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SECTION 4

NORMAL PROCEDURES

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SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section describes the recommended procedures for normal operations for the Seneca III. Required (FAA regulations) procedures and those necessary for the operation of the airplane as determined by the operating and design features of the airplane are presented.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 (Supplements).

These procedures are provided to present a source of reference and review and to supply information on procedures which are not the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

The first portion of this section consists of a short form checklist which supplies an action sequence for normal operations with little emphasis on the operation of the systems.

The remainder of the section is devoted to amplified normal procedures which provide detailed information and explanations of the procedures and how to perform them. This portion of the section is not intended for use as an in-flight reference due to the lengthy explanations. The short form checklist should be used for this purpose.

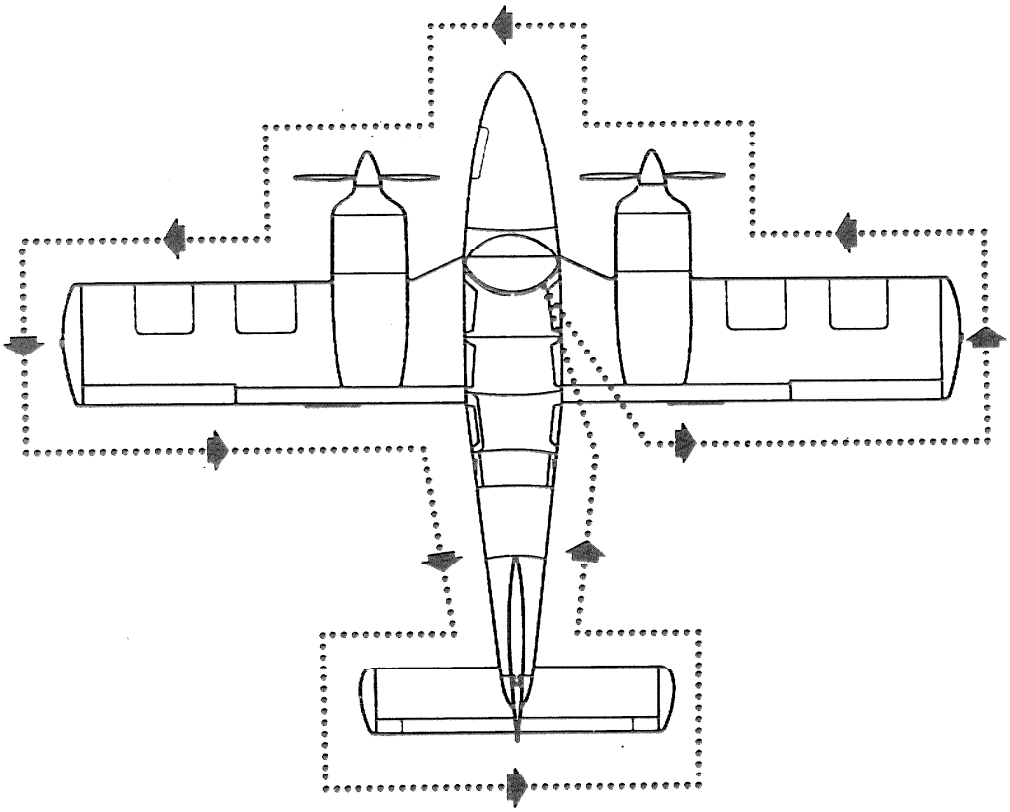
All data given is for both two and three blade propellers unless otherwise noted.

4.3 AIRSPEEDS FOR SAFE OPERATIONS

The following airspeeds are those which are significant to the operation of the airplane. These figures are for standard airplanes flown at gross weight under standard conditions at sea level.

Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

(a) Best Rate of Climb Speed	92 KIAS
(b) Best Angle of Climb Speed	76 KIAS
(c) Turbulent Air Operating Speed (See Subsection 2.3)	136 KIAS
(d) Maximum Flap Speed	115 KIAS
(e) Landing Final Approach Speed (Flaps 40°) Short Field Effort	82 KIAS
(f) Intentional One Engine Inoperative Speed	85 KIAS
(g) Maximum Demonstrated Crosswind Velocity	17 KTS



WALK-AROUND
Figure 4-1

4.5 NORMAL PROCEDURES CHECKLIST

PREPARATION

Airplane status ..... airworthy, papers on board
Weather ..... suitable
Baggage ..... weighed, stowed, tied
Weight and C.G. ..... within limits
Navigation ..... planned
Charts and navigation equipment ..... on board
Performance and range ..... computed and safe

PREFLIGHT CHECK

INSIDE CABIN

Landing gear control ..... DOWN position
Avionics ..... OFF

Battery switch.....ON
Landing gear lights.....3 GREEN
Fuel quantity.....adequate plus reserve
Cowl flaps.....OPEN
Flaps.....check operation
Battery switch.....OFF
Ignition switches.....OFF
Mixture controls.....idle cut-off
Trim indicators.....neutral
Controls.....free
Pitot and static systems.....drain
Empty seats.....fasten belts
Crossfeed drains.....drain

OUTSIDE CABIN

Crossfeed drains.....check closed
Right wing, aileron and flap.....check no ice
Right main gear.....no leaks
Strut.....proper inflation
Tire.....check
Right wing tip.....check
Right leading edge.....check, no ice
Fuel cap.....open, check quantity and color, secure
Right engine nacelle.....check oil
Right propeller.....check
Cowl flaps.....OPEN and secure
Fuel drains.....drain
Nose section.....check
Nose gear.....no leaks
Strut.....proper inflation
Tire.....check
Landing lights.....check
Tow bar.....removed and stowed
Forward baggage door (key removable in locked position only).....secured and locked
Windshield.....clean
Left wing, engine nacelle and landing gear.....check as on right side
Stall warning vanes.....check
Pitot mast.....clear, checked
Dorsal fin air scoop.....clear
Rear doors.....latched
Left static vent.....clear
Empennage.....check, no ice

Stabilator ..... free
Antennas ..... check
Navigation and landing lights ..... check
Right static vent ..... clear

BEFORE STARTING ENGINES

Seats ..... adjusted, secure
Seat belts and harness ..... fasten/adjust - check inertia reel
Parking brake ..... set

WARNING

No braking will occur if knob is pulled before brake application.

Circuit breakers ..... in
Radios ..... OFF
Cowl flaps ..... OPEN
Alternate air ..... OFF
Alternators ..... ON

STARTING ENGINES (AIRPLANE EQUIPPED WITH STANDARD PRIMER SYSTEM)

Fuel selector ..... ON
Mixture ..... FULL RICH
Throttle ..... half travel
Prop control ..... FULL FORWARD
Battery switch ..... ON
Ignition switches (mags) ..... ON
Propeller ..... clear
Starter ..... engage
Primer ..... as required
Throttle ..... adjust when engine starts
Oil pressure ..... check
Repeat for opposite engine.
Alternators ..... check
Gyro suction ..... check

NOTE

When starting at ambient temperatures +20°F and below, operate first engine started with alternator ON (at max charging rate not to exceed 1500 RPM) for 5 minutes minimum before initiating start on second engine.

STARTING ENGINES (AIRPLANE EQUIPPED WITH OPTIONAL ENGINE PRIMER SYSTEM)

Fuel selector ..... ON
Mixture ..... FULL RICH
Throttle ..... FULL FORWARD
Prop control ..... FULL FORWARD
Battery switch ..... ON
Ignition switches (mags) ..... ON
Auxiliary fuel pump ..... OFF
Primer ..... ON
See Figure 4-3 for Priming Time
Throttle ..... CLOSE
Starter ..... engage
At temperatures below +20°F continue priming while cranking until engine starts.

When engine starts & accelerates thru 500 RPM:
Starter ..... release
Throttle ..... advance slowly to obtain 1000 RPM
Primer ..... release
Auxiliary fuel pump ..... low only as necessary to obtain smooth engine operation (1-3 minutes will be required when temp. is below +20°F)
Oil pressure ..... check
Repeat for opposite engine.
Alternators ..... check
Gyro suction ..... check

NOTE

When starting at ambient temperatures +20°F and below, operate first engine started with alternator ON (at max charging rate not to exceed 1500 RPM) for 5 minutes minimum before initiating start on second engine.

STARTING ENGINES WHEN FLOODED

Mixture ..... idle cut-off
Throttle ..... FULL FORWARD
Propeller ..... FULL FORWARD
Battery switch ..... ON
Ignition switches (mags) ..... ON
Auxiliary fuel pump ..... OFF
Propeller ..... clear
Starter ..... engage

When engine fires:
Throttle ..... retard
Mixture ..... advance slowly

STARTING ENGINES IN COLD WEATHER (AIRPLANE EQUIPPED WITH STANDARD ENGINE PRIMER SYSTEM)

Ignition switches ..... OFF
Props ..... turn through by hand (3 times)
Fuel selector ..... ON
Mixture ..... FULL RICH
Throttle ..... FULL FORWARD
Prop control ..... FULL FORWARD
Battery switch ..... ON
Ignition switches (mags) ..... ON
Auxiliary fuel pump ..... ON LO boost
Starter ..... engage
Primer ..... ON 3 sec.
Throttle ..... FULL FORWARD to FULL AFT
Primer ..... ON 3 sec., then OFF 3 sec., then ON 3 sec.

When engine fires:
Starter ..... leave engaged
Primer button ..... tap until rhythmic firing
Starter ..... release
Throttle ..... half travel
Oil pressure ..... check

If engine begins to falter:
Primer button ..... tap
Throttle ..... 1000 RPM
Auxiliary fuel pump ..... OFF after start complete

STARTING ENGINES WITH EXTERNAL POWER

Battery switch ..... OFF
All electrical equipment ..... OFF
Terminals ..... connect
External power plug ..... insert in fuselage
Proceed with normal start.
Throttles ..... lowest possible RPM
External power plug ..... disconnect from fuselage
Battery switch ..... ON - check ammeter
Oil pressure ..... check

WARM-UP

Throttles ..... 1000 to 1200 RPM

TAXIING

Chocks ..... removed
Parking brake ..... release
Taxi area ..... clear
Throttle ..... apply slowly
Brakes ..... check
Steering ..... check
Instruments ..... check
Heater and defroster ..... check
Fuel selector ..... ON, check crossfeed
Autopilot ..... OFF

BEFORE TAKEOFF - GROUND CHECK

Parking brake ..... set
Mixture controls ..... FORWARD
Prop controls ..... FORWARD
Throttle controls ..... 1000 RPM
Manifold pressure lines ..... drain
Prop controls ..... check feathering, 300 RPM max. drop
Throttle controls ..... 2300 RPM
Prop controls ..... check governor
Prop controls ..... FORWARD
Alternate air ..... ON then OFF
Throttle controls ..... 2000 RPM
Magnetos ..... check, max. drop 150 RPM, max. diff. drop 50 RPM
Alternator output ..... check
Gyro suction gauge ..... 4.8 to 5.1 in. Hg.
Throttles ..... 800-1000 RPM
Fuel selectors ..... ON
Alternators ..... ON
Engine gauges ..... in the green
Annunciator panel ..... press-to-test
Flight instruments ..... set
Mixtures ..... set
Quadrant friction ..... ADJUSTED
Alternate air ..... OFF
Cowl flaps ..... set
Seat backs ..... erect
Wing flaps ..... set
Trim ..... set
Belts/harness ..... fastened/adjusted
Empty seats ..... seat belts fastened
Controls ..... free; full travel
Doors ..... latched
Auxiliary fuel pumps ..... OFF
Pitot heat ..... as required
Parking brake ..... release

TAKEOFF

CAUTION

Fast taxi turns immediately prior to takeoff run should be avoided.

Adjust mixture prior to takeoff from high elevations. Do not overheat. Adjust mixture only enough to obtain smooth engine operation. Do not exceed 40 in. Hg. manifold pressure.

NORMAL TAKEOFF (Flaps up)

Brakes ..... apply and hold
Flaps ..... UP
Brakes ..... release
Accelerate to and maintain 79 KIAS.
Control wheel ..... ease back to rotate to climb attitude
After obstacle clearance, accelerate to best rate of climb speed of 92 KIAS.
Gear ..... UP

SHORT FIELD TAKEOFF (25° Flaps)

Flaps ..... 25°
Stabilator trim ..... set
Brakes ..... apply and hold
Takeoff power before brake release.
Brakes ..... release
Accelerate to 64 KIAS.
Control wheel ..... rotate firmly to attain 66 KIAS through 50 ft.
Gear ..... UP

CLIMB

TAKEOFF CLIMB

Best rate (flaps up)	92 KIAS
Best angle (flaps up)	76 KIAS
Cowl flaps	as required
Power	reduce to MCP

CRUISE CLIMB

Mixture	full RICH
Power	2600 RPM and 33 in. Hg MAN PRESS
Climb speed	120 KIAS
Cowl flaps	CLOSED or as required

CRUISING

Power	set per power table
Mixture controls	adjust
Cowl flaps	as required

DESCENT

Mixtures	adjust with descent
Throttles	set
Cowl flaps	CLOSED

APPROACH AND LANDING

Gear warning horn ..... check
Seat backs ..... erect
Belts/harness ..... fasten/adjust
Fuel selectors ..... ON
Cowl flaps ..... as required
Auxiliary fuel pumps ..... OFF
Mixture controls ..... rich
Prop controls ..... FULL FORWARD
Landing gear ..... DOWN, 130 KIAS max.
Flaps ..... set, 115 KIAS max.
Approach speed ..... 90 KIAS or above

GO-AROUND

Full takeoff power, both engines. (40 in. Hg. maximum manifold pressure)
Establish positive climb at 85 KIAS.
Gear ..... UP
Flaps ..... retract slowly
Cowl flaps ..... adjust
Trim ..... as required

AFTER LANDING

Clear of runway.
Flaps ..... retract
Cowl flaps ..... fully OPEN

SHUTDOWN

Heater (if ON) ..... FAN, 2 min. then OFF
Radios & electrical ..... OFF
Throttle ..... full aft
Mixture ..... idle cut-off
Magnetos ..... OFF
Battery switch ..... OFF

MOORING

Parking brake	as required
Control wheel	secured with belts
Flaps	full up
Wheel chocks	in place
Tie downs	secure

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4.7 AMPLIFIED NORMAL PROCEDURES (GENERAL)

The following paragraphs are provided to supply detailed information and explanations of the normal procedures necessary for the operation of the airplane.

4.9 PREPARATION

The airplane should be given a thorough preflight and walk-around check. The preflight should include a determination of the airplane's operational status, a check that necessary papers and charts are on board and in order, and a computation of weight and C.G. limits, takeoff distance and in-flight performance. Baggage should be weighed, stowed and tied down. Passengers should be briefed on the use of seat belts and shoulder harnesses, oxygen, and ventilation controls, advised when smoking is prohibited, and cautioned against handling or interfering with controls, equipment, door handles, etc. A weather briefing for the intended flight path should be obtained, and any other factors relating to a safe flight should be checked before takeoff.

4.11 PREFLIGHT CHECK

CAUTION

The flap position should be noted before boarding the airplane. The flaps must be placed in the "UP" position before they will lock and support weight on the step.

Upon entering the cockpit, check that the landing gear selector is in the DOWN position, turn OFF all avionics equipment (to save power and prevent wear on the units), and turn the battery switch ON. Check the landing gear indicator lights to ensure that the three green lights have illuminated and that the red light has not illuminated. Check the fuel supply. Adequate fuel should be indicated for the flight plus reserve. The cowl flaps should be OPEN to facilitate inspection and ensure cooling after engine start. Extend and retract flaps to check for proper operation. Return the battery switch to OFF to save the battery.

Check that the ignition switches are OFF and move the mixture controls to idle cut-off to prevent an inadvertent start while checking the propellers. Move the trim controls to neutral so that the tabs can be checked for alignment. This check is performed prior to engine start so that you can hear any noise that might indicate binding. The controls should be free and move properly. Drain the pitot and static system lines through the drains located on the side panel next to the pilot's seat. Fasten the seat belts on the empty seats. Before leaving the cockpit, drain the two crossfeed drains on the forward side of the spar box.

The first item to check during the walk-around is to ensure that the crossfeed drains are closed. Check the right wing, aileron and flap hinges and surfaces for damage and ice. Make a close check of the right landing gear for leaks, proper piston exposure under a static load (3-1/2 inches) and that the tires are properly inflated and not excessively worn. The right wing tip and leading edge should be free from ice and damage.

Open the fuel cap to check the quantity and color of the fuel and cap vent. The vent should be free of obstructions. Secure the fuel cap properly. Proceeding around to the engine nacelle, check the oil quantity (six to eight quarts). Make sure that the dipstick has properly seated after checking. Check and ensure that the oil filler cap is securely tightened and secure the inspection door. Check the right propeller for nicks or leaks. The spinner should be secure and undamaged (check closely for cracks). The cowl flaps should be open and secure.

The right fuel drains should be opened to drain moisture and sediment. Drain the two fuel tank drains under the wing and the gascolator drain near the bottom of the engine nacelle (refer to Section 8 for more detailed draining procedure).

Check the nose section for damage and the nose landing gear for leaks and proper strut inflation. Under a normal static load, 2-1/2 inches of strut should be exposed. Check the tire for wear and proper inflation. If the tow bar was used, remove and stow. Before moving on to the forward baggage compartment, check the condition of the landing light. Open the forward baggage compartment and check to make sure that the baggage has been stowed properly. Close, secure and lock the baggage door. The forwward baggage compartment door key can be removed in the locked position only.

At the front of the airplane, the windshield should be clean, secure and free from cracks or distortion. Moving around to the left wing, check the wing, engine nacelle and landing gear as described for the right side. Don't forget to check the fuel and oil.

If a pitot cover was installed, it should be removed before flight and the holes checked for obstructions. With the heated pitot switch on, check the heated pitot head and heated lift detector for proper heating. Check the stall warning vanes for freedom of movement and damage.

A squat switch in the stall warning system does not allow the units to be activated on the ground.

CAUTION

Care should be taken when an operational check of the heated pitot head and the heated lift detectors is being performed. Both units become very hot. Ground operation should be limited to 3 minutes maximum to avoid damaging the heating elements.

Latch the rear door securely and check the left static vent and dorsal fin air scoop for obstructions. The empennage should be free of ice and damage, and all hinges should be secure. Check the stabilator for freedom of movement and ensure that the right static vent is unobstructed. Antennas should be secure and undamaged. After turning on the battery switch and light switches in the cockpit, check the navigation and landing lights.

4.13 BEFORE STARTING ENGINES

Before starting engines, adjust the seats and fasten the seat belts and shoulder harnesses.

NOTES

If the fixed shoulder harness (non-inertia reel type) is installed, it must be connected to the seat belt and adjusted to allow proper accessibility to all controls, including fuel selectors, flaps, trim, etc., while maintaining adequate restraint for the occupant.

If the inertia reel type shoulder harness is installed, a pull test of its locking restraint feature should be performed.

Set the parking brake by first depressing and holding the toe brake pedals and then pulling out the parking brake knob.

WARNING

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

Check to make sure all the circuit breakers are in and the radios are OFF. Cowl flaps should be OPEN and alternate air OFF. The alternators should now be switched ON.

4.15 STARTING ENGINES (AIRPLANE EQUIPPED WITH STANDARD ENGINE PRIMER SYSTEM)

The first step in starting is to move the fuel selector to the ON position. Advance the mixture control to full RICH, open the throttle half travel and move the propeller control full FORWARD. Turn the battery switch and ignition switches ON. After ensuring that the propellers are clear, engage the starter. The primer button should be used (ON) as required. For cold weather starts, refer to paragraph 4.21 - Starting Engines in Cold Weather. When the engine starts, retard the throttle and monitor the oil pressure gauge. 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 the engines have started, check the alternators for sufficient output and the gyro suction gauge for a reading between 4.8 and 5.1 in. Hg.

NOTE

To prevent starter damage, limit starter cranking to 30-second periods. If the engine does not start within that time, allow a cooling period of several minutes before engaging starter again. Do not engage the starter immediately after releasing it. This practice may damage the starter mechanism.

4.17 STARTING ENGINES (AIRPLANE EQUIPPED WITH OPTIONAL ENGINE PRIMER SYSTEM)

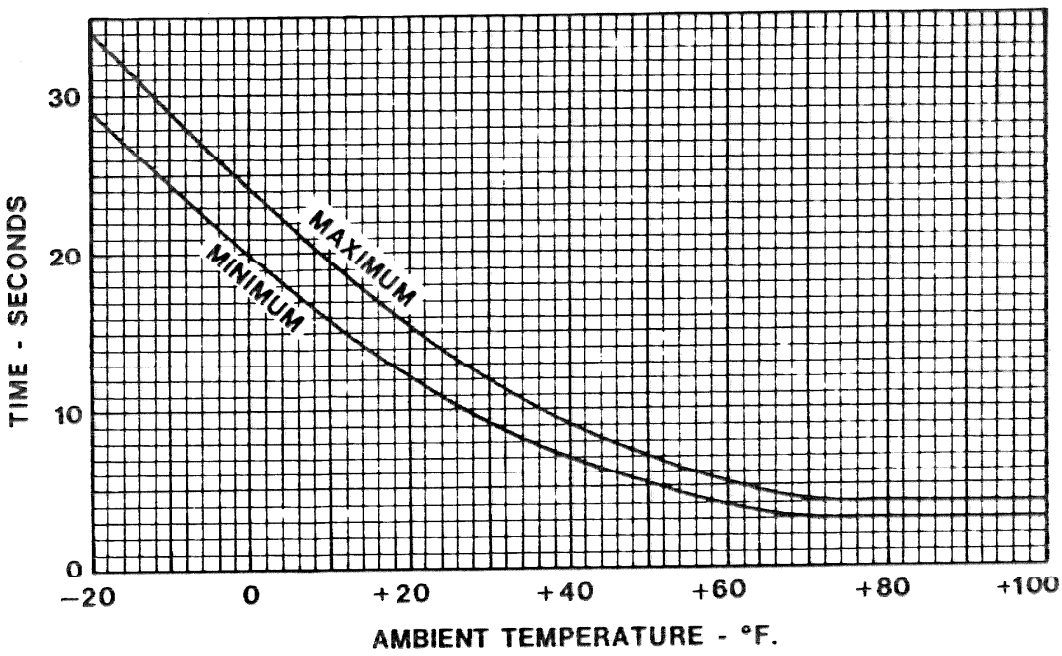
NOTE

Engine starts can be accomplished down to ambient temperatures of +20° F with engines equipped with standard (massive electrode) spark plugs. Below that temperature fine wire spark plugs are highly recommended to ensure engine starts, and are a necessity at +10° F and below. In addition, the use of external electrical power source and preheat is also recommended when ambient temperatures are below +20° F.

Upon entering the cockpit, begin starting procedure by moving the fuel selector to ON. Advance the mixture to full RICH and the throttle and prop controls to full FORWARD. Turn the battery switch and the ignition switches (mag.) ON. The auxiliary fuel pump should be OFF. Push primer switch and hold for the required priming time (see Figure 4-3). Close throttle and immediately engage starter. With ambient temperatures above +20° F, starts may be made by discontinuing priming before engaging starter. With ambient temperatures below +20° F, starts should be made by continuing to prime during cranking period. Do not release starter until engine accelerates through 500 RPM, then SLOWLY advance throttle to obtain 1000 RPM. Release primer and immediately place auxiliary fuel pump switch to LO. Auxiliary fuel pump operation will be required for one to three minutes during initial engine warm-up. When starting at ambient temperatures of +20° F and below, operate the first engine started with alternator ON (at maximum charging rate not to exceed 1500 RPM) for 5 minutes minimum before initiating start on second engine.

NOTE

When cold weather engine starts are made without the use of engine preheating (refer to TCM Operator's Manual), longer than normal elapsed time may be required before an oil pressure indication is observed.



OPTIONAL ENGINE PRIMER SYSTEM - PRIMING TIME VS. AMBIENT TEMPERATURE

Figure 4-3

4.19 STARTING ENGINES WHEN FLOODED

If an engine is flooded, move the mixture control to idle cut-off and advance the throttle and propeller controls full forward. Turn ON the battery switch and ignition switches. The auxiliary fuel pump should be OFF. After ensuring that the propeller is clear, engage the starter. When the engine fires, retard the throttle and advance the mixture slowly.

4.21 STARTING ENGINES IN COLD WEATHER (AIRPLANE EQUIPPED WITH STANDARD ENGINE PRIMER SYSTEM)

NOTE

It may be necessary to apply an external power source and preheat to facilitate engine cranking if the aircraft's battery is deficient of charge.

Prior to attempting the start, turn the propellers through by hand three times after ensuring that the magneto switches are off and mixture controls are in the full aft position. Upon entering the cockpit, begin the starting procedure by moving the fuel selector to ON. Advance the mixture to full RICH and the throttle and prop controls to full FORWARD. Turn ON the battery switch and the ignition switches (mags). The auxiliary fuel pump should be ON in the LO boost position. Push the primer button and engage the starter simultaneously. Begin moving the throttle control back and forth from full forward to full aft. Release the primer button after about 3 seconds of cranking. Leave the primer button off for 3 seconds of cranking and then reapply primer for about 3 seconds, repeat until the engine begins to fire.

When the engine begins firing, leave the starter engaged and tap the primer periodically until a rhythmic firing pattern is observed and then release the starter switch and position the throttle at half travel. Tap the primer button if the engine begins to falter during this period and adjust the throttle to a 1000 RPM idle speed.

The auxiliary fuel pump may be turned OFF as soon as it is determined that the engine will continue to run without it.

4.23 STARTING ENGINES WITH EXTERNAL POWER

An optional feature called the Piper External Power (PEP) allows the operator to use an external battery to crank the engines without having to gain access to the airplane's battery.

Turn the battery switch OFF and turn all electrical equipment OFF. Connect the RED lead of the PEP kit jumper cable to the POSITIVE (+) terminal of an external 12-volt battery and the BLACK lead to the NEGATIVE (-) terminal. Insert the plug of the jumper cable into the socket located on the fuselage. Note that when the plug is inserted, the electrical system is ON. Proceed with the normal starting technique.

After the engines have started, reduce power to the lowest possible RPM, to reduce sparking, and disconnect the jumper cable from the aircraft. Turn the battery switch ON and check the alternator ammeter for an indication of output. DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.

NOTE

For all normal operations using the PEP jumper cables, the battery switch should be OFF, but it is possible to use the ship's battery in parallel by turning the battery switch ON. This will give longer cranking capabilities, but will not increase the amperage.

CAUTION

If the ship's battery has been depleted, the external power supply can be reduced to the level of the ship's battery. This can be tested by turning the battery switch ON momentarily while the starter is engaged. If cranking speed increases, the ship's battery is at a higher level than the external power supply. If the battery has been depleted by excessive cranking, it must be recharged before the second engine is started. All the alternator current will go to the low battery until it receives sufficient charge, and it may not start the other engine immediately.

4.25 PREHEATING

The use of preheat and auxiliary power (battery cart) will facilitate starting during cold weather and is recommended when the engine has been cold soaked at temperatures of 10° F and below in excess of two hours. Successful starts without these aids can be expected at temperatures below normal, provided the aircraft battery is in good condition and the ignition and fuel systems are properly maintained.

The following procedures are recommended for preheating, starting, warm-up, run-up and takeoff.

(a) Select a high volume hot air heater. Small electric heaters which are inserted into the cowling "bug eye" do not appreciably warm the oil and may result in superficial preheating.

WARNING

Superficial application of preheat to a cold-soaked engine can have disastrous results.

A minimum of preheat application may warm the engine enough to permit starting but will not de-congeal oil in the sump, lines, cooler, filter, etc. Typically, heat is applied to the upper portion of the engine for a few minutes after which the engine is started and normal operation is commenced. The operator may be given a false sense of security by indications of oil and cylinder temperatures as a result of preheat. Extremely hot air flowing over the cylinders and oil temperature thermocouples may lead one to believe the engine is quite warm; however, oil in the sump and filter are relatively remote and will not warm as rapidly as a cylinder. For example, even when heat is applied directly, oil lines are usually "lagged" with material which does an excellent job of insulating.

Congealed oil in such lines may require considerable preheat. The engine may start and apparently run satisfactorily, but can be damaged from lack of lubrication due to congealed oil in various parts of the system. The amount of damage will vary and may not become evident for many hours. On the other hand, the engine may be severely damaged and could fail shortly following application of high power. Improper or insufficient application of preheat and the

resulting oil and cylinder temperature indications may encourage the pilot to expedite his ground operation and commence a takeoff prematurely. This procedure only compounds an already bad situation.

Proper procedures require thorough application of preheat to all parts of the engine. Hot air should be applied directly to the oil sump and external oil lines as well as the cylinders, air intake and oil cooler. Excessively hot air can damage non-metallic components such as seals, hoses and drive belts, so do not attempt to hasten the preheat process.

Before starting is attempted, turn the engine by hand or starter until it rotates freely. After starting, observe carefully for high or low oil pressure and continue the warm-up until the engine operates smoothly and all controls can be moved freely. Do not close the cowl flaps to facilitate warm-up as hot spots may develop and damage ignition wiring and other components.

(b) Hot air should be applied primarily to the oil sump and filter area. The oil drain plug door or panel may provide access to these areas. Continue to apply heat for 15 to 30 minutes and turn the propeller, by hand, through 6 or 8 revolutions at 5 or 10 minute intervals.

(c) Periodically feel the top of the engine and, when some warmth is noted, apply heat directly to the upper portion of the engine for approximately five minutes. This will provide sufficient heating of the cylinders and fuel lines to promote better vaporization for starting. If enough heater hoses are available, continue heating the sump area. Otherwise, it will suffice to transfer the source of heat from the sump to the upper part of the engine.

(d) Start engine immediately after completion of the preheating process. Since the engine will be warm, use normal starting procedure.

NOTE

Since the oil in the oil pressure gauge line may be congealed, as much as 60 seconds may elapse before oil pressure is indicated. If oil pressure is not indicated within one minute, shut the engine down and determine the cause.

(e) Operate the engine at 1000 RPM until some oil temperature is indicated. Monitor oil pressure closely during this time and be alert for a sudden increase or decrease. Retard throttles, if necessary, to maintain oil pressure below 100 psi. If oil pressure drops suddenly to less than 30 psi, shut down the engine and inspect lubrication system. If no damage or leaks are noted, preheat the engine for an additional 10 to 15 minutes before restarting.

4.27 WARM-UP

Warm-up the engines at 1000 to 1200 RPM. Avoid prolonged idling at low RPM, as this practice may result in fouled spark plugs.

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.

4.29 TAXIING

Remove chocks from the wheels. Release the parking brake by first depressing and holding the toe brake pedals and then pushing in on the parking brake knob. Check to make sure the taxi area is clear. Always apply the throttles slowly.

Before taxiing, the brakes should be checked by moving forward a few feet, throttling back and applying pressure on the toe pedals. As much as possible, turns during taxiing should be made using rudder pedal motion and differential power (more power on the engine on the outside of the turn, less on the inside engine) rather than brakes.

During the taxi, check the instruments (turn indicator, directional gyro, coordination ball, compass) and the heater and defroster. Check the operation of the fuel management controls by moving each fuel selector to CROSSFEED for a short time, while the other selector is in the ON position. Return the selectors to the ON position. DO NOT attempt a takeoff with the fuel selector on CROSSFEED. The autopilot (if installed) should be off during taxi.

4.31 BEFORE TAKEOFF - GROUND CHECK

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.

During engine run-up, head the airplane into the wind if possible (see crosswind limits for propellers) and set the parking brake. Advance the mixture and propeller controls forward and the throttle controls to 1000 RPM. Drain the manifold pressure lines by depressing the drain valves for 5 seconds. The drain valves are located at the bottom of the instrument panel, behind and below the dual manifold pressure gauge. Do not depress the valves when the manifold pressure exceeds 25 inches Hg. Check the feather position of the propellers by bringing the controls fully aft and then full forward. Do not allow more than a 300 RPM drop during the feathering check. Move the throttles to 2300 RPM and exercise the propeller controls to check the function of the governor. Retard control until a 200 to 300 drop in RPM is indicated. This should be done three times on the first flight of the day. The governor can be checked by retarding the propeller control until a drop of 100 RPM to 200 RPM appears, then advancing the throttle to get a slight increase in manifold pressure. The propeller speed should stay the same when the throttle is advanced, thus indicating proper function of the governor.

Return the propeller controls to full forward position and move the alternate air controls to ON then OFF. Move the throttles to 2000 RPM and check the magnetos. The normal drop on each magneto is 100 RPM and the maximum drop should not exceed 150 RPM. The maximum differential drop should not exceed 50 RPM. The alternator output should be approximately equal for both alternators. A 4.8 to 5.1 in. Hg. indication on the gyro suction gauge signifies proper operation of the gyro suction system.

CAUTION

Ensure that the alternators are not indicating full charge prior to takeoff.

Set the throttles between 800 and 1000 RPM, check that the fuel selectors and alternator switches are ON and that all the engine gauges are within their normal operating ranges (green arc). Press-to-test the annunciator light to make sure they all illuminate. Set the altimeter, attitude indicator, directional gyro and clock. Set the mixtures and advance the propeller controls to the forward position. The friction lock on the right side of the control quadrant should be adjusted. Check to make sure the alternate air is OFF. Adjust the cowl flaps and set the wing flaps and trim (stabilator and rudder) tabs as required. The seat backs should be erect and seat belts and harnesses fastened. Fasten the seat belts on the empty seats.

NOTES

If the fixed shoulder harness (non-inertia reel type) is installed, it must be connected to the seat belt and adjusted to allow proper accessibility to all controls, including fuel selectors, flaps, trim, etc., while maintaining adequate restraint for the occupant.

If the inertia reel type shoulder harness is installed, a pull test of its locking restraint feature should be performed.

All controls should be free with full travel, and all doors should be securely latched. Ensure that the auxiliary fuel pumps are OFF. Pitot heat should be used as required. Release the parking brake.

4.33 TAKEOFF

To achieve the takeoff performance specified in Section 5, it is necessary to set rated power (2800 RPM, 40 In. Hg.) prior to brake release.

NOTES

Takeoffs are normally made with less than full throttle - use throttle only as required to obtain 40 in. Hg. manifold pressure. DO NOT EXCEED 40 IN. HG. MANIFOLD PRESSURE.

The "overboost" indicator lights on the annunciator panel will illuminate at approximately 39.8 in. Hg. manifold pressure. Do not exceed 40 in. Hg. manifold pressure.

Illumination of the yellow overboost light on the annunciator panel does not indicate a malfunction. The overboost lights illuminate when manifold pressure approaches the maximum limit. The overboost lights should be monitored during takeoff to ensure that an overboost condition does not persist.

Takeoff should not be attempted with ice or frost on the wings. Takeoff distances and 50-foot obstacle clearance distances are shown on charts in the Performance Section of this handbook. The performance shown on charts will be reduced by uphill gradient, tailwind component, or 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. As power is applied at the start of the takeoff roll, look at the engine instruments to see that the engines are operating properly and putting out normal power, and at the airspeed indicator to see that it is functioning. Apply throttle smoothly until 40 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.

When obstacle clearance is no problem, a normal flaps up (0°) takeoff may be used. Apply and hold the brakes. Set the flaps to the up (0°) position. Release the brakes, accelerate to 79 KIAS and ease back on the wheel enough to let the airplane lift off and climb past obstacle. After obstacle clearance, accelerate to the best rate of climb speed, 92 KIAS, or higher if desired, retracting the landing gear when a gear-down landing is no longer possible on the runway.

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 stabilator trim indicator slightly nose up from the takeoff range. Apply and hold the brakes and bring the engines to full power before release. Release the brakes, accelerate to 64 KIAS and rotate firmly so that when passing through the 50-foot height the airspeed is approximately 66 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 V_{MC} when using the above procedure. IN THE EVENT THAT AN ENGINE FAILURE SHOULD OCCUR WHILE THE AIRPLANE IS BELOW V_{MC}, 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 may result in a "wheelbarrowing" tendency. This should be avoided.

The distances required using this takeoff procedure are given on a chart in the Performance Section of this handbook.

4.35 CLIMB

On climb-out after takeoff, it is recommended that the best angle of climb speed (76 KIAS) be maintained only if obstacle clearance is a consideration. The best rate of climb speed (92 KIAS) should be maintained with takeoff power on the engines until adequate terrain clearance is obtained. At this point, engine power should be reduced to 2600 RPM and 33 inches Hg manifold pressure for cruise climb. Establish a climb speed of 120 KIAS and close the cowl flaps.

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 closed or adjusted if required to maintain cylinder head and oil temperatures within the normal ranges specified for the engine. During climbs under hot weather conditions, it may be necessary to use LO auxiliary fuel pump for vapor suppression.

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

4.37 CRUISING

When leveling off at cruise altitude, the pilot may reduce to a cruise power setting in accordance with the Power Setting Table in this handbook.

For 45, 55 and 65% power the mixture should be leaned to 25° rich of peak E.G.T. but not to exceed 1650° F E.G.T. For 75% power the mixture should be leaned to 14.5 G.P.H. but not to exceed 1525° F E.G.T. The mixture should be full rich at powers above 75%.

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.

The pilot should monitor weather conditions while flying and should be alert to conditions which might lead to icing. If induction system icing is expected, place the alternate air control in the "ON" position.

WARNING

Flight in icing conditions is prohibited unless aircraft is equipped with the approved and complete Piper ice protection system (see Supplement 6, Section 9). If icing is encountered, immediate action should be taken to fly out of icing conditions. Icing is hazardous due to greatly reduced performance, loss of forward visibility, possible longitudinal control difficulties due to increased control sensitivity, and impaired power plant and fuel system operation.

The ammeter(s) for the electrical system should be monitored during flight, especially during night or instrument flight, so that corrective measures can be taken in case of malfunction. The procedures for dealing with electrical failures are contained in the Emergency Procedure Section of this handbook. The sooner a problem is recognized and corrective action taken, the greater is the chance of avoiding total electrical failure. Both alternator switches should be ON for normal operation. On S/N 34-8133001 thru 34-8233205, the two ammeters continuously indicate the alternator outputs. On S/N 34-8333001 and up, the single ammeter indicates the battery charging current continuously and the alternator outputs momentarily. Certain regulator failures can cause the alternator output voltage to increase uncontrollably. To prevent damage, overvoltage relays are installed to automatically shut off the alternator(s). The alternator light on the annunciator panel will illuminate to warn of the tripped condition. Alternator outputs will vary with the electrical equipment in use and the state of charge of the battery. Alternator outputs should not exceed 65 amperes.

Should the current requirement exceed 130 amps, the alternators will continue at 65 amps each, the remainder coming from the battery. Therefore, to insure against battery discharge, it is recommended that electrical loads be adjusted to limit continuous alternator outputs to 55 amps. It is not recommended to take off into IFR operation with only one alternator operative even though electrical loads may be less than 55 amps.

Since the Seneca III has one combined fuel tank per engine, it is advisable to feed the engines symmetrically during cruise so that approximately the same amount of fuel will be left in each side for the landing. A crossfeed is provided and can be used in cruise after 30 minutes of flight to balance the fuel quantity and extend the range during single-engine operation. Monitor the fuel quantity for the tank not being used to avoid overflow due to vapor return.

During flight, keep account of time and fuel used in connection with power settings to determine how the fuel flow and fuel quantity gauging systems are operating. If the fuel flow indication is considerably higher than the fuel actually being consumed or if an asymmetric flow gauge indication is observed, a fuel nozzle may be clogged and require cleaning.

There are no mechanical uplocks in the landing gear system. In the event of a hydraulic system malfunction, the landing gear will free-fall to the gear down position. The true airspeed with gear down is approximately 75% of the gear retracted airspeed for any given power setting. Allowances for the reduction in airspeed and range should be made when planning extended flight between remote airfields or flight over water.

For flight above 12,500 feet see FAR 91.32 requirements for oxygen and Section 9 - Supplements in this handbook.

4.39 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 E.G.T. should be maintained at approximately 1300°F or higher to keep the engines at the proper operating temperature.

4.41 APPROACH AND LANDING

Sometime during the approach for a landing, the throttle controls should be retarded to check the gear warning horn. Flying the airplane with the horn inoperative is not advisable. Doing so can lead to a gear up landing as it is easy to forget the landing gear, especially when approaching for a single-engine landing, or when other equipment is inoperative, or when attention is drawn to events outside the cabin. The red landing gear unsafe light will illuminate 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 off when the landing gear is in either the full down and locked or full up positions.

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, and the seat belts and shoulder harnesses should be fastened.

NOTE

If the fixed shoulder harness (non-inertia reel type) is installed, it must be connected to the seat belt and adjusted to allow proper accessibility to all controls, including fuel selectors, flaps, trim, etc., while maintaining adequate restraint for the occupant.

If the inertia reel type shoulder harness is installed, a pull test of its locking restraint feature should be performed.

Both fuel selectors should be ON, and the cowl flaps should be set as required. The auxiliary fuel pumps should be OFF. Set the mixture and propeller controls. Select landing gear DOWN and check for three green lights on the panel and look for the nose wheel in the nose wheel mirror. The landing gear should be lowered at speeds below 130 KIAS and the flaps at speeds as follows:

10° 140 KIAS maximum
25° 122 KIAS maximum
40° 115 KIAS maximum

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.

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 on the downwind leg and again on final approach by checking the three green indicator lights on the instrument panel and looking at the external mirror to check that the nose gear is extended. Remember that when the navigation lights are on, the gear position lights are dimmed and are difficult to see in the daytime.

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. If electric trim is available, it can be used to assist a smooth back pressure during flare out.

Maximum braking after touch-down is achieved by retracting the flaps, applying back pressure to the wheel and applying pressure on the brakes. However, unless extra braking is needed or unless a strong crosswind or gusty air condition 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.

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

Approach with full flaps at 82 KIAS for a short field landing. immediately after touch-down, raise the flaps, apply back pressure to the wheel and apply brakes.

If a crosswind or high wind landing is necessary, approach with higher than normal speed and with zero to 25 degrees of flaps. Immediately after touch-down, 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 side slips with a low fuel indication.

The maximum demonstrated crosswind component for landing is 17 KTS.

4.43 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 40 in. Hg. manifold pressure). While the pitch attitude is increased to obtain the balked landing climb speed of 85 KIAS, retract the landing gear and slowly retract the flaps, 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 (76 KIAS) for obstacle clearance or to the best rate of climb speed (92 KIAS), if obstacles are not a factor. Reset the longitudinal trim as required.

4.45 AFTER LANDING

After leaving the runway, retract the flaps and open the cowl flaps. Test the toe brakes, a spongy pedal is often an indication that the brake fluid needs replenishing. The alternate air control should be OFF.

4.47 SHUTDOWN

Prior to shutdown, switch the heater (if on) to the FAN position a few minutes for cooling and then turn it OFF. All radio and electrical equipment should be turned OFF.

Move the mixture controls to idle cut-off. Turn OFF the magneto and battery switches and set the parking brake.

NOTE

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

4.49 MOORING

The airplane can be moved on the ground with the aid of the optional nose wheel tow bar stowed aft of the fifth and sixth seats. Tie-down ropes may be attached to tie-down rings under each wing and to the tail skid. The ailerons and stabilator should be secured by looping the seat belt through the control wheel and pulling it snug. The rudder need not be secured under normal conditions, as its connection to the nose wheel holds it in position. The flaps are locked when in the fully retracted position.

4.51 TURBULENT AIR OPERATION

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or of distractions caused by the conditions. (See Subsection 2.3)

4.53 FLIGHT WITH REAR CABIN AND CARGO DOORS REMOVED

The airplane is approved for flight with the rear cabin and cargo doors removed. Certain limitations must be observed in the operation of this airplane in this configuration.

The maximum speed with doors removed is 129 KIAS. The minimum single engine control speed is 67 KIAS. Smoking is not permitted and all loose articles must be tied down and stowed. The jumper's static lines must be kept free of pilot's controls and control surfaces. Operation is approved for VFR non-icing flight conditions only. It is recommended that all occupants wear parachutes when operating with the rear cabin and cargo doors removed.

All climb and cruise performance will be reduced by approximately five percent when the airplane is operated with the rear cabin and cargo doors removed.

4.55 VSSE - INTENTIONAL ONE ENGINE INOPERATIVE SPEED

VSSE is a speed selected by the aircraft manufacturer as a training aid for pilot's in the handling of multi-engine aircraft. It is the minimum speed for intentionally rendering one engine inoperative in flight. This minimum speed provides the margin the manufacturer recommends for use when intentionally performing engine inoperative maneuvers during training in the particular airplane.

The intentional one engine inoperative speed, VSSE, for the Seneca III is 85 KIAS.

4.57 VMCA MINIMUM SINGLE-ENGINE CONTROL SPEED

VMCA is airspeed below which a twin-engine aircraft cannot be controlled in flight with one engine operating at takeoff power and the other engine windmilling. VMCA for the Seneca III has been determined to be 66 KIAS. Under no circumstances should an attempt be made to fly at a speed below this VMCA with only one engine operating. As a safety precaution, when operating under single-engine flight conditions either in training or in emergency situations, maintain an indicated airspeed above 85 KIAS, VSSE.

The VMCA demonstration required for the FAA flight test for the multi-engine rating approaches an uncontrolled flight condition with power reduced on one engine. The demonstration should not be performed at an altitude of less than 3500 feet above the ground. Initiate recovery during the demonstration by immediately reducing power on the operating engine and promptly lowering the nose of the airplane to accelerate to VSSE.

The most critical situation occurs where the stall speed and VMCA speed coincide. Care should be taken to avoid this flight condition, because at this point loss of directional control occurs at the same time the airplane stalls, and a spin could result.

V_{MCA} DEMONSTRATION

(a) Landing Gear	UP
(b) Flaps	UP
(c) Airspeed	at or above 85 KIAS (V_{SSE})
(d) Propeller Controls	HIGH RPM
(e) Throttle (Simulated Inoperative Engine)	IDLE
(f) Throttle (Other Engine)	MAX ALLOWABLE
(g) Airspeed	Reduce approximately 1 knot per second until either V_{MCA} or STALL WARNING is obtained

CAUTIONS

Use rudder to maintain directional control (heading) and ailerons to maintain 5° bank towards the operative engine (lateral attitude). At the first sign of either V_{MCA} or stall warning (which may be evidenced by: Inability to maintain heading or lateral attitude, aerodynamic stall buffet, or stall warning horn) immediately initiate recovery; reduce power to idle on the operative engine, and immediately lower the nose to regain V_{SSE}.

One engine inoperative stalls are not recommended.

Under no circumstances should an attempt be made to fly at a speed below V_{MCA} with only one engine operating.

4.59 STALLS

The loss of altitude during a power off stall with the gear and flaps retracted may be as much as 400 feet. The loss of altitude with the gear down and 40° of flaps may also be as much as 400 feet.

A power on stall may result in as much as 150 feet of altitude loss.

The stall warning system is inoperative with the battery switch OFF.

PILOT'S OPERATING HANDBOOK LOG OF REVISIONS (cont)

Revision Number and Code	Revised Pages	Description of Revision	FAA Approval Signature and Date
Rev. 2 (PR811016)	3-4	Revised para. 3.3.	
	3-15	Revised para. 3.7.	
	4-i	Changed pg. nos.	
	4-ii	Changed pg. nos.	
	4-4	Revised para. 4.5.	
	4-5	Revised para. 4.5.	
	4-9	Revised para. 4.5.	
	4-12	Revised para. 4.5.	
	4-15	Moved para. 4.11 to pg. 4-16.	
	4-16	Relocated para. 4.11 from pg. 4-15; moved info. to pg. 4-16a.	
	4-16a	New pg; relocated info. from pg. 4-16 and 4-17.	
	4-16b	New pg; relocated info. and para. 4.13 from pg. 4-17; added Note to para. 4.13.	
	4-17	Moved info. to pgs. 4-16a and 4-16b; relocated info. from pg. 4-18.	
	4-18	Moved info. to pg. 4-17; relocated info. from pg. 4-19.	
	4-19	Moved info. to pg. 4-18.	
	4-26	Revised para. 4.31; added Note; moved para. 4.33 to pg. 4-27.	
	4-27	Relocated para. 4.33 from pg. 4-26.	
	4-32	Added Note; moved info. to pg. 4-33.	
	4-33	Relocated info. from pg. 4-32; moved info. to pg. 4-34.	