



Preflight Check

Enter the cockpit. Turn the battery master switch ON and retract the flaps.

Check the interior lights by turning them ON. After the interior lights are checked, turn ON the pitot heat switch, and the exterior light switches. Make certain everything is operating normally.

Before Starting The Engines

After preflight checks and flight planning have been completed, and the airplane has been determined ready for flight, both the forward and all cabin doors should be secured. All occupied seats should be adjusted and secured in position and seat belts and shoulder harnesses properly fastened. All seat belts not occupied should be fastened and pulled secure.

Turn on the alternator switches.

WARNING – No braking will occur if the knob is pulled prior to brake application.

Set the parking brake by turning the parking brake handle clockwise. Verify that the landing gear selector is in the DOWN position.

Check that the control levers move smoothly and place the throttles at IDLE, the propeller controls to FULL INCREASE and the mixture controls at IDLE CUTOFF (approximately 75% back).

Verify that the alternate air control for each engine is OFF and the cowl flaps are OPEN.

Verify that both elevator and rudder trim are set to NEUTRAL and that the fuel selectors are ON.

All other electrical switches, the fuel pumps, and the radio master switch should be OFF to avoid an electrical overload when the starter is engaged. Check that all circuit breakers are in.

Normal Start. Cold Engine

Open the throttles approximately 1 inch and advance the propeller controls to FULL FORWARD. Turn the battery master switch ON and check that the three green gear position lights are illuminated. Turn on the fuel pump and the magneto switches. Advance the mixture control to FULL RICH for approximately 4 seconds then to IDLE CUTOFF. The engine is now primed.

NOTE - The amount of prime depends on engine temperature. Familiarity and practice will enable the operator to estimate the amount of prime required.

Verify the propeller area is clear. Once you are sure the area is clear and the engine can safely be started, engage the starter.

When the engine fires, advance the mixture control to FULL RICH. Move the throttle to the desired setting and check the oil pressure for a positive indication. If no oil pressure is indicated within 30 seconds, shut down the engine and have it checked. In cold weather it may take somewhat longer for an oil pressure indication.

Repeat the above procedure for the opposite engine. After both engines have been started, check the gyro vacuum gauge for a reading within normal operating range.

Engine Start - Cold Weather

Open the throttles 1/2 inch and advance the propeller controls to FULL FORWARD. Turn the battery master switch ON and check that the three green gear position lights are illuminated. Turn on the standby



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fuel pump and the magneto switches. Advance the mixture control to FULL RICH and after approximately 5 seconds of prime, reposition the throttle to the idle position.

Verify the propeller area is clear. Once you are sure the area is clear and the engine can safely be started, engage the starter.

When the engine fires, adjust the throttle as necessary. Check the oil pressure for a positive indication. Normally there should be an indication of oil pressure within 30 seconds. In cold weather it may take a few seconds longer. If after allowing sufficient time, and there is no oil pressure, shut down the engine until the cause is determined and remedied.

Repeat the above procedure for the opposite engine. After both engines have been started, check the gyro vacuum gauge for a reading within normal operating range.

Normal Start – Warm Engine

Open the throttles 1/2 inch and advance the propeller controls to FULL FORWARD. Verify the mixture control is at IDLE CUTOFF. Turn the battery master switch ON and check that the three green gear position lights are illuminated. Verify that the fuel pump is ON.

Turn both magneto switches ON.

Verify the propeller area is clear. Once you are sure the area is clear and the engine can safely be started, engage the starter. When the engine fires, slowly advance the mixture control. Move the throttle to the desired setting and check the oil pressure for a positive indication.

Repeat the above procedure for the opposite engine. After both engines have been started, check the gyro vacuum gauge for a reading within normal operating range.

Before Taxiing

WARM-UP

Takeoff may be made as soon as the ground check is completed, provided that the throttles may be opened fully without backfiring or skipping, and without a reduction in engine oil pressure.

Do not operate the engines at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

PRIOR TO TAXI

Verify the battery master is turned ON. Set the gyros, the altimeter, and the clock as required. Turn ON the radio master switch. Lights and windshield heat may be turned on as desired, Check the fuel tank selector and make sure it is in the desired configuration. Check the radios, and set them as desired. Check the autopilot and the elevator and rudder trim settings.

Complete the passenger briefing. Release the parking brake by turning the parking brake control counter-clockwise.

Taxiing

Check to make sure the taxi area is clear. Always apply the throttles slowly. While taxiing, apply the brakes to determine their effectiveness. Make slight turns to check steering.



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During the taxi, check the flight instruments (turn indicator, directional gyro, coordination ball & compass).

Ground Check

CAUTION - Alternate air is unfiltered. Use of alternate air during ground or flight operations, when dust or other contaminants are present, may result in engine damage from particle ingestion.

A thorough check should be made before takeoff, using a checklist. Before advancing the throttle to check the magnetos and the propeller action, be sure that the engine oil temperature is 75 °F or above. Head the airplane into the wind if possible and set the parking brake.

Advance mixture and propeller controls forward, and the throttle controls to 1000 RPM, and check the engine instruments to see that they are functional, and that readings are within limitations. Advance the throttles to 1500 RPM and retard the propeller controls aft to check feathering. However, do not allow a drop of more than 300 RPM.

Before Takeoff

Ensure cabin doors are closed and latched properly. Check that all seat backs are erect and seats are adjusted and locked in position. Check that all seat belts and harnesses are fastened and adjusted, and that the armrests are stowed. Ensure that the battery master, and alternator are ON. Check and set all of the flight instruments as required and engine gauges for normal engine indication.

WARNING - If flight into known icing conditions (in visible moisture below +5 °C) is anticipated or encountered during climb, cruise or descent activate the aircraft ice protection system, including the pitot heat!

Turn propeller heat, windshield heat, and pitot heat on if necessary. The propeller controls should be set to FULL FORWARD and the mixture controls to FULL RICH. Verify that the engine alternate air selectors are in the OFF position. If flaps are to be used for takeoff, visually confirm that they have extended.

Check and set the elevator and rudder trims, Verify that both fuel control selectors are set to the ON position. Ensure proper flight control movement and response. Release the parking brake.

Takeoff

To achieve the takeoff performance it is necessary to set rated power (2600 RPM. 38 in. Hg.) prior to brake release.

CAUTION - Fast taxi turns immediately prior to takeoff should be avoided to prevent any possibility of fuel line un-porting, which could lead to engine stoppage on takeoff.

NOTE - Takeoffs are normally made with throttle set to 38 in. Hg manifold pressure.

Takeoff should not be attempted with ice or frost on the wings. Takeoff distances and 50 foot obstacle clearance distances will be reduced by uphill gradient, tailwind component, soft, wet, rough or grassy surface, or poor pilot technique.

Avoid fast turns onto the runway, followed by immediate takeoff, especially with a low fuel supply. Fast taxi turns immediately prior to takeoff run can cause temporary malfunction of one engine on takeoff.



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As power is applied at the start of the takeoff roll, look at the engine instruments to make sure that the engines are operating properly and putting out normal power. Also check the airspeed indicator to see that it is functioning. Apply throttle smoothly until 38 in. Hg. manifold pressure is obtained. **DO NOT APPLY ADDITIONAL THROTTLE!**

The flap setting for normal takeoff is 0°. In certain short field takeoff efforts when the shortest possible ground roll and the greatest clearance distance over a 50 ft. obstacle is desired, a flap setting of 25° is recommended.

NORMAL 0° FLAP PERFORMANCE TAKEOFF

When obstacle clearance is no problem, normal flaps up (0°) takeoff may be used. Set the flaps to the up (0°) position. Set the elevator trim indicator as desired. Apply and hold the brakes and bring the engines to full power before release. Release the brakes, accelerate to 81 KIAS and ease back on the wheel enough to let the airplane lift off the runway. Hold 82 KIAS until any obstacle is cleared. After obstacle clearance, accelerate to the best rate of climb speed, 88 KIAS, or higher if desired, retracting the landing gear when a gear-down landing is no longer possible on the runway.

When a short field effort is required, but the situation presents a wide margin on obstacle clearance, the safest short field technique to use is with the flaps up (0°). In the event of an engine failure, the airplane is in the best flight configuration to sustain altitude immediately after the gear is raised.

SHORT FIELD PERFORMANCE TAKEOFF

When the shortest possible ground roll, and the greatest clearance distance over a 50-Foot obstacle is desired, use a 25-degree flap setting. Set the elevator trim indicator slightly nose up. Apply and hold the brakes and bring the engines to full power before release. Release the brakes, accelerate to 73 KIAS and rotate firmly so that when passing through the 50-Foot height the airspeed is approximately 76 KIAS. Retract the gear when a gear down landing is no longer possible on the runway.

It should be noted that the airplane is momentarily near VMC when using the above procedure. **IN THE EVENT THAT AN ENGINE FAILURE SHOULD OCCUR WHILE THE AIRPLANE IS AT THIS AIRSPEED, IT IS MANDATORY THAT THE THROTTLE ON THE OPERATING ENGINE BE RETARDED AND THE NOSE LOWERED IMMEDIATELY TO MAINTAIN CONTROL OF THE AIRPLANE.** It should also be noted that when a 25-degree flap setting is used on the takeoff roll, an effort to hold the airplane on the runway too long might result in a wheel barrowing tendency. This should be avoided.

This procedure should only be used when conditions truly require this kind of performance. The pilot must be aware that he achieves this improved performance only at the expense of a reduction in his safety margins. If an engine failure were to occur near the obstacle with the gear and flaps still down, the only choice available to the pilot is to reduce the remaining power to idle and make the best possible landing straight ahead since single engine performance under these conditions is non-existent

Climb

TAKEOFF CLIMB

On climb-out after takeoff it is recommended that the best angle of climb speed (83 KIAS) be maintained only if obstacle clearance is a consideration. The best rate of climb speed (88 KIAS) should be maintained with takeoff power on the engines until adequate terrain clearance is obtained.

CRUISE CLIMB

At this point, engine power should be reduced to 2500 RPM and 32 inches Hg. manifold pressure for cruise climb. Establish a climb speed of 110 KIAS and position the cowl flaps 1/2 OPEN, or as required to maintain proper engine temperatures.

This combination of reduced power and increased airspeed provides better engine cooling, less engine wear, reduced noise level, and better forward visibility.



When reducing engine power the throttles should be retarded first, followed by the propeller controls. The mixture controls should remain at FULL RICH during the climb. Cowl flaps should be set to the 1/2 open position or adjusted as required, to maintain cylinder head and oil temperatures within the normal ranges specified for the engine.

Consistent operational use of the cruise climb power settings is strongly recommended since this practice will make a substantial contribution to increased engine life, and will reduce the incidence of premature engine overhaul.

Cruise

When leveling off at cruise altitude, the pilot may reduce to a cruise power. For maximum engine service life, cylinder head temperatures should be maintained below 420°F and oil temperatures below 200°F during cruise. These temperatures can be maintained by opening the cowl flaps, reducing the power, enriching the mixture or any combination of these methods.

Descent

When power is reduced for descent, the mixtures should be enriched as altitude decreases. The propellers may be left at cruise setting; however if the propeller speed is reduced, it should be done after the throttles have been retarded. Cowl flaps should normally be closed and the TIT should be maintained at approximately 1300°F or higher to keep the engines at the proper operating temperature.

Set the altimeter. Adjust the windshield defrost as required during descent.

The red lights will illuminate red when the landing gear is in transition between the full up position and the down and locked position. Additionally, the light will illuminate when the gear warning horn sounds. The gear warning horn will sound at low throttle settings if the gear is not down and locked. The light is green when the landing gear is in full down and locked positions.

The landing gear should be lowered at speeds below 128 KIAS and the flaps at speeds as follows:

- 10° - 140 KIAS maximum
- 25° - 120 KIAS maximum
- 40° - 113 KIAS maximum

Prior to entering the traffic pattern, the aircraft should be slowed to approximately 120 KIAS, and this speed should be maintained on the downwind leg. The landing check should be made on the downwind leg. The seat backs should be erect, armrests stowed, and the seat belts and shoulder harnesses should be fastened.

Both fuel selectors should be ON, and the cowl flaps should be set as required. Select landing gear DOWN and check for three green gear lights on the lower panel.

Maintain a traffic pattern speed of 100 KIAS and a final approach speed of 90 KIAS. If the aircraft is lightly loaded, the final approach speed may be reduced to 79 KIAS. Set the mixture controls to FULL RICH.

When the power is reduced on close final approach, the propeller controls should be advanced to the full forward position to provide maximum power in the event of a go-around.

The landing gear position should be checked again on final approach by checking the three green indicator lights on the instrument panel.



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Flap position for landing will depend on runway length and surface wind. Full flaps will reduce stall speed during final approach and will permit contact with the runway at a slower speed.

Good pattern management includes a smooth, gradual reduction of power on final approach; with the power fully off before the wheels touch the runway. This gives the gear warning horn a chance to blow if the gear is not locked down. Elevator trim can be used to assist a smooth backpressure during flare out.

Maximum braking after touchdown is achieved by retracting the flaps, applying backpressure to the wheel and applying pressure on the brakes. However unless extra braking is needed, or unless a strong crosswind or gusty air conditions exists, it is best to wait until turning off the runway to retract the flaps. This will permit full attention to be given to the landing and landing roll, and will also prevent the pilot from accidentally reaching for the gear handle instead of the flap handle.

NORMAL LANDING

For a normal landing approach with full flaps (40°) and partial power until shortly before touchdown, hold the nose up as long as possible before and after contacting the ground with the main wheels.

If a crosswind or high wind landing is necessary, approach with higher than normal speed and with 0° to 25° of flaps. Immediately after touchdown, raise the flaps.

During a crosswind approach, hold a crab angle into the wind until ready to flare out for the landing. Then lower the wing that is into the wind, to eliminate the crab angle without drifting, and use the rudder to keep the wheels aligned with the runway. Avoid prolonged sideslips with a low fuel indication.

The maximum demonstrated crosswind component for landing is 17 KTS.

SHORT FIELD PERFORMANCE LANDING

For a short field landing, approach with full flaps (40°) at 82 KIAS. immediately after touch-down, raise the flaps, apply back pressure to the wheel and apply brakes.

Go-Around

If a go-around from a normal approach with the airplane in the landing configuration becomes necessary, apply takeoff power to both engines (not to exceed 38 in. Hg manifold pressure). While the pitch attitude is increased to obtain the balked landing climb speed of 85 KIAS, slowly retract the flaps and retract the landing gear when a positive climb is established, and adjust cowl flaps for adequate engine cooling.

Airspeed should then be established at the best angle of climb speed (72 KIAS) for obstacle clearance or to the best rate of climb speed (88 KIAS), if obstacles are not a factor. Reset the longitudinal trim as required.

Landing

When clear of the active runway, retract the flaps and open the cowl flaps.

Turn off the strobe lights. Use the landing and taxi lights as required.

Stopping Engine

Turn all radio and electrical equipment, and external lights OFF.

Turn fuel pumps OFF.

Move the throttle controls full aft to IDLE and the mixture controls to IDLE CUTOFF. Turn OFF the magnetos, the alternator and battery master switches. Also, at night, turn OFF the panel lights.



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NOTE - The flaps must be placed in the UP position for the flap step to support weight. Passengers should be cautioned accordingly.