Flight Training Professionals

CESSNA C172S NAV II AND NAV III Maneuver Standard Operating Procedures

Revision 3

DISCLAIMER

Flight Training Professional's Cessna C172S NAV III Standard Operating Procedures, Checklists, and Operations Manual are used to ensure efficient, proper, and safe operation of the C172S NAV III. However, Flight Training Professionals is not responsible for any errors or omissions of this or any other document. The Cessna C172S NAV III Pilot Operating Handbook should be consulted for additional guidance. If any conflict is found between Flight Training Professional's documents and the manufacturer's Pilot Operating Handbook, defer to the manufacturer's guidance.

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INTRODUCTION

Flight Training Professional's Cessna C172S NAV II and NAV III Maneuver Standard Operating Procedures establishes processes to ensure safe, successful execution of all Flight Training Professional's training course maneuvers.

Use these procedures to review and practice each maneuver. Additionally, referencing the FAA Airplane Flying Handbook and FAA Airman Certification Standards (and Practical Test Standards if applicable) in conjunction with this manual is critical to develop the skillset required for complete maneuver proficiency.

SECTION 1: TAKEOFF AND CLIMB

NORMAL TAKEOFF AND CLIMB

1) Perform BEFORE TAKEOFF CHECKLIST.

2) Perform LINE UP CHECKLIST.

3) Set FLAPS 0°.

4) Taxi aircraft onto departure runway, using maximum useable runway and aligned with runway centerline.

5) Verify the correct Runway and make "Runway (Runway #) identified," CALLOUT.

6) Smoothly and completely apply takeoff power.

7) Check static RPM 2300-2400. (Above 3000' Density Altitude: Lean for maximum RPM). Verify engine gauges within normal parameters. Make "Engine instruments normal," CALLOUT.

8) Verify the airspeed indicator shows a non-null value and is increasing and make "Airspeed alive," CALLOUT.

9) At 45 KIAS raise the nose wheel and set the Takeoff attitude.

10) At 55 KIAS lift-off should occur.

11) After lift-off establish V_Y pitch (74 KIAS – Flaps 0 DEGREES).

12) Maintain runway centerline track.

13) Above 1000' AGL, Perform CLIMB CHECKLIST.

CROSSWIND TAKEOFF AND CLIMB

1) Perform BEFORE TAKEOFF CHECKLIST.

2) Perform LINE UP CHECKLIST.

3) Set FLAPS 0°.

4) Taxi aircraft onto departure runway, using maximum useable runway and aligned with runway centerline.

5) Verify the correct Runway and make "Runway (Runway #) identified," CALLOUT.

6) Position the ailerons fully deflected into the wind, maintain neutral elevator position.

7) Smoothly and completely apply takeoff power.

7) Check static RPM 2300-2400. (Above 3000' Density Altitude: Lean for maximum RPM). Verify engine gauges within normal parameters. Make "Engine instruments normal," CALLOUT.

8) Verify the airspeed indicator shows a non-null value and is increasing and make "Airspeed alive," CALLOUT.

9) At 45 KIAS raise the nose wheel and set the take-off attitude.

10) At 55 KIAS lift-off should occur.

11) As the aircraft accelerates maintain centerline control with rudder and adjust the ailerons so that at lift-off there is a slight aileron deflection to allow the leeward wing to lift-off just prior to the windward wing.

12) After lift-off establish V_Y pitch (74 KIAS – Flaps 0 DEGREES)

13) After lift-off establish a Wind Correction Angle to maintain centerline track.

14) After 1000' AGL, Perform CLIMB CHECKLIST.

SHORT-FIELD TAKEOFF AND CLIMB

1) Perform BEFORE TAKEOFF CHECKLIST.

2) Perform LINE UP CHECKLIST

3) Set FLAPS 10°.

4) Taxi aircraft onto departure runway, using maximum useable runway and aligned with runway centerline.

5) Verify the correct Runway and make "Runway (Runway #) identified," CALLOUT.

6) Hold brakes, not to allow any aircraft movement.

7) Smoothly apply takeoff power.

8) Check static RPM 2300-2400. (Above 3000' Density Altitude: Lean for maximum RPM). Verify engine gauges within normal parameters. Make "Engine instruments normal," CALLOUT.

9) Release brakes; maintain directional control.

10) Verify the airspeed indicator shows a non-null value and is increasing and make "Airspeed alive," CALLOUT.

11) Hold the nose wheel on the runway until 55 KIAS, then rotate.

12) After lift-off establish pitch for Obstacle Barrier Speed (56 KIAS).

13) After clear of obstacle establish V_X pitch (62 KIAS). Set FLAPS 0°.

14) Once flaps are at 0° establish V_Y pitch (74 KIAS – Flaps 0 DEGREES).

15) Maintain runway centerline track.

16) Above 1000' AGL, Perform CLIMB CHECKLIST.

SOFT-FIELD TAKEOFF AND CLIMB

1) Perform BEFORE TAKEOFF CHECKLIST.

2) Perform LINE UP CHECKLIST.

3) Set FLAPS 10°.

4) Maintaining taxi speed position aircraft on departure runway; avoid braking and stopping the aircraft.

5) Verify the correct Runway and make "Runway (Runway #) identified," CALLOUT.

5) Smoothly apply takeoff power, verify engine gauges within normal parameters. Make "Engine instruments normal," CALLOUT.

6) Verify the airspeed indicator shows a non-null value and is increasing and make "Airspeed alive," CALLOUT.

7) Maintain full elevator backpressure until nose lift-off, then adjust elevator pressure to maintain nose wheel clear of the runway until aircraft lift-off.

8) After lift-off, adjust pitch to maintain aircraft in ground effect until normal lift-off speed (55 KIAS).

9) A. If there is no obstacle

   i. After lift-off establish V_Y pitch (74 KIAS – Flaps 0 DEGREES).

   ii. Maintain runway centerline track.

   B. If there is an obstacle present,

   i. After lift-off establish pitch for Obstacle Barrier Speed (56 KIAS).

   ii. After clear of obstacle establish V_X pitch (62 KIAS). Set FLAPS 0°.

iii. Once flaps are at 0° establish V_Y pitch (74 KIAS – Flaps 0 DEGREES).

10) Above 1000’ AGL, Perform CLIMB CHECKLIST.

SECTION 2: FLIGHT MANEUVERS

CLEARING TURNS

1) Determine which direction/area the maneuver to follow the clearing turns will be flown into.
2) Set power to 2200 RPM (90 knots – APPROACH CRUISE) or 2300 RPM (99 knots – ENROUTE CRUISE) as appropriate per the desired pitch and power configuration.
3) Visually scan the area above, below, left, and right of the aircraft.
4) Select a visual reference point off the wing tip in the direction of the turn determined in step 1.
5) Roll into a 30° bank turn in the direction of the selected visual reference.
6) Use the banked aircraft attitude to scan the area above and below the aircraft respective to the raised and lowered wings. Also, scan the area in the direction of the turn as well as behind.
7) Lead the rollout to arrive wings level at the selected reference point.
8) Visually scan the area above, below, left, and right of the aircraft.
9) Select a visual reference point off the wing tip in the direction of the second turn determined in step 1.

   NOTE: This turn can be in either direction to include the same direction as the first 90°. This is a 180° turn sectioned into two 90° turns.
10) Roll into a 30° bank turn in the direction of the selected visual reference.
11) Use the banked aircraft attitude to scan the area above and below the aircraft respective to the raised and lowered wings. Also, scan the area in the direction of the turn as well as behind.

12) Lead the rollout to arrive wings level at the selected reference point.

NOTE: Begin the intended maneuver immediately following the clearing turns.

POSITION REPORT

NOTE: POSITION REPORTs shall be made as clearing turns are being completed or immediately after completion.

1) Ensure the appropriate frequency is selected.

2) Continue to monitor the frequency for other aircraft POSITION REPORTs.

3) Consider each important component of a POSITION REPORT before transmitting:

   a. Area of traffic/practice area

   b. Aircraft Information

   c. Aircraft location

   d. Aircraft altitude

   e. Intentions

4) Once mentally rehearsed, transmit a POSITION REPORT on the appropriate frequency. For Example:

   “Bithlo practice area traffic, Skyhawk Four-Two-Two Charlie Bravo, seven southeast Bithlo Antennas, four thousand fife hundred, steep turns.”

SLOW FLIGHT – CLEAN CONFIGURATION

1) Select an altitude to allow recovery to occur above 1500' AGL.
2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
3) Maintain heading, altitude, and airspeed.
4) Set power at 1200 RPM, continuously adjusting pitch up to maintain altitude.
5) At 5 KIAS prior to target airspeed; set power at 1900 RPM.
6) Allow the airplane to slow to target airspeed of 55 KIAS.
7) Adjust pitch and power to maintain altitude and airspeed, ensuring stall warning horn does not sound.
8) Perform maneuvers such as straight and level turns (banks not to exceed 30).
9) Initiate recovery by smoothly applying full power; adjust pitch to maintain altitude as airspeed increases.
10) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.
11) Perform CRUISE CHECKLIST.

NOTE: Once the required pitch and power settings are determined to maintain Slow Flight – Clean Configuration, enter the values in the Pitch and Power Table of reference.

SLOW FLIGHT - LANDING CONFIGURATION

1) Select an altitude to allow recovery to occur above 1500' AGL.
2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
3) Maintain heading, altitude, and airspeed.
4) Set power 1500 RPM, continuously adjusting pitch up to maintain altitude.
5) As airspeed decreases below maximum flap operating speed, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°. Adjust pitch to maintain altitude.
6) As airspeed decreases below 85 knots, make "Below 85 Knots, flaps 20," CALLOUT and set FLAPS 20°. Adjust pitch to maintain altitude.
7) Verify airspeed is below 85 knots, make "Below 85 Knots, flaps 30," CALLOUT. Set FLAPS 30°.
8) At 5 KIAS above target airspeed set power to 2000 RPM.
9) Allow the airplane to slow to target airspeed of 50 KIAS.
10) Adjust pitch and power to maintain altitude and airspeed while ensuring stall warning horn does not sound.
11) Perform maneuvers such as straight and level and turns (bank not to exceed 30°).
12) Initiate recovery by smoothly applying full power, adjust pitch to maintain altitude. Retract flaps to 20°.
13) As airspeed increases above 60 KIAS, make "(Current Airspeed), flaps 10," CALLOUT and retract flaps to 10°.

14) As airspeed increases above 70 KIAS, make "(Current Airspeed), flaps 0," CALLOUT and retract flaps to 0°.

15) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

16) Perform CRUISE CHECKLIST.

NOTE: Once the required pitch and power settings are determined to maintain Slow Flight – Landing Configuration, enter the values in the Pitch and Power Table for reference.

POWER ON STALL - TAKEOFF CONFIGURATION

1) Select an altitude to allow recovery to occur above 1500' AGL.

2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.

3) Maintain heading, altitude, and airspeed.

4) Set power at 1200 RPM, continuously adjusting pitch up to maintain altitude.

5) Set DESIRED TAKEOFF FLAPS. If selecting takeoff flaps to 10°, verify below flap operating range, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°.

6) Slow to lift-off speed (55 KIAS); set takeoff power.

7) Increase pitch smoothly and consistently to stall attitude.

8) Maintain directional control using rudders and ailerons ONLY prior to the occurrence of the stall.

9) Maintain pitch until onset of the stall:

   a. Imminent - First indication of airflow separation, decrease of control effectiveness.

   b. Full - A sudden decrease in pitch attitude and complete loss on control effectiveness.

   Promptly recover by releasing the backpressure from the flight control to reduce the Angle of Attack. Establish pitch to allow for minimum loss of altitude. If necessary, level the wings once the stall has been fully recovered.

   NOTE: DO NOT ATTEMPT TO LEVEL THE WINGS USING AILERONS WHILE STALLED, THIS MAY CAUSE THE AIRCRAFT TO ENTER INCPIENT SPIN.

10) Once the aircraft has accelerated to 70 KIAS, set V_Y pitch, make "(Current Airspeed), flaps 0," CALLOUT and retract flaps to 0°.

11) Climb to an altitude higher than beginning the maneuver or as instructed by Instructor/Examiner.

12) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

13) Perform CRUISE CHECKLIST.

POWER OFF STALL - LANDING CONFIGURATION

1) Select an altitude to allow recovery to occur above 1500' AGL.

2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.

3) Maintain heading, altitude, and airspeed.

4) Set power at 1500 RPM, continuously adjusting pitch up to maintain altitude.

5) As airspeed decreases below maximum flap operating speed, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°. Adjust pitch to maintain altitude.

6) As airspeed decreases below 85 knots, make "Below 85 Knots, flaps 20," CALLOUT and set FLAPS 20°. Adjust pitch to maintain altitude.

7) Verify airspeed is below 85 knots, make "Below 85 Knots, flaps 30," CALLOUT, and set FLAPS 30°.

8) Slow to approach speed (65 KIAS) and adjust pitch for final approach descent.

9) After descending more than 100 feet, reduce power to idle while increasing Angle of Attack to maintain altitude until stall occurs.

10) Increase Angle of Attack until onset of the stall:

   a. If performing an Imminent Stall – Observe the first indication of airflow separation, decrease of control effectiveness. Make "Stall warning," CALLOUT then:

   b. If performing a Full Stall – A sudden decrease in pitch attitude and complete loss on control effectiveness. Make "Stall," CALLOUT then:

Promptly recover by releasing the backpressure from the flight control to reduce the Angle of Attack. Add full power and establish V_X pitch to allow for minimum

loss of altitude. Retract flaps TO 20°. If necessary, level the wings once the stall has been fully recovered.

NOTE: DO NOT ATTEMPT TO LEVEL THE WINGS USING AILERONS WHILE STALLED, THIS MAY CAUSE THE AIRCRAFT TO ENTER INCPIENT SPIN.

11) Once the aircraft has accelerated to 60 KIAS, make "(Current Airspeed), flaps 10," CALLOUT and retract flaps to 10°.

12) Set V_Y pitch attitude. Once the aircraft has accelerated to 70 KIAS, make "(Current Airspeed), flaps 0," and retract flaps to 0°.

13) Climb to the beginning altitude or an altitude higher than beginning the maneuver.

10) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

11) Perform CRUISE CHECKLIST.

SECONDARY STALL

1) Select an altitude to allow recovery to occur above 1500' AGL.

2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT .

3) Maintain heading, altitude, and airspeed.

4) Execute a POWER ON STALL – TAKEOFF CONFIGURATION or POWER OFF STALL – LANDING CONFIGURATION as appropriate through step 7.

5) When the critical angle of attack is exceeded, a sudden decrease in pitch attitude, and complete loss on control effectiveness occurs, make "Stall," CALLOUT and promptly recover by releasing the backpressure from the flight control to reduce the Angle of Attack.

6) While maintaining coordinated use of the rudder and ailerons, before a full recovery of the first stall occurs, immediately increase the Angle of Attack again.

7) When the critical angle of attack is exceeded, a sudden decrease in pitch attitude, and complete loss on control effectiveness occurs, make "Stall," CALLOUT and promptly recover by releasing the backpressure from the flight control to reduce the Angle of Attack.

8) Add full power and establish V_X pitch to allow for minimum loss of altitude. retract flaps to 20°. If necessary, use coordinated rudder and aileron to level the wings once the stall has been fully recovered.

NOTE: DO NOT ATTEMPT TO LEVEL THE WINGS USING AILERONS WHILE STALLED, THIS MAY CAUSE THE AIRCRAFT TO ENTER INCPIENT SPIN.

12) Once the aircraft has accelerated to 60 KIAS, make "(Current Airspeed), flaps 10," CALLOUT and retract flaps to 10°.

13) Set V_Y pitch attitude. Once the aircraft has accelerated to 70 KIAS, make "(Current Airspeed), flaps 0," and retract flaps to 0°.

14) Climb to the beginning altitude or an altitude higher than beginning the maneuver.

12) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

15) Perform CRUISE CHECKLIST.

ACCELERATED STALL

1) Select an altitude to allow recovery to occur above 3000’ AGL.

2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.

3) Select and verify the flaps up.

4) Reduce power to 1200 RPM to allow the airplane to decelerate to 90 KIAS or below V_A, whichever is less, and adjust pitch to maintain altitude.

5) At 90 KIAS, use coordinated flight control inputs to establish a 45° bank in the direction of the cleared area.

6) Increase elevator backpressure to maintain altitude and slow to 70 KIAS.

7) Upon slowing to 70 KIAS, firmly increase elevator backpressure ensuring the aircraft pitch attitude increases and maintain coordinated flight controls.

8) Recovery:

   A. Imminent Stall (Commercial and CFI Applicants) – When the stall warning activates:

      1. Observe the indicated airspeed.
      2. Make “Stall warning,” CALLOUT
      3. Reduce the elevator backpressure and reduce the angle of attack.

   B. Full Stall (CFI Applicants) – When a sudden decrease in pitch attitude occurs:

      1. Observe the indicated airspeed,
      2. Make “Stall,” CALLOUT
      3. Reduce the elevator backpressure and reduce the angle of attack.

9) Apply full power to reduce the loss of altitude.

10) Upon verifying the stall has been avoided/recovered, level the wings using coordinated aileron and rudder inputs.

NOTE: DO NOT ATTEMPT TO LEVEL THE WINGS USING AILERONS WHILE STALLED, THIS MAY CAUSE THE AIRCRAFT TO ENTER INCPIENT SPIN.

13) Climb to the beginning altitude or an altitude higher than beginning the maneuver.

14) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

12) Perform CRUISE CHECKLIST.

CROSS-CONTROL STALL

1) Select an altitude to allow recovery to occur above 2500' AGL.
2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
3) Maintain heading, altitude, and airspeed.
4) Set power at 1200 RPM, continuously adjusting pitch up to maintain altitude.
5) Slow to approach speed (65 KIAS) and adjust pitch for final approach descent.
6) After descending more than 100 feet, reduce power to idle.
7) Pick a reference (preferably a line or rectangle reference to represent a simulated runway) off the wing tip in the direction of the cleared area.
8) Turn towards the reference using a 30° bank.
9) Apply excessive rudder deflection in the direction of the turn to create a skidding turn. This will require opposite aileron to control the over banking-tendency and remain at a 30° bank angle.
10) Increase elevator backpressure to arrest the descent.
11) When the critical angle of attack is exceeded, a sudden decrease in pitch attitude, and complete loss on control effectiveness occurs, make "Stall," CALLOUT and promptly recover by releasing the backpressure from the flight control to reduce the Angle of Attack.
12) Apply full power to reduce the loss of altitude.
13) Upon verifying the stall has been recovered, level the wings using coordinated aileron and rudder inputs.

NOTE: DO NOT ATTEMPT TO LEVEL THE WINGS USING AILERONS WHILE STALLED, THIS MAY CAUSE THE AIRCRAFT TO ENTER INCPIENT SPIN.

14) Climb to the beginning altitude or an altitude higher than beginning the maneuver.

15) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

16) Perform CRUISE CHECKLIST.

NOTE: AVOID USE OF FLAPS DUE TO THE POTENTIAL TO EXCEED V_{FE} DURING THE MANEUVER.

ELEVATOR TRIM STALL

1) Select an altitude to allow recovery to occur above 1500' AGL.
2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
3) Maintain heading, altitude, and airspeed.
4) Set power at 1500 RPM, continuously adjusting pitch up to maintain altitude.
5) As airspeed decreases below maximum flap operating speed, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°. Adjust pitch to maintain altitude.
6) As airspeed decreases below 85 knots, make "Below 85 Knots, flaps 20," CALLOUT and set FLAPS 20°. Adjust pitch to maintain altitude.
7) Verify airspeed is below 85 knots, make "Below 85 Knots, flaps 30," CALLOUT, and set FLAPS 30°.
8) Slow to approach speed (65 KIAS) and adjust pitch and trim for final approach descent.
9) After descending more than 100 feet, apply full power, while allowing the aircraft to yaw and roll left, increase the pitch attitude to a pitch above V_X.
10) Reduce the angle of attack to avoid a stall and improve control authority.
11) Utilize coordinated rudder and ailerons maintain the aircraft in wings level flight.
12) Continue to reduce the angle of attack as required to avoid the stall warning activating as well as a stall.
13) Retract flaps to 20°. If necessary, level the wings once the stall has been fully avoided.

NOTE: DO NOT ATTEMPT TO LEVEL THE WINGS USING AILERONS WHILE STALLED, THIS MAY CAUSE THE AIRCRAFT TO ENTER INCPIENT SPIN.

14) Once the aircraft has accelerated to 60 KIAS, make "(Current Airspeed), flaps 10," CALLOUT and retract flaps to 10°.

15) Set V_Y pitch attitude. Once the aircraft has accelerated to 70 KIAS, make "(Current Airspeed), flaps 0," and retract flaps to 0°.

16) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

17) Perform CRUISE CHECKLIST.

STEEP TURNS

1) Select an altitude to allow recovery to occur above 1500' AGL.
2) Select a Visual Reference Point to roll in and out on.
3) Set power to 2200 RPM (APPROACH CRUISE) to slow the aircraft to a speed below V_A, if appropriate 95 KIAS.
4) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
5) Line up with the Visual Reference Point selected in step 2.
6) Maintain heading and altitude.
7) Smoothly begin rolling into a bank in the direction of the cleared area while maintaining coordination using ailerons and rudders.
8) As the bank angle passes 30°, increase pitch and increase power approximately 150 RPM to maintain altitude and airspeed. Add one full wheel of nose up trim to help maintain backpressure required.
9) Establish 45° of Bank (PVT) or 50° of Bank (COM), as appropriate.
10) Maintain bank angle, altitude, and airspeed by using the horizon in conjunction with outside reference point on the windshield for altitude/airspeed and the glare shield for bank angle. Rudder pressure will be applied in the direction of the bank to maintain coordination. Aileron pressure will be applied opposite the direction of bank to overcome overbanking tendency and to maintain the desired bank angle.
11) Begin rollout prior to the Visual Reference Point to allow wings level flight by the time the nose is pointing at the Visual Reference Point.

12) As the bank angle passes 30°, apply forward pressure to decrease pitch and reduce power to maintain altitude and airspeed.

13) For Private Applicants, if the examiner did not specify a turn in the opposite directions, apply one-wheel nose down trim. For Commercial Applicants, and Private Applicants that have been asked to do a steep turn in the opposite direction, do not adjust the trim.

14) After clearing area, immediately initiate a turn in the opposite direction by smoothly rolling into a bank while maintaining coordination using ailerons and rudders.

15) As the bank angle passes 30°, increase pitch and increase power to maintain altitude and airspeed.

16) Establish 45° of Bank (PVT) or 50° of Bank (COM), as appropriate.

17) Maintain bank angle, altitude, and airspeed by using the horizon in conjunction with outside reference point on the windshield for altitude/airspeed and the glare shield for bank angle. Rudder pressure will be applied in the direction of the bank to maintain coordination. Aileron pressure will be applied opposite the direction of bank to overcome overbanking tendency and to maintain the desired bank angle.

18) Begin rollout prior to the Visual Reference Point to allow wings level flight by the time the nose is pointing at the Visual Reference Point.

19) As the bank angle passes 30°, apply forward pressure to decrease pitch and reduce power to maintain altitude and airspeed.

20) Apply one-wheel nose down trim.

21) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

22) Perform CRUISE CHECKLIST.

CHANDELLES

1) Select an altitude to allow recovery to occur above 1500' AGL.
2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
3) Select a prominent reference point off the wing tip.
4) Maneuver should be done into the wind to avoid drift from cleared area.
5) Establish airspeed below V_A (105 KIAS if appropriate).
6) Establish a coordinated 30 bank turn into the direction of the reference point.
7) Smoothly apply full power while simultaneously increasing the pitch attitude at a constant rate to obtain a pitch at the 90° point which, when maintained, will result in the aircraft slowing to just above the stalling speed at the completion of the 180° point.
8) Maintain coordination and a constant 30° bank angle throughout the first 90° of heading change.
9) After passing the 90° reference point, maintain coordination and begin a slow, continuous rate-of-roll to arrive at the 180° point with wings level.
10) After the 90° point, the backpressure should be adjusted as required to maintain a constant pitch attitude until reaching the 180° point.
11) Upon reaching the 180° point, the aircraft should be held momentarily just above stall speed, then begin the transition to cruise by maintaining altitude allowing the airplane to accelerate.
12) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.
13) Perform CRUISE CHECKLIST.

LAZY EIGHTS

1) Select an altitude to allow recovery to occur above 1500' AGL.

2) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.

3) Select a prominent reference point off the wing tip.

4) Maneuver should be done into the wind to avoid drift from cleared area. Establish airspeed below V_A (105 KIAS, if appropriate)

5) Begin a gradual coordinated climbing turn in the direction of the 90° point. Plan a climbing turn so that, at the 45° point, the aircraft is at the maximum pitch and at 15° of bank.

6) The bank angle should continue to increase until the 90° reference point at which the bank angle should be at 30°. Simultaneously, the pitch attitude should slowly begin to decrease.

7) As the aircraft passes through the 90° point, the pitch attitude should pass through the level. The bank should be at 30°.

8) After the 90° point, the aircraft should pass through the 135° point at the lowest pitch and 15° of bank.

9) After the 135° point the pitch attitude should be continuously increased to level pitch and the bank should continuously decrease to level so that at the 180° point the aircraft is at entry altitude and airspeed.

10) When completing the first 180° turn, immediately begin the turn opposite direction as to complete the second turn identical to the first one.

11) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

12) Perform CRUISE CHECKLIST.

STEEP SPIRAL

1) Select an altitude to allow recovery to occur above 1500' AGL.
2) Determine the wind direction at altitudes the maneuver will be flown through.
3) Select a ground reference point that is prominent but precise. This reference point should be located at or near an area in which an emergency landing can be successfully made.
4) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
5) Position the aircraft to arrive abeam the reference point at approximately one quarter of a mile from the point. Plan to arrive abeam the reference point either downwind, or more preferably on the crosswind to downwind.

   NOTE: The crosswind to downwind position allows for more time to smoothly roll into the steepest bank angle.
6) As the reference point is approached, smoothly reduce the power to idle to avoid a backfire.
7) Continuously adjust pitch up to maintain altitude and slow to 75 KIAS.
8) When abeam the reference point, using coordinated flight controls, roll into the steepest bank angle required for the maneuver (Approximately 40 – 60°). Adjust the bank to remain a constant distance from the reference point.
9) As the turn progresses, the required bank angle will shallow as the wind shifts from a tail wind to a crosswind and then a headwind. Adjust the bank accordingly to maintain a constant radius.

10) To avoid spark plug fouling and prolonged engine cooling, check the engine operation by increasing the power once every turn. Execute this engine check on the upwind position to minimize the effect on the aircraft's ground track.

11) Continue the maneuver for at least three 360° turns.

12) Exit the maneuver on the same heading as the entry.

13) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

14) Perform CRUISE CHECKLIST.

TURNS AROUND A POINT

1) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
2) Select an altitude between 600 and 1,000' AGL. 900' AGL is preferred.
3) Select a small but prominent Main Reference Point within in an area, which in case of an emergency will allow for a safe forced landing.
4) Then select four points on the ground that are equidistant from the Main Reference Point, approximately 1/4 mile from the Main Reference point. These points will be used to keep a uniform radius of turn.
5) Establish 90 KIAS (2200 RPM – APPROACH CRUISE) and enter maneuver directly downwind.
6) Abeam the Main Reference Point, begin a left turn.
7) Adjust bank angle and crab angle to maintain appropriate distance from the Main Reference Point by using the four ground points selected earlier.
8) Plan to depart the downwind after two complete 360 turns.
9) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.
10) Perform CRUISE CHECKLIST.

S-TURNS

1) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
2) Select an altitude between 600 and 1,000' AGL. 900' AGL is preferred.
3) Select a road or other straight-line reference perpendicular to the wind, which in case of an emergency will allow for a safe forced landing.
4) Establish 90 KIAS (2200 RPM – APPROACH CRUISE) and enter maneuver directly downwind.
5) Abeam the reference line, begin a left turn and modifying the bank and crab angle to maintain constant radius throughout the maneuver.
6) At the completion of the first 180° turn, the aircraft should be directly perpendicular to the reference line with wings level.
7) Immediately after completion of the first turn, begin a turn in the opposite direction using same methods to maintain a constant radius throughout the completion of the maneuver.
8) Exit the maneuver directly abeam and perpendicular to the reference line on the downwind.
9) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.
10) Perform CRUISE CHECKLIST.

RECTANGULAR PATTERN

1) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
2) Select an altitude between 600 and 1,000' AGL. 900' AGL is preferred.
3) Select a prominent rectangular field the approximate size of a traffic pattern parallel to the wind, which in case of an emergency will allow for a safe forced landing.
4) Establish 90 KIAS (2200 RPM – APPROACH CRUISE) and enter maneuver on a 45° angle to the downwind.
5) Establish appropriate crab angle throughout the legs of the pattern to maintain equal distance from all sides of the field.
6) Execute turns at corners of the field using a maximum bank angle of 30°.
7) Exit maneuver on a 45° angle away from the downwind.
8) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.
9) Perform CRUISE CHECKLIST.

EIGHTS-ON-PYLONS

1) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.

2) Establish 90 KIAS (2200 RPM – APPROACH CRUISE) at Pivotal Altitude **(Approximated by squaring the ground speed and dividing the product by 11.3).**

3) Select two small but prominent reference points or pylons. The distance between them should allow for 3-5 seconds of straight and level flight during the transition between turns.

4) Enter the maneuver by flying diagonally downwind between pylons.

5) When abeam the pylon, make the first turn into the wind. Place the line-of-sight reference on the pylon, while adjusting pitch and bank to maintain line-of-sight reference on pylon. (Shallowest bank and lowest altitude upwind, steepest bank and highest altitude downwind.)

6) Roll out to cross diagonally between pylons, crabbing as necessary to maintain track between pylons.

7) After 3-5 seconds straight and level, begin turn in opposite direction using same methods as the first turn.

8) Exit the maneuver diagonally to the downwind.

9) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

10) Perform CRUISE CHECKLIST.

SECTION 3: APPROACH AND LANDING

NORMAL APPROACH TO A LANDING

1) Perform DESCENT CHECKLIST.

2) Perform BEFORE LANDING CHECKLIST.

NOTE: Always be extra vigilant for traffic while in vicinity of an airport.

3) Slow to 95 KIAS prior to the 45° entry not less than 2 NM from the airport.

4) Adjust pitch and trim to maintain pattern altitude and 95 KIAS.

5) Turn to join the downwind leg at ½ to 1 mile from the runway.

6) Adjust for wind as needed to track parallel to the runway on the downwind maintaining ½ to 1 mile from the runway.

7) On downwind select a **Touchdown Point**. Then select an **Aiming Point** that is based on the **Touchdown Point** and the conditions of the day.

8) Abeam **Touchdown Point**, reduce power to 1500 RPM, verify that the airspeed is Below 110KIAS, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°. Add one-wheel nose down trim to compensate for adding flaps. Set pitch attitude and trim to maintain 85KIAS.

NOTE: When lowering the Flaps, be prepared to add forward pressure to the flight control to prevent the pitch from ballooning as the flaps are extended.

9) Turn base as appropriate for the conditions of the day and traffic. Verify airspeed is below flap operating range (85 KIAS), make "Below 85 Knots, flaps 20," CALLOUT, and set FLAPS 20°. Look at your **Aiming Point** and make any necessary pitch and power adjustments for a proper approach. Maintain 75 KIAS.

10) Before turning final, clear final approach path area.

14) Turn final, make "Below 85 Knots, flaps 30," CALLOUT, and set FLAPS 30°.

11) Allow the airspeed to slow to 65 KIAS.

12) On final, be stabilized with crosswind correction as appropriate by 300 feet AGL and make "300 feet, stabilized," CALLOUT.

13) On short final, add two to three full wheels of nose up trim to assist in the flare.

NOTE: The amount of trim will vary with the position of the airplanes CG on that day. Do not use Manual Electric Trim to apply this trim setting. It may lead to an over trimming situation that would be hazardous in a Go Around.

14) Maintain 65 KIAS until crossing aiming point and the transition to the round out and flare.

15) Touchdown in a slightly nose high attitude and at the slowest speed possible.

16) After touch down maintain backpressure on the flight control to keep the nose wheel off the runway until the elevator stalls. Maintain directional control and slow to taxi speed before exiting the runway. Use minimal braking if possible.

17) After clearing the runway, perform AFTER LANDING CHECKLIST.

NOTE: On the first approach to a new runway, once the runway has been verified, make "Runway (Runway #) identified," CALLOUT.

SHORT FIELD APPROACH TO LANDING

1) Perform DESCENT CHECKLIST.

2) Perform BEFORE LANDING CHECKLIST.

NOTE: Always be extra vigilant for traffic while in vicinity of an airport.

3) Slow to 95 KIAS prior to the 45° entry.

4) Adjust pitch and trim to maintain pattern altitude and 95 KIAS.

5) Turn to join the downwind leg at ½ to 1 mile from the runway.

6) Adjust for wind as needed to track parallel to the runway on the downwind maintaining ½ to 1 mile from the runway.

7) On downwind select a **Touchdown Point**. Then select an **Aiming Point** that is based on the **Touchdown Point** and the conditions of the day.

8) Abeam **Touchdown Point**, reduce power to 1500 RPM, verify that the airspeed is Below 110KIAS, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°. Add one-wheel nose down trim to compensate for adding flaps. Set pitch attitude and trim to maintain 85KIAS.

NOTE: When lowering the Flaps, be prepared to add forward pressure to the flight control to prevent the pitch from ballooning as the flaps are extended.

9) Turn base as appropriate for the conditions of the day and traffic. Verify airspeed is below flap operating range (85 KIAS), make "Below 85 Knots, flaps 20," CALLOUT, and set FLAPS 20°. Look at your **Aiming Point** and make any necessary pitch and power adjustments for a proper approach. Maintain 75 KIAS.

10) Before turning final, clear final approach path area.

11) Turn final, make "Below 85 Knots, flaps 30," CALLOUT, and set FLAPS 30°.

12) Allow the airspeed to slow to 61 KIAS.

18) On final, be stabilized with crosswind correction as appropriate by 300 feet AGL and make "300 feet, stabilized," CALLOUT.

13) On short final, add two to three full wheels of nose up trim to assist in the flare.

NOTE: The amount of trim will vary with the position of the airplanes CG on that day. Do not use Manual Electric Trim to apply this trim setting. It may lead to an over trimming situation that would be hazardous in a Go Around.

14) Maintain 61 KIAS until clear of any obstacles and after crossing the aiming point, then begin the transition into the flare.

15) Touchdown in a slightly nose high attitude and at the slowest speed possible.

16) After touch down maintain directional control and full aft elevator for maximum aerodynamic braking. Verify throttle at idle. Retract flaps to 0°. Apply maximum allowable braking. **CAUTION: NOT TO APPLY BRAKES TO CAUSE WHEELS TO LOCK.** Bring to aircraft to a full stop before exiting runway.

17) After clearing the runway perform AFTER LANDING CHECKLIST.

NOTE: On the first approach to a new runway, once the runway has been verified, make "Runway (Runway #) identified," CALLOUT.

SOFT FIELD APPROACH TO LANDING

1) Perform DESCENT CHECKLIST.

2) Perform BEFORE LANDING CHECKLIST.

NOTE: Always be extra vigilant for traffic while in vicinity of an airport.

3) Slow to 95 KIAS prior to the 45° entry.

4) Adjust pitch and trim to maintain pattern altitude and 95 KIAS.

5) Turn to join the downwind leg at ½ to 1 mile from the runway.

6) Adjust for wind as needed to track parallel to the runway on the downwind maintaining ½ to 1 mile from the runway.

7) On downwind select an **Aiming Point**. No **Touchdown Point** is required to be specified on Soft Field Landings.

8) Abeam **Touchdown Point**, reduce power to 1500 RPM, verify that the airspeed is Below 110KIAS, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°. Add one-wheel nose down trim to compensate for adding flaps. Set pitch attitude and trim to maintain 85KIAS.

NOTE: When lowering the Flaps, be prepared to add forward pressure to the flight control to prevent the pitch from ballooning as the flaps are extended.

9) Turn base as appropriate for the conditions of the day and traffic. Verify airspeed is below flap operating range (85 KIAS), make "Below 85 Knots, flaps 20," CALLOUT, and set FLAPS 20°. Look at your **Aiming Point** and make any necessary pitch and power adjustments for a proper approach. Maintain 75 KIAS.

10) Before turning final, clear final approach path area.

11) Turn final, make "Below 85 Knots, flaps 30," CALLOUT, and set FLAPS 30°.

12) Allow the airspeed to slow to 61 KIAS.

13) On final, be stabilized with crosswind correction as appropriate by 300 feet AGL and make "300 feet, stabilized," CALLOUT.

14) On short final, add two to three full wheels of nose up trim to assist in the flare.

NOTE: The amount of trim will vary with the position of the airplanes CG on that day. Do not use Manual Electric Trim to apply this trim setting. It may lead to an over trimming situation that would be hazardous in a Go Around.

15) Maintain 61 KIAS until clear of any obstacles and after crossing the aiming point, then begin the transition into the flare.

16) During the flare and round out add just enough power to allow for the nose wheel to remain in the air after touchdown until the aircraft slows to taxi speed.

17) On taxi do not stop moving until you are clear of the runway. Use as much power as necessary to keep the airplane moving.

18) Exit Runway. Perform AFTER LANDING CHECKLIST.

NOTE: On the first approach to a new runway, once the runway has been verified, make "Runway (Runway #) identified," CALLOUT.

FORWARD SLIP TO A LANDING

1) Perform DESCENT CHECKLIST.

2) Perform BEFORE LANDING CHECKLIST.

NOTE: Always be extra vigilant for traffic while in vicinity of an airport.

3) Slow to 95 KIAS prior to the 45° entry not less than 2 NM from the airport.

4) Adjust pitch and trim to maintain pattern altitude and 95 KIAS.

5) Turn to join the downwind leg at ½ to 1 mile from the runway.

6) Adjust for wind as needed to track parallel to the runway on the downwind maintaining ½ to 1 mile from the runway.

7) On downwind select a **Touchdown Point**. Then select an **Aiming Point** that is based on the **Touchdown Point** and the conditions of the day.

8) Abeam **Touchdown Point**, reduce power to 1500 RPM, verify that the airspeed is Below 110KIAS, make "Below 110 Knots, flaps 10," CALLOUT and set FLAPS 10°. Add one-wheel nose down trim to compensate for adding flaps. Set pitch attitude and trim to maintain 85KIAS.

NOTE: When lowering the Flaps, be prepared to add forward pressure to the flight control to prevent the pitch from ballooning as the flaps are extended.

9) Turn base as appropriate for the conditions of the day and traffic. Verify airspeed is below flap operating range (85 KIAS), make "Below 85 Knots, flaps 20," CALLOUT, and set FLAPS 20°. Look at your **Aiming Point** and make any necessary pitch and power adjustments for a proper approach. Maintain 75 KIAS.

10) Before turning final, clear final approach path area.

11) Turn final, and once established on final, add power to arrest the descent and position the airplane high on approach to allow for a FORWARD SLIP TO LANDING.

12) Turn final, make "Below 85 Knots, flaps 30," CALLOUT, and set FLAPS 30°.

13) Allow the airspeed to slow to 65 KIAS.

14) From the viewpoint of the pilot, once the **Aiming Point** appears to move down to the bottom of the windscreen, reduce the power to idle and adjust the pitch and trim to maintain 65 KIAS.

15) Apply aileron control into the crosswind and opposite rudder as needed to control the desired angle of descent while maintaining the position of the airplane over the extended centerline of the runway at 65 KIAS.

NOTE: Due to the slipped configuration, the indicated altitude, airspeed, and vertical speed can be inaccurate. Therefore, control of the airplane's descent and airspeed requires awareness of the airplane's attitude, control effectiveness, and the sound of the airflow around the airplane.

NOTE: Increased aileron and rudder deflection will directly increase the angle of descent.

NOTE: A forward slip configuration will set the airplane's longitudinal axis at an angle misaligned with the runway.

16) On final, be stabilized with crosswind correction as appropriate by 300 feet AGL and make "300 feet, stabilized," CALLOUT.

17) On short final, add two to three full wheels of nose up trim to assist in the flare.

NOTE: The amount of trim will vary with the position of the airplanes CG on that day. Do not use Manual Electric Trim to apply this trim setting. It may lead to an over trimming situation that would be hazardous in a Go Around.

18) Maintain 65 KIAS until crossing aiming point and the transition to the round out and flare.

19) Touchdown in a slightly nose high attitude and at the slowest speed possible.

20) After touch down maintain backpressure on the flight control to keep the nose wheel off the runway until the elevator stalls. Maintain directional control and slow to taxi speed before exiting the runway. Use minimal braking if possible.

21) After clearing the runway, perform AFTER LANDING CHECKLIST.

NOTE: On the first approach to a new runway, once the runway has been verified, make "Runway (Runway #) identified," CALLOUT.

GO-AROUND PROCEDURE

1) Apply full power and set V_X pitch attitude. Retract flaps to 20°.

2) Make "Going around," CALLOUT.

3) Once the aircraft has accelerated to 60 KIAS, make "(Current Airspeed), flaps 10," CALLOUT and retract flaps to 10°.

4) Clear of obstacles and above 65 KIAS make "(Current Airspeed), flaps 0," CALLOUT and retract flaps to 0°.

5) Set V_Y pitch attitude and climb at 74 KIAS.

6) Once above 1000' AGL, Perform CLIMB CHECKLIST.

SECTION 4: EMERGENCY / ABNORMAL MANEUVERS AND PROCEDURES

ENGINE FAILURE "ABCDE"

1) AIRSPEED – Trim for Best Glide 68 KIAS.

2) BEST FIELD - Select the Best Field within gliding distance. Look all around. Once you have selected the field, plan your descent to arrive at 1000' AGL on the downwind abeam the touchdown point.

3) CHECKLIST – Complete memory items on the ENGINE FAILURE INFLIGHT CHECKLIST using the flow pattern. If time and altitude permit, verify that you have completed these items by referring to ENGINE FAILURE INFLIGHT CHECKLIST.

4) DECLARE – Declare the emergency on 121.5 or other appropriate frequency. Set transponder to 7700.

5) EXECUTE – Complete LANDING WITHOUT POWER CHECKLIST if time and altitude permit.

NOTE: Once at 1000' AGL, focus only on flying and landing the airplane.

EMERGENCY DESCENT

1) CLEAR THE AREA BELOW.
2) Throttle – Reduce SMOOTHLY to idle.
3) Enter a descending turn to the pilot's side of the airplane.
4) Use bank angle between 30 to 45° to maintain positive load factors while establishing the descent angle.
5) Maintain a pitch attitude that will allow airspeed to increase to V_{NO} (129 KIAS)
6) Level off at the assigned altitude.
7) Preform CRUISE CHECKLIST.

NO FLAP APPROACH AND LANDING

1) Perform DESCENT CHECKLIST.

2) Perform BEFORE LANDING CHECKLIST.

NOTE: Always be extra vigilant for traffic while in vicinity of an airport.

3) Slow to 95 KIAS prior to the 45° entry not less than 2 NM from the airport.

4) Adjust pitch and trim to maintain pattern altitude and 95 KIAS.

5) Turn to join the downwind leg at ½ to 1 mile from the runway.

6) Adjust for wind as needed to track parallel to the runway on the downwind maintaining ½ to 1 mile from the runway.

7) On downwind select a **Touchdown Point**. Then select an **Aiming Point** that is based on the **Touchdown Point** and the conditions of the day.

8) Abeam **Touchdown Point**, reduce power to 1200 RPM, set pitch attitude and trim to maintain 85KIAS.

9) Turn base as appropriate for the conditions of the day and traffic. Maintain 80 KIAS.

10) Before turning final, clear final approach path area.

11) Turn final and reduce the power as needed to maintain a stabilized descent angle to the **Aiming Point** while adjusting pitch to slow to 70 KIAS.

12) On final, be stabilized with crosswind correction as appropriate by 300 feet AGL and make "300 feet, stabilized," CALLOUT.

13) On short final, add two to three full wheels of nose up trim to assist in the flare.

NOTE: The amount of trim will vary with the position of the airplanes CG on that day. Do not use Manual Electric Trim to apply this trim setting. It

may lead to an over trimming situation that would be hazardous in a Go Around.

14) Maintain 70 KIAS until crossing the **Aiming Point** and the transition to the round out and flare.

15) Touchdown in a slightly nose high attitude and at the slowest speed possible.

16) After touch down maintain backpressure on the flight control to keep the nose wheel off the runway until the elevator stalls. Maintain directional control and slow to taxi speed before exiting the runway. Use minimal braking if possible.

17) After clearing the runway, perform AFTER LANDING CHECKLIST.

NOTE: On the first approach to a new runway, once the runway has been verified, make "Runway (Runway #) identified," CALLOUT.

DIVERSION

1) **Determine the best option for the diversion.** Consider weather, airspace, terrain, and obstructions while reviewing route. Choose alternate airport.

2) **Note the time.** Write down the current time.

3) **Plot the course to the alternate airport.** Confirm the airplane's position using a prominent landmark. Consider weather, airspace, terrain, and obstructions while reviewing route. Using two fingers to make a line from present position to alternate on chart.

   NOTE: The route to the alternate airport may require multiple different courses due to weather, airspace, terrain, and obstructions.

4) **Determine the course to the alternate airport.** Bug and turn to the magnetic course.

5) **Note the magnetic course and required distance.** Copy down the magnetic course and distance.

6) **Compute required Heading and Groundspeed.** Use Sporty's app to calculate Heading & Groundspeed (may use wind on PFD).

   NOTE: The winds aloft are reported as a true value. Convert the magnetic course before computing.

7) **Set the magnetic heading value.** Bug and turn to magnetic heading.

8) **Determine the time to alternate airport.** Estimated Time Enroute (ETA) – Using the app, calculate Time Enroute. Add it to the time noted in step 2.

9) **Determine fuel available is suitable for alternate airport.** Estimate fuel burn in your head (e.g., If burning approximately 9 gph for approximately 20 min = gallons) Do you have enough?

10) **Contact Flight Service to amend the flight plan.** Call FSS – give position, diversion plan, and ETA.

11) **Prepare for arrival and pattern entry at your new destination.** Review all pertinent information at alternate airport.

NOTE: Use pilotage to assist in navigating the diversion. Reference prominent landmarks to assist in verifying the airplane position.

NOTE: The new magnetic course may require a different VFR cruising altitude. Consider what change may be required in cruising altitude.

LOST PROCEDURES

1) Conserve – Minimize fuel consumption by reducing power to minimum required and lean the mixture as appropriate.

   NOTE: Monitor the fuel supply and make a precautionary landing if the fuel does not meet minimum requirements.

2) Use NAVAIDs

   a. Complete the VOR ORIENTATION PROCEDURES

   b. Use the G1000 GPS

      i. Use the NRST function to locate nearest airports or VORs.

      ii. Use the moving map for orientation.

3) Climb (see/hear better) – Generally the higher you are the further you can see, and the more facilities and other aircraft can communicate with you.

4) Circle (do not get more lost) – Circling allows time to regain orientation by remaining near the same landmarks.

5) Call (nearest Approach control, Tower, or Flight Service facility) – If unable to contact any facility, transmit on 121.50 MHz and request assistance.

6) Confess (admit you are lost)

7) Comply (follow their instructions)

SECTION 5: INSTRUMENT MANEUVERS AND PROCEDURES

INSTRUMENT TAKEOFF

1) Perform BEFORE TAKEOFF CHECKLIST.

2) Perform LINE UP CHECKLIST.

3) Set FLAPS 0°.

4) Taxi aircraft onto departure runway, using maximum useable runway and aligned with runway centerline.

5) Hold brakes, not to allow any aircraft movement.

6) Verify that the Horizontal Situation Indicator's (HSI) heading value and the heading bug are set to the correct runway heading. Verify the correct Runway and make "Runway (Runway #) identified," CALLOUT.

7) Smoothly apply takeoff power while releasing brakes and maintain heading with use of exact rudder control.

   NOTE: Check static RPM 2300-2400. (Above 3000' Density Altitude: Lean for maximum RPM). Verify engine gauges within normal parameters. Make "Engine instruments normal," CALLOUT.

8) Verify the airspeed indicator shows a non-null value and is increasing and make "Airspeed alive," CALLOUT.

9) At 45 KIAS, using the attitude indicator, raise the pitch approximately 3° and set the Takeoff attitude.

10) At 55 KIAS lift-off should occur.

11) After lift-off establish V_Y pitch (74 KIAS – Flaps 0 DEGREES) and set trim.

12) Using coordinated rudder and aileron inputs, maintain runway heading.

13) Above 1000' AGL, Perform CLIMB CHECKLIST.

MAGNETIC COMPASS TURNS

1) Maintain heading, altitude, and airspeed.

2) Use charts, situational awareness, and other navigation sources to determine the current latitude location.

3) Approximate the magnetic compass turning error associated with the current latitude location and the new desired heading.

   NOTE: North and South headings correspond to the greatest turning error in association with the current latitude location. Whereas East and West headings have no turning error. See MAGNETIC COMPASS TURNS FIGURE for reference.

4) Roll into a coordinated standard rate turn towards the new desired heading.

5) Lead the rollout based off the normal rollout lead requirement corrected for the required turning error adjustment.

   NOTE: Bank required for standard rate turn = (True Airspeed (TAS) x 0.10) + 5°, thus 100 KTAS x 0.1 = 10° + 5° = 15° bank. Another example, 250 KTAS x 0.1 = 25° + 5° = 30°.

   a. If turning to a northerly heading, the normal rollout lead requirement of ½ the angle of bank, will need additional adjustment for UNDERSHOOTING (roll out before) the desired heading.

      EXAMPLE: Located at the 27° latitude, we can approximate a turning error of 30°. This will be the maximum turning error correction at North and South headings. So, if for example the aircraft must turn from 090° to 360°, roll into a standard rate turn to the left. Remain in the turn until required rollout.

This required rollout would be 7° (approximate normal rollout lead (½ the angle of bank)) + 30° (for turning error lag at current latitude) = 37°. Therefore, the rollout should begin when the magnetic compass indicates 037°.

b. If turning to a southerly heading, the normal rollout lead requirement of ½ the angle of bank, will need a compensated adjustment for OVERSHOOTING (roll out after) the desired heading.

EXAMPLE: Located at the 27° latitude, we can approximate a turning error of 30°. This will be the maximum turning error correction at North and South headings. Then, if for example the aircraft must turn from 090° to 180°, roll into a standard rate turn to the right. Remain in the turn until required rollout. This required rollout would be 7° (approximate normal rollout lead (½ the angle of bank)) - 30° (for turning error lead at current latitude) = -23° (rollout after passing desired heading). Therefore, the rollout should begin when the magnetic compass indicates 203°.

6) Once rolling level, use the attitude indicator to keep the aircraft wings level for several seconds before observing the magnetic compass value (to allow time for swing error to dampen).

TIMED TURNS TO MAGNETIC COMPASS HEADINGS

1) Maintain heading, altitude, and airspeed.

2) Set up timer to be used.

3) Compute the number of degrees between the current heading and new desired heading.

4) Divide the value determined between the current heading and new desired heading by 3° per second (the standard rate of turn). Note the result.

5) Roll into a standard rate turn and start the timer.

   NOTE: Bank required for standard rate turn = (True Airspeed (TAS) x 0.10) + 5°, thus 100 KTAS x 0.1 = 10° + 5° = 15° bank. Another example, 250 KTAS x 0.1 = 25° + 5° = 30°.

6) Remain in the standard rate turn until approximately 1-2 seconds prior to the value determined in step 4 (To compensate for normal rollout lead). Then roll wings level.

   NOTE: The compensation value of 1-2 seconds is established for banks of approximately 15°. The time lead would be increased or decreased for steeper or shallower bank angles.

7) Using the attitude indicator, keep the aircraft wings level for several seconds before observing the magnetic compass value (to allow time for swing error to dampen).

UNUSUAL ATTITUDES

1) The instructor pilot provides the cue word, “Recover.”

2) Scan the available, operational flight instruments. First scan the operational airspeed indicator(s) and then the operational attitude indicator(s).

   a. If the airspeed is below safe values or is decreasing (Nose-High Attitude),

      i. Smoothly increase the power to full.

      ii. Lower the pitch, and thereby the angle of attack, to avoid/recover from a stall and then maintain altitude.

      NOTE: Lowering the pitch may require significant forward elevator pressure due to aircraft configuration.

      iii. Level the wings using coordinated aileron and rudder input.

   b. If the airspeed is above safe values or is increasing (Nose-Low Attitude),

      i. Smoothly reduce the power to idle or as necessary to avoid excessive airspeed, increased loading, and loss of altitude.

      ii. Level the winds using coordinated aileron and rudder input.

      iii. Raise the pitch to a level flight attitude to arrest the descent and avoid excessive airspeed, increased loading, and loss of altitude.

      NOTE: Raising the pitch may require significant aft elevator pressure due to aircraft configuration.

3) Return to the desired altitude.

4) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

5) Perform CRUISE CHECKLIST.

NOTE: During these maneuvers, both the Pilot Flying and Pilot Monitoring must ensure:

- **The aircraft does encounter excessive or rapid increases in load.**
- **The maximum engine operating limitation of 2700 RPM is not exceeded.**
- **That the correct recovery procedure is implemented and if not be ready to take control of the airplane to recover correctly.**

STEEP TURNS (IR)

1) Select an altitude to allow recovery to occur above 1500’ AGL.
2) Select a reference heading to initially begin the maneuver.
3) Set power to 2200 RPM (APPROACH CRUISE) to slow the aircraft to a speed below V_A, if appropriate 95 KIAS.
4) Adjust pitch up to maintain altitude.
5) Perform PRE-MANEUVER CHECKLIST and make a POSITION REPORT.
6) Establish the heading selected in step 2.
7) Maintain heading and altitude. Note the pitch attitude required to maintain altitude. (The normal pitch attitude is 2° for APPROACH CRUISE)
8) Smoothly begin rolling into a bank in the direction of the cleared area while maintaining coordination using ailerons and rudders.
9) As the bank angle passes 30°, increase the pitch attitude by approximately 2° and increase power by approximately 150 RPM to maintain altitude and airspeed. Add approximately one full wheel of nose up trim to help maintain backpressure required.
10) Establish 45° of Bank.
11) Maintain bank angle, altitude, and airspeed by using the appropriate control and performance instruments. Rudder pressure will be applied in the direction of the bank to maintain coordination. Aileron pressure will be applied opposite the direction of bank to overcome overbanking tendency and to maintain the desired bank angle.

12) Begin rollout prior to the entry heading (20 to 25°) to allow wings level flight by the time the aircraft arrives at the entry heading.

13) As the bank angle passes 30°, apply forward pressure to decrease pitch by approximately 2° and reduce power to maintain altitude and airspeed.

14) After clearing area, initiate a turn in the opposite direction by smoothly rolling into a bank while maintaining coordination using ailerons and rudders.

15) As the bank angle passes 30°, increase the pitch attitude by approximately 2° and increase power as needed to maintain altitude and airspeed.

16) Establish 45° of Bank.

17) Maintain bank angle, altitude, and airspeed by using the appropriate control and performance instruments. Rudder pressure will be applied in the direction of the bank to maintain coordination. Aileron pressure will be applied opposite the direction of bank to overcome overbanking tendency and to maintain the desired bank angle.

18) Begin rollout prior to the entry heading (20 to 25°) to allow wings level flight by the time the aircraft arrives at the entry heading.

19) As the bank angle passes 30°, apply forward pressure to decrease pitch by approximately 2° and reduce power to maintain altitude and airspeed.

20) Apply approximately one-wheel nose down trim.

21) Resume normal cruise (2200 RPM (90 knots – APPROACH CRUISE), 2300 RPM (99 knots – ENROUTE CRUISE), or as required) at the appropriate heading and altitude.

22) Perform CRUISE CHECKLIST.

VOR ORIENTATION PROCEDURES

1) **Tune and Ident.** Select the appropriate VOR. Using the navigation chart, determine the appropriate frequency for the selected VOR. Enter that frequency in NAV 1. Identify that you are receiving the correct VOR using the three-letter identifier for the selected VOR. This can be accomplished with Audio/Morse Code or by the Ident window next to the frequency on the Nav Radio. Additionally, verify that the course deviation indicator (D Bar) is visible on the horizontal situation indicator (HIS).

2) **Center the Needle with a From Indication.** Using the Course Knob, rotate the Course Selector (Arrowhead on HSI) until you see a “From” indication on the HSI. Continue to rotate the Course Knob until the D Bar is centered. Read the number in the Course Window. That is the Radial you are located on.

3) **Plot the Radial on the Navigation Chart.** Using the Radial determined in step 2 and the Compass Rose on the Navigation Chart associated with the selected VOR, plot the Radial on the chart.

4) Select a second VOR that would allow you to determine a cross radial. Using Nav 2, Repeat Steps 1 to 3 using a Second VOR station. Once you plot the second radial on the chart, find the aircraft location by locating the point where the two plotted lines intersect.

VOR DIRECT NAV PROCEDURES

1) **Tune and Identify.** Select a VOR using the navigation chart. Determine the appropriate frequency for the selected VOR. Enter that frequency in the NAV 1 or NAV 2 radio as appropriate. Identify that you are receiving the correct VOR using the three-letter identifier for the selected VOR. This can be accomplished with Audio/Morse Code or by the Ident window next to the frequency on the Nav Radio. Also verify that the D Bar is visible on the HSI.

2) **Center the Needle with a To Indication.** Using the Course Knob, rotate the Course Selector (Arrowhead on HSI) until you see a “To” indication on the HSI. Continue to rotate Course Knob until the D Bar is centered. Read the number in the Course Window. This number is the Course To the VOR.

3) **Turn on and Track the Course.** Using the HSI, turn to the heading that is associated with the Course Deviation Indicator. Select a Reference Heading that will maintain the course while compensating for wind conditions.

VOR INTERCEPTING PROCEDURES

1) **Tune and Identify.** Select an appropriate VOR. Using the navigation chart, determine the appropriate frequency for the selected VOR. Enter that frequency in the NAV 1 or NAV 2 radio as appropriate. Identify that you are receiving the correct VOR using the three-letter identifier for the selected VOR. This can be accomplished with Audio/Morse Code or by the Ident window next to the frequency on the Nav Radio. Also verify that the D Bar is visible on the HSI.

2) **Intercept and Track Radial "From" or "To" the VOR?**

   a. To Intercept and Track a Radial ***From*** the VOR, use the Course Selector Knob to dial the Radial into the Course Window. On the HSI, rotate the ***Head of the Needle*** so it is pointing at the ***Radial to be Intercepted***.

   b. To Intercept and Track a Radial ***To*** the VOR, use the Course Selector Knob to dial the Reciprocal Radial into the Course Selector. On the HIS, rotate the ***Tail of the Needle*** so it is pointing at the ***Radial to be Intercepted.***

3) **Note the Direction of Deflection**. Using the Course Deviation Indicator, determine the direction that the course to be intercepted is from your current position. Is the course ***North, South, East, or West*** of your present position?

4) **Select an Intercept Angle.** Based on your distance from the VOR, select an Intercept Angle. If you are at or less than 5NM from the VOR, use a 30° angle. If you are more than 5NM from the VOR, use a 45° angle.

5) **Determine Intercept Heading.** Using the Direction of Deflection from Step 3 and the Intercept Angle from Step 4, look at the HSI and select the Heading that will intercept the radial selected.

6) **Turn to the Intercept Heading.** Note the current heading and turn the shortest direction to the Intercept Heading. Monitor the instruments for the CDI to center.

NOTE: Consider the present distance from the station and the current angular deflection of the CDI (e.g., if the aircraft is presently thirty miles from the station and the CDI is deflected two degrees, the aircraft is off course by one mile).

7) **Determine Quality of Intercept.** If the CDI does not indicate progress towards the desired course in an appropriate time:

   a. Verify established on Intercept Heading.

   b. Verify position relative to desired course.

   c. If appropriate, increase intercept angle by selecting and establishing a new Intercept Heading. (Maximum Intercept Angle – 60°)

8) **As CDI begins to center, turn on course**. Lead the intercept with a turn to the inbound/outbound course heading so as not to fly through the course.

9) Track Course. Select a Reference Heading that will maintain the course while compensating for wind conditions.

FIVE T's

1) **Time.** Start/Stop timer as appropriate.

2) **Turn.** Verify that the appropriate heading has been selected and turn to that heading.

3) **Twist.** Verify that the appropriate course has been selected and twist the CDI to that course.

4) **Throttle.** Verify that the proper power setting has been selected.

5) **Talk.** Verify that the proper communication frequency has been selected. Make radio call as appropriate.

NOTE: The Five T's are used as a tool to develop proficiency in organizing and prioritizing the tasks associated with a transition that occurs during flight events such as reaching a holding fix, crossing an initial approach fix, or a change in course.

HOLDING PROCEDURES

1) **Identify the Holding Fix.** Refer to the hold clearance to identify the holding fix. Holding fixes can be at various locations for example VOR stations, VOR intersections, GPS waypoints or fixes.

   NOTE: AVIONICS TECHNOLOGY HAS MADE HOLDING EASIER THAN EVER. THE GARMIN G1000 SYSTEM ALLOWS FOR PROGRAMMING AND DEPICTION OF BOTH PUBLISHED AND NONPUBLISHED HOLDS AT ANY WAYPOINT. PROFICIENCY IS EXPECTED BOTH WITH AND WITHOUT THIS CAPABILITY.

2) **Determine Entry.** Refer to the hold clearance to draw the hold on the enroute chart unless you are assigned a published hold that is already depicted. Once the hold is depicted, select the recommended entry procedure that will ensure you stay on the holding side of protected airspace.

3) **Slow to APPROACH CRUISE.** When three (3) minutes from the holding fix, slow to APPROACH CRUISE.

4) **Enter Hold.** Upon arrival at the holding fix do the FIVE T's and enter the holding pattern using the procedure determined in Step 2.

5) **Verify FIVE T's in every turn.** While turning inbound and outbound in the hold complete the FIVE T's.

6) **Report.** Once passing the holding fix on the first inbound leg report to ATC the time and altitude reaching the fix.

7) **Standard Leg Length 1 Minute Inbound.** Unless otherwise specified the inbound leg should be one (1) minute at or below 14,000 MSL. If DME leg lengths are specified, the outbound leg should be the DME distance specified.

8) **Outbound Leg Begins Abeam the Fix.** Outbound leg timing begins abeam the holding fix or upon completing the outbound turn if you cannot identify when you are abeam the fix.

9) **Outbound Wind Correction Angle (WCA) is Double/Triple the Inbound.** When compensating for the wind on the outbound leg the WCA is approximately two to three times the correction on the inbound leg. If you have not determined the WCA for the inbound leg, apply a WCA on the first outbound leg based on what you know about the wind at the altitude you are holding. Remember that the outbound correction needs to be exaggerated so you will not end up on the non-holding side of course when you turn inbound.

NOTE: When available, use the G1000 GPS-based ground track indicator overlayed on the HSI (magenta diamond) to estimate outbound wind correction angle. For example, once the magenta diamond is aligned with the course parallel but opposite to the desired inbound course, note the angular difference between the magenta diamond and the current aircraft heading. Then double to triple this amount for the required outbound wind correction angle.

10) **Report Leaving the Hold.** Report to ATC the time leaving the hold fix.

11) **Resume ENROUTE CRUISE.** After departing the hold, resume APPROACH CRUISE or ENROUTE CRUISE.

HOLD ENRTY-DIRECT

1) **Five T's**. Upon reaching the holding fix verify and execute the FIVE T's.

2) **Turn Outbound**. Begin a standard rate turn to the outbound heading that you determined when you drew the hold. Adjust the outbound heading for the wind conditions.

3) **Report**. Report to ATC the time and altitude reaching the fix.

HOLD ENRTY-TEARDROP

1) **Five T's**. Upon reaching the holding fix verify and execute the FIVE T's.

2) **Turn to 30°**. Begin a standard rate turn to the heading that you determined is 30° offset from the outbound heading. Make sure that the 30° angle is applied in a direction that keeps you inside the holding pattern.

   NOTE: Adjust the teardrop heading for the wind conditions. (I.e., add offset if turning into the wind and reduce offset if turning with the wind)

3) **After 1 Minute Turn Inbound**. After one (1) minute make a standard rate turn towards the inbound course to establish the course without leaving the holding side of protected airspace. Adjust the time for the wind conditions.

HOLD ENRTY-PARALLEL

1) **Five T's**. Upon reaching the holding fix verify and execute the FIVE T's.

2) **Turn and Track Course Outbound**. Make a standard rate turn to a heading that will intercept the holding course outbound. Adjust the Reference Heading to correct for wind while maintaining desired course.

3) **After 1 ½ Minutes Turn to Re-Intercept Course**. Make a standard rate 215° turn towards the holding side of course. This will establish a 45° intercept angle with the inbound holding course. Adjust the intercept angle and time for the wind conditions.

4) **Turn and Track Course**. Lead the intercept with a turn to the inbound course to avoid flying through the course. Once intercepted, select a Reference Heading that will maintain the course.

DME ARC PROCEDURES

1) **Tune and Ident.** Select an appropriate VOR. Using the navigation chart, determine the appropriate frequency for the selected VOR. Enter that frequency in the NAV 1 or NAV 2 radio as appropriate. Identify that you are receiving the correct VOR using the three-letter identifier for the selected VOR. This can be accomplished with Audio/Morse Code or by the Ident window next to the frequency on the Nav Radio. Select the CDI to the appropriate NAV 1 or NAV 2 radio and verify that the D Bar is visible on the HSI.

2) **Intercept Radial.** Determine distance and position from the VOR using all available equipment. Determine an intercept angle to the radial assigned or depicted. Select an intercept heading. Turn to intercept heading and intercept the course.

   NOTE: If assigned a heading to join the ARC, this step would not apply.

3) **Track Outbound/Inbound Towards the ARC.** Select a Reference Heading that will maintain the course correcting for current wind conditions. Monitor the DME to remain aware of your distance to the ARC.

4) **Slow before joining the ARC.** Slow to APPROACH CRUISE 3 minutes prior to the IAF or joining the ARC.

   NOTE: If the ARC is not part of an approach procedure, then maintain speed as required.

5) **Join the ARC.** Normally, when within .5 NM of the desired ARC, start a standard rate turn in the direction that you are assigned to track the ARC. Take

into consideration the intercept angle and the aircraft groundspeed as the distance required to turn varies.

NOTE: Refer to FAA-H-8083-25B for guidance on calculating a turn radius.

NOTE: In general, use the following equation to estimate needed lead when intercepting an ARC at a 90° angle:

Lead Distance = Ground Speed x 0.005, e.g., 200 Knots x 0.005 = 1 NM

NOTE: If the intercept angle is less than 90°, then the lead distance would be a fraction of the distance needed at 90°. For example, if assigned a 30° intercept, then the lead distance would be a third of the distance needed at a 90° angle intercept.

6) **Turn to a Heading that is 90° to the Radial.** Turn in the appropriate direction based off the published arc or as instructed when joining a nonpublished arc. The initial heading will be 90° to the radial the aircraft is located on when joining the ARC.

7) **Twist 10°.** Rotate the Course Selector to the radial (“From” indication on the ambiguity meter) that is 10° in advance of your position on the ARC.

8) **Turn 10°.** When the CDI centers turn the heading 10° towards the VOR station. Doing this will maintain the desired DME distance in relatively calm wind conditions.

9) **Twist 10°.** Rotate the Course Selector to the radial (“From” indication on the ambiguity meter) that is 10° in advance of your position on the ARC.

10) **Turn 10°.** When the CDI centers turn the heading 10° towards the VOR station. Doing this will maintain the desired DME distance in relatively calm wind conditions.

11) **Continue Twist 10° then Turn 10°.** Continue to repeat these steps until you reach the assigned radial or the lead radial for the associated instrument approach procedure.

NOTE: Monitor DME Throughout. If DME distance increases, change the aircraft heading by 5° or 10° towards the inside of the ARC (towards the VOR station). If the DME distance decreases, change the aircraft heading by 5° or 10° towards the outside of the ARC (away from the VOR station).

NOTE: Be aware that some wind conditions will require more than 10° of heading change to re-intercept the ARC. Attempt to keep the DME reading as close as possible of the published or assigned DME ARC.

12) **Crossing the Lead Radial Intercept Course**. Upon arriving at the Lead Radial while on the ARC, turn the aircraft to an Intercept Heading that represents a 45° Intercept Angle to the Approach Course.

NOTE: If the flight departs the ARC at an assigned radial/course or waypoint, then Steps 12 through 16 do not apply.

13) **Configure the avionics.** Select the CDI to the appropriate navaid. Twist the Course Selector to the Approach Course.

NOTE: Tune and Identify/Verify for integrity the navaids associated with the approach procedure prior to beginning the procedure.

14) **As the CDI begins to center, turn on course**. Lead the intercept with a turn to the appropriate heading so as not to fly through the course.

15) **Track Course.** Select a Reference Heading that will maintain the course compensating for wind conditions.

16) **Refer to PRECISION APPROACH PROCEDURE or NON-PRECISION APPROACH PROCEDURE to continue.**

NOTE: IF USING GPS TO FLY A PUBLISHED DME ARC ON AN APPROACH PROCEDURE, IT IS ACCEPTABLE TO FOLLOW THE COURSE PLOTTED BY THE GPS. TO ACCOMPLISH THIS TASK AFTER LOADING THE FULL APPROACH, VERIFY GPS INTEGRITY, SELECT THE CDI TO GPS, PROCEED DIRECT TO THE IAF AT THE BEGINNING OF THE ARC OR AS ASSIGNED. IF ARRIVING OVER THE IAF, TURN THE AIRCRAFT TO THE HEADING THAT IS INDICATED BY THE CDI. THEN CONTINUE TO TURN THE AIRCAFT IN A MANNER THAT KEEPS THE CDI CENTERED. IF ARRIVING INSIDE OF THE IAF, ACTIVATE THE DME ARC LEG ON THE FLIGHT PLAN PAGE. THEN CONTINUE TO TURN THE AIRCRAFT IN A MANNER THAT KEEPS THE CDI CENTERED. IF APPLICABLE, ONCE JOINING THE APPROACH COURSE, THE CDI SHOULD AUTOMATICALLY SELECT THE APPROACH NAV RADIO. MONITOR IF IT DOES NOT, THEN SELECT MANUALLY.

INSTRUMENT APPROACH PROCEDURE

1) Receive ATIS as soon as possible.

2) Determine which approach is in use. Select proper approach chart.

3) Determine approach procedure. (Vectored or Full approach)

NOTE: IF FULL APPROACH PROCEDURE IS REQUIRED DETERMINE TIMINING BETWEEN THE IAF/IF AND PROCEDURE TURN BASED ON WHERE THE IAF/IF IS LOCATED.

a. If IAF/IF is located off airport: Time between IAF/IF and PT = 2 minutes at 90 knots ground speed (equal to 3 nm).

b. If IAF/IF is located on airport: Time between IAF/IF and PT = 3 minutes at 90 knots ground speed (equal to 5 nm).

4) Set up for the approach. (Nav 1&2, Comm 1&2, GPS, DME)

5) Conduct APPROACH BRIEFING.

6) Perform BEFORE LANDING CHECKLIST prior to the initial approach segment.

7) Slow to APPROACH CRUISE 3 minutes prior to the IAF.

8) Verify and make "COURSE ALIVE," CALLOUT.

9) At the FAF, make “Below 110 Knots, flaps 10,” CALLOUT and set FLAPS 10°. Set appropriate pitch and power for final approach descent (PRECISION APPROACH DESCENT or NON-PRECISION APPROACH DESCENT).

10) At 500’ above Decision Altitude (DA)/ Minimum Descent Altitude (MDA), make “500 ABOVE MINIMUMS,” CALLOUT.

11) At 100’ above DA/MDA make “100 ABOVE MINIMUMS,” CALLOUT.

12) At DA/MDA make “MINIMUMS,” CALLOUT, and

a. If conditions exist suitable for landing, make "GO VISUAL," CALLOUT and land the airplane.

b. If only the approach lights are visible, make "APPROACH LIGHTS," CALLOUT and continue as appropriate.

c. If none of the required visual references are present, make the "GO MISSED," CALLOUT and execute the MISSED APPROACH PROCEDURE.

NOTE: In the training environment it is sometimes necessary to simulate IFR conditions by using a View Limiting Device. When using the View Limiting Device the following procedures will be used to simulate seeing or not seeing the appropriate visual reference when at Minimums.

i. **If at or before Missed Approach Point the Instructor states "GO VISUAL," the student should raise the Hood and land the Airplane.**

ii. **If at or before the Missed Approach Point the Instructor states "APPROACH LIGHTS," the student will not remove the view-limiting device. The student will continue to fly the approach as appropriate.**

iii. **If at the Missed Approach Point the Instructor has not said anything, the student will make the "GOING MISSED," CALLOUT and execute the MISSED APPROACH PROCEDURE.**

PRECISION APPROACH PROCEDURE

1) Receive ATIS as soon as possible.

2) Determine which approach is in use. Select proper approach chart.

3) Determine approach procedure. (Vectored or Full approach)

NOTE: IF FULL APPROACH PROCEDURE IS REQUIRED DETEMINE TIMINING BETWEEN THE IAF/IF AND PROCEDURE TURN BASED ON WHERE THE IAF/IF IS LOCATED.

a. If IAF/IF is located off airport: Time between IAF/IF and PT = 2 minutes at 90 knots ground speed (equal to 3 nm).

b. If IAF/IF is located on airport: Time between IAF/IF and PT = 3 minutes at 90 knots ground speed (equal to 5 nm).

4) Set up for the approach. (Nav 1&2, Comm 1&2, GPS, DME)

5) Conduct APPROACH BRIEFING.

6) Perform BEFORE LANDING CHECKLIST prior to the initial approach segment.

7) Slow to APPROACH CRUISE 3 minutes prior to the IAF.

8) Verify and make "COURSE ALIVE," CALLOUT.

9) Verify and make “GLIDE SLOPE ALIVE,” CALLOUT.

10) At glide slope intercept, set pitch, power, and FLAPS 10° (make “Below 110 Knots, flaps 10,” CALLOUT) for a PRECISION APPROACH DESCENT.

11) Verify the glide slope is intercepted at the appropriate, published altitude and make “GLIDE SLOPE CHECKED,” CALLOUT.

12) Maintain tracking procedures for the localizer and glide slope using a reference heading and a reference rate of descent.

13) At 500’ above Decision Altitude (DA), make “500 ABOVE MINIMUMS,” CALLOUT.

14) At 100’ above DA, make “100 ABOVE MINIMUMS,” CALLOUT.

15) At DA, make “MINIMUMS,” CALLOUT. Decide whether requirements are met to continue descent below DA or execute MISSED APPROACH PROCEDURE and make "GOING MISSED," CALLOUT.

NON-PRECISION APPROACH PROCEDURE

1) Receive ATIS as soon as possible.

2) Determine which approach is in use. Select proper approach chart.

3) Determine approach procedure. (Vectored or Full approach)

NOTE: IF FULL APPROACH PROCEDURE IS REQUIRED DETEMINE TIMINING BETWEEN THE IAF/IF AND PROCEDURE TURN BASED ON WHERE THE IAF/IF IS LOCATED.

a. If IAF/IF is located off airport: Time between IAF/IF and PT = 2 minutes at 90 knots ground speed (equal to 3 nm).

b. If IAF/IF is located on airport: Time between IAF/IF and PT = 3 minutes at 90 knots ground speed (equal to 5 nm).

4) Set up for the approach. (Nav 1&2, Comm 1&2, GPS, DME)

5) Conduct APPROACH BRIEFING.

6) Perform BEFORE LANDING CHECKLIST prior to the initial approach segment.

7) Slow to APPROACH CRUISE 3 minutes prior to the IAF.

8) Verify and make "COURSE ALIVE," CALLOUT.

9) At FAF, make “FINAL APPROACH FIX” CALLOUT, set pitch, power, and FLAPS 10° (make “Below 110 Knots, flaps 10,” CALLOUT) for a NON-PRECISION APPROACH DESCENT.

10) At 500’ above Minimum Descent Altitude (MDA), make “500 ABOVE MIMIMUMS,” CALLOUT.

11) At 100’ above MDA, make “100 ABOVE MINIMUMS,” CALLOUT.

12) Prior to reaching MDA, initiate level off by setting pitch and power for MDA CRUISE so that level off occurs at MDA and there is no descent below MDA.

16) Maintain MDA until requirements are met to descend below MDA, or until reaching the MAP and executing the MISSED APPROACH PROCEDURE.

NOTE: If the MISSED APPROACH PROCEDURE is executed, make "GOING MISSED," CALLOUT.

CIRCLING APPROACH

1) Review the planned circling procedure during the approach briefing.

   NOTE: While reviewing the appropriate circling procedure for the approach, take into consideration ATC instructions, weather conditions, standard traffic pattern turns to the left, and the effect of other aircraft operating at the airport during the procedure.

2) Ensure the required visual references needed to safely begin a circling approach are visible.

3) When beginning the circling approach, position the aircraft to fly the safest, shortest path to comply with ATC instructions or join the base or downwind leg for the desired Runway as appropriate.

4) Ensure the path remains within the appropriate approach category circling visibility minimum as well as remains within visual contact of the required visual references for the circle approach.

5) Maintain at or above the circling minimum (preferably above the minimums if feasible) while configured at MDA CRUISE.

6) Select a **Touchdown Point**. Then select an **Aiming Point** that is based on the **Touchdown Point** and the conditions of the day.

7) When the circling path is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers:

   a. Reduce the power to 1500 RPM.

b. Verify airspeed is below flap operating range (85 KIAS), make "Below 85 Knots, flaps 20," CALLOUT, and set FLAPS 20°. Look at your **Aiming Point** and make any necessary pitch and power adjustments for a proper approach. Maintain 75 KIAS.

15) Once the landing is assured, make "Below 85 Knots, flaps 30," CALLOUT, and set FLAPS 30°.

19) Allow the airspeed to slow to 65 KIAS.

20) On final, be stabilized with crosswind correction as appropriate by 300 feet AGL and make "300 feet, stabilized," CALLOUT.

21) On short final, add two to three full wheels of nose up trim to assist in the flare.

NOTE: The amount of trim will vary with the position of the airplanes CG on that day. Do not use Manual Electric Trim to apply this trim setting. It may lead to an over trimming situation that would be hazardous in a Go Around.

22) Maintain 65 KIAS until crossing aiming point and the transition to the round out and flare.

23) Touchdown in a slightly nose high attitude and at the slowest speed possible.

24) After touch down maintain backpressure on the flight control to keep the nose wheel off the runway until the elevator stalls. Maintain directional control and slow to taxi speed before exiting the runway. Use minimal braking if possible.

25) After clearing the runway, perform AFTER LANDING CHECKLIST.

NOTE: On the first approach to a new runway, once the runway has been verified, make "Runway (Runway #) identified," CALLOUT.

MISSED APPROACH PROCEDURE

1) Make "GOING MISSED," CALLOUT.

2) Set pitch for V_Y CLIMB.

3) Apply full power.

4) After establishing a positive rate of climb, retract flaps in 10° increments, as appropriate.

   NOTE: Once the aircraft has accelerated to 60 KIAS, make "(Current Airspeed), flaps 10," CALLOUT and retract flaps to 10°.

   NOTE: Clear of obstacles and above 65 KIAS make "(Current Airspeed), flaps 0," CALLOUT and retract flaps to 0°.

5) Announce missed approach to ATC or CTAF, as appropriate.

6) Execute the missed approach procedures as instructed or as published.

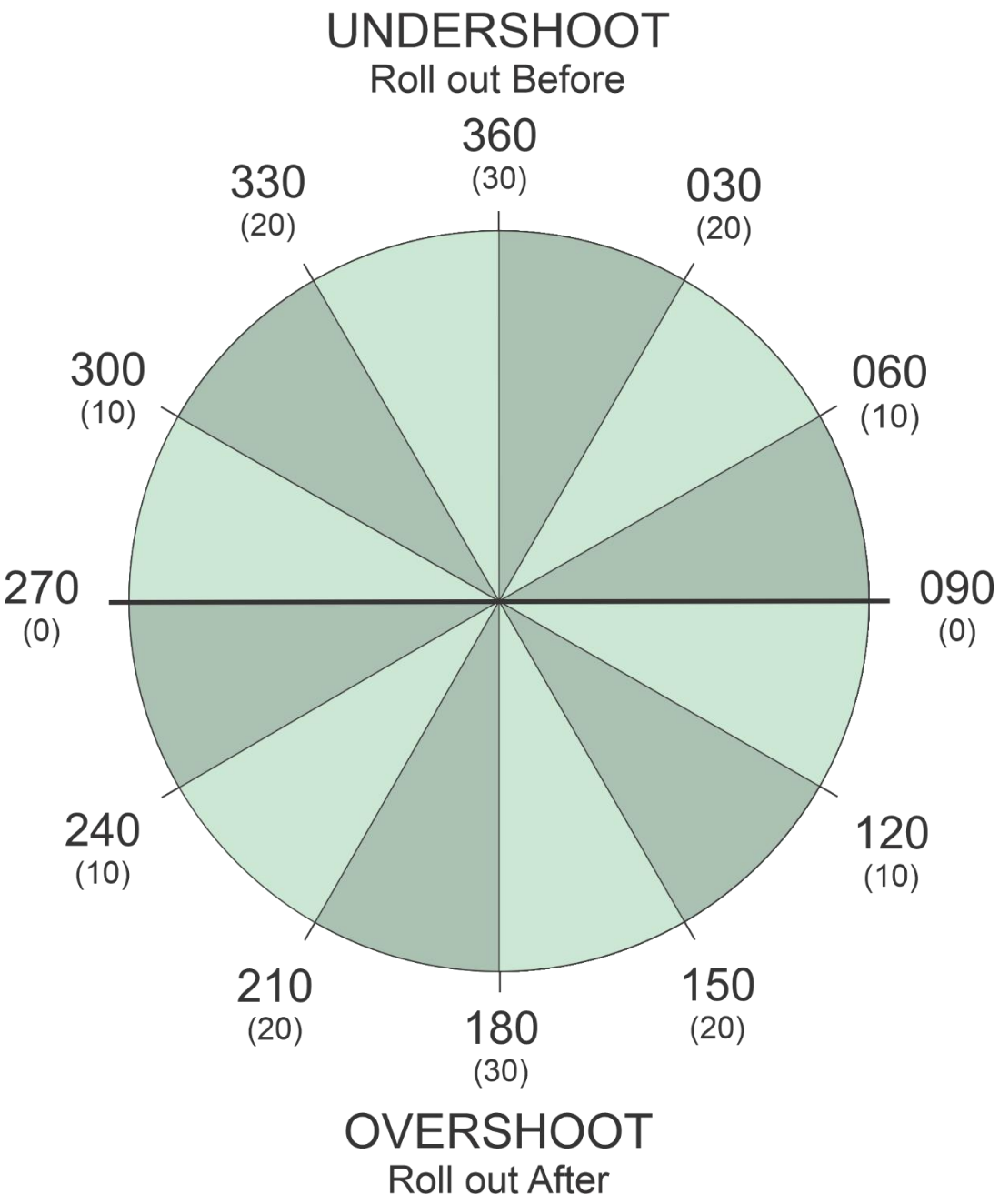
SECTION 6: REFERENCES

C172S PITCH & POWER TABLE

PHASE OF FLIGHT	PITCH	POWER	PERFORMANCE		CONFIGURATION
		RPM	A/S	VSI	
V_Y CLIMB	+9	FULL	74	800	FLAPS UP
V_X CLIMB	+12	FULL	62	700	FLAPS UP
CRUISE CLIMB	+6	FULL	85	600	FLAPS UP
ENROUTE CRUISE	+1	2300	99	0	FLAPS UP
APPROACH CRUISE	+2	2200	90	0	FLAPS UP
MDA CRUISE	0	2250	90	0	10 DEGREES
SLOW FLIGHT CLEAN CONFIGURATION			55	0	FLAPS UP
SLOW FLIGHT LANDING CONFIGURATION			50	0	30 DEGREES
CRUISE DESCENT			SAME AS ENR CRS	-500 FPM	FLAPS UP
APPROACH DESCENT	-2	1800	90	-500 FPM	10 DEGREES
PRECISION APPROACH DESCENT	-3	1900	90	-500 FPM	10 DEGREES
NON-PRECISION APPROACH DESCENT	-5	1700	90	-750 FPM	10 DEGREES

NOTE: WHILE THE PITCH VALUES SHOWN IN THIS TABLE WILL PRODUCE DEPENDABLE RESULTS, THERE CAN BE VARIATIONS DUE TO FACTORS THAT AFFECT PERFORMANCE.

MAGNETIC COMPASS TURNS GUIDE



NOTE: The turning error corrections supplied in this figure are based off operations at approximately the 30° North latitude.