PERFORMANCE AND SPECIFICATIONS*

CESSNA 421C

GROSS WEIGHT:
- Takeoff: 5975 pounds
- Landing: 5975 pounds

SPEED BEST POWER MIXTURE:
- Maximum: 258 knots

Maximum Cruise:
- 73.5% Power 10000’: 208 knots
- 73.5% Power 25000’: 241 knots

RANGE, RECOMMENDED LEAN MIXTURE:
- Maximum Recommended Cruise:
  - 73.5% Power 10000’:
    - 1236 pounds: 853 nautical miles, 4.21 hours, 205 knots
    - 1404 pounds: 988 nautical miles, 4.87 hours, 206 knots
    - 1572 pounds: 1123 nautical miles, 5.52 hours, 206 knots
  - 73.5% Power 25000’:
    - 1236 pounds: 955 nautical miles, 4.20 hours, 238 knots
    - 1404 pounds: 1113 nautical miles, 4.85 hours, 239 knots
    - 1572 pounds: 1271 nautical miles, 5.51 hours, 239 knots

Maximum Range:
- 10000’, 1236 lbs: 1088 nautical miles, 6.94 hours, 156 knots
- 10000’, 1404 lbs: 1274 nautical miles, 8.16 hours, 156 knots
- 10000’, 1572 lbs: 1464 nautical miles, 9.44 hours, 155 knots
- 25000’, 1236 lbs: 1092 nautical miles, 5.64 hours, 197 knots
- 25000’, 1404 lbs: 1287 nautical miles, 6.65 hours, 196 knots
- 25000’, 1572 lbs: 1487 nautical miles, 7.71 hours, 195 knots
RATE-OF-CLIMB AT SEA LEVEL:

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Rate-of-Climb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twin Engine</td>
<td>1940 fpm</td>
</tr>
<tr>
<td>Single Engine</td>
<td>350 fpm</td>
</tr>
</tbody>
</table>

SERVICE CEILING:

<table>
<thead>
<tr>
<th>Engine Type</th>
<th>Service Ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twin Engine</td>
<td>30200’</td>
</tr>
<tr>
<td>Single Engine</td>
<td>14900’</td>
</tr>
</tbody>
</table>

TAKEOFF PERFORMANCE: Takeoff Speed (100 KIAS, Zero Flaps, 7450 pounds)

<table>
<thead>
<tr>
<th>Distance Type</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Run</td>
<td>1786’</td>
</tr>
<tr>
<td>Total Distance over 50’ obstacle</td>
<td>2323’</td>
</tr>
</tbody>
</table>

EMPTY WEIGHT (Approximate):

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>421C</td>
<td>4578 lbs</td>
</tr>
<tr>
<td>421C II</td>
<td>4763 lbs</td>
</tr>
<tr>
<td>421C III</td>
<td>4979 lbs</td>
</tr>
</tbody>
</table>

BAGGAGE ALLOWANCE: 1500 lbs

FUEL CAPACITY:

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>213.4 gal</td>
</tr>
<tr>
<td>w/1 wing locker tank</td>
<td>241.8 gal</td>
</tr>
<tr>
<td>w/2 wing locker tanks</td>
<td>270.2 gal</td>
</tr>
</tbody>
</table>

OIL CAPACITY: 28 quarts

ENGINES:

CONT 6-cylinder, turbocharged
GTSIO-520-L (Standard)
Fuel Injected, 375 rated HP @ 2235 rpm and 39” MP to 20000’

PROPELLERS:

Constant Speed, Full Feathering, 3-bladed, 7’ 6” diameter

*The information provided above and herein is for training purposes only. You are obligated by law to comply with the approved flight manual/pilot operating handbook provided by the manufacturer of your specific aircraft.
**MEMORY ITEMS**

**Engine Securing Procedures:**
1. Throttle – Close
2. Mixture – Idle Cut Off
3. Propeller - Feather

**Engine Failure During Takeoff:**
1. Throttles – Close immediately
2. Brake or Land and Brake – As Required

**Engine Failure After Takeoff:**
1. Mixtures – Full Rich
2. Propellers – Full Forward
3. Throttles – Full Forward
4. Landing Gear – Check Up
5. Inoperative Engine:
   a. Throttle – Close
   b. Mixture – Idle Cut Off
   c. Propeller - Feather

**Sudden Engine Roughness:**
1. Power – Reduce Immediately
   a. Manifold Pressure – 32.5” max
   b. RPM – 1900 Maximum
2. Propeller Synchronizer – OFF
3. Rough Engine – Determine
4. Problem – Analyze
5. Rough Engine – Secure if roughness cannot be cleared

**Engine Failure During Flight:**
1. Inoperative Engine – Determine
2. Operative Engine – Adjust as required
3. Check Fuel Flow
4. Fuel Selector – Main Tanks
5. Fuel Quantity – Check
6. Oil Pressure and Oil Temperature – Check
7. Magneto Switches – Check ON
8. Mixture - Adjust
Engine Inoperative Go-Around:
1. Throttle – Full Forward
2. Wing Flaps – Up
3. Positive Rate of Climb – Establish
4. Landing Gear – UP
5. Climb at One Engine Inoperative Best ROC
6. Trim Tabs - Adjust

Fire on the Ground:
1. Throttles – Close
2. Brakes – As Required
3. Mixtures – Idle Cut Off
4. Battery – OFF
5. Magneto - OFF

Inflight Wing or Engine Fire:
1. Both Auxiliary Fuel Pumps – OFF
2. Operative Engine Fuel Selector – Main Tank
3. Emergency Crossfeed Shutoff – OFF
4. Appropriate Engine – Secure
   a. Throttle – Close
   b. Mixture – Idle Cut Off
   c. Propeller – Feather
   d. Fuel Selector – OFF

Emergency Descent:
1. Throttles - Idle
2. Propellers – Full Forward
3. Mixtures – Adjust
4. Wing Flaps – Up
5. Landing Gear – Up
6. Moderate Bank - Initiate

Pressurization System Emergency:
1. Cabin Pressurization Switch – Depressurize

Spins:
1. Throttles – Close Immediately
2. Rudder – Full Rudder opposite the direction of rotation
4. Inboard Engine – Increase Power to slow rotation.
5. Control Wheel – Pull after rotation has stopped to recover from resultant dive. Apply smooth steady control pressure.
PRESTART CHECKLIST NOTES

BEFORE TURNING ON THE BATTERY AND ALTERNATORS:

Note: When using external power source, do not turn on the battery or alternator switches until external power is disconnected, to avoid damage to the alternators and a weak battery draining off part of the current being supplied by the external source.

STARTING ENGINES CHECKLIST NOTES

ENGINE START:

Note: If the primer is activated for excessive periods of time with the engine inoperative on the ground or during flight, damage may be incurred to the engine and/or aircraft due to fuel accumulation in the induction system. Similar conditions may develop when the engine is shutdown with the auxiliary fuel pump ON.

Should fuel priming or auxiliary fuel pump operation periods in excess of 60 seconds occur, the engine manifold must be purged by one of the following procedures:
   a. With auxiliary fuel pump OFF, allow manifold to drain at least 5 minutes or until fuel ceases to flow out of the drain under the nacelle.
   b. If circumstances do not allow natural draining periods recommended above, with the auxiliary fuel pump OFF, magnetos OFF, mixture idle cut-off and throttle full open, turn engine with starter or by hand a minimum of 15 revolutions.

Note: Release starter button as soon as engine fires or engine will not accelerate and flooding can result.

BEFORE TAXI CHECKLIST NOTE

Note: If the airplane is parked with the nosewheel castered in either direction, initial taxiing should be done with caution. To straighten the nosewheel, use full opposite rudder and differential power instead of differential braking. After a few feet of forward travel, the nosewheel will steer normally.

BEFORE TAKEOFF CHECKLIST NOTE

THROTTLES:

Note: It is important that the engine oil temperature be within the normal operating range prior to applying takeoff power.

Caution: During propeller feathering checks, do not allow the propeller RPM to fall below 1000 RPM as this may damage the hub mechanism.

TAKEOFF CHECKLIST NOTE

POWER:

Note: Apply full throttle smoothly to avoid propeller surging and excessive manifold pressure. Do not exceed 39.0” MP at anytime.
CLIMB CHECKLIST NOTE

AUXILIARY FUEL PUMPS – ON (ABOVE 10000’):

Note: During very hot weather, if there is an indication of vapor in the fuel system (fluctuating fuel flow) or anytime when climbing above 10000’, turn the auxiliary pumps ON until cruising altitude has been obtained and the system is purged (usually 5 to 15 minutes after establishing cruising flight).

CRUISING CHECKLIST NOTES

CRUISING POWER SETTING:

Note: Maintain sufficient power for pressurization requirements.

Turn auxiliary fuel pumps to LOW and mixtures to FULL RICH when switching tanks.

If wing locker tanks are installed, transfer wing locker fuel when main tank fuel quantity is less than 400 pounds. Begin wing locker transfer before main tank quantity decreases below 200 pounds.

Wing locker transfer pump switches provided on the instrument panel, energize the wing locker fuel transfer pumps for transferring fuel. These switches should be turned ON only to transfer fuel and turned OFF when the indicator lights come on indicating fuel has been transferred.

DESCENT CHECKLIST NOTE

POWER – AS REQUIRED:

Note: Maintain sufficient power for pressurization requirements.

GO-AROUND MULTI ENGINE CHECKLIST NOTE

RETRACT WING FLAPS:

Note: Always retract landing gear during an IFR missed approach/go-around after establishing a positive rate of climb. For VFR operations, experience indicates that retracting the landing gear has led to inadvertent gear up landings – always make a final landing gear check on short final.

SECURING AIRCRAFT CHECKLIST NOTE

FUEL PUMPS – OFF:

Note: The fuel pumps must be turned OFF prior to stopping the engines.
FUEL SYSTEM

Fuel for each engine is supplied by a main tank on each wing. Each engine has its own complete fuel system; the 2 systems are interconnected only by a cross feed for emergency use.

Vapor and excess fuel from the engines are returned to the main fuel tanks.

NOTE: During very hot weather, if there is an indication of vapor in the fuel system (fluctuating fuel flow) or any time when climbing above 10000’, turn the auxiliary fuel pumps ON until cruising altitude has been obtained and the system is purged (usually 5 to 15 minutes after establishing cruising flight). It is recommended that the mixture remain at the climb mixture setting for approximately 5 minutes after establishing cruising flight before leaning is initiated.

NOTE: When fuel selector valve handles are changed from one position to another, the auxiliary fuel pumps should be switched to LOW, the mixture should be in FULL RICH and the pilot should feel for the detent to insure that the fuel selector valves are properly positioned.

The AUXILIARY FUEL PUMP LOW SWITCH position runs the auxiliary fuel pumps at low speed providing pressure for vapor clearing and purging.

With an engine driven pump failure and the switch in the ON position, the auxiliary pump on that side will switch to high speed automatically, providing sufficient fuel for all engine operations including emergency takeoff.

CAUTION: If the auxiliary fuel pump switches are positioned to ON for a period in excess of 60 seconds with engines inoperative on the ground or during flight (feathered), the engines and/or aircraft may be damaged due to fuel accumulations in the induction system.

ELECTRICAL SYSTEM

Electrical energy is supplied by a 28-volt, negative ground, direct current system powered by a standard 50 ampere or optional 100 ampere engine-driven alternator on each engine. The electrical system has independent circuits for each side with each alternator having its own regulator and over voltage protection relay.

The voltage regulators are connected to provide proper load sharing. The 24-volt battery is located in the left wing just outboard of the engine nacelle.
Separate battery and alternator switches are provided as a means of checking for a malfunctioning alternator circuit and to permit such a circuit to be cut off.
An emergency alternator field switch is provided in the alternator system and is located on the forward side of the switch and circuit breaker panel. The emergency alternator field switch is used when the alternators will not self-excite. Placing the switch in the ON position provides excitation from the battery even though the battery is considered to have failed.

Two over voltage relays in the electrical system constantly monitor their respective alternator output. Should an alternator exceed the normal operating voltage, that over voltage relay will trip, taking the affected alternator off the line. The over voltage relay can be reset by cycling the applicable alternator switch.

A voltmeter is provided to monitor alternator current output, battery charge or discharge rate and bus voltage. By positioning the switch to L ALT, R ALT, or BATT position, the respective alternator or battery voltage can be monitored. By positioning the switch to the VOLTS position, the electrical system bus voltage can be monitored.

If a circuit breaker/switch breaker incurs an overload and trips/pops, allow 3 minutes cooling before trying to reset. If the breaker/switch opens a second time DO NOT RESET.

The aircraft is equipped with a press-to-test button located to the left of the annunciator panel.

<table>
<thead>
<tr>
<th>LEGEND</th>
<th>COLOR</th>
<th>CAUSE FOR ILLUMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW VOLT</td>
<td>RED</td>
<td>Advises that the airplane bus voltage is less than 25V.</td>
</tr>
<tr>
<td>L ALT OUT</td>
<td>AMBER</td>
<td>Advises that the left alternator is not generating.</td>
</tr>
<tr>
<td>CABIN ALT</td>
<td>AMBER</td>
<td>Advises that cabin altitude is above 10000’.</td>
</tr>
<tr>
<td>L HYD FLOW</td>
<td>AMBER</td>
<td>Advises that insufficient flow exists at 1000 RPM or above.</td>
</tr>
<tr>
<td>L FUEL LOW</td>
<td>AMBER</td>
<td>Advises that approx 60 pounds of fuel remains.</td>
</tr>
<tr>
<td>L TRANS</td>
<td>AMBER</td>
<td>Indicates transfer of left wing locker fuel is complete.</td>
</tr>
<tr>
<td>AC FAIL</td>
<td>AMBER</td>
<td>Advises that a loss of AC power has occurred.</td>
</tr>
<tr>
<td>A COND HYD</td>
<td>GREEN</td>
<td>Advises that the AC compressor is in operation.</td>
</tr>
<tr>
<td>WINDSHIELD</td>
<td>GREEN</td>
<td>Advises that the windshield heating elements are operational.</td>
</tr>
<tr>
<td>T &amp; B TEST</td>
<td>GREEN</td>
<td>Illuminates only when press to test is pushed.</td>
</tr>
<tr>
<td>COURTESY LT</td>
<td>WHITE</td>
<td>Advises that the overhead flight lights/main cabin door ON.</td>
</tr>
<tr>
<td>DOOR WARN</td>
<td>RED</td>
<td>Advises that the main cabin door is not secured.</td>
</tr>
<tr>
<td>R ALT OUT</td>
<td>AMBER</td>
<td>Advises that the right alternator is not generating.</td>
</tr>
<tr>
<td>HYD PRESS</td>
<td>AMBER</td>
<td>Advises that hydraulic pressure is being applied to the gear.</td>
</tr>
<tr>
<td>R HYD FLOW</td>
<td>AMBER</td>
<td>Advises that insufficient flow exists at 1000 RPM or above.</td>
</tr>
<tr>
<td>R FUEL LOW</td>
<td>AMBER</td>
<td>Advises that approx 60 pounds of fuel remains.</td>
</tr>
<tr>
<td>R TRANS</td>
<td>AMBER</td>
<td>Indicates transfer of right wing locker fuel is complete.</td>
</tr>
<tr>
<td>BACK COURSE</td>
<td>AMBER</td>
<td>Advises that equipment is programmed for back course.</td>
</tr>
<tr>
<td>HEATER OVHT</td>
<td>AMBER</td>
<td>Advises that the heater has auto shutdown due to overheat.</td>
</tr>
<tr>
<td>SURF DEICE</td>
<td>GREEN</td>
<td>Advises that the optional tail deice boots are fully pressurized.</td>
</tr>
<tr>
<td>INTERCOMM</td>
<td>WHITE</td>
<td>Advises that pax compartment mike switch is pressed.</td>
</tr>
<tr>
<td>SPARE</td>
<td>WHITE</td>
<td>Reserved.</td>
</tr>
</tbody>
</table>
LANDING GEAR SYSTEM

Electrically controlled, hydraulically actuated, the landing gear cycle completes the retraction cycle in approximately 4.5 seconds at maximum engine RPM.

During ground operation accidental gear retraction, regardless of gear switch position, is prevented by a safety switch located on the left landing gear shock strut. The weight of the airplane compresses the shock strut, causing the safety switch to open, thus preventing electrical power from reaching the shuttle valve.

The 4 landing gear position indicator lights illuminate (3 green lights) when each landing gear is fully extended and locked and (red) when any or all the gears are unlocked.

The landing gear warning horn is controlled by the throttles and flaps, and will sound an intermittent note if either throttle is retarded below approximately 15” MP or the flaps are extended beyond 15 degrees with the landing gear not down and locked. The warning horn is also connected to the UP position of the landing gear switch and will sound if the switch is placed in the UP position while the aircraft is on the ground.

The landing gear emergency extension system, consists of a red emergency gear extension T-handle, a blowdown bottle, located in the nose baggage compartment, and associated plumbing. Refer to the POH for specific procedures.

Pulling the emergency control releases dry nitrogen under pressure into the shuttle valve, causing the shuttle valve to move from the hydraulic to air position. The nitrogen then flows into the uplocks which releases the gear to the freefall position, and then into the landing gear cylinders, which drives the landing gear in to the down and locked position.

NOTE: The landing gear cannot be retracted after emergency gear extension until the system has been ground serviced.
PRESSURIZATION SYSTEM

Pressurization air is supplied from the engine turbocharger through the sonic venturi (flow limiter), the heat exchanger and then into the cabin. Adequate flow to maintain pressurization is provided by either engine at normal power settings.

Two (2) push-pull controls which control pressurization air flow have pressurized (push in) and dump (pull out) positions. In the pressurized position, pressurization air enters the cabin; in the dump position, pressurization air is expelled overboard prior to entering the cabin.

Both controls should remain in the pressurized positions whether operating in the ram mode or the pressurized mode.

The DUMP position should be selected only in the event that contamination of pressurization air is suspected.

A warning light, which illuminates at approximately 10000’ cabin altitude, indicating a need for oxygen, is located in the annunciator panel.

The PRESS position of the cabin pressurization switch, provides for cabin pressurization at altitudes above 8000’. The cabin altitude is maintained at 8000’ at all aircraft altitudes between 80000’ and 23120’. From 23120’ to the operating ceiling of 30000’. 5.0 PSI differential is maintained between cabin and atmosphere.

Until reaching 8000’, the cabin rate-of-climb, will be equal to the aircraft rate-of-climb. At 8000’, the cabin rate-of-climb will drop to zero as pressurization begins. The cabin rate-of-climb will remain approximately at this indication until the aircraft has reached an altitude of 23120’. Above this altitude, the cabin altitude will again begin to ascend as the aircraft ascends, but at a lesser rate than the aircraft rate-of-climb because of the difference in ambient air density and cabin air density. The cabin altitude reaches
approximately 10000’ at an altitude of 26500’; at this time the altitude warning light will illuminate, indicating the need for oxygen.

The cabin differential pressure of 5.0 PSI is limited by the pressure regulator valve located in the aft portion of the cabin. This valve automatically permits air to leave the cabin to maintain the desired pressure. If the regulator valve should fail in the closed position, a safety (dump) valve, also located in the aft portion of the cabin, operates as a safety valve to regulate maximum cabin differential pressure at 5.3 PSI. This is a dual function valve which functions as a cabin dump when the DEPRESS position is selected with the cabin pressurization switch.

The cabin altitude which is maintained at a given aircraft altitude is show in the chart below:

<table>
<thead>
<tr>
<th>Aircraft Altitude</th>
<th>Cabin Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.L. to 8000’</td>
<td>Same as Aircraft Altitude</td>
</tr>
<tr>
<td>8000’ to 23120’</td>
<td>8000’</td>
</tr>
<tr>
<td>24790’</td>
<td>9000’</td>
</tr>
<tr>
<td>26500’</td>
<td>10000’</td>
</tr>
<tr>
<td>28260’</td>
<td>11000’</td>
</tr>
<tr>
<td>30000’</td>
<td>11950’</td>
</tr>
</tbody>
</table>

The aft cabin safety (dump) valve is used during ground operation to assure the cabin pressure differential is zero. The dump valve is opened automatically by the landing gear safety switch when the weight of the aircraft is on the landing gear or can be opened manually by selecting the DEPRESS position of the cabin pressurization switch.

Normally, the cabin pressurization switch can be left in the PRESS position. However, should a malfunction occur or if a landing is attempted above 8000’ PA, select the DEPRESS position. This aircraft is not certified for landings with the cabin pressurized.

IMPORTANT: In the event that an emergency should require immediate depressurization, place the cabin pressurization switch to the DEPRESS position and pull out the ram air control. This electrically opens the aft cabin safety (dump) valve and mechanically opens the ram air inlet butterfly valve located in the nose, however, pressurization air will still flow into the cabin.

HEATING, VENTILATING AND DEFROSTING SYSTEM

The system consists of an air inlet in the nose, a cabin fan, a gasoline combustion-type heater, manual heat exchanger selector valve and controllable heat outlets in the cabin. Two heat outlets are located at the base of the windshield for defrosting purposes. One outlet duct is located on each side of the aft cabin and two are located on the forward pressure bulkhead.

Cabin heating and ventilating is accomplished by the cabin air DEFROST, AFT and FWD controls. Forced ventilation is obtained with the two speed CABIN FAN which may be operated independently of the heater. When the heater is actuated the fan automatically operates in low speed. If additional air flow is desired, the HIGH position may be selected.
Depressurized (Ram Air Control OPEN): On the ground the heating system can be used for ventilation by placing the CABIN FAN switch in the LOW/HIGH position. The heat and vent air is not recirculated but exhausts overboard through the cabin pressure regulating valve.

Pressurization air is heated by the heater and ducted to the pilot and passenger compartments. To increase passenger comfort and heating system efficiency the PRESS AIR HEAT knob may be turned clockwise.

The cabin heater is controlled by a two-position ON/OFF toggle switch labeled CABIN HEAT. Placing the switch in the ON position starts and maintains heater operation and turns the cabin fan on low.
The ventilating fan is controlled by a three-position toggle switch labeled CABIN FAN.

The cabin air temperature control knob is labeled CABIN HEAT; clockwise rotation of this knob increases the desired temperature. This knob adjusts a thermostat located just aft of the heater which then cycles the heater on and off to maintain an even air temperature. Operation is identical for the pressurized and ram modes.

The heater also will be cycled by a thermostatic switch in the heater plenum chamber which shuts off the heater when the plenum temperature reaches approximately 220 F.

The forward cabin air knob control directs warm air to two outlets which are located on the forward pressure bulkhead.

The airflow to all passenger compartment heat registers is controlled by turning the AIR CABIN Air Knob.

Windshield defrosting and defogging is controlled by turning the control knob labeled DEFROST.

An amber overheat warning light is provided in the annunciator panel and is labeled HEATER OVHT. When illuminated, the light indicates that the heater overheat switch has been actuated and that the temperature of the air in the heater has exceeded 325 F. Once the heater overheat switch has been actuated, the heater turns off and cannot be restarted until the overheat switch, located in the right forward nose compartment, has been reset.

NOTE: If warm air is not felt coming out of the registers within one minute, turn cabin heat switch OFF, check circuit breaker and try another start. If heater still does not start, no further starting attempt should be made.

NOTE: During heater operation, defrost and/or cabin air knobs should be open (turn clockwise).

**OXYGEN SYSTEM**

Normal operations may be conducted without supplemental oxygen for extended periods up to a cabin altitude of approximately 10000’. Although the cabin altitude will not exceed 11950’ for operation up to the maximum altitude of 30000’, it should be pointed out that the expected time that a person will remain conscious in the event that the cabin must be depressurized is less than one minute if supplementary oxygen is not used.

An altitude warning light is provided which indicates when the cabin altitude is higher than 10000’.

Two Systems: An optional 114.9 cubic feet oxygen system is available although the standard system is only 11.0 cubic feet. The standard system is designed solely to provide oxygen for emergency descents.

The oxygen system is activated by pulling the oxygen knob to the ON position, allowing oxygen to flow from the regulator to all cabin outlets. A normally closed valve in each oxygen outlet is opened by inserting the connector of the mask and hose assembly. After flights using oxygen, the pilot should ensure that the oxygen system has been deactivated by unplugging all masks and pushing the oxygen knob completely to the OFF position.

NOTE: If the oxygen knob is left in an intermediate position between ON and OFF, it may allow low pressure oxygen to bleed through the regulator overboard.
WARNING: Permit no smoking when using oxygen. Oil, grease, soap, lipstick, lip balm and other fatty materials constitute a serious fire hazard when in contact with oxygen. Be sure hands and clothing are oil free before handling oxygen equipment.

PROPELLER SYNCHRONIZER

The right engine attempts to match to the left engine RPM within a limited range of approximately 25 RPM. The limit is designed to prevent the slave (right) engine losing more than a fixed amount of propeller RPM in case the master (left) engine is feathered with the synchronizer on.

NOTE: Manually synchronize and phase the engines prior to switching the propeller synchronizer system ON.

NOTE: The propeller synchronizer must be switched OFF during takeoff, landing and single engine operation.

STATIC PRESSURE ALTERNATE SOURCE VALVE

A static-pressure alternate source valve, installed in the static system, directly below the parking brake handle, supplies an alternate static source should the external source malfunction.

When positioned to ALTERNATE, the valve vents to the static pressure of the nose compartment.

A drain valve is located behind the placard panel below the parking brake.
CAUTION: Do not drain valve while the cabin is pressurized as flight instrument damage will result.
CABIN DOOR

The door handle is located such that the upper door must be open to gain access to it. In addition the locking pin receptacles can be visually inspected for positive engagement.

An additional safety factor, a cabin door warning light is provided. This light is located on the annunciator panel and is illuminated when the cabin door is not securely latched.

For night entrance, courtesy lights are provided in the cockpit and by the cabin door. These lights are connected directly to the battery and may be turned on or off by using the switches located on the instrument panel or beside the entrance door.

Always make sure the courtesy light switches are in the OFF position upon exiting the airplane.

EMERGENCY EXIT

For emergency exit, the forward oval cabin window on the right side of the passengers’ compartment can be removed. Pull off the plastic cover over the emergency release handle under the window. Turn the release handle counterclockwise to release the window retainers, then pull the window in and down.
TURBOCHARGED ENGINE SYSTEM

The following graphic outlines in very general terms the operation of turbocharged engines:

The waste gate automatically maintains allowable compressor discharge pressure when below 16000’ with full throttle and full RPM. Above 16000’, the turbo system automatically operates the waste gate to limit the manifold pressure to approximately a ratio of 2.1 x ambient pressure. This will give approximately placarded manifold pressure during single engine climb; however, during multi engine climbs at higher speeds or with closed cowl flaps, some throttling may be required to maintain placarded manifold pressure.

MANIFOLD PRESSURE VARIATION WITH ENGINE RPM: When the waste gate is open, the turbocharged engine will react the same as a normally aspirated when the engine RPM is varied. IE, when RPM is increased MP will decrease; when RPM is decreased MP will increase. If the waste gate is closed MP variation with engine RPM is just the opposite of a normally aspirated engine.

MANIFOLD PRESSURE VARIATION WITH ALTITUDE: At full throttle the turbocharger is capable of maintaining the maximum allowable MP of 39” well above 20000’.

MANIFOLD PRESSURE VARIATION WITH AIRSPEED: When the waste gate is open at low altitude, changes in airspeed have little or no effect on MP. At high altitudes when the waste gate is closed, MP will vary with variations in airspeed due to changes in pressure at the compressor inlet.

FUEL FLOW VARIATIONS WITH CHANGES IN MANIFOLD PRESSURE: When the waste gate is open, fuel flow will vary directly with MP, engine speed, mixture, or throttle control position. When the
waster gate is closed and MP changes are due to turbocharger output, fuel flow will follow MP even though the throttle position is unchanged.

MANIFOLD PRESSURE VARIATION WITH INCREASING OR DECREASING FUEL FLOW: When the waster gate is open, movement of the mixture control has little or no effect of the MP. When the waste gate is closed, any change in fuel flow to the engine will have a corresponding change in MP.

MOMENTARY OVERBOOST OF MANIFOLD PRESSURE: Momentary overboost of 2 to 3 inches MP can usually be controlled by slower throttle movements. Do not routinely overboost!

ALTITUDE OPERATION: Fuel vaporization may be encountered and the following items should be remembered:

1. Turn the auxiliary fuel boost pumps ON when climbing to altitudes above 10000’.
2. The fuel boost pumps should be left ON several minutes after cruise in level flight.
3. Lean the mixture during the climb to the proper fuel flow for the power setting.

HIGH ALTITUDE ENGINE ACCELERATION: Engine acceleration is normal from idle to full throttle with full rich mixture at any altitude below 18000”. At higher altitudes it is usually necessary to lean the mixture to get smooth engine acceleration from idle to full power.

ENGINE SHUTDOWN: After extended operations reduce power to a low RPM (600 – 800) for a period of not less than 2 to 3 minutes prior to engine shutdown.

COLD WEATHER OPERATION

RECOMMENDATION: If possible, external preheat should be utilized in cold weather. It is also advisable to rotate propellers through 4 complete revolutions by hand before starting engines. Consideration should also be given to using external power for engine starts during cold weather operations.

For passenger comfort, a manual heat exchanger air selector valve, labeled PRESS AIR HEAT, has been provided to increase passenger comfort and heating system efficiency during cold weather operation. The manual control is located on the instrument panel on the right side of the control pedestal, near the heater controls. In the full clockwise position, pressurization air will bypass the heat exchanger and be directed into the heater inlet. In the full counterclockwise position, all pressurization air will flow through the heat exchanger then into the cabin providing the coolest possible pressurization air. Intermediate positions of the selector valve control will allow some control of the pressurization air temperature.

NOTE: During cold weather operation it is suggested that the heat exchanger air selector valve be turned clockwise for heat.

NOTE: At least one CABIN AIR control should be rotated clockwise when the PRESS AIR HEAT control is in the full clockwise position.

NOTE: The waste gate actuators will not operate satisfactorily with engine oil temperatures below the lower limit of the operating range (75F). With oil temperatures near the bottom of the operating range, the throttle motions should be very slow and care exercised to prevent exceeding the 33.0”MP limit.

CAUTION: If brakes are deiced using alcohol, insure alcohol has evaporated from the ramp prior to starting engines as a fire could result.
DE-ICE/ANTI-ICE

DE-ICE BOOT SYSTEM:

NOTE: The de-icing system is manually controlled. Every time a de-icing cycle is desired, the switch must be positioned to ON. The switch will instantly spring back to OFF, but a 6 second delay action in the switch will complete the de-icing inflation cycle.

NOTE: Complete inflation and deflation cycle will last approximately 30 seconds.

Best results can be obtained by leaving the de-ice system off until ¼ to ½ inch of ice has accumulated. Rapid cycling of the system is not recommended.

NOTE: Since wing, horizontal stabilizer and vertical stabilizer de-ice boots alone do not provide adequate protection for the entire aircraft, know icing conditions should be avoided whenever possible. If icing is encountered, close attention should be given to the pitot static system, propellers, induction systems and other components subject to icing.

PROPELLER DE-ICE SYSTEM: The propeller de-ice system consists of electrically heated boots on the propeller blades. Each boot consists of two heating elements “outboard” and “inboard” which receive their electrical power through a de-ice timer.

NOTE: Periodic fluctuation within the green arc of the propeller de-ice ammeter indicates normal operation of the de-ice elements of first one propeller and then the other.

NOTE: The check all the heating elements of both propellers and the de-ice timer for normal operations, the system must be left ON for approximately two and one-half minutes.

WARNING: When uneven de-icing of the propeller blades is indicated, it is imperative that the de-ice system be turned OFF. Uneven de-icing of the blades can result in propeller unbalance and engine failure.

DUAL HEATED PITOT STATIC SYSTEM:

The pilot’s instruments are connected to the left pitot tube and the upper left and right static sources located on the aft fuselage. When the alternate static source is selected, the pilot’s instruments reference the static pressure in the nose baggage compartment.

The copilot’s instruments are connected to the right pitot tube and the lower left and right static sources located on the aft fuselage. No alternate static source is provided for the copilot’s instruments.

ALCOHOL WINDSHIELD DE-ICE SYSTEM: Consists of a 3.0 gallon alcohol tank, a pump, left and right-hand dispersal tubes, and a switch breaker.

NOTE: For operation in continuous enroute icing conditions, allow approximately 1/8 to ¼ inch of ice accumulation. The windshield de-ice system can be used as an anti-ice system by continuous use and should be so used during the approach to landing. However, the maximum endurance with a 3-gallon tank is approximately 1.0 hour of continuous operations. Airspeed should be 140 KIAS or below for best results.

WARNING: The windshield de-ice switch breaker must be positioned OFF 20 seconds prior to reaching minimum descent altitude. The alcohol film must be allowed to evaporate before a clear field of vision through the windshield is available.
FIRE DETECTION AND EXTINGUISHING SYSTEM

The optional fire detection and extinguishing system consists of three major components: Three heat sensitive detectors located in each engine accessory compartment; an annunciator and actuator panel; and a compressed Freon single shot gas bottle in each engine accessory compartment.

A test function is provided to test the system circuitry. When the test switch is pushed all lights should illuminate, if any light fails to illuminate replace the bulb. If the green light does not illuminate after replacing the bulb, replace firing cartridge in fire extinguisher.

If an overheat condition is detected, the appropriate FIRE light will annunciate the engine to be extinguished. To activate the extinguisher, open the guard for the appropriate engine and press the FIRE light. The amber light “E” will illuminate after the extinguisher has been discharged and will continue to show empty until a new bottle is installed. The FIRE light will remain illuminated until compartment temperatures cool.

NOTE: Better results may be obtained in the airflow through the nacelle is reduced by slowing the aircraft (as slow as practical) prior to actuating the extinguisher.

REVIEW EMERGENCY PROCEDURES

ENGINE FAILURE DURING TAKEOFF
ENGINE FAILURE AFTER TAKEOFF
ENGINE FAILURE DURING FLIGHT
FIRE PROCEDURES
SINGLE ENGINE APPROACH AND LANDING
FORCED LANDING
ENGINE – DRIVEN FUEL PUMP FAILURE
ELECTRICAL SYSTEM
FLIGHT INSTRUMENTS

LANDING GEAR MANUAL EXTENSION

ENGINE INLET AIR SYSTEM ICING

PRESSURIZATION SYSTEM

EMERGENCY DESCENT PROCEDURES

OPERATING LIMITATIONS

OPERATIONS AUTHORIZED

MANEUVERS – NORMAL CATEGORY

ALTITUDE

AIRSPEED

ENGINE OPERATION LIMITATIONS

PRESSURIZATION SYSTEM INSTRUMENT MARKINGS

BAGGAGE COMPARTMENTS

WEIGHT AND BALANCE

RECOMMENDED STANDARD OPERATING PROCEDURES

NORMAL TAKEOFF

REJECTED TAKEOFF

ENGINE FAILURE DURING TAKEOFF

STEEP TURNS

APPROACH TO STALLS

EMERGENCY DESCENT

PRECISION APPROACH TO BALKED LANDING

NON PRECISION APPROACH TO LANDING

SINGLE ENGINE APPROACH TO MISSED APPROACH

SINGLE ENGINE LANDING
SYSTEMS EXAMINATION

1. How many fuel drains?
2. Total usable fuel?
3. When using ext power the BATT switches should be On/Off?
4. CABIN LIGHT Switch is hot wired to the battery bus? Yes/No
5. Start engines with aux fuel switches in the ON position. Yes/No
6. Oil pressure must be in the green arc before engine run-up. Yes/No
7. Maximum rated power is 39.0 MP @ 2235 RPM. Yes/No
8. If vapor is in the fuel system, turn the aux fuel pump to OFF. Yes/No
9. Turn the aux fuel pump on above 10000’. Yes/No
10. Lean during climb? Yes/No
11. Lean during cruise? Yes/No
12. Lean during descent? Yes/No
13. How many fuel tanks does your aircraft have?
14. What is the maximum baggage weight for the nose compartment?
15. Is it possible to pump fuel overboard during normal cruise flight? Yes/No
16. If engine doesn’t start after 30 seconds, wait 5 minutes before cranking again? Yes/No
17. The steerable nosewheel is interconnected with the rudder? Yes/No
18. Full throttle checks on the ground are not recommended? Yes/No
19. Max RPM difference between the L/R engines is 150 RPM? T/F
20. What is your aircraft’s (red line) single engine control speed?
21. What is your aircraft’s blue line airspeed?
22. What is your aircraft’s best ROC?
23. What is your aircraft’s best AOC?
24. To stop tire rotation after lift off you must apply the brakes? T/F
25. Normal after takeoff power setting for your aircraft is _____ MP, _____RPM.
26. What is the horsepower of your airplane?
27. The electrical system is a 24 volt system? T/F
28. The generators produce 28 volts? T/F
29. Battery power must be available for EMER ALT FLD excitation? Yes/No
30. Overvoltage relay can be reset by cycling the applicable alternator switch? Yes/No
31. How many times can you reset a CB and/or a Switch Breaker?
32. The landing gear safety switch is located on the left strut? T/F
33. Green gear lights can be dimmed by turning on the NAV Lights? T/F
34. If you extend the flaps to 15 degrees before landing gear is down a horn will sound? T/F
35. Emergency gear extension is accomplished with a blow down cartridge? T/F
36. Pressurization is accomplished by controlling outflow? T/F
37. The DUMP valve is used upon landing to depressurize the airplane. T/F
38. The PRESS AIR mode should be selected prior to takeoff. T/F
39. A CABIN ALT warning light illuminates at 10000’ PA? T/F
40. Cabin differential pressure of 5.0 PSI is limited by the pressure regulator? T/F
41. The Ram Air Control OPEN will depressurize the airplane. T/F
42. Can the cabin be heated using the turbocharger instead of the heater? Yes/No
43. How many cubic feet of oxygen does your airplane have?
44. Where is the oxygen bottle located?
45. The synchronizer must be on for takeoff and landings? T/F
46. If the waste gate is fully closed at high altitude MP will vary with airspeed. T/F
47. If the waste gate is fully open at low altitude, airspeed will have little effect. T/F
48. How long should you let the engines cool after shutdown?
49. Are you approved to fly into known icing conditions? Yes/No
50. How long will the alcohol windshield deice last if left on continuously?
Use the following information and your flight manual:

Calculate weight and balance and performance:

Pilot – 200 lbs
3 Passengers – 170 lbs each
Full Fuel – 1218 lbs
Baggage – 100 pounds (nose compartment)
30 degrees C

Normal Takeoff Distance _________
Accelerate Stop Distance _________
Single Engine Takeoff Distance _________
Maximum Range (20000’):

73.5% power _________

Total Landing Distance at Sea Level _________ (15 degrees C)