

V <sub>S</sub> 50 KIAS	V <sub>A</sub> @ max weight 106 KIAS	V <sub>LO</sub> 140 KIAS
V <sub>S0</sub> 42 KIAS	V <sub>A</sub> @ 2250 lbs 98 KIAS	V <sub>LE</sub> 164 KIAS
V <sub>R</sub> 55 KIAS	V <sub>FE</sub> Flaps 10° 130 KIAS	V <sub>NO</sub> 145 KIAS
V <sub>X</sub> 67 KIAS	V <sub>FE</sub> Flaps 20-30° 100 KIAS	V <sub>NE</sub> 164 KIAS
V <sub>Y</sub> 84 KIAS	V <sub>BG</sub> @2250 lbs 67 KIAS	V <sub>BG max</sub> 73 KIAS

**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) Landing gear lever – DOWN
- 14) Circuit breakers – CHECK IN
- 15) Cowl flaps – OPEN
- 16) Fuel selector – BOTH
- 17) 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
- 4) Flaps – UP, visually confirm
- 5) Gear indication lights – CHECK & TEST
- 6) Transponder – ALT & 1200
- 7) ATIS/AWOS/ASOS – CHECK
- 8) Flight instruments – SET (altimeter near FE)
- 9) 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) Primer – IN & LOCKED
- 7) Aux fuel pump – ON, rise in pressure, OFF
- 8) Cowl flaps – OPEN
- 9) Mixture – RICH  
**\*Keep runup under 2 minutes and watch temps\***
- 10) Throttle – 1800 RPM
- 11) Magnetos – TEST R, BOTH, L, then BOTH  
(max. 150 RPM drop & 50 RPM differential)
- 12) Propeller – CYCLE 1-3x (approx. 300 RPM drop)
- 13) Carb heat – CHECK (HOT, RPM drop, COLD)
- 14) Engine instruments – CHECK
- 15) Ammeter – CHECK (do not cycle the alternator!)
- 16) Suction gauge – CHECK
- 17) Throttle – IDLE (500-800 RPM), then 800-1000 RPM
- 18) Throttle friction – ADJUSTED
- 19) GPS/NAV – SET
- 20) Takeoff briefing – COMPLETE

“This will be a normal/short-field (soft-field) takeoff, flaps up (10°), departing runway \_\_\_\_ with a climb to \_\_\_\_ feet. V<sub>R</sub> is 55, V<sub>X</sub> is 67, and V<sub>Y</sub> is 84 KIAS. 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 approximately 70 KIAS. Any questions?”

**Before Takeoff**

- 1) Lights – AS NEEDED
- 2) Transponder – ALT & squawk code
- 3) Flaps – UP for normal/short-field takeoff  
(10° for soft-field)
- 4) Mixture – RICH (or set for DA)
- 5) Prop – FULL FWD
- 6) Carb heat – COLD
- 7) Trim tabs – SET FOR TAKEOFF
- 8) Fuel – CHECK quantity, fuel on BOTH, primer LOCKED
- 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 55 KIAS
- 5) Climb – V<sub>Y</sub> 84 KIAS to safe altitude, then 85-95+
- 6) Brakes – APPLY momentarily
- 7) Landing gear – RETRACT

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

- 1) Airspeed – 85 to 95 KIAS (climb at 95+ KIAS on hot days)
- 2) Cowl flaps – OPEN
- 3) Mixture – RICH (lean *slightly* above 5000 *if* engine temps cool)
- 4) Prop – SET 2500 RPM
- 5) **Throttle – FULL FWD (YES, this is best engine cooling!)**
- 6) Engine instruments – MONITOR CONTINUALLY

**Cruise**

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

62% power at 3000': 22" & 2300 = TAS 121/8.4 GPH
65% power at 6000': 22" & 2300 = TAS 128/8.8 GPH
63% power at 8000': 21" & 2300 = TAS 127/8.5 GPH
- 2) Mixture – LEAN FOR ALTITUDE once oil temp is below 210° and EGTs are below 1400°
- 3) Cowl flaps – CLOSE when CHTs are below 400°
- 4) Engine instruments – CHECK & MONITOR
- 5) Trim tabs – SET for cruise airspeed
- 6) Flight instruments – CHECK & SET

**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) Landing gear – below V<sub>LO</sub>, DOWN & GREEN
- 4) Carb Heat – ON before closing throttle
- 5) Mixture – RICH
- 6) Prop – FULL FWD once below 12" MP
- 7) Airspeed – 70 to 75 KIAS flaps UP
- 8) Airspeed – 65 to 70 KIAS 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
- 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 – 10°
- 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 63 KIAS, then begin climb\* and accelerate to V<sub>Y</sub> 84 KIAS
- 8) Landing gear – RETRACT
- 9) Flaps – RETRACT

\* If obstacles are present: climb at 63 KIAS until clear, then accelerate to V<sub>Y</sub> and retract gear & flaps.

**Normal and Soft-field Landing**

- 1) Flaps – 30° (or less, as needed with a crosswind)
- 2) Airspeed – PITCH for 65 to 70 KIAS
- 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 and/or Obstacle Takeoff**

- 1) Flaps – UP
- 2) Brakes – HOLD
- 3) Throttle – Smoothly to FULL FWD
- 4) Engine instruments – CHECK
- 5) Brakes – RELEASE
- 6) Elevator – Lift nosewheel at 55 KIAS
- 7) Climb – \*63 KIAS until clear of obstacles
- 8) Landing gear – RETRACT once clear of obstacles
- 9) Climb – 85 to 95 KIAS

\* See AFM Figure 5-4 to adjust climb speed for weight

**Maximum Performance Climb**

- 1) Airspeed – V<sub>Y</sub> 84\* KIAS at S.L.
  - 2) Cowl flaps – OPEN
  - 3) Mixture – RICH
  - 4) Throttle & Prop – FULL FWD
  - 5) Engine instruments – MONITOR CAREFULLY!
- \* See AFM Figure 5-6 to adjust V<sub>Y</sub> for altitude

**Short-field Landing**

- 1) Flaps – 30°
- 2) Airspeed – PITCH for 63 KIAS
- 3) Throttle – ADJUST for descent rate
- 4) Touchdown – MAIN WHEELS FIRST
- 5) Brakes – APPLY, but do not skid tires!
- 6) Flaps – RETRACT