



**Rainier Flight Service LLC, located at
Renton Municipal Airport and holding
Air Agency Certificate No. 1RFS095L,
is owned and operated as:**

**Rainier Flight Service
790 W Perimeter Rd, Unit B
Renton, WA 98057**

1. TAKEOFFS, LANDINGS AND GO-AROUNDS	7
1.1 MANEUVER: Airport Traffic Pattern	8
1.2 MANEUVER: Normal/Crosswind Takeoff and Climb.....	10
1.3 MANEUVER: Normal/Crosswind Approach and Landing.....	12
1.4 MANEUVER: Soft-Field Takeoff and Climb	14
1.5 MANEUVER: Soft-Field Approach and Landing	16
1.6 MANEUVER: Short-Field Takeoff and Climb	18
1.7 MANEUVER: Short-Field Approach and Landing	20
1.8 MANEUVER: 180° Power-Off Accuracy Approach and Landing.....	22
1.9 MANEUVER: Forward Slip to a Landing	24
1.10 MANEUVER: Go-Around/Rejected Landing.....	26
2. VFR FLIGHT MANEUVERS	28
2.1 MANEUVER: Maneuvering During Slow Flight (Minimum Controllable Airspeed)	30
2.2 MANEUVER: Power-Off Stalls – Full or Imminent	32
2.3 MANEUVER: Power-On Stalls - Full or Imminent	34
2.4 MANEUVER: Crossed-Control Stalls – Full or Imminent (CFI Applicants Only)	36
2.5 MANEUVER: Elevator Trim Stalls – Imminent (CFI Applicants Only)	38
2.6 MANEUVER: Secondary Stalls – Imminent (CFI Applicants Only)	40
2.7 MANEUVER: Accelerated Stalls – Imminent	42
2.8 MANEUVER: Spins (Dual Flights Only).....	44
2.9 MANEUVER: Steep Turns.....	46
2.10 MANEUVER: Steep Spirals.....	48
2.11 MANEUVER: Chandelles.....	50
2.12 MANEUVER: Lazy Eights	52
2.13 MANEUVER: Rectangular Course	54
2.14 MANEUVER: S-Turns Across a Road.....	56
2.15 MANEUVER: Turns-Around-a-Point	58
2.16 MANEUVER: Eights on Pylons.....	60
2.17 MANEUVER: Pilotage and Dead Reckoning	62
2.18 MANEUVER: Radio Navigation and Radar Services	62
2.19 MANEUVER: Diversion	63
2.20 MANEUVER: Lost Procedure.....	63
3. IFR FLIGHT MANEUVERS	64
3.1 MANEUVER: Instrument Cockpit Check	65
3.2 MANEUVER: Straight-and-Level.....	66
3.3 MANEUVER: Change of Airspeed	67
3.4 MANEUVER: Constant Airspeed Climbs and Descents	68
3.5 MANEUVER: Constant Rate Climbs and Descents	69
3.6 MANEUVER: Turns to Headings.....	70
3.7 MANEUVER: Timed Turns to Magnetic Compass Headings.....	71

3.8	MANEUVER: Steep Turns	72
3.9	MANEUVER: Recovery from Unusual Flight Attitudes	73
3.10	MANEUVER: Air Traffic Control Clearances, Procedures, and Compliance	74
3.11	MANEUVER: VOR Navigation.....	75
3.12	MANEUVER: GPS Navigation	76
3.13	MANEUVER: DME Arcs.....	77
3.14	MANEUVER: Holding	78
3.15	MANEUVER: Non-Precision Approach	79
3.16	MANEUVER: Precision Approach	80
3.17	MANEUVER: Missed Approach Procedure	81
3.18	MANEUVER: Landing From a Straight-in Approach	82
3.19	MANEUVER: Circling Approach Procedure.....	83
3.20	Considerations for Instrument Flight.....	84
4. EMERGENCY OPERATIONS – C 1 6 2		86
4.1	EMERGENCY PROCEDURE: Emergency Approach and Landing	87
4.2	EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll.....	88
4.3	EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff.....	88
4.4	EMERGENCY PROCEDURE: Engine Failure - Flight.....	89
4.5	EMERGENCY PROCEDURE: Low Oil Pressure	89
4.6	EMERGENCY PROCEDURE: Carburetor Icing	90
4.7	EMERGENCY PROCEDURE: Emergency Landing Without Engine Power.....	91
4.8	EMERGENCY PROCEDURE: Precautionary Landing with Engine Power	92
4.9	EMERGENCY PROCEDURE: Ditching.....	93
4.10	EMERGENCY PROCEDURE: Emergency Descent.....	93
4.11	EMERGENCY PROCEDURE: Engine Fire – During Start on Ground.....	94
4.12	EMERGENCY PROCEDURE: Engine Fire - Flight.....	95
4.13	EMERGENCY PROCEDURE: Electrical Fire or Cabin Fire In Flight.....	96
4.14	EMERGENCY PROCEDURE: Wing Fire.....	97
4.15	EMERGENCY PROCEDURE: Inadvertent Icing Encounter During Flight	98
4.16	EMERGENCY PROCEDURE: Landing with Partial or No Flight Instrument Information	99
4.17	EMERGENCY PROCEDURE: Landing with a Flat Main Tire	100
4.17	EMERGENCY PROCEDURE: Landing with a Flat Nose Tire	100
4.18	EMERGENCY PROCEDURE: Door Open in Flight	101
4.19	EMERGENCY PROCEDURE: Loss of all Electrical Power (Except PFD)	102
4.20	EMERGENCY PROCEDURE: Low Voltage.....	103
4.21	EMERGENCY PROCEDURE: High Voltage.....	104
4.22	ABNORMAL PROCEDURE: Air Data, ADAHRS Failure.....	105
4.23	ABNORMAL PROCEDURE: PFD and/or MFD Display Failure	105
4.24	ABNORMAL PR OCEDURE: PFD and/or MFD Not Updating	106
4.25	ABNORMAL PROCEDURE: Electric Pitch Trim Failure	106
4.26	ABNORMAL PROCEDURE: Loss of Communications	107

4.27	ABNORMAL PROCEDURE: Spins	108
4.28	Emergency Equipment and Survival Gear	108
5. EMERGENCY OPERATIONS – C 172.....		109
5.1	EMERGENCY PROCEDURE: Emergency Approach and Landing	110
5.2	EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll.....	111
5.3	EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff.....	111
5.4	EMERGENCY PROCEDURE: Engine Failure - Flight.....	112
5.5	EMERGENCY PROCEDURE: Emergency Landing Without Engine Power	113
5.6	EMERGENCY PROCEDURE: Precautionary Landing with Engine Power	114
5.7	EMERGENCY PROCEDURE: Ditching.....	115
5.8	EMERGENCY PROCEDURE: Engine Fire – During Start on Ground.....	116
5.9	EMERGENCY PROCEDURE: Engine Fire – In Flight	117
5.10	EMERGENCY PROCEDURE: Electrical Fire - In Flight.....	118
5.11	EMERGENCY PROCEDURE: Cabin Fire.....	119
5.12	EMERGENCY PROCEDURE: Wing Fire.....	120
5.13	EMERGENCY PROCEDURE: Inadvertent Icing Encounter.....	121
5.14	EMERGENCY PROCEDURE: Landing With A Flat Main Tire.....	122
5.15	EMERGENCY PROCEDURE: Landing With A Flat Nose Tire	122
5.16	EMERGENCY PROCEDURE: Ammeter Shows Excessive Rate of Charge	123
5.17	EMERGENCY PROCEDURE: Low Voltage Annunciator Illuminates	123
5.18	EMERGENCY PROCEDURE: Vacuum System Failure.....	124
5.19	EMERGENCY PROCEDURE: Emergency Descent.....	124
5.20	EMERGENCY PROCEDURE: Spin Recovery.....	125
5.21	ABNORMAL PROCEDURE: Low Oil Pressure	126
5.22	ABNORMAL PROCEDURE: High Oil Temperature	126
5.23	ABNORMAL PROCEDURE: Engine Roughness.....	127
5.24	ABNORMAL PROCEDURE: Open Door	127
5.25	ABNORMAL PROCEDURE: Pitot/Static Blockages	128
5.26	ABNORMAL PROCEDURE: Loss of Communications	128
5.27	Emergency Equipment and Survival Gear	129
6 . EMERGENCY OPERATIONS – C 172 G 1000		130
6.1	EMERGENCY PROCEDURE: Emergency Approach and Landing	131
6.2	EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll.....	132
6.3	EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff.....	132
6.4	EMERGENCY PROCEDURE: Engine Failure – In Flight	133
6.5	EMERGENCY PROCEDURE: Emergency Landing Without Engine Power	134
6.6	EMERGENCY PROCEDURE: Precautionary Landing with Engine Power	135
6.7	EMERGENCY PROCEDURE: Ditching.....	136
6.8	EMERGENCY PROCEDURE: Engine Fire – During Start on Ground.....	137
6.9	EMERGENCY PROCEDURE: Engine Fire – In Flight	138

6.10	EMERGENCY PROCEDURE: Electrical Fire - In Flight	139
6.11	EMERGENCY PROCEDURE: Cabin Fire	140
6.12	EMERGENCY PROCEDURE: Wing Fire.....	140
6.13	EMERGENCY PROCEDURE: Inadvertent Icing Encounter During Flight	141
6.14	EMERGENCY PROCEDURE: Static Source Blockage.....	142
6.15	EMERGENCY PROCEDURE: Excessive Fuel Vapor	142
6.16	EMERGENCY PROCEDURE: Landing with a Flat Main Tire	143
6.17	EMERGENCY PROCEDURE: Landing with a Flat Nose Tire	143
6.18	EMERGENCY PROCEDURE: Over Voltage.....	144
6.19	EMERGENCY PROCEDURE: Under Voltage.....	145
6.20	EMERGENCY PROCEDURE: Low Voltage.....	145
6.21	EMERGENCY PROCEDURE: Air Data System Failure.....	146
6.22	EMERGENCY PROCEDURE: Attitude and Heading Reference System Failure	147
6.23	EMERGENCY PROCEDURE: Autopilot or Electric Trim Failure.....	147
6.24	EMERGENCY PROCEDURE: Display Cooling Advisory	148
6.25	EMERGENCY PROCEDURE: Vacuum System Failure.....	148
6.26	EMERGENCY PROCEDURE: High Carbon Monoxide Level Advisory	149
6.27	EMERGENCY PROCEDURE: Emergency Descent.....	149
6.28	EMERGENCY PROCEDURE: Spin Recovery	150
6.29	ABNORMAL PROCEDURE: Low Oil Pressure	151
6.30	ABNORMAL PROCEDURE: High Oil Temperature	151
6.31	ABNORMAL PROCEDURE: Engine Roughness.....	152
6.32	ABNORMAL PROCEDURE: Open Door	152
6.33	ABNORMAL PROCEDURE: Loss of Communications	153
6.34	Emergency Equipment and Survival Gear	153
7	EMERGENCY OPERATIONS – PA-28RT.....	154
7.1	EMERGENCY PROCEDURE: Emergency Approach and Landing	155
7.2	EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll.....	156
7.3	EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff.....	156
7.4	EMERGENCY PROCEDURE: Engine Power Loss – In Flight	157
7.5	EMERGENCY PROCEDURE: Emergency Landing Without Engine Power	158
7.6	EMERGENCY PROCEDURE: Precautionary Landing with Engine Power	159
7.7	EMERGENCY PROCEDURE: Ditching.....	160
7.8	EMERGENCY PROCEDURE: Engine Fire – During Start on Ground.....	161
7.9	EMERGENCY PROCEDURE: Engine Fire – In Flight	162
7.10	EMERGENCY PROCEDURE: Electrical Fire - In Flight.....	163
7.11	EMERGENCY PROCEDURE: Cabin Fire.....	164
7.12	EMERGENCY PROCEDURE: Wing Fire.....	164
7.13	EMERGENCY PROCEDURE: Inadvertent Icing Encounter During Flight	165
7.14	EMERGENCY PROCEDURE: Static Source Blockage.....	166
7.15	EMERGENCY PROCEDURE: Excessive Fuel Vapor	166

7.16	EMERGENCY PROCEDURE: Landing with a Flat Main Tire	167
7.17	EMERGENCY PROCEDURE: Landing with a Flat Nose Tire	167
7.18	EMERGENCY PROCEDURE: Emergency Landing Gear Extension	168
7.19	EMERGENCY PROCEDURE: Propeller Overspeed	168
7.20	EMERGENCY PROCEDURE: Under Voltage.....	169
7.21	EMERGENCY PROCEDURE: Low Voltage.....	169
7.22	EMERGENCY PROCEDURE: Spin Recovery.....	170
7.23	EMERGENCY PROCEDURE: Open Door In Flight.....	170
7.24	EMERGENCY PROCEDURE: Autopilot Failure.....	170
7.25	EMERGENCY PROCEDURE: Loss Of Fuel Pressure	172
7.26	EMERGENCY PROCEDURE: Vacuum System Failure.....	172
7.27	EMERGENCY PROCEDURE: Emergency Descent.....	173
7.28	EMERGENCY PROCEDURE: Spin Recovery.....	174
7.29	ABNORMAL PROCEDURE: Loss Of Oil Pressure	174
7.30	ABNORMAL PROCEDURE: High Oil Temperature	175
7.31	ABNORMAL PROCEDURE: Engine Roughness.....	176
7.32	ABNORMAL PROCEDURE: Open Door	176
7.33	ABNORMAL PROCEDURE: Loss of Communications	177
7.34	Emergency Equipment and Survival Gear	177
8	GLOSSARY OF ABBREVIATIONS AND TERMS	178

1. TAKEOFFS, LANDINGS AND GO-AROUNDS

Objective

To develop the pilot's proficiency on normal and crosswind takeoffs and landings, short-field takeoffs and landings, soft-field takeoffs and landings, 180° power-off accuracy approaches and landings, go-arounds, and airport traffic patterns.

References

- AC 90-66A: Recommended Standard Traffic Patterns and Practices for Aeronautical Operations at Airports without Operating Control Towers
- FAA-H-8083-3A: Airplane Flying Handbook
- Cessna Model 162 Pilot's Operating Handbook
- Cessna Model 172S Pilot's Operating Handbook
- Practical Test Standards

1.1 MANEUVER: Airport Traffic Pattern

Objective

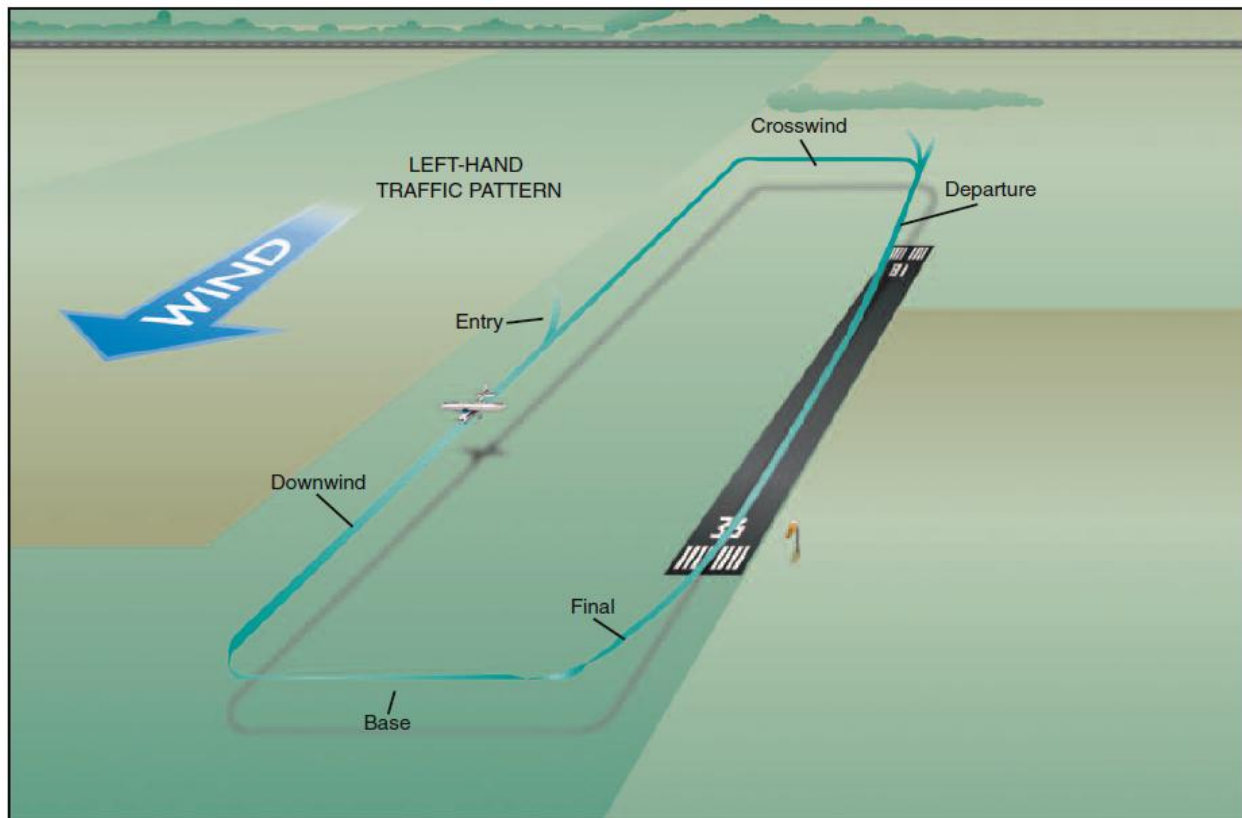
To develop the pilot's knowledge of the rules and procedures involved with airport traffic patterns.

Description

A traffic pattern has rules and procedures designed to assure that air traffic flows into and out of an airport in an orderly manner. It is established appropriate to the local conditions, including: the altitude to be flown, the wind direction, the direction and placement of the pattern, and the procedures for entering and leaving the pattern. Pilots should make all turns to the left, unless otherwise indicated.

Teaching Considerations

- Division of attention.
- Compliance with ATC instructions.
- Adequate spacing between other traffic operating in the traffic pattern.
- All legs of the traffic pattern should be approximately 3/4 mile from the runway.
- Wind drift correction/ground track considerations.
 - Application of ground reference maneuvers to traffic pattern operations.
- Appropriate radio calls at controlled/uncontrolled airports.
- Use of the Airport/Facilities Directory (A/FD) for airport operations.
- Wind shear and wake turbulence.



Set-up

- Determine the Traffic Pattern Altitude (TPA).
- Determine the wind direction, runway, traffic pattern direction, and any existing traffic using any or all of the following:
 - ATIS, ASOS, windsock, etc.
 - Radio communication.
 - Airport overflight at 500 feet above the TPA. Do not descend to TPA until well clear of the pattern.
- Enter the traffic pattern at a 45° angle to the downwind leg at TPA.
- The downwind leg should be approximately 3/4 mile from the runway.
- Apply proper wind correction angle for a ground track parallel to the runway.
- Initiate Before Landing Checklist by mid-field downwind or 2 miles from the runway threshold if entering on base or final leg.
- Select aiming point using the following prioritized criteria.
 - Abeam visual glideslope indicator (PAPI, VASI).
 - Aiming point marking (1,000 foot marker).
 - At least 200 feet beyond threshold, within first 1/3 of the runway.

Execution

- Maintain recommended approach speeds throughout the pattern.
 - Pattern entry (80 KIAS – C162, 90 KIAS – C172, 100 KIAS – PA28RT)
 - Downwind (80 KIAS – C162, 90 KIAS – C172, 100 KIAS – PA28RT)
 - Base (70 KIAS – C162, 80 KIAS – C172, 90 KIAS – PA28RT)
 - Final (60 KIAS – C162, 70 KIAS – C172, 80 KIAS – PA28RT)
 - Short Final (Speed appropriate for flaps, wind and go-around)

NOTE: Change in airspeed should be continual throughout the traffic pattern.

NOTE: If landing with zero flaps, final approach speed should be increased by 9 KIAS.

- Abeam the aiming point - reduce power setting. **Extend gear (PA28RT).**
- The base leg begins 45° from the aiming point. **Check gear (PA28RT).**
- Coordinate final turn to rollout on the runway centerline. **Check gear (PA28RT).**
- Establish a stabilized approach by 200 feet AGL and *verbalize*:
 - A stabilized approach is:
 - Check – All checklists are complete
 - F – Flight path correct (on centerline)
 - L – Landing configuration correct
 - A – Airspeed (+5/-0)
 - P – Power setting appropriate for aircraft configuration
 - S – Sink rate is not abnormal (on glidepath)

NOTE: Changing conditions require adjustments of speed and flap settings, i.e. wind gust factors, ATC.

- Complete Before Landing Checklist prior to 200 feet AGL.
- If a stabilized approach is not attained by 200 feet AGL, a go-around must be conducted.

Closed Traffic Procedures

- Continue on the upwind leg until reaching a point beyond the departure end of the runway and within 300 feet of TPA.
- Continue with specified traffic pattern procedures listed above.
- If leaving the pattern, the pilot should continue straight ahead or depart by making a 45° left turn (right turn for right hand pattern) after reaching TPA.

NOTE: When operating at a tower-controlled airport, ATC may alter standard traffic pattern operations.

1.2 MANEUVER: Normal/Crosswind Takeoff and Climb

Objective

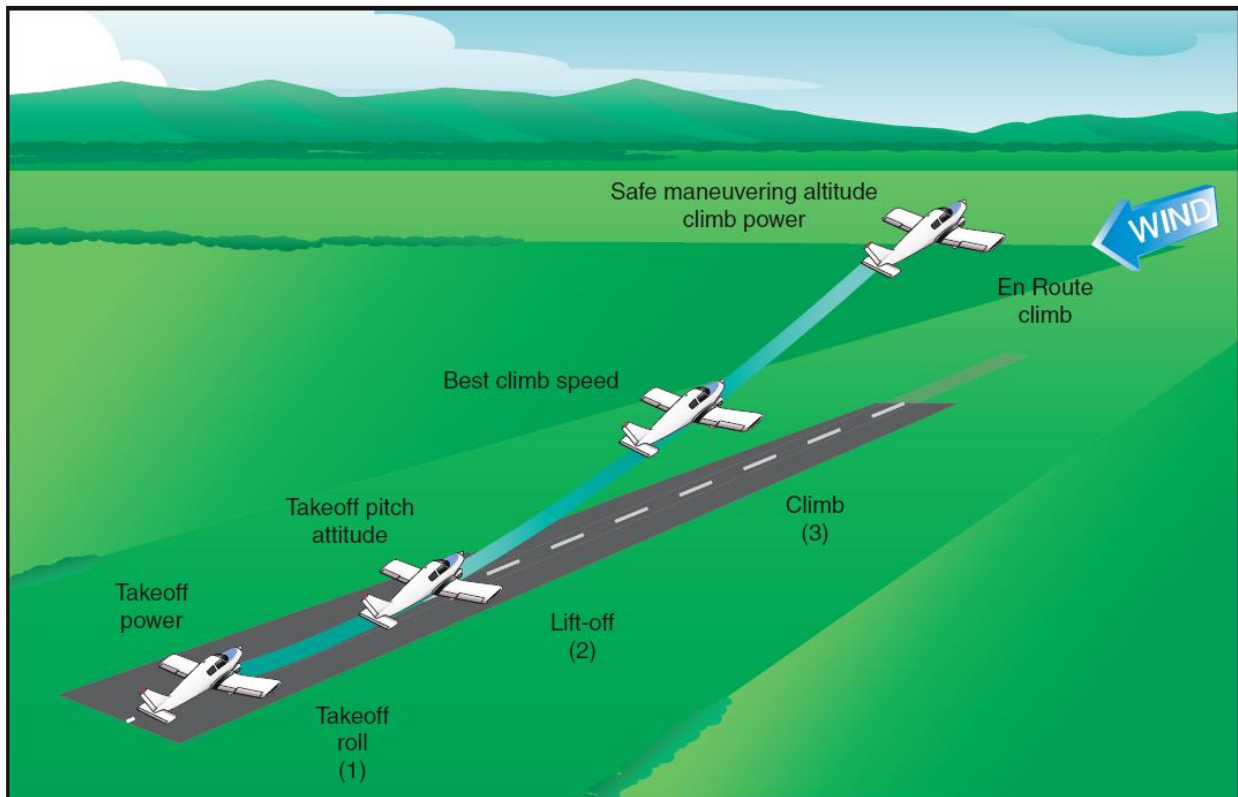
To develop the pilot's proficiency on normal and crosswind takeoffs, and climbs.

Description

The takeoff and climb involves the movement of the airplane from its starting position on the runway to the point where a positive climb to a safe maneuvering altitude has been established.

Teaching Considerations

- PAVE Checklist
- Planning and orientation.
 - Runway length, width, and surface condition.
 - Effect of density altitude.
 - Appropriate climb airspeed.
- Calculation and use of takeoff performance data.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Aborted takeoff before and after liftoff.
- Wind shear and wake turbulence.
- Importance of completing checklists.
- Methods for checking for traffic used in a high wing aircraft.



Set-up

- Set the wing flap setting to 0°.
- Adjust the mixture, obtaining maximum engine performance for the existing conditions (full rich below 3,000 feet, leaned for best power above 3,000 feet pressure altitude).
- Review takeoff performance capabilities and consider obstructions and conditions.
- Verify the final approach and takeoff path are clear of other aircraft.
- Align the airplane on the runway centerline.
- Verify that the heading indicator is aligned with the runway heading.
- Confirm that the runway heading corresponds with the intended runway of use.
- Apply aileron deflection properly for crosswind conditions.

Execution

- Advance the throttle smoothly to maximum power.
- Check engine instruments and annunciators.
- Adjust aileron deflection during acceleration.
- Liftoff at computed airspeed.
- Establish the pitch attitude for and accelerate to V_y or appropriate speed for altitude.
- Maintain directional control and proper wind drift correction throughout the takeoff and climb.
- At 1,000 feet AGL verify the climb flow pattern/checklist complete.

1.3 MANEUVER: Normal/Crosswind Approach and Landing

Objective

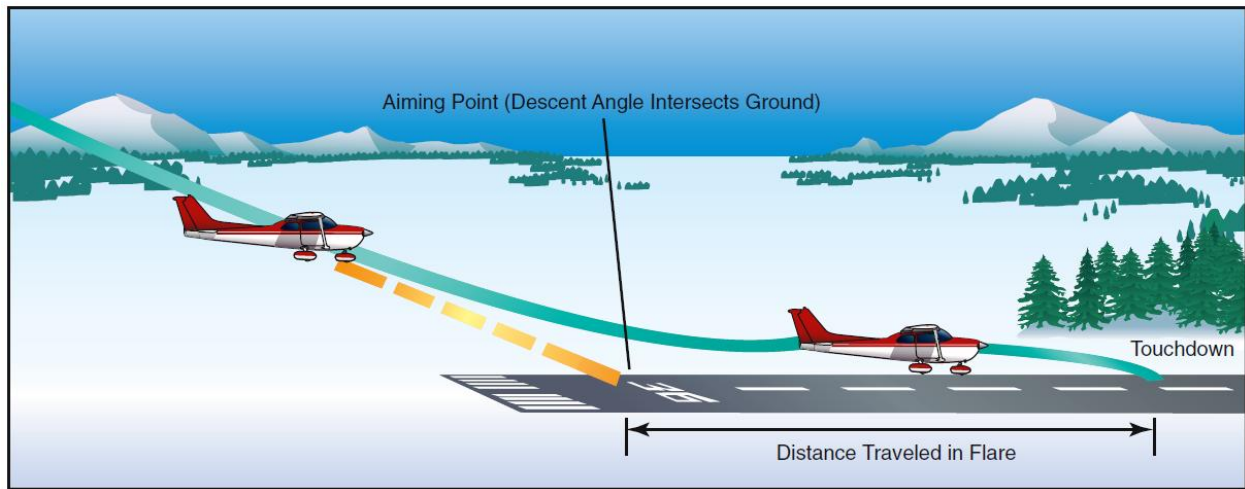
To develop the pilot's proficiency on normal and crosswind approaches and landings.

Description

The landing involves the transition from the airport traffic pattern to the end of the landing roll.

Teaching Considerations

- Planning and orientation.
 - Runway length, width, and surface condition.
 - Effect of density altitude on landing distance.
 - Obstructions or hazards.
 - Landing performance data and limitations.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Wind shear or wake turbulence.
- Effect of flaps on approach and landing.
- Effective use of brakes consistent with safety.
- Timely execution of go-around, if necessary.
- Importance of completing checklists.
- Importance of adjusting seat to appropriate position.
- Appropriate speed for turning off the runway.



Set-up

- Establish the recommended approach and landing configuration and airspeed (see Airport Traffic Pattern).
- Select an aiming point using the following prioritized criteria.
 - Abeam visual glideslope indicator (PAPI, VASI).
 - Aiming point marking (1,000 foot marker).
 - At least 200 feet beyond threshold, within first 1/3 of the runway.

Execution

- Apply proper crosswind correction for landing.
- Establish a stabilized approach by 200 feet AGL and *verbalize*:
 - A stabilized approach is:
 - Check – All checklists are complete
 - F – Flight path correct (on centerline)
 - L – Landing configuration correct
 - A – Airspeed (+5/-0)
 - P – Power setting appropriate for aircraft configuration
 - S – Sink rate is not abnormal (on glidepath)

NOTE: Flight control inputs on final are used to maintain an already stabilized approach path.

NOTE: Changing conditions require adjustments of speed and flap settings, i.e. wind gust factors, ATC.

- If landing with the flaps up, increase approach speed by 9 KIAS.
- Begin the round out at approximately 10–20 feet above the ground, smoothly transitioning to a landing pitch attitude and decrease airspeed.
- Touchdown on main gear first at approximate stalling speed with no drift and with the airplane's longitudinal axis aligned with the runway/landing path.
- Maintain centerline using proper crosswind technique.

1.4 MANEUVER: Soft-Field Takeoff and Climb

Objective

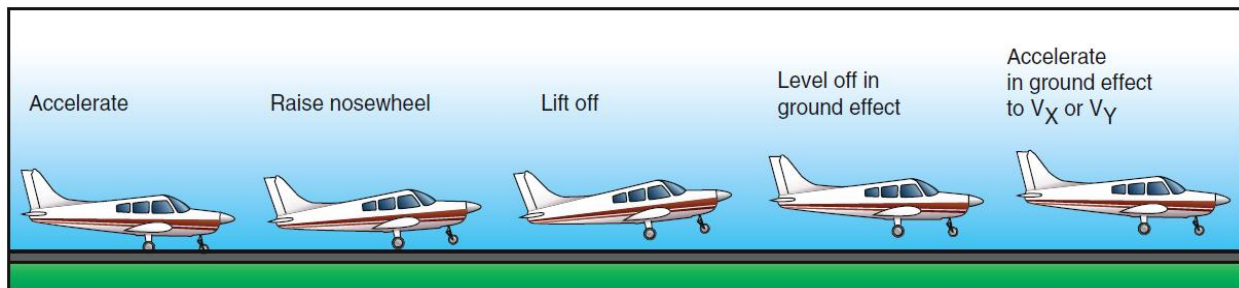
To develop the pilot's ability to obtain maximum performance from the airplane while performing a soft field takeoff.

Description

Takeoffs and climbs from softy field require the use of operational techniques for getting the airplane airborne as quickly as possible to eliminate drag caused by tall grass, soft turf, mud, snow, etc.

Teaching Considerations

- Planning and orientation.
 - Runway length, width, and surface condition.
 - Effect of density altitude.
 - Appropriate climb speed.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Aborted takeoff before and after liftoff.
- Wind shear and wake turbulence.
- Importance of completing checklists.
- Methods for checking for traffic used in a high wing aircraft.



Set-up

- Review takeoff performance capabilities, considering obstructions and conditions.
- Select the wing flap to POH recommended setting.
- Adjust the mixture, obtaining maximum engine performance for the existing conditions (full rich below 3,000 feet, leaned for best power above 3,000 feet pressure altitude).
- Verify the final approach and takeoff path are clear of other aircraft.
- Position the airplane on the takeoff path without coming to a complete stop.
- Verify that the heading indicator is aligned with the runway heading.
- Confirm that the runway heading corresponds with the intended runway of use.
- Apply aileron deflection properly for crosswind conditions.
- When departing with an aft CG loading, elevator trim should be adjusted slightly nose down.

Execution

- Advance the throttle smoothly to maximum power.
- Check engine instruments and annunciators.
- Adjust aileron deflection during acceleration.
- Adjust and maintain a pitch attitude that transfers the weight from the wheels to the wings as rapidly as possible.
- Liftoff at the lowest possible airspeed and remain in ground effect while accelerating to V_x or V_y , as appropriate.
- Establish the pitch attitude for V_x or V_y , as appropriate, and maintain selected airspeed during the climb.
- Retract the wing flaps to up, when the airspeed is above V_y , at a safe altitude and after a positive rate of climb is established.
- Maintain directional control and proper wind drift correction throughout the takeoff and climb.
- At 1,000 feet AGL verify the climb flow pattern/checklist complete.

1.5 MANEUVER: Soft-Field Approach and Landing

Objective

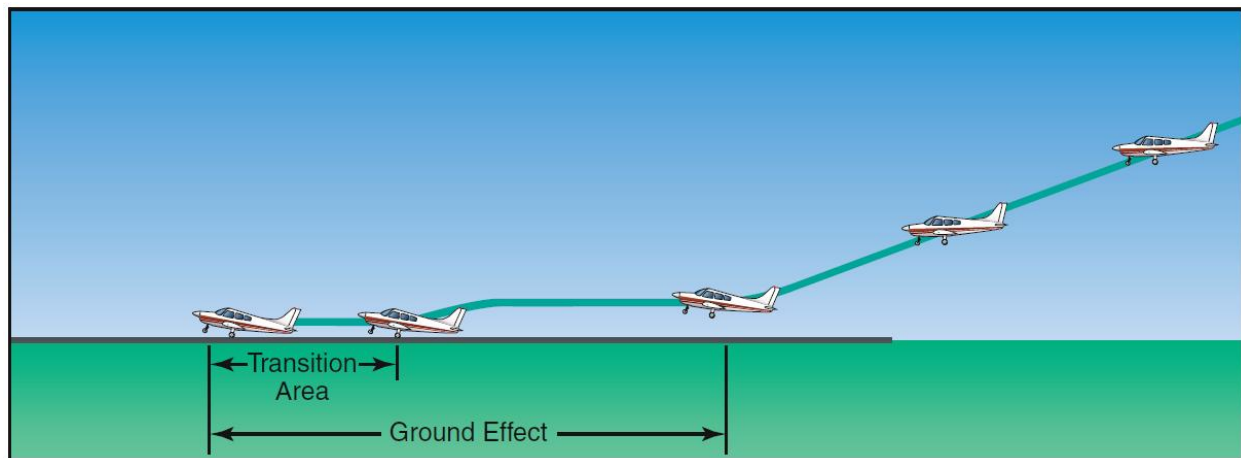
To develop the pilot's ability to obtain maximum performance from the airplane while performing a soft field landing.

Description

Approach and landings to soft-fields require the pilot to control the airplane in a manner that the wings support the weight of the airplane as long as practical. This minimizes drag and stresses imposed on the landing gear by the rough or soft surface.

Teaching Considerations

- Planning and orientation.
 - Runway length, width, and surface condition.
 - Effect of density altitude on landing distance.
 - Obstructions or hazards.
 - Landing performance data and limitations.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Wind shear or wake turbulence.
- Effect of flaps on approach and landing.
- Timely execution of go-around if necessary.
- Importance of completing checklists.
- Importance of adjusting seat to appropriate position.



Set-up

- Establish the recommended approach and landing configuration and airspeed (see Airport Traffic Pattern).
- Select an aiming point using the following prioritized criteria.
 - Abeam visual glideslope indicator (PAPI, VASI).
 - Aiming point marking (1,000 foot marker).
 - At least 200 feet beyond threshold, within first 1/3 of the runway.

Execution

- Apply proper crosswind correction for landing.
- Establish a stabilized approach by 200 feet AGL and *verbalize*:
 - A stabilized approach is:
 - Check – All checklists are complete
 - F – Flight path correct (on centerline)
 - L – Landing configuration correct
 - A – Airspeed (+5/-0)
 - P – Power setting appropriate for aircraft configuration
 - S – Sink rate is not abnormal (on glidepath)

NOTE: Flight control inputs on final are used to maintain an already stabilized approach path.

NOTE: Changing conditions require adjustments of speed and flap settings, i.e. wind gust factors, ATC.

- Begin the round out at approximately 10–20 feet above the ground, smoothly transitioning to a landing pitch attitude.
- Use a slight amount of power to hold the airplane 1 to 2 feet off the surface in ground effect while gradually dissipating forward speed.
- Fly the airplane onto the ground and touchdown at the slowest possible airspeed with the weight fully supported by the wings.
- Touchdown on main gear first softly with no drift and with the airplane's longitudinal axis aligned with the runway/ landing path.
- Maintain centerline using proper crosswind technique.
- After touchdown hold sufficient back elevator pressure to keep the nose wheel off the surface.
- Power as required to keep airplane moving at a safe ground maneuvering speed.

1.6 MANEUVER: Short-Field Takeoff and Climb

Objective

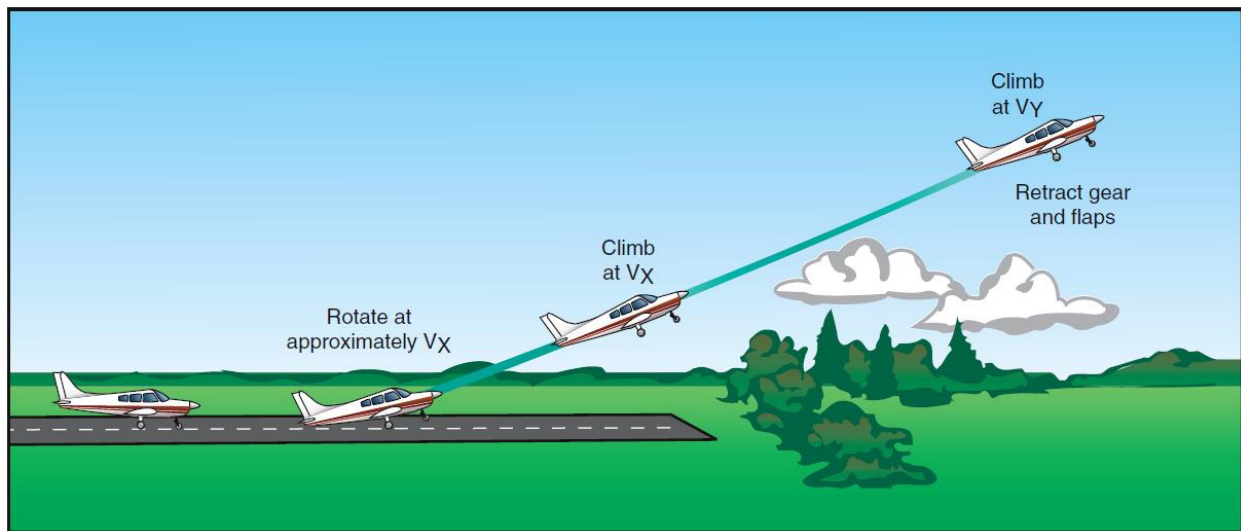
To develop the pilot's ability to obtain maximum performance from the airplane while performing a short field takeoff and clearing all obstacles in the departure path safely.

Description

Takeoffs and climbs from fields where the takeoff area is short or restricted by obstructions require that the airplane be flown at the limit of its takeoff performance capabilities.

Teaching Considerations

- Planning and orientation.
 - Runway length, width, and surface condition.
 - Effect of density altitude.
 - Appropriate climb airspeed.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Aborted takeoff before and after liftoff.
- Wind shear and wake turbulence.
- Importance of completing checklists.
- Methods for checking for traffic used in a high wing aircraft.



Set-up

- Select the wing flaps to POH recommended setting.
- Adjust the mixture, obtaining maximum engine performance for the existing conditions (full rich below 3,000 feet, leaned for best power when above 3,000 feet pressure altitude).
- Review takeoff performance capabilities considering obstructions and conditions.
- Verify the final approach and takeoff path are clear of other aircraft.
- Position the airplane for maximum runway availability and align it with the runway centerline.
- Verify that the heading indicator is aligned with the runway heading.
- Confirm that the runway heading corresponds with the intended runway of use.
- Apply aileron deflection properly for crosswind conditions.

Execution

- Apply brakes and advance the throttle smoothly to maximum power.
- Check engine instruments and annunciators.
- Release brakes.
- Adjust aileron deflection during acceleration, as required.
- Liftoff at POH computed airspeed.
- Accelerate and climb at POH computed airspeed until obstacle is clear, or at least 50 feet AGL.
- After clearing the obstacle, establish the pitch attitude for and accelerate to V_y during the climb.
- Retract the wing flaps to up, when the airspeed is above V_y , at a safe altitude and after a positive rate of climb is established.
- Maintain directional control and proper wind drift correction throughout the takeoff and climb.
- At 1,000 feet AGL verify the climb flow pattern/checklist complete.

1.7 MANEUVER: Short-Field Approach and Landing

Objective

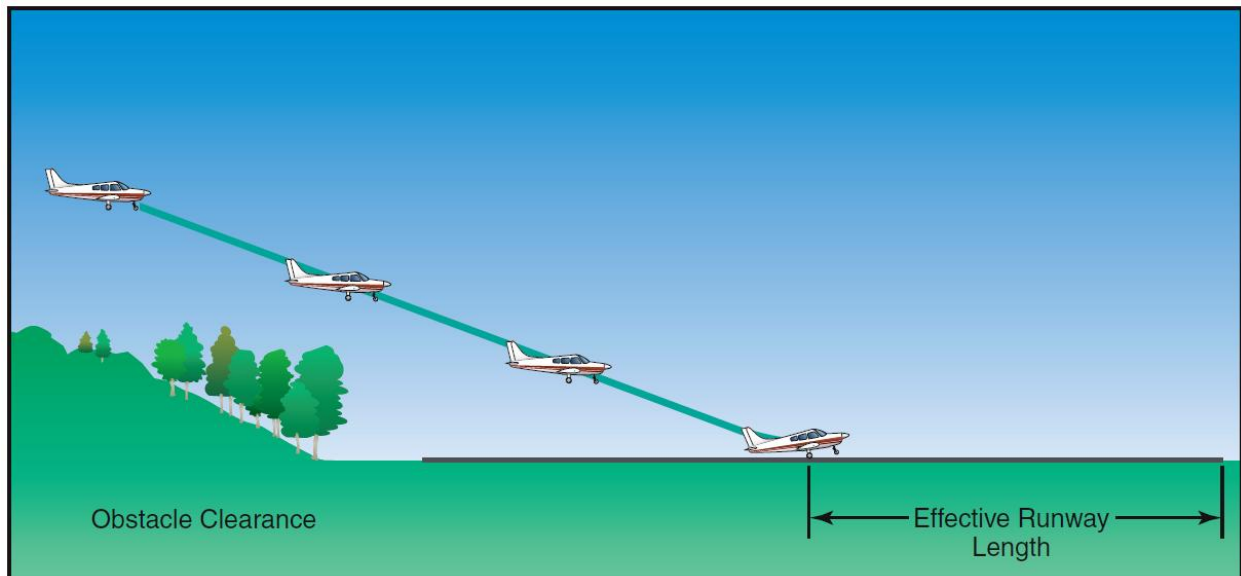
To develop the pilot's ability to obtain maximum performance from the airplane while performing a short field landing and clearing all obstacles in the approach path.

Description

Approaches and landings to fields where the landing area is short or restricted by obstructions require that the airplane be flown at the limit of its landing performance capabilities.

Teaching Considerations

- Planning and orientation.
 - Runway length, width, and surface condition.
 - Effect of density altitude and required landing distance.
 - Obstructions or hazards.
 - Landing performance data and limitations.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Wind shear or wake turbulence.
- Effect of flaps on approach and landing.
- Effective use of brakes consistent with safety and controllability.
- Timely execution of go-around if necessary.
- Importance of completing checklists.
- Importance of adjusting seat to appropriate position.



Set-up

- Establish the recommended approach and landing configuration and airspeed (see Airport Traffic Pattern).
- Select an aiming point using the following prioritized criteria.
 - Abeam visual glideslope indicator (PAPI, VASI).
 - Aiming point marking (1,000 foot marker).
 - At least 200 feet beyond threshold, within first 1/3 of the runway.

Execution

- Apply proper crosswind correction for landing.
- Establish a stabilized approach by 200 feet AGL and *verbalize*:
 - A stabilized approach is:
 - Check – All checklists are complete
 - F – Flight path correct (on centerline)
 - L – Landing configuration correct
 - A – Airspeed (+5/-0)
 - P – Power setting appropriate for aircraft configuration
 - S – Sink rate is not abnormal (on glidepath)

NOTE: Flight control inputs on final are used to maintain an already stabilized approach path.

NOTE: Changing conditions require adjustments of speed and flap settings, i.e. wind gust factors, ATC.

- Begin the round out at approximately 10–20 feet above the ground, smoothly transitioning to a landing pitch attitude.
- Touchdown on main gear first with no drift and with the airplane's longitudinal axis aligned with the runway/landing path.
- Maintain centerline using proper crosswind technique.
- Smoothly apply optimum disc and aerodynamic braking to stop in the shortest possible distance consistent with safety and controllability.

1.8 MANEUVER: 180° Power-Off Accuracy Approach and Landing

Objective

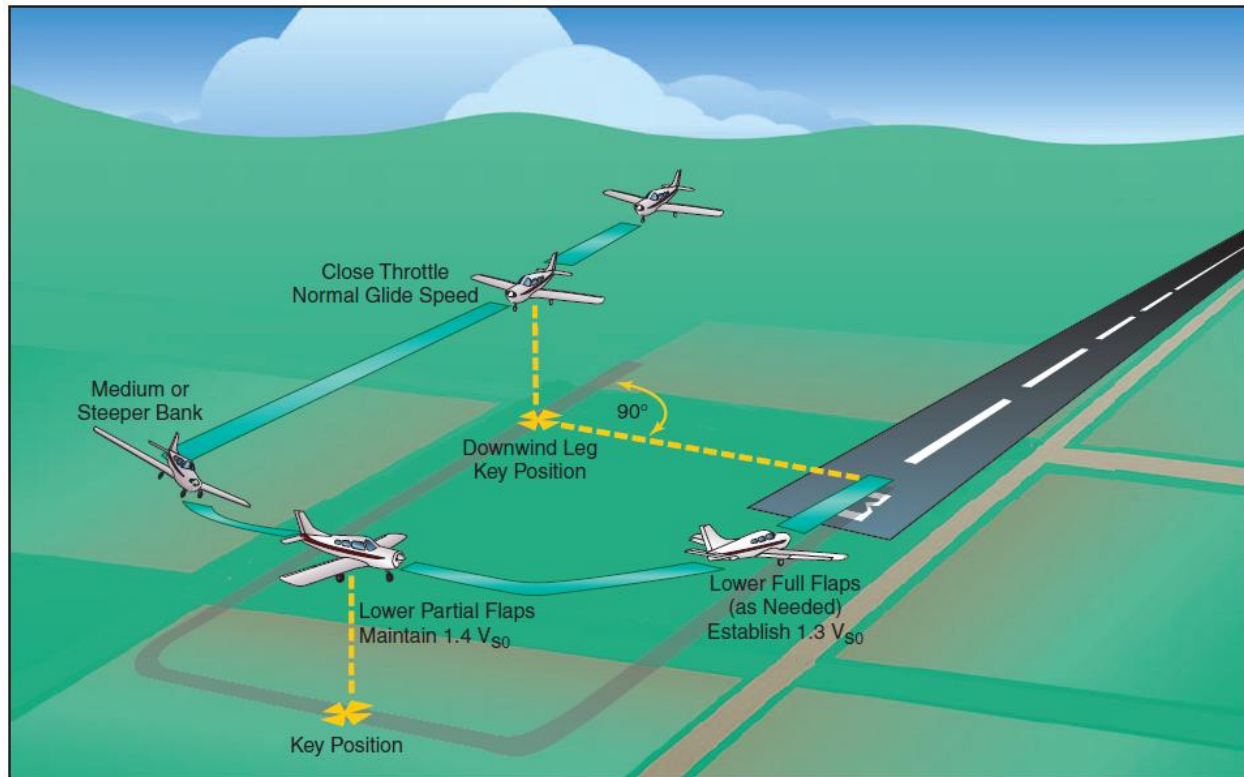
To instill in the pilot the judgment in estimating distances and glide ratios, and the procedures necessary for accurately flying the airplane without power to a safe landing.

Description

The 180° power-off approach is executed by gliding with the power off from a given point on a downwind leg to a preselected landing spot.

Teaching Considerations

- Planning and orientation.
 - Runway length, width, and surface condition.
 - Obstructions or hazards.
 - Landing performance data and limitations.
 - Ability to estimate distance and the required ability to maintain the proper glide while maneuvering the airplane.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Wind shear or wake turbulence.
- Effect of flaps on approach and landing.
- Effective use of brakes consistent with safety.
- Timely execution of go-around if necessary.
- Importance of completing checklists.
- Importance of adjusting seat to appropriate position.



Set-up

- The airplane must be on the downwind leg parallel to the landing runway, and no greater than 1,000 feet AGL.
- The airplane should be flown onto a downwind leg at the same distance from the landing surface as in a normal traffic pattern (see Airport Traffic Pattern).
- Select an aiming point using the following prioritized criteria.
 - Abeam visual glideslope indicator (PAPI, VASI).
 - Aiming point marking (1,000 foot marker).
 - At least 200 feet beyond threshold, within first 1/3 of the runway.

Execution

- Abeam the specified landing spot close the throttle.
- Establish the best glide airspeed.
- The approach path may be varied by positioning the base leg closer to or farther out from the approach end of the runway according to wind conditions.
- The turn from the downwind leg to the base leg should be a uniform turn with a medium or slightly steeper bank.
- The base-to-final turn should be planned and accomplished so that upon rolling out of the turn the airplane shall be aligned with the runway centerline.
- Apply proper crosswind correction for landing.
- Begin the round out at approximately 10–20 feet above the ground, smoothly transitioning to a landing pitch attitude.
- Maintain centerline using proper crosswind technique.

NOTE: Adjust best glide speed for flap configuration.

NOTE: Extended landing gear when landing is assured, no later than 500' AGL.

1.9 MANEUVER: Forward Slip to a Landing

Objective

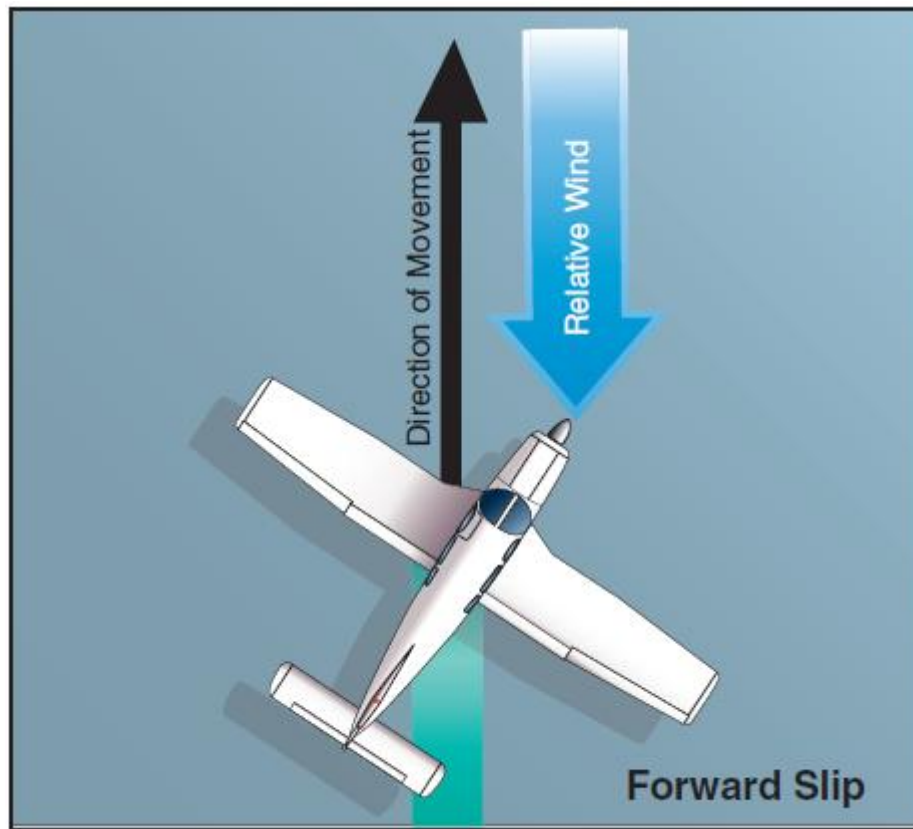
To develop the pilot's proficiency at performing a forward slip to a landing.

Description

Forward slips are used to dissipate altitude without increasing airspeed.

Teaching Considerations

- Obstructions or hazards.
- Importance of maintaining airspeed.
- Aircraft limitations.



Execution

- Reduce throttle to idle.
- Establish the recommended approach and landing configuration and airspeed (see Airport Traffic Pattern).
- Lower upwind wing.
- Apply opposite rudder to prevent the airplane from turning in the direction of the lowered wing.
- Allow the nose of the airplane to be pointed away from the runway.
- Maintain a ground track aligned with the runway centerline.
- Once an acceptable altitude has been attained, the slip may be discontinued.
- Continue with a normal, short-field, soft-field, or power-off landing.

THIS PAGE LEFT BLANK

1.10 MANEUVER: Go-Around/Rejected Landing

Objective

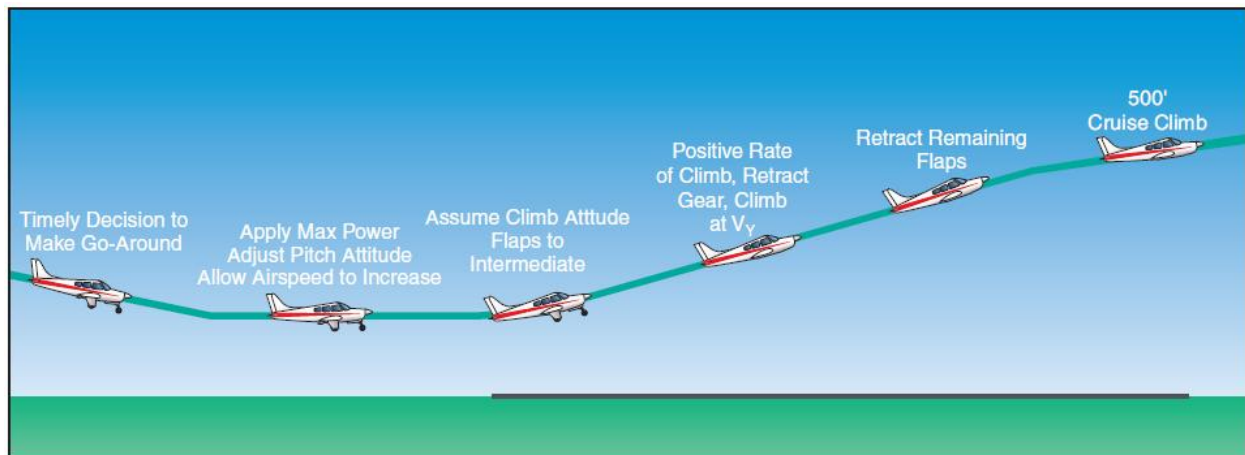
To develop the pilot's ability to safely execute a go around from an unsafe landing.

Description

Whenever landing conditions are not satisfactory, a go-around is warranted. The go-around is not strictly an emergency procedure. It is a normal maneuver that may at times be used in an emergency situation. Although the need to discontinue a landing may arise at any point in the landing process, the most critical go-around will be one started when very close to the ground. A go-around/rejected landing must be executed if a stabilized approach is not achieved by 200 feet AGL.

Teaching Considerations

- An immediate go-around must be executed if any of the following condition are encountered:
 - Over/undershooting runway or aim point
 - Aircraft/Vehicle/People/Objects on runway
 - ATC instructions
 - High roundout
 - Late or rapid roundout
 - Excessive floating
 - Ballooning
 - Bouncing
 - Porpoising
 - Windshear
 - Any other factor placing successful landing in doubt.
- Prompt decision making.
- Anyone may make a call to abort a landing and must be adhered to.
- Failure to apply full power.
- Failure to control pitch to slow or stop descent.
- Wind shear or wake turbulence.
- Stall/spin awareness.
- Importance of completing checklists.



Execution

- Smoothly apply maximum power, level the wings, and transition to a climb pitch attitude that will slow or stop the descent.
- Retract the flaps to 20° (25° PA28RT), if fully extended.
- Establish a positive rate of climb, while accelerating to V_x.
- Retract landing gear once positive rate of climb established.
- After reaching V_y, retract the flaps to up (0°).
- Adjust trim as required.
- Maintain maximum power to a safe maneuvering altitude.

2. VFR FLIGHT MANEUVERS

Objective

To develop the pilot's proficiency on VFR flight maneuvers including: stalls, slow flight, ground reference maneuvers, and commercial maneuvers.

References

- AC 61-67C: Stall and Spin Awareness Training
- FAA-H-8083-3A: Airplane Flying Handbook
- Cessna Model 162 Pilot's Operating Handbook
- Cessna Model 172S Pilot's Operating Handbook
- FAA-H-8083-25A: Pilots Handbook of Aeronautical Knowledge
- Practical Test Standards

THIS PAGE LEFT BLANK

2.1 MANEUVER: Maneuvering During Slow Flight (Minimum Controllable Airspeed)

Objective

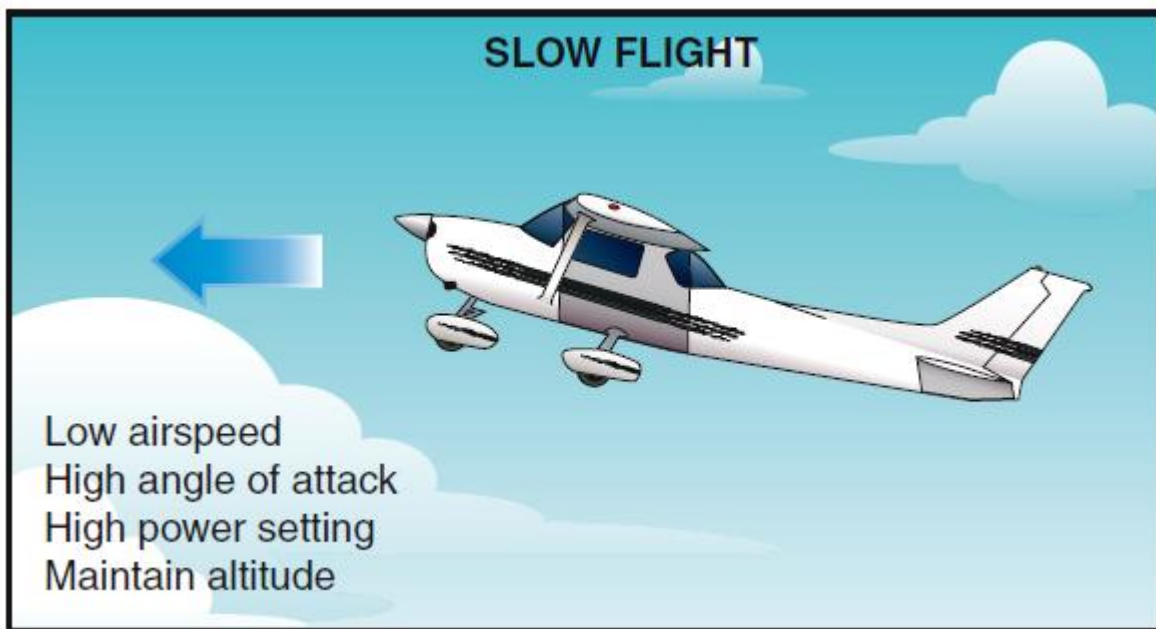
The objective of maneuvering during slow flight is to develop the pilot's sense of feel and ability to use the controls correctly, and to improve proficiency in performing maneuvers that require slow airspeeds.

Description

This maneuver demonstrates the flight characteristics and degree of controllability of the airplane at its minimum flying speed. By definition, the term "flight at minimum controllable airspeed" means a speed at which any further increase in angle of attack, load factor, or reduction in power will cause an immediate stall.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Relationship of configuration, weight, Center of Gravity (CG), maneuvering load, bank angle, and power to flight characteristics and controllability.
- Correlation of the maneuver to critical flight situations.
- Compensation for left turning tendencies.
- Region of reverse command/back side of the power curve.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.

Execution

- Gradually reduce the throttle from cruising position.
- While airspeed is decreasing, the position of the nose in relation to the horizon should be noted and raised as necessary to maintain altitude.
- As the airspeed reaches the maximum allowable for flap operation, flaps should be lowered and the pitch attitude adjusted to maintain altitude.
 - Flap setting as specified by the instructor; extend within flap operating range.
- Apply rudder as necessary to maintain coordinated flight.
- Establish and maintain an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in an immediate stall.
- Maintain heading and altitude while changing flap configurations.

Recovery

- Increase power to cruise setting.
- Maintain coordination.
- Retract wing flaps to 20°, while accelerating to Vy.
- After reaching Vy, retract the wing flaps to up, one increment at a time.
- Adjust pitch as necessary to maintain level flight.
- Return to cruise power setting when the airplane is in normal level flight.

2.2 MANEUVER: Power-Off Stalls – Full or Imminent

Objective

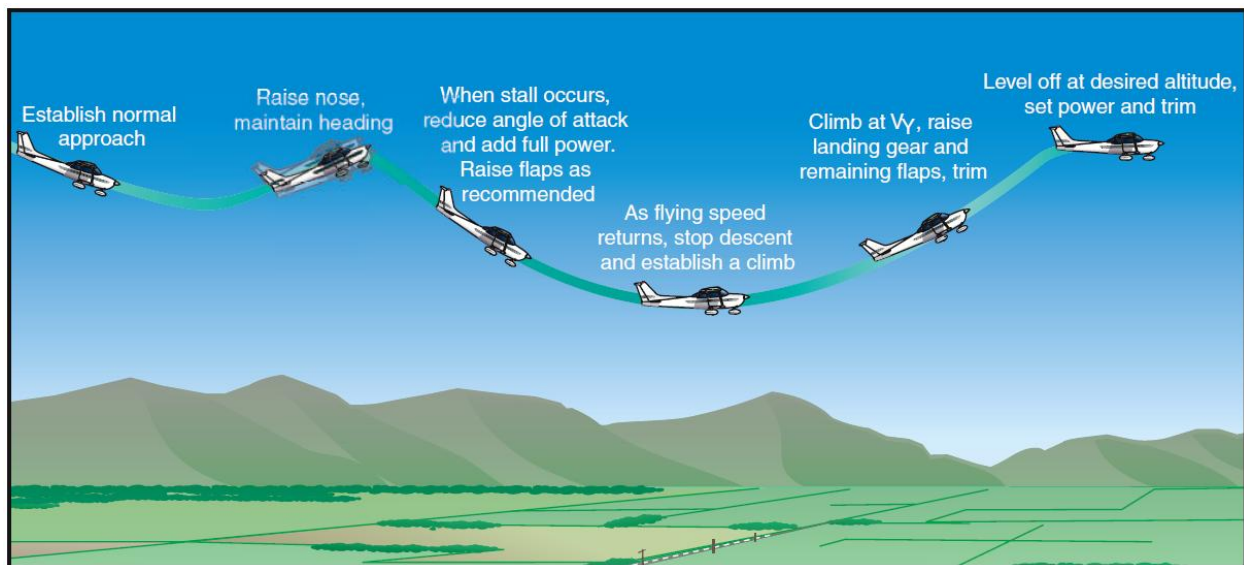
To familiarize the pilot with the conditions that produce power-off stalls, to assist in recognizing an approaching stall, and to develop the habit of taking prompt preventive or corrective action to minimize altitude loss.

Description

Power-off stalls are performed in normal landing configuration to simulate an accidental stall occurring during the approach to landing.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Factors affecting stall speed:
 - Weight
 - Load factor
 - Center of gravity location
 - Configuration
- Stall/Spin awareness considerations:
 - Flight conditions where unintentional stall may occur and procedures for recovery.
 - Aerodynamic factors related to spins.
 - Awareness that an aircraft can stall at any airspeed and attitude.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.

Execution

The instructor shall specify full or imminent stall, bank angle, and flap setting.

- Reduce the throttle to idle.
- After reducing power, maintain a constant altitude in level flight while decelerating to 1.3 V_{so}.
- Pitch the airplane down to establish a normal approach attitude.
- Set flaps - up to full, as specified.
- Establish a stabilized descent while maintaining a specified heading and/or bank angle.
- Establish and maintain a coordinated landing pitch attitude.

Recovery

- Recognize stall indications and recover promptly with a minimum loss of altitude:
 - Reduce the angle of attack by releasing control wheel back pressure.
 - Advance the throttle to maximum power.
 - Level the wings.
 - Maintain coordinated flight.
- Retract the flaps to 20°, if fully extended.
- Establish a positive rate of climb, while accelerating to V_y.
- After reaching V_y, retract the flaps to up, one setting at a time.
- Return to cruise power setting when the airplane is in normal level flight.

2.3 MANEUVER: Power-On Stalls - Full or Imminent

Objective

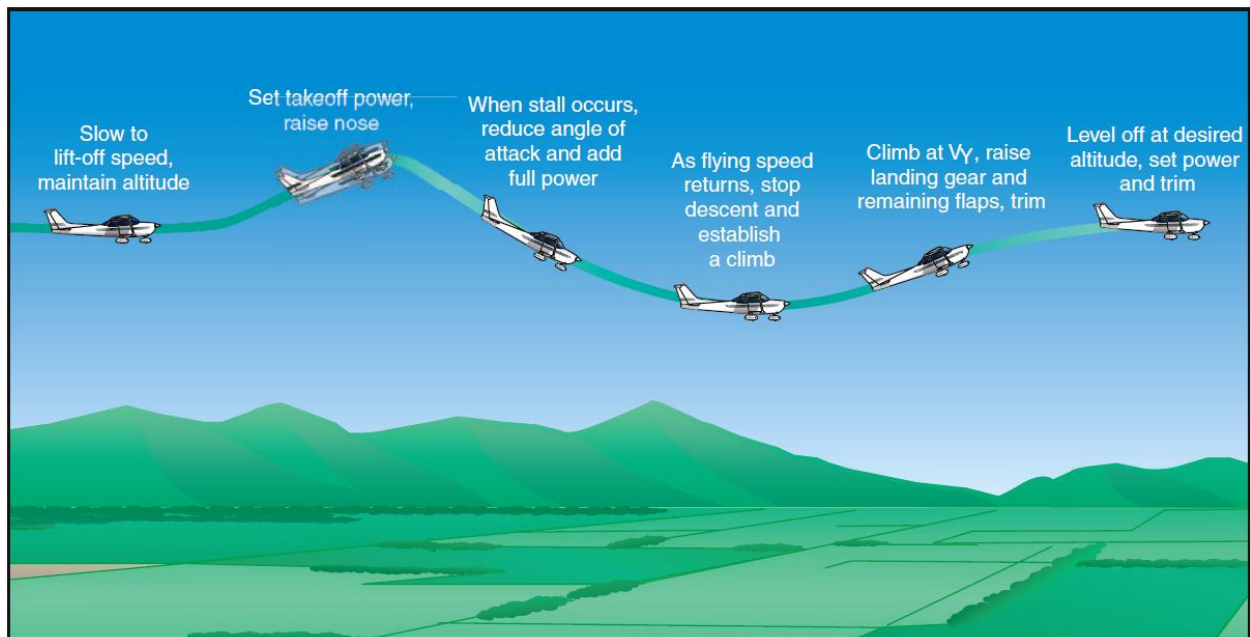
To familiarize the pilot with the conditions that produce power-on stalls, to assist in recognizing an approaching stall, and to develop the habit of taking prompt preventive or corrective action to minimize altitude loss.

Description

Power-on stalls are performed in normal takeoff configuration to simulate an accidental stall occurring during takeoffs.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and the CFI PTS
- Factors affecting stall speed.
 - Weight
 - Load factor
 - Center of gravity location
 - Configuration
 - Power Setting
- Stall/Spin awareness considerations.
 - Flight conditions where unintentional stalls may occur and procedures for recovery.
 - Aerodynamic factors related to spins.
 - Awareness that an aircraft can stall at any airspeed and attitude.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.

Execution

The instructor shall specify full or imminent stall, and airplane configuration.

- Maintain a constant altitude in level flight while decelerating to POH computed lift-off speed.
- Set flaps - as specified by instructor.
- Apply full power and establish a normal coordinated climb attitude.
- Smoothly increase the pitch attitude to one that induces a full or imminent stall in straight climbing flight or a climbing turn (maximum bank angle is 20°).

Recovery

- Recognize stall indications and recover promptly with a minimum loss of altitude:
 - Reduce the angle of attack by releasing control wheel back pressure.
 - Level the wings.
 - Maintain coordinated flight.
- When airspeed is above V_y , retract the flaps to up (0°).
- Return to cruise power setting when the airplane is in normal level flight.

2.4 MANEUVER: Crossed-Control Stalls – Full or Imminent (CFI Applicants Only)

Objective

To develop the pilot's recognition of the approach to a cross-control stall, and timely airplane control recovery techniques.

Description

This type of stall occurs with the controls "crossed": aileron pressure applied in one direction and rudder pressure applied in the opposite direction. When excessive control wheel back pressure is applied, a cross-control stall may result.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and CFI PTS.
- Factors affecting stall speed:
 - Weight
 - Load factor
 - Center of gravity location
 - Configuration
 - Power setting
- Entry techniques:
 - Excessive pitch attitude to induce the stall.
 - Failure to recognize first indications of a stall.
 - Recognize difference between imminent/full stalls.
- Stall/Spin awareness consideration:
 - Flight conditions where unintentional stall may occur and procedures for recovery.
 - Aerodynamic factors related to spins.
 - Awareness that an aircraft can stall at any airspeed and attitude.

Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.

Execution

The instructor shall specify full or imminent stall.

- Set flaps to up.
- Reduce power to idle, maintain altitude, re-trim as airspeed approaches normal glide speed.
- When the glide is established, roll into a medium banked turn to simulate overshooting the centerline of a runway.
- During the turn, excessive rudder pressure should be applied in the direction of the turn, but the bank held constant by applying opposite aileron pressure.
- At the same time, increased control wheel back pressure is required to keep the nose from lowering.
- All of these control pressures shall be increased until the airplane stalls.

Recovery

- Recognize stall indications and recover promptly with a minimum loss of altitude:
 - Reduce the angle of attack by releasing control wheel back pressure.
 - Advance the throttle to maximum power.
 - Level the wings.
 - Resume coordinated flight.
- Establish a positive rate of climb and accelerate to Vy or Vx, as appropriate.
- Return to cruise power setting when the airplane is in normal level flight.

2.5 MANEUVER: Elevator Trim Stalls – Imminent (CFI Applicants Only)

Objective

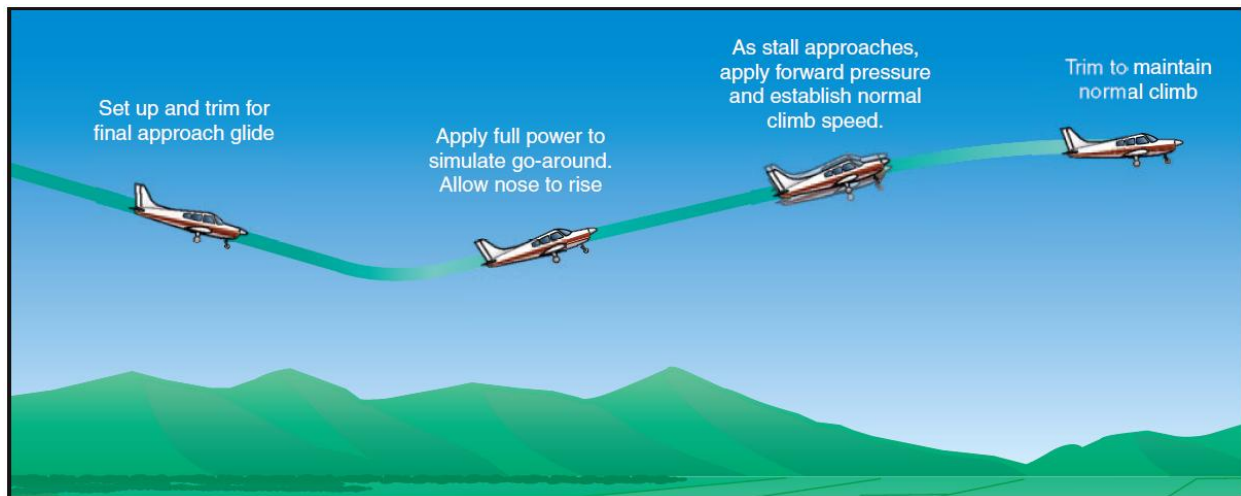
To teach the pilot the importance of making smooth power applications, overcoming strong trim forces, maintaining positive control of the airplane to hold safe flight attitudes, and using proper and timely trim techniques.

Description

This type of stall normally occurs during a go-around procedure from a normal landing approach or a simulated forced landing approach, or immediately after a takeoff and positive control of the airplane is not maintained.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and CFI PTS.
- Factors affecting stall speed:
 - Weight
 - Load factor
 - Center of Gravity location
 - Configuration
 - Power Setting
- Entry techniques:
 - Excessive pitch attitude to induce the stall.
 - Failure to recognize first indications of a stall.
 - Recognize difference between imminent/full stalls.
- Stall/Spin awareness consideration:
 - Flight conditions where unintentional stall may occur and procedures for recovery.
 - Aerodynamic factors related to spins.
 - Awareness that an aircraft can stall at any airspeed and attitude.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.

Execution

- Reduce the throttle slowly.
- Set flaps to Full: once within flap operating range.
- After reducing power, maintain a constant altitude in level flight while decelerating to 1.3 V_{so}.
- Pitch the airplane down to establish normal approach attitude. Trim aircraft to maintain airspeed.
- Apply full power and establish a pitch attitude that induces an imminent stall.

Recovery

- Recognize stall indications and recover promptly with a minimum loss of altitude:
 - Reduce the angle of attack by applying forward control wheel pressure.
 - Level the wings.
 - Maintain coordinated flight.
- Re-trim the airplane as necessary to relieve control pressure.
- Retract the flaps to 20°, if fully extended.
- Establish a positive rate of climb, while accelerating to V_y.
- After reaching V_y, retract the flaps to up (0°).
- Return to cruise power setting when the airplane is in normal level flight.

2.6 MANEUVER: Secondary Stalls – Imminent (CFI Applicants Only)

Objective

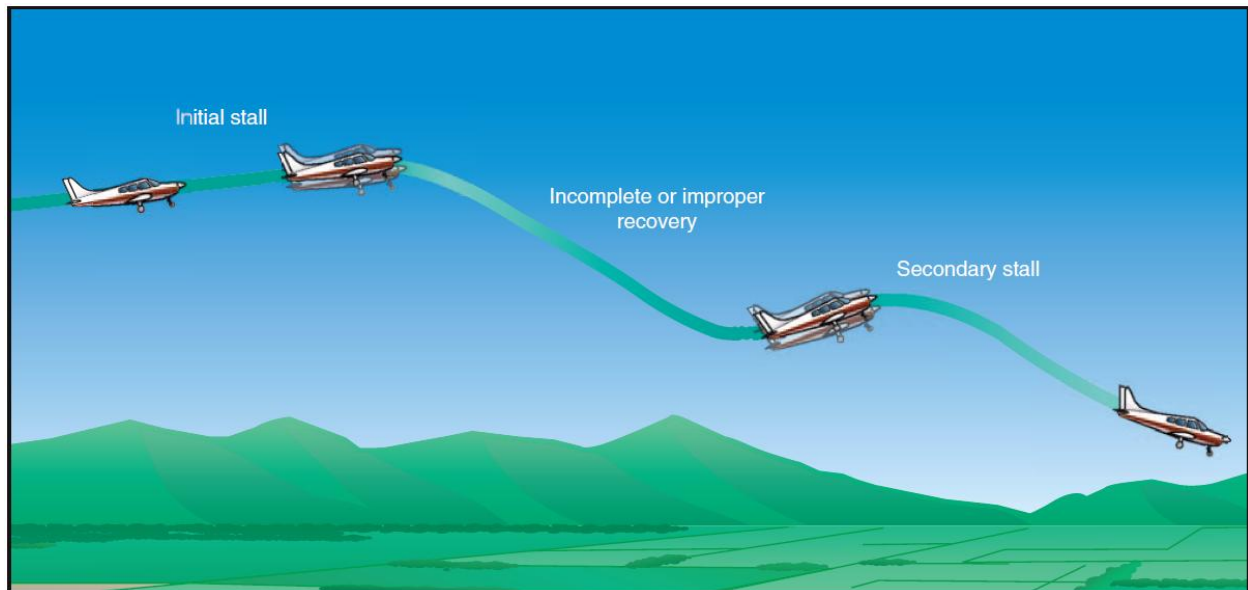
To develop the pilots awareness of the effect of improper stall recovery techniques and recognition of the approach to a secondary stall.

Description

This type of stall is caused by attempting to hasten the completion of a stall recovery before the airplane has regained sufficient flying speed.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and CFI PTS.
- Factors affecting stall speed:
 - Weight
 - Load factor
 - Center of Gravity location
 - Configuration
 - Power Setting
- Entry techniques:
 - Excessive pitch attitude to induce the stall.
 - Failure to recognize first indications of a stall.
 - Recognize difference between imminent/full stalls.
- Stall/Spin awareness consideration:
 - Flight conditions where unintentional stall may occur and procedures for recovery.
 - Aerodynamic factors related to spins.
 - Awareness that an aircraft can stall at any airspeed and attitude.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.

Execution

- Reduce the throttle to idle.
- After reducing power, maintain a constant altitude in level flight while decelerating to 1.3 V_{so}.
- Pitch the airplane down to establish normal approach attitude.
- Set flaps up to full, as specified.
- Establish a stabilized descent while maintaining a specified heading and/or bank angle.
- Establish and maintain a coordinated landing pitch attitude.
- As the stall occurs, attempt to initiate recovery by applying full power and increasing control wheel back pressure in attempt to raise the nose.

Recovery

- Recognize secondary stall indications and recover promptly with a minimum loss of altitude:
 - Reduce the angle of attack by releasing control wheel back pressure.
 - Advance the throttle to maximum power.
 - Level the wings.
 - Maintain coordinated flight.
- Retract the flaps to 20°, if fully extended.
- Establish a positive rate of climb, while accelerating to V_y.
- After reaching V_y, retract the flaps to up (0°).
- Return to cruise power setting when the airplane is in normal level flight.

2.7 MANEUVER: Accelerated Stalls – Imminent

Objective

The objective of demonstrating accelerated stalls is to learn how they may occur, to develop the ability to recognize such stalls immediately, and to take prompt and effective recovery actions.

Description

This stall is performed at best glide airspeed. Bank the aircraft to a minimum of 45°. After turn and bank are established, back-elevator pressure should be firmly increased until a definite stall occurs.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and CFI PTS.
- Factors affecting stall speed.
 - Weight
 - Load factor
 - Center of gravity location
 - Configuration
- Entry techniques.
 - Excessive pitch attitude to induce the stall.
 - Failure to recognize indications of a stall.
 - Recognize difference between imminent/full stalls.
- Stall/Spin awareness consideration.
 - Flight conditions where unintentional stall may occur and procedures for recovery.
 - Aerodynamic factors related to spins.
 - Awareness that an aircraft can stall at any airspeed and attitude.

Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.

Execution

- Establish and stabilize best glide airspeed while maintaining altitude.
- Set wing flaps to up.
- Enter the maneuver by establishing a bank of approximately 45° while increasing control wheel back pressure to maintain altitude.
- After the turn and bank are established, smoothly, firmly, and progressively increase the angle of attack until a stall occurs.

Recovery

- Recognize imminent stall indications and recover immediately with a minimum loss of altitude:
 - Reduce the angle of attack by releasing control wheel back pressure.
 - Advance the throttle to maximum power.
 - Level the wings.
 - Maintain coordinated flight.
- Establish a positive rate of climb while accelerating to V_y or V_x , as appropriate.
- Return to cruise power setting when the airplane is in normal level flight.

2.8 MANEUVER: Spins (Dual Flights Only)

NOTE: Instructors must be spin standardized prior to performance of this maneuver.

Objective

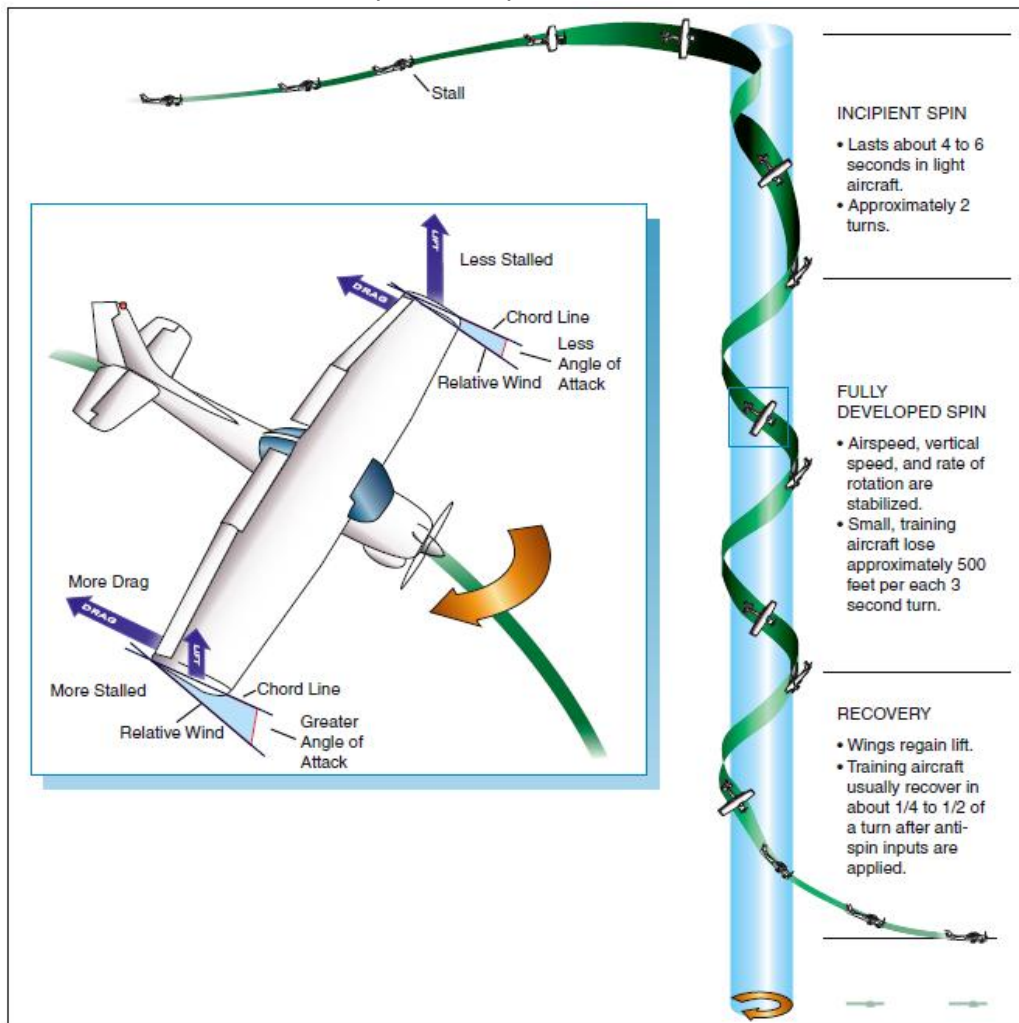
To familiarize the pilot with the conditions that produce spins, to assist in recognizing a spin, and to develop the habit of taking prompt preventive or corrective action to minimize altitude loss.

Description

A spin may be defined as an aggravated stall that results in what is termed "autorotation" wherein the airplane follows a downward corkscrew path. Spins are performed in flaps-up landing configuration to simulate an accidental stall occurring during the landing approach.

Teaching Considerations

- Situations that may result in a spin.
- Phases of a spin.
- Aerodynamics of a spin.
- Spin recovery procedures.
- Airplanes approved for the spin maneuver based on airworthiness category and type certificate.
- Differences between a spin and a spiral dive.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 4,000 feet AGL
- Clear area with two 90° turns.

Execution

- Select suitable ground reference points and altitude so as to allow a specified predetermined number of turns.
- Reduce the throttle to idle.
- After reducing power, maintain a constant altitude in level flight while decelerating to 1.3 V_{so}.
- Pitch the airplane down to establish a normal approach attitude.
- Set flaps up.
- Establish a stabilized descent while maintaining a specified heading and/or bank angle.
- Establish and maintain a coordinated landing pitch attitude.
- As the airplane stalls, apply full aft elevator and apply full rudder in the direction of desired rotation.
- Maintain proper control deflections throughout the spin.
- Count revolutions by half turns.
- Spins shall be limited to two turns.

Recovery

- Verify that throttle is in idle position and ailerons are neutral.
- Within 1/4 of a turn before the desired heading, apply and hold full opposite rudder to stop the rotation.
- Just after rudder reaches the stop, move the control wheel briskly forward far enough to break the stall.
- Hold these control inputs until rotation stops.
- As rotation stops, neutralize rudder, and make a smooth recovery from the resulting dive.

2.9 MANEUVER: Steep Turns

Objective

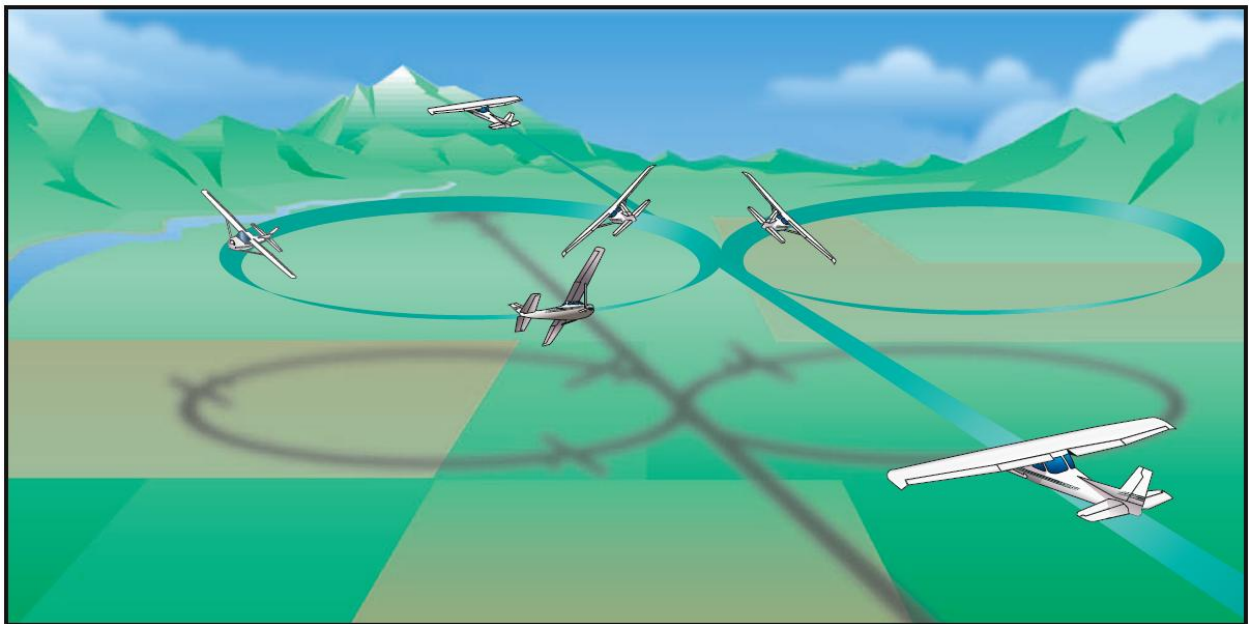
To develop the pilot's smoothness, coordination, orientation, division of attention, and control techniques while executing maximum performance turns.

Description

The steep turn maneuver consists of a turn in either direction, using a bank angle steep enough to cause an "over banking" tendency during which maximum turning performance is attained and relatively high load factors are imposed.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Overbanking tendencies.
- Load factors caused by steep turns.
- Maneuvering speed in relationship to high load factors.
- Turning performance: radius vs. rate.
- Load factor and stall speed.
- Increase in induced drag requires an increase in power.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.
- Adjust power setting to attain an airspeed of (80 KIAS – C162, 90 KIAS – C172, 100 KIAS – PA28RT).

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Smoothly roll into a coordinated bank angle of 45° (private) or 50° (commercial).
- As the turn is being established, control wheel back pressure should be smoothly increased to increase the angle of attack.
- Adjust power to maintain airspeed and pitch to maintain selected altitude.

Recovery

- Rollout on the entry heading by releasing control wheel back pressure, reducing power, and maintaining coordination.
- Return to cruise power setting when the airplane is in normal level flight.

2.10 MANEUVER: Steep Spirals

Objective

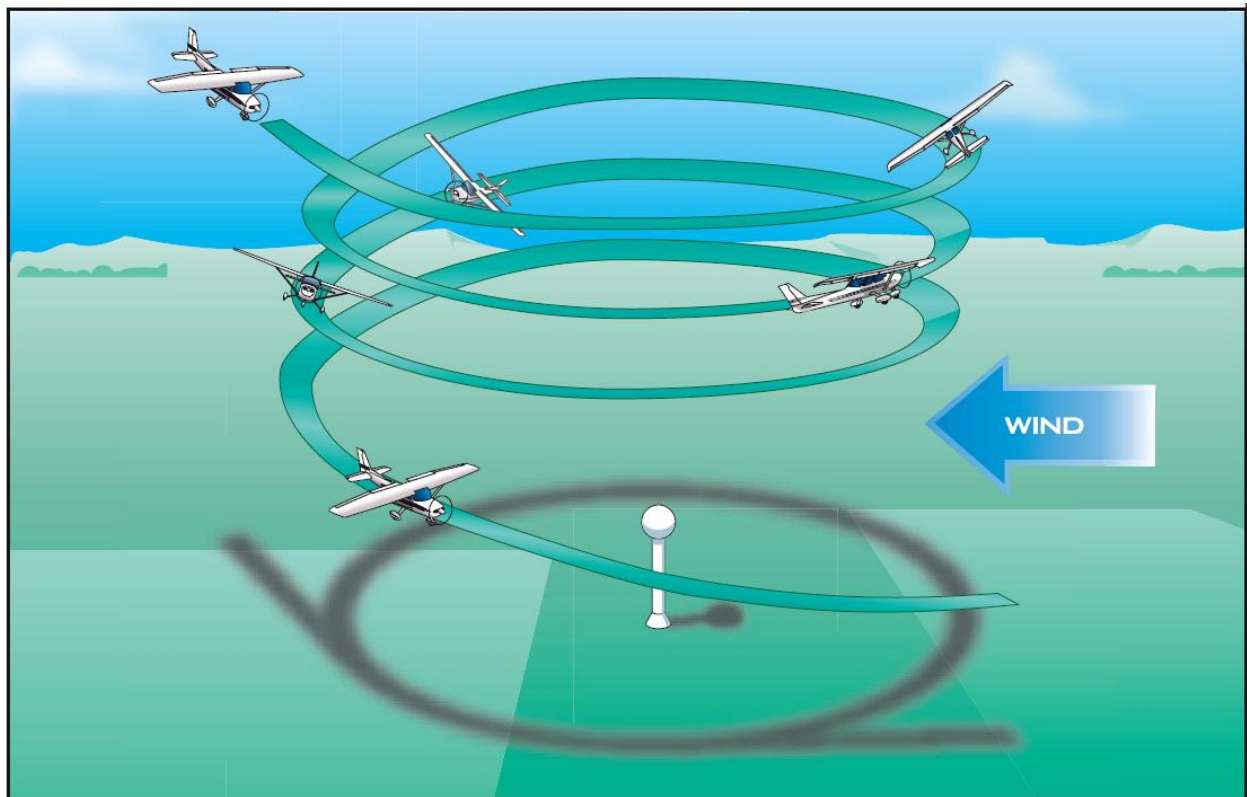
To improve pilot techniques for airspeed control, wind drift control, planning, orientation, and division of attention.

Description

A steep spiral is a constant gliding turn, during which a constant radius around a point on the ground is maintained similar to the maneuver, turns-around-a-point. The radius should be such that the steepest bank shall not exceed 60°.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Suggested radius of turns is 1/4 to 1/3 mile from the reference point.
- Angle of bank shall not exceed 60°.
- Importance of communication if performing maneuver at an airport.
- Importance of monitoring engine temperatures.



Set-up

- Select an entry altitude that allows three 360° turns with the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA 1,000 feet AGL, unless performing a simulated emergency landing to an approved airport as listed in the Safety Policies and Procedures manual.
- Clear area with two 90° turns.
- Select a suitable ground reference point.

Execution

- Reduce power to idle.
- Establish best glide airspeed.
- A gliding spiral should be started and a turn of constant radius and airspeed maintained around the selected spot on the ground.
- Correct for wind by using various angles of bank, not to exceed 60°, to maintain the constant radius.
- The engine should be periodically cleared by briefly advancing throttle to normal cruise power, preferably while headed into the wind.

Recovery

- Recover toward a definite object or specific heading which leads into a pattern over an area that could be used for a forced landing.

NOTE: If performed over an approved airport the maneuver can be continued to a 180° Power-Off Accuracy Approach and Landing.

2.11 MANEUVER: Chandelles

Objective

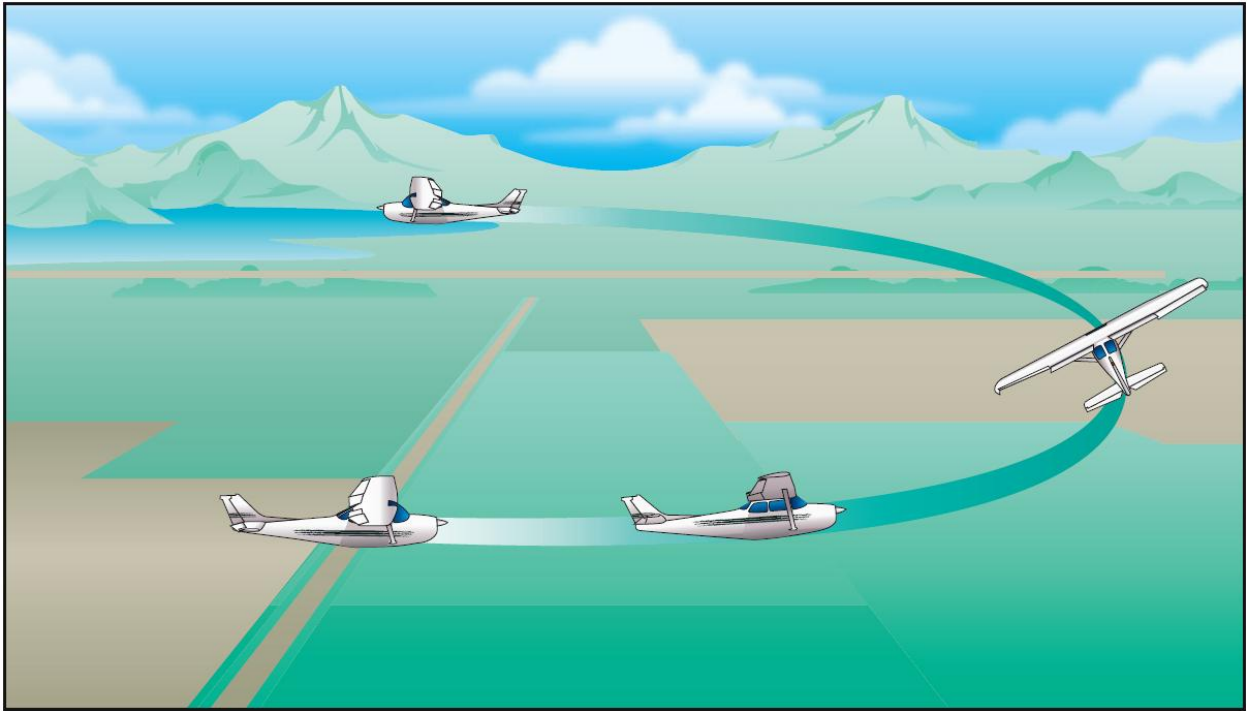
To develop the pilot's coordination, orientation, planning, and accuracy of control during maximum performance flight.

Description

A chandelle is a maximum performance climbing turn beginning from approximately straight-and-level flight, and ending at the completion of a precise 180° of turn in a wings-level nose-high attitude at the minimum controllable airspeed.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Effect of airspeed on control effectiveness.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.
- Adjust power setting to attain V_a .

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Establish a bank angle of approximately 30°.
- Smoothly apply full power while gradually increasing pitch to maintain a coordinated climbing turn to the 90° point with a constant bank angle.
- Execute a coordinated constant rate rollout from the 90° point to the 180° point, maintaining specified power and a constant pitch attitude.
- Complete rollout at the 180° point, just above stall speed and maintain that airspeed momentarily avoiding a stall.

Recovery

- Resume straight-and-level flight with a minimum loss of altitude.
- Return to cruise power setting when the airplane is in normal level flight.

2.12 MANEUVER: Lazy Eights

Objective

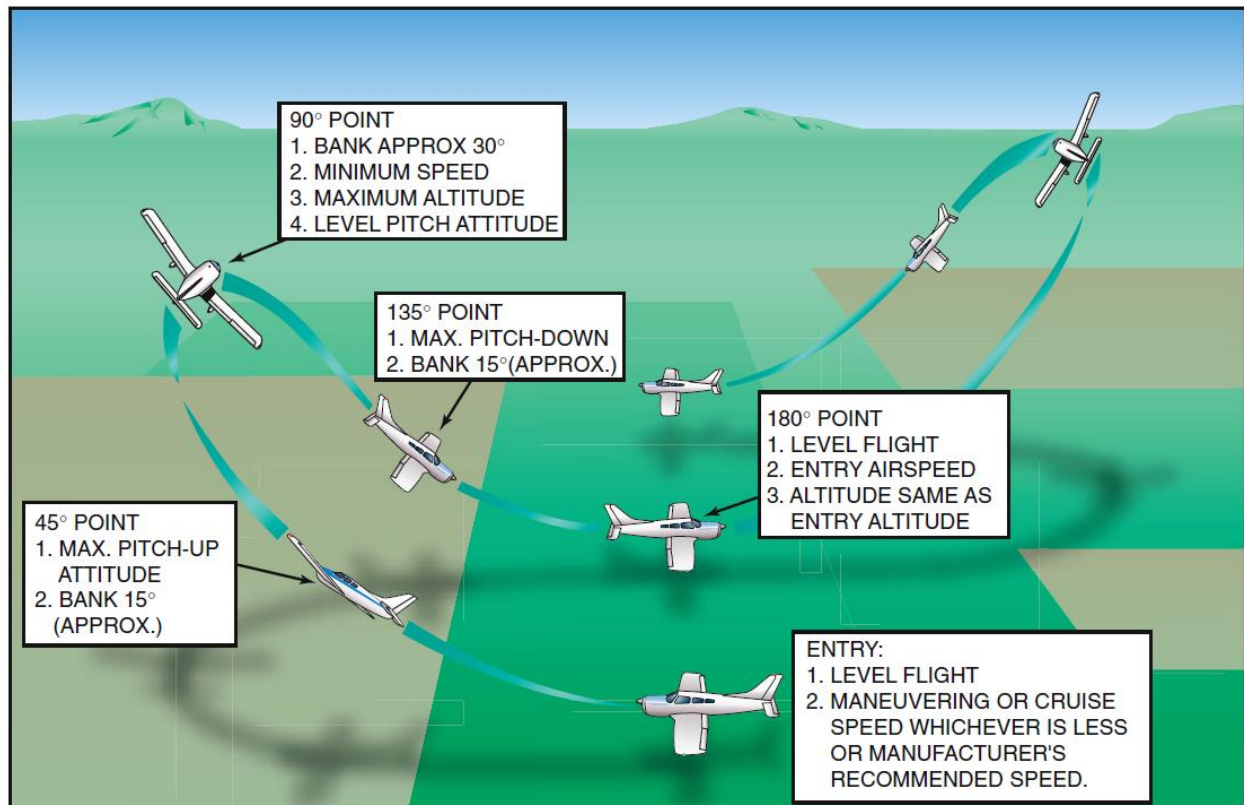
To develop perfect coordination of controls through a wide range of airspeeds and altitudes so that certain accuracy points are reached with planned attitude and airspeed. The maneuver helps develop subconscious feel, planning, orientation, coordination, and speed sense.

Description

Consists of two 180° turns in opposite directions, while making a climb and a descent in a symmetrical pattern during each of the turns.

Teaching Considerations

- Common errors as per the Airplane Flying Handbook and the CFI PTS.
- Effect of airspeed on control effectiveness.



Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.
- Adjust power setting to attain V_a .

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Enter a coordinated climbing turn in the direction of the 45° reference point, attaining the maximum pitch-up attitude and approximately 15° of bank passing through that point.
- Continue the coordinated turn from the 45° reference point to the 90° reference point, decreasing the pitch attitude while increasing the bank to an angle of approximately 30°.
- Complete 90° of turn with the maximum angle of bank, minimum airspeed (5 to 10 knots above stall speed), maximum altitude and level pitch attitude with the longitudinal axis passing through the reference (horizon) point.
- Continue the coordinated descending turn from the 90° reference point to the 135° reference point, decreasing the pitch attitude to the lowest point and decreasing the bank to approximately 15°.
- Continue the coordinated turn from the 135° reference point to the 180° reference point, increasing the pitch attitude and decreasing angle of bank attaining level flight, original airspeed and altitude passing through the 180° reference point.
- Upon returning to the starting altitude and the 180° point, a climbing turn should be started immediately in the opposite direction toward the selected reference points to complete the second half of the eight in the same manner as the first half.
- Throughout the maneuver, power remains fixed.

Recovery

- Return to cruise power setting when the airplane is in normal level flight.

2.13 MANEUVER: Rectangular Course

Objective

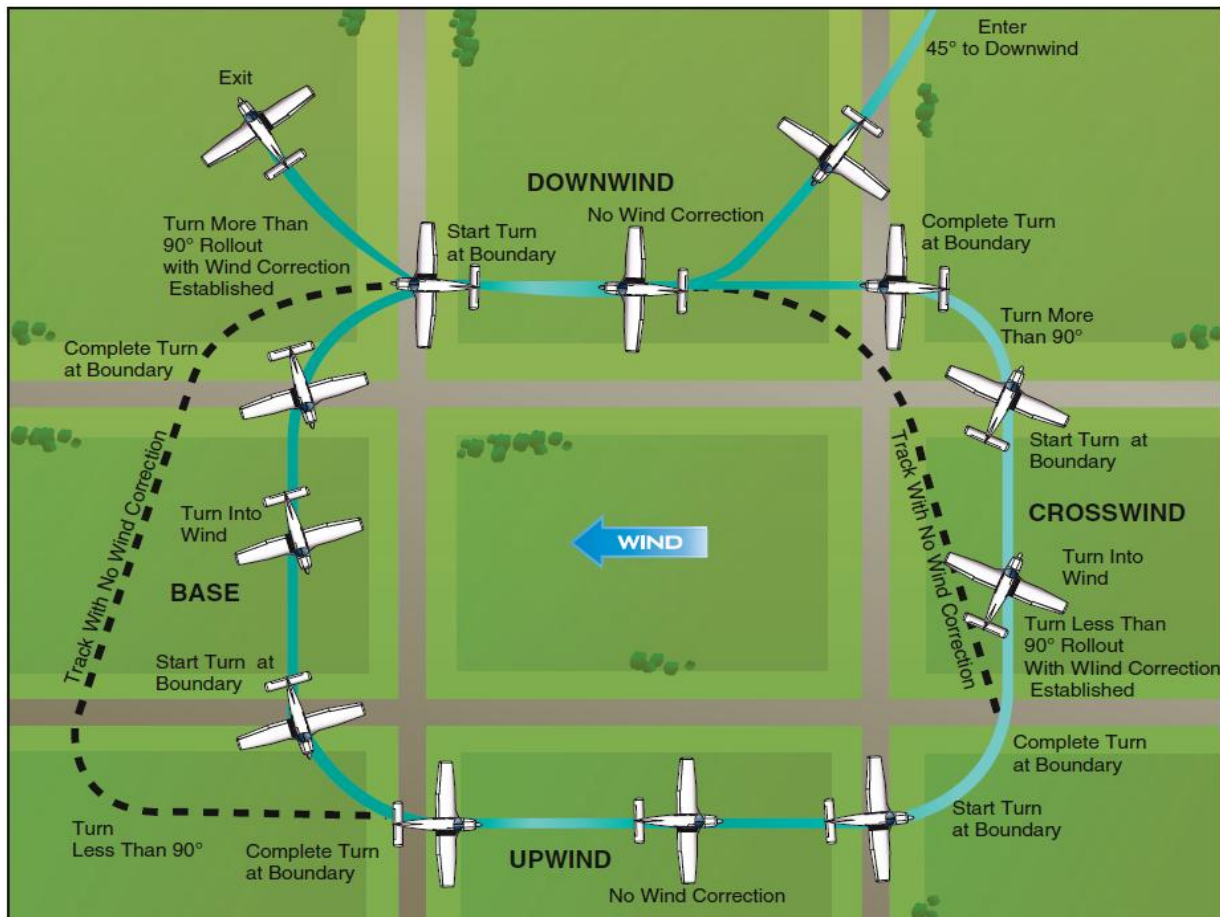
To develop division of attention between the flight path and ground references while controlling the airplane and watching for other aircraft in the vicinity. Another objective is to develop recognition of drift toward or away from a line parallel to the intended ground track.

Description

The rectangular course is a training maneuver in which the ground track of the airplane is equidistant from all sides of a selected rectangular area on the ground.

Teaching Considerations

- Planning and orientation.
 - Noise abatement
 - Obstacle clearance
 - Emergency landing area
 - Configuration and airspeed
 - Selection of a suitable altitude
 - Selection of a suitable reference point and it's orientation to the wind
- Faulty technique.
 - Uncoordinated flight controls
- Common errors as per the Airplane Flying Handbook and the CFI PTS.



Set-up

- Select a suitable altitude for the maneuver (600 feet - 1,000 feet AGL).
- Clear area with two 90° turns.
- Adjust power setting to attain an airspeed of (80 KIAS – C162, 90 KIAS – C172, 100 KIAS – PA28RT).

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Select a square or rectangular field, the sides of which are approximately a mile in length.
- Plan the maneuver so as to enter a left or right pattern at an appropriate distance (1/4 to 1/2 mile) from the selected reference area, 45° to the downwind leg.
- Maintain a ground track that is equidistant from all sides of the reference area. The airplane should be flown parallel to and at a uniform distance from the field boundaries, not above the boundaries.
- Adjust power to maintain entry airspeed; pitch to maintain selected altitude.

Recovery

- Return to cruise power setting when the airplane is in normal level flight.

2.14 MANEUVER: S-Turns Across a Road

Objective

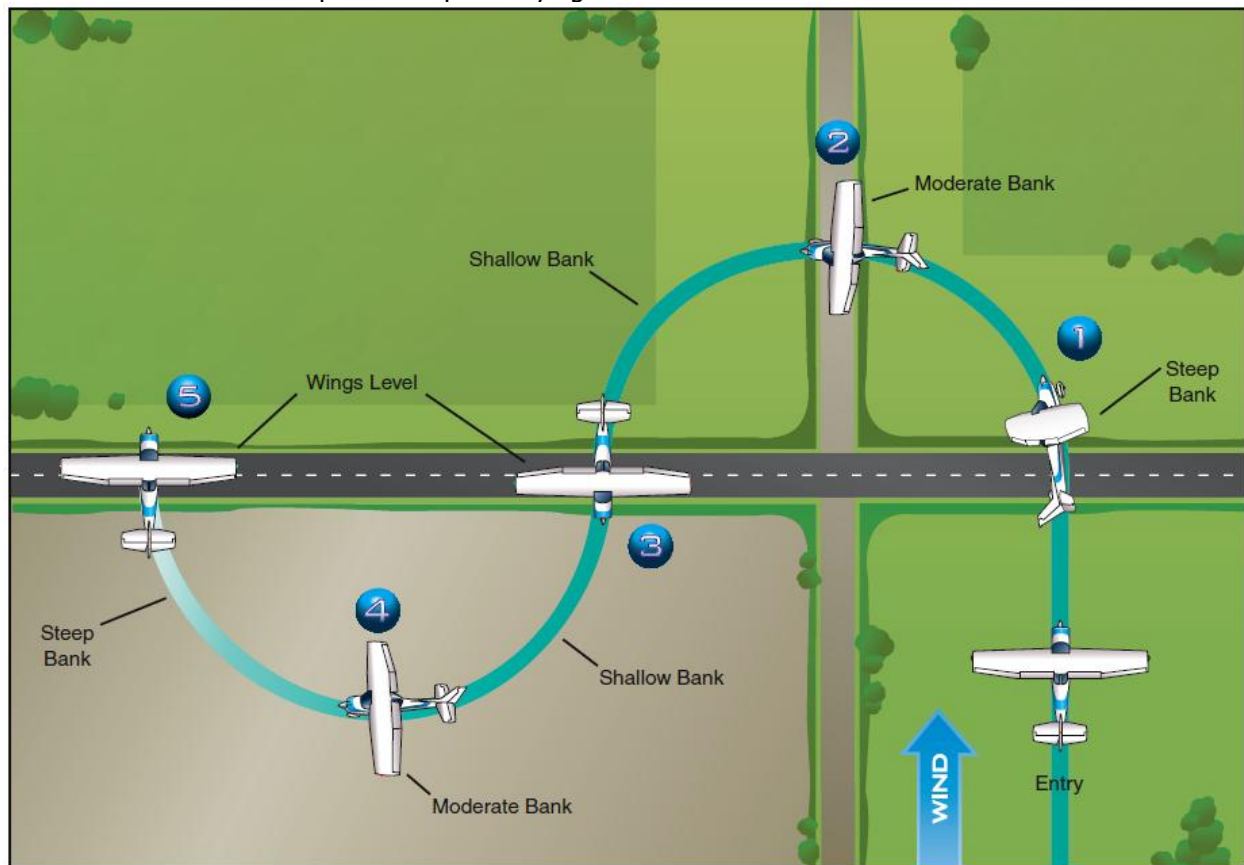
To develop the ability to compensate for drift during turns, orient the flight path with ground references, follow an assigned ground track, arrive at specified points on assigned headings, and divide the pilot's attention.

Description

The maneuver consists of crossing the road at a 90° angle and immediately beginning a series of 180° turns of uniform radius in opposite directions, re-crossing the road at a 90° angle just as each 180° turn is completed.

Teaching Considerations

- Planning and orientation.
 - Noise abatement
 - Obstacle clearance
 - Emergency landing area
 - Configuration and airspeed
 - Selection of a suitable altitude
 - Selection of a suitable reference point and it's orientation to the wind
- Faulty technique.
 - Uncoordinated flight controls
- Common errors as per the Airplane Flying Handbook and the CFI PTS.



Set-up

- Select a suitable altitude for the maneuver (600 feet – 1,000 feet AGL).
- Clear area with two 90° turns.
- Adjust power setting to attain an airspeed of (80 KIAS – C162, 90 KIAS – C172, 100 KIAS – PA28RT).

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Select a suitable ground reference line that lies perpendicular to the wind.
- Enter perpendicular to the selected reference line on a downwind heading.
- Complete a series of 180° turns of uniform radius in opposite directions, re-crossing the reference line at a 90° angle just as each 180° turn is completed.
- Apply the necessary wind-drift correction to track a constant radius turn on each side of the selected reference line.
- To accomplish a constant radius ground track requires a changing roll rate and angle of bank to establish the wind correction angle. Both will increase or decrease as ground speed increases or decreases. Bank angle should not exceed 45°.
- Suggested radius of turns is 1/4 to 1/2 mile from the reference line.
- Adjust power to maintain entry airspeed and pitch to maintain selected altitude.

Recovery

- Return to cruise power setting when the airplane is in normal level flight.

2.15 MANEUVER: Turns-Around-a-Point

Objective

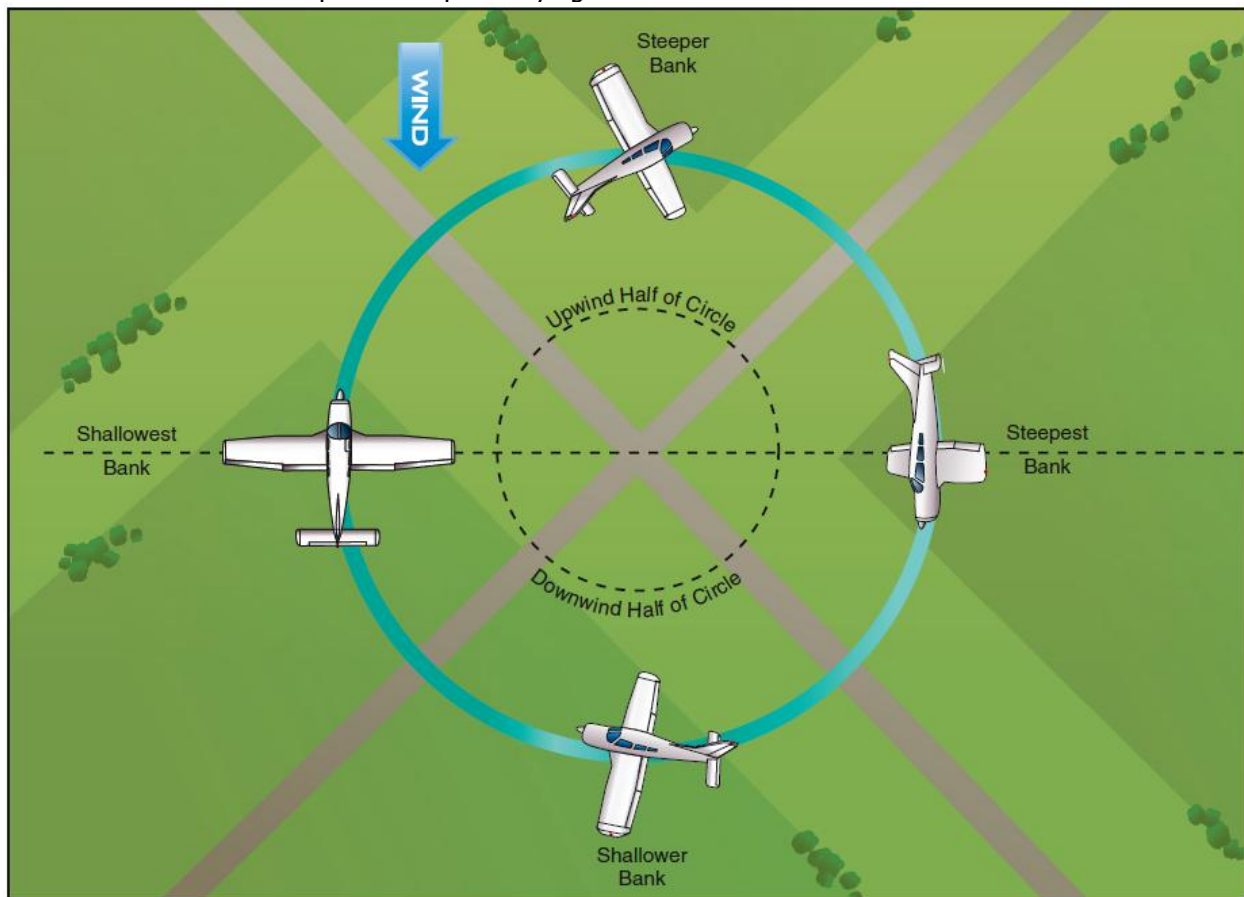
To develop division of attention between the flight path and ground references and recognition of drift towards or away from a prominent ground reference point while maintaining a constant altitude.

Description

This maneuver involves flying the airplane in two or more complete circles of uniform radii or distance from a prominent ground reference point, using a maximum bank of approximately 45° while maintaining a constant altitude.

Teaching Considerations

- Planning and orientation.
 - Noise abatement
 - Obstacle clearance
 - Emergency landing area
 - Configuration and airspeed
 - Selection of a suitable altitude
 - Selection of a suitable reference point and it's orientation to the wind
- Faulty technique.
 - Uncoordinated flight controls
- Common errors as per the Airplane Flying Handbook and the CFI PTS.



Set-up

- Select a suitable altitude for the maneuver (600 feet – 1,000 feet AGL).
- Clear area with two 90° turns.
- Adjust power setting to attain an airspeed of (80 KIAS – C162, 90 KIAS – C172, 100 KIAS – PA28RT).

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Select a suitable ground reference point.
- Enter the maneuver left or right at a distance equal to the desired radius of the turn on a downwind heading.
- Suggested radius of turns is 1/4 to 1/2 mile from the reference point.
- Maintain proper ground track by correcting for wind.

Recovery

- Return to cruise power setting when the airplane is in normal level flight.

2.16 MANEUVER: Eights on Pylons

Objective

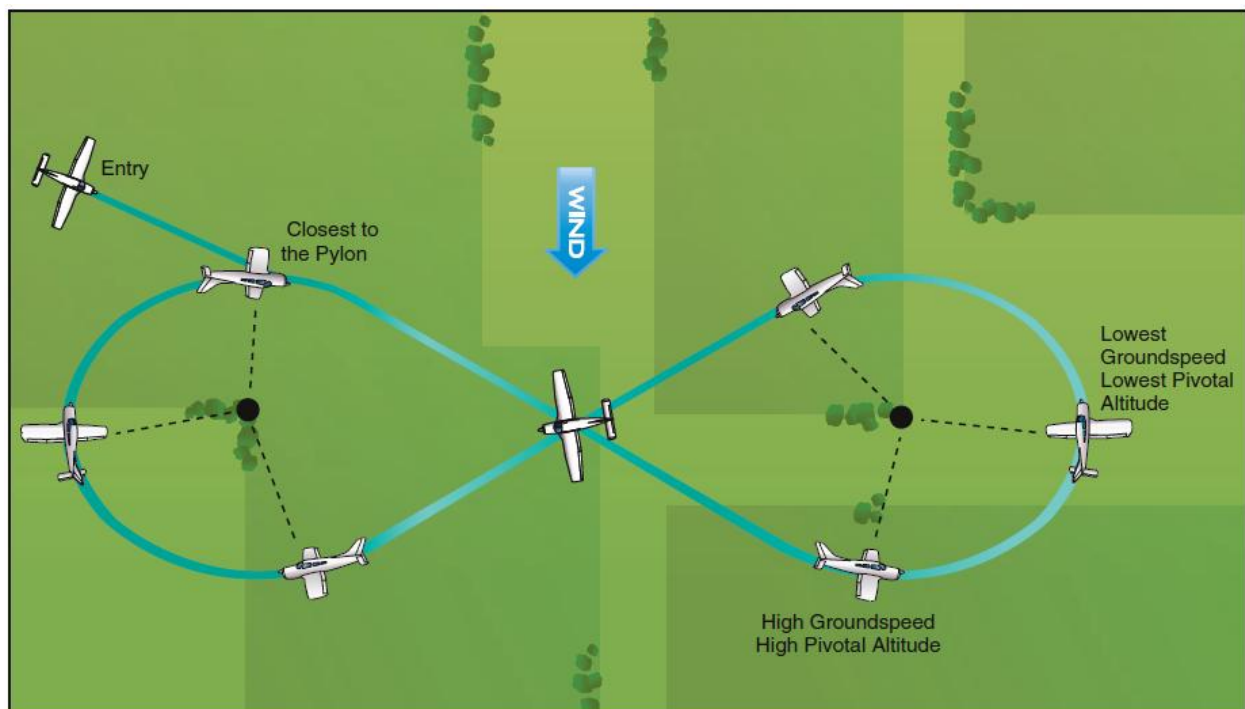
To develop the ability to maneuver the airplane accurately while dividing attention between the flight path and selected pylons on the ground.

Description

Involves flying the airplane in circular paths, alternately left and right, in the form of a figure "8" around two selected pylons on the ground. No attempt is made to maintain a uniform distance from the pylon. The airplane is flown at such an altitude and airspeed that a line parallel to the airplane's lateral axis, and extending from the pilot's eye appears to pivot on each of the pylons.

Teaching Considerations

- Planning and orientation.
 - Noise abatement
 - Obstacle clearance
 - Emergency landing area
 - Configuration and airspeed
 - Selection of a suitable altitude
 - Selection of a suitable reference point and it's orientation to the wind
- Faulty technique.
 - Uncoordinated flight controls
 - Use of rudder to maintain position on the pylon
- Common errors as per the Airplane Flying Handbook and the CFI PTS.



Set-up

- Select a suitable altitude for the maneuver.
- Clear area with two 90° turns.
- Adjust power setting to attain an airspeed of (80 KIAS – C162, 90 KIAS – C172, 100 KIAS – PA28RT).

NOTE: Pivotal Altitude should be calculated during preflight, $(GS\ KIAS)^2 / 11.3 + \text{Field Elevation} = PA$

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Select two points on the ground along a line which lies 90° perpendicular to the direction of the wind.
- Enter the maneuver by flying diagonally crosswind between the pylons to a point downwind from the first pylon so that the first turn can be made into the wind.
- As the airplane approaches a position where the pylon appears to be just ahead of the wingtip, the turn should be started by lowering the upwind wing to place the pilot's line of sight reference on the pylon.
- Adjust pivotal altitude as required to maintain the pilot's reference line on the pylon. As the airplane heads into the wind, a descent must be made to hold the reference line on the pylon.
- No correction should be made to counteract drifting during the turns.
- As the airplane turns downwind the rollout should be started to allow the airplane to proceed diagonally to a point on the downwind side of the second pylon. The rollout must be completed in the proper wind correction angle to correct for wind drift, so that the airplane will arrive at a point downwind from the second pylon the same distance it was from the first pylon.
- Start a turn in the opposite direction by lowering the upwind wing to again place the pilot's line of sight reference on the second pylon. The turn is then continued just as in the turn around the first pylon but in the opposite direction.
- Throughout the maneuver power remains fixed.

Recovery

- Return to cruise power setting when the airplane is in normal level flight.

2.17 MANEUVER: Pilotage and Dead Reckoning

Objective

To develop the pilot's ability to navigate on cross-country flights by reference to landmarks and computations.

Description

Picking suitable landmarks and making computations based on airspeed, course, and heading to be able to determine the position of the airplane at all times.

Teaching Considerations

- Select prominent landmarks that can be readily identified.
- Use of checkpoints.
- Definitions for obtaining flight information.
- Use of E6B to calculate ground speed, ETA and fuel burn.

Execution

- Follow a preplanned course by reference to landmarks.
- Identify landmarks by relating surface features to chart symbols.
- Navigate by means of pre-computed headings, ground speeds, and elapsed time.
- Correct and record the differences between preflight ground speed and heading calculations, and those determined enroute.

2.18 MANEUVER: Radio Navigation and Radar Services

Objective

To develop the pilot's ability to use radio navigation and radar services.

Teaching Considerations

- VHF Omnidirectional Range (VOR).
- Area Navigation (GPS/RNAV).
- Transponder (Mode C/Mode S).
- Avionics manuals.

Execution

- Demonstrate the ability to use an airborne electronic navigation system.
- Locate the airplane's position using the navigation system.
- Intercept and track a given course, radial or bearing, as appropriate.
- Recognize and describes the indication of station passage if appropriate.
- Recognize signal loss and take appropriate action.
- Use proper communication procedures when utilizing radar services.

2.19 MANEUVER: Diversion

Objective

To develop the ability to orient one's self with a chart and make rapid and reasonably accurate computations of headings and arrival time estimates.

Teaching Considerations

- Timely and appropriate selection of diversion destination.
- Accurate calculation of heading, ground speed, arrival time, and fuel consumption.
- In-flight communications with ATC and FSS.

Execution

- Select appropriate alternate airport and route.
- Make an estimate of heading, ground speed, arrival time, and fuel consumption to the alternate airport.
- Check NOTAMS and weather conditions.
- Change flight plan with FSS.

2.20 MANEUVER: Lost Procedure

Objective

To develop the pilot's ability to make sound decisions based on pilotage, dead reckoning, and radio navigation to assist in locating the aircraft's position.

Teaching Considerations

- Situational awareness.
- The 5 C's:
 - Confess to yourself that you are lost.
 - Climb to a more suitable altitude.
 - Communicate with the necessary ATC facility.
 - Conserve fuel.
 - Circle to maintain position.

Execution

- Select an appropriate course of action.
- Maintains an appropriate heading and climbs, if necessary.
- Identify prominent landmarks.
- Use navigation systems/facilities and or contact an ATC facility for assistance, as appropriate.

3. IFR FLIGHT MANEUVERS

Objective

The objective of this section is to develop the pilot's knowledge, ability, confidence, professionalism and competence in performing IFR flight maneuvers and the associated instrument approaches in an aircraft.

References

- Federal Aviation Regulations
- Aeronautical Information Manual
- FAA-H-8083-15A: Instrument Flying Handbook
- FAA-H-8261-1A: Instrument Procedures Handbook
- AC 61-134: General Aviation Controlled Flight Into Terrain Awareness
- Practical Test Standards
- RFS Safety Policies and Procedures
- Cessna Model 172S Pilot's Operating Handbook
- Cessna 172S Checklist

3.1 MANEUVER: Instrument Cockpit Check

Objective

During preflight, before and during taxi, and before takeoff, flight instruments, avionics, and navigation equipment are checked for currency and proper operation by following the established flow patterns/checklists.

Teaching Considerations

- VOR check procedures
- GPS database currency
- Inspection dates
 - Altimeter
 - Pitot/Static
 - Transponder

Execution

- Ensure all required inspections have been completed.
- Determine that the flight instruments, avionics, and navigation equipment are in a condition for completion of a safe instrument flight.
- Perform the preflight, before taxi, taxi, run-up, and before takeoff flow patterns/checklist items.

3.2 MANEUVER: Straight-and-Level

Objective

To develop the basic skill and knowledge of attitude instrument flying as it relates to straight-and-level flight.

Description

A standardized system by which the pitch, bank, and power control instruments are integrated to maintain desired altitude, heading, and airspeed.

Teaching Considerations

- Cross-check, instrument interpretation, and aircraft control.
- Fixation, omission, and emphasis errors.
- Over-controlling and failure to trim the aircraft.
- Primary and supporting, or control and performance methods.

Execution

Pitch

- Maintain altitude using the primary and supporting, or control and performance methods.
 - To return to the desired altitude, make an attitude change that results in a vertical speed rate that is approximately double the error in altitude not to exceed 200 feet per minute.
 - For errors less than 100 feet, increase/decrease the pitch attitude 2°.
 - For errors of more than 100 feet, increase/decrease the pitch attitude 4°.

Bank

- Maintain heading using the primary and supporting or control and performance methods.
- Make corrections to the desired heading by using an angle of bank no greater than the number of degrees to be turned. Limit bank corrections to an angle no greater than that required for a standard rate turn.

Power

- Set the power as necessary to maintain the desired airspeed.

3.3 MANEUVER: Change of Airspeed

Objective

To achieve the skill and knowledge of the elements relating to basic attitude instrument flying during changes of airspeed in straight-and-level flight and in turns.

Description

When power is changed to vary airspeed, the airplane tends to change attitude around all axes of movement. Therefore, control pressures will change in proportion to the change in power.

Teaching Considerations

- Cross-check, instrument interpretation, and aircraft control.
- Fixation, omission, and emphasis errors.
- Over-controlling and failure to trim the aircraft.
- Relationship between power, altitude, airspeed, and attitude.
- Primary and supporting, or control and performance methods.

Execution

- For changes in airspeed, vary the pitch, bank, and power in order to maintain the desired altitude, heading, and bank angle.
 - To increase airspeed, smoothly increase power to the approximate setting necessary to achieve the desired airspeed.
 - To reduce airspeed, smoothly decrease power to the approximate setting necessary to achieve the desired airspeed.
 - As the aircraft changes speed adjust pitch and trim as needed to maintain the desired attitude.

3.4 MANEUVER: Constant Airspeed Climbs and Descents

Objective

To achieve the skill and knowledge of the elements related to basic instrument flying during constant airspeed climbs and descents.

Description

A standardized system by which the pitch, bank, and power control instruments are integrated to maintain a constant airspeed climb or descent.

Teaching Considerations

- Cross-check, instrument interpretation, and aircraft control.
- Fixation, omission, and emphasis errors.
- Over-controlling and failure to trim the aircraft.
- Relationship between power, altitude, airspeed, and attitude.
- Primary and supporting, or control and performance methods.

Execution

- Add or reduce power as needed to initiate a climb or descent.
- Increase or decrease the pitch attitude to an approximate level that allows the airplane to climb or descend at the predetermined airspeed. The attitude indicator is the primary instrument for pitch during the transition period.
- To maintain a constant airspeed climb or descent, the primary instruments are:
 - Pitch – Airspeed tape.
 - Bank – HIS/DG during straight flight, turn indicator and bank angle indicator during a turn.
 - Power –Tachometer.
- Re-trim the aircraft to hold the appropriate attitude.
- To level off from a climb/descent lead the altitude by 10 percent of the vertical speed.
- Adjust the pitch on the attitude indicator for level flight and smoothly adjust power to achieve the desired airspeed.
- Re-trim the airplane.

3.5 MANEUVER: Constant Rate Climbs and Descents

Objective

To achieve the skill and knowledge of the elements related to basic attitude instrument flying while performing constant rate climbs and descents.

Description

A standardized system by which the pitch, bank, and power control instruments are integrated to maintain a constant rate climb or descent.

Teaching Considerations

- Cross-check, instrument interpretation, and aircraft control.
- Fixation, omission, and emphasis errors.
- Over-controlling and failure to trim the aircraft.
- Relationship between power, altitude, airspeed, and attitude.
- Primary and supporting, or control and performance methods.

Execution

- Add or reduce power as needed to initiate a climb or descent.
- Increase or decrease the pitch attitude to an approximate level that allows the airplane to climb or descend at the predetermined rate. The attitude indicator is primary for pitch during this transition period.
- To maintain a constant rate climb or descent, the primary instruments are:
 - Pitch – Vertical speed indicator.
 - Bank – HIS/DG during straight flight, turn indicator and bank angle indicator during a turn.
 - Power – Airspeed tape.
- Re-trim the aircraft to hold the appropriate attitude.
- To level off from a climb/descent lead the altitude by 10 percent of the vertical speed.
- Adjust the pitch on the attitude indicator for level flight and smoothly adjust power to achieve the desired airspeed.
- Re-trim the airplane.

3.6 MANEUVER: Turns to Headings

Objective

To achieve the skill and knowledge of the elements related to basic attitude instrument flying to establish a standard rate turn and rollout on predetermined headings.

Description

A standardized system by which pitch, bank, and power control instruments are integrated to turn to a specific heading.

Teaching Considerations

- Cross-check, instrument interpretation, and aircraft control.
- Fixation, omission, and emphasis errors.
- Over-controlling and failure to trim the aircraft.
- Relationship between power, altitude, airspeed, and attitude.
- Primary and supporting, or control and performance methods.

Execution

- To enter the turn, apply coordinated aileron and rudder pressure in the desired direction of the turn.
- A standard rate turn shall be maintained with a bank angle equal to 15 percent of the TAS.
- Use the bank angle indicator on the attitude indicator to bank approximately 15° then use the turn indicator to make small corrections for a standard rate turn by aligning the magenta indication of the turn indicator to the standard rate turn mark.
- Use the Skid/Slip indicator to maintain coordination. By keeping the black trapezoid at the top of the attitude indicator in line with the bank angle indicator a coordinated turn shall be maintained.
- To maintain a turn to a heading, the primary instruments are:
 - Pitch – Altitude tape.
 - Bank – Turn indicator.
 - Power – Airspeed tape.
- Adjust power and pitch as necessary to maintain the desired airspeed and altitude.
- For rollout, lead the desired heading by one-half the number of degrees of bank being used.
- Use the attitude indicator during rollout to return the aircraft to straight flight, reference the HSI/DG to rollout on the desired heading.
- On completion of the rollout adjust pitch, bank, power, and trim as necessary.

3.7 MANEUVER: Timed Turns to Magnetic Compass Headings

Objective

To achieve the skill and knowledge necessary to turn to a desired compass heading in the event of a HIS/DG failure.

Description

A turn in which the clock and the turn indicator (or bank angle indicator) are used to change heading a definite number of degrees in a given time.

Teaching Considerations

- Cross-check, instrument interpretation, and aircraft control.
- Fixation, omission, and emphasis errors.
- Over-controlling and failure to trim the aircraft.
- Relationship between power, altitude, airspeed, and attitude.
- Failure to compute the correct time.
- Compass errors.
- Primary and supporting, or control and performance methods.

Execution

- Determine the number of degrees to be turned and divide that number by 3 (i.e. $90^\circ/3 = 30$ seconds).
- Start the roll-in while noting the time on the clock, and hold the turn at the calibrated standard rate indication (or half-standard rate for small heading changes).
- If no standard rate indication is available use the bank angle indicator on the standby attitude indicator. A standard rate turn shall be maintained with a bank angle equal to 15 percent of the TAS.
- Begin the rollout when the computed number of seconds has elapsed. If the rates of roll-in and rollout are the same, the time taken during entry and recovery does not need to be considered in the time computation.
- Use the magnetic compass at the completion of the turn to check turn accuracy, taking compass deviation errors into consideration.
- Control pressures throughout the entry, turn, and recovery are the same as full panel turns to headings.
- To maintain a timed turn to a magnetic compass heading, the primary instruments are:
 - Pitch – Altimeter.
 - Bank – Attitude indicator.
 - Power – Airspeed indicator.

3.8 MANEUVER: Steep Turns

Objective

To achieve the skill and knowledge necessary to control the airplane with bank attitudes in excess of those normally used during instrument flight. To enable the pilot to react smoothly, quickly, and confidently to unexpected abnormal flight attitudes under instrument flying conditions.

Description

The steep turn maneuver consists of a turn in either direction, using a bank that results in a greater than standard rate turn.

Teaching Considerations

- Technique
 - Improper pitch correction during banking.
 - Power application, during roll in and rollout.
 - Rollout (suggested is 1/2 of the bank angle).
- Overbanking tendencies during high bank turns.
- Load factors caused by high bank turns.
- Maneuvering speed in relationship to high load factors.
- Increases in induced drag requiring an increase in power.
- Cross-check, instrument interpretation, and aircraft control.

Set-up

- Select an entry altitude that allows the recovery to be completed no lower than the Minimum Recovery Altitude.
 - MRA (Dual) 1,500 feet AGL
 - MRA (Solo) 2,000 feet AGL
- Clear area with two 90° turns.
- Adjust power setting to attain an airspeed appropriate for the aircraft.

NOTE: During operations at density altitudes which lower the aircraft's performance capability, a lower speed may be used.

Execution

- Rolls into a coordinated steep turn with approximately a 45° bank.
- To maintain a steep turn, the primary instruments are:
 - Pitch – Altimeter.
 - Bank – Attitude indicator.
 - Power – Airspeed.
- An increased rate of cross-check and slight adjustments of pitch, power and bank will be necessary to maintain airspeed and altitude.
- If desired, elevator trim may be used to help maintain the desired pitch attitude.

Recovery

- Rollout on the entry heading by releasing control wheel back pressure, reducing power, and maintaining coordination.
- Return to cruise power setting when the airplane is in normal level flight.

3.9 MANEUVER: Recovery from Unusual Flight Attitudes

Objective

To achieve the skill and knowledge to recover from both nose-high and nose-low unusual flight attitudes.

Description

An unusual attitude is any attitude not normally desired for instrument flight.

Teaching Considerations

- Cross-check, instrument interpretation, and aircraft control.
- Fixation, omission, and emphasis errors.
- Over-controlling and failure to trim the aircraft.
- Proper instruments to be used for recovery.
- Reviewing the airplane's load factor and airspeed limitations.
- Proper recovery techniques.

Execution

- Nose-high attitudes are recognized by an increase shown on the altimeter, and vertical speed indicator, and decrease in airspeed.
- Nose-low attitudes are recognized by a decrease shown on the altimeter, and vertical speed indicator, and an increase in airspeed.
- Nose-high
 - Increase power as necessary in proportion to the observed deceleration.
 - Apply forward control wheel pressure to lower the nose and prevent a stall.
 - Apply aileron and rudder pressure to resume coordinated straight flight.
- Nose-low
 - Reduce power to prevent excessive airspeed and loss of altitude.
 - Apply aileron and rudder pressure to resume straight flight.
 - Raise the nose to level flight attitude by applying smooth control wheel back pressure.

Recovery

- Return to cruise power setting when the airplane is in normal level flight.

3.10 MANEUVER: Air Traffic Control Clearances, Procedures, and Compliance

Objective

To achieve the necessary skills and knowledge to copy, correctly interpret, and comply with various types of ATC clearances.

Teaching Considerations

- Elements of an IFR clearance.
- Obtaining and canceling clearances.
- Use of standard phraseology.
- Failure to read back entire clearance.
- Correctly interpreting ATC clearances.
- Use of the G1000 play back feature (G1000).

Execution

- Contact the appropriate ATC facility and file the routing information at least 30 minutes before the desired departure time.
- Contact the appropriate ATC facility and request the clearance.
- Read back the clearance to ensure it is copied correctly.
- Correctly interpret and determine that it is possible to comply with the clearance.
- Using current and appropriate navigation publications, comply with the approved and accepted clearance. Upon arrival execute the appropriate approach procedure as requested or assigned.
- Monitor and communicate effectively at uncontrolled airports to obtain advance information and ensure collision avoidance.

3.11 MANEUVER: VOR Navigation

Objective

To achieve the necessary skill and knowledge to intercept and track VOR radials.

Description

The airplane is maneuvered onto a specific radial and maintains that radial by adjusting for wind.

Teaching Considerations

- VOR navaid facility operations and limitations.
- Operational errors as per the Instrument Flying Handbook.
- Partial panel operations.

Execution

- Tune and identify the desired VOR facility.
- Determine the aircraft's position relative to the VOR facility.
- Set the course to be intercepted and determine the intercept angle and heading.
- Turn to the intercept heading.
- Lead the turn to prevent overshooting the selected course.
- When established on the selected course, make the appropriate heading correction(s) to compensate for wind.

3.12 MANEUVER: GPS Navigation

Objective

To achieve the necessary skill and knowledge to intercept and track GPS courses.

Description

GPS navigation includes initialization, and maneuvering onto a specific bearing and maintaining that bearing by adjusting for wind.

Teaching Considerations

- GPS operations and limitations.
- Situational awareness.
- Determination of the proper intercept angle and lead points.
- Difference between track and heading as they relate to wind correction.
- GPS course sensitivity.
- Waypoint passage and sequencing.

Execution

- Verify operational status of GPS.
- Select appropriate radio navigation source and ensure proper annunciator display.
- Select desired waypoint(s) and input into GPS unit as appropriate.
- Determine the airplane's position relative to the GPS reference waypoint.
- Determine the desired course, intercept angle, and intercept heading and then turn to the selected intercept heading.
- Lead the turn to prevent overshooting the selected bearing.
- When established on the desired course, make the appropriate heading correction(s) to compensate for wind.

NOTE: Initialization/start-up procedures are outlined in the amplified checklist procedures.

3.13 MANEUVER: DME Arcs

Objective

To achieve the skill and knowledge required to intercept and track DME Arcs.

Description

Using distance information the airplane is flown at a constant distance from a navigation facility or waypoint.

Teaching Considerations

- Techniques for wind-drift correction.
- Arcing procedures: VOR vs. GPS.
- Determining the proper DME arc interception.
- Situational awareness.

Execution

- Establish appropriate airspeed. (Recommended airspeed is 100 KIAS.)
- Determine what radial/bearing the aircraft is currently on.
- Prior to reaching the DME arc, turn approximately 90° from the current radial/bearing. Lead the turn to prevent overshooting. A .5 Nautical miles lead is satisfactory for ground speeds of approximately 100 knots.
- When established on the DME arc, make appropriate heading correction(s) to compensate for wind-drift.
- Initiate the inbound turn for the intermediate/final approach segment, if applicable.

3.14 MANEUVER: Holding

Objective

To achieve the skill and knowledge required to enter and remain within a published or non-published holding pattern.

Description

Holding is a predetermined maneuver which keeps the aircraft within a specified airspace while awaiting further clearance from ATC.

Teaching Considerations

- Standard and non-standard holding patterns.
- Wind-drift and timing corrections.
- Published vs. non-published holding patterns.
- Various holding pattern entries.
- Situational awareness.

Set-up

- Begin slowing to the holding airspeed when within 3 minutes of the holding fix. (Recommended holding airspeed is 90 KIAS.)
- Determine the type of entry to be made to ensure the aircraft remains within the holding pattern airspace.

Execution

- After crossing the fix, execute the appropriate entry procedure.
- Comply with ATC reporting requirements.
- Use the proper timing criteria where applicable as required by altitude or ATC instructions.
- Use proper wind correction to maintain the desired pattern.
- Depart the fix in accordance with ATC instructions.

3.15 MANEUVER: Non-Precision Approach

Objective

To achieve the skill and knowledge necessary to transition from the enroute phase to the instrument approach and then to the landing with only horizontal guidance.

Description

A standard instrument approach procedure in which only horizontal guidance is provided.

Teaching Considerations

- NDB, VOR, LOC/LOC BC, GPS/RNAV, ASR, LDA, SDF approaches.
- ATC requirements, requests, and clearances.
- Approach charts and procedures.
- Importance of completing checklists.
- Airport/approach lighting.
- Appropriate approach airspeed.
- Situational awareness.
- Missed approach procedures.
- Wind shear and wake turbulence.
- Controlled Flight Into Terrain (CFIT).

Set-up

- Select, tune, identify, and confirm the operational status of the navigation equipment to be used.
- Set the proper course(s) with the OBS or for an ASR approach fly the assigned headings/altitudes. Establish the appropriate airplane configuration and airspeed prior to the FAF or in the absence of a FAF, upon commencing a descent to the minimum descent altitude.
- Comply with ATC clearances.

Execution

- Perform appropriate call-outs.
- Complete descent checklist prior to the IAF or intercepting the final approach course, if being radar vectored.
- Complete the Before Landing Checklist prior to the FAF.
- Fly the published approach procedure; in the case of an ASR follow ATC instructions.
- Configure airplane with 10° flaps and 90 KIAS prior to FAF.
- Extend gear at FAF.
- Establish a rate of descent and track that ensures arrival at the MDA prior to reaching the MAP.
- Maintain the MDA.
- Descent from the MDA should be made at the VDP.
 - Minimum descent height (an AGL altitude) divided by 300 gives the VDP.
- Complete the landing under visual conditions if:
 - Runway environment is visible.
 - Visibility requirements are met.
 - The aircraft is in a position to make a normal descent and landing.
- Execute the missed approach procedures at the MAP if visual contact with the runway environment is not established.

NOTES: Per 91.175 (c)(3)(i) - If runway is not in sight by 100 feet above TDZE a missed approach MUST be executed.

3.16 MANEUVER: Precision Approach

Objective

To achieve the skill and knowledge necessary to transition from the enroute phase to the instrument approach, and then to the landing with horizontal and vertical guidance.

Description

A standard instrument approach procedure in which both vertical and horizontal guidance is provided.

Teaching Considerations

- ILS, GPS/LPV, PAR approaches.
- ATC requirements, requests, and clearances.
- Approach charts and procedures.
- Importance of completing checklists.
- Airport/approach lighting.
- Appropriate approach speed and configuration.
- Situational awareness.
- Missed approach procedures.
- Wind shear and wake turbulence.
- Controlled Flight Into Terrain (CFIT).

Set-up

- Select, tune, identify and confirm the operational status of the navigation equipment to be used.
- Set the proper course(s) with the OBS; in the case of a PAR fly the assigned headings/altitudes.
- Establish the appropriate airplane configuration and airspeed prior to interception of the glideslope.
- Comply with ATC clearances.

Execution

- Perform appropriate call-outs.
- Complete descent checklist prior to the IAF or intercepting the final approach course if being radar vectored.
- Complete Before Landing Checklist prior to the FAF.
- Configure airplane with 10° flaps and 90 KIAS prior to FAF.
- Extend gear at FAF.
- As the glideslope (GS) is intercepted, establish the rate of descent required to maintain the glideslope to the decision altitude (DA).
- Complete the landing under visual conditions if:
 - Runway environment is visible.
 - Visibility requirements are met.
 - The aircraft is in a position to make a normal descent and landing.
- Execute the missed approach procedures at the decision altitude (DA) if visual contact with the runway environment is not established.

NOTES: Per 91.175 (c)(3)(i) - If runway is not in sight by 100 feet above TDZE a missed approach MUST be executed.

3.17 MANEUVER: Missed Approach Procedure

Objective

To achieve the skill and knowledge necessary to recognize situations that require execution of a missed approach and accomplish the appropriate missed approach procedure.

Description

A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing.

Teaching Considerations

- Importance of a prompt execution of the missed approach procedure.
- Situational awareness.
- Conditions which require a missed approach:
 - Whenever the requirements for operating below DA or MDA are not met.
 - Whenever an identifiable part of the airport is not visible.
 - When so directed by ATC.
 - Whenever the approach exceeds PTS standards.
- How the missed approach procedure differs at various points in the approach segments
- Compliance with the published or alternate missed approach procedure.
- Regulations concerning takeoff and landing under IFR.
- Controlled Flight Into Terrain (CFIT).

NOTE: Execution of a missed approach procedure from an intermediate point between the FAF and MDA/DA must be flown so as to remain within the protected approach corridor. Unless otherwise directed by ATC, climb out so as to remain on the approach centerline until reaching the missed approach point. At that time, the missed approach or climb-out track must be followed.

Execution

- Determine that the missed approach procedure is necessary.
- Apply climb power and establish a climb attitude.
- After a positive rate of climb has been established, retract gear.
- Retract flaps while accelerating to Vy or enroute climb speed.
- Climb at Vy or Enroute Climb speed, while complying with missed approach procedure.
- Advise ATC of the missed approach and your intentions.

3.18 MANEUVER: Landing From a Straight-in Approach

Objective

To achieve the skill and knowledge necessary to transition from the DA, MDA, or VDP to a runway aligned with the final approach course.

Description

Upon achieving visual contact with the runway the airplane is maneuvered under visual flight conditions from the DA, MDA or VDP to touchdown.

Teaching Considerations

- Approach categories and criteria.
- Transition from approach airspeed and configuration to an appropriate landing airspeed and configuration.
- Regulations concerning takeoff and landing under IFR.
- Controlled Flight Into Terrain (CFIT).
- Importance of completing checklists.
- Wind shear and wake turbulence.

Execution

- Perform appropriate call-outs.
- Transition to and maintain a visual flight condition using a stabilized approach until touchdown.
 - A stabilized approach is:
 - Check – All checklists are complete
 - F – Flight path correct (on centerline)
 - L – Landing configuration correct
 - A – Airspeed (+5/-0)
 - P – Power setting appropriate for aircraft configuration
 - S – Sink rate is not abnormal (on glidepath)
- Utilizes visual glideslope indicators, if available.

3.19 MANEUVER: Circling Approach Procedure

Objective

To achieve the skill and knowledge necessary to maneuver the airplane from the MDA or VDP and land on a runway not aligned with the instrument final approach course.

Description

A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable.

Teaching Considerations

- Approach categories and criteria.
- Transition from approach airspeed and configuration to an appropriate landing airspeed and configuration.
- Situational awareness.
- Circling approach protected area and visibility criteria.
- Regulations concerning takeoff and landing under IFR.
- Controlled Flight Into Terrain (CFIT).
- Circling pattern considerations:
 - airport design
 - ceiling and visibility
 - wind direction and velocity
 - final approach course alignment
 - distance from the final approach fix to the runway
 - ATC instructions

Set-up

- Determine the circling airspeed considering airplane configuration and weather conditions.
- Determine the runway of intended landing and select the appropriate circling altitude for the approach category, and maneuvering capabilities of the airplane.
- Confirm the direction of traffic, pattern to be flown, and adhere to restrictions and instructions issued by ATC.

Execution

- Transition to and maintain a visual flight condition and circle to the appropriate runway.
- Maintain circling altitude until in a position from which a stabilized approach to a normal landing can be made. If the ceiling allows it, fly at an altitude that approximates the VFR traffic pattern altitude.
 - A stabilized approach is:
 - Check – All checklists are complete
 - F – Flight path correct (on centerline)
 - L – Landing configuration correct
 - A – Airspeed (+5/-0)
 - P – Power setting appropriate for aircraft configuration
 - S – Sink rate is not abnormal (on glidepath)
- Utilizes visual glideslope indicators, if available.

3.20 Considerations for Instrument Flight

Takeoff, cruise, descent, and instrument arrivals

During all phases of flight the pilot must at all times be aware of the aircraft's position and attitude with regards to navigation and Controlled Flight Into Terrain (CFIT). The pilot must monitor ATC and comply with all clearance limits and requests. During VMC conditions the pilot should at all times maintain an active visual scan for collision avoidance.

Actual Instrument Conditions (IMC)

In actual instrument conditions, the pilot's primary responsibility is aircraft control and navigation while remaining alert for visual conditions. Upon reaching visual contact with the surface the Pilot should state, "Visual contact." Upon reaching a point at which the runway environment is clearly in sight, the pilot should state, "Approach lights/Runway in sight" (as appropriate). At this time the pilot should divide his/her attention between flight by reference to instruments and flight by visual reference. The pilot may transition to flight by visual reference alone at the point at which a safe approach is assured. During this time, the pilot should remain alert to changing visual conditions. In conditions in which a transition from the instrument approach to landing is not possible, the pilot should announce, "Missed approach" at the DA or MDA (as appropriate). "Missed approach" should be announced by the pilot at any other time a missed approach procedure is executed. (Example: Loss of visual reference while on a circling approach procedure, etc.)

Straight-in Approach: Landing Preparation and Briefing

The pilot should have the appropriate charts, and airport diagrams organized and readily available. Landing computations and the approach briefing should be accomplished during the low workload, low traffic phases of flight after current destination conditions are known. This is done preferably in the last few minutes of cruise but should be accomplished before leaving 2,000 feet AGL.

Circling Approach: Landing Preparation and Briefing

Brief the missed approach point and how, if it becomes necessary, it shall be executed from various positions of the circling approach pattern. The pilot must maintain visual contact with the airport at all times. If visual contact is lost, immediately execute the missed approach procedure. Brief (preferably before departure) the terrain features of the destination terminal area. If existing or forecast weather dictates a circling approach, and high terrain is a factor, consider using an alternate airport or delaying the flight. Discuss the inherent dangers of executing a circling approach if any of these conditions exist:

- Low visibility
- Night conditions
- Terrain
- Unfamiliar airfield
- Strong winds

Consider an alternate plan of action if necessary. Remember: Safely executed circling approaches are not last minute maneuvers. Know the destination weather, plan accordingly, and communicate with the crew. During some phases of a circling approach, the runway may not be visible to one of the crew. It is imperative to continuously communicate.

Missed Approach

The main objective for the Pilot is to execute the initial missed approach procedure, clean up the airplane and start to climb on course. In addition the pilot has the responsibility to tune and identify the appropriate nav aids, set in the appropriate course for the missed approach procedure, and contact ATC with her intentions. Remember: Fly the airplane first, navigate second, and communicate with ATC last. The pilot shall brief what shall follow the missed approach procedure if it is initiated. (i.e. vectors for another approach, clearance to the alternate). Formulate a plan and fly it. Multiple approaches in deteriorating conditions is rarely a safe plan of action. Do not wait until the MAP to decide, have a plan and execute it. Before continuing to the alternate airport: the Pilot shall re-confirm weather conditions and ascertain that conditions are still suitable for a successful approach and landing and fuel reserves are adequate.

Holding Procedures

When notified of a "slowdown" or "hold" by ATC, the pilot should determine the nature of the hold (i.e. weather, traffic, airport closure). Understanding the reason for the hold will greatly aid in determining whether the clearance should be accepted. The pilot should monitor the fuel gauges and mentally note fuel used as well as fuel remaining. During extended holding, delayed arrival, or a situation that could jeopardize the safety of the flight arises, the pilot should determine the fuel remaining and make a calculated decision. Based on the fuel calculations, ATC must be notified when fuel reserves are deemed insufficient for the remaining flight. If the fuel remaining is insufficient, and the pilot is unable to receive priority, declare an emergency. Remember: an EFC usually is an indication of an extended hold. The pilot should obtain the latest alternate weather and have charts and approach plates organized and available in case a reroute becomes necessary.

4. EMERGENCY OPERATIONS – C162

Objective

To develop the pilot's knowledge of the elements related to emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Cessna 162. The pilot should be able to analyze various situations and take appropriate action for simulated emergencies and malfunctions in which they may encounter.

Description

This chapter outlines and explains in detail the various emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Cessna 162.

Checklist Usage

- There are two checklists for the aircraft: a laminated Quick Reference checklist and a manufacturer's checklist containing amplified procedures.
- The boxed Emergency Procedures items in Quick Reference checklist and the bold items in the manufacturer's checklist are to be committed to memory. However, once the items have been completed, the checklist should be referenced to ensure proper completion.
- Some procedures in the Quick Reference checklist may continue with amplified procedures in the manufacturer's checklist and shall be referenced as directed, provided time and altitude permit.

Suitable Landing Areas

Certain checklist procedures direct the pilot to divert to another airport. In these cases the checklist will state 'Nearest Suitable Airport' or 'Land As Soon As Possible'. The pilot must exercise good judgment in these situations considering external factors such as terrain, airspace, weather, personal limitations, etc. The intent of these terms are:

Nearest Suitable Airport – An airport within reasonable distance and adequate facilities to complete repairs. Preferably one with a Cessna Service Center that has adequate inventory and expertise.

Land As Soon As Possible – Nearest suitable landing area, preferably an airport, but possibly a road, field or lake of adequate length and without obstructions permitting a normal approach and safe landing.

References

Airplane Flying Handbook

Cessna Model 162 Pilot's Operating Handbook

Cessna 162 Checklist – Emergency Procedures

4.1 EMERGENCY PROCEDURE: Emergency Approach and Landing

Objective

- The objective of a simulated emergency landing is to develop the pilot's accuracy, judgment, planning, procedures, and confidence when little or no power is available.

Description

- The airplane is flown from the point of simulated engine failure to where a safe landing could be made utilizing proper emergency cockpit procedures.

Teaching Considerations

- Stall and spin awareness.
- Best glide and configuration.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Wind effect on glide distance.
- Assessing priorities and division of attention.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.

Set-up

- Establish and maintain best glide airspeed, with the appropriate configuration for the simulated emergency.
- Trim the airplane to maintain best glide airspeed.
- Select a suitable landing area within gliding distance.

Execution

- Plan and follow a flight pattern to the selected landing area while considering altitude, wind, terrain, obstructions, and other factors.
- Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
- Follow the appropriate Emergency Checklist.
- Maintain positive control of the airplane.
- Fly the approach as close to a normal power-off 180° approach as possible.

Recovery

- Conduct a normal go-around procedure.
- Recoveries must be made no lower than 1,000 feet AGL unless a stabilized approach and landing can be made at an approved airport.
- Approach and landings at an approved airport during this maneuver can only be attempted on dual flights.

4.2 EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll

Indications/Recognition

- A loss of power, annunciator illumination, or any abnormality before rotation constitutes a reason for a rejected Takeoff.

Teaching Considerations

- If simulating this emergency, it must be performed within the first 1/3 of the runway.

Execution

1. **THROTTLE Control - IDLE (pull full out)**
2. **Brakes - APPLY**
3. Wing Flaps - RETRACT
4. MIXTURE Control - IDLE CUTOFF (pull full out)
5. MAGNETOS Switch - OFF
6. MASTER Switch (ALT and BAT) – OFF

4.3 EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff

Indications/Recognition

- A loss of power, annunciator illumination, or any abnormality after rotation constitutes an engine failure immediately after takeoff.

Teaching Considerations

- Stall/spin awareness.
- Selecting a safe landing site.
- The use and completion of appropriate Emergency Checklists.

Execution

1. **Airspeed - 70 KIAS - Flaps UP**
65 KIAS - Flaps 10° - FULL
2. **MIXTURE Control - IDLE CUTOFF (pull full out)**
3. FUEL SHUTOFF Valve - OFF (pull full out)
4. MAGNETOS Switch - OFF
5. Wing Flaps - AS REQUIRED (FULL recommended)
6. MASTER Switch (ALT and BAT) - OFF (when landing is assured)
7. Land - STRAIGHT AHEAD
8. Secondary Interior Door Latch - OPEN
9. Primary Interior Door Latch - OPEN (just prior to touchdown)

CAUTION: NON-EMERGENCY FLIGHT WITH DOOR(S) OPEN IS PROHIBITED.

NOTE: Both cabin doors are equipped with gas struts and should open automatically when unlatched. Delaying opening until just prior to touchdown will reduce cabin buffeting and wind noise.

4.4 EMERGENCY PROCEDURE: Engine Failure - Flight

Indications/Recognition

- A loss of power, engine roughness, and/or abnormal engine instrument readings could lead to an engine failure in cruise flight.

Teaching Considerations

- If the engine failure was caused by water in the fuel, it will take a short period of time to be used up.
- Maintain positive aircraft control and situational awareness throughout the emergency.
- The use and completion of appropriate Emergency Checklists.

Execution

1. **Airspeed - 70 KIAS (best glide speed)**
2. **THROTTLE Control - IDLE (pull full out)**
3. **CARB HEAT Control Knob - ON (pull full out)**
4. **FUEL SHUTOFF Valve - ON (push full in)**
5. **MIXTURE Control - RICH (if restart has not occurred)**
6. **MAGNETOS Switch - BOTH (or START if propeller is stopped)**

NOTE: If the propeller is windmilling, engine will restart automatically within a few seconds. If propeller has stopped (possible at low speeds), turn MAGNETOS switch to START, advance throttle slowly from idle and lean the mixture from full rich as required to obtain smooth operation.

4.5 EMERGENCY PROCEDURE: Low Oil Pressure

Indication/Recognition

- Oil PSI Indicator in the Red Band Range

Teaching Considerations

- Understand the difference between normal and abnormal conditions.
- Troubleshoot and take appropriate measures to prolong engine output.
- The importance of a timely diversion while considering landing areas enroute.

Execution

1. OIL °F - CHECK

IF OIL °F ABOVE GREEN BANDRANGE OR OIL °F RISING (engine failure imminent)

2. Throttle Control - REDUCE POWER IMMEDIATELY
3. Airspeed - 70 KIAS (best glide speed)
4. Land as soon as possible (refer to EMERGENCY LANDING WITHOUT ENGINE POWER)

IF OIL °F WITHIN GREEN BAND RANGE

2. OIL °F - MONITOR
3. OIL PSI - MONITOR
4. Land as soon as practical. (nearest suitable airport recommended)

4.6 EMERGENCY PROCEDURE: Carburetor Icing

Indication/Recognition

- Carb °F Indicator in the Yellow Band Range
- Engine Roughness

Teaching Considerations

- Anticipating carb ice conditions.
- Importance of timely troubleshooting.

Execution

1. ENGINE - MONITOR FOR ROUGHNESS AND/OR RPM LOSS

NOTE: Carb °F indicator in yellow band range indicates temperatures may support carb icing formation.

IF ENGINE ROUGHNESS AND/OR RPM LOSS IS DETECTED (CARB °F IN YELLOW BAND)

- 2. CARB HEAT Control Knob- ON (pull full out)**
- 3. THROTTLE Control - FULL (push full in)**
- 4. MIXTURE Control - LEAN (as required)**
5. CARB °F Indicator - CHECK

IF ENGINE ROUGHNESS CONTINUES

6. CARB °F Indicator - MONITOR
7. ALTITUDE - CONSIDER CHANGE (to warmer or drier air mass if terrain permits)
8. Land as soon as practical.

IF ENGINE ROUGHNESS AND/OR RPM LOSS IS NOT DETECTED

2. CARB °F Indicator - MONITOR
3. CARB HEAT Control Knob - AS REQUIRED
4. Continue flight as normal.

4.7 EMERGENCY PROCEDURE: Emergency Landing Without Engine Power

Indication/Recognition

- To be completed as directed by checklist.

Teaching Considerations

- Undershooting and overshooting the selected emergency landing area.
- Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
- The use and completion of appropriate Emergency Checklists.
- Airspeed – Best glide airspeed, ensures maximum power-off glide performance.
- Place to Land – Pilot Option - Select a suitable landing site as soon as possible while keeping glide distance in mind.
- Seats & Seat Belts – Secure - Belts/Harness should be secure to prevent injury.

Execution

- 1. Seats and Seat Belts - SECURE**
- 2. Airspeed -70 KIAS - Flaps UP**
65 KIAS - Flaps 10° - FULL
- 3. MIXTURE Control – IDLE CUTOFF (pull full out)**
- 4. FUEL SHUTOFF Valve - OFF (pull full out)**
5. Radio - ALERT ATC or TRANSMIT MAYDAY ON 121.5 MHZ, (give location, intentions and SQUAWK 7700)
6. MAGNETOS Switch - OFF
7. Wing Flaps - AS REQUIRED (FULL recommended)
8. MASTER Switch (ALT and BAT) - OFF (when landing is assured)
9. ELT - ACTIVATE
10. Secondary Interior Door Latch (if installed) - OPEN
11. Primary Interior Door Latch - OPEN (just prior to touchdown)

CAUTION: NON-EMERGENCY FLIGHT WITH DOOR(S) OPEN IS PROHIBITED.

NOTE: Both cabin doors are equipped with gas struts and should open automatically when unlatched. Delaying opening until just prior to touchdown will reduce cabin buffeting and wind noise.

12. Touchdown - SLIGHTLY TAIL LOW
13. Brakes - APPLY HEAVILY

4.8 EMERGENCY PROCEDURE: Precautionary Landing with Engine Power

Indication/Recognition

- To be completed as directed by checklist.
- Pilot decision to land at safe location due to external factors (i.e. rapidly deteriorating weather)

Teaching Considerations

- Understanding of when a precautionary landing may be necessary.
- Stall and spin awareness.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Assessing priorities and division of attention.

Execution

1. Seats and Seat Belts - SECURE
2. Airspeed - 70 KIAS
3. Wing Flaps - 10° or 25°
4. Radio - ALERT ATC or TRANSMIT MAYDAY ON 121.5 MHZ, (give location, intentions and SQUAWK 7700)
5. Selected Field - FLY OVER (noting terrain and obstructions)
6. Wing Flaps - FULL (on final approach)
7. Airspeed - 60 KIAS
8. MASTER Switch (ALT and BAT) - OFF (when landing assured)
9. ELT - ACTIVATE
10. Secondary Interior Door Latch (if installed) - OPEN
11. Primary Interior Door Latch - OPEN (just prior to touchdown)

CAUTION: NON-EMERGENCY FLIGHT WITH DOOR(S) OPEN IS PROHIBITED.

NOTE: Both cabin doors are equipped with gas struts and should open automatically when unlatched. Delaying opening until just prior to touchdown will reduce cabin buffeting and wind noise.

12. Touchdown - SLIGHTLY TAIL LOW
13. MIXTURE Control - IDLECUTOFF (pull full out)
14. MAGNETOS Switch - OFF
15. Brakes - APPLY HEAVILY

4.9 EMERGENCY PROCEDURE: Ditching

Indication/Recognition

- Applicable when completing off airport landing in river, lake or ocean.

Teaching Considerations

- Use of personal flotation devices and life rafts.
- Emergency egress procedures in case the aircraft capsizes inverted.
- The necessity of touching down at the established rate of descent and not in a landing flare.

Execution

1. Radio - TRANSMIT MAYDAY on 121.5 MHz, (give location, intentions and SQUAWK 7700)
2. Heavy Objects (in baggage area) - SECURE (if possible)
3. Seats and Seat Belts - SECURE
4. Wing Flaps - 25° or FULL
5. Power - ESTABLISH 300 FT/MIN DESCENT AT 60 KIAS

NOTE: If no power is available, approach at 70 KIAS with Flaps UP or at 65 KIAS with Flaps 10°.

6. Approach - High Winds, Heavy Seas - INTO THE WIND
Light Winds, Heavy Swells - PARALLEL TO SWELLS
7. ELT - ACTIVATE
8. Secondary Interior Door Latch (if installed) - OPEN
9. Primary Interior Door Latch - OPEN (just prior to touchdown)

CAUTION: NON-EMERGENCY FLIGHT WITH DOOR(S) OPEN IS PROHIBITED.

NOTE: Both cabin doors are equipped with gas struts and should open automatically when unlatched. Delaying opening until just prior to touchdown will reduce cabin buffeting and wind noise.

10. Touchdown - LEVEL ATTITUDE AT ESTABLISHED 300 FT/MIN DESCENT
11. Face - CUSHION AT TOUCHDOWN (with folded coat)
12. Airplane - EVACUATE THROUGH CABIN DOORS

4.10 EMERGENCY PROCEDURE: Emergency Descent

Indications/Recognition

- This procedure may be directed by another checklist or initiated by the pilot to rapidly lose altitude in an emergency situation.

Teaching Considerations

- Aircraft limitations.
- Appropriate recovery altitude for simulated emergency descents.

Execution

1. Throttle – IDLE
2. Mixture – RICH
3. Bank – 30° to 45° (A steep bank greatly decreases the vertical component of lift, allowing the pilot to quickly establish a steep descent angle while maintaining positive load factors (G-forces) on the airplane.)
4. Rollout – Upon Obtaining VNO

NOTE: In the event of an engine fire the mixture should be idle/cut-off.

4.11 EMERGENCY PROCEDURE: Engine Fire – During Start on Ground

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Proper priming technique.
- Proper starting technique.
- Determining electrical vs. engine fire.
- MAGNETOS Switch – Start, continue cranking - This causes the excess fuel in the induction system to be drawn into the cylinders.

Execution

1. MAGNETOS Switch - START (continue cranking to start the engine)

IF ENGINE STARTS

2. Power - 1800 RPM (for a few minutes)
3. Engine - SHUTDOWN (inspect for damage)

IF ENGINE FAILS TO START

2. **THROTTLE Control - FULL (push full in)**
3. **MIXTURE Control – IDLE CUTOFF (pull full out)**
4. **MAGNETOS Switch - START (continue cranking)**
5. **FUEL SHUTOFF Valve - OFF (pull full out)**
6. **MAGNETOS Switch - OFF**
7. **MASTER Switch (ALT and BAT) - OFF**
8. Engine - SECURE
9. Parking Brake - RELEASE
10. Fire Extinguisher - OBTAIN (have ground attendants obtain if not installed)
11. Airplane - EVACUATE
12. Fire - EXTINGUISH (using fire extinguisher, wool blanket, or dirt)
13. Fire Damage - INSPECT (repair or replace damaged components and/or wiring before conducting another flight)

4.12 EMERGENCY PROCEDURE: Engine Fire - Flight

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of nearest suitable airport/emergency landing location.
- Determining electrical vs. engine fire.

Execution

- 1. MIXTURE Control – IDLE CUTOFF (pull full out)**
- 2. FUEL SHUTOFF Valve - OFF (pull full out)**
- 3. MASTER Switch (ALT Only) - OFF**
4. Cabin Vents - OPEN (as needed)
5. CABIN HEAT Control Knob - OFF (push full in) (to avoid drafts)
6. Airspeed - 85 KIAS (If fire is not extinguished, increase glide speed to find an airspeed, within airspeed limitations, which will provide an incombustible mixture)
7. Forced Landing - EXECUTE (refer to EMERGENCY LANDING WITHOUT ENGINE POWER)

4.13 EMERGENCY PROCEDURE: Electrical Fire or Cabin Fire In Flight

Indications/Recognition

- Flames or smoke from inside the cabin.

Teaching Considerations

- Determining electrical vs. engine fire.
- Use of fire extinguisher inflight (Halon).

Execution

1. MASTER Switch (ALT and BAT) - OFF

WARNING: OUTSIDE VISUAL REFERENCE MUST BE USED TO MAINTAIN SITUATIONAL AWARENESS. ALL FLIGHT INSTRUMENTS, RADIOS, AND PITCH TRIM WILL BE INOPERATIVE WHEN MASTER SWITCH IS TURNED OFF.

- 2. Cabin Vents - CLOSED (to avoid drafts)**
- 3. CABIN HEAT Control Knob - OFF (push full in) (to avoid drafts)**
- 4. Fire Extinguisher - ACTIVATE (if available)**
5. AVN MASTER Switch - OFF
6. All Other Switches (except MAGNETOS switch) - OFF

IF FIRE HAS NOT BEEN EXTINGUISHED

- 7. MASTER Switch (ALT and BAT) - ON**
- 8. Rapid Descent - EXECUTE (Perform sideslip to rapidly lose altitude and shorten exposure time).**
9. AVN MASTER Switch - ON
10. Radio - ALERT ATC or TRANSMIT MAYDAY ON 121.5 MHZ, (give location, intentions and SQUAWK 7700)
11. Forced Landing - EXECUTE (refer to PRECAUTIONARY LANDING WITH ENGINE POWER)

NOTE: The G300 self-test and ADAHRS alignment may take several minutes to establish thus delaying display of flight instrument data. It may be necessary to execute landing without airspeed or altitude information.

IF FIRE HAS BEEN EXTINGUISHED AND ELECTRICAL POWER IS NECESSARY FOR CONTINUED FLIGHT TO NEAREST SUITABLE AIRPORT OR LANDING AREA

WARNING: AFTER THE FIRE EXTINGUISHER HAS BEEN USED, MAKE SURE THAT THE FIRE IS EXTINGUISHED BEFORE EXTERIOR AIR IS USED TO REMOVE SMOKE FROM THE CABIN.

7. Cabin Vents - OPEN (when sure that fire is completely extinguished)
8. CABIN HEAT Control Knob - ON (pull full out) (when sure that fire is completely extinguished)
9. Circuit Breakers - CHECK (for OPEN circuit(s), do not reset)
10. MASTER Switch (ALT and BAT) – ON
11. AVN MASTER Switch – ON
12. Land the airplane as soon as possible to inspect for damage.

4.14 EMERGENCY PROCEDURE: Wing Fire

Indications/Recognition

- Flames and/or smoke coming from the wing.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of the nearest suitable airport/emergency landing location.

Execution

- 1. LDG Light Switch - OFF**
- 2. NAV Light Switch - OFF**
- 3. STROBE Light Switch - OFF**

NOTE: Perform a sideslip to keep the flames away from the fuel tank and cabin.

4. Land as soon as possible.

4.15 EMERGENCY PROCEDURE: Inadvertent Icing Encounter During Flight

Indications/Recognition

- Formation of ice on the windshield, wings, and stabilizers.

Teaching Considerations

- Definition of known icing conditions.
- Determination of where icing conditions may exist.
- Exit strategies in the case of an icing encounter.

Execution

1. **Turn back or change altitude to exit icing conditions.** Consider lateral or vertical flight path reversal to return to last "known good" flight conditions (to obtain an outside air temperature that is less conducive to icing). Maintain VFR flight.

WARNING: FAILURE TO ACT QUICKLY MAY RESULT IN AN UNRECOVERABLE ICING ENCOUNTER.

2. **CABIN HEAT Control Knob - ON (pull full out)**

3. Watch for signs of induction air filter icing and apply carburetor heat as required. Monitoring the G300 Carb °F Indicator may assist early detection. A loss of engine RPM could be caused by carburetor ice or ice blocking the air intake filter. Adjust the throttle as necessary to hold engine RPM. Adjust mixture as necessary for any change in power settings or if carburetor heat is used continuously.
4. Watch for ice accretion on pitot tube and signs of pitot-static icing. Airspeed and altimeter indications may become unreliable.
 - a. Attitude and Heading information will remain reliable in event of airspeed and altimeter failure. Use attitude indicator to monitor pitch and bank.
 - b. Reference GS (ground speed) in conjunction with GPS derived wind information to determine an approximate airspeed.
 - c. Reference GPS ALTITUDE on MFD INFO page (if installed) or select G300 TERRAIN Profile page. GPS Altitude is provided by the white arrowhead on the left side of the TERRAIN Profile display.
 - d. Navigate using Heading Strip, Lateral Deviation, and GPS moving map (GPS moving map and TERRAIN Profile cannot be displayed at the same time).

NOTE: GPS information is not as accurate as barometric data but will provide an approximate value for comparison to pitot-static instruments or a back-up if barometric instruments become unreliable.

5. Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable off airport landing site.
6. With an ice accumulation of 0.25 inch (6.35 mm) or more on the wing leading edges, be prepared for significantly higher power requirements, higher approach and stall speeds, and a longer landing roll. Gently pitch and yaw the airplane periodically to keep ice bridging on the controls to a minimum.
7. Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
8. Perform a landing approach using a forward slip, if necessary, for improved visibility.
9. Approach at 65 to 70KIAS (estimated 70 KTS if using GPS for airspeed indication) depending upon the amount of ice accumulation.
10. Perform landing in level attitude.
11. Go arounds should be avoided whenever possible because of severely reduced climb capability.

4.16 EMERGENCY PROCEDURE: Landing with Partial or No Flight Instrument Information

Indications/Recognition

- In the event the PFD detects a loss of air data, the affected indicator is removed from the display and replaced with a red "X".
- In the event the PFD detects a loss of attitude data, the affected indicator is removed from the display and replaced with a red "X".

Teaching Considerations

- AHRS/ADC system and functions.
- Vacuum and pitot/static systems and functions.

Execution

1. Transponder - Select Pressure Alt display using FUNC button (ADAHRS may be providing altitude information to transponder).
2. Selected Field - FLY OVER (noting terrain, obstructions, and any visual cues that may be used for speed references (i.e. traffic on nearby highway, etc))
3. Approach - NORMAL
4. Wing Flaps - AS REQUIRED (FULL recommended)
5. Speed - Use best pilot judgment and experience to reference speed cues such as flap extension forces, slipstream sounds, etc. Stall warning horn will function and provide approximately 5 knot stall warning.
6. Touchdown - NORMAL
7. Directional Control - MAINTAIN

NOTE: Without accurate speed information, landing may be made at faster than normal speeds. Gently apply brakes while continuing to "fly" the airplane during roll-out. Loss of directional control may result from locked brakes and skidding tires due to over braking.

4.17 EMERGENCY PROCEDURE: Landing with a Flat Main Tire

Indications/Recognition

- Visible damage (i.e. deformation, shredding, etc.)

Teaching Considerations

- Recognition of abnormal tire condition.
- Importance of proper preflight.

Execution

1. Approach - NORMAL
2. Wing Flaps - FULL
3. Touchdown - GOOD MAIN TIRE FIRST (hold airplane off flat tire as long as possible with aileron control)
4. Directional Control - MAINTAIN (using rudder and brake on good wheel as required)

4.17 EMERGENCY PROCEDURE: Landing with a Flat Nose Tire

Indications/Recognition

- Visible damage (i.e. deformation, shredding, etc.)

Teaching Considerations

- Recognition of abnormal tire condition.
- Importance of proper preflight.

Execution

1. Approach - NORMAL (choose longest runway if possible)
2. Wing Flaps - AS REQUIRED
 - a. 65 to 70 KIAS - Flaps UP - 10°
 - b. Below 65 KIAS - Flaps 10° - FULL
3. Touchdown - ON MAINS (tail slightly low)
4. Elevator - continue stick to full aft as airplane slows (hold nosewheel off the ground as long as possible)
5. When nosewheel touches down, maintain full up elevator as airplane slows to stop.
6. Directional Control - MAINTAIN (using full rudder control). Attempt to limit differential braking.
7. Braking - Use brakes only as needed to lessen chance of prop strike. Rolling drag of the flat nose tire will increase braking effect.

4.18 EMERGENCY PROCEDURE: Door Open in Flight

Indication/Recognition

- If cockpit door latches are not secure the doors may open partially or completely resulting in buffeting, wind noise and increased drag.

Teaching Considerations

- Importance of checklist usage.
- Maintaining positive aircraft control.

Execution

WARNING: INTENTIONAL FLIGHT WITH DOOR(S) OPEN IS PROHIBITED.

1. CABIN DOOR - LEAVE OPEN (do not attempt to close)
2. THROTTLE Control - REDUCE (as necessary)
3. Airspeed - 80 KIAS (or less)
4. Seat Belts - CHECK (verify secure and tight)
5. Cabin - CHECK (stow loose materials)
6. Land as soon as practical.

LANDING WITH DOOR OPEN

1. Wing Flaps - AS REQUIRED
2. 65 to 70 KIAS - Flaps UP - 10°
3. Below 65 KIAS - Flaps 10° - FULL
4. Landing Approach - NORMAL (limit sideslip angle if possible)
5. Touchdown - NORMAL

4.19 EMERGENCY PROCEDURE: Loss of all Electrical Power (Except PFD)

Indications/Recognition

- Loss of electrical equipment.
- Ammeter discharge.

Teaching Considerations

- Electrical system and component malfunctions.
-

Execution

1. MAIN CB RESET Switch - PRESS MOMENTARILY

IF ELECTRICAL POWER RESUMES NORMAL OPERATION

2. Continue flight and land as soon as practical.

IF ELECTRICAL POWER REMAINS INOPERATIVE (EXCEPT PFD)

2. Land as soon as possible.

NOTE: The PFD will be operating on the secondary battery only. The secondary battery is not a back-up battery. It is included in the electrical system to limit display presentation issues that might arise during the voltage drop which occurs during engine start. In good condition, the secondary battery may provide 5 to 10 minutes of PFD operation.

3. Prepare for total loss of electrical power and PFD. Refer to ABNORMAL LANDINGS, LANDING WITH PARTIAL OR NO FLIGHT INSTRUMENT INFORMATION.

4.20 EMERGENCY PROCEDURE: Low Voltage

Indications/Recognition

- Low voltage annunciator comes on.
- Volts indication below green band range
- Volts less than 12.5

Teaching Considerations

- Electrical system and component malfunctions.

Execution

NOTE: Volts indication below the green band range or less than 12.5 volts may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the volts indication will increase into the green band range (12.5 - 15.0 volts) at higher RPM. The master switch need not be recycled since an overvoltage condition has not occurred to deactivate the alternator system.

1. AVN MASTER Switch - OFF

NOTE: Radio, Transponder, Pitch Trim, and options (MFD, Autopilot, and PS Intercom), if installed, will be inoperative with AVN MASTER Switch in the OFF position.

2. START/ALT Circuit Breaker - CHECK IN (if open, reset (close) circuit breaker. If circuit breaker opens again, do not reset)
3. MASTER Switch (ALT Only) - OFF
4. MASTER Switch (ALT Only) - ON
5. MAIN CB RESET Switch - PRESS MOMENTARILY
6. VOLTS - CHECK 13.5 Volts (minimum)
7. AMPS - CHECK CHARGING (positive)
8. AVN MASTER Switch - ON (only if VOLTS are 12.5 and AMPS are charging)

IF VOLTS INDICATION REMAINS BELOW GREEN BAND RANGE OR LESS THAN 12.5 VOLTS

9. MASTER Switch (ALT Only) - OFF
10. Electrical Load - REDUCE as follows:
 - a. LDG Light Switch - OFF (use as required for landing)
 - b. NAV Light Switch - OFF
 - c. STROBE Light Switch - OFF
 - d. AVN MASTER Switch - OFF

NOTE: Radio, Transponder, Pitch Trim, and options (MFD, Autopilot, and PS Intercom), if installed, will be inoperative with AVN MASTER Switch in the OFF position.

11. Land as soon as practical.

NOTE: A fully charged battery in good condition should provide power under reduced load for 30 minutes.

4.21 EMERGENCY PROCEDURE: High Voltage

Indications/Recognition

- Voltage indication above green band range.
- Volts more than 15.

Teaching Considerations

- Electrical system and component malfunctions.

Execution

1. MASTER Switch (ALT Only) - OFF
2. Electrical Load - REDUCE as follows:
 - a. LDG Light Switch - OFF (use as required for landing)
 - b. NAV Light Switch - OFF
 - c. STROBE Light Switch - OFF
 - d. AVN MASTER Switch - OFF

NOTE: Radio, Transponder, Pitch Trim, and options (MFD, Autopilot, and PS Intercom), if installed, will be inoperative with AVN MASTER Switch in the OFF position.

3. Land as soon as practical.

NOTE: A fully charged battery in good condition should provide power under reduced load for 30 minutes.

4.22 ABNORMAL PROCEDURE: Air Data, ADAHRS Failure

Indications/Recognition

- Red X – PFD or MFD Indicators (Airspeed, Altitude, Attitude, Horizontal Situation Indicator (HSI), or Engine Indicating System (EIS))

Teaching Considerations

- System and equipment malfunctions.

Execution

1. ADAHRS Circuit Breaker - CHECK IN
 - a. If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.
 - b. If closed, pull (open) ADAHRS Circuit Breaker, and pull (open) SEC PWR Circuit Breaker (overhead Panel Light will go off) then reset (close) both circuit breakers.
2. Affected Indicator (other than EIS) - RED-X STILL DISPLAYED
 - a. Reference GS (ground speed) in conjunction with GPS derived wind information to determine an approximate airspeed.
 - c. Select COMPASS ARC from G300 MAP SET-UP for approximate GPS derived heading information or monitor magnetic compass (if installed).
 - d. Reference GPS ALTITUDE on TERRAIN PROFILE page (GPS altitude is the white arrowhead on left side) or MFD INFO page (if installed) for approximate altitude.
 - e. Navigate using pilotage and GPS moving map if available.
 - f. Land as soon as possible.
3. EIS Engine Indicating System - RED-X STILL DISPLAYED
 - a. If only the EIS is RED X (no other PFD or MFD RED X is present), continue monitoring. Non-emergency full throttle operation should be limited to prevent engine overspeed or exceeding temperatures. Descents should be made at idle with carburetor heat applied.
 - b. Land as soon as possible.
4. Affected Indicator - RED-X HAS CLEARED (indicator normal)
5. Land as soon as practical.

4.23 ABNORMAL PROCEDURE: PFD and/or MFD Display Failure

Indications/Recognition

- PFD or MFD display black (no information)

Teaching Considerations

- System and equipment malfunctions.

Execution

1. PANEL LIGHTS Control Knob - FULL BRIGHT (full clockwise rotation)
2. PFD/MFD Circuit Breaker - CHECK IN
 - a. If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.
 - a. If closed, pull (open) PFD/MFD Circuit Breaker, and pull (open) SEC PWR Circuit Breaker (overhead Panel Light will go off) then reset (close) both circuit breakers.
3. Affected Display - CONTINUED BLACK SCREEN (No information displayed) - Use other display (if installed).
 - a. Transponder - Select Pressure Alt display using FUNC button (ADAHRS may be providing altitude information to transponder).
 - b. Navigate using pilotage and magnetic compass (if installed) to nearest suitable landing site.
 - c. Land as soon as possible. Refer to LANDING WITH PARTIAL OR NO INSTRUMENTATION INFORMATION.
4. Affected Display - NORMAL SCREEN
 - a. Land as soon as practical.

4.24 ABNORMAL PROCEDURE: PFD and/or MFD Not Updating**Indications/Recognition**

- Indications frozen during applications or pitch, power or yaw.

Teaching Considerations

- System and equipment malfunctions.

Execution

1. Pull (open) the following circuit breakers:
 - a. ADAHRS Circuit Breaker - OPEN
 - b. PFD/MFD Circuit Breaker - OPEN
 - c. SEC PWR Circuit Breaker - OPEN (overhead panel light will go off)
2. Reset (close) all three circuit breakers
 - a. ADAHRS Circuit Breaker - CLOSE
 - b. PFD/MFD Circuit Breaker - CLOSE
 - c. SEC PWR Circuit Breaker - CLOSE
3. Affected Display(s) - NOT UPDATING (use other display) (if installed)
 - a. Transponder - Select Pressure Altitude display using FUNC button (ADAHRS may be providing altitude information to transponder).
 - b. Navigate using pilotage and magnetic compass (if installed) to nearest suitable landing site.
 - c. Land as soon as possible. Refer to LANDING WITH PARTIAL OR NO INSTRUMENTATION INFORMATION.
4. Affected Display - NORMAL SCREEN
 - a. Land as soon as practical.

4.25 ABNORMAL PROCEDURE: Electric Pitch Trim Failure

Indications/Recognition

- No movement of pitch trim or indicator when pitch trim commanded.

Teaching Considerations

- System and equipment malfunctions.

Execution

1. AVN MASTER Switch - VERIFY ON
2. TRIM/AP Circuit Breaker - CHECK IN
 - a. If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.
 - a. If closed, pull (open) TRIM/AP Circuit Breaker, then reset (close) the circuit breaker.

ELECTRIC PITCH TRIM SYSTEM REMAINS INOPERATIVE

3. Reduce pitch control forces by changing speed or flap configuration (within airspeed limitations).
4. CRUISE - Consider range reduction and destination change if cruise speed is reduced by flap speed limitations.
5. APPROACH - Establish stabilized approach using normal speeds is preferred. This may include change of destination for longer runway.
6. LANDING WITH FAILED TRIM - Consider making Flaps UP landing if pitch control force increases uncomfortably when lowering landing flaps.
7. Land as soon as practical.

ELECTRIC PITCH TRIM SYSTEM RESUMES NORMAL OPERATION

3. Land as soon as practical.

4.26 ABNORMAL PROCEDURE: Loss of Communications**Indications/Recognition**

- Failure to communicate through the radio with outside sources.

Teaching Considerations

- Lost communications during VFR/IFR conditions.
- Alternate courses of action.
- Attempting to use different frequencies.
- Faulty push-to-talk switch: Trying the button on the other control wheel.
- Setting audio panel to speaker.
- Use of the hand-held mic.
- Radios – Switch
- Circuit Breakers – Check. If a breaker has popped, do not reset.
- Volume – Check and set to adequate level
- Transponder – Squawk 7600 - This alerts ATC to the communications failure.
- Proceed as required for VFR or IFR conditions.
- Alternate courses of action:
 - Attempt to use different frequencies.
 - Faulty push-to-talk switch; try the button on the other control wheel.
 - Set audio panel to speaker.
 - Use the hand-held mic.
 - Use your cell phone, if available.

4.27 ABNORMAL PROCEDURE: Spins

Indications/Recognition

- Uncoordinated stall resulting in autorotation.

Teaching Considerations

- Spin Aerodynamics
- Spin vs steep spiral
- Situations where spins may occur
- Recovery procedures

Execution

1. **IMMEDIATELY RETARD THROTTLE TO IDLE POSITION.**
2. **PLACE AILERONS IN NEUTRAL POSITION.**
3. **APPLY AND HOLD FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.**
4. **JUST AFTER THE RUDDER REACHES THE STOP, MOVE CONTROL BRISKLY FORWARD FAR ENOUGH TO BREAK THE STALL.** Full down elevator may be required at aft center of gravity loadings to assure optimum recoveries.
5. **HOLD THESE CONTROL INPUTS UNTIL ROTATION STOPS.** Premature relaxation of the control inputs may extend the recovery.
6. **AS ROTATION STOPS, NEUTRALIZE RUDDER, WINGS LEVEL, FLAPS UP AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE. AVOID OVERSTRESSING AND OVERSPEEDING THE AIRFRAME.**

NOTE: If the rate of the spin makes determining the direction of rotation difficult, the magenta turn rate trend vector in the heading strip over the PFD Attitude Indicator will show the rate and direction of the turn. The HSI compass card will rotate in the opposite direction. Hold full rudder opposite the direction of the turn indicated by the turn rate trend vector.

4.28 Emergency Equipment and Survival Gear

Objective

- To develop the pilot's knowledge of the elements related to emergency equipment and survival gear appropriate to the aircraft and environment encountered during the flight.

Description

- This section outlines the available emergency equipment and survival gear located in the Cessna 162.

Teaching Considerations

- Additional personal gear. (i.e., cell phone, credit card)
- Required winter clothing.
- Survival Kit
- Emergency Locator Transmitter (ELT)

5. EMERGENCY OPERATIONS – C172

Objective

To develop the pilot's knowledge of the elements related to emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Cessna 172. The pilot should be able to analyze various situations and take appropriate action for simulated emergencies and malfunctions in which they may encounter.

Description

This chapter outlines and explains in detail the various emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Cessna 172.

Checklist Usage

- There are two checklists for the aircraft: a laminated Quick Reference checklist and a manufacturer's checklist containing amplified procedures.
- The boxed Emergency Procedures items in Quick Reference checklist and the bold items in the manufacturer's checklist are to be committed to memory. However, once the items have been completed, the checklist should be referenced to ensure proper completion.
- Some procedures in the Quick Reference checklist may continue with amplified procedures in the manufacturer's checklist and shall be referenced as directed, provided time and altitude permit.

Suitable Landing Areas

Certain checklist procedures direct the pilot to divert to another airport. In these cases the checklist will state 'Nearest Suitable Airport' or 'Land As Soon As Possible'. The pilot must exercise good judgment in these situations considering external factors such as terrain, airspace, weather, personal limitations, etc. The intent of these terms are:

Nearest Suitable Airport – An airport within reasonable distance and adequate facilities to complete repairs. Preferably one with a Cessna Service Center that has adequate inventory and expertise.

Land As Soon As Possible – Nearest suitable landing area, preferably an airport, but possibly a road, field or lake of adequate length and without obstructions permitting a normal approach and safe landing.

References

Airplane Flying Handbook

Cessna Model 172 Nav II Pilot's Operating Handbook

Cessna 172 Checklist – Emergency Procedures

5.1 EMERGENCY PROCEDURE: Emergency Approach and Landing

Objective

The objective of a simulated emergency landing is to develop the pilot's accuracy, judgment, planning, procedures, and confidence when little or no power is available.

Description

The airplane is flown from the point of simulated engine failure to where a safe landing could be made utilizing proper emergency cockpit procedures.

Teaching Considerations

- Stall and spin awareness.
- Best glide and configuration.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Wind effect on glide distance.
- Assessing priorities and division of attention.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.

Set-up

- Establish and maintain best glide airspeed, with the appropriate configuration for the simulated emergency.
- Trim the airplane to maintain best glide airspeed.
- Select a suitable landing area within gliding distance.

Execution

- Plan and follow a flight pattern to the selected landing area while considering altitude, wind, terrain, obstructions, and other factors.
- Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
- Follow the appropriate Emergency Checklist.
- Maintain positive control of the airplane.
- Fly the approach as close to a normal power-off 180° approach as possible.

Recovery

- Conduct a normal go-around procedure.
- Recoveries must be made no lower than 1,000 feet AGL unless a stabilized approach and landing can be made at an approved airport.
- Approach and landings at an approved airport during this maneuver can only be attempted on dual flights.

5.2 EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll

Indications/Recognition

- A loss of power, annunciator illumination, or any abnormality before rotation constitutes a reason for a rejected Takeoff.

Teaching Considerations

- If simulating this emergency, it must be performed within the first 1/3 of the runway.

Execution

5. **Throttle – IDLE**
6. **Brakes – APPLY**
7. Wing Flaps – RETRACT
8. Mixture- IDLE CUT OFF
9. Ignition Switch – OFF
10. Master Switch - OFF

5.3 EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff

Indications/Recognition

- A loss of power, annunciator illumination, or any abnormality after rotation constitutes an engine failure immediately after takeoff.

Teaching Considerations

- Stall/spin awareness.
- Selecting a safe landing site.
- The use and completion of appropriate Emergency Checklists.

Execution

1. **Airspeed – 70 KIAS (flaps up)
65 KIAS (flaps down)**
2. Mixture – IDLE CUT OFF
3. Fuel Shutoff Valve – OFF (Pull Full Out)
4. Ignition Switch – OFF
5. Wing Flaps – AS REQUIRED
6. Master Switch – OFF
7. Cabin Door – UNLATCH
8. Land – STRAIGHT AHEAD

5.4 EMERGENCY PROCEDURE: Engine Failure - Flight

Indications/Recognition

- A loss of power, engine roughness, and/or abnormal engine instrument readings could lead to an engine failure in cruise flight.

Teaching Considerations

- If the engine failure was caused by water in the fuel, it will take a short period of time to be used up. Fuel flow pressure indications will be normal.
- Maintain positive aircraft control and situational awareness throughout the emergency.
- The use and completion of appropriate Emergency Checklists.

Execution

1. Airspeed – 68 KIAS
2. Fuel Shutoff Valve – ON (push full in)
3. Fuel Selector Valve – BOTH
4. Auxiliary Fuel Pump Switch – ON
5. Mixture – RICH (if restart has not occurred)
6. Ignition Switch – BOTH (or START if propeller is stopped)

NOTE: If the propeller is windmilling, the engine will restart automatically within a few seconds. If the propeller has stopped (possible at low speeds), turn the ignition switch to START, advance the throttle slowly from idle and lean the mixture from full rich as required for smooth operation.

7. Auxiliary Fuel Pump Switch – OFF

NOTE: If the fuel flow indicator immediately drops to zero (indicating an engine-driven fuel pump failure), return the Auxiliary Fuel Pump Switch to the ON position.

5.5 EMERGENCY PROCEDURE: Emergency Landing Without Engine Power

Indication/Recognition

- This procedure is appropriate if power is not restored after an engine failure inflight.

Teaching Considerations

- Undershooting and overshooting the selected emergency landing area.
- Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
- The use and completion of appropriate Emergency Checklists.

Execution

1. Passenger Seat Backs – MOST UPRIGHT POSITION
2. Seats and Seat Belts – SECURE
3. Airspeed – 70 KIAS (flaps up)
65 KIAS (flaps down)
4. Mixture – IDLE CUT OFF
5. Fuel Shutoff Valve – OFF (pull full out)
6. Ignition Switch – OFF
7. Wing Flaps – AS REQUIRED (30° recommended)
8. Master Switch – OFF (when landing is assured)
9. Doors – UNLATCH PRIOR TO TOUCHDOWN
10. Touchdown – SLIGHTLY TAIL LOW
11. Brakes – APPLY HEAVILY

5.6 EMERGENCY PROCEDURE: Precautionary Landing with Engine Power

Indication/Recognition

- This procedure is appropriate when landing off airport, with the engine still producing power.

Teaching Considerations

- Understanding of when a precautionary landing may be necessary.
- Stall and spin awareness.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Assessing priorities and division of attention.

Execution

1. Passenger Seat Backs – MOST UPRIGHT POSITION
2. Seats and Seat Belts – SECURE
3. Airspeed – 65 KIAS
4. Wing Flaps – 20°
5. Selected Field – FLY OVER, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed.
6. Avionics Master Switch and Electrical Switches – OFF
7. Wing Flaps – 30° (on final approach)
8. Airspeed - 65 KIAS
9. Master Switch – OFF
10. Doors – UNLATCH PRIOR TO TOUCHDOWN
11. Touchdown – SLIGHTLY TAIL LOW
12. Ignition Switch – OFF
13. Brakes – APPLY HEAVILY

5.7 EMERGENCY PROCEDURE: Ditching

Indication/Recognition

- This procedure is appropriate if an emergency water landing is necessary.

Teaching Considerations

- Use of personal flotation devices and life rafts.
- Emergency egress procedures in case the aircraft capsizes inverted.
- The necessity of touching down at the established rate of descent and not in a landing flare.

Execution

1. Radio – TRANSMIT MAYDAY on 121.5 MHz, giving location and intentions and SQUAWK 7700.
2. Heavy Objects (in baggage area) – SECURE OR JETTISON (if possible)
3. Passenger Seat Backs – MOST UPRIGHT POSITION
4. Seats and Seat Belts – SECURE
5. Wing Flaps – 20° to 30°
6. Power – ESTABLISH 300 FT/MIN DESCENT AT 55 KIAS

NOTE: If no power is available, approach at 70 KIAS with flaps up or at 65 KIAS with 10° flaps.

7. Approach – High Winds, Heavy Swells – INTO THE WIND
- Light Winds, Heavy Swells – PARALLEL TO SWELLS
8. Cabin Doors – UNLATCH
9. Touchdown – LEVEL ATTITUDE AT ESTABLISHED RATE OF DESCENT
10. Face – CUSHION at touchdown with folded coat
11. ELT – Activate
12. Airplane – EVACUATE through cabin doors. If necessary, open window and flood cabin to equalize pressure to doors can be opened.
13. Life Vests and Raft – INFLATE WHEN CLEAR OF AIRPLANE

5.8 EMERGENCY PROCEDURE: Engine Fire – During Start on Ground

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Proper priming technique.
- Proper starting technique.
- Determining electrical vs. engine fire.

Execution

1. **Ignition Switch – START, Continue Cranking** to get a start which would suck the flames and accumulated fuel into the engine

If Engine Starts:

2. Power – 1800 RPM for a few minutes
3. Engine – SHUTDOWN and inspect for damage

If Engine Fails to Start:

4. **Throttle – FULL OPEN**
5. **Mixture – IDLE CUT OFF**
6. **Cranking – CONTINUE**
7. **Fuel Shutoff Valve – Off (pull full out)**
8. **Auxiliary Fuel Pump Switch – OFF**
9. Fire Extinguisher – ACTIVATE
10. Engine – SECURE
 - a. Master Switch – OFF
 - b. Ignition Switch – OFF
11. Parking Brake – RELEASE
12. Airplane – EVACUATE
13. Fire – EXTINGUISH using fire extinguisher, woo blanket or dirt
14. Fire Damage – INSPECT, repair damage or replace damaged components or wiring before conducting another flight

5.9 EMERGENCY PROCEDURE: Engine Fire – In Flight

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of nearest suitable airport/emergency landing location.
- Determining electrical vs. engine fire.

Execution

- 1. Mixture – IDLE CUT OFF**
- 2. Fuel Shutoff Valve – Pull Out (OFF)**
- 3. Auxiliary Fuel Pump Switch – OFF**
- 4. Master Switch – OFF**
5. Cabin Heat and Air – OFF (except overhead vents)
6. Airspeed – 100 KIAS (If the fire is not extinguished, increase glide speed to find an airspeed – within airspeed limitations – which will provide an incombustible mixture)
7. Forced Landing – EXECUTE (as described in Emergency Landing Without Engine Power)

5.10 EMERGENCY PROCEDURE: Electrical Fire - In Flight

Indications/Recognition

- Flames or smoke from inside the cabin with smell of burning wire insulation.

Teaching Considerations

- Determining electrical vs. cabin fire.
- Use of fire extinguisher inflight (Halon).

Execution

1. **Master Switch – OFF**
2. **Vents, Cabin Air, Heat – CLOSED**
3. **Fire Extinguisher – ACTIVATE**
4. Avionics Master Switch – OFF
5. All Other Switches (except ignition switch) – OFF

WARNING: After discharging fire extinguisher and ascertaining that fire has been extinguished, ventilate the cabin.

6. Vents, Cabin Air, Heat – ON

If fire has been extinguished and electrical power is necessary for continuance of flight to nearest suitable airport or landing area:

7. Master Switch – ON
8. Circuit Breakers – CHECK for faulty circuit, do not reset
9. Radio Switches – OFF
10. Avionics Master Switch – ON
11. Radio/Electrical Switches – ON one at a time, with delay after each until short circuit is localized

5.11 EMERGENCY PROCEDURE: Cabin Fire

Indications/Recognition

- Flames or smoke from inside the cabin with no smell of burning wire insulation.

Teaching Considerations

- Determining electrical vs. engine fire.
- Use of fire extinguisher inflight (Halon).

Execution

- 1. Master Switch – OFF**
- 2. Vents, Cabin Air, Heat – CLOSED (to avoid drafts)**
- 3. Fire Extinguisher – ACTIVATE**

WARNING: After discharging fire extinguisher and ascertaining that the fire has been extinguished, ventilate the cabin.

4. Vents, Cabin Air, Heat – Open when it is ascertained that fire is completely extinguished
5. Land the airplane as soon as possible to inspect for damage.

5.12 EMERGENCY PROCEDURE: Wing Fire

Indications/Recognition

- Flames and/or smoke coming from the wing.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of the nearest suitable airport/emergency landing location.

Execution

- 1. Landing, Taxi Light Switches – OFF**
- 2. Navigation Light Switch – OFF**
- 3. Strobe Light Switch – OFF**
- 4. Pitot Heat Switch – OFF**

NOTE: Perform a sideslip to keep the flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown.

5.13 EMERGENCY PROCEDURE: Inadvertent Icing Encounter

Indications/Recognition

- Visible ice collecting on windshield, leading edges
- Propeller vibration
- Degraded performance

Teaching Considerations

- Definition of known icing conditions.
- Determination of where icing conditions may exist.
- Exit strategies in the case of an icing encounter.

Execution

1. **Turn pitot heat switch ON**
2. **Turn back or change altitude** to obtain an outside air temperature that is less conducive to icing.
3. **Pull cabin heat control full out and open defroster outlets** to obtain maximum windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
4. Watch for signs of engine-related icing conditions. An unexplained loss of engine speed could be caused by ice blocking the air intake filter, or, in extremely rare instances, ice completely blocking the fuel injection air reference tubes. Change the throttle position to obtain maximum RPM. This may require either advancing or retarding the throttle, dependent on where ice has accumulated in the system. Adjust mixture, as required, for maximum RPM.
5. Plan a landing at the nearest airport. With an extremely rapid ice build up, select a suitable "off airport" landing site.
6. With an ice accumulation of ¼ inch or more on the wing leading edges, be prepared for significantly higher stall speed and a longer landing roll.
7. Leave wing flaps retracted. With a severe ice build up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
8. Open left window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
9. Perform a landing approach using a forward slip, if necessary, for improved visibility.
10. Approach at 65 to 75 KIAS depending upon the amount of the accumulation.
11. Perform a landing in level attitude.

5.14 EMERGENCY PROCEDURE: Landing With A Flat Main Tire

Indications/Recognition

- Uncommanded loss of directional control with accompanying vibrations.

Teaching Considerations

- Possible causes of a flat tire.

Execution

1. Approach – NORMAL
2. Wing Flaps – 30°
3. Touchdown – GOOD MAIN TIRE FIRST, hold airplane off flat tire as long as possible with aileron control.
4. Directional Control – MAINTAIN using brake on good wheel as required.

5.15 EMERGENCY PROCEDURE: Landing With A Flat Nose Tire

Indications/Recognition

- Excessive nose wheel vibrations with degraded acceleration.

Teaching Considerations

- Possible causes of a flat tire.

Execution

1. Approach – NORMAL
2. Flaps – AS REQUIRED
3. Touchdown – ON MAIN, hold nose wheel off the ground as long as possible.
4. When nose wheel touches down, maintain full up elevator as airplane slows to a stop.

5.16 EMERGENCY PROCEDURE: Ammeter Shows Excessive Rate of Charge

Indications/Recognition

- An abnormally high alternator output of more than 40 amps or the illumination of the HIGH VOLTS annunciator.

Teaching Considerations

- Importance of a proper instrument scan, including engine gauges.
- Reduction of electrical loads during operations using the battery only.

Execution

1. Alternator – OFF

CAUTION: With the alternator side of the Master Switch off, compass deviations as much as 25° may occur.

2. Nonessential Electrical Equipment – OFF
3. Flight – TERMINATE as soon as practical

5.17 EMERGENCY PROCEDURE: Low Voltage Annunciator Illuminates

Indications/Recognition

- A zero reading on the voltmeter indicating a loss of alternator output.
- LOW VOLTS Annunciator illuminated.

Teaching Considerations

- Importance of a proper instrument scan, including engine gauges.
- Reduction of electrical loads during operations using the battery only.
- LOW VOLTS ANNUNCIATOR ILLUMINATED AT OR BELOW 1000 RPM

Execution

NOTE: Illumination of "VOLTS" on the annunciator panel may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the annunciator will go out at a higher RPM. The master switch need not be recycled since an overvoltage condition has not occurred to deactivate the alternator system.

1. Avionics Master Switch – OFF
2. Alternator Circuit Breaker (ALT FLD) – CHECK IN
3. Master Switch – OFF (both sides)
4. Master Switch – ON
5. Low Voltage Annunciator (VOLTS) – CHECK OFF
6. Avionics Master Switch – ON

If low voltage annunciator (VOLTS) illuminates again:

7. Alternator – OFF
8. Nonessential Radio and Electrical Equipment – OFF
9. Flight – TERMINATE as soon as practical

5.18 EMERGENCY PROCEDURE: Vacuum System Failure

Indications/Recognition

- Left vacuum (L VAC) annunciator or right vacuum (VAC R) annunciator illuminates as well as a low reading on the vacuum suction gauge.

Teaching Considerations

- Partial panel operations.
- Effects on instrument indications.

Execution

CAUTION: If vacuum is not within normal operating limits, a failure has occurred in the vacuum system and partial panel procedures may be required for continued flight.

1. **Vacuum Gauge – CHECK** to ensure vacuum within normal operating limits

5.19 EMERGENCY PROCEDURE: Emergency Descent

Indications/Recognition

- This procedure may be directed by another checklist or initiated by the pilot to rapidly lose altitude in an emergency situation.

Teaching Considerations

- Aircraft limitations.
- Appropriate recovery altitude for simulated emergency descents.

Execution

1. **Throttle – IDLE**
2. **Mixture – RICH**
3. **Bank – 30° to 45°** (A steep bank greatly decreases the vertical component of lift, allowing the pilot to quickly establish a steep descent angle while maintaining positive load factors (G-forces) on the airplane.)
4. FUEL PUMP Switch – ON
5. Rollout – Upon Obtaining VNO

NOTE: In the event of an engine fire the mixture should be idle/cut-off and the fuel pump turned off.

5.20 EMERGENCY PROCEDURE: Spin Recovery

Indications/Recognition

- Stalled condition.
- One wing often drops, then the nose yaws in the direction of the low wing.
- Rolling about longitudinal axis.

Teaching Considerations

- Different phases of a spin.
- CG location.
- Overstressing the aircraft.
- Spin aerodynamics.
- Flight situations where unintentional spins may occur.

Execution

- 1. Throttle – IDLE**
- 2. Ailerons – NEUTRAL**
- 3. Rudder – FULL OPPOSITE THE DIRECTION OF ROTATION**
- 4. Control Wheel – BRISKLY FORWARD**

When Rotation Stops:

- 5. Rudder – NEUTRAL**
- 6. Control Wheel – RECOVER FROM DIVE**
- 7. Throttle – RESUME NORMAL FLIGHT**

NOTE: If disorientation precludes a visual determination of the direction of rotation, the symbolic airplane in the turn coordinator may be referred to for this information.

5.21 ABNORMAL PROCEDURE: Low Oil Pressure

Indications/Recognition

- Low reading on oil pressure gauge.
- Oil pressure annunciator may be illuminated.
- High oil temperature reading.

Teaching Considerations

- Reasons for partial or complete loss of oil pressure.
- Troubleshooting actual failure versus faulty gauge.
- Selecting the closest suitable airport or landing site.

Execution

1. Annunciator Light – CHECK
2. Oil Pressure Gauge – CHECK
3. Oil Temperature Gauge – CHECK
4. Prepare for a power-off landing – The engine may stop suddenly without engine oil. Maintain altitude until such time as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available.

5.22 ABNORMAL PROCEDURE: High Oil Temperature

Indications/Recognition

- High temperature reading on the oil temperature gauge.
- Low reading on the oil pressure gauge.

Teaching Considerations

- Cooling techniques.
- Troubleshooting actual failure versus faulty gauge.
- Selecting the closest suitable airport or landing site.
- Reasons for partial or complete loss of oil pressure.

Execution

1. Mixture – RICH
2. Throttle – REDUCE
3. Oil Pressure Gauge – CHECK
4. Oil Temperature – CHECK
5. Prepare for a power-off landing - High engine oil temperature due to the loss of oil may cause the engine to stop suddenly. Maintain altitude until such time as a power-off landing is possible, should it be necessary. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available.

5.23 ABNORMAL PROCEDURE: Engine Roughness

Indications/Recognition

- A loss in engine RPM.

Teaching Considerations

- Selecting the closest suitable airport or landing site.
- The effect of atmospheric conditions on engine performance.

Execution

1. Mixture – Adjust for Maximum Smoothness
2. FUEL PUMP Switch - ON
3. FUEL SHUTOFF Valve – ON
4. Fuel Selector Valve – SWITCH TANKS
5. Engine Gauges – CHECK
6. MAGNETOS Switch – L then R then Both (If operation is satisfactory on either magneto, proceed on that magneto at reduced power with mixture full rich to the nearest airport.)
7. If roughness persists – Prepare to complete Engine Failure – Inflight checklist

5.24 ABNORMAL PROCEDURE: Open Door

Indications/Recognition

- In-flight, a noise or breeze coming from the sides of the cockpit and visually determining the door latch is not engaged. This usually happens shortly after takeoff.

Teaching Considerations

- Normally, open doors occur right after takeoff.
- If the door cannot be latched, find the nearest airport and land, latch the door and continue the flight.
- Fly the aircraft first.
 - A partially open door does not affect normal flight characteristics.
 - A normal landing can be made with the door open.
- Latch cabin doors is an item on both the Before Start and the Before Takeoff Checklists.
- Maintain situational awareness while attempting to latch the door.

Execution

1. Airspeed – REDUCE
2. Cabin Vents – CLOSE
3. Window – OPEN
4. Side Latch (If Open) – Pull on armrest and move latch handle to latched position.

5.25 ABNORMAL PROCEDURE: Pitot/Static Blockages

Indications/Recognition

- The pitot/static instruments read incorrectly, seem frozen, or fall to zero.

Teaching Considerations

- Errors that occur when using an alternate static source.
- Partial panel operations.
- Effects on instrument indications.

Execution

1. PITOT HEAT Switch – ON
2. ALT STATIC AIR Valve – OPEN
3. Cabin Vents – CLOSED
4. CABIN HT/Air Control Knobs – ON (pull full out)
5. Flight Instruments – Scan/Monitor
6. Airspeed – Refer to POH - Airspeed Calibration, Alternate Static Source correction chart.

5.26 ABNORMAL PROCEDURE: Loss of Communications

Indications/Recognition

- Failure to communicate through the radio with outside sources.

Teaching Considerations

- Lost communications during VFR/IFR conditions.
- Alternate courses of action.
- Attempting to use different frequencies.
- Faulty push-to-talk switch: Trying the button on the other control wheel.
- Setting audio panel to speaker.
- Use of the hand-held mic.

Execution

1. Radios – Switch
2. Circuit Breakers – Check (If a breaker has popped, do not reset)
3. Volume – Check
4. Transponder – Squawk 7600
5. Proceed as required for VFR or IFR conditions.
6. Additional troubleshooting:
 - a. Attempt to use different frequencies.
 - b. Faulty push-to-talk switch; try the button on the other control wheel.
 - c. Set audio panel to speaker.
 - d. Use the hand-held mic.
 - e. Use your cell phone, if available.

5.27 Emergency Equipment and Survival Gear

Objective

- To develop the pilot's knowledge of the elements related to emergency equipment and survival gear appropriate to the aircraft and environment encountered during the flight.

Description

- This section outlines the available emergency equipment and survival gear located in the Cessna 172.

Teaching Considerations

- Additional personal gear. (i.e., cell phone, credit card)
- Required winter clothing.
- Survival Kit
- Emergency Locator Transmitter (ELT)

6 . EMERGENCY OPERATIONS – C172 G1000

Objective

To develop the pilot's knowledge of the elements related to emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Cessna 172. The pilot should be able to analyze various situations and take appropriate action for simulated emergencies and malfunctions in which they may encounter.

Description

This chapter outlines and explains in detail the various emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Cessna 172.

Checklist Usage

- There are two checklists for the aircraft: a laminated Quick Reference checklist and a manufacturer's checklist containing amplified procedures.
- The boxed Emergency Procedures items in Quick Reference checklist and the bold items in the manufacturer's checklist are to be committed to memory. However, once the items have been completed, the checklist should be referenced to ensure proper completion.
- Some procedures in the Quick Reference checklist may continue with amplified procedures in the manufacturer's checklist and shall be referenced as directed, provided time and altitude permit.

Suitable Landing Areas

Certain checklist procedures direct the pilot to divert to another airport. In these cases the checklist will state 'Nearest Suitable Airport' or 'Land As Soon As Possible'. The pilot must exercise good judgment in these situations considering external factors such as terrain, airspace, weather, personal limitations, etc. The intent of these terms are:

Nearest Suitable Airport – An airport within reasonable distance and adequate facilities to complete repairs. Preferably one with a Cessna Service Center that has adequate inventory and expertise.

Land As Soon As Possible – Nearest suitable landing area, preferably an airport, but possibly a road, field or lake of adequate length and without obstructions permitting a normal approach and safe landing.

References

Airplane Flying Handbook

Cessna Model 172 Nav III Pilot's Operating Handbook

Cessna 172 Checklist – Emergency Procedures

6.1 EMERGENCY PROCEDURE: Emergency Approach and Landing

Objective

The objective of a simulated emergency landing is to develop the pilot's accuracy, judgment, planning, procedures, and confidence when little or no power is available.

Description

The airplane is flown from the point of simulated engine failure to where a safe landing could be made utilizing proper emergency cockpit procedures.

Teaching Considerations

- Stall and spin awareness.
- Best glide and configuration.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Wind effect on glide distance.
- Assessing priorities and division of attention.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.

Set-up

- Establish and maintain best glide airspeed, with the appropriate configuration for the simulated emergency.
- Trim the airplane to maintain best glide airspeed.
- Select a suitable landing area within gliding distance.

Execution

- Plan and follow a flight pattern to the selected landing area while considering altitude, wind, terrain, obstructions, and other factors.
- Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
- Follow the appropriate Emergency Checklist.
- Maintain positive control of the airplane.
- Fly the approach as close to a normal power-off 180° approach as possible.

Recovery

- Conduct a normal go-around procedure.
- Recoveries must be made no lower than 1,000 feet AGL unless a stabilized approach and landing can be made at an approved airport.
- Approach and landings at an approved airport during this maneuver can only be attempted on dual flights.

6.2 EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll

Indications/Recognition

A loss of power, annunciator illumination, or any abnormality before rotation constitutes a reason for a rejected Takeoff.

Teaching Considerations

- If simulating this emergency, it must be performed within the first 1/3 of the runway.

Execution

- 1. Throttle Control - IDLE (pull full out)**
- 2. Brakes - APPLY**
3. Wing Flaps - RETRACT
4. Mixture Control - IDLE CUTOFF (pull full out)
5. MAGNETOS Switch - OFF
7. STBY BATT Switch - OFF
8. MASTER Switch (ALT and BAT) – OFF

6.3 EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff

Indications/Recognition

A loss of power, annunciator illumination, or any abnormality after rotation constitutes an engine failure immediately after takeoff.

Teaching Considerations

- Stall/spin awareness.
- Selecting a safe landing site.
- The use and completion of appropriate Emergency Checklists.

Execution

- 1. Airspeed - 70 KIAS - Flaps UP**
65 KIAS - Flaps 10° - FULL
2. Mixture Control - IDLE CUTOFF (pull full out)
3. FUEL SHUTOFF Valve - OFF (pull full out)
4. MAGNETOS Switch - OFF
5. Wing Flaps - AS REQUIRED (FULL recommended)
7. STBY BATT Switch - OFF
8. MASTER Switch (ALT and BAT) - OFF
9. Cabin Door - UNLATCH
10. Land - STRAIGHT AHEAD

6.4 EMERGENCY PROCEDURE: Engine Failure – In Flight

Indications/Recognition

A loss of power, engine roughness, and/or abnormal engine instrument readings could lead to an engine failure in cruise flight.

Teaching Considerations

- If the engine failure was caused by water in the fuel, it will take a short period of time to be used up. Fuel flow pressure indications will be normal.
- Maintain positive aircraft control and situational awareness throughout the emergency.
- The use and completion of appropriate Emergency Checklists.

Execution

1. **Airspeed - 68 KIAS (best glide speed)**
2. **FUEL SHUTOFF Valve - ON (push full in)**
3. **FUEL SELECTOR Valve - BOTH**
4. **FUEL PUMP Switch - ON**
5. **Mixture Control - RICH (if restart has not occurred)**
6. **MAGNETOS Switch - BOTH (or START if propeller is stopped)**

NOTE: If the propeller is windmilling, engine will restart automatically within a few seconds. If propeller has stopped (possible at low speeds), turn MAGNETOS switch to START, advance throttle slowly from idle and lean the mixture from full rich as required to obtain smooth operation.

7. **FUEL PUMP Switch - OFF**

NOTE: If the indicated fuel flow (FFLOW GPH) immediately drops to zero, a sign of failure of the engine-driven fuel pump, return the FUEL PUMP switch to the ON position

6.5 EMERGENCY PROCEDURE: Emergency Landing Without Engine Power

Objective

This procedure is appropriate if power is not restored after an engine failure in flight.

Teaching Considerations

- Undershooting and overshooting the selected emergency landing area.
- Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
- The use and completion of appropriate Emergency Checklists.

Execution

1. Pilot and Passenger Seat Backs - MOST UPRIGHT POSITION
2. Seats and Seat Belts - SECURE
3. Airspeed - 70 KIAS - Flaps UP
65 KIAS - Flaps 10° - FULL
4. Mixture Control - IDLE CUTOFF (pull full out)
5. FUEL SHUTOFF Valve - OFF (pull full out)
6. MAGNETOS Switch - OFF
7. Wing Flaps - AS REQUIRED (FULL recommended)
8. STBY BATT Switch - OFF
9. MASTER Switch (ALT and BAT) - OFF (when landing is assured)
10. Doors - UNLATCH PRIOR TO TOUCHDOWN
11. Touchdown - SLIGHTLY TAIL LOW
12. Brakes - APPLY HEAVILY

6.6 EMERGENCY PROCEDURE: Precautionary Landing with Engine Power

Objective

This procedure is appropriate when landing off airport, with the engine still producing power.

Teaching Considerations

- Understanding of when a precautionary landing may be necessary.
- Stall and spin awareness.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Assessing priorities and division of attention.

Execution

1. Pilot and Passenger Seat Backs - MOST UPRIGHT POSITION
2. Seats and Seat Belts - SECURE
3. Airspeed - 65 KIAS
4. Wing Flaps - 20°
5. Selected Field - FLY OVER (noting terrain and obstructions)
6. Wing Flaps - FULL (on final approach)
7. Airspeed - 65 KIAS
8. STBY BATT Switch - OFF
9. MASTER Switch (ALT and BAT) - OFF (when landing assured)
10. Doors - UNLATCH PRIOR TO TOUCHDOWN
11. Touchdown - SLIGHTLY TAIL LOW
12. Mixture Control - IDLE CUTOFF (pull full out)
13. MAGNETOS Switch - OFF
14. Brakes - APPLY HEAVILY

6.7 EMERGENCY PROCEDURE: Ditching

Objective

This procedure is appropriate if an emergency water landing is necessary.

Teaching Considerations

- Use of personal flotation devices and life rafts.
- Emergency egress procedures in case the aircraft capsizes inverted.
- The necessity of touching down at the established rate of descent and not in a landing flare.

Execution

1. Radio - TRANSMIT MAYDAY on 121.5 MHz, (give location, intentions and SQUAWK 7700)
2. Heavy Objects (in baggage area) - SECURE OR JETTISON (if possible)
3. Pilot and Passenger Seat Backs - MOST UPRIGHT POSITION
4. Seats and Seat Belts - SECURE
5. Wing Flaps - 20° - FULL
6. Power - ESTABLISH 300 FT/MIN DESCENT AT 55 KIAS

NOTE: If no power is available, approach at 70 KIAS with Flaps UP or at 65 KIAS with Flaps 10°.

7. Approach - High Winds, Heavy Seas - INTO THE WIND
Light Winds, Heavy Swells - PARALLEL TO SWELLS
8. Cabin Doors - UNLATCH
9. Touchdown - LEVEL ATTITUDE AT ESTABLISHED RATE OF DESCENT
10. Face - CUSHION AT TOUCHDOWN (with folded coat)
11. ELT - ACTIVATE
12. Airplane - EVACUATE THROUGH CABIN DOORS

NOTE: If necessary, open window and flood cabin to equalize pressure so doors can be opened.

13. Life Vests and Raft - INFLATE WHEN CLEAR OF AIRPLANE

6.8 EMERGENCY PROCEDURE: Engine Fire – During Start on Ground

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Proper priming technique.
- Proper starting technique.
- Determining electrical vs. engine fire.

Execution

1. MAGNETOS Switch - START (continue cranking to start the engine)

IF ENGINE STARTS

2. Power - 1800 RPM (for a few minutes)
3. Engine - SHUTDOWN (inspect for damage)

IF ENGINE FAILS TO START

2. Throttle Control - FULL (push full in)
3. Mixture Control - IDLE CUTOFF (pull full out)
4. MAGNETOS Switch - START (continue cranking)
5. FUEL SHUTOFF Valve - OFF (pull full out)
6. FUEL PUMP Switch - OFF
7. MAGNETOS Switch - OFF
8. STBY BATT Switch - OFF
9. MASTER Switch (ALT and BAT) - OFF
10. Engine - SECURE
11. Parking Brake - RELEASE
12. Fire Extinguisher - OBTAIN (have ground attendants obtain if not installed)
13. Airplane - EVACUATE
14. Fire - EXTINGUISH (using fire extinguisher, wool blanket, or dirt)
15. Fire Damage - INSPECT (repair or replace damaged components and/or wiring before conducting another flight)

6.9 EMERGENCY PROCEDURE: Engine Fire – In Flight

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of nearest suitable airport/emergency landing location.
- Determining electrical vs. engine fire.

Execution

- 1. Mixture Control - IDLE CUTOFF (pull full out)**
- 2. FUEL SHUTOFF Valve - OFF (pull full out)**
- 3. FUEL PUMP Switch - OFF**
- 4. MASTER Switch (ALT and BAT) - OFF**
5. Cabin Vents - OPEN (as needed)
6. CABIN HT and CABIN AIR Control Knobs - OFF (push full in) (to avoid drafts)
7. Airspeed - 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed, within airspeed limitations, which will provide an incombustible mixture)
8. Forced Landing - EXECUTE (refer to EMERGENCY LANDING WITHOUT ENGINE POWER)

6.10 EMERGENCY PROCEDURE: Electrical Fire - In Flight

Indications/Recognition

- Flames or smoke from inside the cabin with smell of burning wire insulation.

Teaching Considerations

- Determining electrical vs. engine fire.
- Use of fire extinguisher inflight (Halon).

Execution

- 1. STBY BATT Switch - OFF**
- 2. MASTER Switch (ALT and BAT) - OFF**
- 3. Cabin Vents - CLOSED (to avoid drafts)**
- 4. CABIN HT and CABIN AIR Control Knobs - OFF (push full in) (to avoid drafts)**
- 5. Fire Extinguisher - ACTIVATE (if available)**
6. AVIONICS Switch (BUS 1 and BUS 2) - OFF
7. All Other Switches (except MAGNETOS switch) - OFF

WARNING: AFTER THE FIRE EXTINGUISHER HAS BEEN USED, MAKE SURE THAT THE FIRE IS EXTINGUISHED BEFORE EXTERIOR AIR IS USED TO REMOVE SMOKE FROM THE CABIN.

8. Cabin Vents - OPEN (when sure that fire is completely extinguished)
9. CABIN HT and CABIN AIR Control Knobs - ON (pull full out) (when sure that fire is completely extinguished)

IF FIRE HAS BEEN EXTINGUISHED AND ELECTRICAL POWER IS NECESSARY FOR CONTINUED FLIGHT TO NEAREST SUITABLE AIRPORT OR LANDING AREA

10. Circuit Breakers - CHECK (for OPEN circuit(s), do not reset)
11. MASTER Switch (ALT and BAT) - ON
12. STBY BATT Switch - ARM
13. AVIONICS Switch (BUS 1) - ON
14. AVIONICS Switch (BUS 2) - ON

6.11 EMERGENCY PROCEDURE: Cabin Fire

Indications/Recognition

- Flames and/or smoke coming from inside the cabin.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Use of fire extinguisher inflight (Halon).

Execution

1. STBY BATT Switch - OFF
2. MASTER Switch (ALT and BAT) - OFF
3. Cabin Vents - CLOSED (to avoid drafts)
4. CABIN HT and CABIN AIR Control Knobs - OFF (push full in) (to avoid drafts)
5. Fire Extinguisher - ACTIVATE (if available)

WARNING: AFTER THE FIRE EXTINGUISHER HAS BEEN USED, MAKE SURE THAT THE FIRE IS EXTINGUISHED BEFORE EXTERIOR AIR IS USED TO REMOVE SMOKE FROM THE CABIN.

6. Cabin Vents - OPEN (when sure that fire is completely extinguished)
7. CABIN HT and CABIN AIR Control Knobs - ON (pull full out) (when sure that fire is completely extinguished)
8. Land the airplane as soon as possible to inspect for damage

6.12 EMERGENCY PROCEDURE: Wing Fire

Indications/Recognition

- Flames and/or smoke coming from the wing.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of the nearest suitable airport/emergency landing location.

Execution

1. LAND and TAXI Light Switches - OFF
2. NAV Light Switch - OFF
3. STROBE Light Switch - OFF
4. PITOT HEAT Switch - OFF

NOTE: Perform a sideslip to keep the flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown

6.13 EMERGENCY PROCEDURE: Inadvertent Icing Encounter During Flight

Indications/Recognition

- Visible ice around windshield, leading edges or wing struts.

Teaching Considerations

- Importance of recognizing and taking immediate action to exit icing conditions.
- Effects of icing on aircraft aerodynamics and engine performance.

Execution

- 1. PITOT HEAT Switch - ON**
- 2. Turn back or change altitude (to obtain an outside air temperature that is less conducive to icing)**
- 3. CABIN HT Control Knob - ON (pull full out)**
- 4. Defroster Control Outlets - OPEN (to obtain maximum windshield defroster airflow)**
- CABIN AIR Control Knob - ADJUST (to obtain maximum defroster heat and airflow)
- Watch for signs of induction air filter icing. A loss of engine RPM could be caused by ice blocking the air intake filter. Adjust the throttle as necessary to hold engine RPM. Adjust mixture as necessary for any change in power settings.
- Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable off airport landing site.
- With an ice accumulation of 0.25 inch or more on the wing leading edges, be prepared for significantly higher power requirements, higher approach and stall speeds, and a longer landing roll.
- Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
- Open left window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
- Perform a landing approach using a forward slip, if necessary, for improved visibility.
- Approach at 65 to 75 KIAS depending upon the amount of ice accumulation.
- Perform landing in level attitude.
- Missed approaches should be avoided whenever possible because of severely reduced climb capability

6.14 EMERGENCY PROCEDURE: Static Source Blockage

Indications/Recognition

- Erroneous instrument readings may or may not be accompanied by equipment failure indications on display.

Teaching Considerations

- Effects of static system blockage on instruments and autopilot.

Execution

1. **ALT STATIC AIR Valve - ON (pull full out)**
2. Cabin Vents - CLOSED
3. CABIN HT and CABIN AIR Control Knobs - ON (pull full out)
4. Airspeed - Refer to Section 5, Figure 5-1 (Sheet 2) Airspeed Calibration, Alternate Static Source correction chart.

6.15 EMERGENCY PROCEDURE: Excessive Fuel Vapor

Indications/Recognition

- Flow indications of 1 GPH or more, or power surges occur.

Teaching Considerations

- Systems description and possible causes.

Execution

1. FUEL PUMP Switch - ON
2. Mixture Control - ADJUST (as necessary for smooth engine operation)
3. Fuel Selector Valve - SELECT OPPOSITE TANK (if vapor symptoms continue)
4. FUEL PUMP Switch - OFF (after fuel flow has stabilized)

6.16 EMERGENCY PROCEDURE: Landing with a Flat Main Tire

Indications/Recognition

- Main tire appears deflated or shredded.

Teaching Considerations

- Importance of maintaining directional control.

Execution

1. Approach - NORMAL
2. Wing Flaps - FULL
3. Touchdown - GOOD MAIN TIRE FIRST (hold airplane off flat tire as long as possible with aileron control)
4. Directional Control - MAINTAIN (using brake on good wheel as required)

6.17 EMERGENCY PROCEDURE: Landing with a Flat Nose Tire

Indications/Recognition

- Nose tire appears deflated or shredded.

Teaching Considerations

- Importance of protecting propeller from ground contact.

Execution

1. Approach - NORMAL
2. Wing Flaps - AS REQUIRED
 - 85 to 110 KIAS - Flaps UP - 10°
 - Below 85 KIAS - Flaps 10° - FULL
3. Touchdown - ON MAINS (hold nosewheel off the ground as long as possible)
4. When nosewheel touches down, maintain full up elevator as airplane slows to stop.

6.18 EMERGENCY PROCEDURE: Over Voltage

Indications/Recognition

- High volts annunciator comes on or M BATT Amps more than 40

Teaching Considerations

- Importance of a proper instrument scan, including engine gauges.
- Possible outcomes of uncorrected over voltage situations.

Execution

1. MASTER Switch (ALT Only) - OFF
2. Electrical Load - REDUCE IMMEDIATELY as follows:
 - a. AVIONICS Switch (BUS 1) - OFF
 - b. PITOT HEAT Switch - OFF
 - c. BEACON Light Switch - OFF
 - d. LAND Light Switch - OFF (use as required for landing)
 - e. TAXI Light Switch - OFF
 - f. NAV Light Switch - OFF
 - g. STROBE Light Switch - OFF
 - h. CABIN PWR 12V Switch – OFF

NOTE: The main battery supplies electrical power to the main and essential buses until M BUS VOLTS decreases below 20 volts. When M BUS VOLTS falls below 20 volts, the standby battery system will automatically supply electrical power to the essential bus for at least 30 minutes.

NOTE: Select COM1 MIC and NAV1 on the audio panel and tune to the active frequency before setting AVIONICS BUS 2 to OFF. If COM2 MIC and NAV2 are selected when AVIONICS BUS 2 is set to OFF, the COM and NAV radios cannot be tuned.

- i. COM1 and NAV1 - TUNE TO ACTIVE FREQUENCY
- j. COM1 MIC and NAV1 - SELECT (COM2 MIC and NAV2 will be inoperative once AVIONICS BUS 2 is selected to OFF)

NOTE: When AVIONICS BUS 2 is set to OFF, the following items will not operate:

Autopilot	Audio Panel
COMM 2	NAV 2
Transponder	MFD

- k. AVIONICS Switch (BUS 2) - OFF (KEEP ON if in clouds)
3. Land as soon as practical.

NOTE: Make sure a successful landing is possible before extending flaps. The flap motor is a large electrical load during operation.

6.19 EMERGENCY PROCEDURE: Under Voltage

Indications/Recognition

- Low Volts annunciator comes on below 1000 RPM

Teaching Considerations

- Importance of a proper instrument scan, including engine gauges.

Execution

1. Throttle Control - 1000 RPM
2. LOW VOLTS Annunciator - CHECK OFF

LOW VOLTS ANNUNCIATOR REMAINS ON AT 1000 RPM:

3. Authorized maintenance personnel must do electrical system inspection prior to next flight.

6.20 EMERGENCY PROCEDURE: Low Voltage

Indications/Recognition

- Low Volts annunciator comes on or does not go out at higher RPM.

Teaching Considerations

- Importance of a proper instrument scan, including engine gauges.
- Possible outcomes of uncorrected low voltage situations.

Execution

1. MASTER Switch (ALT Only) - OFF
2. ALT FIELD Circuit Breaker - CHECK IN
3. MASTER Switch (ALT and BAT) - ON
4. LOW VOLTS Annunciator - CHECK OFF
5. M BUS VOLTS - CHECK 27.5 V (minimum)
6. M BATT AMPS - CHECK CHARGING (+)

IF LOW VOLTS ANNUNCIATOR REMAINS ON

7. MASTER Switch (ALT Only) - OFF
8. Electrical Load - REDUCE IMMEDIATELY as follows:
 - a. AVIONICS Switch (BUS 1) - OFF
 - b. PITOT HEAT Switch - OFF
 - c. BEACON Light Switch - OFF
 - d. LAND Light Switch - OFF (use as required for landing)
 - e. TAXI Light Switch - OFF
 - f. NAV Light Switch - OFF
 - g. STROBE Light Switch - OFF
 - h. CABIN PWR 12V Switch - OFF

NOTE: The main battery supplies electrical power to the main and essential buses until M BUS VOLTS decreases below 20 volts. When M BUS VOLTS falls below 20 volts, the standby battery system will automatically supply electrical power to the essential bus for at least 30 minutes.

NOTE: Select COM1 MIC and NAV1 on the audio panel and tune to the active frequency before setting AVIONICS BUS 2 to OFF. If COM2 MIC and NAV2 are selected when AVIONICS BUS 2 is set to OFF, the COM and NAV radios cannot be tuned.

- i. COM1 and NAV1 - TUNE TO ACTIVE FREQUENCY
- j. COM1 MIC and NAV1 - SELECT (COM2 MIC and NAV2 will be inoperative once AVIONICS BUS 2 is selected to OFF)

NOTE: When AVIONICS BUS 2 is set to OFF, the following items will not operate:

Autopilot	Audio Panel
COMM 2	NAV 2
Transponder	MFD

- k. AVIONICS Switch (BUS 2) - OFF (KEEP ON if in clouds)
9. Land as soon as practical.

NOTE: Make sure a successful landing is possible before extending flaps. The flap motor is a large electrical load during operation

6.21 EMERGENCY PROCEDURE: Air Data System Failure

Indications/Recognition

- RED X on airspeed and/or altitude indicators.

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.
- Importance of maintaining partial panel proficiency.

Execution

RED X - PFD AIRSPEED INDICATOR

1. ADC/AHRS Circuit Breakers - CHECK IN (ESS BUS and AVN BUS 1). If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.
2. Standby Airspeed Indicator - USE FOR AIRSPEED INFORMATION

RED X - PFD ALTITUDE INDICATOR

1. ADC/AHRS Circuit Breakers - CHECK IN (ESS BUS and AVN BUS 1). If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.
2. Standby Altimeter - CHECK current barometric pressure SET. USE FOR ALTITUDE INFORMATION.

6.22 EMERGENCY PROCEDURE: Attitude and Heading Reference System Failure

Indications/Recognition

- RED X on attitude and/or horizontal situation indicator (HSI).

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.
- Importance of maintaining partial panel proficiency.

Execution

RED X - PFD ATTITUDE INDICATOR

1. ADC/AHRS Circuit Breakers - CHECK IN (ESS BUS and AVN BUS 1). If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.
2. Standby Attitude Indicator - USE FOR ATTITUDE INFORMATION

RED X - HORIZONTAL SITUATION INDICATOR (HSI)

1. ADC/AHRS Circuit Breakers - CHECK IN (ESS BUS and AVN BUS 1). If open, reset (close) circuit breaker. If circuit breaker opens again, do not reset.
2. Non-Stabilized Magnetic Compass - USE FOR HEADING INFORMATION

6.23 EMERGENCY PROCEDURE: Autopilot or Electric Trim Failure

Indications/Recognition

- AP or PTRM annunciator(s) come on.
- Uncommanded or unresponsive to control inputs.

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.
- Various ways of disconnecting autopilot/trim system.

Execution

1. **Control Wheel - GRASP FIRMLY (regain control of airplane)**
2. **A/P TRIM DISC Button - PRESS and HOLD (throughout recovery)**
3. **Elevator Trim Control - ADJUST MANUALLY (as necessary)**
4. **AUTO PILOT Circuit Breaker - OPEN (pull out)**
5. A/P TRIM DISC Button - RELEASE

WARNING: FOLLOWING AN AUTOPILOT, AUTOTRIM OR MANUAL ELECTRIC TRIM SYSTEM MALFUNCTION, DO NOT ENGAGE THE AUTOPILOT UNTIL THE CAUSE OF THE MALFUNCTION HAS BEEN CORRECTED.

6.24 EMERGENCY PROCEDURE: Display Cooling Advisory

Indications/Recognition

- PFD1 COOLING or MFD1 COOLING annunciator(s) come on.

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.

Execution

1. CABIN HT Control Knob - REDUCE (push in) (minimum preferred)
2. Forward Avionics Fan - CHECK (feel for airflow from screen on glareshield)

IF FORWARD AVIONICS FAN HAS FAILED

3. STBY BATT Switch - OFF (unless needed for emergency power)

IF PFD1 COOLING OR MFD1 COOLING ANNUNCIATOR DOES NOT GO OFF WITHIN 3 MINUTES OR
IF BOTH PFD1 COOLING AND MFD1 COOLING ANNUNCIATORS COME ON

4. STBY BATT Switch - OFF (land as soon as practical)

6.25 EMERGENCY PROCEDURE: Vacuum System Failure

Indications/Recognition

- LOW VACUUM annunciator comes on.

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.

Execution

1. Vacuum Indicator (VAC) - CHECK EIS ENGINE PAGE (make sure vacuum pointer is in green band limits)

CAUTION: IF VACUUM POINTER IS OUT OF THE GREEN BAND DURING FLIGHT OR THE GYRO FLAG IS SHOWN ON THE STANDBY ATTITUDE INDICATOR, THE STANDBY ATTITUDE INDICATOR MUST NOT BE USED FOR ATTITUDE INFORMATION.

6.26 EMERGENCY PROCEDURE: High Carbon Monoxide Level Advisory

Indications/Recognition

- CO LVL HIGH annunciator comes on.

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.

Execution

1. CABIN HT Control Knob - OFF (push full in)
 2. CABIN AIR Control Knob - ON (pull full out)
 3. Cabin Vents - OPEN
 4. Cabin Windows - OPEN (163 KIAS maximum windows open speed)
- CO LVL HIGH ANNUNCIATOR REMAINS ON:
5. Land as soon as practical.

6.27 EMERGENCY PROCEDURE: Emergency Descent

Indications/Recognition

- This procedure may be directed by another checklist or initiated by the pilot to rapidly lose altitude in an emergency situation.

Teaching Considerations

- Aircraft limitations.
- Appropriate recovery altitude for simulated emergency descents.

Execution

1. **Throttle – IDLE**
2. **Mixture – RICH**
3. **Bank – 30° to 45°** (A steep bank greatly decreases the vertical component of lift, allowing the pilot to quickly establish a steep descent angle while maintaining positive load factors (G-forces) on the airplane.)
4. FUEL PUMP Switch – ON
5. Rollout – Upon Obtaining VNO

NOTE: In the event of an engine fire the mixture should be idle/cut-off and the fuel pump turned off.

6.28 EMERGENCY PROCEDURE: Spin Recovery

Indications/Recognition

- Stalled condition.
- One wing often drops, then the nose yaws in the direction of the low wing.
- Rolling about longitudinal axis.

Teaching Considerations

- Different phases of a spin.
- CG location.
- Overstressing the aircraft.
- Spin aerodynamics.
- Flight situations where unintentional spins may occur.

Execution

- 1. Throttle – IDLE**
- 2. Ailerons – NEUTRAL**
- 3. Rudder – FULL OPPOSITE THE DIRECTION OF ROTATION**
- 4. Control Wheel – BRISKLY FORWARD**

When Rotation Stops:

- 5. Rudder – NEUTRAL**
- 6. Control Wheel – RECOVER FROM DIVE**
- 7. Throttle – RESUME NORMAL FLIGHT**

NOTE: If the rate of the spin makes determining the direction of rotation difficult, the magenta turn rate indicator at the top of the HSI compass card will show the rate and direction of the turn. The HSI compass card will rotate in the opposite direction. Hold opposite rudder to the turn vector direction.

6.29 ABNORMAL PROCEDURE: Low Oil Pressure

Indications/Recognition

- Low reading of oil pressure.
- Oil pressure annunciator may be illuminated.
- High oil temperature reading.

Teaching Considerations

- Reasons for partial or complete loss of oil pressure.
- Troubleshooting actual failure versus faulty gauge.
- Selecting the closest suitable airport or landing site.

Execution

1. Annunciator – CHECK
2. Oil Pressure – CHECK
3. Oil Temperature – CHECK
4. Prepare for a power-off landing – The engine may stop suddenly without engine oil. Maintain altitude until such time as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available.

6.30 ABNORMAL PROCEDURE: High Oil Temperature

Indications/Recognition

- High temperature reading of the oil temperature.
- Low reading on the oil pressure.

Teaching Considerations

- Cooling techniques.
- Troubleshooting actual failure versus faulty gauge.
- Selecting the closest suitable airport or landing site.
- Reasons for partial or complete loss of oil pressure.

Execution

1. Mixture – RICH
2. Throttle – REDUCE
3. Oil Pressure Gauge – CHECK
4. Oil Temperature – CHECK
5. Prepare for a power-off landing - High engine oil temperature due to the loss of oil may cause the engine to stop suddenly. Maintain altitude until such time as a power-off landing is possible, should it be necessary. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available.

6.31 ABNORMAL PROCEDURE: Engine Roughness

Indications/Recognition

- A loss in engine RPM.

Teaching Considerations

- Selecting the closest suitable airport or landing site.
- The effect of atmospheric conditions on engine performance.

Execution

1. Mixture – Adjust for Maximum Smoothness
2. FUEL PUMP Switch - ON
3. FUEL SHUTOFF Valve – ON
4. Fuel Selector Valve – SWITCH TANKS
5. Engine Gauges – CHECK
6. MAGNETOS Switch – L then R then Both (If operation is satisfactory on either magneto, proceed on that magneto at reduced power with mixture full rich to the nearest airport.)
7. If roughness persists – Prepare to complete Engine Failure – Inflight checklist

6.32 ABNORMAL PROCEDURE: Open Door

Indications/Recognition

- In-flight, a noise or breeze coming from the sides of the cockpit and visually determining the door latch is not engaged. This usually happens shortly after takeoff.

Teaching Considerations

- Normally, open doors occur right after takeoff.
- If the door cannot be latched, find the nearest airport and land, latch the door and continue the flight.
- Fly the aircraft first.
 - A partially open door does not affect normal flight characteristics.
 - A normal landing can be made with the door open.
- Latch cabin doors is an item on both the Before Start and the Before Takeoff Checklists.
- Maintain situational awareness while attempting to latch the door.

Execution

1. Airspeed – REDUCE
2. Cabin Vents – CLOSE
3. Window – OPEN
4. Side Latch (If Open) – Pull on armrest and move latch handle to latched position.

6.33 ABNORMAL PROCEDURE: Loss of Communications

Indications/Recognition

- Failure to communicate through the radio with outside sources.

Teaching Considerations

- Lost communications during VFR/IFR conditions.
- Alternate courses of action.
- Attempting to use different frequencies.
- Faulty push-to-talk switch: Trying the button on the other control wheel.
- Setting audio panel to speaker.
- Use of the hand-held mic.

Execution

1. Radios – Switch
2. Circuit Breakers – Check (If a breaker has popped, do not reset)
3. Volume – Check
4. Transponder – Squawk 7600
5. Proceed as required for VFR or IFR conditions.
6. Additional troubleshooting:
 - a. Attempt to use different frequencies.
 - b. Faulty push-to-talk switch; try the button on the other control wheel.
 - c. Set audio panel to speaker.
 - d. Use the hand-held mic.
 - e. Use your cell phone, if available.

6.34 Emergency Equipment and Survival Gear

Objective

To develop the pilot's knowledge of the elements related to emergency equipment and survival gear appropriate to the aircraft and environment encountered during the flight.

Description

This section outlines the available emergency equipment and survival gear located in the Cessna 152/172.

Teaching Considerations

- Additional personal gear. (i.e., cell phone, credit card)
- Required winter clothing.
- Survival Kit
- Emergency Locator Transmitter (ELT)

7 . EMERGENCY OPERATIONS – PA-28RT

Objective

To develop the pilot's knowledge of the elements related to emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Pipe Arrow. The pilot should be able to analyze various situations and take appropriate action for simulated emergencies and malfunctions in which they may encounter.

Description

This chapter outlines and explains in detail the various emergencies, abnormal procedures, system and equipment malfunctions appropriate to the Piper Arrow.

Checklist Usage

- There are two checklists for the aircraft: a laminated Quick Reference checklist and a manufacturer's checklist containing amplified procedures.
- The boxed Emergency Procedures items in Quick Reference checklist and the bold items in the manufacturer's checklist are to be committed to memory. However, once the items have been completed, the checklist should be referenced to ensure proper completion.
- Some procedures in the Quick Reference checklist may continue with amplified procedures in the manufacturer's checklist and shall be referenced as directed, provided time and altitude permit.

Suitable Landing Areas

Certain checklist procedures direct the pilot to divert to another airport. In these cases the checklist will state 'Nearest Suitable Airport' or 'Land As Soon As Possible'. The pilot must exercise good judgment in these situations considering external factors such as terrain, airspace, weather, personal limitations, etc. The intent of these terms are:

Nearest Suitable Airport – An airport within reasonable distance and adequate facilities to complete repairs. Preferably one with a Piper Service Center that has adequate inventory and expertise.

Land As Soon As Possible – Nearest suitable landing area, preferably an airport, but possibly a road, field or lake of adequate length and without obstructions permitting a normal approach and safe landing.

References

Airplane Flying Handbook

Piper Model PA-28RT Pilot's Operating Handbook

Piper Arrow Checklist – Emergency Procedures

7.1 EMERGENCY PROCEDURE: Emergency Approach and Landing

Objective

The objective of a simulated emergency landing is to develop the pilot's accuracy, judgment, planning, procedures, and confidence when little or no power is available.

Description

The airplane is flown from the point of simulated engine failure to where a safe landing could be made utilizing proper emergency cockpit procedures.

Teaching Considerations

- Stall and spin awareness.
- Best glide and configuration.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Wind effect on glide distance.
- Assessing priorities and division of attention.
- Common errors as per the Airplane Flying Handbook and the CFI PTS.

Set-up

- Establish and maintain best glide airspeed, with the appropriate configuration for the simulated emergency.
- Trim the airplane to maintain best glide airspeed.
- Select a suitable landing area within gliding distance.

Execution

1. Plan and follow a flight pattern to the selected landing area while considering altitude, wind, terrain, obstructions, and other factors.
2. Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
3. Follow the appropriate Emergency Checklist.
4. Maintain positive control of the airplane.
5. Fly the approach as close to a normal power-off 180° approach as possible.

Recovery

- Conduct a normal go-around procedure.
- Recoveries must be made no lower than 1,000 feet AGL unless a stabilized approach and landing can be made at an approved airport.
- Approach and landings at an approved airport during this maneuver can only be attempted on dual flights.

7.2 EMERGENCY PROCEDURE: Engine Failure - During Takeoff Roll

Indications/Recognition

A loss of power, annunciator illumination, or any abnormality before rotation constitutes a reason for a rejected takeoff.

Teaching Considerations

- If simulating this emergency, it must be performed within the first 1/3 of the runway.

Execution

- 1. Throttle Control - IDLE**
- 2. Brakes - APPLY**
3. Wing Flaps – RETRACT
4. Radio – Advise tower or CTAF

If indication of fire:

5. Mixture Control - IDLE CUTOFF
6. MAGNETOS Switch – OFF
7. MASTER Switch (ALT and BAT) – OFF

7.3 EMERGENCY PROCEDURE: Engine Failure - Immediately After Takeoff

Indications/Recognition

A loss of power, annunciator illumination, or any abnormality after rotation constitutes an engine failure immediately after takeoff.

Teaching Considerations

- Stall/spin awareness.
- Selecting a safe landing site.
- The use and completion of appropriate Emergency Checklists.

Execution

- 1. Airspeed - 79 KIAS - Flaps UP**
72 KIAS - (when landing can be made)
- 2. Landing Gear Selector – Down**
3. Throttle – IDLE
4. Mixture Control - IDLE CUTOFF
5. Ignition – OFF
6. Master Switch – OFF
7. Fuel Selector – OFF
8. Seat Belt – Secure

7.4 EMERGENCY PROCEDURE: Engine Power Loss – In Flight

Indications/Recognition

A loss of power, engine roughness, and/or abnormal engine instrument readings could lead to an engine failure in cruise flight.

Teaching Considerations

- If the engine failure was caused by water in the fuel, it will take a short period of time to be used up. Fuel flow pressure indications will be normal.
- Maintain positive aircraft control and situational awareness throughout the emergency.
- The use and completion of appropriate Emergency Checklists.

Execution

1. **Airspeed - 79 KIAS (best glide speed)**
2. **FUEL Selector Valve - Switch (tank containing fuel)**
3. **Electronic Fuel Pump - ON**
4. **Mixture Control - RICH (if restart has not occurred)**
5. **Alternate Air – Open**
6. **MAGNETOS Switch – “L” THEN “R” THEN “BOTH” (or START if propeller is stopped)**

NOTE: If the propeller is windmilling, engine will restart automatically within a few seconds. If propeller has stopped (possible at low speeds), turn MAGNETOS switch to START, advance throttle slowly from idle and lean the mixture from full rich as required to obtain smooth operation.

7. **FUEL PUMP Switch – OFF**

NOTE: If the indicated fuel flow (FFLOW GPH) immediately drops to zero, a sign of failure of the engine-driven fuel pump, return the FUEL PUMP switch to the ON position

8. **Alternate Air – Closed**

7.5 EMERGENCY PROCEDURE: Emergency Landing Without Engine Power

Objective

This procedure is appropriate if power is not restored after an engine failure inflight.

Teaching Considerations

- Undershooting and overshooting the selected emergency landing area.
- Plan the approach to arrive at the downwind position abeam the selected landing area at 1,000 feet AGL.
- The use and completion of appropriate Emergency Checklists.

Execution

1. **Emergency Gear Lever – OVERRIDE ENGAGE (above 105 KIAS)**
2. **Seats and Seat Belts - SECURE**
3. **Airspeed - 79 KIAS - Flaps UP**
77 KIAS - Flaps 10° - FULL
4. **Propeller Control – Full Decrease**
5. **Throttle – Closed**
6. Master Switch – OFF
7. Ignition Switches – OFF
8. Flaps – As Desired
9. Fuel Selector Valve – OFF
10. Mixture – Idle Cut Off
11. Touchdown – LOWEST POSSIBLE AIRSPEED

7.6 EMERGENCY PROCEDURE: Precautionary Landing with Engine Power

Objective

This procedure is appropriate when landing off airport, with the engine still producing power.

Teaching Considerations

- Understanding of when a precautionary landing may be necessary.
- Stall and spin awareness.
- Selecting a suitable landing area.
- Establishing a stabilized approach.
- The use and completion of appropriate Emergency Checklists.
- Assessing priorities and division of attention.

Execution

1. **Pilot and Passenger Seat Backs - MOST UPRIGHT POSITION**
2. **Seats and Seat Belts - SECURE**
3. **Airspeed - 79 KIAS**
4. **Selected Field - FLY OVER (noting terrain and obstructions)**
5. **Wing Flaps - FULL (on final approach)**
6. **Airspeed - 77 KIAS**
7. **Master Switch (ALT and BAT) - OFF (when landing assured)**
8. **Doors - UNLATCH PRIOR TO TOUCHDOWN**
9. **Touchdown – LOWEST POSSIBLE AIRSPEED**
15. Mixture Control - IDLE CUTOFF (pull full out)
16. Fuel Selector Valve - OFF
17. Magnetos Switch - OFF
18. Brakes – Apply Brakes Heavily

7.7 EMERGENCY PROCEDURE: Ditching

Objective

This procedure is appropriate if an emergency water landing is necessary.

Teaching Considerations

- Use of personal flotation devices and life rafts.
- Emergency egress procedures in case the aircraft capsizes inverted.
- The necessity of touching down at the established rate of descent and not in a landing flare.

Execution

1. Radio - TRANSMIT MAYDAY on 121.5 MHz, (give location, intentions and SQUAWK 7700)
2. Heavy Objects (in baggage area) - SECURE OR JETTISON (if possible)
3. Pilot and Passenger Seat Backs - MOST UPRIGHT POSITION
4. Seats and Seat Belts - SECURE
5. Wing Flaps - 20° - FULL
6. Landing Gear - UP
7. Power - ESTABLISH 300 FT/MIN DESCENT AT 72 KIAS

NOTE: If no power is available, approach at 79 KIAS with Flaps UP or at 65 KIAS with Flaps 10°.

8. Approach - High Winds, Heavy Seas - INTO THE WIND
Light Winds, Heavy Swells - PARALLEL TO SWELLS
9. Cabin Doors - UNLATCH
10. Touchdown - LEVEL ATTITUDE AT ESTABLISHED RATE OF DESCENT
11. Face - CUSHION AT TOUCHDOWN (with folded coat)
12. ELT - ACTIVATE
13. Airplane - EVACUATE THROUGH CABIN DOORS

NOTE: If necessary, open window and flood cabin to equalize pressure so doors can be opened.

14. Life Vests and Raft - INFLATE WHEN CLEAR OF AIRPLANE

7.8 EMERGENCY PROCEDURE: Engine Fire – During Start on Ground

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Proper priming technique.
- Proper starting technique.
- Determining electrical vs. engine fire.

Execution

1. MAGNETOS Switch - START (continue cranking to start the engine)

IF ENGINE STARTS

2. Power - 1800 RPM (for a few minutes)
3. Engine - SHUTDOWN (inspect for damage)

IF ENGINE FAILS TO START

4. Mixture Control - IDLE CUTOFF (pull full out)
5. Throttle Control - FULL (push full in)
6. Magnetos Switch - START (continue cranking)

IF FIRE CONTINUES FOR MORE THAN A FEW SECONDS

7. Fuel Selector Valve – OFF
8. Fuel Pump Switch - OFF
9. Magnetos Switch - OFF
10. Master Switch (ALT and BAT) - OFF
11. Engine - SECURE
12. Parking Brake - RELEASE
13. Fire Extinguisher - OBTAIN (have ground attendants obtain if not installed)
14. Airplane - EVACUATE
15. Fire - EXTINGUISH (using fire extinguisher, wool blanket, or dirt)
16. Fire Damage - INSPECT (repair or replace damaged components and/or wiring before conducting another flight)

7.9 EMERGENCY PROCEDURE: Engine Fire – In Flight

Indications/Recognition

- Flames and smoke coming from the engine cowl.
- Heat and the smell of smoke in the cockpit.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of nearest suitable airport/emergency landing location.
- Determining electrical vs. engine fire.

Execution

- 1. Fuel Selector Valve - OFF**
- 2. Throttle – CLOSED**
- 3. Mixture – IDLE CUT - OFF**
- 4. Fuel Pump Switch – OFF**
- 5. Heater and Defroster – OFF**
- 4. MASTER Switch (ALT and BAT) - OFF**
- Cabin Vents - OPEN (as needed)
- Airspeed - 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed, within airspeed limitations, which will provide an incombustible mixture)
- Forced Landing - EXECUTE (refer to EMERGENCY LANDING WITHOUT ENGINE POWER)

7.10 EMERGENCY PROCEDURE: Electrical Fire - In Flight

Indications/Recognition

- Flames or smoke from inside the cabin with smell of burning wire insulation.

Teaching Considerations

- Determining electrical vs. engine fire.
- Use of fire extinguisher inflight (Halon).

Execution

- 1. MASTER Switch (ALT and BAT) - OFF**
- 2. Cabin Vents - OPEN**
- 3. Heater and Defroster – OFF**
- 4. Fire Extinguisher - ACTIVATE (if available)**
5. All Other Switches (except MAGNETOS switch) - OFF

WARNING: AFTER THE FIRE EXTINGUISHER HAS BEEN USED, MAKE SURE THAT THE FIRE IS EXTINGUISHED BEFORE EXTERIOR AIR IS USED TO REMOVE SMOKE FROM THE CABIN.

IF FIRE HAS BEEN EXTINGUISHED AND ELECTRICAL POWER IS NECESSARY FOR CONTINUED FLIGHT TO NEAREST SUITABLE AIRPORT OR LANDING AREA

6. Circuit Breakers - CHECK (for OPEN circuit(s), do not reset)
7. MASTER Switch (ALT and BAT) - ON

7.11 EMERGENCY PROCEDURE: Cabin Fire

Indications/Recognition

- Flames and/or smoke coming from inside the cabin.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Use of fire extinguisher inflight (Halon).

Execution

1. **MASTER Switch (ALT and BAT) - OFF**
2. **Cabin Vents - OPEN**
3. **Heater and Defroster – OFF**
4. **Fire Extinguisher - ACTIVATE (if available)**

WARNING: AFTER THE FIRE EXTINGUISHER HAS BEEN USED, MAKE SURE THAT THE FIRE IS EXTINGUISHED BEFORE EXTERIOR AIR IS USED TO REMOVE SMOKE FROM THE CABIN.

5. Land the airplane as soon as possible to inspect for damage

7.12 EMERGENCY PROCEDURE: Wing Fire

Indications/Recognition

- Flames and/or smoke coming from the wing.

Teaching Considerations

- Procedures for extinguishing a fire during flight.
- Location of the nearest suitable airport/emergency landing location.

Execution

1. **LAND and TAXI Light Switches - OFF**
2. **NAV Light Switch - OFF**
3. **STROBE Light Switch - OFF**
4. **PITOT HEAT Switch - OFF**

NOTE: Perform a sideslip to keep the flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown

7.13 EMERGENCY PROCEDURE: Inadvertent Icing Encounter During Flight

Indications/Recognition

- Visible ice around windshield, or leading edges

Teaching Considerations

- Importance of recognizing and taking immediate action to exit icing conditions.
- Effects of icing on aircraft aerodynamics and engine performance.

Execution

- 1. PITOT HEAT Switch - ON**
- 2. Turn back or change altitude (to obtain an outside air temperature that is less conducive to icing)**
- 3. CABIN HT Control Knob - ON**
- 4. Defroster Control Outlets - OPEN (to obtain maximum windshield defroster airflow)**
- CABIN AIR Control Knob - ADJUST (to obtain maximum defroster heat and airflow)
- Watch for signs of induction air filter icing. A loss of engine RPM could be caused by ice blocking the air intake filter. Adjust the throttle as necessary to hold engine RPM. Adjust mixture as necessary for any change in power settings.

IF RPM LOSS OCCURS

Alternate Air - OPEN

- Plan a landing at the nearest airport. With an extremely rapid ice build-up, select a suitable off airport landing site.
- With an ice accumulation of 0.25 inch or more on the wing leading edges, be prepared for significantly higher power requirements, higher approach and stall speeds, and a longer landing roll.
- Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
- Open left window and, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.
- Perform a landing approach using a forward slip, if necessary, for improved visibility.
- Approach at 75 to 85 KIAS depending upon the amount of ice accumulation.
- Perform landing in level attitude.

Missed approaches should be avoided whenever possible because of severely reduced climb capability

7.14 EMERGENCY PROCEDURE: Static Source Blockage

Indications/Recognition

- Erroneous instrument readings may or may not be accompanied by equipment failure indications on display.

Teaching Considerations

- Effects of static system blockage on instruments and autopilot.

Execution

1. **ALT STATIC AIR Valve - ON (rotate)**
2. Cabin Vents - CLOSED
3. CABIN HT and CABIN AIR Control Knobs - ON (pull full out)

7.15 EMERGENCY PROCEDURE: Excessive Fuel Vapor

Indications/Recognition

- Flow indications of 1 GPH or more, or power surges occur.

Teaching Considerations

- Systems description and possible causes.

Execution

1. FUEL PUMP Switch - ON
2. Mixture Control - ADJUST (as necessary for smooth engine operation)
3. Fuel Selector Valve - SELECT OPPOSITE TANK (if vapor symptoms continue)
4. FUEL PUMP Switch - OFF (after fuel flow has stabilized)

7.16 EMERGENCY PROCEDURE: Landing with a Flat Main Tire

Indications/Recognition

- Main tire appears deflated or shredded.

Teaching Considerations

- Importance of maintaining directional control.

Execution

1. Approach - NORMAL
2. Wing Flaps - FULL
3. Touchdown - GOOD MAIN TIRE FIRST (hold airplane off flat tire as long as possible with aileron control)
4. Directional Control - MAINTAIN (using brake on good wheel as required)

7.17 EMERGENCY PROCEDURE: Landing with a Flat Nose Tire

Indications/Recognition

- Nose tire appears deflated or shredded.

Teaching Considerations

- Importance of protecting propeller from ground contact.

Execution

1. Approach - NORMAL
2. Wing Flaps - AS REQUIRED
Below 108 KIAS - Flaps 0° - FULL
3. Touchdown - ON MAINS (hold nosewheel off the ground as long as possible)
4. When nosewheel touches down, maintain full up elevator as airplane slows to stop.

7.18 EMERGENCY PROCEDURE: Emergency Landing Gear Extension

Indications/Recognition

- Gear unsafe light.
- Gear down lights (3 green) not illuminating.

Teaching Considerations

- Importance of gear unsafe recognition.

Execution

1. Master Switch – ON
2. Circuit Breakers – IN
3. Panel Lights – OFF (if daytime)
4. Gear Indicators – CHECK BULBS
5. If gear does not check down, and safe
6. Airspeed – BELOW 87 KIAS
7. Landing Gear Selector – DOWN
8. Emergency Lever – EMERGENCY DOWN POSITION
9. If gear still does not lock down: Yaw plane side to side with rudder. IF nose gear does not lock down, slow airplane to slowest airspeed.

7.19 EMERGENCY PROCEDURE: Propeller Overspeed

Indications/Recognition

- Propeller RPM higher than 2700 RPM.
- Propeller blades rotate to full low pitch

Teaching Considerations

- Importances of a proper instrument scan, including engine gauges.
- Possible outcomes of prop Overspeeding.

Execution

1. Throttle – Retard (If speed and altitude permit)
2. Oil Pressure – Check
3. Propeller Control – Full Decrease RPM
4. Propeller Control – Set RPM (if control is available)
5. Airspeed and throttle – Adjust to maintain 2700 RPM

7.20 EMERGENCY PROCEDURE: Under Voltage

Indications/Recognition

- Low Volts Annunciator comes on below 1000 RPM

Teaching Considerations

- Importance of a proper instrument scan, including engine gauges.

Execution

1. Throttle Control - 1000 RPM
2. LOW VOLTS Annunciator - CHECK OFF

LOW VOLTS ANNUNCIATOR REMAINS ON AT 1000 RPM:

3. Authorized maintenance personnel must do electrical system inspection prior to next flight.

7.21 EMERGENCY PROCEDURE: Low Voltage

Indications/Recognition

- Low Volts Annunciator comes on or does not go out at higher RPM.

Teaching Considerations

- Importance of a proper instrument scan, including engine gauges.
- Possible outcomes of uncorrected low voltage situations.

Execution

1. MASTER Switch (ALT Only) - OFF
2. ALT FIELD Circuit Breaker - CHECK IN
3. MASTER Switch (ALT and BAT) - ON
4. LOW VOLTS Annunciator - CHECK OFF

IF LOW VOLTS ANNUNCIATOR REMAINS ON

5. MASTER Switch (ALT Only) - OFF
 6. Electrical Load - REDUCE IMMEDIATELY as follows:
 - a. PITOT HEAT Switch - OFF
 - b. BEACON Light Switch - OFF
 - c. LAND Light Switch - OFF (use as required for landing)
 - d. TAXI Light Switch - OFF
 - e. NAV Light Switch - OFF
 - f. STROBE Light Switch - OFF
- Transponder MFD

7.22 EMERGENCY PROCEDURE: Spin Recovery

Indications/Recognition

- Uncoordinated Stall

Teaching Considerations

- Dangers of a spin.
- Intentional spins are prohibited.

Execution

1. Rudder – FULL OPPOSITE DIRECTION OF ROTATION
2. Control Wheel – FULL FORWARD
3. Ailerons – NEUTRAL
4. Throttle – IDLE

When rotation stops. Neutralize rudder and ease back on control wheel, regain level flight.

7.23 EMERGENCY PROCEDURE: Open Door In Flight

Indications/Recognition

- Door not latched.
- Door partially open.
- Airspeed slightly lower.

Teaching Considerations

- Importance of flying the airplane
- Keeping calm

Execution

1. Airspeed – 87 KIAS
2. Air Vents – CLOSED
3. Storm Window – OPEN
4. Arm Rest – PULL DOOR CLOSED
5. Lower Latch – LOCK
6. Upper Latch – LOCK

7.24 EMERGENCY PROCEDURE: Autopilot Failure

Indications/Recognition

- Uncommanded or unresponsive to control inputs.

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.
- Various ways of disconnecting autopilot/trim system.

Execution

- 1. Control Wheel - GRASP FIRMLY (regain control of airplane)**
- 2. Interrupt Switch – PUSH**
- 3. Autopilot Master Switch – OFF**
- 4. Control Wheel – OVERRIDE MANUALLY**

WARNING: FOLLOWING AN AUTOPILOT SYSTEM MALFUNCTION, DO NOT ENGAGE THE AUTOPILOT UNTIL THE CAUSE OF THE MALFUNCTION HAS BEEN CORRECTED.

7.25 EMERGENCY PROCEDURE: Loss Of Fuel Pressure

Indications/Recognition

- Fuel Flow Indication Reading Low.
- Power Loss.
- Engine Roughness.
- Fuel Quantity Low.

Teaching Considerations

- Instrument Scan.
- Switching Fuel Tanks.

Execution

1. Fuel Selector Valve – TANK WITH FUEL
2. Electric Fuel Pump – ON
3. Land as soon as possible.

7.26 EMERGENCY PROCEDURE: Vacuum System Failure

Indications/Recognition

- LOW VACUUM annunciator comes on.

Teaching Considerations

- Proper systems knowledge to troubleshoot extent of problem.

Execution

1. Vacuum Indicator (VAC) – 4.8" HG and 5.1" HG

CAUTION: IF VACUUM POINTER IS OUT OF LIMITS DURING FLIGHT OR THE GYRO FLAG IS SHOWN ON THE ATTITUDE INDICATOR, THE ATTITUDE INDICATOR MUST NOT BE USED FOR ATTITUDE INFORMATION.

7.27 EMERGENCY PROCEDURE: Emergency Descent

Indications/Recognition

- This procedure may be directed by another checklist or initiated by the pilot to rapidly lose altitude in an emergency situation.

Teaching Considerations

- Aircraft limitations.
- Appropriate recovery altitude for simulated emergency descents.

Execution

1. **Throttle – IDLE**
2. **Mixture – RICH**
3. **Bank – 30° to 45°** (A steep bank greatly decreases the vertical component of lift, allowing the pilot to quickly establish a steep descent angle while maintaining positive load factors (G-forces) on the airplane.)
4. FUEL PUMP Switch – ON
5. Rollout – Upon Obtaining VNO

NOTE: In the event of an engine fire the mixture should be idle/cut-off and the fuel pump turned off.

7.28 EMERGENCY PROCEDURE: Spin Recovery

Indications/Recognition

- Stalled condition.
- One wing often drops, then the nose yaws in the direction of the low wing.
- Rolling about longitudinal axis.

Teaching Considerations

- Different phases of a spin.
- CG location.
- Overstressing the aircraft.
- Spin aerodynamics.
- Flight situations where unintentional spins may occur.

Execution

- 1. Rudder – FULL OPPOSITE THE DIRECTION OF ROTATION**
- 2. Control Wheel – FULL FORWARD**
- 3. Ailerons – NEUTRAL**
- 4. Throttle – IDLE**

When Rotation Stops:

- 5. Rudder – NEUTRAL**
- 6. Control Wheel – RECOVER FROM DIVE**
- 7. Throttle – RESUME NORMAL FLIGHT**

7.29 ABNORMAL PROCEDURE: Loss Of Oil Pressure

Indications/Recognition

- Low reading of oil pressure.
- Oil pressure annunciator may be illuminated.
- High oil temperature reading.

Teaching Considerations

- Reasons for partial or complete loss of oil pressure.
- Troubleshooting actual failure versus faulty gauge.
- Selecting the closest suitable airport or landing site.

Execution

- 1. Annunciator – CHECK**
- 2. Oil Pressure – CHECK**
- 3. Oil Temperature – CHECK**
- 4. Prepare for a power-off landing – The engine may stop suddenly without engine oil. Maintain altitude until such time as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available.**

7.30 ABNORMAL PROCEDURE: High Oil Temperature

Indications/Recognition

- High temperature reading of the oil temperature.
- Low reading on the oil pressure.

Teaching Considerations

- Cooling techniques.
- Troubleshooting actual failure versus faulty gauge.
- Selecting the closest suitable airport or landing site.
- Reasons for partial or complete loss of oil pressure.

Execution

1. Mixture – RICH
2. Throttle – REDUCE
3. Oil Pressure Gauge – CHECK
4. Oil Temperature – CHECK
5. Prepare for a power-off landing - High engine oil temperature due to the loss of oil may cause the engine to stop suddenly. Maintain altitude until such time as a power-off landing is possible, should it be necessary. Don't change power settings unnecessarily, as this may hasten complete power loss. Depending on the circumstances, it may be advisable to make an off airport landing while power is still available.

7.31 ABNORMAL PROCEDURE: Engine Roughness

Indications/Recognition

- A loss in engine RPM.

Teaching Considerations

- Selecting the closest suitable airport or landing site.
- The effect of atmospheric conditions on engine performance.

Execution

1. Mixture – Adjust for Maximum Smoothness
2. Alternate Air – OPEN
3. FUEL PUMP Switch – ON
4. Fuel Selector Valve – SWITCH TANKS
5. Engine Gauges – CHECK
6. MAGNETOS Switch – L then R then Both (If operation is satisfactory on either magneto, proceed on that magneto at reduced power with mixture full rich to the nearest airport.)
7. If roughness persists – Prepare to complete Engine Failure – Inflight checklist

7.32 ABNORMAL PROCEDURE: Open Door

Indications/Recognition

- In-flight, a noise or breeze coming from the sides of the cockpit and visually determining the door latch is not engaged. This usually happens shortly after takeoff.

Teaching Considerations

- Normally, open doors occur right after takeoff.
- If the door cannot be latched, find the nearest airport and land, latch the door and continue the flight.
- Fly the aircraft first.
 - A partially open door does not affect normal flight characteristics.
 - A normal landing can be made with the door open.
- Latch cabin doors is an item on both the Before Start and the Before Takeoff Checklists.
- Maintain situational awareness while attempting to latch the door.

Execution

1. Airspeed – REDUCE
2. Cabin Vents – CLOSE
3. Side Latch (If Open) – Pull on armrest and move latch handle to latched position.

7.33 ABNORMAL PROCEDURE: Loss of Communications

Indications/Recognition

- Failure to communicate through the radio with outside sources.

Teaching Considerations

- Lost communications during VFR/IFR conditions.
- Alternate courses of action.
- Attempting to use different frequencies.
- Faulty push-to-talk switch: Trying the button on the other control wheel.
- Setting audio panel to speaker.
- Use of the hand-held mic.

Execution

1. Radios – Switch
2. Circuit Breakers – Check (If a breaker has popped, do not reset)
3. Volume – Check
4. Transponder – Squawk 7600
5. Proceed as required for VFR or IFR conditions.
6. Additional troubleshooting:
 - a. Attempt to use different frequencies.
 - b. Faulty push-to-talk switch; try the button on the other control wheel.
 - c. Set audio panel to speaker.
 - d. Use the hand-held mic.
 - e. Use your cell phone, if available.

7.34 Emergency Equipment and Survival Gear

Objective

To develop the pilot's knowledge of the elements related to emergency equipment and survival gear appropriate to the aircraft and environment encountered during the flight.

Description

This section outlines the available emergency equipment and survival gear located in the Piper Arrow.

Teaching Considerations

- Additional personal gear. (i.e., cell phone, credit card)
- Required winter clothing.
- Survival Kit
- Emergency Locator Transmitter (ELT)

8 GLOSSARY OF ABBREVIATIONS AND TERMS

Abeam: An aircraft is "abeam" a fix, point, or object when that fix, point, or object is approximately 90 degrees to the right or left of the aircraft track. Abeam indicates a general position rather than a precise point.

A/FD - Airport/Facilities Directory: An FAA Publication containing information on all airports, communications, and NAVAIDs.

AGL - Above Ground Level: Actual height above the ground.

Aiming Point: During the landing procedure it is the point on the ground at which, if the airplane maintains a constant glidepath and was not flared for landing, it would strike the ground.

Angle of Attack: The acute angle between the chord line of the airfoil and the direction of the relative wind.

CRM - Crew Resource Management: The effective use of all available resources: human resources, hardware, and information. Human resources include all groups routinely working with the cockpit crew or pilot who are involved with decisions that are required to operate a flight safely. These groups include, but are not limited to:

- dispatchers
- cabin crewmembers
- maintenance personnel
- air traffic controllers (ATC)
- weather services

CRM is not a single *task*, but a set of competencies that must be evident in all tasks. The principles of CRM should be applied to all operations regardless of whether tasks are done as a single pilot or as part of a crew.

Dead Reckoning: Navigation solely by means of computations based on the time, airspeed, distance, and direction.

Discrepancy: The term for an inoperative or defective piece of equipment.

DME - Distance Measuring Equipment

ELT - Emergency Locator Transmitter: A small, self-contained radio transmitter that automatically, upon the impact of a crash, transmits an emergency signal on 121.5, 243.0, or 406.0 MHz.

EPU - External Power Unit: An external battery used to crank the engine without having to gain access to the aircraft's battery.

FAF - Final Approach Fix: The fix from which an IFR final approach to an airport is executed, and which identifies the beginning of the final approach segment. An FAF is designated on government charts by the Maltese cross symbol for non-precision approaches, and the lightning bolt symbol for precision approaches.

Flight Controls:

- Ailerons
- Elevator/Stabilator
- Rudders
- Trim
- Flaps

Fuel Pump: An engine driven or electrically powered pump used to supply positive fuel pressure. The electric fuel pump should be turned on before switching tanks, and should be left on for a short period thereafter.

Go-Around Point: The point at which if the aircraft has not touched down under control, a go-around should be executed. **NOTE:** A go-around can be executed at any point during the landing phase as deemed necessary by the PIC.

GPS - Global Positioning System: A satellite-based radio positioning, navigation, and time-transfer system.

IAF - Initial Approach Fix: The fix depicted on Instrument Approach Procedure charts where the Instrument Approach Procedure begins unless otherwise authorized by Air Traffic Control.

Instruments:

- **Flight Instruments:**
 - Airspeed Indicator
 - Attitude Indicator (gyro)
 - Altimeter
 - VSI - Vertical Speed Indicator
 - Heading Indicator (directional gyro)
 - Turn Coordinator and Inclinator (ball)
 - Magnetic Compass
- **Radio Navigation Instruments :**
 - VOR/LOC - VHF Omni-Directional Range/Localizer
 - ADF - Automatic Direction Finder
 - NDB - Non-Directional Radio Beacon
 - GPS - Global Positioning System
- **Engine Instruments:**
 - Tachometer
 - Fuel Quantity
 - Engine Gauge, Oil Temp, Oil and Fuel Pressure

IFR - Instrument Flight Rules: Rules and regulations established by the Federal Aviation Administration to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends on reference to instruments in the cockpit, and navigation by reference to electronic signals.

KIAS - Knots Indicated Airspeed

Land as soon as possible: Land at the nearest available landing site. If no airport is within gliding distance, an off-airport landing should be made.

Land as Soon as Practical: Divert to the nearest suitable airport.

MAP - Missed Approach Point: A point prescribed in each instrument approach at which a missed approach procedure shall be executed if the required visual reference has not been established.

MCA - Minimum Controllable Airspeed: An airspeed at which any further increase in angle of attack, increase in load factor, or reduction of power, would result in an immediate stall.

MDA - Minimum Descent Altitude: The lowest altitude (in feet MSL) to which descent is authorized on final approach, or during circle-to-land maneuvering in execution of a non-precision approach.

MEL - Minimum Equipment List: An inventory of instruments and equipment that may legally be inoperative, with specific conditions under which an aircraft may be flown with such items inoperative.

MFD - Multifunction Display

MSL - Mean Sea Level

MRA - Minimum Recovery Altitude: The lowest altitude expressed in feet (MSL or AGL) to which descent is authorized.

OAT - Outside Air Temperature

PFD - Primary Flight Display

PIC - Pilot in Command: The pilot who has final authority and responsibility for the operation and safety of the flight. They have authority over all decisions, are authorized to take control when they feel it is necessary for safety or instruction, and are responsible for determining safe flight.

Pilotage: Navigation by reference to landmarks or checkpoints.

POH - Pilot's Operating Handbook

PIM - Pilot Information Manual

PTS - Practical Test Standards

Pylons: An identifiable point on the ground marking a prescribed turning point used in some ground reference maneuvers.

Rotation: The act of applying control wheel back pressure to raise the nose-wheel off the ground.

Sink Rate: The rate at which the aircraft is descending.

Slips: An intentional maneuver to decrease airspeed or increase the rate of descent, and to compensate for a crosswind on landing.

Forward Slip: This slip moves sideways, the nose points into the wind, and is used to quickly decrease altitude without increasing airspeed.

Side Slip: This slip moves forward, the nose is aligned with the ground track, and is used to apply a crosswind correction during landing.

Slow Flight: Flight at any airspeed that is less than cruise. The PTS requires demonstration at MCA to feel the effects of airspeeds and configurations found in takeoffs, climbs, descents, etc., at which any increase in angle of attack, load factor, or a reduction in power would result in an immediate stall.

SRM - Single Pilot Resource Management: Single-Pilot Resource Management refers to the effective use of ALL available resources: human resources, hardware, and information. It is similar to Crew Resource Management (CRM) procedures that are being emphasized in multi-crewmember operations except that only one crewmember (the pilot) is involved.

TPA - Traffic Pattern Altitude: The altitude to be flown on the downwind leg of an airport traffic pattern. The AIM recommends adding 1,000 feet AGL to the field elevation, but generally ranges from 600-1,500 feet AGL.

Touchdown Point: The desired point on the runway where the aircraft should touch the ground. This should be a minimum of 200 feet past the threshold and within the first 1/3 of the runway.

VFR - Visual Flight Rules: Flight rules adopted by the FAA governing aircraft using visual references, VFR operations specify the amount of ceiling and the visibility the pilot must have in order to operate according to the rules. When the weather conditions are such that the pilot cannot operate according to VFR, he or she must use instrument flight rules (IFR).

V-Speeds

- VSO - Stalling Speed in landing configuration.
- VS - Stalling Speed at a specified configuration.
- VX - Best Angle-of-Climb Speed. The airspeed that delivers the greatest gain of altitude in the shortest distance.
- VGLIDE - Best Glide Speed.
- VY - Best Rate-of-Climb Speed. The airspeed that delivers the greatest gain in altitude in the shortest possible time.
- VA - Maneuvering Speed. The maximum speed at which full available aerodynamic control will not overstress the airplane.
- VFE - Maximum Flap Extended Speed.
- VNO - Maximum structural cruising speed.
- VNE - Never Exceed Speed.

Wake Turbulence: Wingtip vortices that are created when an airplane generates lift. When an airplane generates lift, air spills over the wingtips from the high pressure areas below the wings to the low pressure areas above them. This flow causes rapidly rotating whirlpools of air called wingtip vortices or wake turbulence.

Wind Shear: A sudden drastic shift in wind speed, direction, or both that may occur in the horizontal or vertical plane.