Airspeed Limitations:

Speed Name/Remarks		Calibrated Airspeed	
		Knots	MPH
V_{NE}	Never Exceed Speed Do not exceed this speed in any operation	148	171
V_{NO}	Max structural cruising speed Do not exceed this speed except in smooth air and then only with caution	121	140
V_A	Maneuvering speed at 2,400 Pounds	112	129
V_{FE}	Maximum flap extended speed	100	115
V_S	Stall speed (No Flaps)	58	67
V_{S0}	Stall speed in landing configuration (40^o Flaps)	49	57
	Demonstrated Crosswind capability		

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Optimum/Recommended Speeds:

Speed Name/Remarks		Indicated Airspeed	
		Knots	MPH
V_X	Best angle of climb	64	74
V_Y	Best rate of climb	74	85
V_R	Normal rotation	53	60
	Normal climb	74	85
	Enroute climb	87	100
	Normal landing (no flaps)	74	85
	Normal landing (full flaps)	66	76
	Powered landing (no flaps)	74	85
	Powered landing (full flaps)	66	76
	Max performance approach	61	70
	Optimum glide	71	82

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Maneuvering Limits:

Speed Name/Remarks	Max Indicated Airspeed	
	Knots	MPH
Chandelles	Use V_A	
Lazy Eights	Use V_A	
Steep Turns	Use V_A	
Spins	Not Authorized	
Stalls (except whip stalls)		

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Engine Failure During Takeoff Run:

Throttle.....Idle
Brakes .....Apply
Flaps.....Retract
Mixture .....Idle Cutoff
Ignition Switch .....Off
Master Switch.....Off

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Engine Failure Immediately After Takeoff:

1. **If enough runway remaining to land:**
   Throttle ..... Idle
   Land airplane
   Brakes..... Apply
   Flaps ..... 40°
   Mixture..... Idle cutoff
   Ignition Switch..... Off
   Master Switch ..... Off
2. **Not enough runway to land**
   Airspeed ..... 82 MPH IAS (71 Knots)
   Fly runway heading to emergency landing site
   Mixture..... Idle cutoff
   Fuel Selector..... Off
   Ignition switch ..... Off
   Flaps ..... As required
   Master switch..... Off
   Door ..... Ajar

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Engine Failure In Flight:

1. **Gain all the altitude you can!**

   Pull back (gently) to use the aircraft's momentum to gain altitude until airspeed falls off to the optimum glide speed (82 MPH IAS; 71 Knots).

2. **Airspeed - Optimum glide speed 82 MPH IAS (71 Knots)**

   Trim the airplane for optimum glide speed..

3. **Find a suitable place to land and fly to it**

   If altitude and distance to selected site permit, try to set up a normal landing pattern. If that's not possible, take what you can get. Regardless of whether or not a full pattern can be set up, make sure the approach results in a landing parallel to any furrows in the selected field.

4. **If time permits, try to correct the problem**

   Fuel Selector ..... Fullest tank
   Electric Fuel Pump..... On
   Mixture ..... Rich (Forward)
   Carburetor Heat..... On
   Throttle..... 1/4 Inch
   Primer..... In and Locked
   Master Switch..... On (Both sides)
   Ignition switch..... Both magnetos
   Start - if propeller is stopped.

5. **If still have time communicate**

   Transponder..... 7700
   Comm Radio..... 121.5

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Emergency Landing Without Engine Power:

1. **Fly the airplane**

   Airspeed ..... 82 MPH IAS / 71 Knots (flaps up)
   76 MPH IAS / 66 Knots (flaps down)

2. **Prepare aircraft for landing**

   Mixture..... Idle cutoff
   Fuel Selector..... Off
   Electric Fuel Pump ..... Off
   Ignition Switch..... Off
   Flaps ..... As required (40° recommended)
   Master Switch ..... Off
   Door ..... Unlatch prior to touchdown

3. **Landing**

   Touchdown ..... Lowest possible speed
   Brakes..... Apply heavily

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Precautionary Landing With Engine Power:

1. **Fly the airplane**

   Airspeed.....As appropriate
   Flaps.....25°
   Selected Field.....Inspect

   Fly over field noting terrain and obstructions then retract flaps upon reaching a safe altitude and airspeed.

2. **Prepare airplane for landing**

   Radios and Electrical.....Off
   Flaps.....As required
   Airspeed.....76 MPH IAS (66 Knots) on final
   Master Switch.....Off
   Door.....Unlatch prior to touchdown

3. **Landing**

   Touchdown.....As slow as possible
   Ignition Switch .....Off
   Brakes .....Apply heavily

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Ditching:

1. **Prepare for ditching**

   Radio ..... Transmit MAYDAY on 121.5

   Give location, situation and intentions.

   Note, if you were already communicating with ATC, report situation to controller, as opposed to using 121.5.

   Transponder 7700
   Heavy Baggage..... Secure or jettison

2. **Fly the airplane**

   Approach

   High wind / Heavy seas - Into the wind

   Light winds / Heavy swells - Parallel to the swells

   Flaps ..... 25° - 40°
   Power..... 300 ft./min. descent, 76 MPH IAS (66 Knots).
   Cabin Doors ..... Unlatch prior to touchdown

3. **Landing**

   Touchdown ..... Level attitude at 300 ft./min. descent
   Face ..... Cushion with folded coat
   Evacuate..... Through door.

   If necessary, open window to allow cabin to flood to equalize pressure so door can be opened.

   Life Vests and Raft ..... Inflate

Engine Fire During Start Up:

If Engine Has No Started

Mixture ..... Idle Cutoff
Throttle..... Full Open
Crank engine with starter to suck fire into the engine

If Engine Has Started

Continue running to try to suck fire into the engine

In either case if fire is not out in a few seconds

Fuel..... Off
Mixture ..... Idle Cutoff
Use fire extinguisher

Engine Fire In Flight:

Fuel Selector ..... Off
Throttle..... Closed
Mixture ..... Idle Cutoff
Heater..... Off
Defroster..... Off
Landing..... Forced Landing Without Power

Electrical Fire In Flight:

Master Switch..... Off
Vents ..... Open
Cabin Heat/Defroster ..... Off
Landing..... As soon as possible

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Cabin Fire:

Master Switch ..... Off
Vents, Cabin Heat/Air ..... Closed
Fire Extinguisher ..... Activate
After using fire extinguisher within a closed cabin ventilate the cabin.
Landing ..... As soon as possible

Wing Fire:

Navigation lights ..... Off
Strobe Lights ..... Off
Pitot Heat..... Off
Attitude
Perform side-slip to keep the flames away from the fuel tank and cabin.
Land..... ASAP
Do not use flaps.

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Pre-Flight Inspection Checklist:

1. Wing Tops/Fuel Tanks

Fuel Level ..... Both Wings - Visual check

If needed get gas (AVGAS 100) before proceeding with other fuel tank related items.

Filler caps ..... Both Wings - Secure

Wing Tops ..... Inspect for loose screws, rivets and damage

2. Cockpit

Control wheel lock ..... Remove

Ignition switch ..... Off

Master switch ..... On (both sides)

Fuel gauges ..... Check quantity

Flaps ..... 10°

Pitot Heat ..... On - observe Ammeter drop - then off

Strobe/Beacon ..... On - visually check - off

Master Switch ..... Off

Fuel tank selector ..... On fullest tank

Paperwork:

Airworthiness certificate

Registration

Operating limitations (POH)

Weight/loading data

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3. Cockpit - Night Flights

Nav Lights & Strobes ..... On

Walk around plane and visually check to see that all are operating.

Landing Light ..... On

Visually check from outside if not dark enough to see that it's on from inside the cockpit.

Instrument Lights ..... On

Light switches ..... Off (except beacon)

Master switch ..... Off

3. Right Wing

Flap ..... Check freedom of movement and security.

Aileron ..... Check security and freedom of movement

Wing tip ..... Check for cracks; Check light security.

Leading edge ..... Look for dents

Fuel sump ..... Check sample for color, water and dirt.

Main landing gear ..... Check tire wear, brake pads, leaking brake fluid.

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4. Nose

Cowling	Check secured.
Oil	8 Quarts max; 6 Quarts minimum.
Nose gear	Check tire wear; Strut inflation; security
Engine compartment	Check for bird's nests
Propeller	Check for nicks and security;
Spinner	Check security
Landing light	Check security
Air Filter	Check clean and security
Fuel sump	Check sample for color, water and dirt.

4. Left Wing

Leading edge	Look for dents
Main landing gear	Check tire wear, brake pads, leaking brake fluid.
Fuel sump	Check sample for color, water and dirt.
Pitot/Static	Check cover off; Check holes not obstructed.
Wing tip	Check for cracks; Check light security.
Aileron	Check security and freedom of movement.
Flap	Check freedom of movement and security.
Stall Warning Vane	Check for free operation

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5. Fuselage – Left Side

Check for loose rivets, screws and damage.

6. Empenage

Stabilator	Check security and freedom of movement.
Rudder	Check security and freedom of movement.

7. Fuselage – Right Side

Check for loose rivets, screws and damage

Baggage Door	Closed and locked

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Normal Engine Starting Checklist:

1. **Before Starting**

Preflight Inspection	**Completed**
Seat position	**Adjust & ensure locked**
Seal belts/harness	**Adjust and lock**

Brief passengers on use of belts/harnesses and requirements for wearing them.

Fuel Selector	**Fullest Tank**
Radios/electrical	**Off**
Autopilot	**Off**
Brakes	**Test and set**
Circuit Breakers	**Check all in**

2. **Starting Engine**

Mixture	**Rich (Forward)**
Carburetor heat	**Cold (up)**
Primer	**Prime if required** **Make sure locked in**
Throttle	**1/4 Inch**
Key	**In ignition**
Master Switch	**On (both sides)**
Fuel Pump	**On**
Propeller Area	**Call "Clear" & check prop area and behind plane**
Ignition	**Start - release on start**
Throttle	**1,000 RPM**
Oil Pressure	**Check in green**

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3. **Before Taxiing**

Radios	**On and set to appropriate frequency. Call for radio check**
Transponder	**Standby**
Beacon/Strobe	**On**
Nav. Lights/Strobes	**On if required**
Flaps	**Full up (normal takeoff)**

4. **Taxiing**

Clearance	**Check for things in way of wings** **Check for people ahead of and behind plane**
Flight Controls	**Set for existing wind conditions**
Brakes	**Come to full stop immediately after starting taxi roll**

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5. IFR Instrument Checks

Turn Coordinator	**Should indicate turn in proper direction while taxiing.**
Attitude Indicator	**Very little change due to turns; Slight pitch indications due to acceleration or deceleration.**
Heading Indicator	**Should track headings.**
Altimeter	**When set to current altimeter setting should indicate within 75 ft. of airport elevation.**
VSI	**Should indicate zero. If not, note indication and use for level indication in flight.**
VORs	**Check at local ground check point or against each other based on some receivable signal.**

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Before Takeoff Checklist:

1. **Final Cockpit Check**

Cabin door ..... **Closed and latched**
Flight Controls ..... **Free and correct**
Elevator trim ..... **Takeoff position**
Rudder trim ..... **Takeoff position**
Flight Instruments ..... **Check and set**

Set attitude indicator to level flight position

Set altimeter to runway altitude or locally reported altimeter setting

Set heading indicator to magnetic compass

Comm Radio/VOR ..... **Set to appropriate freqs**
Beacon/Strobe ..... **On**
Nav Lights/Strobes ..... **On if required**
Autopilot ..... **Off**

2. **Engine Run-up**

Fuel Selector ..... **Fullest Tank**
Mixture ..... **Rich (Forward)**
Parking brake ..... **Set or hold foot brakes**
Throttle ..... **1,800 RPM**
Magnetos ..... **Check**

RPM drop should not exceed 125 RPM on either magneto.

RPM difference between magnetos should not exceed 50 RPM.

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Carburetor Heat ..... **On**

Check for RPM drop then back to off

Engine instruments ..... **Check**

Oil pressure/Temperature

Suction

Ammeter - Create electrical load with landing light. Make sure no more than needle width deflection.

Fuel Pump ..... **Momentarily Off; Check for good fuel pressure; On**
Throttle ..... **1,000 RPM**
Throttle quadrant lock ..... **Adjust**
Transponder ..... **Set to mode C/Altitude**

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Normal Takeoff and Climb Procedures

Flaps.....Full up
Carburetor Heat.....Cold (Up)
Fuel Pump.....On
Elevator Trim.....Takeoff position
Rudder Trim.....Takeoff position
Heading indicator.....Calibrate against compass
Throttle.....Full open (Forward)
Engine Instruments .....Check while starting roll
RPM – In the green arc
Oil Pressure - In the green
Oil Temperature - In the green
Suction - In the green
Airspeed.....Building
Elevator.....Lift nose wheel at 60 MPH (52 KIAS)
Climb Speed .....85 MPH (74 KIAS)

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Maximum Performance Takeoff (Short Field):

Taxi ..... Maximum runway usage
Takeoff procedure should be started using ALL available runway. Taxi to end of runway and align with centerline.
Brakes..... Set and hold
Flaps ..... 25^0
Carburetor Heat ..... Cold (Up)
Fuel Pump ..... On
Elevator Trim ..... Takeoff position
Rudder Trim ..... Takeoff position
Heading indicator ..... Calibrate against compass
Throttle ..... Full open (in)
Engine Instruments..... Check before starting roll
RPM – In the green arc
Oil Pressure - In the green
Oil Temperature - In the green
Suction - In the green
Brakes..... Release
Airspeed ..... Building
Elevator ..... Slightly tail low
Climb Speed..... 74 MPH (65 KIAS) until obstacles are cleared, then 85 MPH (74 KIAS).
Flaps ..... Retract at safe altitude with positive rate of climb.

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Soft Field Takeoff:

Taxi.....**Keep rolling to avoid bogging down**

Flaps.....**25°**

If 25° flaps are used, with obstacles ahead, leave them extended until the obstacle is cleared and at a safe altitude.

Carburetor Heat.....**Cold (Up)**

Fuel Pump.....**On**

Elevator Trim.....**Takeoff position**

Rudder Trim.....**Takeoff position**

Heading indicator.....**Calibrate against compass or runway heading**

Throttle.....**Full open (in)**

Engine Instruments.....**Check as starting roll**

RPM – In the green arc

Oil Pressure - In the green

Oil Temperature - In the green

Suction - In the green

Airspeed.....**Building**

Elevator.....**Slightly tail low**

Allow the airplane to lift off as soon as possible (before reaching safe climb speed). Level off at a few feet above the ground and fly in ground effect until reaching normal climb speed.

Climb Speed.....**74 MPH (65 KIAS) until obstacles are cleared, then 85 MPH (74 KIAS).**

Flaps.....**Retract at safe altitude with positive rate of climb.**

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After Takeoff Checklist

1. **Climbout**

   Airspeed.....**85 MPH (74 KIAS)**

   Altitude.....**Above 300 AGL**

   Flaps.....**Up (one click at a time)**

   Fuel Pump.....**Off at 1,000 AGL; Check fuel pressure**

2. **At Cruise Altitude**

   Attitude.....**Level**

   Airspeed.....**Let build to desired cruise speed**

   Throttle.....**Reduce to desired cruise setting**

   Heading Indicator.....**Calibrate against compass**

3. **Above 5,000 MSL**

   Mixture.....**Lean for maximum RPM**

Enroute Climb:

Normal Alrspeed.....**100 MPH (87 KIAS)**

Max Performance.....**See POH Climb Table in Section IV**

Throttle.....**Full Open (Forward)**

Carburetor Heat.....**Cold (Up)**

Mixture.....**Rich (Forward) below 5,000 ft. Leaned for maximum RPM above 5,000.**

Normal Approach and Landing Procedures:

1. **Pre-Landing (Downwind) check**

Seat belts/Harnesses.....Adjust and lock
Mixture .....Rich (Forward)
Fuel Selector .....Fullest Tank
Fuel Pump.....On; Check fuel pressure
Autopilot .....Off

2. **Approach and Landing**

Power .....Reduce to 1,300 to 1,500 RPM abeam approach end of runway
Airspeed.....Let bleed off to less than 115 MPH (100KIAS)
Flaps.....Use as desired

Under light (less than 10 Knots) wind conditions 10^{o} descending on the end of the downwind leg, 25^{o} on base, and full flaps over the threshold as required.

In heavier winds 25^{o} or less is good flap setting for landing.

Use minimum flap setting possible for cross wind landing

Airspeeds

Downwind through base 90 MPH (78 KIAS)

Final approach 80 - 85 MPH (70 – 74 KIAS)

In gusty winds add 1/2 difference between gust and average wind speed to approach speed.

Touchdown

Just above stalling speed - main wheels first.

Landing Roll

Lower nose wheel gently

Braking

Minimum required.

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Short Field Landing:

1. **Pre-Landing (Downwind) check**

Seat belts/Harnesses ..... Adjust and lock
Mixture..... Rich (Forward)
Fuel Selector..... Fullest Tank
Fuel Pump ..... On; Check fuel pressure
Autopilot..... Off

2. **Approach and landing**

Power..... Reduce to 1,300 to 1,500 RPM abeam approach end of runway
Airspeed ..... Let bleed off to less than 115 MPH (100KIAS)

Flaps

Under light (less than 10 Knots) wind conditions 10^{o} descending on the end of the downwind leg, 25^{o} on base, and full flaps on final.

Airspeeds

Downwind through base 90 MPH (78 KIAS)

Final approach 70 - 75 MPH (61 – 65 KIAS)

In gusty winds add 1/2 difference between gust and average wind speed to approach speed.

Touchdown

Roundout must be done much faster than usual due to low airspeed.

Landing Roll..... Hold Nose off as long as possible.
Braking ..... Maximum possible without sliding tires; Hold full up elevator
Flaps ..... Retract

Soft Field Landing:

1. **Pre-Landing (Downwind) check**

Seat belts/Harnesses.....Adjust and lock
Mixture .....Rich (Forward)
Fuel Selector .....Fullest Tank
Fuel Pump.....On; Check fuel pressure
Autopilot .....Off

2. **Approach and Landing**

Power .....Reduce to 1,300 to 1,500 RPM abeam approach end of runway
Airspeed.....Let bleed off to less than 115 MPH (100KIAS)
Flaps.....Use as desired

Under light (less than 10 Knots) wind conditions 10^{o} descending on the end of the downwind leg, 25^{o} on base, and full flaps over the threshold as required.

In heavier winds 25^{o} or less is good flap setting for landing.

Use minimum flap setting possible for cross wind landing

Airspeeds

Downwind through base 90 MPH (78 KIAS)

Final approach 80 - 85 MPH (70 – 74 KIAS)

In gusty winds add 1/2 difference between gust and average wind speed to approach speed.

Touchdown

Just above stalling speed - main wheels first.

Landing Roll

Hold nose wheel off as long as possible

Braking

Minimum required.

Flight Controls .....Full up elevator

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Balked Landing (Go Around):

Throttle ..... Full Open (in)
Carburetor Heat ..... Cold (Up)
Flaps ..... Raise in increments once a positive rate of climb and safe airspeed are obtained
Airspeed ..... 85 MPH (74 KIAS)

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Post-Landing Checklists:

1. **After Landing - Clear of Runway**

   Flaps.....Full Up
   Carburetor Heat.....Off (Up
   Fuel Pump.....Off
   Elevator Trim.....Takeoff position
   Rudder Trim.....Takeoff position

2. **If Hard Landing**

   ELT.....Listen for on 121.5 on communications radio

3. **Engine Shutdown**

   Radios/Electrical.....All off
   Throttle.....1,000 RPM
   Master Switch.....Off
   Mixture.....Idle cutoff
   Ignition.....Off

4. **Securing the Airplane**

   Control Lock.....Install
   Tiedown.....Wings and Tail
   Pitot Cover.....Install
   Double Check
   All electrical equipment - Off
   Master Switch - Off

5. **Close your Flight Plan**

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Before Leaving Home

1. **Self Check**

   Feeling ok..... Yes
   Under any stress ..... No more than usual
   Taking any medication..... No
   Alcohol in last 12 Hrs. ..... No

2. **Flight Planning/Navigation Equipment**

   Current Charts
   A/FD
   POH
   Airport Guide
   E6-B
   Plotter
   Calculator
   Timer
   Custom Checklists
   Flight Plans
   Weather Reports
   Pencils
   Clipboards

3. **Emergency Items**

   Hand Compass
   Knife
   Flashlights
   Batteries
   Bulbs
   Cell Phone (Charged)
   Spare Glasses
   Sun Glasses

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