Chapter

Maneuvers

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References and Performance Standards obtained from the following:

FAR / AIM
FAA Commercial Pilot Practical Test Standards
FAA Airplane Flying Handbook
Piper PA-34-200 Seneca Pilot Information Manual

TRANSITION AIRSPEEDS

At times it may be desirable for flight crews to establish transition airspeeds other than the normal cruise airspeeds, usually when transitioning to or from the practice area and between maneuvers. These airspeeds will:

- decrease the amount of time spent getting to and from the practice areas
- increase the number of training procedures that can be accomplished in any one training event

Transitioning to and from practice area

Flight crews may establish airspeed of 130 KIAS in transit to or from the practice areas.

Transitioning between maneuvers

Flight crews may establish 100 KIAS between maneuvers.

CHECKLISTS AND CALLOUT DURING MANEUVERS

As described in this manual, flight crews are reminded that they shall execute appropriate checklists and perform the required callouts during all operations. Refer to Cockpit Crew Coordination Procedures chapter in this manual.

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TAXIING (AMEL)

Objective

Flight crews will develop the ability to taxi a multi-engine, complex airplane while minimizing the use of brakes and using differential thrust to maximum advantage.

CAUTION

Maximum taxi speed on aircraft parking ramp area shall be equivalent to slow walking speed.

Procedures description:

1. Both pilots shall check brakes immediately during the initial movement after engine startup, and before commencing further taxiing from any parking space.
2. When moving in a straight line, minimize use of brakes.
3. When attempting to slow down, first reduce power to idle, and only then apply additional brakes, if needed.
4. When attempting to turn, in general:

    - ✓ Reduce power on both engines to idle.
    - ✓ Apply full rudder (no brake) in the direction of turn to engage nosewheel steering
    - ✓ Add small amount of power on the engine opposite the direction of turn to create differential thrust for turning.
    - ✓ If turn radius is insufficient, apply appropriate brake pressure on the pedal in the direction of turn.

5. When discontinuing a turn, set the throttles evenly to eliminate differential thrust.
6. Prior to stopping after a turn, straighten the nosewheel by making both rudder pedals even with one another.
7. Always select appropriate taxi speed considering the possibility of brakes failure, and the consequent need to bring aircraft to a safe stop without using the brakes.

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PRE-MANEUVER CHECKLIST

Objective

Flight crews will use this procedure to prepare the aircraft for training maneuvers, while remaining in positive aircraft control and maintaining strict vigilance for traffic at all times.

CAUTION

This checklist shall be complete prior to starting any maneuver.

If multiple maneuvers are conducted in sequence, this checklist needs only be verified as complete during all subsequent maneuvers.

Procedure description:

1. Select an altitude that will allow for the maneuver to be recovered above the altitude specified for the maneuver.
2. Ensure that the airframe and aircraft (doors, windows) are secured.
3. Ensure that the seatbelts and harnesses are securely fastened and any baggage is secured.
4. Verify both fuel selectors are set to ON.
5. Set the cowl flaps as required to provide adequate engine cooling.
6. Ensure both mixtures are set as required for the conditions.
7. Set power to the Practice area setting (**19" MP / 2200 RPM)**
8. Verify that all engine instruments are indicating normal operation.
9. Verify both engines sets of magnetos are ON.
10. Verify that external lighting is set for maximum visibility.
11. Verify that the checklist has been completed by calling "Pre-Maneuver Checklist complete."

CAUTION

Conducting the Pre-Maneuver Checklist during clearing turns is PROHIBITED.

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CLEARING TURNS

Objective

Flight crews will conduct clearing turns in order to "see and be seen", while retaining positive aircraft control and dedicating their **undivided attention** to scanning for traffic.

WARNING

Clearing turns shall be conducted before each maneuver.

Clearing turns are to be performed VISUALLY (eyes outside), with the Flight Crew continuously scanning for traffic.

Procedure description:

1. Prior to initiation of Clearing Turns, ensure that Pre-Maneuver checklist has been completed.

CAUTION

Conducting the Pre-Maneuver Checklist during clearing turns is PROHIBITED.

2. Ensure that the immediate area is clear of obstructions and other aircraft by initiating a combination of turns, first to the left and then to the right.
3. Prior to starting a turn in any direction, ensure that there are no aircraft in the immediate area for the direction of the turn.
4. Pick a horizon reference off of left wing. Entering a medium banked left turn, execute a 90° heading change and roll out on your reference.
5. During the turn continuously scan the area above, below and ahead of the aircraft.
6. Repeat the process to the right, thereby returning to the original heading.
7. One continuous left 180° turn will also suffice as a clearing turn if the flight crew wishes to reverse direction.
8. Once both turns (or one 180° turn) are completed and the flight crew has determined that the area is clear of other aircraft and obstructions, the maneuver may be initiated.

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AIRPORT OPERATIONS

SAFETY CONSIDERATIONS AND SOPS

For any takeoff:

- ✓ BEFORE executing a takeoff, flight crews must ensure that the final approach and departure runway is clear at both controlled and non-controlled airports.
- ✓ Avoid fast taxi turns while entering the runway to prevent any possible fuel system unporting that could lead to engine hesitation or stoppage during takeoff.
- ✓ During takeoff, PF's hand shall remain on the throttles at all times in the event an aborted takeoff becomes necessary.
- ✓ Retract the landing gear only after determining that a forced landing on available runway or other suitable landing area is no longer an option.
- ✓ If a significant crosswind exists, hold the aircraft on the ground slightly longer than normal to ensure a smooth, positive liftoff.
- ✓ During strong gusty wind conditions, climb speeds should be increased by 1/2 the gust factor.
- ✓ Other than in an emergency, NO TURNS ARE TO BE MADE BELOW 400'AGL after takeoff.
- ✓ Turns after takeoff and during traffic pattern operations are limited to a maximum of 30° of bank, unless safety of flight necessitates exceptional maneuvering.

For all terminal and traffic pattern operations:

- ➢ If the airport is a non-controlled field and the runway in use cannot be determined before arrival, consider over-flying the airport at traffic pattern altitude +500' (minimum) to determine the active runway. Execute an appropriate downwind entry to the correct runway.

- Large and turbine aircraft frequently fly 1500' AGL patterns. Crossing 500' above typical piston-engine/small aircraft pattern altitude of 1000'AGL places small aircraft at 1500' AGL and may create a traffic conflict. Use sound judgment when selecting an over-flight altitude.
- Do NOT assume that lack of radio traffic at a non-towered field means a lack of other aircraft in the area. An aircraft may not be equipped with a radio, or may be transmitting on the wrong frequency.
- Straight-in VFR approaches to airports without an operating control tower are PROHIBITED. Flight crews may conduct a straight-in approach as part of an instrument approach procedure, provided it is not contrary to the active traffic pattern.

For any approach and landing:

- ✓ During gusty wind conditions, final approach speeds should be increased by ½ the gust factor (e.g. Approach = 78 KIAS, Winds = 15 KIAS, Gusts = 25 KIAS, Final Approach = 83 KIAS).
- ✓ Higher approach speeds and lower flap settings should be considered under turbulent air conditions.
- ✓ Avoid closing the throttle rapidly before the aircraft is ready for touchdown, as it will likely result in an immediate increase in the rate of descent and a hard landing.

TRAFFIC PATTERN (Departures, Arrivals and Closed Traffic)

Quick reference:

- **Closed traffic - Crosswind at TPA minus 300' (typical)**
- **Arriving from outside traffic pattern - TPA by 1 mile out, 100 KIAS**
- **Downwind leg – 100 KIAS (approx. 18" MP / 2500 RPM)**
- **Midfield – "Before Landing / Gear Down" flows**
- **Abeam landing point – 15" MP, flaps 10°, descent -500 FPM, 90 to 100 KIAS**
- **Base leg – flaps 25°, 90 KIAS**
- **Final approach leg – flaps full, 82 KIAS (or as appropriate)**
- **GUMP check – on base or final leg, no lower than 300' AGL**

Objective

Flight crews will develop the ability to safely conduct departures, arrivals and traffic pattern operations in a complex, multi-engine airplane.

Departure Procedures:

1. Perform the appropriate takeoff procedure as described in this chapter.
2. Continue climbing to TPA at **Vy (92 KIAS).**
3. Turn crosswind within **300'** of TPA, or as instructed by the control tower. Maintain Vy.

NOTE

If not remaining in the pattern, depart either straight out, on a **45°** ground track in the direction of the traffic pattern, or as instructed by the control tower.

For departures opposite to the established traffic pattern, continue climbing to at least **500'** above TPA prior to turning on course.

4. While climbing on crosswind leg and prior to turning downwind, maintain extra vigilance for other aircraft in the traffic pattern. Momentarily reduce the pitch attitude if necessary to visually clear the area.
5. Upon reaching TPA, and if remaining in the closed traffic pattern, turn downwind and set the power to maintain **100 KIAS** (approximately 18" MP / 2300 RPM)**.** Continue at **step 3** of the Arrival procedures.

Arrival procedures:

1. Once the active runway has been determined, establish the airplane on 45° to the middle point of the downwind leg, or as otherwise instructed by the control tower.
2. No later than by **1 mile** prior to reaching the downwind leg, establish TPA and slow down to **100 KIAS** (approximately 18" MP / 2300 RPM)**.**
3. At or just prior to downwind midfield, perform "Before Landing / Gear down" flows. Ensure the airspeed is below Vlo (down) (130 KIAS).
4. **Verify gear is down and locked and perform the appropriate callouts.**

5. At or just prior to abeam the intended landing point, reduce the power to approx. **15" MP,** and exten**d flaps to 10°.** Begin an approx. **500 FPM descent** and maintain **100 KIAS.**
6. At 45° to the intended landing point, or as directed by the control tower, turn BASE.
7. Ensure the airspeed remains below Vfe (108 KIAS) and set **flaps to 25°.** Maintain **90 KIAS.**
8. Visually CLEAR the final approach and opposite base leg before turning final.
9. On final approach, deploy full flaps (see the following note) and maintain **82 KIAS**, adding ½ the gust factor, as appropriate. Ensure the propellers are set to **FULL FORWARD.**
10. No lower than **300' AGL,** complete the **GUMP check** (GAS / UNDERCARRIAGE / MIXTURE / PROPS). This check may be completed on BASE or FINAL leg, as appropriate.

NOTE

Approaching in either CROSSWIND or HIGH WIND, use 25° of flaps

If crabbing into the wind, hold the crab angle until ready to flare. Taking the crab out too soon with the rudder by aligning with the runway centerline (wing-low method) will result in an aerodynamic slip and immediate drag increase, and may result in excessive sink rate, requiring large power addition to maintain airspeed and the glide path.

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TOUCH-AND-GO / STOP- AND- GO

Objective

Flight crews will develop the ability to safely transition into a takeoff configuration immediately after a landing, and execute an appropriate takeoff procedure in a complex, multi-engine airplane.

CAUTION

Touch and go operations are not to be conducted after a simulated single engine approach.

Procedures description:

1. Ensure that the required traffic pattern has been conducted, as specified in this chapter, as appropriate.
2. Perform an appropriate landing procedure as described in this manual.
3. Once on the runway, assure that the aircraft is in positive control at all times as the aircraft rolls down the runway (for a touch and go) or comes to a complete stop (for a stop and go).

NOTE

The term "positive control" shall be interpreted to mean that the aircraft is immediately correcting for and is maintaining centerline, with proper crosswind controls established and slowing down to a safe speed where the necessary transition steps to takeoff can be executed.

4. The PF will call out "FLAPS IDENTIFIED" and place the hand on the flap handle.
   - ✓ The PMF will call out "FLAPS VERIFIED" after verifying the PF action.
5. The PF will call out "FLAPS SET TO [actual degrees]" and set the flaps as appropriate.
   - ✓ The PMF will visually verify that flaps are set for takeoff, as appropriate.
6. The PF will call out "TRIM SET FOR TAKEOFF" and set the trim for takeoff.
   - ✓ The PMF will visually verify that trim is set for takeoff.
7. Execute the appropriate takeoff procedure as described in this manual.

NOTE

- Terminate Touch and Go operation and abort takeoff if either insufficient runway remains, the aircraft is not properly or timely configured for takeoff, or positive aircraft control is lost.
- In some aircraft, the possibility of confusing the flap lever with the landing gear lever exists, resulting in inadvertent gear retraction on the ground. This possibility is reduced in the BSU Piper Seneca due to the flap system utilizing a handle and not a switch/lever similar to a landing gear lever.
- **Regardless, in all complex aircraft, it is a good operating procedure to positively identify the flap control prior to raising the flaps on the ground.**

LOW APPROACH

Objective

Flight crews will develop the ability and judgment to intentionally discontinue a visual or an instrument approach immediately prior to touch down, and execute a rejected landing / go-around procedure in a multi-engine, complex airplane.

NOTE

This procedure may be requested by the flight crew or initiated by ATC.

Procedure description:

1. If on a simulated instrument approach at a towered airport, ensure that the flight crew is clear on the action required by ATC immediately following the low approach.
2. If on a simulated instrument approach at a non-towered airport, ensure that the intentions are transmitted on the appropriate frequency throughout the approach.
3. Plan and establish a stabilized approach to a runway, with the intention of **not** touching down.
4. Prior to where normal landing flare would take place, execute a go-around procedure, as described in this manual.
5. Communicate with ATC or on CTAF, as appropriate.
6. Verify the appropriate checklist flows.

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TAKEOFFS, LANDINGS AND GO-AROUNDS

NORMAL AND CROSSWIND TAKEOFF AND CLIMB

Objective

Flight crews will develop the ability to safely conduct a normal and/or crosswind takeoff and climb in a multi-engine, complex airplane.

Quick reference:

- **Flaps - 0°**
- **Rotate at Vr (74 KIAS)**
- **Climb at Vy (92 KIAS)**
- **Positive rate, no runway remaining and below Vlo (108 KIAS) – gear up**
- **500' AGL – Climb checklist**
- **1000' AGL – 25"/2500 RPM, or as required**

Procedures description:

1. At the hold short line, ensure the appropriate checklist is complete, **flaps set to 0° and trim set for takeoff.**
2. Contact the control tower for clearance, or at non-controlled airports, make a radio call.
3. Taxi the aircraft into position on the runway, while completing the final takeoff SOP items.
4. Check the windsock indications. Apply full ailerons into the wind if crosswind is present.
5. Set full throttle. As the aircraft begins to accelerate, check and ensure that all engine instruments are indicating normal and that the engine is producing 100% power, appropriate to the airport elevation.
6. As the aircraft accelerates, verify airspeed indicator is functioning normally.
7. Adjust the ailerons pressure into the wind, as needed, to control drift, and utilize rudder pedal steering to maintain runway centerline.
8. At manufacturer recommended airspeed (**74 KIAS)**, rotate to establish a V_Y climb attitude and accelerate to **Vy** airspeed (**92 KIAS)**.
9. As the aircraft rotates with the ailerons adjusted into the crosswind, the downwind wing will rise first and the downwind main wheel will lift off first.
10. Once the aircraft rotates, crab into the wind to maintain runway centerline.
11. After establishing a positive rate of climb, and out of usable landing area, the PF shall gently apply brake pressure to stop wheel rotation, and retract the landing gear. Ensure that the airspeed is below $\mathbf{V_{lo\ (up)}}$ **(108 KIAS)** prior to retracting the gear.
12. Maintain runway centerline and an extended centerline ground track while crabbing into the wind with the aircraft coordinated.
13. At **500' AGL**, initiate the "Climb" checklist. At **1000' AGL**, reduce power to **25" MP / 2500 RPM**, by first reducing the throttle, followed by the propellers.
14. ONE AT A TIME, turn the fuel pumps OFF. Turn the LEFT pump off first, while monitoring the LEFT fuel pressure and the LEFT engine performance indications. If no abnormalities are noted, turn off the RIGHT fuel pump, following the same procedure.

15. Continue climbing at **Vy** (**92 KIAS)** or **V_{climb}** (**104 KIAS**), as appropriate.
16. Monitor engine temperatures in climb and adjust the cowl flaps if necessary.

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NORMAL AND CROSSWIND APPROACH AND LANDING

Objective

Flight crews will develop the ability to safely and accurately execute approach, landing and roll out in a multi-engine, complex airplane, under both normal and crosswind conditions.

Quick reference:

- **Conduct traffic pattern, as appropriate (see previous)**
- **Final approach leg – flaps full, 82 KIAS (or as appropriate)**
- **GUMP check – on base or final leg, no later than 300' AGL**

Procedures description:

1. Ensure that the required traffic pattern has been conducted, as specified in this chapter.
2. Adjust the final approach speed by adding ½ the gust factor, if appropriate, to the normal approach speed of **82 KIAS.**
3. Select the appropriate final flap setting based on the wind conditions (refer to Traffic Pattern Operations)

NOTE

If reduced flap setting is used due to crosswind conditions, take into account the increased landing distance requirements and ensure adequate runway distance exists.

4. Ensure that the aircraft is on **a stabilized approach** with a final flap setting prior to reaching **300' AGL**.
5. Complete the **GUMP check** before descending below **300' AGL**. (Refer to Traffic Pattern Operations)
6. Crab into the wind to remain on extended runway centerline.
7. Coordinate pitch and power so as to maintain and the desired approach angle resulting in a smooth landing within the designated area.
8. Transitioning to flare, correct for crosswind by aligning the airplane with runway centerline using the rudder, and maintaining the airplane over the centerline with the ailerons (the wing-low method). Maintain this crosswind correction throughout the flare.
9. During flare, slow the aircraft descent rate by simultaneously increasing the pitch and smoothly reducing the power to idle, while holding the established crosswind correction, so that the aircraft touches down smoothly onto the runway on the main gear at the designated touchdown point.

CAUTION

Avoid closing the throttle rapidly before the aircraft is ready for touchdown, as it will likely result in an immediate increase in the rate of descent and a hard landing.

10. Use of proper crosswind correction will result in the airplane touching down while banking slightly, on the upwind main gear first, followed by the downwind gear and then the nosewheel, all the while remaining over and aligned with the runway centerline.
11. Continue "flying the plane" immediately after touchdown. Gently lower the nosewheel and continue deflecting the ailerons into the wind, adjusting the rudder pressures as the airplane slows down.
12. Maintain back pressure on the yoke throughout the landing roll to avoid hard touchdown of the nose wheel. During the landing roll, crosswind correction inputs will have to be increased due to decreased control effectiveness as the airspeed decreases.
13. Maintain the aircraft's longitudinal axis with the centerline, and slow the aircraft by applying the brakes as necessary.
14. Slow the aircraft to a safe taxi speed and taxi off the runway.

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SHORT-FIELD TAKEOFF AND MAX PERFORMANCE CLIMB (No flaps)

Objective

Flight crews will develop the ability to safely conduct a short-field takeoff and maximum performance climb in a multi-engine, complex airplane, in order to clear any obstacles in the flight path, while executing required procedures.

Quick reference:

- **Flaps - 0°**
- **Maximize runway distance**
- **Hold brakes, set full power, check instruments – only then release brakes**
- **Rotate at Vr (74 KIAS)**
- **Climb at Vx (78 KIAS) until clear of obstacles**
- **Positive rate, no runway remaining and below Vlo (108 KIAS) – gear up**
- **When clear of obstacle, climb at Vy (92 KIAS)**
- **500' AGL – Climb checklist**
- **1000' AGL – 25"/2500 RPM, or as required**

Procedures description:

1. At the hold short line, ensure the appropriate checklist is complete, **flaps set to 0° and trim set for takeoff.**
2. Contact the control tower for clearance, or at non-controlled airports, make a radio call. In both cases, request or announce a short delay (on the runway).
3. Taxi the aircraft into position on the runway, while completing the final takeoff SOP items. Get as close to the approach end of the runway as possible to maximize available takeoff distance.
4. Check the windsock indications. Apply full ailerons into the wind if crosswind is present.
5. Apply and hold brakes to prevent aircraft movement. Smoothly and positively set full throttle. Check that both engines' instruments display normal readings and 100% power appropriate to the airport elevation.
6. Release the brakes, allowing the aircraft to accelerate. Check that the airspeed indicator is functioning.
7. Adjust the ailerons pressure into the wind, as needed, to control drift, and utilize rudder pedal steering to maintain runway centerline.
8. At manufacturer recommended airspeed (**74 KIAS)**, rotate to establish a V_x climb attitude and accelerate to Vx airspeed (**78 KIAS)**.
9. As the aircraft rotates with the ailerons adjusted into the crosswind, the downwind wing will rise first and the downwind main wheel will lift off first. Once airborne, crab into the wind to maintain runway centerline.
10. Maintain V_x until all obstacles have been cleared. Once clear of the obstacles, establish a V_y climb attitude and accelerate to Vy airspeed (**92 KIAS**).
11. After establishing a positive rate of climb, out of usable landing area and below $V_{lo\ (up)}$ **(108 KIAS),** apply brake pressure to stop wheel rotation and retract the landing gear.
12. Maintain runway centerline and an extended centerline ground track using coordinated rudder and aileron control inputs, while crabbing into the wind, as appropriate.

13. At **500' AGL**, initiate the "Climb" checklist, continue climbing and verify full power is set and being achieved. Above **1000' AGL**, smoothly reduce power to **25"/2500 RPM**, by first reducing the throttles followed by the propellers.
14. ONE AT A TIME, turn the fuel pumps OFF. Turn the LEFT pump off first, while monitoring the LEFT fuel pressure prior to turning off the RIGHT fuel pump.
15. Continue climbing at **Vy (92 KIAS)** or **V_{climb} (104 KIAS**), as appropriate.
16. Monitor engine temperatures in climb and adjust the cowl flaps if necessary.

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SHORT-FIELD APPROACH AND LANDING

Objective

Flight crews will develop the ability to safely and accurately execute a short-field, maximum performance approach and landing in a multi-engine, complex airplane.

Quick reference:

- **Conduct traffic pattern, as appropriate (see previous)**
- **Final approach leg – flaps full, 76 KIAS (or as appropriate)**
- **GUMP check – on base or final leg, no later than 300' AGL**

Procedures description:

1. Ensure that the required traffic pattern has been conducted, as specified in this chapter.
2. If crosswind is present, apply the crosswind techniques as described in "Normal and Crosswind approach and landing" throughout the procedure.
3. Adjust the final approach speed by adding ½ the gust factor, if appropriate, to the **short field approach speed of 76 KIAS.**
4. Select the appropriate final flap setting based on the wind conditions (refer to Traffic Pattern Operations)

NOTE

If reduced flap setting is used due to crosswind conditions, take into account the increased landing distance requirements and ensure adequate runway distance exists.

5. Ensure that the aircraft is on **a stabilized approach** with a final flap setting prior to reaching **300' AGL**.
6. Complete the **GUMP check** before descending below **300' AGL**. (Refer to Traffic Pattern Operations)
7. Coordinate pitch and power so as to maintain and the desired approach angle resulting in a smooth landing within the designated area.
8. During flare, slow the aircraft descent rate by simultaneously increasing the pitch and smoothly reducing the power to idle, so that the aircraft touches down smoothly onto the runway on the main gear at the designated touchdown point.

CAUTION

Avoid closing the throttle rapidly before the aircraft is ready for touchdown, as it will likely result in an immediate increase in the rate of descent and a hard landing.

9. Immediately after touchdown, raise the flaps. Continue applying backpressure to the yoke adjusting the rudder pressures as the airplane slows down. Apply maximum braking without locking up the wheels.

NOTE

The term "maximum braking" shall be interpreted to mean maximum available braking that result in the aircraft coming to as rapid a stop as practical, under positive control without locking the brakes and damaging or blowing a tire.

10. Maintain increasing back pressure on the yoke throughout the landing roll to avoid hard touchdown of the nose wheel and to maximize aerodynamic braking.
11. Slow the aircraft to a safe taxi speed and taxi off the runway.

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GO-AROUND / REJECTED LANDING

Objective

Flight crews will develop the ability to reach a timely go-around decision and smoothly execute a rejected landing / go-around procedure in a multi-engine, complex airplane

Quick reference – remember the C's:

- **Cram – Full power (Mixtures/Props/Throttles forward, in that order)**
- **Climb – Establish appropriate pitch attitude, maintain Vx or Vy, as appropriate**
- **Clean – Flaps 25° immediately, then as appropriate; Positive rate of climb – gear up**
- **Call – announce go-around on radio**
- **Cool – set cowl flaps, as appropriate (typically open)**
- **Care – set power and propellers, as appropriate**
- **Checklist – verify the appropriate checklist flows**

WARNING

- Practice single engine go-around procedures (using only one engine) are prohibited.
- In an actual single engine situation following an actual engine failure, full power on the operating engine may not be enough to allow for a climb or even level flight at a safe airspeed. **A single engine go-around may be impossible.**
- Directional control and a safe airspeed must be maintained at all times. **In situations where level flight or single-engine climb cannot be sustained, a descent must be accepted to maintain aircraft control.**

Procedures description:

1. Once the decision has been made to initiate a go-around / rejected landing, simultaneously establish a level pitch attitude, apply full power (Mixtures, Props, Throttles - ALL forward in that order), level the wings, and establish a Vx or Vy attitude to initiate a climb.
2. Immediately set flaps 25° (if fully extended). Establish a positive rate of climb.
3. Once established in a positive climb and out of usable runway, retract the landing gear.

NOTE

During two-engine go-around, flight crews should use V_X climb airspeed and flaps at 25° if obstacle clearance is required and until all obstacles have been cleared.

4. When clear of obstacles and above **80 KIAS,** retract flaps to 10° and establish Vy pitch attitude.
5. Above **90 KIAS,** retract flaps to 0° and establish a Vy climb at **92 KIAS.**
6. When aircraft is under complete control and safely established in a climb, transmit the go-around intentions on the radio, as appropriate.

7. Open or adjust cowl flaps, as required, to maintain proper engine cooling.
8. If no aircraft is on the runway or departing, climb straight over the runway and maintain ground track along the runway extended centerline using coordinated rudder and aileron control inputs.
9. If an aircraft is on the runway or taking off, alter course to the right, or as directed by the control tower, while keeping the departing aircraft in sight.
10. Set the power and propellers for traffic pattern operations, or as required.
11. Perform the Climb Checklist flow and complete the checklist as soon as practical.

CAUTION

Flight crews are cautioned about altering course toward a parallel runway unless authorized to do so by the control tower, due to the possibility of midair conflicts with other aircraft.

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SLOW FLIGHT AND STALLS

MANEUVERING DURING SLOW FLIGHT

(Clean Configuration: Gear UP, Flaps UP)

Objective

Flight crews will develop the ability to recognize changes in the aircraft flight characteristics and control effectiveness at critically slow airspeeds in various configurations, while maintaining positive aircraft control, altitudes and headings, as specified.

WARNING

The minimum altitude during any portion of this maneuver is **3,000' AGL**

Single engine slow flight is **prohibited.**

Quick reference:

- **Maintain altitude and heading**
- **Throttles - approx. 14" MP**
- **105 KIAS and slowing – propellers full forward**
- **Approaching MCA – throttles approx. 17" MP**

Procedures description:

1. Brief Vmc, aircraft configuration and the expected stall speed, as appropriate.
2. Ensure that all pre-maneuver checklist items, clearing turns and a radio call are complete, as specified.
3. Configure the aircraft for straight-and-level flight. Choose a visual reference point on the horizon and note the heading to maintain during the maneuver.
4. Set the throttle to **14" MP.** During the power reduction, maintain altitude by smoothly increasing pitch as airspeed decreases. Trim the aircraft as necessary.
5. Adjust cowl flaps, as required. As the aircraft slows below **105 KIAS**, set the propellers to **FULL INCREASE.**
6. Approaching slow flight airspeed, increase the power to approximately **17" MP** (this setting will vary). Maintain airspeed and altitude by adjusting pitch and power.

NOTE

The required power setting to maintain slow flight airspeed will vary depending on aircraft weight, loading and density altitude.

7. Perform straight-and-level flight, turns, climbs and descents using specified bank angles while maintaining flight at minimum airspeed.
8. Recover the maneuver by smoothly applying power, adjust pitch to maintain the altitude as the airspeed increases, and trim the aircraft as necessary.
9. Resume cruising at PX area power setting (**19" MP/2200 RPM)** or as specified.

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MANEUVERING DURING SLOW FLIGHT

(Landing Configuration: Flaps DOWN, Gear DOWN)

Objective

Flight crews will develop the ability to recognize changes in the aircraft flight characteristics and control effectiveness at critically slow airspeeds in various configurations, while maintaining positive aircraft control, altitudes and headings, as specified.

WARNING

The minimum altitude during any portion of this maneuver is **3,000' AGL**

Single engine slow flight is **prohibited.**

Quick reference:

- **Maintain altitude and heading**
- **Throttles - approx. 14" MP**
- **V_{lo} (130 KIAS) and below – gear down**
- **V_{fe} (108 KIAS) and below – flaps down in increments, until full**
- **105 KIAS and slowing – propellers full forward**
- **Approaching MCA – throttles approx. 18" MP**
- **Recovery:**
  - **Full power**
  - **Flaps from full to 25°**
  - **Landing gear up**
  - **Passing 80 KIAS – Flaps from 25° to 10°**
  - **Passing 90 KIAS – Flaps from 10° to 0°**

Procedures description:

1. Brief V_{mc}, aircraft configuration and the expected stall speed, as appropriate.
2. Ensure that all pre-maneuver checklist items, clearing turns and a radio call are complete, as specified.
3. Configure the aircraft for straight-and-level flight and choose a reference point on the horizon and heading to begin the maneuver.
4. Set the throttle to **14" MP.** During the power reduction, maintain altitude by smoothly increasing pitch as airspeed decreases. Trim the aircraft as necessary.
5. Extend the landing gear below $V_{lo(down)}$ **(130 KIAS)**
6. Below Vfe **(108 KIAS)**, smoothly add full flaps, in increments.
7. Adjust cowl flaps, as required. As the aircraft slows below **105 KIAS**, set the propeller to **FULL INCREASE.**
8. Approaching slow flight airspeed, increase the power to approximately **18" MP** (this setting will vary). Maintain airspeed and altitude by adjusting pitch and power.

NOTE

The required power setting to maintain slow flight airspeed will vary depending on aircraft weight, loading and density altitude.

9. Perform straight-and-level flight, turns, climbs and descents using specified bank angles while maintaining flight at minimum airspeed.
10. Recover the maneuver by smoothly applying full power, immediately bringing **flaps to 25° and landing gear UP.** Adjust pitch to maintain the altitude as the airspeed increases, and trim the aircraft as necessary.
11. As the airplane accelerates through **80 KIAS,** retract **flaps to 10°.** Passing through **90 KIAS** retract flaps to **0°.**
12. Resume cruising at PX area power setting (**19" MP/2200 RPM)** or as specified.

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POWER-ON STALL (Clean Configuration: Gear UP, Flaps UP)

Objective

Flight crews develop the ability to recognize changes in the aircraft flight characteristics and control effectiveness as the stall approaches in the power-on (take-off and climb) configuration, and to make prompt and effective recovery either before the stall occurs (imminent stall recovery) or after the stall occurs (full stall recovery).

WARNING

The minimum altitude during any portion of this maneuver is **3,000' AGL**

Loss of altitude during stalls may be as much as **600'**

Single engine stalls are **prohibited.**

Quick reference:

- **Maintain altitude and heading on entry**
- **Mixtures – full rich**
- **Propellers – 2500 RPM**
- **Power – 17" MP**
- **At V_y (92 KIAS) – throttles to 19" MP**
- **Pitch up to approx. 15° nose up to simulate over-rotation / excessive climb pitch**
- **Maintain heading or set angle of bank, as specified**
- **Continue maintaining the pitch and induce imminent or full stall, as specified**

Procedure description:

1. Brief Vmc, aircraft configuration and the expected stall speed, as appropriate.
2. Ensure that all pre-maneuver checklist items, clearing turns and a radio call are complete, as specified.
3. Configure the aircraft for straight-and-level flight and choose a reference point on the horizon and heading to begin the maneuver.
4. Set mixture to **FULL RICH,** propellers to **2500 RPM,** and set the power to **17" MP.** During the airspeed reduction, maintain altitude by smoothly increasing pitch as airspeed decreases. Trim the aircraft as necessary.
5. Approaching Vy (**92 KIAS)**, increase the power to **19" MP.** Simultaneously, pitch up to **15°.** Maintain original heading or set up to **20°** of bank, left or right, as specified.

NOTE

Turning stalls to the left/ right are accomplished with a maximum bank angle of 20°

6. Continue simulating excessive pitch attitude that can occur after rotation / during climb. Maintain the aircraft pitch attitude that will induce a stall by smoothly increasing backpressure as airspeed decreases until stall occurs.
7. Recover from **IMMINENT STALL** or from **FULL STALL,** as specified.

NOTE

- **IMMINENT STALL:** Buffeting, stall warning horn, or rapid decay of control effectiveness (whichever occurs first); The aircraft is ABOUT to stall.
- **FULL STALL:** A sudden loss of control effectiveness, excessive sink rate, or sudden decrease in pitch attitude; The aircraft HAS stalled.

8. Initiate a recovery by promptly decreasing the angle of attack. Simultaneously, apply full power to minimize altitude loss. If appropriate, level the wings.
9. Once the aircraft is no longer stalled, pitch for an attitude that ensures a minimal loss of altitude and positive climb rate. Maintain positive climb rate and pitch for **Vx** or **Vy**, as appropriate, to simulate climbing away from approaching terrain.
10. Return to the specified altitude, airspeed and heading. Resume cruising at PX area power setting (**19" MP/2200 RPM)** or as specified.

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POWER-OFF STALL (Landing Configuration: Gear DOWN, Flaps DOWN)

Objective

Flight crews develop the ability to recognize changes in the aircraft flight characteristics and control effectiveness as the stall approaches in the power-off (approach and landing) configuration, and to make prompt and effective recovery either before the stall occurs (imminent stall recovery) or after the stall occurs (full stall recovery).

WARNING

The minimum altitude during any portion of this maneuver is **3,000' AGL**

Loss of altitude during stalls may be as much as **600'**

Single engine stalls are **prohibited.**

Quick reference:

- **Maintain altitude and heading on entry**
- **Mixtures – full rich**
- **Power – 17" MP**
- **V_{lo} (130 KIAS) and below – gear down**
- **V_{fe} (108 KIAS) and below – flaps down in increments, until full**
- **105 KIAS and slowing – propellers full forward**
- **At V_y (92 KIAS) – throttles IDLE**
- **Establish normal approach to a simulated runway**
- **Maintain heading or set angle of bank, as specified**
- **Simulate flare and induce imminent or full stall, as specified**
- **Recovery:**
  - **Reduce the angle of attack, full power, then level the wings**
  - **Flaps from full to 25°**
  - **Establish V_X or V_Y pitch attitude to climb away from simulated terrain**
  - **Positive rate of climb - landing gear up below $V_{LO(UP)}$**
  - **Passing 80 KIAS – Flaps from 25° to 10°**
  - **Passing 90 KIAS – Flaps from 10° to 0°**

Procedures description:

1. Brief Vmc, aircraft configuration and the expected stall speed, as appropriate.
2. Ensure that all pre-maneuver checklist items, clearing turns and a radio call are complete, as specified.
3. Configure the aircraft for straight-and-level flight and choose a reference point on the horizon and heading to begin the maneuver.

4. Set mixture to **FULL RICH** and the power to **17" MP.** During the airspeed reduction, maintain altitude by smoothly increasing pitch as airspeed decreases. Trim the aircraft as necessary.
5. Below $V_{lo\ (DOWN)}$ **(130 KIAS)** bring landing gear **DOWN**.
6. Below V_{fe} (**108 KIAS)** smoothly set **FULL flaps**, in increments.
7. Below **105 KIAS** set propellers to **FULL FORWARD.**
8. Approaching **92 KIAS**, reduce throttle to **IDLE.** Simultaneously, while maintaining **92 KIAS,** establish a landing approach to a simulated runway**.** Maintain original heading or set up to **20°** of bank, left or right, as specified.

NOTE

Turning stalls to the left/ right are accomplished with a maximum bank angle of 20°

9. Simulate landing flare. Establish aircraft pitch attitude that will induce a stall, by smoothly increasing backpressure as airspeed decreases, until stall occurs.
10. Recover from **IMMINENT STALL** or from **FULL STALL,** as specified.

NOTE

- **IMMINENT STALL:** Buffeting, stall warning horn, or rapid decay of control effectiveness (whichever occurs first); The aircraft is ABOUT to stall.
- **FULL STALL:** A sudden loss of control effectiveness, excessive sink rate, or sudden decrease in pitch attitude; The aircraft HAS stalled.

11. Initiate a recovery by promptly decreasing the angle of attack. Simultaneously, apply full power to minimize altitude loss. If appropriate, level the wings.
12. Once the aircraft is no longer stalled, retract flaps to **25°** and pitch for an attitude that ensures a minimal loss of altitude and positive climb rate. Maintain positive climb rate and pitch for **Vx** or **Vy**, as appropriate, to simulate climbing away from approaching terrain.
13. When positive rate of climb is established, bring landing gear **UP.** Ensure that the landing gear is retracted before reaching $V_{lo(UP)}$ **(108 KIAS)**
14. Above **80 KIAS**, retract flaps **to 10°**.
15. As the airplane accelerates in the climb and past **90 KIAS,** retract flaps to **0°.**
16. Return to the specified altitude, airspeed and heading. Resume cruising at PX area power setting (**19" MP/2200 RPM)** or as specified.

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SPIN AWARENESS (Unintentional spin avoidance and recovery only)

WARNING

The PA-34-200 Seneca is NOT certified for spins.

Intentional spins are PROHIBITED.

The following guidance is for unintentional spin recovery only.

It is not to be practiced or demonstrated in the actual aircraft.

Objective

Flight crews will develop knowledge regarding situations where unintentional spins may occur, and the procedures for recovery from such unintentional spins.

Procedure description:

1. Avoid situations where unintentional spins may occur, such as approaches to stalls with single engine inoperative, single engine slow flight, prolonged flight below Vmc and uncoordinated flight. If an unintentional spin does occur, perform the following steps in accordance with manufacturer recommendations.
2. Retard both **throttles to IDLE.**
3. **Full rudder** in the direction **OPPOSITE of rotation.**
4. Release all backpressure and, if the nose does not drop immediately, apply **yoke FULL FORWARD.**
5. Maintain **ailerons** in **NEUTRAL** position.
6. **HOLD ALLTHE CONTROLS** in their respective positions **UNTIL ROTATION STOPS,** then neutralize the rudder.
7. **RECOVER from the resulting dive** with smooth backpressure on the yoke.
8. **Avoid abrupt control movement** during dive recovery, as to not exceed the positive limit load factor.

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PERFORMANCE MANEUVER(s)

STEEP TURNS

Objective

Flight crews will develop the ability to turn the airplane at steep angles of bank, while maintaining altitude, coordination and division of attention between the primary outside visual references and secondary aircraft supporting instruments.

Quick reference:

- **Power – approx. 20" MP / 2300 RPM**
- **Maintain V_A or 110 KIAS, whichever is less**
- **Add power (approx. 22") and backpressure rolling into the turn**
- **Complete 360° level left turn at 50° of bank**
- **Reduce power and pitch rolling out of the left turn**
- **Immediately transit into the right turn with no level flight in-between**
- **Add power and backpressure rolling into the turn**
- **Complete 360° level right turn at 50° of bank**
- **Maintain original altitude, heading and airspeed on recovery**

Procedure description:

1. Select an altitude that will allow for the maneuver to be recovered above **1500' AGL.**
2. The maneuver will consist of two **360^0 turns** in opposite directions, commencing with the left turn first, followed immediately by the right turn with the rollout on the original heading.
3. Ensure that all pre-maneuver checklist items, clearing turns and a radio call are complete, as specified.
4. Configure the aircraft for straight-and-level flight at **Va (maneuvering speed)** for the actual aircraft weight, **or 110 KIAS,** whichever airspeed is less **(approximately 20" MP / 2300 RPM).**
5. Set the cowl flaps as required for engine cooling.
6. Choose a primary visual reference point on the horizon, and note the corresponding heading as a secondary backup.

WARNING

Flight crews will ensure that the aircraft remains **below <u>actual</u> V_A** for the aircraft weight at all times to avoid exceeding aircraft load limits.

7. Smoothly roll the aircraft into 50° (Commercial PTS) bank level left turn. Trim as necessary.
8. As the **bank** passes **through 30°** set the throttle to approximately **22" MP** and adjust power as necessary to maintain the entry airspeed from step 3 throughout the maneuver.

9. As the bank angle increases, apply back pressure on the yoke as necessary to maintain constant altitude, and control airspeed by smooth power adjustments.
10. Maintain a constant bank angle, altitude and airspeed during the turn.
11. Smoothly initiate the **rollout** approximately ½ **the bank angle** prior to the desired rollout heading (50° of bank would result in initiating the rollout approximately 25° prior to the desired heading).
12. During the rollout, **relax control pressure** used to maintain altitude during the turn, and **reduce power** to the initial entry power setting.
13. Smoothly and positively roll into a level **turn to the right**. Repeat the procedures from Steps 6 through 10 to complete 360 degrees of turn to the right. Upon completion of the right turn, return to the initial entry heading. Trim as necessary.
14. During the final rollout, **relax control pressure** used to maintain altitude during the turn, and **reduce power** to the initial entry power setting. Continue maintaining original entry airspeed, altitude and heading.
15. Resume PX Area cruise settings (**19" MP / 2200 RPM)**, or as specified.

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EMERGENCY AND MULTIENGINE OPERATIONS

ENGINE FAILURE DURING TAKEOFF BEFORE V_{MC}

Objective

Flight crews will develop the ability to identify engine failure during takeoff roll prior to reaching $V_{MC,}$ and to safely discontinue the takeoff prior to liftoff.

Procedure description:

1. At some point during the takeoff roll, engine failure will be simulated by the instructor.

WARNING

Instructors shall only simulate an engine failure during takeoff roll

before reaching 50% of the calculated V_{MC}

2. Reduce both throttles to idle immediately.
3. As appropriate for runway conditions, apply brakes.
4. Maintain backpressure on the yoke to reduce the load on the nose wheel and provide aerodynamic braking.
5. Maintain runway centerline with rudder, and adjust ailerons for crosswind conditions, as appropriate.
6. Bring the airplane safely to a complete stop as soon as possible.

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ENGINE FAILURE AFTER LIFTOFF

Objective

Flight crews will develop the ability to identify engine failure shortly after liftoff, to follow the appropriate procedures while maintaining positive aircraft control, to identify the best course of action and to bring the flight to a successful outcome.

Procedure description:

1. At some point shortly after liftoff, engine failure will be simulated by the instructor.

WARNING

- SIMULATED ENGINE FAILURES WILL NOT BE PRACTICED BELOW **Vsse (92 KIAS)**
- SIMULATED ENGINE FAILURES **BELOW 3,000 feet AGL** WILL BE ACCOMPLISHED WITH **THROTTLE ONLY**
- SIMULATED ENGINE FEATHERING BELOW 3,000 feet AGL WILL BE ACCOMPLISHED WITH ZERO THRUST SETTING ONLY (approx. 11" MP)

2. If adequate runway length remains, landing on the remaining runway may be the best option.
3. If inadvisable to land on the remaining runway, perform the steps 1 through 3 of the "Maneuvering with one engine inoperative" procedure of this manual. Immediately simulate feathering the engine if below 1,000' AGL.
4. Pitch for the best single engine rate of climb airspeed **V_{YSE} (92 KIAS**) if no obstacles present, or best single engine angle of climb **V_{XSE} (86 KIAS)** with actual or simulated obstacles.
5. Adjust the controls for best single engine performance, and, once the obstacles have been cleared, maintain **V_{YSE} (92 KIAS**) for best rate of climb, or, if climb is not possible, to minimize the descent rate.
6. Evaluate airplane performance and the possibility of returning to the airport.
   - ✓ If airplane performance is satisfactory, continue straight ahead until safe altitude is reached to commence turning back to the airport.
   - o If the airplane performance is unsatisfactory, plan to land on the most suitable area ahead.
7. Secure the inoperative engine and complete the appropriate emergency checklist as time permits.
8. Perform "Approach and landing with an inoperative engine" procedure of this manual, starting at Step 3.

APPROACH AND LANDING WITH AN INOPERATIVE ENGINE

Objective

Flight crews will develop the ability to recognize an engine failure while approaching to land in or near the traffic pattern, maintain positive aircraft control and perform a safe single engine approach and landing.

WARNING

- SIMULATED ENGINE FAILURES WILL NOT BE PRACTICED BELOW **Vsse (92 KIAS)**
- SIMULATED ENGINE FAILURES **BELOW 3,000 feet AGL** WILL BE ACCOMPLISHED WITH **THROTTLE ONLY**
- SIMULATED ENGINE FEATHERING BELOW 3,000 feet AGL WILL BE ACCOMPLISHED WITH ZERO THRUST SETTING ONLY (approx. 11" MP)
- MAXIMUM SINGLE ENGINE APPROACH **FLAP SETTING – 25º**
- **NO TOUCH AND GO, LOW APPROACH or MISSED APPROACH** WILL BE PERFORMED AFTER COMPLETION OF A SINGLE ENGINE APPROACH AND/OR LANDING.

Procedures description:

1. At some point, engine failure will be simulated by the instructor retarding one throttle.
2. Perform the steps 1 through 3 of the "Engine Failure During Flight / Maneuvering With One Engine Inoperative" procedure of this manual.

NOTE

Instructors will inform ATC about the simulated emergency

using "simulated single engine" terminology.

3. Fly a normal traffic pattern as conditions and the airplane performance permit

   (Refer to "Traffic pattern operations" in this manual).

4. On final approach, maintain manufacturer recommended single engine final approach speed **$V_{REF(SE)}$ (92 KIAS)**
5. When assured of making the runway:
   a. Extend the landing gear
   b. Extend the flaps (not to exceed **25º**)
   c. Complete the appropriate callouts
6. Execute a normal landing (Refer to "Normal and crosswind approach and landing" in this manual)

ENGINE INOPERATIVE BEST RATE OF CLIMB DEMO (Vyse DEMO)

Objective

Flight crews will develop the ability to initiate best rate climb with one engine inoperative. The maneuver will conducted with both left and right engine inoperative. This maneuver is not required for the practical test but is used to gain a better understanding of multi-engine aircraft control.

WARNING

- SIMULATED ENGINE FAILURES WILL NOT BE PRACTICED BELOW **Vsse (92 KIAS).**
- SIMULATED ENGINE FAILURES **BELOW 3,000 feet AGL** WILL BE ACCOMPLISHED WITH **THROTTLE ONLY**
- SIMULATED ENGINE FEATHERING BELOW **3,000 feet AGL** WILL BE ACCOMPLISHED WITH ZERO THRUST SETTING ONLY (approx. **11" MP**)
- ABOVE 3,000 FEET AGL AND NEAR A SUITABLE AIRPORT THAT CAN BE REACHED ON A SINGLE OPERATING ENGINE FOR ADDED MARGIN OF SAFETY, ACTUAL ENGINE FEATHERING MAY BE DIRECTED BY THE INSTRUCTOR.

Quick reference:

- **Mixtures-Full Rich**
- **Power- 15" MP**
- **Props full forward-below 105 KIAS**
- **Establish and maintain 91 KIAS (Blue Line)**
- **Set zero thrust (Approx 11"MP) and close cowl flap.**
- **Set opposite throttle to full**
- **Hold heading and note VSI**
- **Set flaps to 10 °, note VSI**
- **Set flaps to 25 °, note VSI**
- **Set flaps to 40 °, note VSI**
- **Extend gear, note VSI**
- **Set select engine to idle, hold heading, maintain 91 KIAS, note VSI**
- **Retract gear, note VSI**
- **Retract flaps increments, note VSI each increment**
- **Recovery:**
  - **Reduce angle of attack, and**
  - **Add power to 15" MP on inoperative engine, monitor CHT**
  - **CHT in green resume normal operations**

Procedure description:

1. Brief Vyse, aircraft configuration and recovery procedures in the event of either directional control loss, or approach to a stall indication.
2. Set throttles to 15" MP while maintaining heading and altitude.
3. Smoothly add Propeller controls full forward below 105 KIAS.
4. Establish and maintain 91 KIAS(Blue line), trimming as necessary.
5. Set zero thrust on the desired engine. The zero thrust power setting is approx. 11" MP. Note the CHT and adjust cowl flaps as necessary.
6. Set the operative engine to full power. Maintain heading and note the VSI for aircraft performance in this desired configuration.
7. Add each notch of flaps one at a time, noting the VSI for aircraft performance in this desired configuration.
8. Extend the landing gear, note the VSI for aircraft performance in this desired configuration.
9. Set the inoperative engine to idle, maintain heading and 91 KIAS, noting the VSI for aircraft performance.
10. Retract the landing gear, note the VSI for aircraft performance.
11. Rectract the flaps one notch at a time, noting the VSI for aircraft performance in this desired configuration.
12. The recovery for the maneuver is reduce the angle of attack, smoothly add the power on the inoperative engine to 15"MP and monitor the CHT. Once the CHT on the inoperative engine has reached the green arc normal operations and power settings may commence.

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ENGINE INOPERATIVE LOSS OF DIRECTIONAL CONTROL DEMO (V_{MC} demo)

Objective

Flight crews will develop the ability to recognize indications of the approaching loss of directional control and/or stall as the airplane approaches Vmc with one engine inoperative, and take immediate corrective action, with the emphasis on early recognition and recovery at the first indications of EITHER the stall or loss of directional control..

WARNING

- RECOVERY FROM THIS MANEUVER MUST BE ACCOMPLISHED NO LOWER THAN **3,000 feet AGL**
- SIMULATED ENGINE FAILURE WILL BE PERFORMED **ONLY BY RETARDING THE THROTTLE**, AND BY NO OTHER MEANS. EITHER LEFT OF RIGHT ENGINE FAILURE MAY BE SIMULATED.
- AIRCRAFT AND ATMOSPHERIC CONDITIONS MAY CAUSE THE AIRPLANE TO REACH THE STALL BEFORE REACHING Vmc. THEREFORE, RECOVERY MUST BE INITIATED WHEN STALL INDICATIONS ARE EXPERIENCED OR WHEN DIRECTIONAL CONTROL IS LOST, WHICHEVER OCCURS **FIRST**.
- LIMITING RUDDER TRAVEL BY THE CFI WILL SIMULATE MAXIMUM AVAILABLE RUDDER AND CAUSE LOSS OF DIRECTIONAL CONTROL TO OCCUR AT A HIGHER AIRSPEED PRIOR TO REACHING A STALL.
- FAILURE TO RECOVER IMMEDIATELY AT THE FIRST INDICATIONS OF A STALL OR LOSS OF DIRECTIONAL CONTROL MAY CAUSE THE AIRPLANE TO BECOME UNCONTROLLABLE, AND RECOVERY MAY BE IMPOSSIBLE.

Quick reference:

- **Mixtures – full rich**
- **Power – 15" MP**
- **105 KIAS and slowing – propellers full forward**
- **At Vyse (92 KIAS) – adjust throttles to maintain 92 KIAS**
- **Trim – takeoff**
- **Simulated inoperative engine – throttle smoothly IDLE**
- **Operating engine – throttle smoothly FULL**
- **Maintain Vyse (92 KIAS)**
- **Pitch up slowly – 1 knot airspeed loss per second**
- **First indication of stall or loss of directional control - RECOVER**
- **Recovery:**
  - **Reduce angle of attack, and**
  - **Reduce power on the operating engine to idle immediately**
  - **Reaching Vyse (92 KIAS) – operating engine throttle smoothly to FULL**
  - **Once stabilized, operating engine – throttle to 19"**
  - **Simulated inoperative engine - throttle to 15", monitor CHT**
  - **CHT in normal range – resume normal operations**

Procedure description:

13. Brief Vmc, aircraft configuration and recovery procedures in the event of either directional control loss, or approach to a stall indication, whichever occurs first.
14. Ensure that all pre-maneuver checklist items, clearing turns and a radio call are complete.
15. Configure the aircraft for straight-and-level flight and choose a reference point/heading.
16. Set mixture to **FULL RICH** and the power to **15" MP.** During the airspeed reduction, maintain altitude by smoothly increasing pitch as airspeed decreases.
17. Below **105 KIAS** set **propellers** to **FULL FORWARD.**
18. Upon reaching **Vyse (92 KIAS)**, adjust the throttles and pitch, as necessary, to maintain **92 KIAS** in straight-and-level flight**.** Set trim for takeoff.
19. Reduce throttle smoothly to **IDLE** on the **simulated inoperative engine** (either left or right)**.** Increase throttle smoothly to **FULL** on the remaining **operating engine.** AVOID ABRUPT THROTTLE MOVEMENT.
20. Maintain directional control with rudder, **Vyse** with pitch, and bank no more than **5° toward the operating engine.**
21. **Slowly and smoothly** increase pitch attitude to reduce the airspeed by approx. **1 knot per second,** while maintaining directional control with the rudder.
22. At the **first indications** of either **approach to a stall or a loss of directional control**, initiate immediate recovery by simultaneously reducing the power on the operating engine to idle and reducing the angle of attack to regain both directional control and airspeed.
23. Upon reaching **Vyse** (**92 KIAS)**, smoothly add full power on the operating engine to maintain **Vyse** and minimize altitude loss.
24. When stabilized at **Vyse**, with directional control maintained at all times, complete the maneuver by reducing the power on the operating engine to **19" MP.** Then, slowly increase the power on the "failed" engine to **15" MP** until CHT returns to normal operating range.
25. Return to the specified altitude, airspeed and heading. Resume cruising at PX area power setting (**19" MP/2200 RPM),** or as specified.

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ENGINE FAILURE DURING FLIGHT /

MANEUVERING WITH ONE ENGINE INOPERATIVE

Objective

Flight crews will develop the ability to respond accurately to an unexpected engine failure in flight, to maintain directional control while maneuvering with one engine inoperative, and to immediately execute appropriate procedures while diverting to the nearest suitable airport.

WARNING

- SIMULATED ENGINE FAILURES WILL NOT BE PRACTICED BELOW **Vsse (92 KIAS).**
- SIMULATED ENGINE FAILURES **BELOW 3,000 feet AGL** WILL BE ACCOMPLISHED WITH **THROTTLE ONLY**
- SIMULATED ENGINE FEATHERING BELOW **3,000 feet AGL** WILL BE ACCOMPLISHED WITH ZERO THRUST SETTING ONLY (approx. **11" MP**)
- ABOVE 3,000 FEET AGL AND NEAR A SUITABLE AIRPORT THAT CAN BE REACHED ON A SINGLE OPERATING ENGINE FOR ADDED MARGIN OF SAFETY, ACTUAL ENGINE FEATHERING MAY BE DIRECTED BY THE INSTRUCTOR.
- IF ATTEMPTS TO UNFEATHER INTENTIONALLY SHUT-DOWN ENGINE ARE UNSUCCESSFULL, THE SITUATION SHALL BE TREATED AS AN EMERGENCY.

Procedures description:

1. The PF/PUI will treat any engine failure indication as potentially a real engine failure, even when under instruction, and take immediate action.
2. Upon detecting an engine failure, the PF/PUI will maintain directional control and verbalize the quoted actions below, while performing the appropriate procedures.

    - ✓ "**CONTROL**" – add appropriate rudder to maintain directional control.
    - ✓ "**POWER - full"** – right to left, increase both mixtures, both propellers and both throttles full forward.
    - ✓ "**DRAG – flaps up, gear up**" – unless ground contact is imminent, immediately retract flaps and gear, as appropriate, to improve climb performance.
    - ✓ "**IDENTIFY – idle foot, idle engine";** the foot that is not holding the rudder is on the same side as the failed engine.
    - ✓ "**VERIFY – left/right engine**" – retard the throttle on the same side as the idle foot. If there is no change in yaw and required rudder pressure, the failed engine has been identified properly.
    - ✓ "**TROUBLESHOOT**" or "**FEATHER**", as appropriate. Typically, with the airplane under control and at or above 1,000 feet AGL, time may permit troubleshooting. Below 1,000 feet AGL or if situation demands, simulate feathering the engine by making the appropriate announcement. Do not actually feather the engine unless directed to do so by the instructor.
    - ✓ If situation permits troubleshooting, complete the appropriate flows and checklists.

NOTE

Instructors shall block the propeller levers, if necessary, to prevent undesired actual engine feathering by the PUI, unless the feathering has been directed by the instructor.

3. The PF/PUI will initiate a turn toward a nearest airport, as appropriate. Close the Cowl Flaps on the "failed" engine to prevent excessive cooling. Monitor the operating engine and adjust engine controls.
4. The PF/PUI will also perform straight and level flight, climbs, turns and descents, as directed by the instructor.
5. The PF/PUI will complete the maneuver by restoring power on the "failed" engine by completing the appropriate checklist, or proceeding with a single engine approach and landing, as directed by the instructor.

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EMERGENCY DESCENT

Objective

Flight crews will develop the ability to identify situations requiring an immediate emergency descent (such as a fire/cockpit smoke), configuring the aircraft properly and executing an emergency descent allowing for the possibility of an imminent forced landing should the situation require.

Procedure description:

NOTE
The lowest allowable altitude during any portion of a simulated emergency descent maneuver shall be **1500' AGL.**

1. Ensure that all pre-maneuver checklist items, clearing turns and a radio call are complete.
2. From straight and level flight, simulate an emergency requiring an immediate emergency descent, such as cockpit smoke and/or fire.
3. Set the throttles to IDLE and set the propeller controls to the FULL INCREASE position.
4. Below V_{LE} = **130 KIAS** extend the landing gear.
5. Initiate a descent resulting in an airspeed not to exceed V_{LE} = **130 KIAS**
6. If appropriate, establish and maintain bank angle of **between 30° and 45°** to increase the rate of descent, clear the area, and maintain positive load factors at all times.

WARNING
If turbulence is experienced, the airspeed should be reduced to below Va for the actual aircraft weight, to avoid structural damage to the aircraft.

7. Initiate the recovery to complete the maneuver **no lower than 1,500' AGL.**
8. With the airspeed below **$V_{LO\ (UP)}$ = 108 KIAS**, retract the landing gear.
9. Resume normal cruise or transition cruise flight.

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INSTRUMENT APPROACH – ONE ENGINE INOPERATIVE

Objective

Flight crews will develop the ability to recognize an engine failure while conducting an instrument approach, maintain positive aircraft control and perform a safe single engine instrument approach and landing.

WARNING

- SIMULATED ENGINE FAILURES WILL NOT BE PRACTICED BELOW **Vsse (92 KIAS)**
- SIMULATED ENGINE FAILURES **BELOW 3,000 feet AGL** WILL BE ACCOMPLISHED WITH **THROTTLE ONLY**
- SIMULATED ENGINE FEATHERING BELOW 3,000 feet AGL WILL BE ACCOMPLISHED WITH ZERO THRUST SETTING ONLY (approx. 11" MP)
- MAXIMUM SINGLE ENGINE APPROACH **FLAP SETTING – 25º**
- **NO TOUCH AND GO** WILL BE PERFORMED AFTER COMPLETION OF A SINGLE ENGINE APPROACH AND LANDING
- **NO PRACTICE MISSED APPROACH or LOW APPROACH** WILL BE PERFORMED AFTER COMPLETION OF A SINGLE ENGINE INSTRUMENT APPROACH

Procedures description:

1. At some point, during simulated instrument flight, engine failure will be simulated by the instructor retarding one throttle.

NOTE

Instructors will inform ATC about the simulated emergency

using **"simulated single engine"** terminology.

2. Perform the steps 1 through 3 of the "Engine Failure During Flight / Maneuvering With One Engine Inoperative" procedure of this manual, while continuing to control the aircraft by reference to instruments. **Take into consideration the following factors.**

   - **Engine failure outside of FAF – gear and flaps are still up :**
     - **Precision approach (ILS) –** if aircraft performance permits, consider lowering the gear at the usual point of glideslope intercept, and not using flaps until runway is assured. Typically, the glideslope can thus be maintained with remaining engine power.
     - **Non-precision approach (straight-in) –** since you may not descend below MDA, consider leaving the gear up until the requirements for descent from MDA are met and safely reaching the runway is assured.
     - **Circling approach -** since you may not descend below circling minimums, consider leaving the gear up until the point where descent from the circling minimums is commenced and safely reaching the runway is assured.

- **Engine failure inside of FAF – gear and flaps already down:**
  - **Precision approach (ILS) –** consider leaving the gear down and maintain the approach flap setting, if aircraft performance permits, while remaining on the glideslope. If performance is marginal, consider retracting the flaps until runway is assured. Typically, the glideslope can thus be maintained with remaining engine power.
  - **Non-precision approach (straight-in) –** since you may not descend below MDA, consider retracting landing gear and flaps, if necessary, to remain at or above MDA, until the requirements for descent from MDA are met and safely reaching the runway is assured.
  - **Circling approach -** since you may not descend below circling minimums, consider retracting the gear and flaps until the point where descent from the circling minimums is commenced and safely reaching the runway is assured.

3. Fly a normal approach as conditions and the airplane performance permit
4. On final approach, maintain **100 KIAS**
5. When assured of making the runway:

   a. Extend / verify the landing gear is down
   b. Extend / verify the **flaps** are set as appropriate (**not to exceed 25º**)
   c. Complete the appropriate callouts and checklist flows

6. Execute a normal landing (Refer to "Approach and Landing with a Inoperative Engine" and "Normal and crosswind approach and landing" in this manual)

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INSTRUMENT MANUEVERS

PRECISION and PRECISION-LIKE APPROACH

Objective

Flight crews will develop the ability to conduct a precision or a precision-like approach in a multi-engine, complex airplane, by establishing on the approach and maintaining the prescribed glideslope / glidepath down to minimums, while executing appropriate procedures, callouts and flows.

Quick reference:

- **Prior to IAF / PT Turn inbound / Intercepting final approach course**
  - **Approach brief complete**
  - **Descent checklist flows complete**
  - **110 KIAS (20"MP / 2300 RPM)**
- **Glideslope intercept (1 dot low)**
  - **Flaps 10° / Gear down**
  - **100 KIAS (16" / 2500 RPM)**
  - **Before landing checklist flows**
- **500' above DA – GUMP Check**

Procedures description:

1. Prior to being established on the approach, tune, identify and confirm operational status of all airplane and ground equipment necessary for the approach.
2. **Brief** the approach and complete/verify the descent checklist flows prior to IAF or equivalent.
3. Slow down to **110 KIAS** by establishing approximately **20" MP** and **2300 RPM** prior to:
   a. IAF if full approach procedure
   b. Procedure turn INBOUND if executing a procedure turn
   c. Final approach course intercept if being radar vectored
4. Approaching glideslope / glidepath intercept (**one dot below GS** needle and on final approach):
   a. Flaps **10°**
   b. Gear down
   c. Maintain **100 KIAS** on GS (approx. **16" MP / 2500 RPM**)
   d. Perform before landing checklist flows
5. Note the altitude and time/distance, as appropriate, crossing the OM / LOM or equivalent.
6. Perform GUMP check at **500'** above DA or equivalent.
7. Execute a normal landing or a missed approach, in accordance with **FAR 91.175** requirements.

NON-PRECISION APPROACH

Objective

Flight crews will develop the ability to conduct a non-precision approach in a multi-engine, complex airplane, by establishing on the approach and maintaining the prescribed course down to minimums, while executing appropriate procedures, callouts and flows.

Quick reference:

- **Prior to IAF / PT Turn inbound / Intercepting final approach course**
  - **Approach brief complete**
  - **Descent checklist flows complete**
  - **110 KIAS (20"MP / 2300 RPM)**
- **Just prior to FAF**
  - **Flaps 10° / Gear down**
  - **100 KIAS (16" / 2500 RPM)**
  - **Before landing checklist flows**
- **500' above MDA – GUMP Check**

Procedures description:

1. Prior to being established on the approach, tune, identify and confirm operational status of all airplane and ground equipment necessary for the approach.
2. **Brief** the approach and complete/verify the descent checklist flows prior to IAF or equivalent.
3. Slow down to **110 KIAS** by establishing approximately **20" MP** and **2300 RPM** prior to:
   a. IAF if full approach procedure
   b. Procedure turn INBOUND if executing a procedure turn
   c. Final approach course intercept if being radar vectored
4. Approaching FAF (just prior to, approx. **1 mile** from FAF and established on final approach):
   a. Flaps **10°**
   b. Gear down
   c. Maintain **100 KIAS** (approx. **16" MP / 2500 RPM**)
   d. Perform before landing checklist flows
5. Note the altitude and time/distance, as appropriate, when crossing waypoints / stepdown fixes (if any).
6. Perform GUMP check at **500'** above MDA.
7. Execute a normal landing or a missed approach, in accordance with **FAR 91.175** requirements.