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 0o(15o), 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 _____. Gear retraction will be at _____ feet.

-For an abnormality at a low airspeed, I will close the throttles, maintain directional control and bring the airplane to a stop on the remaining runway.

-For an emergency before V_{MC}, I will close the throttles, apply maximum breaking, maintain directional control and bring the airplane to a stop on the remaining runway.

-For an engine fire or failure with runway remaining and gear down, I will close the throttles, land straight ahead, and apply maximum breaking.

-For an engine failure with no remaining runway and above V_{MC}, I will pitch for blue line, apply maximum thrust, retract gear and flaps, then identify, verify, and feather the failed engine.

-For an emergency or abnormality with altitude available, I will perform the appropriate checklist. Emergency training scenarios below 3,000'AGL will be simulated by reducing throttle. 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 & Qty	ON & CHECK QTY
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)

-	Throttle	Verify & Reduce to Idle
-	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
-	Other engine	Monitor temps & reduce power if able
-	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 only **

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 15º 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	Set for Cruise (halfway fwd)
Mixture	RICH just prior to engaging starter
Starter	Engage

- Once engine starts set throttle, prop, mixture to **15"MP & 2000 RPM**

Oil pressure	CHECK
Fuel Pump	OFF
Cowl Flaps	AS REQ.
Alternator	ON

Engine Fire in Flight

1. **Engine Fire checklist**:
   a. Affected engine throttle – verify & IDLE
   b. Affected engine mixture – verify & idle CUTOFF
   c. Affected engine fuel selector – verify & OFF
   d. Affected engine fuel pump – verify OFF
2. **Emergency Descent checklist**:

a.	Throttles	Both IDLE
b.	Props	Full FWD
c.	Cowl flaps	Closed
d.	Landing Gear	DOWN below V_{LE}
e.	Airspeed	Maintain < V_{LE} (150 MPH)

   f. Bank 40-45º to decrease vertical lift, or slip to increase drag.
   g. Recover on operating engine once the fire is out or approaching 1500' AGL.
3. **Engine Power Loss & Securing After Engine Fire**:

a.	Pitch for **Blue Line**	**105 MPH**
b.	Bank into good engine	< 5° & check ball ½ deflected
c.	Mix, Prop, Throttle	FWD on operating engine
d.	Gear	UP or as needed
e.	Flaps	UP
f.	Identify	DEAD FOOT
g.	Verify	Confirm operating engine
h.	Affected engine prop	Verify & FEATHER
i.	Affected engine mags	Verify & OFF
j.	Affected engine alternator	Verify & OFF
k.	Affected engine cowl flap	CLOSED (open on operating engine)

4. **Single-Engine Landing:** On final, landing assured:

a.	Landing Gear	DOWN
b.	Flaps	EXTEND 15º
c.	V_{APP}	BLUE LINE – 105 MPH

Electrical Fire or Smoke in Flight

Master Switch	OFF
Vents	OPEN
Door	Open if necessary
Cabin Heater	OFF
Oxygen (if equipped)	As required

- Land as soon as possible without flaps, V_{APP} 100 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

Power Off Landing (Both Engines Out)

Pitch for Best Glide	110 MPH
Landing Site	Select, spiral over if able
Propellers	FEATHER BOTH
Mixtures	IDLE
Magnetos	ALL OFF
Fuel Selectors	BOTH to OFF
Radio	Declare emergency
Landing Gear	DOWN if/when appropriate

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 landing site
Setup: fuel pumps ON & fuel on MAIN tanks

Steep Turns

1. Setup: Cruise (18" MP, 2400 RPM, mix lean, cowl flaps closed, CHAPS)
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.

Accelerated Stall

1. Setup: Cruise (15" MP, 2400 RPM, mix lean, cowl flaps closed, CHAPS)
2. Slow to between 110-120 MPH.
3. Enter into a 45° bank steep turn, increasing back pressure to hold altitude 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.

Slow Flight

1. Setup: Takeoff or Landing (2400 RPM, mix rich, cowl flaps open, CHAPS)
2. Throttles — 14" MP
3. Landing Gear — Extend below 140 MPH
4. Flaps — Extend below 120 MPH
5. Throttles — 16" MP
6. Pitch — Maintain airspeed of 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, CHAPS)
2. Throttles — 14" MP
3. Landing Gear — Extend below 140 MPH
4. Flaps — Extend below 120 MPH
5. Throttles — 12" MP
6. Begin a descent to landing at V_{APP} (95 MPH)
7. Once stabilized, begin a roundout and flare.
8. Bring throttles to idle. Recover at first sign of stall.

Recovery:

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

Power-On Stall

1. Setup: Takeoff (mix rich, cowl flaps open, CHAPS)
2. Throttles — 14" MP
3. Props — **2100 RPM** maximum
4. Slow to 90 MPH (or as instructed by examiner)
5. Throttles — 21" MP maximum
6. Begin a climb at V_X, then pitch up slightly to try to climb steeper 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.

Emergency Descent

1. Setup: simulated engine fire (perform Engine Fire in Flight 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: No lower than 1500' AGL & Cruise checklist.

V_{MC} Demo

1. Setup: Takeoff climb (gear & flaps up, mix rich, cowl flaps open, CHAPS)
2. Throttles 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, CHAPS)
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, airspeed > 105**
   - 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})