PREFLIGHT INSPECTION

Approaching Airplane

1. Overall Condition -- CHECK. Look for Stress Cracks, Damage from vehicles, line boys, vandalism. Oil Leaks, etc.

Cabin (Copilot Side)

1. Canopy -- UNLOCK
2. (Overhead Canopy Pins -- Can be felt for location)
3. Mixture -- IDLE CUTOFF
4. Avionics Master -- OFF
5. Electrical Equipment -- OFF
6. Circuit Breakers -- CHECK IN

Cabin (Pilot Side)

1. If Night Anticipated -- FLASHLIGHT
2. Mag Switches -- OFF
3. Throttle – CLOSED
4. Prop Area -- “CLEAR”
5. Master Switch -- ON
6. Flaps -- DOWN
7. Avionics Fan – Listen for operation
8. Header Fuel Quantity – CHECK level
9. Main Fuel Quantity – CHECK level and sanity check
10. Master Switch – OFF
11. Overhead Canopy Pins – Can be felt for location
12. Elevator Trim -- SET Neutral
13. Oxygen Tank -- Installed if needed. Check Pressure and Arm

Empennage

1. Elevator Hinge Pins -- CHECK haven't migrated out
2. Elevator Hinges -- CHECK for looseness
3. Elevator Halves -- CHECK in step
4. Rudder Gust Lock -- REMOVE
5. Rudder -- CHECK for wear in rod end
6. Rudder Hinge -- CHECK for security
7. Tail Tie-down Ring – REMOVE

Cabin (Copilot Side again)

1. Master Switch -- ON
2. Strobes/Anti-Collision – CHECK working (3)
3. NAV lights – Check working (3)
4. Master Switch -- OFF

Copilot Wing

1. Flaps -- CHECK integrity
2. Flap Hinge -- CHECK security and wear
3. Aileron -- CHECK freedom of movement, looseness & travel
4. Aileron C/W -- CHECK for security & interference
5. Screws under Wingtip -- CHECK
6. Fuel Vent -- UNOBSTRUCTED
7. Wing Tip -- CHECK for security
8. Wing -- SHAKE to drive water to center
9. Leading Edge -- CHECK for Damage
10. Pitot Tube -- REMOVE cover and check for obstructions
11. Fuel Level -- CHECK visually
12. Fuel Cap -- CORRECTLY positioned & Locked
13. Tie-down Ring -- REMOVE
14. Main Gear -- CHECK for inflation / damage / brake fluid
15. Augmented Exhaust Tube -- CHECK Secure

Nose

1. Fuel Filter Sump -- DRAIN
2. Lower Cowl Scoop -- CHECK for integrity, looseness
3. Header Fuel Cap -- CHECK position & Locked
4. Oil -- CHECK level
5. Cowl -- CHECK integrity / damage

6. Inlets -- CHECK for obstructions / bird nests / etc.
7. Prop -- Thrust End Play - CHECK for “Clunk”
8. Prop -- CHECK for oil leaks
9. Prop -- Leading Edge and back side - CHECK for damage
10. Prop Tape – Check for damage and delamination
11. Prop -- Confirm Magneto’s OFF -- Rotate 4 cycles in opposite direction to check compression.

DANGER: ENGINE COULD START!

12. Spinner -- CHECK for damage
13. Cowl Hinge Pins (4) -- CHECK locked
14. Nose Gear -- CHECK for security
15. Air Box -- CHECK for blockage / damage
16. Oil NACA scoop -- CHECK for blockage
17. Earwig thing -- CHECK for security (Screw, 2 hinge pins)

Pilot Wing

1. Header Tank Sump -- DRAIN
2. Main Tank Sump -- DRAIN
3. Augmented Exhaust Tube -- CHECK for security
4. Main Gear -- CHECK inflation / damage / brake fluid
5. Tie-down Ring -- REMOVE
6. Fuel Level – CHECK Visually
7. Fuel Cap -- CORRECTLY positioned & Locked
8. Tie-Down Ring -- REMOVE
9. Leading Edge -- CHECK for damage
10. Wing Tip -- CHECK for Security
11. Fuel Vent -- UNOBSTRUCTED
12. Screws under Wingtip -- CHECK
13. Aileron C/W -- CHECK for security & interference
14. Aileron -- CHECK freedom of movement, looseness & full travel
15. Flaps -- CHECK integrity
16. Flap Hinge -- CHECK security and wear
17. Main Fuel Vent – UNOBSTRUCTED
18. LRI Probe – CHECK unobstructed & angle

BEFORE LOADING BAGGAGE FOR TRIP

1. Oxygen -- ARMED
2. Header -- Pump up as required
3. Cannulas – available
4. Cell phones -- OFF

BEFORE STARTING ENGINE

1. Cell Phones -- OFF
2. Preflight Inspection -- COMPLETE
3. Flight Planning –COMPLETE
   a) Wx & NOTAMs -- checked
   b) EFB -- updated and set
4. Pax Briefing -- COMPLETE
   a) Canopy Operation (open/close and don't hit latch)
   b) Seat Belt Operation
   c) Experimental nature
   d) Don't touch controls (No push on Rudder Pedals)
   e) If Pilot pax – Please watch touching instruments – fingerprints and scratches.
5. Seatbelts, Shoulder harness – FASTENED
6. Tow bar -- Secure
7. Chocks -- Secure
8. Rubber Mats -- Stowed
9. Flashlight – Ready
10. Oxygen System – Confirm Armed & Cannulas Ready

STARTING ENGINE

1. Gravity Feed -- OFF
2. Fuel Selector -- MAIN TANK
3. Mixture -- MOSTLY RICH
4. Carb Heat -- OFF
5. Prop Area -- “CLEAR”
6. Master Switch -- ON
7. Strobes – ON
8. Starter Solenoid CB - ON
9. Fuel Pump -- ON
10. Fuel Pressure – CONFIRM
11. Left Mag – Down (OFF)
12. Right Mag (Plasma) – Up (ON)
13. Prop Area -- “CLEAR” Again
14. Brakes – HOLD gently
15. Throttle -- If Cold; PUMP twice during start

    Expect fire on startup and prepare

16. Starter – Engage

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17. Left Mag – UP (ON)
18. Starter Light – CHECK OFF
19. Oil Pressure – CHECK
20. Starter Solenoid CB -- OFF
21. Fuel Pump -- OFF
22. Fuel Pressure -- CHECK
23. Flaps -- 1 Notch and CONFIRM
24. Mixture -- LEAN for taxi
25. Recognition Lights -- ON
26. Landing Light -- ON
27. Avionics Power -- ON
28. HSI -- Set
29. Fuel Totalizer – ADD or RESET fuel, as necessary
30. IFR Instruments -- Check while taxiing

BEFORE TAKEOFF

1. Fuel Quantity -- CHECK Both
2. Selector (Fuel) -- HEADER Tank
3. Elevator Trim -- CHECK for freedom
4. Elevator Trim -- SET for Takeoff (nose down for luggage, nose up if full fuel without luggage)
5. Flight Controls -- FREE & CORRECT
6. Flight Instruments
   a) Airspeed -- ZERO
   b) Altimeters -- CHECK both
   c) HSI -- SET
7. CO Detector -- Armed
8. Canopies -- CLOSED & LATCHED
9. Copilot Canopy 2nd Safety -- ON
10. Copilot Brakes – TEST
11. Mixture -- AS REQ'D for Takeoff (RICH)
12. Green Light (Prop) – CHECK ON
13. Ammeter & LV Light -- CHECK by cycling Alternator Off
14. Throttle -- 1700 RPM
    a) Mags – Expect no change when Left Mag off; Expect 100 rpm drop when right mag off. Check for bad spark plugs with GEM
    b) Carb Heat -- CHECK for MP drop
    c) Engine Instruments -- In green
    d) Suction -- 4.0 Inches or more
    e) Fuel Flow (4 to 5 GPH)
15. Throttle – 2000 rpm & cycle prop
16. Throttle -- Retard 1100 RPM
17. Annunciators -- PRESS to test
18. HSI Switch – NAV 1
19. DME Switch - NAV 1
20. Flaps -- Confirm One notch
    (Two notches for short or soft)
21. Fuel Pump -- ON & Confirm pressure rise
22. Prop – Green Light (Full)
23. Seatbelts -- TIGHT
24. Transponder -- Squawk ALT (1200 if required)
25. Pitot Heat -- ON if required
26. Compass Check with Rwy Hdg

TAKEOFF

1. COMMS – Load Tower and Next Freq
2. Flaps -- 1 or 2 notches and visually confirm
3. No Sharp turns before TAKEOFF (per SB #134)
4. Canopies -- CLOSED & LATCHED
5. Fuel Pump -- ON
6. Fuel -- Header Tank
7. Prop –Green Light (Full RPM)
8. Mixture -- As Req'd for Takeoff (RICH)
9. Transponder -- Confirm ALT
10. Start Elapsed Timer on ADF
11. HSI -- Check on Rwy Heading
12. Tach -- 2700 RPM
13. Oil Pressure -- Green
14. Fuel Pressure -- Green
15. Airspeed -- Alive
16. Rotate -- 65 (abrupt 70-75 if Xwinds)
17. Climb -- 90 w/ flap
18. When clear of obstacles – Accelerate to 100

- After safe altitude -

19. Flaps -- RETRACT
20. Climb -- 120

CLIMB

1. Flaps -- Confirm UP
2. Cruise Climb -- 130 - 120 (whatever will sustain 500 fpm)
3. Before Switching Tanks -- PICK Field
4. Fuel -- MAIN Tank
5. Prop – 2600 rpm for good climb, reduced heat
6. Mixture -- LEAN for climb – 10 GPH

CRUISE

1. Fuel -- MAIN Tank
2. Fuel Pump – OFF
3. Fuel Pressure -- CHECK
4. Prop -- As Required for 8.5 GPH or less (2400 min rpm)
5. Mixture -- LEAN for cruise

DESCENT

1. Mixture – If running LOP, richen before throttle
2. Throttle – 20" at 20 NM

BEFORE LANDING

G
1. Fuel Pump -- ON
2. Header Tank Level -- CHECK
3. Fuel Selector – if fuel in Header, then Switch to Header Tank
4. Fuel Pressure -- CONFIRM

U
5. Undercarriage - Down

M
6. Mixture -- As Required

P
7. Prop – Full (Green Light)

S
8. Seatbelts - Tight

LANDING

1. Downwind target power – 13 to 15 inches
2. Carb Heat – As Required
3. Just before Abeam touchdown -- reduce power to 8 inches
4. white arc -- Flaps 1 notch - 90 KIAS
5. Base leg -- 2 notches - 80 KIAS
6. Final -- GUMP confirmed, 3 notches, 75 KIAS

Clean Up

1. Fuel Pump -- OFF
2. Mixture -- Lean for Taxi
3. Xponder -- STBY
4. Radio -- Switch to Ground Frequency

SHUT DOWN

1. Elapsed Time -- NOTE
2. Avionics Master -- OFF
3. Electrical Equipment -- OFF
4. Flaps -- DOWN
5. Mixture -- IDLE CUTOFF
6. **Magnetos -- OFF!**
7. Gravity Feed -- BURP!
8. Master -- OFF
9. Fuel Selector – Recheck Header (to avoid bleed down)

POST FLIGHT

1. Oxygen – OFF
2. Panel lights – OFF
3. Close Flight Plan

Put diagrams of Attitudes for various flight configurations here too.

ENGINE FAILURE Immediately after Takeoff

1. **Fly the airplane!** -- Lower the nose for landing
2. Flaps -- As Required
3. Mixture -- IDLE CUT-OFF
4. Fuel -- OFF
5. Magnetos -- OFF
6. Master -- OFF

(In general, land straight ahead up to 200' AGL. From 200' to 400' AGL, a 45 degree turn may be possible. From 400' to 800' AGL, a 90 degree turn may be made. Once at pattern altitude, one should be able to return to the runway or land on a parallel runway or taxiway.)

TOTAL ENGINE FAILURE at Altitude

1. Maintain altitude until 90KIAS, trim and turn toward field
2. Carb Heat -- ON
3. Fuel Pump -- ON
4. Fuel Selector -- Switch to Header Tank if not empty
5. Mixture -- FULL RICH or As Required
6. Throttle – Check FULL or As Required
7. Gravity Feed – ON
8. Prop – FULL – but if there is oil pressure, and the engine won't restart, retarding the prop will increase glide.
9. Squawk 7700
10. Mayday on current freq or 121.5
11. Secure for Forced Landing

Best Glide -- 90 KIAS with prop wind milling

Forced Landing without Power

1. Fly the Airplane!
2. Mixture -- IDLE CUT-OFF
3. Fuel Selector & Gravity Feed -- OFF
4. Magnetos -- OFF
5. Wing Flaps -- AS REQUIRED
6. Master Switch -- OFF
7. Loose items – STOW if time

Engine Fire during start

1. Continue cranking to suck in flames

If engine starts:

2. Throttle -- 1700 rpm for a minute or two.
3. Mixture -- IDLE CUTOFF
4. Fuel -- OFF
5. Mags -- OFF
6. Master -- OFF
7. Inspect for damage

If engine fails to start:

8. Throttle -- 50% Open
9. Mixture -- IDLE CUT-OFF
10. Fire Extinguisher -- OBTAIN
11. Engine -- Secure
    a) Master Switch -- OFF
    b) Fuel -- OFF
    c) Ignition -- OFF

Engine Fire in Flight

1. Mixture – IDLE CUTOFF
2. Fuel Selector & Gravity Feed – OFF
3. DIVE TO BLOW OUT FIRE
4. Master Switch -- OFF
5. Mags -- OFF
6. Execute Emergency (No Flap) Landing

Electrical Fire in Flight

1. Master Switch – OFF
2. Fire Extinguisher – As Required
3. Vents – OPEN if Extinguisher is used.
4. THINK before attempting to re-establish power
5. If fire not out, Emergency Descent and execute Forced Landing

(It may be possible to pull most of the circuit breakers, shed most of the electrical load, and run with the Electrical Bypass only. Alternator Field breaker should be OFF.)

Low Fuel Pressure Warning

1. Electric Fuel Pump – ON
2. Check Fuel in Header – IF NONE, SWITCH TO MAIN TANK
3. Ensure that Emergency Gravity Feed is -- OFF

(Sometimes in the summer, when the main tank is full and after mechanical fuel pump heat soaks during a hot climb, the Fuel Pressure will drop to about a half inch, triggering the Low Fuel Pressure Warning Annunciator over the Intercom.)

Runaway Annunciator Voice Alerts

1. Disable TEL audio to Headset on the Audio Panel
2. Return to Checklist if interrupted during critical time in flight

High Oil Temp Warning

1. Lower the nose to straight and level flight until oil temp cools down
2. Reduce prop to 2600 rpm

(It is not uncommon to see high oil temperature during a prolonged climb out when OAT's are above 100 degrees F.)

AIRSPEEDS FOR OPERATION

V_x = 80 KIAS (SL). Allows margin for stall

V_y = 100 KIAS (SL std) expect 1000 fpm or better, depending on weight

Climb at 120 KIAS gives 1000+ fpm @2600 rpm
(Documented 1200 fpm @ 115 KIAS, 50% max load.)

Power off glide at 90 KIAS gives glide ratio of 9:1.
(That is, at 6000 AGL, you can glide in no wind about 9 miles.)

Max Demonstrated Crosswind – Left: 30 kts
Max Demonstrated Crosswind – Right: 20 kts

V_{so} = 59 KIAS
V_s = 63 KIAS

20 inches, 2400 rpm gives 130 KIAS level
20 inches, 2400 rpm, 500 fpm descent @ 140 KIAS

15 inches, prop full, 500 fpm descent @ 120 KIAS
15 inches, prop full gives 105 KIAS level

15 inches, prop full, 1 notch flap gives 90 KIAS

ALT	THROT	RPM	GPH (R or L)	OAT	KIAS	DATE

Maximum Cruise Settings (75% Power; Full Throttle)

ALT (Press)	RPM	Fuel Flow
2000 ft	2500	8.5 gph
4000 ft	2550	8.5 gph
6000 ft	2575	8.5 gph
8000 ft	2625	8.5 gph
10000 ft	2700	8.5 gph

Standard Temperatures
Mixture not overly rich (i.e. best power or leaner)
RPM is guideline only; Fuel Flow actually determines power

Fuel Flows & Endurance

% Power	Fuel Flow	Endurance
100	11.3*	3 hrs, 48 min
75	8.5	5 hours
65	7.3	5 hrs, 53 min
55	6.2	6 hrs, 56 min
45	5.4	7 hrs, 58 min

Lean Mixture
* Does not include extra rich mixture for engine cooling