

Preflight Inspection

Cockpit

1. Control Lock—REMOVE & STOW
2. Master on—CHECK FUEL GAGES FOR OPERATION
3. All Switches—OFF
4. Trim Tabs—SET TO ZERO
5. Flush-type Fuel Drain/Emergency Gear Extension Tool—ON BOARD
6. Emergency Extension Valve---CLOSED

LEFT WING TRAILING EDGE

1. Flap—CHECK GENERAL CONDITION
2. Fuel Vent—CHECK UNOBSTRUCTED
3. Aileron—CHECK GENERAL CONDITION AND FREEDOM OF MOVEMENT
4. Wing Tip—CHECK
5. Position & Strobe Light—CHECK

LEFT WING LEADING EDGE

1. Pitot—REMOVE COVER, EXAMINE FOR OBSTRUCTIONS
2. Landing & Taxi Light—CHECK
3. Stall Warning Vane—CHECK FREEDOM OF MOVEMENT
4. Fuel Tank—CHECK QUANTITY; CAP SECURE
5. Tiedown & Chocks—REMOVE
6. Flush-type Fuel Sump—DRAIN
7. Fuel Selector—DRAIN
8. Engine Cowling—CHECK CONDITION & SECURITY
9. Air Intakes—CLEAR
10. Propeller—EXAMINE FOR NICKS, SECURITY, & OIL LEAKS
11. Engine Oil—CHECK QUANTITY; Cap & Door—SECURE
12. Cowl Flap—CHECK
13. Wheel Well, Door, Tire, Brake Line, & Strut—CHECK
14. Flush-type Crossfeed Drains (2)—DRAIN

PREFLIGHT

NOSE SECTION

1. Nose Cowling & Nose Cone—CHECK CONDITION & SECURITY
2. Heater Air Intake—CLEAR
3. Heater Exhaust & Vents—CLEAR
4. Wheel Wells, Doors, Tire, & Strut—CHECK

RIGHT WING LEADING EDGE

1. Flush-type Crossfeed Fuel Drains (2)—DRAIN
2. Wheel Well, Door, Tire, Brake Line, & Strut—CHECK
3. Engine Cowling—CHECK CONDITION & SECURITY
4. Air Intakes—CLEAR
5. Propeller—EXAMINE FOR NICKS, SECURITY, & OIL LEAKS
6. Engine Oil—CHECK QUANTITY; Cap & DOOR—SECURE
7. Cowl Flap—CHECK
8. Fuel Selector —DRAIN
9. Flush-type Fuel Sump—DRAIN
10. Tiedown & Chokes—REMOVE
11. Fuel Tank—CHECK QUANTITY; Cap—SECURE
12. Stall Warning Vane—CHECK FREEDOM OF MOVEMENT
13. Taxi Light—CHECK
14. Wing Tip—CHECK
15. Position & Strobe Light—CHECK

RIGHT WING TRAILING EDGE

1. Aileron—CHECK CONDITION AND FREEDOM OF MOVEMENT
2. Fuel Vent—CHECK UNOBSTRUCTED
3. Flap—CHECK GENERAL CONDITION

FUSELAGE RIGHT SIDE

1. Battery Vents— CLEAR OF OBSTRUCTIONS
2. Static Port—CLEAR OF OBSTRUCTIONS
3. ELT—ARMED (OFF switch position)

EMPENNAGE

1. Control Surfaces & Trim Tabs—CHECK
2. Tail Cone & Position Light—CHECK
3. Tiedown—REMOVE
4. Cabin Air inlet—CHECK

FUSELAGE LEFT SIDE

1. Static Port—CLEAR OF OBSTRUCTIONS
2. Cabin Air Outlet—CHECK
3. All Antennas—CHECK
4. Load Distribution—CHECK & SECURE
5. Baggage Door---CHECK

NORMAL PROCEDURES

BEFORE STARTING

1. Fuel Drain/Emergency Extension Tool—STOW
2. Seats—POSITION & LOCK; Seat Backs—UPRIGHT
3. Seat Belts & Shoulder Harnesses—FASTEN
4. Parking Brake—SET (optional)
5. All Switches—OFF
6. Circuit Breakers—IN
7. Landing Gear Handle—DOWN
8. Carburetor Heat—OFF (up position)
9. Cowl Flap Controls—OPEN (down position)
10. Fuel Selectors—CHECK OPERATION, THEN ON
11. Alternate Static Source—OFF
12. Battery Switch—ON
13. Fuel Quantity Indicators—CHECK QUANTITY (See LIMITATIONS for take-off fuel)
14. Landing Gear Position Lights—CHECK

STARTING / COLD START

1. Battery Switch—ON
2. Alternator-out Under voltage Lights—CHECK ILLUMINATED
3. Flaps—RAISE
4. Mixtures—FULL RICH
5. Propellers—HIGH RPM (Low Pitch)
6. Left Aux Fuel Pump—ON
7. Right Aux Fuel Pump—ON
8. Right Throttle—OPEN ¼ INCH
9. Right Magneto/Start Switch—PRIME (3-5 Seconds)
10. Right Magneto/Start Switch—START

DO NOT PUMP THROTTLES DURING STARTING PROCEDURES

(Continued)

**NORMAL
PROCEDURES**

11. Engine Warm UP—1000 to 1200 RPM
12. Oil Pressure—ABOVE RED RADIAL WITHIN 30 SECONDS
13. External Power (if used)—DISCONNECT
14. Right Aux Fuel Pump—OFF
15. Alternator Switch—ON; CHECK FOR CHARGING
16. Starter Engage Warning Light—CHECK
17. Mixture—LEAN FOR TAXI

USE SAME PROCEDURE FOR LEFT ENGINE

Alternator Check—LEFT and RIGHT
Transponder—1200 or as assigned—ON

HOT START PROCEDURES

1. Mixture—FULL RICH
2. Throttle—1/4 inch OPEN
3. Fuel Boost Pump—OFF
4. Starter—ENGAGE

FLOODED ENGINE

1. Mixture—IDLE CUT-OFF
2. Throttle—1/4 TRAVEL
3. Starter—ENGAGE (After 2 to 3 seconds prime briefly, intermittently)
4. Mixture—ADVANCE TO FULL RICH when engine starts

CAUTION

Maximum starter engage duty cycle is 30 seconds ON, followed by a minimum of two minutes OFF

AFTER STARTING & TAXI

1. Avionics—ON
2. Lights & Strobes—AS REQUIRED
3. Annunciator Warning Lights—PRESS TO TEST
4. All Engine Instruments—CHECK
5. Brakes—RELEASE & TEST

BEFORE TAKEOFF

1. Mixtures—FULL RICH
2. Seatbelts & Shoulder Harness—CHECK
3. Parking Brake—optional
4. Flight Instruments—CHECK & SET
5. Engine Instruments—CHECK
6. Starter Engaged Warning Light—CHECK
7. Fuel Selectors—ON
8. Flight Controls—CHECK PROPER DIRECTION & FREEDOM OF MOVEMENT
9. Wing Flaps—CHECK OPERATION
10. Electric Trim—CHECK OPERATION
11. Trim—SET TO TAKEOFF RANGE
12. Throttles—2200 RPM
13. Propellers--EXERCISE (100-200 rpm drop)
14. Magnetos—CHECK (175 rpm max drop, within 50 rpm each other)
15. Carburetor Heat—CHECK
16. Throttles 1500 RPM
17. Propellers—FEATHER CHECK (DO NOT EXCEED 500 rpm drop) Repeat 3-4 times in cold weather.
18. Gyro Pressure & Loadmeters—CHECK
19. Throttle--IDLE
20. Aux Fuel Pumps—ON
21. Doors & Windows—SECURE
22. Parking Brake—RELEASE
23. Engine Instruments—CHECK
24. Transponder—CHECK ALT
25. Avionics—SET AS REQUIRED
26. Takeoff Briefing—GIVEN

Takeoff

1. Mixtures—FULL RICH OR LEAN FOR SMOOTH OPERATION
2. Position centerline, hold brakes, power up to 20 inches manifold
3. Engine Instruments—CHECK
4. Release Brakes—INCREASE TO FULL POWER
5. Landing Gear—RETRACT when positive rate and no usable runway
6. Airspeed—ESTABLISH DESIRED CLIMB SPEED when clear of obstacles

NOTE

If red in-transit light remains illuminated after 30 seconds, place landing gear switch handle in the down position, make a normal landing and have the landing gear system checked.

CRUISE CLIMB

Throttles: 25 inches, 2500 rpm

1. Engine Temps—MONITOR
2. Power—SET
3. Mixtures—LEAN AS REQUIRED
4. COWL FLAPS—AS REQUIRED

CRUISE

Max Cruise.....24", 2400 rpm

Recommended Cruise..... 22", 2400 rpm

Economy/Practice Cruise...20", 2300 rpm

1. Power—SET AS DESIRED
2. Mixtures—LEAN AS REQUIRED
3. COWL FLAPS—AS REQUIRED
4. Aux Fuel Pumps—OFF

DESCENT

1. Altimeter—SET
2. Cowl Flaps—CLOSED
3. Windshield Defroster—AS REQUIRED
4. Carburetor Heat—AS NEEDED

(Continued)

5. Power—AS REQUIRED (avoid prolonged idle settings & low cylinder head temperatures)
6. Mixtures—ENRICH AS REQUIRED

BEFORE LANDING

1. Seatbelts & Shoulder Harness—FASTENED, SEAT BACKS UPRIGHT
2. Fuel Selectors—CHECK ON
3. Aux FUEL Pumps—ON
4. Mixture Controls—FULL RICH or LEAN AS REQUIRED
5. Carburetor Heat—AS REQUIRED

NOTE

In the event of a go around, carb. heat shall be in the full OFF (cold) position AFTER full throttle application

6. Cowl Flaps—CLOSED
7. Landing Gear—DOWN (140 kts max)
8. Landing & Taxi Lights—AS REQUIRED
9. Wing Flaps—AS REQUIRED (max 110 kts)
10. Airspeed—ESTABLISH LANDING APPROACH SPEED
11. Propellers—HIGH RPM (below 90 kts)

BALKED LANDING

ALL AVAILABLE POWER

1. Props—HIGH RPM
2. Throttles—FULL FORWARD
3. Airspeed—71kts
4. Wing Flaps—UP
5. Landing Gear—UP
6. Cowl Flaps—OPEN
7. Side Step runway

AFTER LANDING

CLEAR ACTIVE RUNWAY

1. Landing & Taxi Lights—AS REQUIRED
2. Wing Flaps—IDENTIFIED & VERIFIED, then UP
3. Cowl Flaps—OPEN
4. Carb Heat—OFF
5. Aux Fuel Pumps—OFF
6. Pitot Heat—OFF
7. Mixtures—LEAN FOR TAXI
8. Heater—Blower (if in use)

SHUTDOWN

1. Parking Brake—SET
2. Electrical & Avionics —OFF
3. Propellers—HIGH RPM
4. Throttles—1200 RPM
5. Mixtures—IDLE CUTOFF
6. Magnetos—OFF, after engines stop
7. Alternator & Battery Switches—OFF
8. Controls—INSTALL LOCK
9. Chock wheels or tie down.

PRACTICE OR REAL EMERGENCY PROCEDURES

ENGINE FAILURE DURING GROUND ROLL

1. Throttles—IDLE
2. Braking—MAXIMUM
3. Directional Control—MAINTAIN
4. Exit runway if/when able
5. Shutdown

ENGINE FAILURE AFTER LIFT- OFF AND IN FLIGHT

1. **ALL AVAILABLE POWER**
2. **CLEAN UP—FLAPS, GEAR**
3. **PITCH BLUELINE—85 KTS**
4. **BANK INTO GOOD ENGINE**
5. **BALL ½ OUT**
6. IDENTIFY & VERIFY DEAD ENGINE—DEAD FOOT, DEAD ENGINE
7. FEATHER –if close to the ground. Try to fix if time permits.

NOTE

ONLY after positive control of the airplane is established, secure the inoperative engine.

SECURING THE ENGINE

1. Mixture Control—IDLE CUT OFF
2. Fuel Selector—OFF
3. Aux Fuel Pump—OFF
4. Magnetos—OFF
5. Alternator Switch—OFF
6. Cowl Flap—CLOSED
7. Airspeed—MAINTAIN 85KTS or HIGHER
8. Electrical Load—MONITOR (max 100 on good engine)

EMERGENCY

AIR RESTART

NOTE

Airspeed should be maintained at or above 100 KIAS to ensure the engine will windmill.

1. Fuel Selector—ON
2. Throttle—SET approximately $\frac{1}{4}$ travel
3. Aux Fuel Pump—ON
4. Magneto Switch—BOTH
5. Propeller Control—MOVE FULL FORWARD UNTIL ENGINE WINDMILLS, THEN BACK TO MIDRANGE. USE STARTER MOMENTARILY TO START WINDMILLING, IF NECESSARY.
6. Mixture—FULL RICH
7. If engine fails to run, clear engine by allowing it to windmill with mixture in the FULL LEAN position. When engine fires, advance mixture to FULL RICH.
8. When Engine Starts—ADJUST THROTTLE, PROPELLER, & MIXTURE CONTROLS
9. Warm Up Engine (2000 rpm and 15 inches). Bottom of green arcs-RPM, MP
10. Aux Fuel Pump—OFF (with reliable power regained)
11. Alternator Switch—ON
12. Oil Pressure & Oil Temperature—CHECK
13. Wait until cylinder temperature is in the green before increasing power.
14. Set power and trim

LANDING GEAR MANUAL EXTENSION

1. Landing GEAR MOTOR Circuit Breaker—OFF (pull out)
2. Landing Gear Switch Handle—DOWN position
3. Airspeed—100 KTS Maximum

(Continued)

4. Emergency Extension Valve—OPEN
(Use Emergency Extension Wrench—
Turn **Counterclockwise**)
5. If electrical system is operative, check
landing gear position lights and warning
horn. (Check Landing GEAR
CONTROL circuit breaker engaged)

LANDING GEAR RETRACTION AFTER PRACTICE MANUAL EXTENSION

1. Emergency Extension Valve—CLOSED
(Use Emergency Extension Wrench—
Turn Clockwise)
2. Landing GEAR MOTOR Circuit
Breaker—ON (push in)
3. Landing Gear Switch Handle—UP

ZERO THRUST (Simulated Feather)

1. Throttle Lever—SET 10" MAINFOLD
PRESSURE
2. Propeller Lever—RETARD TO
FEATHER DENTENT

GEAR UP LANDING

1. Cowl Flaps—CLOSED
2. Wing Flaps—FULL DOWN
3. Throttles—IDLE
4. Mixture Controls—IDLE CUT OFF
5. Battery, Alternator, & Mags—OFF
6. Fuel Selectors—OFF
7. Keep wings level during touchdown
8. Get clear of the airplane after it stops

ONE ENGINE INOPERATIVE LANDING

1. Landing—ASSURED
2. Landing Gear—DOWN
3. Airspeed—85KTS (blue line)
4. Power—AS REQUIRED

(Continued)

When it is certain there is no possibility of a go around....

5. Wing FLAPS—FULL DOWN
6. Execute normal landing

ONE ENGINE INOPERATIVE GO AROUND

WARNING

DO NOT attempt a one engine inoperative go around after flaps have been fully extended

1. Power—MAXIMUM ALLOWABLE
2. Landing Gear—UP
3. Wing Flaps—UP
4. Airspeed—MAINTAIN 85 KTS
MINIMUM

OPERATION ON CROSSFEED

NOTE

*The fuel cross feed is used **ONLY** during emergency conditions in level flight.*

1. Operative Engine Aux Fuel Pump—ON
2. Inoperative Engine Fuel Selector—OFF
3. Operative Engine Fuel Selector—
CROSSFEED
4. Operative Engine Aux Fuel Pump—ON
or OFF as required

ELECTRICAL SMOKE OR FIRE

1. Battery & Alternator Switches—OFF
2. All Electrical Switches—OFF
3. Battery & Alternator Switches—ON
4. Essential Electrical Equipment—ON
(Isolate defective equipment)

NOTE

Ensure fire is out and will not be aggravated by draft. Turn off CABIN HEAT and push in the CABIN AIR control. To aid in smoke evacuation, open pilot storm window.

COMPLETE LOSS OF ELECTRICAL POWER

1. Both Alternator Switches—OFF
2. Battery Switch—OFF
3. Both BUS-ISO Circuit Breakers—PULL
4. Remove all electrical loads.
5. Both Alternator Switches—ON
6. Minimize all electrical loads. Select only that electrical equipment which is essential for safe flight.
7. Extend landing gear with emergency system.

CAUTION

Minimize electrical load in order to reduce the possibility of damage to electrical components.

ILLUMINATION OF ALTERNATOR OUT LIGHT

Single UNDER/OVERVOLTAGE light illuminated: Check the respective loadmeter for load indication

1. No load—Turn off affected alternator
2. Reduce load to single alternator capability
3. Reset the affected alternator with alternator switch. Monitor overvoltage and undervoltage lights and loadmeter for proper operation.

CAUTION

If proper operation is not restored, turn alternator switch **OFF**

BOTH OVERVOLTAGE or BOTH UNDERVOLTAGE lights ILLUMINATED

Check loadmeters for load indication. If condition indicates malfunction of **both** alternator circuits...

1. Both ALT Switches—OFF
2. Minimize electrical load since only battery power will be available

(Continued)

3. Reset the alternators with alternator switches. Monitor overvoltage and undervoltage lights and loadmeters for proper operation.

CAUTION

If proper operation is not restored, turn alternator switches OFF.

STARTER ENGAGED WARINING LIGHT ILLUMINATED

ILLUMINATED ON THE GROUND

1. Battery & Alternator Switches—OFF
2. DO NOT TAKE OFF

ILLUMINATED IN FLIGHT AFTER AIR START

1. Perform action for COMPLETE LOSS OF ELECTRICAL POWER (see this section)
2. Land as soon as possible

ENGINE FIRE (GROUND)

1. Mixture Controls—IDLE CUT OFF
2. Continue to crank affected engine
3. Fuel Selectors—OFF
4. Battery & Alternator Switches—OFF
5. Extinguish fire with extinguisher

ENGINE FIRE IN FLIGHT

1. Fuel Selector—OFF
2. Mixture Control—IDLE CUT OFF
3. Propeller—FEATHER
4. Aux Fuel Pump—OFF
5. Magneto Switch—OFF
6. Alternator Switch—OFF
7. **Land Immediately**

EMERGENCY DESCENT

1. Throttles—IDLE
2. Propellers—Maximum RPM
3. Landing Gear—DOWN (Below 140 KTS)
4. Airspeed—Maximum 140 KTS

MAXIMUM GLIDE CONFIGURATION

1. Propellers—FEATHER
2. Wing Flaps—UP
3. Landing Gear—UP
4. Cowl Flaps—CLOSED
5. Airspeed—95 KTS

VFR AIRSPEEDS & SETTINGS

Position	AS	PWR	Flaps/Gear
DNWIND	100	18/2400	0/Gear DN
Numbers	100	15/2400	10 Deg (3 sec)
Base	95	15/2400	20 Deg (2 sec)
Final	85	12-15/high	

SINGLE ENGINE PATTERN

Position	AS	PWR	Flaps/Gear
DNWIND	85+	AS REQ'D	NONE
Numbers	85+	20/2600	AS REQ'D)
Base	85+	17-20/2600	AS REQ'D
Final	85	Reduce/2600	20 w/lbg assured

INSTRUMENT POWER AND SPEEDS

Position	AS	PWR	Flaps/Gear	VSI
ILS	110	18"/2400	GEAR @ GS	500
ILS-SE	110	23"/2500	GEAR @ GS	500
NP	110	15"/2400@FAF	GEAR@FAF	1000
NP	110	18"/2400@MDA	No Change	0
NP-SE	110	15"/2500@FAF	Clean	1000
NP-SE	110	22"/2500@FAF	GEAR LDG ASSURED	0
Holding	110	18"/2400	Clean	0

Two Engine Speeds Single Engine Speeds

VR	80		NA
VX	71		85
VY	85		85
Cruise Climb	100		85
VA	132		132
VSSE	71		NA
VMCA	65		65

AIRSPEEDS