

Preflight check

1 Control wheel	Remove restraint
2 Avionics & battery master	Off
3 Magnetos	Off
4 Landing gear selector	Down
5 Battery master	On
6 Fuel quantity gauge	Check each tank
7 Wing flaps	Lower
8 Battery master	Off

Right wing

1 Control surfaces	Check
2 Wing tip and nav light	Check
3 Outboard (aux) fuel tank	Check
4 Fuel tank vents and drains	Check
5 Tie down and wheel chock	Check
6 Main gear strut inflation	2 - 3 in.
7 Tire wear and inflation	Check
8 Oil quantity	5 - 7 quarts
9 Propeller	Check for nicks
10 Area around propeller	Clear of debris
11 Cowling	Secure
12 Inboard (main) fuel tank	Check

Nose section

1 Windshield	Clean
2 Heater and ventilating air inlet	Clear
3 Nose gear strut	2 - 3 in.
4 Tire wear and inflation	Check

Left wing

1 Inboard (main) fuel tank	Check
2 Cowling	Secure
3 Area around propeller	Clear of debris
4 Propeller	Check for nicks
5 Oil quantity	5 - 7 quarts
6 Tire wear and inflation	Check
7 Main gear strut inflation	2 - 3 in.
8 Tie down and wheel chock	Remove
9 Outboard (aux) fuel tank	Check
10 Stall warning switch	Free
11 Pitot head	Check
12 Wing tip and nav light	Check
13 Control surfaces	Check

Fuselage and empennage

1 Static vents	Holes clear
2 Baggage door	Secure
3 Control surfaces	Check
4 Nav lights	Check
5 Antennas	Check
6 Dorsal fin ventilating air inlet	Clear
7 Tie down	Remove

For night operation

1 Nav and landing lights	Check
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Preflight check

2 Panel and cabin lights	Check
3 Flashlight	On board

Before starting engines

1 Time	Record
2 Seats	Adjusted
3 Seat belts	Secure
4 Brakes	Set
5 Fuel strainers	Drain 5 sec. each
6 Fuel selectors	Aux (or main)
7 Circuit breakers	Check in
8 Cowl flaps	Open
9 Alternate air	In/closed
10 Alternators	On
11 Beacon	On
12 Alternate static source	Closed
13 Landing gear selector	Down
14 Controls	Free and correct

Engine start - cold

1 Mixtures	Rich
2 Propeller controls	Full forward
3 Throttles	1/2" open
4 Magnetos	On
5 Battery master	On
6 Fuel pumps	Prime for 1-3 seconds

Clear prop

7 Starter	Engage (max 15 sec)
8 Throttle	1000 RPM
9 Oil pressure	Check
10 Mixture	Lean for taxi

In no oil pressure in 30 seconds, stop engine.

11 Repeat procedure for other engine

Engine start - hot

1 Mixture	Idle cut-off
2 Throttle	Full forward - open
3 Battery master	On
4 Magnetos	On
5 Electric fuel pump	On
6 Mixture	Full rich to purge lines - then idle cut-off
7 Electric fuel pump	Off

Clear prop

8 Magnetos	On
9 Starter	Engage
10 Throttle	Retard
11 Mixture	Advance slowly to full rich
12 Oil pressure	Check

Engine start - flooded

1 Mixture	Idle cut-off
2 Throttle	Full forward - open
3 Electric fuel pump	Off

Clear prop

4 Magneto switches	On
5 Starter	Engage
6 Throttle	Retard
7 Mixture	Advance slowly to full rich
8 Oil pressure	Check

Starter cranking periods must be limited to 30 seconds with a two minute rest between cranking periods.

Before taxi

1 Fuel computer	Set
2 Mixtures	Lean for taxi
3 Fuel pumps	Off
4 Wing flaps	Retract
5 Wing flap selector	Off position
6 Landing gear light	Check green
7 Avionics master	On
8 Fuel cross-feed	Test 1 min
9 Pitot heat (if IMC anticipated)	Test
10 Electric trim	Test
11 Autopilot	Test
12 Aux fuel tanks	Test 1 min

Taxi

1 Brakes	Check
2 Steering	Check
3 Flight instruments	Check

Run up

1 Brakes	Set
2 Fuel selectors	Main tanks
3 Mixtures	Rich
Above 5,000' density alt. lean mixtures until any engine roughness is eliminated.	
4 Throttles	1800 RPM
5 Propellers	Cycle (300 - 400 RPM drop)
6 Magnetos	Check (Max drop 175 RPM, max diff 50 RPM)
7 Vacuum	Check
8 Engine instruments	Check
9 Throttles	Check idle, then 1000 RPM

Before takeoff	
1 Fuel selectors	Main tanks
2 Mixture	Rich
3 Electric fuel pumps	On
4 Flaps	0 - 15 degrees
5 Trim tab	Set for takeoff
6 Directional gyro	Check
7 Lights	Set
8 Transponder	Set
9 Cabin door	Secure

Takeoff	
1 Throttles	Smooth and steady increase
2 Engine instruments	Check
3 Airspeed	Alive
4 Vr	78 kts
<i>Positive rate of climb</i>	
5 Brakes	Tap
6 Landing gear	Retract
7 Gear indicator	Amber
8 Climb at Vy	97 kts
9 Flaps	Retract

Climb	
At 500' AGL	
1 Verify gear	Up
2 Verify flaps	Up
3 Electric fuel pumps	Off
4 Fuel flow/engine instruments	Check

Max performance climb	
1 Power	Full throttle and RPM

Normal climb	
1 Full power	Until 1000' AGL
2 En route climb speed	113 kts
3 Manifold pressure	25 in hg
4 Propeller controls	2500 RPM
5 Cylinder head temp	Maintain in green

Cruise	
1 Power	Set per power table
2 Mixture	Adjust to EGT gauge
<i>100 degrees rich of peak EGT for 75% power</i>	
<i>50 degrees rich of peak EGT for 65% power</i>	
3 Aux fuel	Use only in cruise flight
4 Engine gauges	Monitor
5 Cowl flaps	Close, monitor CHTs

Descent	
<i>Reduce manifold pressure to keep airspeed in green arc, or in yellow arc if smooth</i>	
1 Mixture	Enrichen with descent

Approach and landing	
1 Seat belts	Fasten
2 Electric fuel pumps	On
3 Fuel selectors	Main tanks
4 Landing gear	Down under 130 kts
5 Gear indicator	Green
6 Flaps	As required under 108 kts
7 Cowl flaps	Open
8 Propeller controls	Full forward
9 Mixture	Enrichen as required
10 Gump check	On final
11 Approach speed	91 kts on final
If crosswind is above 12 kts, use partial or no flaps and higher than normal approach speed.	

Short field landing	
1 Approach speed	78 kts on final
2 Throttles	Carry power until flare
3 Flaps	Retract after touchdown
4 Yoke	Full aft to put weight on main landing gear
5 Brakes	Apply

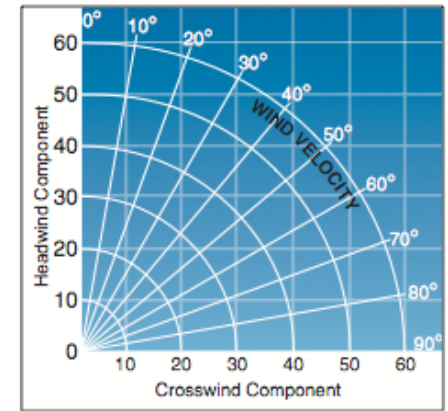
Soft field landing	
1 Approach speed	78 kts
2 Throttles	Carry power until flare
3 Flaps	Leave extended to maximize wing lift
4 Yoke	Back pressure to relieve airplane weight
5 Brakes	Minimum brake application

Go around	
1 Propeller controls	Full forward
2 Throttles	Full forward
3 Pitch	Climb attitude
4 Landing gear	Retract
5 Gear indicator	Amber
6 Climb at Vy	97 kts
7 Flaps	Retract
<i>Perform climb checklist</i>	

After landing	
1 Flaps	Retract
2 Lights	As required
3 Mixtures	Lean for taxi
4 Electric fuel pumps	Off
5 Cowl flaps	Open
6 Cabin heater	Off

Shutdown	
1 Avionics master	Off
2 Mixtures	Idle cut-off
3 Magnetos	Off
4 Battery master	Off
5 Pilot window	Closed

V speeds		
Vso	Stall speed (gear and flaps extended)	60
Vs	Stall speed (clean)	66
Vmca	Single engine minimum control speed	78
Vr	Rotation speed	78
Vx	Best angle-of-climb speed	78
Vxse	Best single engine angle-of-climb speed	82
Vapp	Final approach to landing speed	83
Vsse	Minimum intentional single engine speed	84
Vfe	Recommended flap extension speed	87
Vyse	Best single engine rate-of-climb speed	91
Vy	Best rate-of-climb speed	97
Vfe	Flap extension speed	108
Vlo	Recommended gear speed	108
Vlo	Landing gear operation speed	130
Va	Maneuvering speed / turbulent air penetration speed	141
Vne	Never exceed speed	200
Best en route rate-of-climb speed		113
Demonstrated crosswind component		17



Go around		
1	Throttles	Forward
2	Climb	Positive rate
3	Speed	91 kts minimum
4	Flaps	Up
5	Landing gear	Up
6	Cowl flaps	Open

Engine out - takeoff roll		
1	Throttles	Closed
2	Brakes	As required
3	Fuel selectors	Off
4	Master/magnetos	Off

Engine out- initial climb or enroute		
Maintain directional control pitch attitude & airspeed		
1	Mixtures	Enrichen
2	Propellers	Forward
3	Throttles	Forward
4	Flaps	Up
5	Gear	Up
6	Identify	Dead foot, dead engine
7	Verify	Inop engine, throttle: close
- fix or feather? -		
If time permits, fix:		
1	Fuel selector	Switch
2	Alternate air	On
3	Mixture	Adjust
4	Throttle	Adjust
5	Electric fuel pump	On
6	Engine gauges	Determine cause
If decision to feather:		
1	Propeller	Feather
2	Mixture	Idle cut-off
3	Airspeed	Vyse 91 kts or higher
4	Fuel pump	Off
5	Magnetos	Off
6	Cowl flap	Closed
7	Fuel	Crossfeed as necessary

Electrical fire		
1	Master	Off
2	Vents	Open
3	Door	Open if needed
4	Cabin heater	Off
5	Fire extinguisher	As required

Propeller overspeed		
1	Propeller	Reduce RPM
2	Throttle	Retard
3	Airspeed	Reduce
4	Throttle	Below 2700 RPM
5	Propeller - if necessary	Feather
6	Land ASAP	to investigate

Engine fire - during start		
Continue start attempt		
If engine starts:		
1	Throttle	2000 RPM or more (1 min)
2	Engine	Shutdown
If no start:		
3	Starter	Continue cranking
4	Mixture	Idle cut-off
5	Throttle	Full open
6	Electric fuel pump	Off
7	Fuel selector	Off
8	Call for fire fighting assistance	if needed
9	Master	Off
10	If fire continues	Extinguish or retreat

Engine fire - in flight		
1	Throttle	Close
2	Propeller	Feather
3	Mixture	Idle cut-off
4	Fuel selector	Off
5	Electric fuel pump	Off
<i>If fire persists - increase airspeed to Vne</i>		
6	Land	Nearest airport

Single engine landing		
1	Inop engine	Secured
2	Landing assured	Lower gear
3	Flaps	Extend 15
4	Airspeed	91 kts

Icing		
1	Alternate air	On
2	Propellers	Full forward
3	Throttles	Full forward
4	Mixtures	Adjust for smooth operation
5	Heater/defroster	On
6	Pitot heat	On
7	Airspeed	Maintain higher
8	Flaps	No flaps on landing

Manual gear extension		
1	Master	Check on
2	Circuit breaker	Check & reset
3	Airspeed	Below 87 kts
4	Landing gear switch	Down
5	Landing gear switch	Center "off"
6	Motor release handle	Disengage
<i>Gear should free-fall</i>		
<i>If necessary, use gear extension handle</i>		
7	Extend handle	Full forward
8	Handle locked full forward	Gear is down

Dual engine failure		
1	Directional control	Maintain
2	Best glide speed	96 kts
3	Propellers	Feather
4	Mixtures	Cut-off
5	Fuel selectors	Off
6	Transponder	7700
7	Seatbelts/harness	Secured
8	Flaps	As needed
9	Gear	Down
10	Master	Off
11	Magnetos	Off
12	Door	Unlatch

Engine troubleshooting & securing procedure		
1	Fuel selector	Switch to fullest tank
2	Cross feed	As required
3	Electric fuel pump	On
4	Magnetos	Check on
5	Mixture	Enrichen/adjust
6	Alternate air	On
7	Engine gauges	Determine cause
If power is restored:		
8	Electric fuel pump	Off
9	Alternate air	Off
If power is not restored:		
10	Propeller	Feather
11	Mixture	Idle cut-off
12	Fuel selector	Off
13	Electric fuel pump	Off
14	Magneto switches	Off
15	Cowl flap	Closed
16	Alternator	Off
17	Electrical load, if necessary	Reduce

Single engine fuel crossfeed		
1	Inoperative engine side	Fuel valve on main or aux
2	Operative engine side	Crossfeed on
3	Do not put both fuel selector valves on crossfeed	
<i>Before landing:</i>		
4	Operative engine side	Main
5	Inoperative engine side	Off
6	Operative engine fuel pump	On

Air start - unfeathering procedure		
1	Fuel selector	On main or aux
2	Mixture	Rich
3	Prop	Match to other prop
4	Throttle	¼" open
5	Alternator	On
6	Magnetos	On
7	Starter	Engage up to 30 seconds
<i>When engine starts:</i>		
8	Oil pressure	Check
9	Cowl flap	As required
10	Warm engine	17" MP