SECTION 4
NORMAL PROCEDURES

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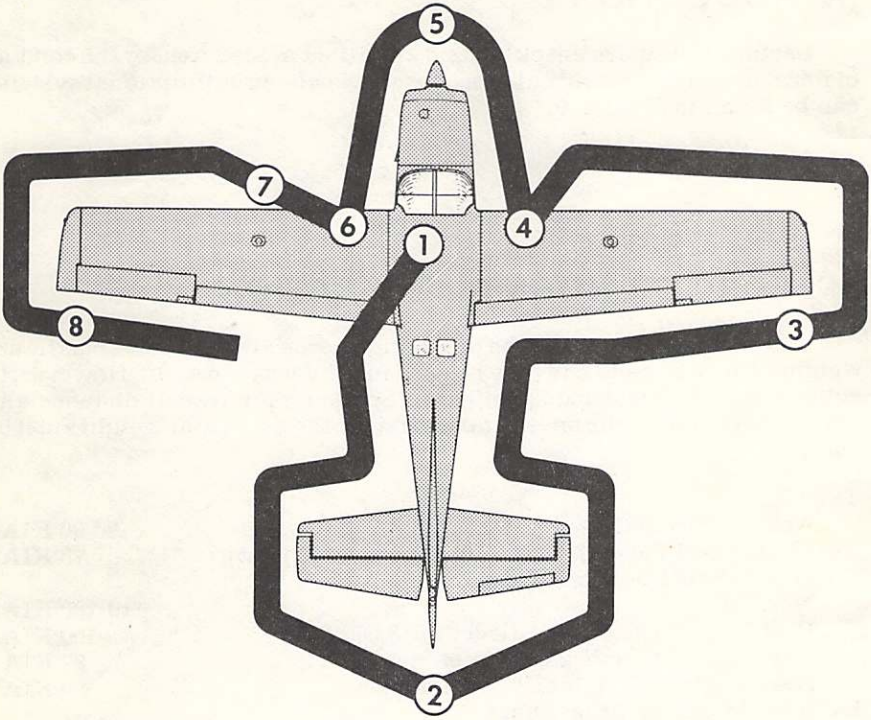
INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 4000 pounds and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff distance and climb performance, the speed appropriate to the particular weight must be used.

Takeoff:	
Normal Climb Out	80-90 KIAS
Short Field Takeoff, Flaps 10°, Speed at 50 Feet	78 KIAS
Enroute Climb, Flaps and Gear Up:	
Normal	110-120 KIAS
Best Rate of Climb, Sea Level to 18,000 Feet	100 KIAS
Best Rate of Climb, 23,000 Feet	97 KIAS
Best Angle of Climb, All Altitudes	80 KIAS
Landing Approach (3800 Lbs):	
Normal Approach, Flaps Up	85-95 KIAS
Normal Approach, Flaps 30°	70-80 KIAS
Short Field Approach, Flaps 30°	72 KIAS
Balked Landing (3800 Lbs):	
Maximum Power, Flaps 20°	70 KIAS
Maximum Recommended Turbulent Air Penetration Speed:	
4000 Lbs	130 KIAS
3350 Lbs	119 KIAS
2700 Lbs	106 KIAS
Maximum Demonstrated Crosswind Velocity:	
Takeoff or Landing	21 KNOTS



NOTE

Visually check airplane for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. Prior to flight, check that pitot heater (if installed) is warm to touch within 30 seconds with battery and pitot heat switches on. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

Figure 4-1. Preflight Inspection

CHECKLIST PROCEDURES

PREFLIGHT INSPECTION

(1) CABIN

1. Pilot's Operating Handbook -- AVAILABLE IN THE AIRPLANE.
2. Control Wheel Lock -- REMOVE.
3. Parking Brake -- SET.
4. Avionics Power Switch -- OFF.
5. Ignition Switch -- OFF.
6. Landing Gear Lever -- DOWN.
7. Air Conditioner (if installed) -- OFF.
8. Radar (if installed) -- OFF.
9. Master Switch -- ON.

WARNING

When turning on the master switch, 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, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

10. Low Voltage and Alternator Out Warning Lights (if installed) -- ON.
11. Vacuum Gage Warning Buttons (if installed) -- CHECK both extended.
12. Fuel On-Off Valve -- ON (push full in).
13. Fuel Quantity Indicators -- CHECK QUANTITY.
14. Fuel Selector Valve -- BOTH ON.
15. Oxygen Expended Lights (if installed) -- CHECK.
16. Avionics Cooling Fan -- CHECK AUDIBLY FOR OPERATION.
17. Master Switch -- OFF.
18. Static Pressure Alternate Source Valve -- OFF.
19. Trim Controls -- NEUTRAL.
20. Oxygen System (if installed) -- CHECK MASKS AND HOSES.
21. Windshield and Windows -- CHECK for CRACKS.

(2) EMPENNAGE

1. Static Source Openings (both sides of fuselage) -- CHECK for stoppage.

2. Baggage Door -- CHECK for security.
3. Rudder Gust Lock -- REMOVE.
4. Tail Tie-Down -- DISCONNECT.
5. Control Surfaces -- CHECK freedom of movement and security.

(3) RIGHT WING Trailing Edge

1. Main Wheel Tire and Wheel Well -- CHECK tire for proper inflation and wheel well for condition and cleanliness.
2. Aileron -- CHECK for freedom of movement and security.
3. Aileron Gap Seal -- CHECK security and ATTACHMENT.
4. Fuel Tank Vent at Wing Tip Trailing Edge -- CHECK for stoppage.

(4) RIGHT WING

1. Wing Tie-Down -- DISCONNECT.
2. Fuel Quantity -- CHECK VISUALLY for desired level.
3. Fuel Filler Cap -- SECURE and vent unobstructed.
4. Radome (if weather radar is installed) -- CHECK for condition and security.
5. Fuel Tank Sump Quick-Drain Valve -- DRAIN fuel (using sampler cup) to check for water, sediment, and proper fuel grade before first flight of the day and after each refueling. If water is observed, take further samples until there is no evidence of water contamination.

(5) NOSE

1. Propeller and Spinner -- CHECK for nicks, security and oil leaks.
2. Air Inlets -- CHECK, engine induction air (right) and heat exchanger and oil cooler air (left) for restrictions.
3. Landing and Taxi Lights -- CHECK for condition and cleanliness.
4. Nose Gear Doors -- CHECK for security.
5. Nose Wheel Tire, Strut and Wheel Well -- CHECK tire and strut for proper inflation and wheel well for condition and cleanliness.
6. Nose Tie-Down -- DISCONNECT.
7. Engine Oil Filler Cap -- CHECK secure.
8. Engine Oil Dipstick -- CHECK oil level, then check dipstick SECURE. Do not operate with less than seven quarts. Fill to ten quarts for extended flight.
9. Fuel Strainer Quick-Drain Valve -- DRAIN fuel (using sampler cup) to check for water, sediment, and proper fuel grade before first flight of day and after each refueling. Check strainer drain CLOSED. If water is observed, the fuel system may contain additional water, and further draining of the system at the strainer, fuel tank sumps, reservoir, and vapor return line drain (below vicinity of selector valve) must be accomplished.

(6) LEFT WING

1. Fuel Tank Sump Quick-Drain Valve -- DRAIN fuel (using sampler cup) to check for water, sediment, and proper fuel grade before first flight of day and after each refueling. If water is observed, take further samples until there is no evidence of water contamination.
2. Fuel Quantity -- CHECK VISUALLY for desired level.
3. Fuel Filler Cap -- SECURE and vent unobstructed.

(7) LEFT WING Leading Edge

1. Pitot Tube Cover -- REMOVE and check opening for stoppage.
2. Stall Warning Vane -- CHECK for freedom of movement. While master switch is turned on, horn should sound when vane is pushed upward.
3. Wing Tie-Down -- DISCONNECT.

(8) LEFT WING Trailing Edge

1. Fuel Tank Vent at Wing Tip Trailing Edge -- CHECK for stoppage.
2. Aileron -- CHECK for freedom of movement and security.
3. Aileron Gap Seal -- CHECK security and ATTACHMENT.
4. Main Wheel Tire and Wheel Well -- CHECK tire for proper inflation and wheel well for condition and cleanliness.

BEFORE STARTING ENGINE

1. Preflight Inspection -- COMPLETE.
2. Passenger Briefing -- COMPLETE.
3. Seats, Seat Belts, Shoulder Harnesses -- ADJUST and LOCK.
4. Control Wheel Lock -- CHECK REMOVED.
5. Brakes -- TEST and SET.
6. Cabin Door -- CLOSE and LOCK (with cabin window open).
7. Openable Window -- AS DESIRED for ventilation.
8. Avionics Power Switch -- OFF.

CAUTION

The avionics power switch must be OFF during engine start to prevent possible damage to avionics.

9. Circuit Breakers -- CHECK IN.
10. Radar Altimeter (if installed) -- OFF.
11. Cabin Pressurization:
    a. Dump Valve Control -- IN (OUT on warm days).

b. Cabin Pressurization Switch -- ON (OFF on warm days).
c. Cabin Altitude Selector -- SET (high on warm days).

NOTE

For improved cabin comfort on warm days, the cabin altitude selector should be set to 8000 to 10,000 feet, the dump valve control should not be pushed in, and the pressurization switch should not be turned on until approaching the set altitude. With the individual overhead outlets open and the cabin ventilation fan on HIGH, this procedure will allow maximum entry and circulation of the cooler ram air from the wing airscoops while climbing or cruising through the warm lower altitudes. A similar procedure should be used for hot weather descents.

12. Electrical Equipment -- OFF.
13. Landing Gear Lever -- DOWN.
14. Air Conditioner (if installed) -- OFF.
15. Radar (if installed) -- OFF.
16. Autopilot (if installed) -- OFF.
17. Cowl Flaps -- OPEN (move lever out of locking hole to reposition).
18. Manual Primer (if installed) -- IN and LOCKED.
19. Fuel On-Off Valve -- ON (push full in).
20. Fuel Selector Valve -- BOTH ON.
21. Emergency Exit -- LOWER or CLOSE.

STARTING ENGINE

1. Throttle -- CLOSED.
2. Propeller -- HIGH RPM.
3. Mixture -- RICH.
4. Propeller Area -- CLEAR.
5. Master Switch -- ON.
6. Landing Gear Lights and Horn -- PRESS TO TEST.
7. Auxiliary Fuel Pump -- ON.
8. Throttle -- ADVANCE to obtain 50-60 PPH fuel flow, then RETURN to IDLE POSITION.
9. Auxiliary Fuel Pump -- OFF.
10. Ignition Switch -- START.
11. Throttle -- ADVANCE slowly.
12. Ignition Switch -- RELEASE when engine starts.

NOTE

The engine should start in two or three revolutions. If it

does not continue running, start again at step 7 above. If the engine does not start, leave auxiliary fuel pump switch off, set mixture to idle cut-off, open throttle, and crank until engine fires or for approximately 15 seconds. If still unsuccessful, start again using the normal starting procedure after allowing the starter motor to cool.

13. Throttle -- RESET to desired idle speed.
14. Oil Pressure -- CHECK.
15. Avionics Power Switch -- ON.
16. Low-Voltage Light -- OFF (at approximately 1000 RPM).
17. Alternator Off Lights (if installed) -- OFF.
18. Fuel Computer/Digital Clock (if installed) -- SET.
19. Navigation Lights and Flashing Beacon -- ON as required.
20. Radios -- ON.

BEFORE TAKEOFF

1. Parking Brake -- SET.
2. Seats, Seat Belts, Shoulder Harnesses -- CHECK SECURE.
3. Flight Controls -- FREE and CORRECT.
4. Flight Instruments -- CHECK and SET.
5. Auxiliary Fuel Pump Switch -- OFF.
6. Mixture -- RICH.
7. Fuel On-Off Valve -- RECHECK ON (full in).
8. Fuel Quantity -- CHECK.
9. Fuel Selector Valve -- RECHECK BOTH ON.
10. Elevator and Rudder Trim -- SET for takeoff.
11. Throttle -- 1700 RPM.
    a. Magnetos -- CHECK (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
    b. Propeller -- CYCLE from high to low RPM; return to high RPM (full forward).
    c. Suction Gage -- CHECK in green arc and low vacuum warning buttons retracted (if installed).
    d. Engine Instruments and Ammeter/Voltmeter (if installed) -- CHECK.
12. Throttle -- 1000 RPM.
13. Throttle Friction Lock -- ADJUST.
14. Cabin Pressurization Controls -- RECHECK.
15. Strobe Lights -- AS DESIRED.
16. Radios and Avionics -- SET.
17. Autopilot (if installed) -- PREFLIGHT TEST (See Section 9), then OFF.
18. Wing Flaps -- SET for takeoff (see Takeoff checklists).

19. Cowl Flaps -- FULL OPEN.
20. Cabin Door, Openable Window and Emergency Exit -- CLOSED and LOCKED.
21. Cabin Door Handle Safety Lock -- UNLOCKED (pulled out).
22. Air Conditioner (if installed) -- OFF
23. Brakes -- RELEASE.

TAKEOFF

NORMAL TAKEOFF

1. Wing Flaps -- 0°- 10° (10° preferred).
2. Power -- 35.5 INCHES Hg and 2700 RPM (5 minute limitation).
3. Mixture -- ADJUST to 180-186 PPH.
4. Elevator Control -- LIFT NOSE WHEEL at 65-70 KIAS.

NOTE

When the nose wheel is lifted, the gear motor may run 2-3 seconds to restore hydraulic pressure.

5. Climb Speed -- 80-90 KIAS.
6. Brakes -- APPLY momentarily when airborne.
7. Landing Gear -- RETRACT in climb out.
8. Wing Flaps -- RETRACT after reaching 85 KIAS.

SHORT FIELD TAKEOFF

1. Wing Flaps -- 10°.
2. Brakes -- APPLY.
3. Power -- 35.5 INCHES Hg and 2700 RPM (5 minute limitation).
4. Mixture -- ADJUST to 180 PPH.
5. Brakes -- RELEASE.
6. Elevator Control -- LIFT NOSE WHEEL at 65 KIAS.
7. Climb Speed -- 78 KIAS until all obstacles are cleared.
8. Landing Gear -- RETRACT after obstacles are cleared.
9. Wing Flaps -- RETRACT after reaching 85 KIAS.

NOTE

Do not reduce power until wing flaps and landing gear have been retracted.

ENROUTE CLIMB

NORMAL CLIMB

1. Airspeed -- 110-120 KIAS.
2. Power -- 30 INCHES Hg and 2500 RPM (above 22,500 feet reduce manifold pressure in accordance with power and fuel flow placard).

NOTE

On hot days, use of 2600 RPM may be necessary above 20,000 feet altitude in order to maintain the desired manifold pressure. With 2600 RPM, set the fuel flow to correspond to the manifold pressure as shown on the power and fuel flow placard.

3. Mixture -- ADJUST to 125 PPH (for 30 inches Hg and 2500 RPM).
4. Auxiliary Fuel Pump -- ON as required.

NOTE

During climb under warm day conditions, be alert for fuel vapor indications. If fuel flow fluctuations or a dropoff is observed, place the auxiliary fuel pump switch in the ON position and reset the mixture control as required to maintain placarded fuel flow. If vapor symptoms persist, change the fuel selector valve position in accordance with Section 3 Fuel Flow Stabilization Procedures checklist.

5. Cowl Flaps -- OPEN as required (full open on warm days).
6. Cabin Door Handle Safety Lock -- LOCK (before pressurizing).
7. Cabin Pressurization -- CHECK/PUSH dump valve control IN and CHECK/TURN pressurization switch ON at set altitude. CHECK maximum differential pressure at and above inner scale altitude.

MAXIMUM PERFORMANCE CLIMB

1. Airspeed -- 100 KIAS.
2. Power -- 34.5 INCHES Hg and 2600 RPM.
3. Mixture -- ADJUST to 168 PPH.

NOTE

See power and fuel flow placard for maximum continuous power manifold pressure and fuel flow above 18,000 feet. Refer to Section 5 for airspeed above 18,000 feet.

NOTE

On hot days above 18,000 feet, it may not be possible to maintain the placarded manifold pressure as the airplane climbs, even with full throttle. If this is the case, set fuel flow to correspond to available full throttle manifold pressure as shown on the power and fuel flow placard.

4. Auxiliary Fuel Pump -- ON as required.

NOTE

During climb under warm day conditions, be alert for fuel vapor indications. If fuel flow fluctuations or a dropoff is observed, place the auxiliary fuel pump switch in the ON position and reset the mixture control as required to maintain placarded fuel flow. If vapor symptoms persist, change the fuel selector valve position in accordance with Section 3 Fuel Flow Stabilization Procedures checklist.

5. Cowl Flaps -- FULL OPEN.
6. Cabin Door Handle Safety Lock -- LOCK (before pressurizing).
7. Cabin Pressurization -- CHECK/PUSH dump valve control IN and CHECK/TURN pressurization switch ON at set altitude. CHECK maximum differential pressure at and above inner scale altitude.

CRUISE

1. Power -- 21-30 INCHES Hg, 2200-2500 RPM (no more than 80% power). (Above 22,500 feet, observe maximum manifold pressure in accordance with the power and fuel flow placard.)
2. Elevator and Rudder Trim -- ADJUST.
3. Mixture -- LEAN to obtain 1650°F or peak TIT, whichever occurs first on the TIT indicator. Check proper setting by momentarily enriching mixtures; TIT indication should decrease, confirming proper setting.

NOTE

Cruise mixture may also be set using the data in Section 5.

NOTE

In hot weather at high altitudes, be alert for fuel vapor

indications. If fuel flow fluctuations or an unexplained drop in fuel flow are observed, place the auxiliary fuel pump switch in the ON position and reset the mixture control as desired. If vapor symptoms persist, change the fuel selector valve position in accordance with Section 3 Fuel Flow Stabilization Procedures checklist. Turn the auxiliary fuel pump off when fuel flows will remain steady, and reset the mixture as necessary.

4. Cowl Flaps -- CLOSED (open as required on warm days or at high altitude).

DESCENT

1. Auxiliary Fuel Pump -- OFF.

CAUTION

Failure to turn auxiliary pump off may result in a complete power loss at reduced throttle settings due to an excessively rich mixture.

2. Power -- AS DESIRED.

NOTE

A minimum of 18 to 24 inches Hg at 2500 RPM or 21 to 25 inches Hg at 2200 RPM is required for pressurization depending on aircraft altitude, cabin altitude, and OAT. If necessary, extend the landing gear (below 165 KIAS) to increase rate of descent.

3. Mixture -- ADJUST for smooth operation (full rich for idle power).
4. Cowl Flaps -- CLOSED.
5. Cabin Altitude Selector -- SET.

NOTE

For improved cabin comfort on warm days, slowly set cabin altitude selector to 8000 to 10,000 feet prior to or during initial descent. After descending below set altitude, turn pressurization switch off, pull cabin dump valve out, and open the individual overhead outlets and turn the cabin ventilation fan on HIGH for maximum entry and circulation of the cooler air from the wing airscoops.

BEFORE LANDING

1. Seats, Seat Belts, Shoulder Harnesses -- SECURE.
2. Auxiliary Fuel Pump -- OFF

CAUTION

Failure to turn auxiliary pump off may result in a complete power loss at reduced throttle settings due to an excessively rich mixture.

3. Fuel Selector Valve -- BOTH ON.
4. Landing Gear -- EXTEND (below 165 KIAS).
5. Landing Gear -- CHECK (observe main gear down and green indicator light on).
6. Mixture -- RICH.
7. Propeller -- HIGH RPM.
8. Cabin Door Handle Safety Lock -- UNLOCK (pulled out).
9. Cabin Pressurization -- CHECK ZERO differential.
10. Radar (if installed) -- OFF.
11. Autopilot (if installed) -- OFF.
12. Wing Flaps -- AS DESIRED (0° to 10° below 160 KIAS, 10° to 20° below 130 KIAS, and 20° to 30° below 115 KIAS).
13. Air Conditioner (if installed) -- OFF.

LANDING

NORMAL LANDING

1. Airspeed -- 85-95 KIAS (flaps UP).
2. Wing Flaps -- AS DESIRED (flaps down preferred).
3. Airspeed -- 70-80 KIAS (flaps DOWN).
4. Elevator Trim -- ADJUST.
5. Touchdown -- MAIN WHEELS FIRST.
6. Landing Roll -- LOWER NOSE WHEEL GENTLY.
7. Braking -- MINIMUM REQUIRED.

SHORT FIELD LANDING

1. Wing Flaps -- FULL DOWN.
2. Airspeed -- 72 KIAS.
3. Elevator Trim -- ADJUST.
4. Power -- REDUCE to idle after clearing obstacle.
5. Touchdown -- MAIN WHEELS FIRST.
6. Brakes -- APPLY HEAVILY.
7. Wing Flaps -- RETRACT.

BALKED LANDING

1. Power -- 35.5 INCHES Hg and 2700 RPM.
2. Wing Flaps -- RETRACT to 20° (immediately).
3. Climb Speed -- 70 KIAS (until obstacles are cleared).
4. Wing Flaps -- RETRACT SLOWLY (after reaching safe altitude and 75 KIAS).
5. Cowl Flaps -- OPEN.

AFTER LANDING

1. Wing Flaps -- RETRACT.
2. Cowl Flaps -- OPEN.

SECURING AIRPLANE

1. Parking Brake -- SET.
2. Avionics Power Switch, Electrical Equipment -- OFF.
3. Mixture -- IDLE CUT-OFF (pulled full out).
4. Ignition Switch -- OFF.
5. Master Switch -- OFF.
6. Control Lock -- INSTALL.
7. Fuel Selector Valve -- LEFT ON or RIGHT ON (select low wing tank if parked on sloping surface to minimize cross-feeding and spillage).

AMPLIFIED PROCEDURES

PREFLIGHT INSPECTION

The Preflight Inspection, described in figure 4-1 and adjacent checklist, is recommended for the first flight of the day. Inspection procedures for subsequent flights are normally limited to brief checks of control surface hinges, fuel and oil quantity, security of fuel and oil filler caps and draining of the fuel tank sumps and strainer. If the airplane has been in extended storage, has had recent major maintenance, or has been operated from marginal airports, a more extensive exterior inspection is recommended.

After major maintenance has been performed, the flight and trim tab controls should be double-checked for free and correct movement and security. The security of all inspection plates on the airplane should be checked following periodic inspections. If the airplane has been waxed or polished, check the external static pressure source holes for stoppage.

If the airplane has been exposed to much ground handling in a crowded hangar, it should be checked for dents and scratches on wings, fuselage, and tail surfaces, as well as damage to navigation and anti-collision lights, and avionics antennas.

Outside storage for long periods may result in dust and dirt accumulation on the induction air filter, obstructions in airspeed system lines, and condensation in fuel tanks. If any water is detected in the fuel system, the fuel tank sump quick-drain valves, fuel reservoir quick-drain valve, fuel vapor return line quick-drain valve, and fuel strainer quick-drain valve should all be thoroughly drained until there is no evidence of water or sediment contamination. Outside storage in windy or gusty areas, or tiedown adjacent to taxiing airplanes, calls for special attention to control surface stops, hinges, and brackets to detect the presence of wind damage.

If the airplane has been operated from muddy fields or in snow or slush, check the main and nose gear wheel wells for obstructions and cleanliness. Operation from a gravel or cinder field will require extra attention to propeller tips and abrasion on leading edges of the horizontal tail. Stone damage to the propeller can seriously reduce the fatigue life of the blades.

Airplanes that are operated from rough fields, especially at high altitudes, are subjected to abnormal landing gear abuse. Frequently check all components of the landing gear, shock strut, tires, and brakes. If the shock strut is insufficiently extended, undue landing and taxi loads will be subjected on the airplane structure.

To prevent loss of fuel in flight, make sure the fuel tank filler caps are tightly sealed after any fuel system check or servicing. Fuel system vents should also be inspected for obstructions, ice or water, especially after exposure to cold, wet weather.

The interior inspection will vary according to the planned flight and the optional equipment installed. Prior to high-altitude flights, it is important to check the condition and quantity of oxygen face masks and hose assemblies. The oxygen supply system should be functionally checked to ensure that it is in working order and that an adequate supply of oxygen is available.

STARTING ENGINE

Proper fuel management and throttle adjustments are the determining factors in securing an easy start from your turbocharged continuous-flow fuel-injection engine. The procedure outlined below should be followed closely as it is effective under nearly all operating conditions.

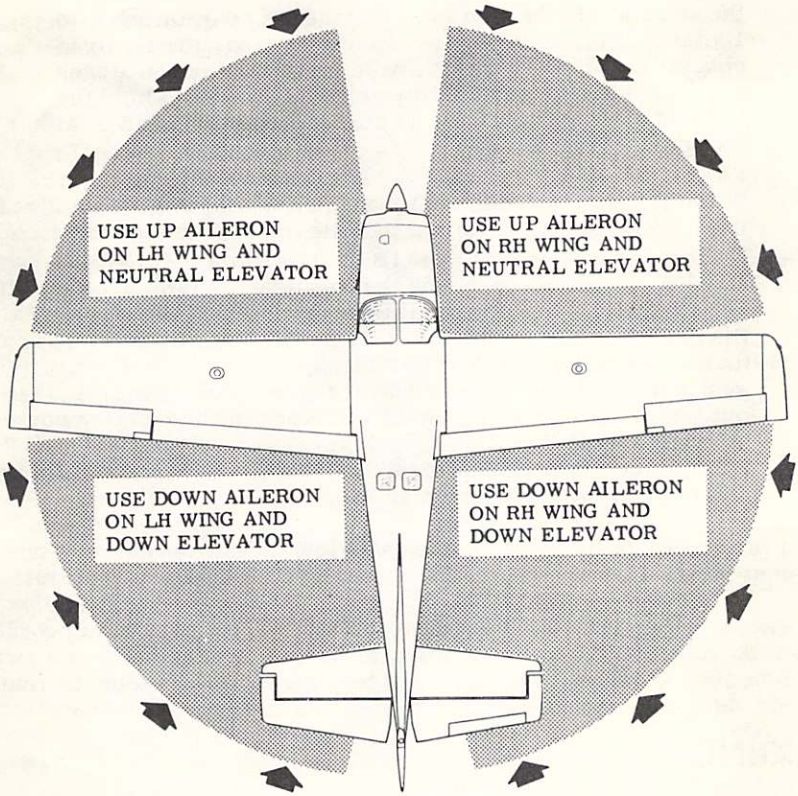
Conventional full rich mixture and high RPM propeller settings are used for starting; the throttle, however, should be fully closed initially. When ready to start, place the auxiliary fuel pump switch in the ON position and advance the throttle to obtain 50-60 PPH fuel flow. Then promptly return the throttle to idle and turn off the auxiliary fuel pump. Place the ignition switch in the START position. While cranking, slowly advance the throttle until the engine starts. Slow throttle advancement is essential since the engine will start readily when the correct fuel/air ratio is obtained. When the engine has started, reset the throttle to the desired idle speed.

When the engine is hot or outside air temperatures are high, the engine may die after running several seconds because the mixture became either too lean due to fuel vapor, or too rich due to excessive prime fuel. The following procedure will prevent over-priming and alleviate fuel vapor in the system:

1. Set the throttle 1/3 to 1/2 open.
2. When the ignition switch is in the BOTH position and you are ready to engage the starter, place the right half of the auxiliary fuel pump switch in the ON position until the indicated fuel flow comes up to 25 to 35 PPH; then turn the switch off.

NOTE

During a restart after a brief shutdown in extremely hot weather, the presence of fuel vapor may require the use of



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WIND DIRECTION

NOTE

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

Figure 4-2. Taxiing Diagram

the auxiliary fuel pump switch in the ON position for up to 1 minute or more before the vapor is cleared sufficiently to obtain 25 to 35 PPH for starting. If the above procedure does not obtain sufficient fuel flow, fully depress and hold the left half of the switch in the HI position to obtain additional fuel pump capability.

3. Without hesitation, engage the starter and the engine should start in 3 to 5 revolutions. Adjust throttle for 1200 to 1400 RPM.
4. If there is fuel vapor in the lines, it will pass into the injector nozzles in 2 to 3 seconds and the engine will gradually slow down and stop. When engine speed starts to decrease, hold the left half of the auxiliary fuel pump switch in the HI position for approximately one second to clear out the vapor. Intermittent use of the HI position of the switch is necessary since prolonged use of the HI position after vapor is cleared will flood out the engine during a starting operation.
5. Let the engine run at 1200 to 1400 RPM until the vapor is eliminated and the engine idles normally.

If prolonged cranking is necessary, allow the starter motor to cool at frequent intervals, since excessive heat may damage the armature.

After starting, if the oil pressure gage does not begin to show pressure within 30 seconds in normal temperatures and 60 seconds in very cold weather, shut off the engine and investigate. Lack of oil pressure can cause serious engine damage.

TAXIING

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips. Refer to figure 4-2 for additional taxiing instructions.

BEFORE TAKEOFF

WARM-UP

Since the engine is closely cowled for efficient in-flight cooling, precautions should be taken to avoid overheating on the ground. Full power checks on the ground are not recommended unless the pilot has good reason to suspect that the engine is not turning up properly.

MAGNETO CHECK

The magneto check should be made at 1700 RPM as follows. Move ignition switch first to R position and note RPM. Next move switch back to

BOTH to clear the other set of plugs. Then move switch to the L position, note RPM and return the switch to the BOTH position. RPM drop should not exceed 150 RPM on either magneto or show greater than 50 RPM differential between magnetos. If there is a doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists.

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.

ALTERNATOR CHECK

Prior to flights where verification of proper alternator and alternator control unit operation is essential (such as night or instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the landing light during the engine runup (1700 RPM). The ammeter will remain within a needle width of the initial indication if the alternator and alternator control unit are operating properly.

TAKEOFF

POWER CHECK

It is important to check takeoff power early in the takeoff roll. Any sign of rough engine operation or sluggish engine acceleration is good cause for discontinuing the takeoff.

Full power runups over loose gravel are especially harmful to propeller tips. When takeoffs must be made over a gravel surface, it is very important that the throttle be advanced slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown back of the propeller rather than pulled into it.

On the first flight of the day, when the throttle is advanced for takeoff, manifold pressure will normally exceed 35.5 inches Hg and fuel flows may exceed 186 PPH if the throttle is opened fully. On any takeoff, the manifold pressure should be monitored and the throttle set to provide 35.5 inches Hg; then, for maximum engine power, the mixture should be adjusted during the initial takeoff roll to 180 PPH. With a heat soaked engine on a hot day, it may be necessary to use the auxiliary fuel pump to obtain the recommended takeoff fuel flow.

After throttle is advanced to 35.5 inches Hg, adjust the throttle friction lock clockwise to prevent the throttle from creeping from a maximum

power position. Similar friction lock adjustments should be made as required in other flight conditions to maintain a fixed throttle setting.

WING FLAP SETTINGS

For normal takeoffs, use of 10° flaps is preferred since it results in easier nose wheel lift-off and lower initial climb attitude, as well as a 10% reduction in ground roll and total distance over an obstacle compared to takeoff with flaps up. Compared to 20° flaps, use of 10° flaps facilitates transition to normal climb without greatly increasing total takeoff distance over an obstacle.

The use of 20° flaps is reserved for minimum ground roll or takeoffs from soft or rough fields, since it will allow safe use of slower takeoff speeds, resulting in shortening the ground roll approximately 10% compared to 10° flaps.

Flap settings greater than 20° are not approved for takeoff.

SHORT FIELD TAKEOFF

If an obstruction dictates the use of a steep climb angle, after liftoff accelerate to and climb out at an obstacle clearance speed of 78 KIAS with 10° flaps and gear extended. This speed provides the best overall climb speed to clear obstacles when taking into account the turbulence often found near ground level. The takeoff performance data in Section 5 is based on this speed and configuration.

Minimum ground roll takeoffs are accomplished using 20° flaps by lifting the nose wheel off the ground as soon as practical and leaving the ground in a slightly tail-low attitude. However, the airplane should be leveled off immediately to accelerate to a safe climb speed. If 20° of flaps are used on soft or rough fields with obstacles ahead, it is normally preferable to leave them extended rather than partially retract them in the climb to the obstacle. With 20° flaps, use an obstacle clearance speed of 72 KIAS. After clearing the obstacle, and reaching a safe altitude, the flaps may be retracted slowly as the airplane accelerates to the normal climb-out speed.

CROSSWIND TAKEOFF

Takeoffs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length, to minimize the drift angle immediately after takeoff. With the ailerons partially deflected into the wind, the airplane is accelerated to a speed higher than normal, and then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the

wind to correct for drift.

LANDING GEAR RETRACTION

Landing gear retraction normally is started after reaching the point over the runway where a wheels-down, forced landing on that runway would become impractical. Since the landing gear swings downward approximately two feet as it starts the retraction cycle, damage can result by retracting it before obtaining at least that much ground clearance.

Before retracting the landing gear, the brakes should be applied momentarily to stop wheel rotation. Centrifugal force caused by the rapidly-spinning wheel expands the diameter of the tire. If there is an accumulation of mud or ice in the wheel wells, the rotating wheel may rub as it is retracted into the wheel well.

ENROUTE CLIMB

Power settings for climb must be limited to 34.5 inches of manifold pressure and 2600 RPM up to 18,000 feet with decreasing manifold pressure above 18,000 feet as noted on the power and fuel flow placard. On hot days it may not be possible to maintain placarded manifold pressure as the airplane climbs above 18,000 feet, even with full throttle. If this is the case, set the fuel flow to correspond to the available full throttle manifold pressure as shown on the power and fuel flow placard.

A cruising climb at 30 inches of manifold pressure, 2500 RPM, 125 PPH fuel flow, and 110 to 120 KIAS is normally recommended to provide an optimum combination of performance, visibility ahead, engine cooling, economy and passenger comfort (due to lower noise level). On hot days it may be necessary to begin advancing the throttle to maintain 30 inches manifold pressure at altitudes as low as 12,000 feet. On hot days it also may not be possible to maintain 30 inches Hg with 2500 RPM above 20,000 feet, even with full throttle. In this case, establish 2600 RPM and set the fuel flow to correspond to 30 inches Hg manifold pressure as shown on the power and fuel flow placard. This action will enable 30 inches Hg to be available for approximately another 2000 feet of climb.

NOTE

> During warm weather, if there is an indication of vapor in the fuel system (fluctuating fuel flow) or if the desired fuel flow cannot be maintained with the mixture control in the full rich position, turn on the auxiliary fuel pump and reset the mixture as required until cruising altitude has been obtained and the system is purged (usually 5 to 15 minutes

after establishing cruising flight). If vapor symptoms persist, change the fuel selector valve position in accordance with Section 3 Fuel Flow Stabilization Procedures checklist. The auxiliary fuel pump may be turned off when fuel flow remains steady.

If it is necessary to climb rapidly to clear mountains or reach favorable winds or better weather at high altitudes, the best rate-of-climb speed should be used with maximum continuous power. This speed is 100 KIAS from sea level to 18,000 feet, decreasing to 97 KIAS at 23,000 feet.

If an obstruction dictates the use of a steep climb angle, climb with flaps retracted and maximum continuous power at 80 KIAS.

CRUISE

Normal cruising is performed between 60% and 80% of the maximum continuous power rating. The power settings and corresponding fuel consumption for various altitudes can be determined by using the data in Section 5. The cruise performance data shows cruise powers greater than 80% for some conditions. This data has been included for interpolation so that a power setting can be selected that results in no more than 80% power for the existing atmospheric conditions. Power settings contained within the shaded areas may not be obtainable on all airplanes. These settings have been included for interpolation purposes only.

	80% POWER (2500 RPM)		70% POWER (2400 RPM)		60% POWER (2300 RPM)	
ALTITUDE	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG
5000 Feet	164	8.9	155	9.7	145	10.8
10,000 Feet	172	9.3	162	10.1	150	11.2
15,000 Feet	180	9.7	169	10.6	155	11.6
20,000 Feet	188	10.2	176	11.0	160	12.0
Standard Conditions						Zero Wind

Figure 4-3. Cruise Performance Table

NOTE

Cruising should be done at 70% to 80% power until a total of 50 hours has accumulated or oil consumption has stabilized. This is to ensure proper seating of the rings and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

The Cruise Performance Table, figure 4-3, illustrates the advantage of higher altitude on both true airspeed and nautical miles per gallon. In addition, the beneficial effect of lower cruise power on nautical miles per gallon at a given altitude can be observed. This table should be used as a guide, along with the available winds aloft information, to determine the most favorable altitude and power setting for a given trip. The selection of cruise altitude on the basis of the most favorable wind conditions and the use of low power settings are significant factors that should be considered on every trip to reduce fuel consumption.

For reduced noise levels and lower fuel consumption, select the lowest RPM in the green arc range for a given percent power that will provide smooth engine operation. The cowl flaps should be opened, as required, to maintain the cylinder head temperature within the normal operating range (green arc).

The fuel injection system employed on this engine is considered to be non-icing. In the event that unusual conditions cause the intake air filter to become clogged or iced over, an alternate intake air valve opens automatically for the most efficient use of either normal or alternate air, depending on the amount of filter blockage. Due to the lower intake pressure available through the alternate air valve or a partially blocked filter, manifold pressure can decrease up to 10 in. Hg from a cruise power setting. This pressure should be recovered by increased throttle setting or higher RPM as necessary to maintain the desired power. Maximum continuous manifold pressure (34.5 in. Hg) is available up to 13,000 feet under warm day conditions using the alternate air source with a fully blocked filter.

LEANING WITH AN EGT (TIT) INDICATOR

Exhaust gas turbine inlet temperature (TIT) as shown on the Cessna mixture indicator should be used for mixture leaning in cruising flight at up to 80% power. This unit displays the absolute exhaust gas temperature at the inlet of the turbine in degrees F.

To adjust the mixture with reference to the TIT indicator, lean slowly and directly to establish 1650°F on the indicator. At lower powers (approximately 55-60% depending on RPM), peak TIT may occur before reaching

1650°. In this case, set the mixture to maintain peak TIT. Any change in altitude, power setting or auxiliary pump operation will require a recheck of TIT indication.

Operation on the rich side of peak only at 1650°F is approved. In order to confirm that the mixture is on the rich side of peak, momentarily enrichen the mixture from 1650°F setting. TIT indication should decrease, confirming proper setting. It is especially important to make this confirmation check when adjusting mixture after making a power increase or turning the auxiliary pump off during cruise or descents.

Certain limitations must be observed when using an EGT/TIT indicator. Operations which are not approved include:

1. Power settings above 80%.
2. Operation at TIT indications above 1650°F.
3. Operation on the lean side of peak TIT.

STALLS

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 knots above the stall in all configurations. Altitude loss during a stall recovery may be as much as 300 feet from a wings-level stall and even greater from a turning stall.

Power-off stall speeds at maximum weight for both forward and aft C.G. are presented in Section 5.

DESCENT

Descent should be initiated far enough in advance of estimated landing to allow a gradual rate of descent at cruising speed. Just prior to beginning the descent, check that the auxiliary fuel pump has been turned off.

CAUTION

Failure to turn the auxiliary fuel pump off could cause a complete power failure at reduced throttle settings due to an abnormally rich mixture if throttle switch rigging or fuel pressure settings are out of tolerance. In this event, turn the auxiliary fuel pump off,set the throttle to one-half

open, and lean or adjust the mixture to regain power. Have the fuel metering system inspected as soon as practicable.

Descent should be adjusted to permit a cabin altitude rate of descent of approximately 500 FPM for passenger comfort, using enough power to maintain pressurization and to keep the engine warm. The optimum engine RPM in a descent is usually the lowest RPM in the green arc range that will allow cylinder head temperature to remain in the recommended green arc operating range and provide smooth engine operation.

If a steep descent is required, the landing gear can be extended at speeds as high as 165 KIAS after which the speed can be increased as desired in smooth air up to 200 KIAS.

The airplane is equipped with a specially marked altimeter to attract the pilot's attention and prevent misreading the altimeter. A striped warning segment on the face of the altimeter is exposed at all altitudes below 10,000 feet to indicate low altitude.

BEFORE LANDING

In view of the relatively low drag of the extended landing gear and the high allowable gear-operating speed (165 KIAS), the landing gear should be extended before entering the traffic pattern. This practice will allow more time to confirm that the landing gear is down and locked. As a further precaution, leave the landing gear extended in go-around procedures or traffic patterns for touch-and-go landing.

Landing gear extension can be detected by illumination of the gear-down indicator light (green), absence of a gear warning horn with the throttle retarded below 15 inches of manifold pressure, and visual inspection of the main gear position. Should the gear indicator light fail to illuminate, the light should be checked for a burned-out bulb by pushing to test. A burned-out bulb can be replaced in flight with the landing gear-up (amber) indicator light.

NOTE

Landing with the cabin pressurized is not authorized. Therefore, the differential pressure should be checked at traffic pattern altitude to assure that no residual pressure remains.

LANDING

NORMAL LANDING

Normal landing approaches can be made with power on or power off with any flap setting desired. Use of flaps down is normally preferred to minimize touchdown speed and subsequent need for braking. For a given flap setting, surface winds and turbulence are usually the primary factors in determining the most comfortable approach speed.

Actual touchdown should be made with power off and on the main wheels first to reduce the landing speed and subsequent need for braking in the landing roll. The nose wheel is lowered to the runway after the speed has diminished to avoid unnecessary nose gear load. This procedure is especially important in rough or soft field landings.

SHORT FIELD LANDING

For short field landings, make a power approach at 72 KIAS with full flaps. After all approach obstacles are cleared, progressively reduce power. Maintain 72 KIAS approach speed by lowering the nose of the airplane. Touchdown should be made with the throttle closed, and on the main wheels first. Immediately after touchdown, lower the nose gear and apply heavy braking as required. For maximum brake effectiveness after all three wheels are on the ground, retract the flaps, hold full nose-up elevator and apply maximum possible brake pressure without sliding the tires.

At light operating weights, during ground roll with full flaps, hold the control wheel full back to ensure maximum weight on the main wheels for braking. Under these conditions, full nose-down elevator (control wheel full forward) will raise the main wheels off the ground.

CROSSWIND LANDING

When landing in a strong crosswind, use the minimum flap setting required for the field length. Although the crab or combination method of drift correction may be used, the wing-low method gives the best control. After touchdown, hold a straight course with the steerable nose wheel and occasional braking if necessary.

BALKED LANDING

In a balked landing (go-around) climb, the wing flap setting should be reduced to 20° immediately after full power is applied. After all obstacles are cleared and a safe altitude and airspeed are obtained, the wing flaps should be retracted.

COLD WEATHER OPERATION

The use of an external pre-heater and an external power source is recommended whenever possible to reduce wear and abuse to the engine and the electrical system. Pre-heat will thaw the oil trapped in the oil cooler, which probably will be congealed prior to starting in extremely cold temperatures. When using an external power source, the position of the master switch is important. Refer to Section 9, Supplements, for Ground Service Plug Receptacle operating details.

For quick, smooth engine starts in very cold temperature, use six strokes of the manual primer (if installed) before cranking, with an additional one or two strokes as the engine starts.

In very cold weather, no oil temperature indication need be apparent before takeoff. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), the engine is ready for takeoff if it accelerates smoothly and the oil pressure is normal and steady.

NOTE

The waste gate controller will not respond quickly to variations in manifold pressure when oil temperature is near the lower limit of the green arc. Therefore, under these conditions, the throttle motions should be made slowly and care should be exercised to prevent exceeding the 35.5 inches Hg manifold pressure limit.

The turbocharged engine installation has been designed such that a winterization kit is not required. With the cowl flaps fully closed, engine temperature will be normal (in the lower green arc range) in outside air temperatures as low as 20° to 30°C below standard. When colder surface temperatures are encountered, the normal air temperature inversion will result in warmer temperatures at cruise altitudes above 5000 feet.

If low altitude cruise in very cold temperatures results in engine temperature below the green arc, increasing cruise altitude or cruise power will increase engine temperature into the green arc. Cylinder head temperatures will increase approximately 50°F as cruise altitudes increase from 5000 to 23,000 feet.

During descent, observe engine temperatures closely and carry sufficient power to maintain them in the recommended green arc operating range.

NOISE CHARACTERISTICS

Increased emphasis on improving the quality of our environment requires renewed effort on the part of all pilots to minimize the effect of airplane noise on the public.

We, as pilots, can demonstrate our concern for environmental improvement, by application of the following suggested procedures, and thereby tend to build public support for aviation:

1. Pilots operating aircraft under VFR 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 judgment, an altitude of less than 2000 feet is necessary for him to adequately exercise his duty to see and avoid other aircraft.

The certificated noise level for the Model P210N at 4000 pounds maximum weight is 78.0 dB(A). No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.