



GRUMMAN COUGAR TRAINING MANUAL

Long Island Aviators, LLC
8350 Republic Airport
Farmingdale, NY 11735
(631) 465-0588

Sosa, Ed (FAA)
info@longislandaviators.com

Table of Contents

Introduction.....	4
Clearing Turns.....	6
Normal/Crosswind Takeoff	7
Short Field Takeoff	8
Normal/Crosswind Landing.....	9
Short Field Landing.....	10
Go-Around/Rejected Landing.....	11
Emergency Descent.....	12
Steep Turns.....	14
Maneuvering During Slow Flight.....	15
Power On Stall	16
Power Off Stall	17
Accelerated Stalls.....	18
Engine Failure During Takeoff Before V_{MC}	19
Engine Failure After Liftoff (Simulated)	20
Approach & Landing with Inoperative Engine.....	22
Maneuvering with One Inoperative Engine	23
V_{MC} Demonstration.....	24
Drag Demonstration	25
Precision Approach, Single-Engine.....	26
Non-Precision Approach, Single-Engine	27

Introduction

Power Settings

This document is intended to introduce to you the standard method of performing maneuvers in the Grumman American GA-7 Cougar aircraft. Each maneuver has been written to reduce the amount of steps and aid in memorization.

The GA-7 Cougar has five simple initial power settings each pilot should remember. They serve as a reference point to initiate a maneuver. Fine-tuning will be necessary. They are:

	MP	RPM
Climb	25"	2500 or MAX (Not to Exceed Red Line)
Normal Cruise	23"	2300
All-Engine Pattern/Landing	15-17"	2300
Single-Engine Pattern/Landing	18-21"	2500
Sustained Single-Engine	25"	2500

The sustained single-engine power setting is meant to reduce engine wear if practicing single-engine maneuvers and enable you to maintain altitude. If you are unable to maintain altitude at V_{YSE} , use full power and full operating RPM.

While practicing single-engine operations all pilots should monitor engine gauges with increased attention. Consider closing the cowl flap on the inoperative engine and opening the operating engine's cowl flap.

As always, if the approved Airplane Flight Manual and this Maneuvers Checklist disagree, the procedure in the AFM should be followed in the interest of safety.

Landing Speed Considerations

Note that there are slight differences in the speeds in our procedures and those specified in the Pilot's Operating Handbook. Our speeds are slightly higher in order to add a margin of safety should an engine fail while in the landing phase. Accordingly, when calculating landing distances, you should account for the extra speed needed to come to a complete stop.

Single engine landings are to be conducted with no more than 20° of flaps due to drag considerations. Runways less than 4,000' should not be considered for a single engine landing.

Recurrent Training

In addition to basic landing currency requirements, it is highly recommended that multiengine pilots receive regular recurrent training from a qualified multiengine instructor or training firm, at a minimum of twelve month intervals. This training should include instrument procedures, operations with an engine failure under VMC and IMC, and a review of systems and procedures.

CLEARING TURNS

Clearing Turns

Objective:	To visually clear the area surrounding the aircraft so as to not pose a collision hazard to any other traffic.	
ACS	Private Multi Add-On:	None
	Commercial Multi Add-On:	None
	ME Instructor:	None

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed			

PROCEDURE

- 1) Establish power setting for appropriate speed for maneuver to be followed by clearing turns.
- 2) Visually clear the areas to the right, front, left, and behind the aircraft. Also look for traffic above and below your altitude.
- 3) Turn 90° to the left.
- 4) Visually scan the area again.
- 5) Turn 90° to the right.
- 6) Scan the area one last time.
- 7) Announce intentions on Practice Area Advisory Frequency (if applicable).

PRE-MANEUVER CHECKLIST **AND** PATTERN CHECKLIST (DOWNWIND, BASE AND FINAL)

G= GAS

U= UNDERCARRIAGE

M= MIXTURES

P= PROPELLERS

S= SEAT BELTS, LIGHTS AND COWL FLAPS (PILOT'S DISCRETION).

TAKEOFF MANEUVER

Normal/Crosswind Takeoff

Objective:	To depart an airport during normal or crosswind conditions with more than adequate clearance of obstacles on departure.	
ACS	Private Multi Add-On:	V _Y +10/-5 knots
	Commercial Multi Add-On:	V _Y ±5 knots
	ME Instructor:	V _Y ±5 knots

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed		Liftoff: 71 KIAS Climb: 95 KIAS V _Y	
CLIMB	V _Y = 95 KIAS	V _X = 81 KIAS	V _{YSE} = 85 KIAS

PROCEDURE

- 1) Visually scan for traffic on final and down the departure end of runway.
- 2) Taxi into position for takeoff. Position aileron controls for crosswind.
- 3) Smoothly increase throttles to takeoff power while maintaining directional control. If a crosswind exists, it is acceptable to lead slightly with the upwind throttle.
- 4) Scan engine instruments, manifold pressure and tachometers.
- 5) Verify indicated airspeed is functioning.
- 6) Announce "Engine instruments checked, Airspeed alive."
- 7) Maintain enough aileron pressure to keep wings level if a crosswind exists.
- 8) At 71 KIAS, smoothly pitch up to rotate (Approximately 3°/second).
- 9) Establish climb attitude (Approximately 10° up) while accelerating to 95 KIAS (V_Y).
- 10) When established in a climb above 35' (**NO MORE USABLE RWY**), announce "Positive rate (on the altimeter), Gear UP," and retract the landing gear.
- 11) Crab into the wind if necessary.
- 12) At 1000' AGL, Set Climb Power. 25 MP 2500 RPM. If staying in the pattern: Check for traffic and turn crosswind at 300' from TPA. Follow noise abatement procedures if applicable.
- 13) If exiting the pattern: At 1000' AGL turn fuel pumps off one at a time, and complete "Climb" checklist. Accelerate to Cruise Climb (100 KTS).

TAKEOFF MANEUVER

Short Field Takeoff

Objective:	To depart an airport during with obstacles on departure demanding a maximum performance takeoff and climb out.	
ACS	Private Multi Add-On:	V _X +10/-5 knots until clear, then V _Y +10/-5 knots
	Commercial Multi Add-On:	V _X +5/-0 knots until clear, then V _Y ±5 knots
	ME Instructor:	V _X +5/-0 knots until clear, then V _Y ±5 knots

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed		Liftoff: 71 KIAS 50-Ft: 81 KIAS (V _X)	

PROCEDURE

- 1) Visually scan for traffic on final and down the departure end of runway.
- 2) Taxi into position for takeoff utilizing maximum available runway. Position aileron controls for crosswind.
- 3) Stand on the brakes and increase the power to FULL POWER
- 4) Check engine instruments, Manifold Pressure, and Tachometers.
- 5) Release brakes.

Caution:

Expect full right rudder pressure to be necessary during beginning of takeoff roll due to Torque Effect

- 6) Scan engine instruments and verify indicated airspeed is functioning.
- 7) Maintain enough aileron pressure to keep wings level if a crosswind exists.
- 8) At 71 KIAS, rotate, looking for V_X (**81 KIAS**).
- 9) Establish climb attitude (Approx 12° up).
- 10) When established in a climb above 35', announce "Positive rate, Gear UP," and retract the landing gear.
- 11) Maintain 81 KIAS until clear of obstacles or 50', and then lower the nose slightly to accelerate to 95 KIAS.
- 12) Crab into the wind if necessary.
- 13) At 1000' AGL, set Climb Power 25 MP 2500 RPM.
- 14) If staying the pattern: Check for traffic and turn crosswind at 300' from TPA. Follow noise abatement procedures if applicable.
- 15) If exiting the pattern: At 1000' AGL turn fuel pumps off one at a time, set climb power 2500 RPM/25 in and complete "Climb checklist." Accelerate to Cruise Climb (100 KTS).

LANDING MANEUVER

Normal/Crosswind Landing

Objective:	To arrive and land at an airport during normal or crosswind conditions with more than adequate clearance of obstacles on approach.	
ACS	Private Multi Add-On:	V _{REF} +10/-5 knots (plus wind factor)
	Commercial Multi Add-On:	V _{REF} ±5 knots (plus wind factor)
	ME Instructor:	V _{REF} ±5 knots (plus wind factor)

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed	85 KIAS	Downwind: 100 KIAS Base: 90 KIAS Final: 85 KIAS	Pattern: 120 KIAS

PROCEDURE

- 1) Complete the Approach checklist 5 NM prior to entering pattern (GUMPS).
- 2) Slow to desired pattern entry speed 2 NM prior to entering pattern.
- 3) Enter the pattern on a 45° downwind entry at least 2 NM from the runway, at pattern altitude. Set power to approximately 17-20"/2300 RPM.
- 4) Maintain ½ to ¾ mile separation from the runway and turn downwind. (Runway should appear about ¾ up wing)
- 5) Abeam the selected point of landing, extend the landing gear and leave hand on handle until 3 Green/No Yellow has been confirmed. Announce "Gear Down and Locked."
- 6) Extend flaps to 10°. Descend at 100 KIAS.
- 7) 45° from the point of landing turn base extend flaps to 20° and GUMPS check.
- 8) Visually clear opposite base and final.
- 9) Turn final, GUMPS check. Props Forward Set flaps to 30° (Full Down) when runway is made.
- 10) Slow to 85 KIAS, adjusting power if necessary.
- 11) At 500' AGL, verify cleared to land, Gear Down and brake check.
- 12) During flare, reduce throttles to idle (at pilots discretion, some power may be left on upwind engine in a crosswind until touchdown), and touch down smoothly.
- 13) Initiate braking after nose wheel has touched down.

LANDING MANEUVER

Short Field Landing

Objective:	To arrive at an airport and land safely where there is a limited length of runway and/or obstacles on approach.	
ACS	Private Multi Add-On:	V _{REF} +10/-5 knots (plus wind factor), within 200 feet of touchdown point, on centerline, no side drift
	Commercial Multi Add-On:	V _{REF} ±5 knots (plus wind factor), within 100 feet of touchdown point, on centerline, no side drift
	ME Instructor:	V _{REF} ±5 knots (plus wind factor), within 100 feet of touchdown point, on centerline, no side drift

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed	81 KIAS (WHEN RWY MADE)	Downwind: 100 KIAS Base: 90 KIAS Final: 85 KIAS	Pattern: 120 KIAS

PROCEDURE

- 1) Complete the Approach checklist 5 NM prior to entering pattern.
- 2) Slow to desired pattern entry speed 2 NM prior to entering pattern.
- 3) Enter the pattern on a 45° downwind entry at least 2 NM from the runway, at pattern altitude. Set power to 15"/2300 RPM.
- 4) Maintain ½ to ¾ mile separation from the runway and turn downwind. (Runway should appear about ¾ up wing)
- 5) Abeam your selected point of landing, extend landing gear and leave hand on handle until 3 Green/No Yellow has been confirmed. Announce "Gear Down and Locked."
- 6) Extend flaps to 10°. Descend at 100 KIAS.
- 7) 45° from the point of landing turn base and extend flaps to 20°. GUMPS check.
- 8) Visually clear opposite base and final.
- 9) Turn final (85 KTS), GUMPS check. Props Forward. Set flaps to 30° (Full Down) when runway is made.
- 10) Slow to 80 KIAS by setting Manifold Pressure to 14" or as necessary. It is likely that additional power may be required to maintain Vref after aircraft is stabilized on speed and descent profile.
- 11) At 500' AGL, verify cleared to land, Gear Down and brake check.
- 12) During flare, reduce throttles to idle and touch down smoothly.
- 13) Initiate maximum braking after nose wheel has touched down.

LANDING MANEUVER

Go-Around/Rejected Landing

Objective:	To safely abort a landing and establish climb configuration as quickly as possible.	
ACS	Private Multi Add-On:	V _Y +10/-5 knots
	Commercial Multi Add-On:	V _Y ±5 knots
	ME Instructor:	V _Y ±5 knots

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed	85 KIAS		

PROCEDURE

- 1) Apply full power.
- 2) Pitch up for V_{YSE} (85 KIAS).
- 3) Verify props and mixtures full forward, and retract flaps to 20°.
- 4) When Established in a positive rate of climb, retract the landing gear.
- 5) Clear of obstacles, Verify airspeed is at or above 85 KIAS, and retract flaps.
- 6) Sidestep to the left or right (as appropriate) and announce intentions to CTAF/ATC.
- 7) Accomplish “Climb” checklist.

Note

The recall checklist for a go-around is as follows:

- **“MAX POWER, FLAPS 20”**
- **“POSITIVE RATE, GEAR UP”**
- *Clear obstacles:* **“FLAPS UP, CLIMB CHECKLIST”**

**PERFORMANCE
 MANEUVER**

Emergency Descent

Objective:	To quickly gain airspeed and lose altitude. Simulation of putting out an engine fire is appropriate for this maneuver and should be practiced.	
ACS	Private:	Bank 30 to 45° A/S +0/-10, Recovery Alt +/-100'
	Commercial:	Bank 30 to 45° A/S +0/-10, Recovery Alt +/-100'
	ME Instructor:	Bank 30 to 45° A/S +0/-10, Recovery Alt +/-100'

Restrictions	Minimum	Optimum	Maximum
Altitude	Recovery: 2000' AGL	4000' AGL	
Speed	130 KIAS		140KIAS

PROCEDURE

- 1) Brief entry and level off altitudes.
- 2) Perform clearing turns, with increased emphasis on traffic below your position.
- 3) Throttles IDLE. Carb Heat On.
- 4) Set props full forward.
- 5) Mixtures Rich.
- 6) Flaps up.
- 7) Gear down below 145 kts.
- 8) Initiate bank (30° - 45°), Airspeed not to exceed VLE (145 KIAS).

Note

The recall checklist for an emergency descent is as follows:

- **THROTTLES IDLE, CARB HEAT ON, MIXTURES RICH**
- **PROPELLERS MAX RPM**
- **GEAR DOWN < 145**
- **LEVEL OFF ALTITUDE-CHECK**
- **ATC – ADVISE**

- 1) Approaching level-off altitude, begin pitching up to arrest descent rate.
- 2) At target altitude, maintain altitude while slowing to landing gear retraction speed (V_{LO}).
- 3) Carb. heat off.
- 4) Retract landing gear.
- 5) Return aircraft to cruise configuration. Complete “Cruise” checklist.

DISCUSSION:

This maneuver can be used:

- To extinguish and engine fire
- Rapidly lose altitude in preparation for a precautionary landing
- In the event of a medical emergency
- Escaping altitude hypoxia

**PERFORMANCE
 MANEUVER**

Steep Turns

Objective:	To maintain two opposite-direction, level turns while rolling out on entry heading for both turns.	
ACS	Private:	45° Bank ±5°, Altitude ±100 feet, Heading ±10°, Airspeed ±10 knots
	Commercial:	50° Bank ±5°, Altitude ±100 feet, Heading ±10°, Airspeed ±10 knots
	ME Instructor:	50° Bank ±5°, Altitude ±100 feet, Heading ±10°, Airspeed ±10 knots

Restrictions	Minimum	Optimum	Maximum
Altitude	3000' AGL		
Speed		120 KIAS	

PROCEDURE

- 1) Perform pre-maneuver check, and clearing turns.
- 2) Set power to 22"/2300 RPM and maintain approximately 120 KIAS (V_A).
- 3) Stabilize aircraft on entry heading and set heading indicator bug.
- 4) Roll left into the turn. Add power (MP 23").
- 5) Maintain altitude by pitching up; maintain coordination with rudder pressure, and monitor VSI, altimeter, heading indicator, and airspeed to coordinate rollout.
- 6) Using your heading reference bug, lead rollout by approximately twenty degrees, reduce power again to 20" MP past 30° of bank and maintain altitude by reducing pressure on yoke.
- 7) Roll out on reference heading.
- 8) Repeat procedure in opposite direction.
- 9) After rolling out again, return airplane to cruise configuration.

SLOW FLIGHT & STALLS

Maneuvering During Slow Flight

Objective:	To maneuver the aircraft safely at minimum possible airspeed.	
ACS	Private:	Bank $\pm 10^\circ$, Altitude ± 100 feet, Heading $\pm 10^\circ$, Airspeed +10/-0 knots. Stall recovery at first indication.
	Commercial:	Bank $\pm 5^\circ$, Altitude ± 50 feet, Heading $\pm 10^\circ$, Airspeed +5/-0 knots. Stall recovery at first indication.
	ME Instructor:	Bank $\pm 5^\circ$, Altitude ± 50 feet, Heading $\pm 10^\circ$, Airspeed +5/-0 knots. Stall recovery at first indication.

Restrictions	Minimum	Optimum	Maximum
Altitude	Completed no lower than 3000'	3500'	
Speed	80 KIAS	80 KIAS	

PROCEDURE

- 1) Set power to 15"/2300 RPM.
- 2) Perform pre-maneuver check, and clearing turns.
- 3) Below 145 KTS Gear Down, Prop Levers Full Forward, flaps to 30° .
- 4) Establish and maintain an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in a stall warning (e.g., aircraft buffet, stall horn, etc.). Add power to maintain level flight at altitude and pitch to maintain air speed.
- 5) Maintain coordinated flight, add power during turns to prevent a stall.
- 6) Recovery:
 - a) Set MAX power and flaps to 20°
 - b) At 85 KIAS retract the landing gear.
 - c) Retract remaining flaps.
 - d) At cruise airspeed, set cruise power and Complete "Cruise" checklist.

SLOW FLIGHT & STALLS

Power On Stall

Objective:	To demonstrate recovery from a stall in the takeoff configuration.	
ACS	Private:	Heading $\pm 10^\circ$, Bank not to exceed $20^\circ \pm 10^\circ$, V_Y before Flaps 0° . Stall Recovery at first indication.
	Commercial:	Heading $\pm 10^\circ$, Bank not to exceed $20^\circ \pm 10^\circ$, V_Y before Flaps 0° . Stall Recovery at first indication.
	ME Instructor:	Heading $\pm 10^\circ$, Bank not to exceed $20^\circ \pm 10^\circ$, V_Y before Flaps 0° . Stall Recovery at first indication.

Restrictions	Minimum	Optimum	Maximum
Altitude	3500' AGL no lower than 3000' AGL		
Speed			

PROCEDURE

- 1) Set power to 15"/2300 RPM.
- 2) Perform pre-maneuver check, and clearing turns.
- 3) Prop Levers Full Forward.
- 4) At 80 KIAS, set power to 20" Manifold Pressure (no lower than 65% power).
- 5) Pitch up to stalling airspeed (Maximum pitch attitude 20°).

Recovery:

- 6) At first sign of stall (buffet or horn), add full Power and reduce pitch attitude. Maintain coordinated flight and level the wings.
- 7) Pitch for V_{YSE} .
- 8) At completion of maneuver:
 - a) Pitch for level flight.
 - b) Establish cruise configuration.
 - c) Complete "Cruise" checklist.

SLOW FLIGHT & STALLS

Power Off Stall

Objective:	To demonstrate recovery from a stall in the landing configuration.	
ACS	Private:	Heading $\pm 10^\circ$, Bank not to exceed $20^\circ \pm 10^\circ$, V_Y before Flaps 0° . Stall Recovery at first indication.
	Commercial:	Heading $\pm 10^\circ$, Bank not to exceed $20^\circ \pm 5^\circ$, V_Y before Flaps 0° . Stall Recovery at first indication.
	ME Instructor:	Heading $\pm 10^\circ$, Bank not to exceed $20^\circ \pm 10^\circ$, V_Y before Flaps 0° . Stall Recovery at first indication.

Restrictions	Minimum	Optimum	Maximum
Altitude	3500' AGL no lower than 3000' AGL		
Speed			

PROCEDURE

- 1) Set power to 15"/2300 RPM.
- 2) Perform clearing turns.
- 3) Below 145 KIAS: Landing Gear Down.
- 4) Props Forward, flaps to 30° , begin gradual descent.
- 9) Reduce power to idle and pitch up smoothly; do not climb.

Recovery:

- 5) At first sign of impending stall (buffet or horn), add Full Power and reduce pitch attitude. Maintain coordinated flight and level the wings.
- 6) Above V_{S0} , Retract flaps to 20° and pitch for V_X (if obstructions) or V_Y .
- 7) Positive rate, Gear UP.
- 8) Retract flaps to 0° above.
- 9) At completion of maneuver:
 - a) Pitch for level flight.
 - b) Establish cruise configuration.
 - c) Complete "Cruise" checklist.

ACCELERATED STALLS

Accelerated Stalls

Objective:	To demonstrate recovery from a n accelerated stall.	
ACS	Private:	
	Commercial:	Bank 45°. Stall Recovery at first indication. Accelerate to VX/VY
	ME Instructor:	Bank 45° 0°. Stall Recovery at first indication. Acceleratr to VX/VY

Restrictions	Minimum	Optimum	Maximum
Altitude	3000'AGL	3500	
Speed		120	VA

PROCEDURE

- 1) Perform clearing turns
- 2) Set; Power 15-17 MP, Props FWD
- 3) Establish a 45° Bank
- 4) Slowly increase the backpressure until first stall indication

Recovery:

- 1) Level the wings and apply full power
- 2) Accelerate to VX/VY

Complete "Cruise" checklist.

ENGINE-OUT MANEUVERS

Engine Failure During Takeoff Before V_{MC}

Objective:	To demonstrate a successful aborted takeoff in the event of an engine failure before liftoff.		
ACS	Private:	Throttles to idle, maintain directional control.	
	Commercial:	Throttles to idle, maintain directional control.	
	ME Instructor:	Throttles to idle, maintain directional control.	

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed	30 KIAS	35 KIAS	40 KIAS

PROCEDURE

- 1) Reduce throttles to idle.
- 2) Maintain directional control.
- 3) Apply sufficient braking to stop on the runway.
- 4) Notify ATC/CTAF.

Note:

The recall checklist for an engine failure prior to V_{mc} is as follows:

- **THROTTLES** **IDLE**
- **BRAKING** **MAXIMUM AS REQUIRED**

Advise ATC and accomplish "Ground Evacuation" checklist if required

ENGINE-OUT MANEUVERS

Engine Failure After Liftoff (Simulated)

Objective:	To demonstrate a successful engine failure procedure after liftoff.		
ACS	Private:	Heading $\pm 10^\circ$, Airspeed ± 5 knots (VYSE 85)	
	Commercial:	Heading $\pm 10^\circ$, Airspeed ± 5 knots (VYSE 85)	
	ME Instructor:	Heading $\pm 10^\circ$, Airspeed ± 5 knots (VYSE 85)	

Restrictions	Minimum	Optimum	Maximum
Altitude	500' AGL		
Speed	85 KIAS	85 KIAS	

PROCEDURE

- 1) Maintain Directional Control of the aircraft.
- 2) Maintain V_{YSE} as appropriate (at or above).
- 3) Verify Maximum Thrust:
 - a) Mixtures **FULL RICH**.
 - b) Prop Levers **FULL FORWARD**.
 - c) Throttles **FULL FORWARD**.
 - d) Speed VYSE 85 KTS (at or above)
- 4) Verify flaps and landing gear are **UP**.
- 5) **IDENTIFY** inoperative engine (“dead foot, dead engine”).
- 6) **VERIFY** inoperative engine by reducing throttle on suspected engine.
- 7) **Point to the Propeller** to be feathered. Instructor will set Zero Thrust (12” MP) to simulate feathering the inoperative engine (props remain forward).
- 8) **ESTABLISH** Zero-Sideslip (Sufficient rudder pressure into operating engine, 2°-3° of bank and half a ball into operating engine). Only in straight and level flight.
- 9) Maintain @ or above V_{YSE}.
- 10) Accomplish “Engine Failure, Fire, or Severe Damage” recall items and “securing inoperative engine” checklist.
- 11) Simulate declaring emergency, return for landing.

Note:

The recall checklist for an engine failure in flight is as follows:

- MIXTURES-FWD
- PROPS-FWD
- THROTTLE -FWD
- VYSE 85 KTS
- FLAPS AND GEAR UP
- IDENTIFY (dead foot dead engine) VERIFY (throttle back) FIX OR FEATHER.

Accomplish "Securing Inoperative Engine" checklist

Discussion:

An engine failure in a critical phase of flight requires an immediate and precise response in order to maintain aircraft control. The response should be memorized as follows: **"mixtures forward, propellers forward, throttles forward, , flaps up and gear up, identify ("dead foot, dead engine"), verify (with affected engine throttle), fix or feather (inoperative engine), CHECKLIST.**

ENGINE-OUT MANEUVERS

Approach & Landing with Inoperative Engine

Objective:	To approach an airport and land safely with one engine inoperative. This maneuver should only be attempted with a simulated failure.	
ACS	Private:	Stabilized Approach, Airspeed $V_{YSE} +10/-5$ knots
	Commercial:	Stabilized Approach, Airspeed $V_{YSE} \pm 5$ knots
	ME Instructor:	Stabilized Approach, Airspeed $V_{YSE} \pm 5$ knots

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed	90 KIAS		

PROCEDURE

- 1) Complete “Engine Failure, Fire, or Severe Damage” checklist and “Securing Inoperative Engine” checklist.
- 2) Complete the Approach checklist 5 NM prior to entering pattern.
- 3) Enter the pattern on a 45° downwind entry, at pattern altitude*. Set power to 22”/2500 RPM. If more power is required to maintain V_{YSE} /altitude, more may be used. Maintain 100 KIAS.
- 4) Abeam the selected point of landing or 3 nm final, Gear Down .
- 5) 45° from the point of landing, turn base, 10° may be selected.
- 6) Visually clear opposite base and final.
- 7) Turn final. Slow to 90-100 KIAS, adjusting power if necessary. Complete final GUMPS check.
- 8) Props Forward. Maximum flap setting is 20° on one engine.
- 9) Clearing the airport boundary, begin slowing to touchdown speed.
- 10) During flare, reduce throttles to idle, maintain directional control, and touch down smoothly.
- 11) Initiate braking after nose-wheel has touched down.

Note:

Rudder trim should be set to neutral prior to commencing approach to alleviate directional control issues in flare. Be prepared to center rudder and/or use appropriate crosswind technique during flare to maintain aircraft position and heading over runway centerline

**If an engine failure after takeoff during initial climb, pattern altitude shall be the minimum safe altitude for obstacle clearance, typically 1,000’ AGL. For an engine failure at cruise or in descent, standard pattern altitude should be used.*

ENGINE-OUT MANEUVERS

Maneuvering with One Inoperative Engine

Objective:	To demonstrate the aircraft's behavior and performance during operations with one engine inoperative.	
ACS	Private:	Altitude ± 100 feet or minimum sink, Heading $\pm 10^\circ$
	Commercial:	Altitude ± 100 feet or minimum sink, Heading $\pm 10^\circ$
	ME Instructor:	Altitude ± 100 feet or minimum sink, Heading $\pm 10^\circ$

Restrictions	Minimum	Optimum	Maximum
Altitude	4500' AGL		
Speed	85 KIAS	100 KIAS	

PROCEDURE

- 1) Situate aircraft above a suitable airfield in the event a restart is unsuccessful.
- 2) Set power to 15"/2300 RPM.
- 3) Perform pre-maneuver check, and clearing turns.
- 4) At 100 KIAS, set prop levers full forward.
- 5) Stabilize the aircraft at or above 85 KIAS and maintain altitude.
- 6) Move power to idle on inoperative engine.
- 7) Move mixture to idle-cutoff.
- 8) Use rudder pressure to counteract yawing tendency, establish zero sideslip.
- 9) Feather inoperative engine.
- 10) Perform "Securing Inoperative Engine" checklist.
- 11) Maintain altitude and at least $V_{YSE}+10$. Set 25" MP and 2500 RPM.
- 12) Perform climbs, descents, and turns as directed.
- 13) Perform "In-flight Engine Start" checklist.
- 14) Return to cruise configuration. Complete "Cruise" checklist.

Note

If unable to restart the inoperative engine, it is to be considered an emergency and the aircraft should be landed at the nearest suitable airport. Demonstration of actual shut-down of an engine should only be accomplished above 4,500 AGL and within GLIDING DISTANCE of a suitable airfield.

ENGINE-OUT MANEUVERS

V_{MC} Demonstration

Objective:	To demonstrate the aircraft's behavior during simulated V _{MC} conditions. The instructor will block the rudder in order to induce V _{MC} conditions before stalling speed. See notes at end of procedure.	
ACS	Private:	Heading ±20°, Recover to V _{YSE} +10/-5 knots
	Commercial:	Heading ±20°, Recover to V _{YSE} ±5 knots
	ME Instructor:	Heading ±20°, Recover to V _{YSE} ±5 knots

Restrictions	Minimum	Optimum	Maximum
Altitude	3000' AGL		
Speed	80 KIAS (simulated V _{MC})		

PROCEDURE

- 1) Set power to 15-17"/2300 RPM.
- 2) Mixtures Rich Flaps and Landing Gear Up.
- 3) Perform pre-maneuver check, and clearing turns.
- 4) At 100 KIAS, set prop levers full forward.
- 5) Reduce power on simulated inoperative engine (Left Engine). Engine should remain wind-milling.
- 6) Set full power on operating engine (Right Engine).
- 7) Establish zero sideslip.
- 8) Being pitching up and slowing at 1 knot per second.
- 9) Use rudder pressure to counteract yawing tendency.
- 10) At 85 KIAS, instructor will block the rudder to maintain safe margin from stall speed. Refrain from using ailerons to maintain directional control.
- 11) Initiate recovery at the first sign of uncontrolled heading drift, stall horn, stall buffet, or stall airspeed:
 - a) Reduce power on operating engine smoothly to regain control.
 - b) Maintain maximum available rudder pressure.
 - c) Lower nose to regain airspeed.
 - d) As airspeed increases above V_{MC} increase power on available engine.
 - e) With sufficient airspeed, maintain V_{YSE} and full power on operating engine.
- 12) Increase power on inoperative engine and return to cruise configuration.
- 13) Complete "Cruise" checklist.

Note:

In addition to blocking rudder, use of aileron for directional control beyond initial zero sideslip configuration should be avoided so as to permit realistic V_{MC} demonstration without the aircraft stalling first.

ENGINE-OUT MANEUVERS

Drag Demonstration

Objective:	To demonstrate the associated drag penalties with different configurations during single-engine operations.	
	Private:	Not Applicable
	Commercial:	Not Applicable
	ME Instructor:	Exhibits instructional knowledge; demonstrates and explains.

Restrictions	Minimum	Optimum	Maximum
Altitude	3000' AGL		
Speed	75 KIAS	85 KIAS	95 KIAS

PROCEDURE

- 1) Set power to 15-17"/2300 RPM.
- 2) Perform pre-maneuver check, and clearing turns.
- 3) Gear and Flaps up. Mixtures Rich.
- 4) Set propeller levers full forward at or below 100 KIAS.
- 5) Slow to 85 KIAS (V_{YSE}).
- 6) Reduce power on simulated inoperative engine. Set zero thrust (12"MP).
- 7) Advance operating engine to full power, Cowl Flaps **OPEN**.
- 8) Establish **zero sideslip**.
- 9) Maintain 85 KIAS (V_{YSE}). Note VSI indication.
- 10) Slow to 75 KIAS. Note VSI indication.
- 11) Increase to 95 KIAS. Note VSI indication.
- 12) Extend landing gear and maintain 85 KIAS. Note VSI indication.
- 13) Extend flaps to 10°, 20°, and full down. For each, note VSI indication.
- 14) Retract flaps and landing gear on schedule.
- 15) Reduce power on inoperative engine to idle to windmill propeller. Note VSI
- 16) Recover and return to cruise configuration.
- 17) Complete "Cruise" checklist.

INSTRUMENT APPROACHES

Precision Approach, Single-Engine

Objective:	To safely execute a precision instrument approach procedure with one engine inoperative.	
Practical Test Standards	Private:	Altitude $\pm 100'$, Airspeed ± 10 knots, Heading $\pm 10^\circ$, CDI $\frac{3}{4}$ scale
	Commercial:	Altitude $\pm 100'$, Airspeed ± 10 knots, Heading $\pm 10^\circ$, CDI $\frac{3}{4}$ scale
	ME Instructor:	Altitude $\pm 100'$, Airspeed ± 10 knots, Heading $\pm 10^\circ$, CDI $\frac{3}{4}$ scale

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed	85 KIAS	90 KIAS	100 KIAS

PROCEDURE

- 1) Outside FAF (approximately 1 to 2 miles) FAF, 10° of flaps and accomplish "Before Landing" checklist (GUMPS). Gear Down @ FAF.
- 2) Set 18" MP and propeller on operating engine to maximum RPM.
- 3) Maintain 90-100 KIAS.
- 4) Maximum flap setting shall be 20° when landing assured.

Caution:

Use maximum flap setting of 20° for landing once the RWY is made. Recovery from a missed approach or low altitude go-around with more than 20° of flaps is doubtful. Adjust landing speed and distance to account for partial flap configuration.

INSTRUMENT APPROACHES

Non-Precision Approach, Single-Engine

Objective:	To safely execute a non-precision instrument approach procedure with one engine inoperative.	
ACS	Private:	Altitude ±100', Airspeed ±10 knots, Heading ±10°, CDI ¾ scale
	Commercial:	Altitude ±100', Airspeed ±10 knots, Heading ±10°, CDI ¾ scale
	ME Instructor:	Altitude ±100', Airspeed ±10 knots, Heading ±10°, CDI ¾ scale

Restrictions	Minimum	Optimum	Maximum
Altitude			
Speed	85 KIAS	90 KIAS	100 KIAS

PROCEDURE

- 1) Outside FAF (approximately 1 to 2 miles) , 10° of flaps. Initial power setting is 18" MP and MAX RPM. Perform GUMPS check. Gear down @ FAF.
- 2) Maintain 90-100 KIAS.
- 3) Maximum flap setting shall be 20° when landing assured.
- 4) Upon reaching MDA/VDP, verify runway in sight. If not in sight, execute missed approach using SE Missed Approach Procedure
- 5) On Circling Approach, extend the gear after circling and when the runway is assured.

Caution:

Use maximum flap setting of 20° for landing. Recovery from a missed approach or low altitude go-around with more than 20° of flaps is doubtful. Adjust landing distance and speed to account for partial flap configuration.

WARNING:

*Use **extreme caution** when executing a non-precision single engine approach as level off at MDA is impracticable and/or the success of a missed approach is doubtful. Plan the descent so that MDA is reached at an appropriate Visual Descent Point (VDP) so a continuous, stabilized descent to landing can be achieved without leveling off at the MDA.*

WARNING:

*In the event of an actual engine failure in instrument meteorological conditions, it is **strongly recommended** that a precision approach be utilized. Consider diversion to an airport with suitable facilities and VFR WX conditions.*