

V _S	64 MPH	V _Y	88 MPH	V _{BG} @2000 lbs	68 MPH
V _{SO}	55 MPH	V _{FE}	110 MPH	V _{BG} max	80 MPH
V _R	60 MPH	V _A @ max	128 MPH	V _{NO}	160 MPH
V _X	70 MPH	V _A @ 2000 lbs	108 MPH	V _{NE}	193 MPH

Before Starting Engine

- 1) Preflight inspection – COMPLETE
- 2) Towbar – STOWED
- 3) Fuel caps – ON & SECURE
- 4) Pitot cover – REMOVED
- 5) Control lock – REMOVED
- 6) Documents – ON BOARD
- 7) Hobbs & tach – RECORDED
- 8) Airplane keys – ON DASH
- 9) Pax & PIC briefing – COMPLETE
- 10) Seats & seatbelts – ADJUSTED
- 11) Brakes – TEST & SET
- 12) Avionics & electrical equipment – OFF
- 13) Circuit breakers – CHECK IN
- 14) Cowl flaps – OPEN
- 15) Fuel selector – BOTH
- 16) Doors – CLOSED & LOCKED

Starting Engine

- 1) Primer
 - Engine Cold – 2-3 strokes, locked
 - Engine Hot – 0-1 strokes, locked
- 2) Carb heat – COLD
- 3) Throttle – OPEN ¼ inch
- 4) Prop – FULL FWD
- 5) Mixture – RICH
- 6) Master switch – ON
- 7) Beacon/strobes – ON
- 8) Propeller area – “CLEAR” and visually clear area
- 9) Ignition – START, slowly advance throttle, release after start
- 10) Throttle – SET 800 to 1000 RPM
- 11) Oil pressure – CHECK GREEN within 30 seconds

After Start

Look around and move if people are waiting.

Don't block the ramp!

- 1) Ammeter – CHECK slightly positive
- 2) Avionics – ON
- 3) Mixture – LEAN for taxi, slightly rich of engine roughness
- 4) Flaps – UP, visually confirm (DO NOT hold flap handle UP/DOWN longer than necessary as it will damage the flap motor)
- 5) Transponder – ALT & 1200
- 6) ATIS/AWOS/ASOS – CHECK
- 7) Flight instruments – SET (altimeter near FE)
- 8) Radios – SET, CONTACT GROUND

Taxi

- 1) Brief taxi diagram & hot spots
- 2) Brakes – CHECK gently
- 3) Flight instruments – CHECK OPERATION

Run-up

- 1) Nosewheel straight, brakes held tight
- 2) Flight Controls – FREE & CORRECT
- 3) Elevator & rudder trim tabs – SET FOR TAKEOFF
(trim flush with elevator, rudder pedals neutral)
- 4) Flight instruments – CHECK & SET
- 5) Doors & windows – CLOSED & LATCHED
- 6) Cowl flaps – OPEN
- 7) Primer – IN & LOCKED
- 8) Mixture – RICH
Keep runup under 2 minutes and watch temps
- 9) Throttle – 1700 RPM
- 10) Magnetos – TEST R, BOTH, L, then BOTH
(50 RPM differential)
- 11) Propeller – CYCLE (approx. 300 RPM drop)
- 12) Carb heat – CHECK HOT, note RPM drop, then COLD
- 13) Engine instruments – CHECK
- 14) Ammeter – CHECK (do not cycle the alternator!)
- 15) Throttle – IDLE (500-800 RPM), then 800-1000
- 16) Throttle friction – ADJUSTED
- 17) GPS/NAV – SET
- 18) Transponder – ALT & squawk code
- 19) Takeoff briefing – COMPLETE

“This will be a normal (short-field/soft-field) takeoff, flaps up (20°), departing runway ____ with a climb to ____ feet. V_R is 60, V_X is 70, V_Y is 88, and normal climb once clear of obstacles is 110 MPH.

For any abnormality with runway remaining, I will call “abort, abort,” reduce the throttle to idle, and bring the aircraft to a stop on the runway. For an engine failure below 400' AGL, I will land straight ahead. I will not attempt to return to the runway until reaching a safe altitude. For any abnormality or emergency I will aviate, navigate, communicate, and run the appropriate checklist. Best glide is 80*. Any questions?”

*Best glide varies with weight and flaps

Before Take-off

- 1) Lights – AS NEEDED
- 2) Carb heat – COLD
- 3) Prop – FULL FWD
- 4) Mixture – RICH (or set for DA)
- 5) Flaps – UP for normal takeoff
(20° for short-field or soft-field)
- 6) Fuel – CHECK quantity, fuel on BOTH
- 7) Cowl flaps – OPEN
- 8) Trim tabs – SET FOR TAKEOFF
- 9) Seats & seatbelts – ADJUSTED
- 10) Doors & windows – CLOSED & LATCHED
- 11) Radios – SET & CONTACT TOWER

Normal Takeoff

- 1) Flaps – UP, visually confirm
- 2) Throttle – Smoothly to FULL FWD
- 3) Engine instruments – CHECK
- 4) Elevator – Lift nosewheel at 60 MPH
- 5) Climb – 90 MPH to safe altitude, then 100-120+

Enroute Climb (at 1000' AGL & clear of obstacles)

- 1) Airspeed – 100 to 120 MPH (climb 120* MPH on hot days)
- 2) Cowl flaps – OPEN
- 3) Mixture – RICH (lean *slightly* above 5000 *if* engine temps cool)
- 4) Prop – SET 2450 RPM
- 5) Throttle – SET 23" MP
- 6) Engine instruments – MONITOR CONTINUALLY
CHTs < 415°F EGTs < 1515°F Oil temp < 220°F

Cruise

- 1) Throttle & Prop – SET per POH chart (< 70% power)

59% power at 2500': 21" & 2200 = TAS 142/10.8 GPH
64% power at 5000': 21" & 2300 = TAS 151/11.9 GPH
66% power at 7500': 21" & 2300 = TAS 156/12.2 GPH
- 2) Engine instruments – CHECK & MONITOR
- 3) Cowl flaps – CLOSE once CHTs are below 400°
- 4) Mixture – LEAN FOR ALTITUDE (rich of peak)
 - **Maintain CHTs < 400° and EGTs < 1515°**
- 5) Trim tabs – SET for cruise airspeed
- 6) Flight instruments – CHECK

Descent

- 1) ATIS/AWOS/ASOS – CHECK
- 2) Flight instruments – CHECK & SET
- 3) Radios – SET, report 10 miles out
- 4) Approach/pattern entry briefing – COMPLETE
- 5) Carb heat – ON if required
- 6) Throttle – REDUCE max of 2" MP per min.
- 7) Mixture – ENRICHEN throughout descent
- 8) Cowl flaps – CLOSED
- 9) Seats & seatbelts – ADJUSTED

Before Landing (GUMPS)

- 1) Lights – AS NEEDED
- 2) Fuel – CHECK quantity, fuel on BOTH, primer LOCKED
- 3) Carb heat – ON before closing throttle
- 4) Mixture – RICH
- 5) Prop – FULL FWD once below 12" MP
- 6) Airspeed – 90 MPH flaps UP
- 7) Airspeed – 75 to 80 MPH flaps DOWN

After Landing (stop once clear of runway)

- 1) Radio – Switch to GROUND when advised
- 2) Cowl flaps – OPEN
- 3) Flaps – UP, visually confirm
- 4) Mixture – LEAN for taxi
- 5) Prop – FULL FWD
- 6) Carb Heat – COLD
- 7) Lights – AS NEEDED
- 8) Trim tabs – SET FOR TAKEOFF
- 9) Transponder – ALT & 1200
- 10) Radios – CONTACT GROUND

Shutdown

- 1) Avionics and electrical switches – OFF
- 2) Throttle – 1000 RPM
- 3) Mixture – IDLE CUTOFF
CONTINUED →

- 4) Ignition – OFF, key on dash
- 5) Master switch – OFF
- 6) Fuel selector – LEFT or RIGHT TANK
- 7) Cowl flaps – CLOSED
- 8) Control lock, sunshade & pitot cover – INSTALL
- 9) Hobbs & tach – RECORD
- 10) Trash – REMOVE & TIDY UP
- 11) Tiedowns & chocks – INSTALL
- 12) Doors – LOCK

Soft-field Takeoff

- 1) Flaps – 20°
- 2) Elevator – FULL AFT
- 3) Brakes – Minimize use
- 4) Throttle – Smoothly to FULL FWD
- 5) Engine instruments – CHECK
- 6) Elevator – Maintain nose high/tail low until liftoff
- 7) Climb – Remain in ground effect until 60 MPH, then begin climb* and accelerate to V_Y 88 MPH
- 8) Flaps – RETRACT in 10° increments

* If obstacles are present: climb at 60 MPH until clear of obstacles, then accelerate to V_Y and retract flaps.

Normal and Soft-field Landing

- 1) Flaps – 30° (or less, as needed with a crosswind)
- 2) Airspeed – PITCH for 75 to 80 MPH
- 3) Throttle – ADJUST for descent rate
- 4) Touchdown – MAIN WHEELS FIRST
- 5) Elevator – Increase gradually to FULL AFT during deceleration
- 6) Brakes – Minimize use

Short-field Takeoff

- 1) Flaps – 20°
- 2) Brakes – HOLD
- 3) Throttle – Smoothly to FULL FWD
- 4) Engine instruments – CHECK
- 5) Brakes – RELEASE
- 6) Elevator – Lift nosewheel at 60 MPH
- 7) Climb – 60 MPH until clear of obstacles
- 8) Accelerate – 88 MPH
- 9) Flaps – RETRACT in 10° increments

Maximum Performance Climb

- 1) Airspeed – V_Y 88* MPH at S.L.
- 2) Throttle & Prop – FULL FWD
- 3) Engine instruments – MONITOR CAREFULLY!
- 4) Mixture – RICH
- 5) Cowl flaps – OPEN
* V_Y: Subtract 2 MPH for every 5000' of altitude

Short-field Landing

- 1) Flaps – 40°
- 2) Airspeed – PITCH for 69 MPH
- 3) Throttle – ADJUST for descent rate
- 4) Touchdown – MAIN WHEELS FIRST
- 5) Brakes – APPLY, but do not skid tires!
- 6) Flaps – RETRACT