smoothly apply more right rudder than needed and hold, sense the yaw 4. Smoothly adjust the rudder to cancel the yaw	
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Tips & Techniques • In 2a, rock the wings smoothly and continuously at least 30° of bank side to side. *This is a coordinated maneuver — no crossed controls*. ○ Aileron & rudder move at the same time and in the same direction — *no crossed controls*. ○ The aileron input should be larger than the rudder input.	
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Tips & Techniques • *Control* means without stalling or spiraling out of the turns. Adjust as needed to maintain control. ○ Maintain a consistent scan without fixating on any one instrument. ○ Coordinated Dutch roll into and out of the turns — *no crossed controls*. • Lightly wiggle your feet to fine tune yaw control once established in the turns.	

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- The more relaxed you can be, the better — guide the airplane into and out of the stalls.
- The purpose here is to focus on sensing the stall and then feeling the airflow grab onto the wing again during recovery. Hence, the reason for not messing with flap and power settings.
- Rather than going from power-off stalls to full power-on stalls, the intermediate power setting makes things less dramatic and more manageable en route to full power-on stalls later.
- If you feel resistance against applying forward elevator, push however much you need to push for stall recovery.
- You should be able to do 4–6 power-off and 4–6 power-on stalls before moving on.
- Think about being more active with your feet! Higher frequency, smaller amplitude rudder movements will give you a better sense of feel for what's needed, especially prior to and during stall recovery.
- Be mindful of the tendency to deflect ailerons during stalls. If you have a habit of flailing the ailerons, your instructor might penalize you monetarily every time you move the ailerons!

Stalls: In climbing turns (e.g., simulated missed approach)	
❑ Trim for wings-level flight at 1800–2000 rpm – *do not change the setting* ❑ Do 1a thru 1e once or twice to the left and once or twice to the right 1. Begin a coordinated, climbing turn a. Smooth, steady pitch all the way to the stall b. Maintain a constant angle of bank up to the stall (≈ 30° or less) c. Active rudder work to cancel yaw throughout d. Recover at the first indication of stall (buffet, pitch change, roll off) i. Just enough push to reattach airflow and silence stall warning ii. Do not chase roll off/changes in bank angle with the ailerons e. Set a level flight attitude, *keeping stall warning silent* ❑ Describe any illusions or disorientation	

Tips & Techniques

- Airplane behavior during climbing stalls can be more variable than during wings-level stalls. Differences in airplane design, pilot technique, angle of bank, and rudder coordination can affect the behavior. Assuming coordinated, climbing flight at a constant and shallow angle of bank, airplanes will *usually* roll toward wings level at the stall. This is called “over-the-top” stall behavior as the outside wing stalls first. The rate of roll “over the top” depends on things like left turning tendencies (faster roll to the left than to the right), as well as the pilot’s pitch rate into the stall (faster roll with a faster pitch rate/increased load factor).
- Even if the airplane rolls at the stall, the student must still push forward on the elevator control while using rudder to cancel yaw. When students get distracted by the roll, invariably they forget to push on the elevator. Emphasize good stall recovery discipline: *ignore the roll*; focus on forward elevator along with proper rudder use first. Reattach the airflow (i.e., push), then worry about fixing the angle of bank if necessary.
- As in the previous stall exercises, the purpose is to focus on sensing the stall and feeling the airflow grab the wing again during recovery. Hence, the reason for not messing with flap and power settings. And rather than doing full power-on stalls, the intermediate power setting makes things less dramatic and more manageable at this point.

Exploded view of skidded turns	
❑ Trim for a wings-level slow flight with flaps UP (carburetor heat as required) 1. Start a coordinated, level turn at a comfortable angle of bank (e.g., 20°) 2. Confirm the turn is proceeding "as it should" 3. Begin skidding the turn a. Smoothly feed in rudder in the direction of turn b. Observe and call out the instrument indications 4. Instructor calls, "Try to pull the nose up" a. Smoothly apply more aft elevator pressure b. Observe and call out the instrument indications c. Acknowledge an increase in G-load, if able 5. Instructor calls, "Stop skidding" a. Smoothly release the aft elevator and actively move your feet to remove the skid/cancel the yaw b. Smoothly Dutch roll to wings level c. Smoothly return to the level flight attitude	
Tips & Techniques • Apply the inputs smoothly and in sequence so you can see their individual effects on the turn and the recovery • Key takeaway: don't ever do this again!	
Spiral dives & recoveries	
❑ Trim for wings-level slow flight, flaps UP at 1.3V_S 1. Roll to a medium-steep bank AND ALLOW THE NOSE TO FALL BELOW THE HORIZON (don't fight it, let the nose fall!) 2. As the nose falls, instructor calls, "Try to pull the nose up" a. Smoothly apply more aft elevator pressure b. Observe and call out the instrument indications c. Feel the increase in G-load 3. Instructor calls, "Recover" a. Apply Power-Push-Roll recovery actions in sequence: i. Call "Power" as you reduce throttle to idle ii. Call "Push" as you release the aft elevator pressure iii. Call "Roll" as you smoothly but positively Dutch roll 4. Stop rolling as you approach wings level, then pitch to level flight a. You may need some forward pressure to slow the pitch rate to level flight since airspeed is now faster than the trim speed 5. Repeat in the opposite direction.	
Tips & Techniques • The instructor will talk you into and out of the first spiral or two, then talk you into a spiral or two, call "Recover" and have you talk-and-do your way out of them. • The "Roll" action is the main event in the recovery sequence; make it a coordinated Dutch roll.	

What's next

The next steps will be to:

1. Schedule and complete DO and FLY with qualified course instructors
2. Attend the virtual Course Debrief
3. Complete the post-course survey
4. Receive your well-earned acknowledgments