SECTION 4

NORMAL PROCEDURES

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INTRODUCTION

Section 4 provides the checklists and amplified procedures for normal operation of the airplane. This includes pre-flight inspection and preparation of the airplane, normal flight, and after-landing shutdown. Normal operations associated with optional equipment on the airplane are to be found in Section 9 (Supplements) of this handbook.

Ensure that all required maintenance has been performed prior to carrying out pre-flight inspections. Also, review your flight plan and compute weight and balance.

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AIRSPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following airspeeds are based on a maximum weight of 3800 lb. and may be used at a lesser weight.

CONDITION	KIAS
TAKEOFF	
Normal Climb Out	70-80
Short Field Takeoff – Flaps 20°, Speed at 50 feet	67
ENROUTE CLIMB, FLAPS UP	
Normal – Sea Level	80-90
$\mathbf{V_y}$, Best Rate-of-Climb : Sea Level	90
$\mathbf{V_y}$, Best Rate-of-Climb : 10,000 feet	81
$\mathbf{V_x}$, Best Angle-of-Climb : Sea Level	68
$\mathbf{V_x}$, Best Angle-of-Climb : 10,000 feet	73
LANDING APPROACH	
Normal Approach : Flaps Up	80-90
Normal Approach : Flaps 30°	70-80
Short Field Approach : Flaps 30°	70
BALKED LANDING	
Maximum Power : Flaps 30°	72
MAXIMUM RECOMMENDED TURBULENT AIR PENETRATION SPEED	118
MAXIMUM DEMONSTRATED CROSSWIND VELOCITY	
Takeoff or Landing	15

NORMAL PROCEDURES CHECKLISTS

PRE-FLIGHT INSPECTION

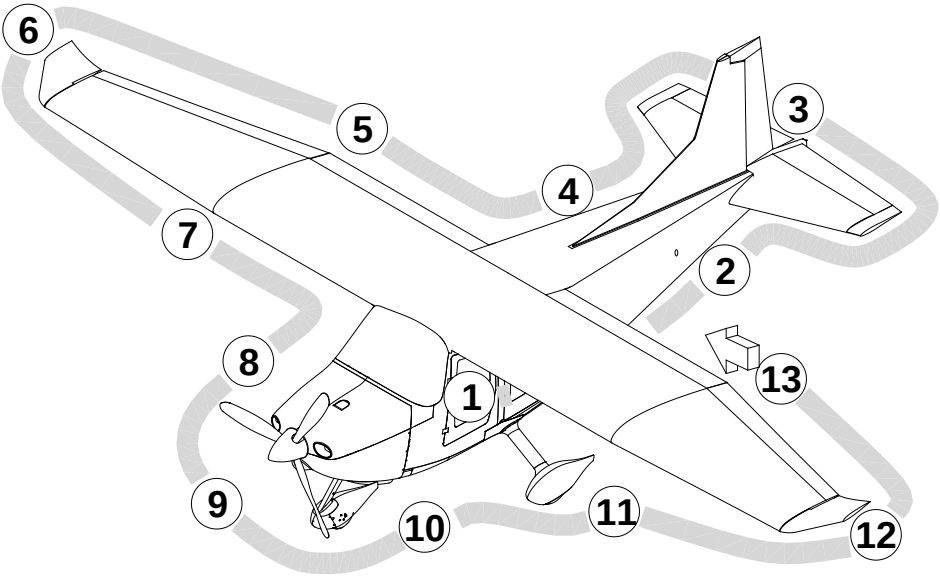

Figure 4-1: Pre-Flight Walk-Around Inspection

NOTE

During the pre-flight inspection, perform a walk around of the airplane and make a visual check of the general condition of the airplane and any other items specified in the pre-flight inspection checklist. To ensure that the fuel drain valves allow for accurate fuel inspection, the airplane should be parked in a level ground attitude.

In cold weather, make sure to remove even small amounts of frost, ice or snow accumulation from the wing, tailplane and control surfaces. Also make sure that no accumulations reside in the internal spaces of the control surfaces. Check to ensure that the pitot heater is warm to the touch within 30 seconds with the master switch and pitot heat switch ON.

1. CABIN

1. Cabin Doors.....UNLOCK ALL
2. Pilot's Operating Handbook .....VERIFY IN AIRPLANE
3. Airplane Weight and Balance .....CHECKED
4. Parking Brake .....SET
5. Control Wheel Lock .....REMOVE
6. Ignition Switch.....OFF

WARNING

WHEN TURNING ON THE MASTER SWITCH OR USING AN EXTERNAL POWER SOURCE OR PULLING THE PROPELLER THROUGH BY HAND, TREAT THE PROPELLER AS IF THE IGNITION SWITCH WERE ON.
< DO NOT STAND WITHIN THE ARC OF THE PROPELLER >
ANY PERSON STANDING WITHIN PROPELLER ARC MAY BE IN SERIOUS DANGER SINCE A COMPONENT MALFUNCTION INCLUDING A LOOSE OR BROKEN WIRE COULD CAUSE THE PROPELLER TO ROTATE.

7. Master Switch .....ON
8. Avionics Master Switch.....OFF
9. Engine Monitor (MVP-50) .....CHECK ON
10. Fuel Quantity Indicators .....CHECK QUANTITY
11. Pitot Heat.....ON
    (Confirm an approximate 6 amp draw as shown on MVP-50.
    Check to ensure that pitot heater is warm to touch within 30 sec.)
12. Fuel Shut-off Valve.....LEFT or RIGHT
13. Alternate Static Source .....NORMAL (if installed)
14. Flaps .....EXTENDED
15. Pitot Heat .....OFF
16. Master Switch .....OFF
17. NACA Fresh Air Inlet .....UNOBSTRUCTED

2. LEFT FUSELAGE

1. Left Aft Door.....CHECK Closed & Unlocked
2. Left Collector Tank Fuel Drain Valve....DRAIN (Underside)
3. Fuel Strainer Valve (Gascolator).....DRAIN (Underside)

Drain collector tanks and fuel strainer (gascolator) via the drain points located on the bottom of the fuselage. Using a sampler cup, check for water or sediment contamination and for proper fuel grade before each flight and after each refuelling. If water is observed, take further samples until clear and then gently rock the wings to move any additional contaminants to the fuel drains. Take further repeated samples from all fuel drain points to ensure that all contamination has been removed. If contaminants are still present, refer to the WARNING below and do not fly the airplane.

WARNING

IF AFTER REPEATED FUEL SAMPLING EVIDENCE OF CONTAMINATION STILL EXISTS, THE AIRPLANE SHOULD NOT BE FLOWN. FUEL TANKS MUST BE DRAINED AND SYSTEM PURGED BY QUALIFIED MAINTENANCE PERSONNEL. CONTAMINATION MUST BE REMOVED BEFORE FURTHER FLIGHT.

4. Static Port.....CHECK for Blockage
5. ELT Antenna.....CHECK Condition and Security

3. EMPENNAGE

1. Horizontal & Vertical Stabilizer.....CHECK Security
2. Tie-Down.....DISCONNECT
3. Elevator .....CHECK Freedom, Condition and Security
4. Elevator Balance Weight.....CHECK Condition and Security
5. Rudder & Rudder Trim Tab .....CHECK Freedom, Condition and Security
6. Rudder Balance Weight.....CHECK Condition and Security

4. RIGHT FUSELAGE

1. Static Port .....CHECK for Blockage
2. Right Collector Tank Fuel Drain Valve..DRAIN (Underside)

Drain collector tanks and fuel strainer (gascolator) via the drain points located at the bottom of the fuselage. Using a sampler cup, check for water or sediment contamination and for proper fuel grade before each flight and after each refuelling. If water is observed, take further samples until clear and then gently rock the wings to move any additional contaminants to the fuel drains. Take further repeated samples from all fuel drain points to ensure that all contamination has been removed. If contaminants are still present, refer to the WARNING below and do not fly the airplane.

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3. Right Aft Door.....CHECK Closed & Unlocked

5. RIGHT WING TRAILING EDGE

1. Flap.....CHECK Security
2. Aileron & Tab .....CHECK Freedom and Security
3. Aileron Balance Weight .....CHECK Condition and Security
4. Hinges, Push Rod, Bolts.....CHECK Security

6. RIGHT WING TIP

1. Wing Tip .....CHECK Security
2. Strobe, Nav Light and Lens.....CHECK Condition and Security

7. RIGHT WING LEADING EDGE AND MAIN GEAR

1. Wing Tie-Down.....DISCONNECT
2. Stall Warning Vane .....CHECK Condition and Freedom
   (To check the system, with the MASTER Switch on, moving the vane up will activate the stall warning horn and light.)
3. Fuel Tank Vent opening .....CHECK for Stoppage
4. Fuel Quantity.....CHECK VISUALLY
5. Fuel Filler Cap.....SECURE
6. Fuel Quick Drain Valves .....DRAIN

Drain fuel tank at each location using sampler cup and check for water or sediment contamination and for proper fuel grade before each flight and after each refuelling. If water is observed, take further samples until clear and then gently rock the wings to move any additional contaminants to the fuel drains. Take further repeated samples from all fuel drain points to ensure that all contamination has been removed. If contaminants are still present, refer to the WARNING below and do not fly the airplane.

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7. Leading Edge .....CHECK Condition
8. Leading Edge VGs .....CHECK Condition and Security
   (Allowable up to 4 missing per wing)
9. Pitot Tube.....REMOVE Cover and CHECK Clear
10. Leading Edge Fresh Air Vent.....UNOBSTRUCTED
11. Main Wheel Tire .....Condition, Inflation and Wear
12. Wheel Pants.....CHECK Security and Debris
13. Chocks.....REMOVE
14. Co-Pilot Door .....CHECK Closed and Unlocked

8. RIGHT NOSE

1. NACA Fresh Air Vent.....UNOBSTRUCTED
2. Cowl Access Door.....CHECK Condition and Security

9. NOSE

1. Landing Light.....CHECK Condition
2. Engine Cooling Air Inlets.....CHECK for Obstructions
3. Propeller and Spinner Cap.....CHECK for nicks and Security
4. Air Filter.....CHECK for Stoppage
5. Engine Oil Dipstick/Filler Cap.....CHECK Oil Level and Secure Dipstick and Access Cover

WARNING
DO NOT OPERATE ENGINE WITH LESS THAN 4 QUARTS OF OIL. FOR EXTENDED FLIGHT, FILL TO 11 QUARTS

6. Cowlings.....CHECK Fasteners Secure
7. Cowl Flaps.....CHECK Condition/Operation
8. Nose Wheel Tire.....Condition, Inflation and Wear

10. LEFT NOSE

1. NACA Fresh Air Vent.....UNOBSTRUCTED
2. Cowl Access Door.....CHECK Condition and Security

11. LEFT WING LEADING EDGE AND MAIN GEAR

1. Wing Tie-Down.....DISCONNECT
2. Fuel Tank Vent opening .....CHECK for Stoppage
3. Fuel Quantity.....CHECK VISUALLY
4. Fuel Filler Cap.....SECURE
5. Fuel Quick Drain Valves .....DRAIN

Drain fuel tank at each location using sampler cup and check for water or sediment contamination and for proper fuel grade before each flight and after each refuelling. If water is observed, take further samples until clear and then gently rock the wings to move any additional contaminants to the fuel drains. Take further repeated samples from all fuel drain points to ensure that all contamination has been removed. If contaminants are still present, refer to the above WARNING and do not fly the airplane.

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6. Leading Edge .....CHECK Condition
7. Leading Edge VGs .....CHECK Condition and Security (Allowable up to 4 missing per wing)
8. Leading Edge Fresh Air Vent.....UNOBSTRUCTED
9. Main Wheel Tire .....Condition, Inflation and Wear
10. Wheel Pants.....CHECK Security and Debris
11. Chocks.....REMOVE

12. LEFT WING TIP

1. Wing Tip .....CHECK Security
2. Strobe, Nav Light and Lens .....CHECK Condition and Security

13. LEFT WING TRAILING EDGE

1. Aileron Balance Weight .....CHECK Condition and Security
2. Aileron & Tab .....CHECK Freedom and Security
3. Flap.....CHECK Security
4. Hinges, Push Rod, Bolts .....CHECK Security

PRIOR TO ENGINE START

1. Pre-flight Inspection .....COMPLETE
2. Emergency Equipment.....ON BOARD
3. Passenger Briefing.....COMPLETE
4. Seats .....ADJUST and SECURE
5. Seatbelts .....FASTENED and ADJUSTED
6. Parking Brake .....SET as required
7. Circuit Breakers.....CHECK IN
8. Ancillary Electrical Equipment .....OFF

WARNING

THE AVIONICS MASTER SWITCH MUST BE TURNED OFF DURING ENGINE START TO PREVENT POSSIBLE DAMAGE TO AVIONICS

9. Avionics Master Switch.....OFF
10. Alternate Induction Air.....CLOSED
11. Cowl Flaps.....SET as required
12. Fuel Selector Valve .....ON FULLEST TANK

STARTING ENGINE

STARTING A COLD ENGINE

1. Throttle .....OPEN ¼ inch.
2. Propeller .....HIGH RPM (push full in)
3. Mixture .....FULL RICH (push full in)
4. Propeller Area.....CLEAR
5. Master Switch.....ON
6. Alternator Switch.....ON
7. Engine Monitor (MVP-50) .....CHECK On and Normal
8. Auxiliary Fuel Pump Switch.....ON until positive fuel flow then OFF

(After positive fuel flow, bring mixture to idle cut-off, Rich after start)

NOTE

Auxiliary Fuel Pump should be left OFF during taxiing and engine run-up to confirm that the engine driven pump is functioning properly. Auxiliary Fuel Pump should be left ON during takeoff and for climb as required for vapour suppression with hot or warm fuel.

9. External Lights .....ON as Required
10. Mixture .....LEAN
11. Ignition Switch .....START (Release After Start)
12. Throttle .....ADJUST to 1000 ~1200 RPM for Warm Up
13. Oil Pressure .....CHECK

(Pressure should be indicating within 30 seconds)

14. Engine Parameters .....MONITOR
15. Charging System.....CHECK
16. Avionics Master Switch .....ON
17. Radios.....SET

PRIOR TO TAKEOFF

1. Parking Brake .....SET
2. Fuel Quantity & Balance .....CHECK
3. Fuel Selector Valve.....ON FULLEST TANK
4. Alternate Air .....CLOSED
5. Cowl Flaps.....SET as Required
6. Engine Instruments .....CHECK in Operating Range
7. Mixture .....RICH
8. Propeller .....HIGH RPM
9. Throttle .....1700 RPM
   (a) Magnetos .....CHECK
   (RPM drop should not exceed 175 RPM on either magneto or 50 RPM differential between magnetos)

   NOTE

   During mag check the unselected magneto should indicate "Left Mag Out" or "Right Mag Out" on the Engine Monitor (MVP-50) as appropriate.

   (b) Propeller .....CHECK Operation
   (Note RPM drop of approximately 200 RPM)
   (c) Propeller .....HIGH RPM
   (d) Charging System.....CHECK in Operational Range
   (e) Under/Over Voltage Light .....OUT
10. Minimum Throttle.....CHECK Idle
11. Throttle .....1000-1200 RPM
12. Throttle Friction Lock.....ADJUST
13. Master Switch .....CHECK ON
14. Alternator Switch.....CHECK ON
15. Flaps .....SET for TAKEOFF (20^{o})
16. Pitch Trim.....SET for TAKEOFF
17. Rudder Trim .....SET for TAKEOFF
18. Annunciator .....ON
19. Auxiliary Fuel Pump Switch.....ON
20. External Lights .....AS REQUIRED
21. Pitot Heat.....AS REQUIRED
22. Propeller .....HIGH RPM
23. Mixture .....RICH
    (Above 5000 ft LEAN to obtain maximum RPM)

24. Seats and Seat Belts .....CHECK Secure
25. Doors .....LATCHED
26. Avionics.....AS REQUIRED
27. Flight Controls.....CHECK FREE and CORRECT
28. Flight Instruments .....CHECK and SET
29. Parking Brake .....RELEASE

TAKEOFF

Power Check: Check full-throttle engine operation early in takeoff run. The engine should run smoothly and show manifold pressure of about 29 inches at S.L. and engine speed of 2700 RPM. Monitor engine instruments for correct indication. Discontinue takeoff at any sign of rough operation or sluggish acceleration. Make a thorough full-throttle static run-up before attempting another takeoff.

For takeoff over a gravel surface: Advance Power Lever slowly. This allows the airplane to start rolling before high RPM is developed, and gravel will be blown behind the propeller rather than pulled into it.

Soft or rough field takeoffs: Performed by lifting the airplane's nose off the ground as soon as practical using elevator aft control. Holding the nose wheel just off the ground during the takeoff roll to reduce friction drag. Immediately after liftoff, transition into level flight with wheels just clear of the surface and accelerate to the required climb speed. Ensure that the aircraft is not forced back to the runway. Climb out when safe speed is reached.

Takeoffs with strong crosswinds: These takeoffs are normally performed with the minimum flap setting (0^o or 20^o) necessary for the field length, to minimize the drift angle immediately after takeoff. With the ailerons partially deflected into the wind, accelerate the airplane to a speed slightly higher than normal and then pull it off briskly to prevent the aircraft from settling back to the runway while drifting. When clear of the ground, use coordinated turn into wind to correct for drift and to maintain alignment over the runway.

NORMAL TAKEOFF

1. Flaps ..... 20^o
2. Power ..... FULL THROTTLE at 2700 RPM
3. Mixture ..... RICH
4. Elevator Control ..... ROTATE at 60KIAS
5. Climb Speed ..... 70-80 KIAS
6. Flaps ..... UP at Safe Speed and Altitude
7. Auxiliary Fuel Pump ..... OFF at Safe Altitude

NOTE

If the flap indicator is non-functional, for example, flap indicator reads zero when flaps are deployed, use flaps up for all takeoffs.

SHORT FIELD TAKEOFF

1. Flaps.....20°
2. Brakes .....APPLY
3. Propeller.....2700 RPM
4. Mixture.....RICH
   (Above 5000 feet, LEAN to obtain maximum power)
5. Throttle.....FULL
6. Brakes .....RELEASE
7. Elevator Control.....ROTATE AT 60
8. Climb Speed .....67 KIAS (Until obstacle cleared)
   THEN 80-90 KIAS
9. Flaps.....UP at Safe Speed and Altitude
10. Auxiliary Fuel Pump .....OFF at Safe Altitude

ENROUTE CLIMB

1. Airspeed.....80-90 KIAS

NOTE

If a maximum performance climb is necessary, use speeds shown in the *Rate of Climb* chart in Section 5 - Performance.

2. Propeller.....As required
3. Throttle .....FULL THROTTLE
4. Auxiliary Fuel Pump .....OFF
5. Mixture.....RICH
   (Above 5000 feet,
   LEAN as required)

CRUISE

1. Power .....AS DESIRED
   (For performance see Figure 5-13)
2. Pitch Trim .....ADJUST
3. Mixture.....LEAN as required

DESCENT

1. Power ..... AS DESIRED
2. Mixture ..... ADJUST for Smooth Operation (Full rich for idle power)
3. Wing Flaps …….. AS DESIRED (UP above 116 KIAS, 10^{o} to 30^{o} below 116 KIAS)

BEFORE LANDING

1. Seats ..... ADJUSTED and SECURED
2. Seatbelts ..... FASTENED
3. Fuel Selector Valve..... SELECT FULLEST
4. Mixture ..... RICH
5. Landing/Light..... AS REQUIRED
6. External Lights..... AS REQUIRED
7. Auxiliary Fuel Pump Switch ..... ON

LANDING

NORMAL LANDING

1. Wing Flaps …….. AS DESIRED (UP above 116 KIAS, 10^{o} to 30^{o} below 116 KIAS)
2. Airspeed (Flaps Up)..... 80-90 KIAS
3. Airspeed (Flaps 30^{o}) ..... 70-80 KIAS
4. Propeller..... HIGH RPM
5. Touchdown ..... NOSE UP
6. Braking ..... AS REQUIRED

NOTE

Normal landing approaches can be made with power on or off with any flap setting desired. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds.

SHORT FIELD LANDING

1. Flaps.....FULL DOWN (30^o)
2. Airspeed.....70 KIAS
3. Propeller.....HIGH RPM
4. Throttle .....REDUCE to IDLE (After Clearing Obstacles)
5. Touchdown .....NOSE-UP
6. Brakes .....APPLY as REQUIRED
7. Flaps.....RETRACT

BALKED LANDING

1. Power .....FULL THROTTLE and 2700 RPM
2. Flaps.....20^o
3. Airspeed.....72 KIAS

When clear of obstacles:

4. Airspeed.....80 ~ 90 KIAS
5. Flaps.....SLOWLY RETRACT to FLAPS UP

AFTER LANDING

1. Flaps.....RETRACT
2. Auxiliary Fuel Pump Switch .....OFF
3. Pitot Heat .....OFF

SECURING AIRPLANE

1. Parking Brake ..... SET
2. Radio ..... CHECK (ELT Channel)
   (Check for inadvertent ELT triggering due to landing)
3. Avionics Master Switch ..... OFF
4. Mixture ..... IDLE CUTOFF (Pull Full Out)
5. Ignition Switch ..... OFF
6. Master Switch ..... OFF
7. Alternator Switch ..... OFF
8. Fuel Selector ..... OFF
9. Control Lock ..... INSTALL

AMPLIFIED NORMAL PROCEDURES

The following Amplified Normal Procedures provide further insight into the information contained in the Normal Procedures Checklists of this section. These Amplified Procedures also include information which cannot be adapted into a checklist format. This information should be reviewed in detail before flying the airplane and should also be reviewed on a regular basis to maintain pilot proficiency on the procedures.

PRE-FLIGHT INSPECTION

A pre-flight inspection is required before each flight to ensure the proper working condition of the airplane. If the airplane has been in storage for an extended period, or has had recent major maintenance, a more thorough inspection by the pilot is warranted. Furthermore, if the airplane has operated from a marginal airport or has been exposed to severe weather conditions, a more thorough exterior inspection is again appropriate.

Following any extensive maintenance or repairs, all flight controls, including trim controls, should be checked for free and correct movement and security. All access panels on the airplane should be checked to verify that they are securely in place.

Aircraft damage which may be caused during ground handling of the airplane, especially in crowded hangar space, may cause minor dents, nicks, or scratches. The wings, fuselage and empennage should be given close attention if any such damage occurs. Other protuberances such as the navigation and anti-collision lights, and avionics antennas are also prone to damage. Improper ground handling during towing and exceeding tow limits can also result in damage to the nose wheel.

Storing the airplane outside over long periods may result in dust and dirt accumulation on the induction air filter, obstructions in the pitot-static system, contaminants in the fuel tanks and fuel system, and even bird/insect nesting. A through inspection of these areas is recommended before each flight.

The fuel system must be checked for water and sediment contamination at all of the following quick drain valves:

1. Fuel tank drain valves
2. Fuel collector drain valves
3. Fuel strainer drain valve

If water is observed in any of the above mentioned drain points, take further samples until the contamination is clear and then gently rock the wings to move any additional contaminants to the fuel drains. Take further repeated samples from all fuel drain points to ensure that all contamination has been removed. If contaminants are still present, the fuel tanks and fuel system must be completely drained and cleaned before any further flight.

To protect against in-flight fuel loss as a result of fuel siphoning out of the fuel tank filler necks, ensure that the filler caps are tightly sealed after checking or servicing the fuel system. The fuel system vents should also be checked for and cleared of any blockage including ice or water, especially after exposure to cold, wet weather.

Furthermore, if the airplane has been stored outside in high or gusty wind conditions, or in the wake of taxiing aircraft, special attention should be paid to the control surface stops, hinges and brackets to detect the presence of potential wind damage.

If the airplane is operated in snow, slush or muddy fields, check the main gears and nose wheel for obstructions and cleanliness. In rough fields, especially at higher altitudes, the landing gear may be subjected to unusually high loads and a frequent check of all components including the gear legs, tires and brakes should be performed. Additionally, operation from a gravel or cinder field is particularly hazardous to the propeller tips and leading edges of the horizontal tailplane. Stone damage to the propeller tips can seriously reduce the life of the blades, and abrasion on the leading edges of the horizontal stabilizer is also detrimental.

STARTING THE ENGINE

The proper engine start procedure will depend on the climate conditions and the elapsed time after last shutdown. The need to prime the engine will be dependent on these two factors.

In cooler weather, the engine temperature drops off rapidly following an engine shutdown, leaving the injector nozzle lines nearly full of fuel. Engine shutdown in warmer weather will often see a temperature rise in the engine compartment following the shutdown which tends to vaporize the lingering fuel in the fuel intake lines and manifold.

Engine compartment temperatures may increase rapidly following engine shutdown in warmer weather and fuel lines will vaporize and escape into the intake manifold. Hot weather starting procedures depend considerably on how soon the next engine start is attempted. In warm weather, the first 15 to 20 minutes after shutdown leaves the fuel manifold adequately primed and the empty injector nozzles will fill before the engine dies. However, after approximately 20 minutes, the vaporized fuel in the manifold will have nearly dissipated and some slight priming could be required to refill the nozzle lines and keep the engine running after the initial start.

Starting a hot engine is facilitated by advancing the mixture promptly to 1/3 open when the engine fires, smoothly advance to full rich as power develops, then reduce throttle to desired idle speed.

If the engine tends to die after starting, turn on the auxiliary fuel pump temporarily and adjust the throttle and/or mixture as necessary to keep the engine running. If the engine has been over-primed or flooded, turn off the auxiliary fuel pump, open the throttle from 1/2 to full open, set mixture to full lean and continue cranking. When the engine fires, retard the throttle to the desired idle speed and smoothly advance the mixture control to full rich.

In cold weather with a cold engine, the engine might be under-primed and not fire at all. In this case, additional priming will be necessary. Additional information regarding cold weather staring and operation may be found under the appropriate paragraph at the end of this section.

After starting the engine, the oil pressure gauge should show pressure within 30 seconds in the summer time and one minute in very cold weather. If this is not the case, shut down the engine immediately and investigate the problem. A lack of oil or oil pressure can seriously damage the engine.

TAXIING

When taxiing the aircraft, speed should be kept to a minimum, controlled primarily with throttle. Be especially careful not to "ride" the brakes as this may cause them to overheat. Nose wheel swivelling and differential brakes provide adequate control of direction, even in significant wind conditions. A momentary use of brakes in the direction of turn is may be required. During taxi, both elevator and aileron control should be used to help maintain directional control and balance (refer to figure below).

Taxiing over loose gravel or cinders should be done at low engine speed to avoid stone damage to the propeller.

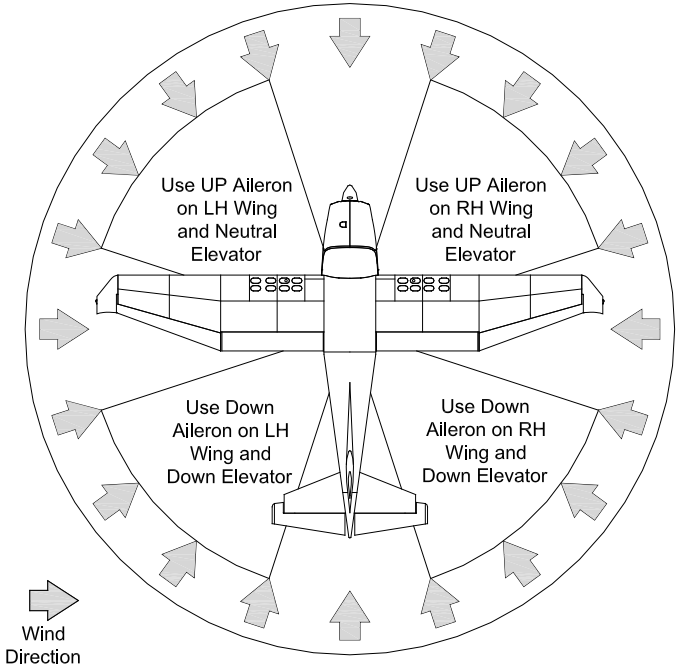


Figure 4-2: Taxiing Diagram

NOTE

Strong quartering tail winds require caution. Avoid sudden bursts of the throttle and sharp braking when the airplane is in this situation. Use the swivelling nose wheel and rudder to maintain direction.

PRIOR TO TAKEOFF

WARM UP

Engine oil temperature limitations must be adhered to. It is recommended that the oil temperature be allowed to increase to 45°C at low power settings before advancing power to 1700 RPM for run-up, and full power should not be applied until oil temperature is at 55°C or warmer. As with all air-cooled general aviation piston engines, care must be taken not to overheat the engine during long periods of idling, especially in warm weather conditions. Air-cooled engines are cowled to provide efficient in-flight engine cooling and are therefore by nature inefficient while on the ground. Extensive idling can also foul the spark plugs leading to further engine troubles. Accordingly, it is recommended that the engine be operated lean during operations on the ground.

MAGNETO CHECK

The magneto check is intended to verify proper ignition system operation prior to flight. The magneto check should be made at 1700 RPM using the following procedure. First move the ignition switch to the right (R) position and note the RPM. Then move the ignition switch to the both (BOTH) position to clear the other set of plugs. Then move the ignition switch to the left (L) position and again note the RPM. Finally, return the switch to the both (BOTH) position. The RPM drop on either magneto should not exceed 175 RPM, and the difference in RPM reading between the left and right magnetos should not be more than 50 RPM. Should these limits be exceeded, or if there is any other doubt as to the working function of the ignition system, an RPM check at higher engine speeds will usually confirm whether a problem exists. Attention should also be paid to the ignition system if there is an absence of an RPM drop when switching over the magnetos. This may be an indication of a faulty ground connection on one side of the ignition system or that the magneto timing is set in advance of the proper setting. Note also that as the right (R) magneto is selected the tachometer should indicate “Left Mag Out”. Similarly, when the left (L) magneto is selected the tachometer should indicate “Right Mag Out”. See Chapter 7 for additional information on the tachometer function.

The Auxiliary Fuel Pump should be OFF during the magneto check in order to confirm that the engine driven pump is functioning properly.

TAKEOFF

POWER CHECK

It is important to check full throttle operation early in the takeoff roll. Any sign of rough engine operation or sluggish response is good cause for discontinuing the takeoff. Should this occur, a full throttle static run-up is justified and should be conducted before any further flights can be attempted. In the run-up, the engine should run smoothly and turn at approximately 2650-2700 RPM.

When takeoffs are attempted over surfaces consisting of loose gravel or cinders, care should be taken not to damage the propellers by pulling the loose material into it. It is important to advance the throttle slowly thereby rolling the airplane first before high RPM is developed.

Prior to takeoffs from high elevation fields particularly above 5000 feet elevation, the mixture should be leaned to provide maximum RPM in a full throttle static run-up.

After full throttle is applied, the throttle friction lock can be tightened so as to prevent the throttle from creeping back from the maximum power position. The throttle lock is tightened by adjusting it clockwise and should also be done in other flight conditions to maintain a fixed throttle setting.

FLAP SETTINGS

Normal Takeoffs

Normal takeoffs are accomplished using 20^{o} of flaps. This setting reduces ground roll and total distance over an obstacle. Flap settings above 20^{o} are not approved for normal takeoffs. The flap position should be maintained until all obstacles are cleared and a safe retraction speed of 72 KIAS is reached.

ENROUTE CLIMB

NORMAL CLIMB

A normal enroute climb is performed with flaps retracted, full throttle at the best rate-of-climb airspeed. The mixture should be set to full rich below 5000 feet and may be leaned above 5000 feet altitude to obtain best power or for smoother engine operation.

BEST RATE-OF-CLIMB

For a maximum rate-of-climb, use the best rate-of-climb airspeeds shown in the performance tables of Section 5 - *Rate of Climb Chart*.

BEST ANGLE-OF-CLIMB

If obstacles dictate the use of a steep climb angle, the best angle-of-climb airspeed of 68~73 KIAS should be used with flaps retracted, throttle set to full and 2700 RPM. Climbs at speeds lower than the best rate-of-climb airspeed should be of short duration to minimize the effects of poor engine cooling at slow speeds.

CRUISE

Normal cruise is maintained with an engine power setting of 60% to 75%. Section 5 - *Cruise Performance*, provides data for the engine speed (RPM), the manifold pressure (MP) and corresponding fuel consumption for various altitudes. During initial break-in of the engine, cruise should be done at 75% power as much as possible until a total of 50 hours have accumulated or the oil consumption has stabilized. It is a common misconception that high power during the break-in period of the engine is harmful. In fact, proper seating of the piston rings is dependent on operation at higher power settings. This is applicable to new engines, engines having received new cylinders, or engines with a top overhaul of one or more cylinders.

When planning long trips, the selection of cruise altitude depends on the basis of the most favourable wind conditions, and the use of low power settings are significant factors to reduce fuel consumption. In addition to power settings, proper leaning techniques can also improve range and are factored into the cruise performance tables. To achieve the Recommended Lean Mixture fuel consumption figures shown in Section-5, the mixture should be leaned until the EGT peaks and then enriched to decrease EGT by 50^{o}F. At lower power settings,

it may be necessary to enrich the mixture slightly to obtain smoother engine operation.

LEANING WITH AN EGT GAUGE

When leaning the engine in cruising flight at 75% power or less, the Exhaust Gas Temperature (EGT) indicators may be used as a guide. To lean the mixture using the indicators, lean the engine to establish the peak EGT as a reference point. Enrich the mixture based on the following chart below:

Mixture Description	Exhaust Gas Temperature EGT)
Recommended Lean Mixture (Pilot's Operating Handbook)	50° F Rich of Peak EGT
BEST POWER	100 ° F Rich of Peak EGT
Best Economy (75% Power or Less)	Peak EGT

NOTE

Any change in altitude or throttle position requires a re-check of EGT indication. Operating at peak EGT may cause engine roughness and the Recommended Lean Mixture should be used instead.

As shown in the figure above, Peak EGT will provide the best economy possible. This setting results in an increased range of approximately 4% and a decrease in speed of approximately 2 knots over the Recommended Lean Mixture.

For additional information on the use of the engine monitor (MVP-50) see Chapter 7.

STALLS

The stall characteristics of this airplane are conventional and an audible warning horn and light is provided by the stall warning system between 5 and 10 knots above the stall in all configurations.

Normally, the stall is marked by a gentle nose drop and the wings can easily be held level or in the bank with coordinated use of the ailerons and rudder. Upon stall warning in flight, recovery is accomplished by immediately by reducing back pressure to maintain safe airspeed, adding power if necessary and rolling wings level with coordinated use of the controls.

SPINS

Intentional spins are not approved for this aircraft. However, should the pilot enter an inadvertent spin, the following procedure should be used to recover from the event:

1. Retard the throttle to the IDLE position.
2. Centralize/Analyze. Place the ailerons in NEUTRAL position.
3. Apply and HOLD FULL RUDDER OPPOSITE to the direction of rotation.
4. Just after the rudder reaches the stop, move the CONTROL WHEEL BRISKLY FORWARD far enough to break the stall. Full down elevator may be required at aft center of gravity loadings to assure optimum recovery.
5. HOLD these control inputs UNTIL ROTATION STOPS. Premature relaxation of the control inputs may extend the recovery.
6. As rotation stops, NEUTRALIZE RUDDER and make a smooth RECOVERY from the resulting dive.
7. Retract the flaps.
8. Pull from dive NOT exceeding 3.8g.

Variations in the weight and balance of the airplane can cause differences in spin behaviour. However, the recovery technique shown above should be used in any case and will result in the quickest recovery from a spin.

LANDING

NORMAL LANDING

A normal landing approach can be made with or without power and using any flap setting desired. The combination of these will be dependent on the approach setup, the surface winds and field length. A comfortable approach speed is usually governed by the air turbulence and surface winds present at the time. Touchdown should be made with power off to reduce the landing speed and braking requirement in the rollout.

SHORT FIELD LANDING

A short field landing should be made with 30^{o} of flaps and at speed of 70 KIAS (higher approach speeds should be used in windy or turbulent conditions). Power should be used to control the glide path over obstacles. Once the obstacles are cleared, the power should be progressively reduced while maintaining airspeed by lowering the nose of the airplane. To maximize braking effectiveness, retract the flaps and hold the control wheel full back. Do not skid the tires as this may not only damage the tires but also reduce directional control of the airplane.

CROSSWIND LANDING

Landings in strong crosswind mandate the use of the minimum flap settings needed for the landing field length. The *crab* or *combination method* of drift correction may be used in a crosswind landing, however the *wing low method* gives the best control. After touchdown, hold a straight course using the rudder and occasional differential braking if necessary. Maintain aileron deflection in direction of the wind component throughout the landing roll.

The maximum allowable crosswind is dependent on pilot capability and airplane limitations. However, landing in a direct crosswind of 15 knots has been demonstrated in this airplane.

BALKED LANDING

If an approach or landing is not successful and a go-around is required, immediately apply full power. If obstacles must be cleared during the climb, reduce the flap settings to 20^{o} and climb at 72 KIAS initially. Once the obstacles are cleared, climb at 80~90 KIAS and retract the flaps and re-trim the aircraft in stages until flaps are fully retracted.

COLD WEATHER OPERATION

When operating during the winter season or in cold temperatures, special attention should be given to the airplane before any flight.

Proper pre-flight draining of the fuel system sumps is particularly important to ensure that no water is present in the system which may contaminate the system or freeze up and cause blockage in the lines. The use of additives such as isopropyl alcohol or diethylene glycol monomethyl ether (DIEGME) may also be desirable. Refer to Section 8 - *Handling, Service and Maintenance* for the proper use of such additives.

During the walk around inspection, any accumulations of snow, frost, or ice must be removed from all surfaces, especially the wing, tailplane and all control surfaces. The control surfaces must also be free of any internal accumulations which may inhibit proper movement of the controls. Even small accumulations of snow, frost or ice can affect airplane performance and handling.

Should the takeoff surface be covered in snow or slush, a greater takeoff allowance must be given to account for the degradation in takeoff roll performance. Depending on the depth and consistency of the snow cover, a safe takeoff may not be possible and one should not be attempted.

If the engine has been cold soaked, general recommendation is that the propeller be pulled through by hand several times to break loose or limber the oil. This procedure will reduce power draw on the battery if a battery start is made.

The engine cowl flaps should be adjusted prior to takeoff. For cold weather operation the cowl flaps may be closed.

STARTING - GENERAL

On cold mornings, it is advisable to pull the propeller through several times to free up the oil before cranking with the engine starter.

WARNING

WHEN PULLING THE PROPELLER THROUGH BY HAND, TREAT THE PROPELLER AS IF THE IGNITION SWITCH WERE ON.

< DO NOT STAND WITHIN ARC OF PROPELLER >

ANY PERSON STANDING WITHIN PROPELLER ARC MAY BE IN SERIOUS DANGER SINCE A COMPONENT MALFUNCTION INCLUDING A LOOSE OR BROKEN WIRE COULD CAUSE THE PROPELLER TO ROTATE.

When air temperatures are below 20°F (-6°C), the use of an external pre-heater is recommended in order to obtain a good start. By using the external pre-heater, oil which has accumulated in the oil cooler can be thawed from its congealed state thereby reducing wear on the engine.

Cold weather starting procedures are the same as the normal starting procedures (refer to *Normal Procedures Checklist - Starting Engine*). Be careful not to allow inadvertent forward motion of the airplane during starting when parked on a slippery surface, snow, or ice.

NOTE

If the engine does not start during the first few attempts, or if the engine firing diminishes in strength, there is a possibility that the spark plugs have frosted over. In this case, pre-heat of the engine is necessary before another start can be attempted.

HOT WEATHER OPERATION

During hot weather operations, the engine starting procedure is dependent on the severity of the weather and how soon after engine shutdown the next engine start is attempted. Refer to the starting information (*Starting Engine*) in this section for further details.

In hot weather, avoid prolonged idling and engine operation on the ground because of the poor engine cooling efficiency.

The engine cowl flaps position should be adjusted prior to takeoff. For hot weather operation the cowl flaps should be opened to the maximum position.

NOISE CHARACTERISTICS AND NOISE REDUCTION

The certificated noise level for the Found FBA-2C3 Expedition E350 at a maximum weight of 3800 lb. is 87.0 dB(A) using maximum continuous power at 2700 RPM. No determination has been made by Transport Canada that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into or out of any airport.

In order to minimize the effects of airplane noise on the environment, the following noise abatement procedures are suggested:

1. Pilots operating airplanes under VFR conditions over outdoor assemblies of persons, recreational and park areas, and other noise sensitive areas should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.

2. During departure from or approach to an airport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise sensitive areas.

NOTE

The above recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgement, an altitude of less than 2000 feet is necessary to adequately exercise the duty to see and avoid other airplanes.

GARMIN G500 NORMAL PROCEDURES

Refer to the Garmin G500 PFD/MFD System Cockpit Reference Guide P/N 190-01102-03 or G500 Pilot's Guide P/N 190-01102-02, presented in Paragraph 2.1 of this document, for normal operating procedures. This includes all Primary Flight Display and Multi-Function Display information.

Although intuitive and user friendly, the G500 PFD/MFD System requires a reasonable degree of familiarity to avoid becoming too engrossed at the expense of basic instrument flying in IMC and basic see-and-avoid procedures in VMC.

Pilot workload will be higher for pilots with limited familiarity in using the unit in an IFR environment, particularly without the autopilot engaged. Garmin provides excellent training material with the Cockpit Reference Guide and the detailed Pilot's Guide. Pilots should take full advantage of these training tools to enhance system familiarization.

PFD KNOB & PFD SOFT KEYS

The basic PFD controls are on the left side of the unit, next to and beneath the PFD display. The rotary knob performs the function annunciated on the display just to the upper left of the HSI: HDG, CRS, ALT, V/S, or BARO. If no function is annunciated then the knob is providing a HDG function. Assigning the function of the knob is done by pressing/releasing one of the dedicated function buttons to the left of the display. The knob defaults back to HDG if it is not rotated for a period of 10 seconds. The Garmin G500 PFD/MFD System Cockpit Reference describes each function and its operation.

The soft keys at the bottom of the PFD display are used to configure the course data displayed in the HSI (CDI button, 1-2 button) and select the optional bearing pointers (BRG1 and BRG2 button) which are may be overlaid in the HIS presentation on the PFD. The soft keys operate by press and release. Note: In Dual G500 installations, the CDI key located on the GNS units is not operational Consult the Garmin G500 PFD/MFD System Cockpit Reference for a complete description.

The units and markings on the PFD are not user configurable. They match the units as specified in the aircraft's FAA approved Airplane Flight Manual and standby instruments. Display and control of the airspeed references are made via the AUX page of the MFD; consult the Garmin G500 Cockpit Reference Guide

for description and operation of these references.

MFD KNOBS & MFD SOFT KEYS

The MFD controls are on the right side of the unit, next to and beneath the MFD display. The rotary knobs scroll through various page groups and pages of the MFD and manipulate data and settings by pressing the knob to activate a cursor.

Soft keys at the bottom of the display allow for some quick functions to be performed on each page. The soft keys operate by press and release. More detailed configuration is typically available by pressing the MENU button, which is on the right side of the display.

Pressing and holding down the CLR key is a good way to get back to the main map page on the MFD. This can be used as a quick way back, or when the pilot has selected a submenu within the system. The functions available under the MFD are explained in the Garmin G500 Cockpit Reference Guide.

ALTITUDE SYNCHRONIZATION

The pilot must synchronize the PFD BARO setting and the Standby Altimeter Kollsman window with the local altimeter setting as appropriate. In dual installations if synchronization between the units is enabled, setting either PFD will adjust both PFDs, but the standby must still be set by the pilot. Reference the Garmin G500 Cockpit Reference Guide for a complete description and the usage of synchronization in dual installations.

SYNTHETIC VISION TECHNOLOGY (IF INSTALLED)

The SVT system may be turned on or off, as desired. To access the synthetic vision system softkey menu, press the PFD softkey on the GDU 620, followed by the SYN VIS softkey. Synthetic vision terrain, horizon headings, and airport signs can be toggled on and off from this menu. Press the BACK softkey to return to the root PFD menu.

AUTOPILOT OPERATIONS WITH THE G500 (IF INSTALLED)

The G500 PFD/MFD System offers various integration capabilities dependent mainly upon the type of autopilot installed in a particular aircraft.

Course / NAV Selection coupling to the autopilot

When operating the autopilot in NAV mode, the deviation information from the installed navigation sources (i.e. GPS1, GPS2, NAV1, NAV2) is switched via the G500 PFD display. Whatever is displayed on the HSI is the NAV source the autopilot is following. Most autopilots also use the course datum to determine the best intercept angles when operating in NAV mode.

Heading Bug coupling capability to the autopilot

When operating the autopilot in HDG mode, the difference between the HDG bug location on the HSI and the actual aircraft heading creates an error signal which the autopilot will minimize by turning in the direction of the bug. If the bug is turned more then 180 degrees, the autopilot may turn the airplane in the opposite direction of the desired turn.

Roll Steering capable autopilots

If the autopilot is already designed to receive Roll Steering information, the data is transmitted via a digital communications bus from the G500 to the autopilot.

The G500 receives this data from the GPS. In dual GPS installations, the G500 sends Roll Steering information for the GPS which is currently selected for use via the PFD 1-2 button.

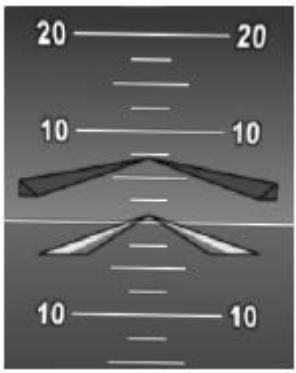
Altitude Pre-Selector integrated with the autopilot

If the autopilot is compatible with the Altitude Alerter in the G500 system, then the alerter may be used as an Altitude Pre-Selector for the autopilot. The G500 system does not control the rate or pitch of the climb; it only communicates the approaching altitude to the autopilot computer. The Altitude Bug Setting will flash when approaching within 1000 feet of the selected altitude, and an audio tone is played when approaching or deviating within 200 feet of the selected altitude.

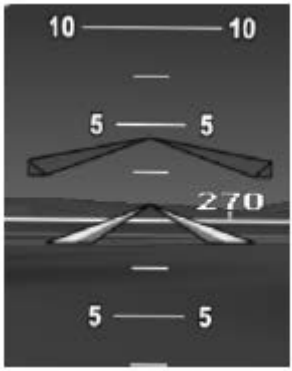
Flight Director Display

If autopilot flight director commands are interfaced to the G500, they will be presented as a single cue flight director on the PFD. Control of the flight director is accomplished via the autopilot/flight director controller; there are no pilot controls or adjustments for the flight director on the G500.

The G500 system limits the distance the flight director pitch commands may deviate from the aircraft attitude icon. In the event that the pitch command provided by the autopilot flight director is greater than the distance allowed by the G500, the command bars will be displayed at the maximum distance allowed by the G500. As the aircraft pitch changes to satisfy the command bars, the bars will continue to be displayed at the maximum distance from the aircraft attitude icon until the aircraft pitch deviation is within the command display limit. In both examples below, the flight director is commanding approximately 7 degrees pitch up. With SVT turned off, the 7 degree pitch up command is displayed with the command bar at 7 degrees pitch up. With SVT turned on, the G500 limits the command bar shown as 4.5 degrees pitch up, which is the maximum deviation that can be displayed. The G500 system will hold the command bars at the same distance from the aircraft icon until the aircraft pitch attitude is within 4.5 degrees of the command.



SVT Off



SVT On