AMPLIFIED PROCEDURES

STARTING ENGINES

Either engine may be started first and the procedure is identical for both. Starting the rear engine first enables the engine start to be heard. On the other hand, starting the front engine first permits more effective clearing of the propeller area and, in cold weather, more efficient electrical power because of the shorter battery cable.

NOTE
The convex mirror, mounted on the inboard side of the left boom, provides a view of the rear propeller area from the pilot's position.

The continuous-flow fuel injection system will start spraying fuel in the intake ports as soon as the throttle and mixture controls are opened and the auxiliary fuel pump is turned on. If the auxiliary pump is turned on accidentally while the engine is stopped, with the throttle open and the mixture rich, solid fuel will collect temporarily in the cylinder intake ports, the quantity depending on the amount of throttle opening and the length of time the pump has been operating. If this happens, it is advisable to wait a few minutes until this fuel drains away before starting the engine. To avoid flooding, turn the auxiliary fuel pump switch off promptly when the fuel flow reaches 60 lbs/hr during preparation for engine start.

Engine mis-starts characterized by weak, intermittent firing followed by puffs of black smoke from the exhausts are caused by over-priming or flooding. This situation is more apt to develop in hot weather, or when the engine is hot. If it occurs, repeat the starting routine with the throttle approximately 1/2 open, the mixture in idle cut-off and the auxiliary fuel pump switch off. As the engine fires, move the mixture control to full rich and decrease the throttle to idle.

Engine mis-starts characterized by sufficient power to take the engine away from the starter but dying in 3 to 5 revolutions are the result of an excessively lean mixture after the start and can occur in warm or cold temperatures. Repeat the starting procedure but allow additional priming time with the auxiliary fuel pump switch on HI before cranking is started. If extremely hot temperatures have caused vapor which prevents a start, it will be necessary to place the auxiliary fuel pump switch on HI for 5 to 10 seconds or more to flush the vapor through the fuel lines until the fuel flow reaches 60 lbs/hr. Then turn off the pump and proceed with normal starting procedures.

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, as in any twin-engine airplane, should be done with both engines operating. The airplane should be taxied initially using the rear engine, followed by applying power to the front engine. Further power adjustments should be made primarily with the rear engine. The characteristic change in sound of the rear engine with variations in power will provide assurance that the rear engine is operating normally. Taxiing with primarily the rear engine also prevents the front propeller tips from being damaged needlessly while taxiing over gravel or cinders. The rear propeller has greater ground clearance, thereby minimizing stone damage to the propeller tips. Full power runups over loose gravel should be avoided unless the airplane has obtained considerable forward speed.

BEFORE TAKEOFF WARM-UP

Since the engines are closely cow led 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 engines are not turning up properly.

TAKEOFF POWER CHECK

To confirm that the rear engine is operating normally at the start of a takeoff run, it is recommended that the rear engine throttle be advanced ahead of the front engine throttle. It is important that full power engine operation be monitored periodically throughout the initial takeoff run oy glancing at fuel flow and RPM. If either of these indicators is below normal, or if there are any signs of rough engine operation or sluggish acceleration, the takeoff run should be discontinued immediately while sufficient runway still remains for braking to a safe stop.

Advancing the throttles rapidly to full power (especially with cold oil) may result in a momentary overshoot of two or three inches over maximum allowable manifold pressure. This slight over boosting is not considered detrimental to the engine as long as it is momentary.

After maximum power is applied, adjust the friction lock clockwise to prevent creepage of the engine controls. Similar friction lock adjustments should be made as required in other flight conditions to maintain fixed engine control settings.

NORMAL TAKEOFF

For normal takeoffs, the use of 1/3 flaps results in easier nose wheel lift-off and lower initial climb attitude, as well as a 10% reduction in takeoff distance compared to flaps-up takeoff. After all obstacles are cleared and a safe altitude is reached, the airplane may be accelerated to an initial climb speed of 100 KIAS while slowly retracting the flaps. The takeoff performance in Section 5 is based on short field takeoff techniques.

NOTE
Flaps settings greater than 1/3 are not approved for takeoff.

SHORT FIELD TAKEOFF

Short field takeoffs are performed with 1/3 flaps, as described in the checklist. Brakes should be held until power settings are stabilized.

Elevator back pressure should be applied approximately 5 KIAS under the lift-off speed for the particular takeoff weight. After lift-off, the airplane attitude should be controlled to give a smooth transition to the obstacle climb speed (70 KIAS at maximum weight). The wing flaps and landing gear should not be retracted until all obstacles are cleared.

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.

ROUGH FIELD OPERATION

When taking off from a gravel field, the possibility of gravel damaging the propellers can be reduced considerably by using 1/3 flaps, and using only the rear engine for initial acceleration. When doing this, the nose gear should be raised clear of the ground as soon as possible, followed by full throttle application on the front engine.

LANDING GEAR RETRACTION

On long runways, the landing gear should be retracted after reaching the point over the runway where a wheels-down forced landing on that runway would become impractical. However, on short runways it may be preferable to retract the landing gear after the airplane is safely airborne. This would get the airplane into a more favorable configuration for a possible engine-out emergency.

Since the landing gear swings downward approximately two feet as it starts the retraction cycle, retraction should be avoided until obtaining at least that much ground clearance and a positive climb is established.

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

A cruising climb at approximately 75% power, 90 lbs/hr fuel flow, and 115 to 130 KIAS is normally recommended. This type of climb provides better engine cooling, less engine wear, and lower noise level than a maximum power climb. An even quieter and smoother climb can be accomplished by climbing at 130 to 145 KIAS using 75% power, with the front and rear cowl flaps closed during cool weather.

Maintain cylinder head temperatures at approximately 400°F by increasing or decreasing airspeed as required. This configuration should produce a rate of climb of approximately 500 feet per minute, and provide the pilot with more forward visibility. If it is necessary to climb rapidly to clear mountains or reach favorable winds at high altitudes, the best rate-of-climb speed should be used with maximum power. If an obstruction ahead requires a steep climb angle, the best angle-of-climb speed should be used with flaps up and maximum power.

CRUISE

Normal cruising is performed between 55% and 75% power.
NOTE
Cruising should be done at 65% to 75% 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.

For increased passenger comfort, use the lowest RPM and highest manifold pressure (within green arc limits) that will give the desired percent cruise power with smooth engine operation and stable manifold pressures. Use the outer green arc limits (2200 to 2450 RPM) on the tachometer unless unstable manifold pressure (bootstrapping) is encountered. IIi this event, increase RPM as required within the upper limit of the inner green arc (2600 RPM). Reset manifold pressures to obtain desired power settings.

Under normal operating conditions, the cowl flaps should be adjusted to maintain cylinder head temperatures within the green arc range. Under some hot-day and high-altitude conditions, it may be necessary to open cowl flaps and increase fuel flow to provide desired cylinder head cooling.

For best fuel economy at 65% power or less, the engines may be operated at six pounds per hour leaner than shown in this handbook and on the power computer. This will result in approximately 8% greater range accompanied by approximately 4 knots decrease in speed.

The fuel injection system employed on these engines 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 door on each engine 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 front alternate air door, manifold pressure can decrease 10 inches Hg or more from a cruise power setting. This pressure should be recovered by increased throttle setting or a higher RPM as necessary to maintain desired power. Maximum allowable manifold pressure (37 inches Hg) is available up to approximately 18,000 feet using the alternate air source with a fully blocked filter.

LEANING WITH A ECONOMY MIXTURE INDICATOR (EGT)

Exhaust gas temperature (EGT) as shown on the optional Cessna Economy Mixture Indicator may be used as an aid for mixture leaning in cruising flight at 75% power or less. To adjust the mixture, using this indicator, lean to establish the peak EGT as a reference point and then enrichen the mixture by a desired increment.

Continuous operation at peak EGT is authorized only at 65% power or less. This best economy mixture setting results in approximately 8% greater range than shown in this handbook accompanied by approximately 4 knots decrease in speed.

NOTE
Operation on the lean side of peak EGT is not approved.

When leaning the mixture, use a slow movement of the mixture control. If a distinct peak is not obtained, use the corresponding maximum EGT as a reference point for enrichening the mixture to the desired cruise setting. Any change in altitude or power will require a recheck of the EGT indication.

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. A mild aerodynamic buffet will occur almost simultaneously with the stall warning horn.

Power-off stall speeds with throttles closed and at both forward and aft C.G. positions are presented in Section 5 for several weights.

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 descent, check that the auxiliary fuel pump switches are turned off. The rate of descent should be adjusted to permit a cabin altitude rate of descent of no more than 500 FPM for passenger comfort. Sufficient power should be used to keep the engines warm and maintain proper pressurization system operation. The optimum engine RPM in a descent is usually the lowest RPM in the green arc range that will allow proper pressurization system operation and the cylinder head temperature to remain in the recommended operating range. If a steep descent is required, the landing gear can be extended at speeds as high as 140 KIAS after which the speed can be increased as desired up to 205 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 (140 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.

Landing gear extension can be detected by illumination of the gear down indicator light (green), absence of a gear warning horn with either 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 pressing to test. A burned-out bulb can be replaced in flight with the bulb from the landing gear up (amber) indicator light.

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

LANDING

Landings should be made 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 field landings.

SHORT FIELD LANDING

For short field landings, make a power approach at 78KIAS with full flaps. After all approach obstacles are cleared, progressively reduce power. Maintain 78 KIAS approach speed by lowering the nose of the airplane. Touchdown should be made with the throttles 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 down elevator (control wheel full forward) could raise the main wheels off the ground.

CROSSWIND LANDING

A wing-low drift correction technique with wing flaps fully extended is the preferred method of performing crosswind landings. The maximum crosswind velocity is generally dependent upon pilot proficiency as well as airplane limitations.

NOTE
Depending on the severity of the slip required, indicated airspeeds may be very unreliable during a slipping final approach.

BALKED LANDING

In a balked landing (go-around) climb, the wing flap setting should be reduced to 1/3 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 and cowl flaps opened. Retraction of the landing gear is not recommended if another landing approach is to be conducted.

COLD WEATHER OPERATION STARTING

The front engine should be started first since it is closer to the battery.
Starting can be expedited by switching the auxiliary fuel pumps to the HI position and advancing the throttles for a fuel flow of 50 to 60 lbs/ hr for 3 to 6 seconds.
The use of an external pre-heater and an external power source is recommended whenever possible to reduce wear and abuse to the engines and the electrical system. Pre-heat will thaw the oil trapped in the oil coolers, which may be partially congealed prior to starting in extremely cold temperatures. When using an external

power source, the battery switch should be turned on. Refer to Section 7, paragraph Ground Service Plug Receptacle, for operating details.

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

WARM-UP
In very cold weather, no oil temperature indication need by apparent before takeoff. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), with cylinder head temperatures showing above 200°F, the engines are ready for takeoff if they accelerate smoothly and the oil pressure is normal and steady.

INFLIGHT
During cruise 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.

Increasing cruise altitude or cruise power will increase engine temperature. Cylinder head temperatures will increase approximately 50°F as cruise altitudes increase from 5000 to 20,000 feet.

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

NOISE ABATEMENT
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.