

Before Start

| | |
|--------------------|------------|
| Brakes | SET |
| Seats | ADJUSTED |
| Seatbelts | FASTENED |
| Fuel Selectors | MAIN TANKS |
| Circuit Breakers | CHECK |
| Radio Master | CHECK OFF |
| Alternators | OFF |
| Alt. Static Source | NORMAL |
| Cowl Flaps | OPEN |
| Door | SECURE |

Engine Starting

| | |
|---------------|--------------|
| Master Switch | ON |
| Strobes | ON |
| Propellers | FULL FORWARD |

**** Start one engine at a time ****

For Hot Start, skip priming

To Prime for Cold Start

- Throttle HALF OPEN
- Mixture RICH
- Fuel Pump ON
- Fuel Flow Rise to 5 gph (max 5 sec.)
- Fuel Pump OFF
- Mixture Idle Cut-Off

| | |
|----------------------|--------------------------------|
| Throttle (L or R) | ¼ inch OPEN |
| Magnetos (L or R) | ON |
| Propeller Area | "CLEAR" |
| Starter (max 30 sec) | ENGAGE L or R |
| Mixture (L or R) | ADVANCE to RICH while cranking |
| Throttle | SET 1000 RPM |
| Oil Pressure | GREEN within 30 seconds |
| Alternator (L or R) | ON, verify positive |

After Start

| | |
|--------------|-------------------|
| Alternators | BOTH ON & CHECK |
| Vacuum Gauge | CHECK |
| Radio Master | ON |
| Mixtures | LEAN FOR TAXI |
| Lights | AS REQUIRED |
| Flaps | UP |
| GPS/ATIS | CHECK |
| Instruments | SET & CHECK |
| Transponder | ALT & SQUAWK |
| Taxi | CLEARANCE & BRIEF |

Taxiing

| | |
|-----------------|----------------|
| Brakes | CHECK |
| TC, HI, Compass | CHECK MOVEMENT |

Run-up

| | |
|---------------------------|-------------------------------|
| Brakes | SET |
| Flight Controls | FREE & CORRECT |
| Trim Tabs | SET FOR TAKEOFF |
| Cowl Flaps | OPEN |
| Mixtures | RICH |
| Throttles to 1500 RPM | |
| - Feather test (L then R) | < 500 RPM drop |
| - Mag check (L then R) | < 175 drop, < 50 diff, smooth |
| Throttles to 2000 RPM | |
| - Cycle each prop x3 | Check RPM, MP, Oil Press |
| - Vacuum | Check (4.8-5.1" Hg) |
| - Ammeter | Check |
| - Oil Temp & Press | Check |

| | |
|--------------------|---------------------|
| Throttles | IDLE, then 1000 RPM |
| Flight Instruments | CHECK & SET |
| Landing Gear | DOWN & GREEN |
| GPS/NAV | SET FOR DEPARTURE |
| Radios | SET FOR DEPARTURE |
| Transponder | ALT & SQUAWK |
| Takeoff Briefing | |

This will be a normal (short -field) takeoff, flaps set at 0° (15°), departing runway ____ with an initial climb to ____ feet and heading _____. V_R is 90, V_X is 90, V_Y is 112, V_{MC} is 90, and V_{YSE} is 105 MPH. Ground roll is _____, 50' obstacle clearance is _____, and accelerate-stop is _____. Landing distance is _____ and landing from a 50' obstacle requires _____ feet.

- For any emergency before V_{MC} , I will close the throttles, apply maximum braking and maintain directional control.
- For an engine failure after V_{MC} with runway remaining and gear down, I will close the throttles, land straight ahead, and apply maximum braking.
- For an engine failure with no remaining runway and above V_{MC} , I will pitch for blue line, retract gear and flaps, then identify, verify, and feather the inoperative engine.
- For an emergency or abnormality with altitude available, I will perform the appropriate checklist.

No simulated emergencies below 3000' AGL without prior discussion. Any questions?

Before Take-off

| | |
|-----------------|-------------------------------|
| Trim | SET FOR TAKEOFF |
| Flaps | UP (15° for Short/Soft Field) |
| Cowl Flaps | OPEN |
| Mixtures | RICH |
| Props | FULL FORWARD |
| Lights | AS REQUIRED |
| Fuel Pumps | ON |
| Doors & Windows | CLOSED |

ENGINE FAILURE DURING CLIMB

| | |
|----------------------------|--|
| Pitch for Blue Line | 105 MPH |
| Bank into good engine | < 5° & check ball ½ deflected |
| Mix, Props, Throttles | FULL FORWARD |
| Gear | UP |
| Flaps | UP |
| Identify | DEAD FOOT |
| Verify | REDUCE L or R THROTTLE |
| Prop | Decide to FIX or FEATHER |
| <u>Fix</u> | |
| - Fuel | Mixtures, Fuel Pumps, █ Qty., Switch Tanks |
| - Spark | Magnetos ON |
| - Air | Alt Air ON |
| - Gauges | Monitor |

Feather (perform on dead engine only)

- Mixture Verify & Idle Cut-Off
- Prop Verify & Reduce to Feather
- Fuel Selector Verify & OFF
- Fuel Pump Verify & OFF
- Mags Verify & OFF
- Cowl Flap CLOSED (open on operating engine)
- Alternator OFF
- Fuel Selector Cross-feed as required
- ATC Declare emergency
- Review single-engine landing procedure

* Zero thrust = 10" MP & 2200 RPM *

Climb (above 1000' AGL or safe altitude)

| | |
|--------------------|---------------------|
| Airspeed | 130 MPH |
| Throttles | 25" MP |
| Props | 2500 RPM |
| Lights | AS REQUIRED |
| Fuel Pumps | OFF (one at a time) |
| Engine Instruments | CHECK |

Cruise

| | |
|---------------------------|-------------------|
| Throttles (max 75% power) | SET |
| Props | SET/SYNC |
| Mixture | LEAN FOR ALTITUDE |
| Cowl Flaps | CLOSED |
| Engine Instruments | MONITOR |

** Aux fuel tanks may be used in level flight **

Descent

| | |
|----------------|------------------------|
| ATIS/AWOS/ASOS | CHECK |
| Approach Brief | COMPETE |
| Throttles | Decrease 1" per minute |
| Airspeed | GREEN CHT |
| Mixtures | ENRICHEN SLOWLY |

Approach & Landing (5-10 nm out)

| | |
|------------------------|--|
| Seats | ADJUSTED |
| Seatbelts | FASTENED |
| Cabin Heater | OFF |
| Fuel Selectors | MAIN TANKS |
| Mixtures | RICH |
| Fuel Pumps | ON |
| Landing Gear (<125MPH) | DOWN & GREEN |
| Flaps (<110MPH) | AS REQUIRED (Flaps 15° single-eng) |
| Approach Speed | 95 MPH (90 short/soft, 105 single-eng) |

After Landing

| | |
|----------------|-----------------|
| Flaps | UP |
| Cowl Flaps | OPEN |
| Mixtures | LEAN FOR TAXI |
| Props | FULL FORWARD |
| Lights | AS REQUIRED |
| Fuel Pumps | OFF |
| Trim | SET FOR TAKEOFF |
| Taxi Clearance | OBTAIN |

Shutdown

| | |
|---------------|--------------|
| Throttles | 1000 RPM |
| Radio Master | OFF |
| Alternators | OFF |
| Mixtures | IDLE CUT-OFF |
| Lights | ALL OFF |
| Magnetos | ALL OFF |
| Master Switch | OFF |

Securing Aircraft

| | |
|--------------------|---------|
| Cowl Flaps | CLOSE |
| Sunshades | INSTALL |
| Controls | SECURE |
| Hobbs & Tach | RECORD |
| Window & Door | CLOSE |
| Pitot Cover | INSTALL |
| Tie Downs & Chocks | INSTALL |

Air Start (unfeathering procedure)

| | |
|---|----------------|
| Magnetos | ON |
| Fuel Selector | ON |
| Fuel Pump | ON |
| Throttle | 1/4" Open |
| Prop | Fwd to Cruise |
| Starter | Engage |
| Mixture | Slowly Advance |
| - Once started set throttle, prop, mixture to 15"MP & 2000 RPM | |
| Oil pressure | CHECK |
| Fuel Pump | OFF |
| Cowl Flaps | AS REQ. |
| Alternator | ON |

Single-Engine Landing

- On final, landing assured:

| | |
|------------------|---------------------|
| Landing Gear | DOWN |
| Flaps | EXTEND 15° |
| V _{APP} | BLUE LINE – 105 MPH |

Landing Gear Fault

| | |
|----------------------|--|
| Master Switch | CHECK ON |
| Landing Gear Breaker | CHECK - Reset circuit breaker once if open |

- If gear operates but no Green Light:

| | |
|----------------------|---------|
| Light Rheostat | CHECK |
| Nav Lights | OFF |
| Gear Indicator Light | REPLACE |

*Gear light and horn inoperative during electrical failure

- If gear doesn't operate, Manual Gear Extension:

| | |
|------------------------|---|
| Airspeed | BELOW 100 MPH |
| Gear Handle | DOWN |
| Gear Motor Release Arm | DISENGAGE and push forward through full travel (gear should fall) |
| Gear Extension Handle | If left socket is not in clear position, place handle in right socket and twist clockwise until left socket in position |
| Gear Extension Handle | Left socket, extend handle and rotate FULL forward until locked |
| Gear Indicator Light | Verify GREEN |

V Speeds

| | |
|---|---------|
| V _A at 3,600 lbs | 162 MPH |
| V _A at 2,450 lbs | 135 MPH |
| V _{S0} | 69 MPH |
| V _{S1} | 76 MPH |
| V _{NO} | 194 MPH |
| V _{NE} | 230 MPH |
| V _{BG} | 110 MPH |
| V _R | 90 MPH |
| V _{X*} | 90 MPH |
| V _{Y*} | 112 MPH |
| V _{FE} | 125 MPH |
| V _{FE} recommended | 100 MPH |
| V _{LE} & V _{LO} | 150 MPH |
| V _{LE} & V _{LO} recommended | 125 MPH |
| V _{APP} | 95 MPH |
| V _{APP} flaps up | 100 MPH |

* Note: V_X increases approx 0.25 mph and V_Y decreases 0.75 mph for each 1000' increase in DA above MSL

Single-Engine Speeds

| | |
|------------------------------|---------|
| V _{MC} | 90 MPH |
| V _{YSE} (blue line) | 105 MPH |
| V _{SSE} | 97 MPH |
| V _{SXE} | 94 MPH |
| V _{APP} | 105 MPH |

* Zero thrust = 10" MP & 2200 RPM *

65% Cruise Power Settings Fuel Burn 17.7 GPH*

| Altitude | MP | RPM |
|----------|-------|------|
| 3000' | 21.9" | 2400 |
| 4000' | 21.6" | 2400 |
| 5000' | 21.3" | 2400 |
| 6000' | 21.1" | 2400 |
| 7000' | 20.8" | 2400 |
| 8000' | 20.5" | 2400 |
| 9000' | 20.3" | 2400 |
| 10,000' | 20.0" | 2400 |

55% Cruise Power Settings Fuel Burn 16 GPH*

| | | |
|---------|-------|------|
| 10,000' | 17.9" | 2400 |
| 11,000' | 17.7" | 2400 |
| 12,000' | 17.4" | 2400 |
| 13,000' | 17.2" | 2400 |

* Based on given power settings and mixture set 100° Rich of Peak

Before beginning each maneuver, complete the following:

Clear the Area

Heading or Reference

Altitude: > 3000' AGL for maneuvers, > 5000' AGL for stalls

Position: airspace, emergency site

Setup: fuel on MAIN, pumps ON

Steep Turns

1. Setup: Cruise (18" MP, 2400 RPM, mix lean, cowl flaps closed)
2. Bank to 50°, increasing back pressure as you pass 30° bank.
3. Increase MP approximately 2".
4. Monitor sight picture, VSI, altitude, ball & bank.
5. Begin rollout 20° before desired heading/reference.
6. Reduce back pressure and power to maintain altitude & speed.

Emergency Descent

1. Setup: simulated engine fire (perform Engine Fire checklist) or pressurization loss.
2. Throttles Idle
3. Props Full Fwd
4. Cowl flaps Closed
5. Landing Gear Down
6. Airspeed Below V_{LE} (150 MPH)
7. Bank 40-45° to decrease vertical lift, or slip to increase drag.

Recovery: Engine Failure checklist or Cruise checklist.

Slow Flight

1. Setup: Takeoff or Landing (2400 RPM, mix rich, cowl flaps open)
2. Throttles 14" MP
3. Landing Gear Extend below 125 MPH
4. Flaps Extend below 100 MPH
5. Throttles 16" MP
6. Pitch Maintain airspeed at 85-90 MPH
7. Throttles As needed to control altitude

Recovery:

8. Pitch Lower slightly
9. Throttles 24" MP
10. Landing Gear Up
11. Flaps Retract to 15°, then UP
12. Maintain altitude & complete the Cruise checklist.

Power-Off Stall

1. Setup: Landing (2400 RPM, mix rich, cowl flaps open)
2. Throttles 12-13" MP
3. Landing Gear Extend below 125 MPH
4. Flaps Extend below 100 MPH
5. Slow to and descend at 95 MPH
6. Once stabilized, begin a roundout and flare to landing.
7. Bring throttles to idle. Recover at first sign of stall.

Recovery:

8. Pitch Lower to break the stall
9. Throttles Full Fwd
10. Landing Gear Up
11. Flaps Retract to 15°, then UP
12. Return to altitude & complete the Cruise checklist.

Power-On Stall

1. Setup: Takeoff (mix rich, cowl flaps open)
2. Throttles 12" MP
3. Props **2100 RPM** maximum
4. Slow to 80-90 MPH (or as instructed by examiner)
5. Throttles 21" MP maximum
6. Begin a climb at V_X , then pitch up some to try to climb slower than V_X . Recover at first sign of stall.

Recovery:

7. Pitch Lower to break the stall
8. Props 2400 RPM
9. Throttles As req. to recover
10. Return to altitude & complete the Cruise checklist.

Accelerated Stall

1. Setup: Cruise (16" MP, 2400 RPM, mix lean, cowl flaps closed)
2. Slow to approximately 110 MPH.
3. Enter into a 45° bank, increasing back pressure as you pass 30° bank.
4. At the first indication of stall, reduce back pressure to break the stall.
5. Level the wings.
6. Return to altitude & complete the Cruise checklist.

V_{MC} Demo

1. Setup: Takeoff climb (gear & flaps up, mix rich, cowl flaps open)
 2. Throttles 12-14" MP
 3. Props Full FWD
 4. Airspeed Slow to V_{YSE} / V_{SSE}
 5. Trim Takeoff position
 6. Left Throttle Slowly reduce to Idle
 7. Airspeed Maintain V_{YSE}
 8. Bank 2-3° (no more than 5°) into operating engine.
 9. Verify ball is deflected half toward operating engine.
 10. Right Throttle Slowly Increase to Full FWD
 11. Pitch attitude Increase to lose 1 MPH/sec
 12. Directional control Maintain with aileron & rudder
- Recovery: At first indication of loss of control (stall or aileron/rudder max deflected and not able to maintain heading)
- Simultaneously reduce pitch and power, neutralize rudder & aileron
13. Airspeed Pitch for V_{XSE} or V_{YSE}
 14. Directional control Maintain with aileron & rudder
 15. Right Throttle Slowly apply full power
 16. Left Throttle Slowly warm up
 17. Return to altitude & complete the Cruise checklist.

Drag Demo

1. Setup: Climb (2400 RPM, mix rich, cowl flaps open)
2. Throttles 12" MP
3. Cowl flaps L closed, R open
4. Airspeed Slow to V_{YSE}
5. Left Prop & Throttle Set zero thrust (10" MP/2200 RPM)
6. Right Prop & Throttle Increase to FULL FWD
7. Bank 2-3° (no more than 5°) into operating engine
8. Airspeed Reduce below V_{YSE}, note VSI change
9. Airspeed Return to V_{YSE}
10. Airspeed Increase above V_{YSE}, note VSI,
11. Airspeed Return to V_{YSE}
12. Landing Gear Extend, note VSI change
13. Flaps Extend to 15°, note VSI change
14. Flaps Extend to 27°, note VSI change
15. Landing Gear Retract, note VSI change
16. Flaps Retract to 15°, then UP, note VSI
17. Windmill the Left Engine Note VSI change
18. Return to altitude & complete the Cruise checklist.

Engine Failure Before V_{MC}

1. Setup: Begin a normal or short-field takeoff
 - At indication of engine failure (no faster than 50% of V_{MC}):
2. Throttles IDLE
3. Directional control Maintain
4. Brakes As required

Engine Failure After Liftoff (no lower than 400' AGL)

1. Setup: Takeoff climb (gear & flaps up, mix rich, cowl flaps open)
2. Takeoff briefing Complete
3. Begin a normal takeoff climb (25"/2500 or full fwd)
 - Note: CFI will use throttle to simulate failed engine
 - At indication of engine failure:
4. Pitch for **Blue Line** **105 MPH**
5. Bank into good engine < 5° & check ball ½ deflected
6. Mix, Props, Throttles FULL FORWARD
7. Gear UP
8. Flaps UP
9. Identify DEAD FOOT
10. Verify REDUCE L or R THROTTLE
11. Prop VERIFY & FEATHER*
 - *CFI will set zero thrust (10" MP & 2200 RPM)
 - The remaining items will be simulated only:
12. Mixture Verify & Idle Cut-Off
13. Prop Verify & Reduce to Feather
14. Fuel Selector Verify & OFF
15. Fuel Pump Verify & OFF
16. Mags Verify & OFF
17. Cowl Flap CLOSED (open op engine)
18. Alternator OFF
19. Fuel Selector Cross-feed as required
20. ATC Declare emergency
21. Review Single-Engine Landing checklist

Single-Engine Approach & Landing in the pattern

1. Setup: One engine inoperative (failed engine feathered)
2. Downwind 18" MP, 2400 RPM
3. Abeam #s 16" MP, maintain V_{YSE}
4. Landing Gear Down to descend
5. Flaps Landing assured, set 15°
6. Airspeed 105 MPH (V_{YSE})