

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

Fix

- 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 Selected (above 3000' AGL)

Position (airspace, emergency site)

Setup (run the appropriate checklist), fuel on MAIN, pumps ON

Steep Turns

1. Setup: Cruise configuration & checklist.
2. Bank to 50°, increasing back pressure as you pass 30° bank.
3. Increase MP approximately 1-2".
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: Cruise configuration, simulated engine fire 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 Fire checklist or Cruise checklist

Slow Flight

1. Setup: Takeoff or Landing configuration & checklist.
2. Throttles 12" MP
3. Landing Gear Extend below 125 MPH
4. Flaps Extend below 100 MPH
5. Slow to approximately 85 MPH
6. Throttles 16" MP
7. Pitch Hold airspeed 80-85 MPH
8. Throttles As needed to control altitude

Recovery:

9. Pitch Lower to the horizon
10. Throttles As req. to recover
11. Landing Gear Up
12. Flaps Retract to 15°, then UP
13. Resume Cruise & complete the Cruise checklist.

Power-Off Stall

1. Setup: Landing configuration & checklist
2. Throttles 12" 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. Resume Cruise & complete the Cruise checklist

Power-On Stall

1. Setup: Takeoff configuration & checklist
except throttle & prop settings
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. Resume Cruise & complete the Cruise checklist

Accelerated Stall

1. Setup: Cruise configuration & checklist.
2. Slow to approximately 110 MPH.
3. Begin to bank toward 50°, increasing back pressure as you pass 30° bank.
4. At the first indication of stall, reduce back pressure and level the wings. Recover from the stall.
5. Resume Cruise & complete the Cruise checklist

V_{MC} Demo

1. Setup: Takeoff configuration (clean) & checklist.
 2. Throttles 12" MP
 3. Props Full Fwd
 4. Airspeed Slow to V_{YSE}
 5. Trim Takeoff position
 6. Left Throttle Slowly reduce to Idle
 7. Right Throttle Slowly Increase to Full Fwd
 8. Airspeed Maintain V_{YSE}
 9. Bank 2-3° (no more than 5°) into operating engine.
 10. Verify ball is deflected half toward operating engine.
 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 still not able to maintain heading)
- Simultaneously reduce pitch and power until:
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. Resume Cruise & complete the Cruise checklist.

Drag Demo

1. Setup: Takeoff configuration & checklist.
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. Resume Cruise & complete the Cruise checklist.

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

1. Setup: Takeoff configuration & checklist.
2. Takeoff briefing Complete
3. Begin a normal takeoff
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 before engine actually feathers
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

* Zero thrust = 10" MP & 2200 RPM *

Engine Failure Before V_{MC}

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