SECTION 3

EMERGENCY PROCEDURES

3.1 GENERAL

The recommended procedures for coping with various types of emergencies and critical situations are provided by this section. Required (FAA regulations), emergency procedures and those necessary for the operation of the airplane as determined by the operating and design features of the airplane are presented.

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

The first portion of this section consists of an abbreviated emergency checklist which supplies an action sequence for critical situations with little emphasis on the operation of systems.

The remainder of the section is devoted to amplified emergency procedures containing additional information to provide the pilot with a more complete understanding of the procedures.

Pilots should familiarize themselves with the procedures given in this section and be prepared to take appropriate action should an emergency arise.

Most basic emergency procedures, such as power off landings, are a normal part of pilot training. Although these emergencies are discussed here, this information is not intended to replace such training, but only to provide a source of reference and review, and to provide information on procedures which are not the same for all aircraft. It is suggested that the pilot review standard emergency procedures periodically to remain proficient in them.

3.3 EMERGENCY PROCEDURES CHECKLIST

AIRSPEEDS FOR SAFE OPERATIONS

One engine inoperative air minimum control ..... 66 KIAS
One engine inoperative best rate of climb ..... 92 KIAS
One engine inoperative best angle of climb ..... 78 KIAS
Maneuvering ..... 136 KIAS
Never exceed ..... 205 KIAS

ENGINE INOPERATIVE PROCEDURES

NOTE

The power on the operating engine should be reduced when safe to do so.

DETECTING DEAD ENGINE

Loss of thrust.
Nose of aircraft will yaw in direction of dead engine (with coordinated controls).

ENGINE SECURING PROCEDURE (FEATHERING PROCEDURE)

Minimum control speed ..... 66 KIAS
One engine inoperative best rate of climb ..... 92 KIAS
Maintain direction and airspeed above 85 KIAS.
Mixture controls ..... forward
Propeller controls ..... forward
Throttle controls ..... (40 in. Hg. Max.) forward
Flaps ..... retract
Gear ..... retract
Identify inoperative engine.
Throttle of inop. engine ..... retard to verify

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EMERGENCY PROCEDURES

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To attempt to restore power prior to feathering:

Mixtures ..... as required
Fuel selector ..... ON
Magnetos ..... left or right only
Aux. fuel pump ..... unlatch, ON HI, if power is not immediately restored - OFF
Alternate air ..... ON

If power cannot be restored continue with feathering procedure.

Prop control of inop. engine ..... feather before RPM drops below 800
Mixture of inop. engine ..... idle cut-off
Trim ..... as required (3° to 5° of bank toward operative engine - ball 1/2 to 1 out)
Aux. fuel pump of inop. engine ..... OFF
Magnetos of inop. engine ..... OFF
Cowl flaps ..... close on inop. engine, as required on operative engine
Alternator of inop. engine ..... OFF
Electrical load ..... reduce
Fuel selector ..... OFF inop. engine, consider crossfeed
Aux. fuel pump operative engine ..... OFF
Power of operative engine ..... as required

ENGINE FAILURE DURING TAKEOFF (Below 85 KIAS)

If engine failure occurs during takeoff and 85 KIAS has not been attained:

Throttles ..... CLOSE both immediately
Stop straight ahead.

If inadequate runway remains to stop:

Throttles ..... CLOSED
Brakes ..... apply max. braking
Battery switch ..... OFF
Fuel selectors ..... OFF
Continue straight ahead, turning to avoid obstacles.

ENGINE FAILURE DURING TAKEOFF (85 KIAS or above)

If engine failure occurs during takeoff ground roll or after lift-off with gear still down and 85 KIAS has been attained:
If adequate runway remains, CLOSE both throttles immediately, land if airborne and stop straight ahead.
If runway remaining is inadequate for stopping, decide whether to abort or continue. If decision is made to continue, maintain heading. After establishing a climb, retract landing gear, accelerate to 92 KIAS, and feather inoperative engine prop (see Engine Securing Procedure).

WARNING

In certain combinations of aircraft weight, configuration, ambient conditions and speeds, negative climb performance may result. Refer to One Engine Inoperative Climb Performance chart, Figure 5-21.

ENGINE FAILURE DURING FLIGHT (Below 66 KIAS)

Rudder ..... apply toward operative engine
Throttles (both) ..... retard to stop turn
Pitch attitude ..... lower nose to accelerate above 66 KIAS*
Operative engine ..... increase power as airspeed increases above 66 KIAS*

If altitude permits, a restart may be attempted. If restart fails or if altitude does not permit restart, see Engine Securing Procedure.

ONE ENGINE INOPERATIVE LANDING

Inop. engine prop ..... feather
When certain of making field:
Landing gear ..... extend
Wing flaps (as required) ..... lower
Maintain additional altitude and speed during approach.
Final approach speed ..... 90 KIAS

*67 KIAS with aft doors removed.

ONE ENGINE INOPERATIVE GO-AROUND (SHOULD BE AVOIDED IF AT ALL POSSIBLE)

Mixture ..... forward
Propeller ..... forward
Throttle ..... (40 in. Hg. Max.) open slowly
Flaps ..... retract
Landing gear ..... retract
Airspeed ..... 92 KIAS
Trim ..... set
Cowl flap operating engine ..... as required

AIR START (UNFEATHERING PROCEDURE)

Fuel selector inop. engine ..... ON
Aux. fuel pump inop. engine ..... LO boost
Throttle ..... open 1/4 inch
Mixture ..... RICH
Magneto switches ..... ON
Prop control ..... full forward
Starter ..... engage until propeller windmills
Throttle ..... reduce power until engine is warm
Aux. fuel pump ..... OFF

If engine does not start, prime as required.
Alternator (after restart) ..... ON

AIR START (UNFEATHERING PROCEDURE)

On Airplanes Equipped With Unfeathering Accumulators

Fuel selector inop. engine ..... ON
Aux. fuel pump inop. engine ..... LO boost
Throttle ..... open 1/4 inch
Mixture ..... RICH
Magneto switches ..... ON
Prop control & latch ..... push full forward
Throttle ..... reduce power until engine is warm
Aux. fuel pump ..... OFF

If engine does not start, prime as required, and engage starter.
Alternator (after restart) ..... ON

NOTE

The starter may be used in conjunction with the unfeathering accumulators if required.

FIRE

ENGINE FIRE ON GROUND:

If engine has not started:
Mixture ..... idle cut-off
Throttle ..... open
Starter ..... crank engine

If engine has already started and is running, continue operating to try pulling the fire into the engine.
If fire continues, extinguish with best available means.
If external fire extinguishing is to be applied:
Fuel selector valves ..... OFF
Mixture ..... idle cut-off

ENGINE FIRE IN FLIGHT

Affected engine:
Fuel selector ..... OFF
Throttle ..... close
Propeller ..... feather
Mixture ..... idle cut-off
Heater ..... OFF
Defroster ..... OFF
If terrain permits land immediately.

FUEL MANAGEMENT DURING ONE ENGINE INOPERATIVE OPERATION

CRUISING

When using fuel from tank on the same side as the operating engine:
Fuel selector operating engine ..... ON

Fuel selector inop. engine ..... OFF
Aux. fuel pumps ..... OFF

When using fuel from tank on the side opposite the operating engine:
Fuel selector operating engine ..... CROSSFEED
Fuel selector inop. engine ..... OFF
Aux. fuel pumps ..... OFF

Use crossfeed in level cruise flight only.

NOTE

Do not crossfeed with full fuel on same side as operating engine since vapor return fuel flow will be lost through the vent system.

LANDING

Fuel selector operating engine ..... ON
Fuel selector inop. engine ..... OFF

ENGINE DRIVEN FUEL PUMP FAILURE

Throttle ..... retard
Aux. fuel pump ..... unlatch, on HI
Throttle ..... reset (75% power or below)

CAUTION

If normal engine operation and fuel flow is not immediately re-established, the auxiliary fuel pump should be turned off. The lack of a fuel flow indication while on the HI auxiliary fuel pump position could indicate a leak in the fuel system, or fuel exhaustion.

CAUTION

Actuate the auxiliary fuel pumps if vapor suppression is required (LO position) or the engine driven fuel pump fails (HI position). The auxiliary fuel pumps have no standby function. Actuation of the HI switch position when the engine fuel injection system is functioning normally may cause engine roughness due to excessively rich fuel air mixture.

LANDING GEAR UNSAFE WARNINGS

Red light indicates gear in transit.
Recycle gear if indication continues.
Light will illuminate when gear warning horn sounds at low throttle settings.

MANUAL EXTENSION OF LANDING GEAR

Check following before extending gear manually:
Circuit breakers ..... check
Battery switch ..... ON
Alternators ..... check
Navigation lights ..... OFF (daytime)

To extend, reposition clip downward clear of knob and proceed as follows:
Airspeed ..... reduce (85 KIAS max.)
Gear selector ..... GEAR DOWN LOCKED position
Emerg. gear extend knob ..... pull
Indicator lights ..... 3 green
Leave emergency gear extension knob out.

GEAR UP LANDING

Approach ..... Normal
Flaps ..... as desired
Throttles ..... closed prior to touchdown

Battery switch ..... OFF
Fuel selector ..... OFF
Touch down at minimum airspeed.

ENGINE FAILURE WITH REAR CABIN AND CARGO DOORS REMOVED

S.E. min. control speed of 67 KIAS for this configuration.

If airspeed is below 67 KIAS reduce power on operating engine to maintain control.

ELECTRICAL FAILURES

ALT warning light illuminated:
Ammeter/Ammeters..... check L & R/check
Electrical load ..... reduce to minimum
Alternators..... OFF, then ON one at a time

If alternator outputs are NOT restored:
Battery switch ..... OFF
Alternator switches..... OFF, then ON one at a time

If alternator outputs are NOT restored:
Alternator switches..... OFF
Battery switch .....as required

If alternator cannot be restored, reduce electrical load and land as soon as practical. The battery is the only remaining source of electrical power.

WARNING

Compass error may exceed 10 degrees with both alternators inoperative.

NOTE

If battery is depleted, the landing gear must be lowered using the emergency gear extension procedure. Gear position lights will be inoperative.

Electrical overload (alternators over 30 amps above known electrical load):
Electrical load ..... reduce

If alternator loads cannot be reduced:
Battery switch ..... OFF

If alternator loads are not reduced, land as soon as possible.
Anticipate complete electrical power failure.

GYRO SUCTION FAILURES

Pressure below 4.5 in. Hg.
RPM ..... increase to 2600
Altitude ..... descend to maintain 4.5 in Hg.
Use electric turn indicator to monitor Directional Indicator and Attitude Indicator performance.

SPINS

Throttles ..... retard to idle
Rudder ..... full opposite to direction of spin
Control wheel ..... release back pressure
Control wheel ..... full forward if nose does not drop
Ailerons ..... neutral
Rudder ..... neutralize when rotation stops
Control wheel ..... smooth back pressure to recover from dive

EMERGENCY DESCENT

Throttles ..... closed
Propellers ..... full forward
Mixture ..... as required for smooth operation
Landing gear ..... extend
Airspeed ..... 130 KIAS

COMBUSTION HEATER OVERHEAT

Unit will automatically cut-off.
Do not attempt to restart.

OPEN DOOR (ENTRY DOOR ONLY)

If both upper and side latches are open, the door will trail slightly open and airspeeds will be reduced slightly.

To close the door in flight:
Slow airplane to 90 KIAS.
Cabin vents ..... close
Storm window ..... open

If upper latch is open ..... latch
If side latch is open ..... pull on armrest while moving latch handle to latched position

If both latches are open ..... latch side latch then top latch

PROPELLER OVERSPEED

Throttle ..... retard
Prop control ..... full DECREASE rpm, then set if any control available
Airspeed ..... reduce
Throttle ..... as required to remain below 2600 rpm

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3.5 AMPLIFIED EMERGENCY PROCEDURES (GENERAL)

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action and probable cause of an emergency situation.

3.7 ENGINE INOPERATIVE PROCEDURES

DETECTING A DEAD ENGINE

A loss of thrust will be noted and with coordinated controls, the nose of the aircraft will yaw in the direction of the dead engine.

ENGINE SECURING PROCEDURE (FEATHERING PROCEDURE)

Keep in mind that the one engine inoperative air minimum control speed is 66 KIAS and the one engine inoperative best rate of climb speed is 92 KIAS.

To feather a propeller, maintain direction and an airspeed above 85 KIAS. Move the mixture and propeller controls forward. The throttle controls should be moved forward to maintain a safe airspeed. Retract the flaps and landing gear and identify the inoperative engine. The airplane will yaw in the direction of the dead engine. Retard the throttle of the inoperative engine to verify loss of power.

NOTE

If circumstances permit, in the event of an actual engine failure, the pilot may elect to attempt to restore power prior to feathering.

If circumstances permit an attempt to restore power prior to feathering, adjust the mixture control as required, move the fuel selector control to ON, and select either L (left) or R (right) magneto. Move the ALTERNATE AIR control to ON and the AUX. fuel pump to the ON-HI position. If power is not immediately restored turn off the AUX. fuel pump.

The propellers can be feathered only while the engine is rotating above 800 RPM. Loss of centrifugal force due to slowing RPM will actuate a stop pin that keeps the propeller from feathering each time the engine is stopped on the ground. One engine inoperative performance will decrease if the propeller of the inoperative engine is not feathered.

The propeller control of the inoperative engine should be moved to the feather position and the mixture control of the inoperative engine to idle cut-off.

Trim the aircraft as required and maintain a 3° to 5° bank toward the operating engine. The ball will be ½ to 1 out for minimum drag. The AUX. fuel pumps should be off except in the case of an engine driven fuel pump failure. Turn OFF the magnetos and close the cowl flaps on the inoperative engine. Cowl flaps should be used as necessary on the operative engine. The alternator of the inoperative engine should be turned OFF and the electrical load reduced to prevent depletion of the battery. Move the fuel selector control for the inoperative engine to the OFF position. If necessary, consider the use of crossfeed (refer to Fuel Management During One Engine Inoperative Operation, paragraph 3.11). Turn OFF the operative engine's AUX. fuel pump.

NOTE

When an engine is feathered the alternator, gyro air, and oil annunciator warning lights will remain illuminated.

ENGINE FAILURE DURING TAKEOFF (BELOW 85 KIAS)

The one engine inoperative air minimum control speed for this airplane is 66 KIAS under standard conditions.

If engine failure occurs during takeoff ground roll and 85 KIAS has not been attained, CLOSE both throttles immediately and stop straight ahead. If inadequate runway remains to stop, close the throttles and apply maximum braking. The battery switch and fuel selectors should be turned OFF. Continue path straight ahead turning to avoid obstacles as necessary.

ENGINE FAILURE DURING TAKEOFF (85 KIAS OR ABOVE)

If engine failure occurs during takeoff ground roll or after lift-off with the gear still down and 85 KIAS has been attained, the course of action to be taken will depend on the runway remaining. If adequate runway remains, CLOSE both throttles immediately, land if airborne and stop straight ahead. If the runway remaining is inadequate for stopping, the pilot must decide whether to abort the takeoff or to continue. The decision must be based on the pilot's judgment considering loading, density altitude, obstructions, the weather, and the pilot's competence. If the decision is made to continue the takeoff, maintain heading and airspeed. When climb is established RETRACT the landing gear, accelerate to 92 KIAS, and FEATHER the inoperative engine (refer to Engine Securing Procedure).

WARNING

In certain combinations of aircraft weight, configuration, ambient conditions and speeds, negative climb performance may result. Refer to One Engine Inoperative Climb Performance chart, Figure 5-21.

ENGINE FAILURE DURING FLIGHT (BELOW 66 KIAS)

Should an engine fail during flight at an airspeed below 66 KIAS, apply rudder towards the operative engine to maintain directional control. The throttles should be retarded to stop the yaw force produced by the inoperative engine. Lower the nose of the aircraft to accelerate above 66 KIAS and increase the power on the operative engine as the airspeed exceeds 66 KIAS*.

After an airspeed above 66 KIAS* has been established, an engine restart attempt may be made if altitude permits. If the restart has failed, or if altitude does not permit, the engine should be secured, see Engine Securing Procedure.

*67 KIAS with aft doors removed.

ONE ENGINE INOPERATIVE LANDING

Complete the Engine Securing Procedure. The landing gear should not be extended and the wing flaps should not be lowered until certain of making the field.

Maintain additional altitude and speed during approach, keeping in mind that landing should be made right the first time and that a go-around should be avoided if at all possible.

Establish a final approach speed of 90 KIAS and use wing flaps as required.

WARNING

Under some conditions of loading and density altitude a go-around may be impossible, and in any event the sudden application of power during one engine inoperative operation makes control of the airplane more difficult.

ONE ENGINE INOPERATIVE GO-AROUND

NOTE

A one engine inoperative go-around should be avoided if at all possible.

To execute a one engine inoperative go-around, advance the mixture and propeller levers forward. The throttle should be advanced slowly to 40 in. Hg. manifold pressure. Retract the flaps and landing gear. Maintain airspeed at the one engine inoperative best rate of climb speed of 92 KIAS. Set the trim and cowl flaps as required.

AIR START (UNFEATHERING PROCEDURE)

Move the fuel selector for the inoperative engine to the ON position and check to make sure the AUX fuel pump for that engine is on LO boost. Open the throttle 1/4 inch and the mixtures should be set RICH. Turn ON the magneto switches and push the propeller control latch and propeller control lever full forward. On airplanes equipped with the optional unfeathering system the propeller will start to windmill. On airplanes not so equipped,

engage the starter until the propeller windmills freely. If the engine does not start, prime as necessary. After restart turn OFF the AUX fuel pump, reduce the power until the engine is warm and turn the alternator switch ON.

If required the starter may be used in conjunction with the unfeathering accumulators.

3.9 FIRE

ENGINE FIRE ON THE GROUND

The first attempt to extinguish the fire is to try to draw the fire back into the engine. If the engine has not started move the mixture control to idle cut-off and open the throttle. Begin to crank the engine with the starter in an attempt to pull the fire into the engine.

If the engine has already started and is running, continue operating to try to pull the fire into the engine.

In either case (above), if the fire continues longer than a few seconds the fire should be extinguished by the best available external means.

If an external fire extinguishing method is to be applied move the fuel selector valves to OFF and the mixture to idle cut-off.

ENGINE FIRE IN-FLIGHT

The procedure given below is general and pilot judgment should be the deciding factor for action in such an emergency.

If an engine fire occurs in flight, place the fuel selector of the affected engine in the OFF position. Feather the propeller on the faulty engine. Move the mixture control to idle cut-off. The cowl flap should be open. A landing should be made if terrain permits.

3.11 FUEL MANAGEMENT DURING ONE ENGINE INOPERATIVE OPERATION

A crossfeed is provided to increase range during one engine inoperative operation. Use crossfeed in level flight only.

CRUISING

When using fuel from the fuel tank on the same side as the operating engine the fuel selector of the operating engine should be ON and the fuel selector for the inoperative engine should be OFF. The AUX. fuel pumps should be OFF except in the case of an engine driven fuel pump failure. If an engine driven fuel pump has failed the AUX. fuel pump on the operating engine side must be ON - HI.

Increased range is available by using fuel from the tank on the opposite side of the operating engine. For this configuration the fuel selector of the operating engine should be on X-FEED (crossfeed) and the fuel selector of the inoperative engine should be OFF. The AUX. fuel pumps should be OFF.

NOTE

A vapor return line from each engine will return a percentage of fuel back to the tank on the same side as that engine. Therefore, a minimum of 30 minutes of fuel should be used from this tank before selecting crossfeed. If the tank gauge approaches "FULL," go back to that tank and operate for 30 minutes to bring the fuel level down before returning to crossfeed or fuel may be pumped overboard through the fuel vent.

LANDING

During the landing sequence the fuel selector of the operating engine must be ON and the fuel selector of the inoperative engine OFF. The AUX. fuel pump of the operating engine should be OFF.

3.13 ENGINE DRIVEN FUEL PUMP FAILURE

Should a malfunction of the engine driven fuel pump occur, the auxiliary fuel pump system can supply sufficient fuel pressure for engine power up to approximately 75%. Any combination of RPM and Manifold Pressure defined on the Power Setting Table may be used, but leaning may be required for smooth operation at altitudes above 15,000 feet or for RPM's below 2300. Normal cruise, descent and approach procedures should be used.

Loss of fuel pressure and engine power can be an indication of failure of the engine driven fuel pump. Should these occur and engine driven fuel pump failure is suspected, retard the throttle and unlatch the auxiliary pump and select the HI position. The throttle can then be reset at 75% power or below.

CAUTIONS

If normal engine operation and fuel flow is not immediately re-established, the auxiliary fuel pump should be turned off. The lack of a fuel flow indication while on the HI auxiliary fuel pump position could indicate a leak in the fuel system, or fuel exhaustion.

Actuate the auxiliary fuel pumps if vapor suppression is required (LO position) or the engine driven fuel pump fails (HI position). The auxiliary fuel pumps have no standby function. Actuation of the HI switch position when the engines are operating normally may cause engine roughness and/or power loss.

3.15 LANDING GEAR UNSAFE WARNINGS

The red landing gear light will illuminate when the landing gear is in transition between the full up position and the down and locked position. The pilot should recycle the landing gear if continued illumination of the light occurs. 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.

3.17 MANUAL EXTENSION OF THE LANDING GEAR

Several items should be checked prior to extending the landing gear manually. Check for popped circuit breakers and ensure the battery switch is ON. Now check the alternators. If it is daytime, turn OFF the navigation lights.

To execute a manual extension of the landing gear, power should be reduced to maintain airspeed below 85 KIAS. Place the landing gear selector switch in the GEAR DOWN position and pull the emergency gear extension knob. Check for 3 green indicator lights.

WARNING

If the emergency gear extension knob has been pulled out to lower the gear due to a gear system malfunction, leave the control in its extended position until the airplane has been put on jacks to check the proper function of the landing gears hydraulic and electrical systems.

3.19 GEAR-UP EMERGENCY LANDING

An approach should be made with power at a normal airspeed with the flap position to be used at the pilot's discretion. Flaps up will reduce wing flap damage. Close the throttles just before touchdown. Turn OFF the battery and ignition switches and move the fuel selector valve controls to OFF. Contact to the surface should be made at a minimum airspeed.

3.21 ENGINE FAILURE WITH REAR CABIN AND CARGO DOORS REMOVED

The minimum single engine control speed for this configuration is 67 KIAS. If engine failure occurs at an airspeed below 67 KIAS, reduce power as necessary on the operating engine and apply rudder to maintain directional control.

3.23 ELECTRICAL FAILURES

S/N 34-8133001 THRU 34-8233205

If an ALT annunciator light illuminates, observe the ammeters to determine which alternator is inoperative. If both ammeters show zero output, reduce electrical loads to the minimum. Turn OFF both alternator switches and then turn them momentarily ON one at a time while observing the ammeters. The alternator showing the LEAST (but not zero) current should be turned ON. The other alternator should be left OFF. Electrical

loads may be reinstated as required to a maximum of 60 amperes. If both alternator outputs cannot be restored, both alternator switches should be left OFF. Reduce the electrical load to essential systems and land as soon as practical. The battery is the only remaining source of electrical power.

If one ammeter shows zero output, cycle its switch OFF and then ON. If this fails to restore output check the circuit breakers. The breakers may be reset once if required. If the alternator remains inoperative reduce electrical loads if necessary and exercise judgment regarding continued flight.

Corrective maintenance actions should be performed prior to further flights.

NOTE

The markings on the ammeters (loadmeters) require mental interpolations to estimate the ampere values noted. Operating the alternators at less than 60 amperes will assure that the battery will not be depleted.

WARNING

Compass error may exceed 10° with both alternators inoperative.

If abnormally high alternator outputs are observed and persists (more than 30 amps above known electrical loads) they may be caused by a low battery, a battery fault, or other abnormal electrical load. If it is caused by a low battery the indication should begin to decrease towards normal within 5 minutes. If this condition is observed proceed with the following. Turn the battery switch OFF and the alternator output indications should decrease. Turn the battery switch ON. Should the alternator output indications not decrease, leave the battery switch OFF and land as soon as practical. All electrical load is being supplied by the alternators. Also anticipate complete electrical power failure.

NOTE

Operation with the alternator ON and the battery switch OFF should be made only when required by electrical failure, due to increased system voltage and radio frequency noise.

S N 34-8333001 AND UP

If an ALT annunciator light illuminates, check the output of each alternator individually, using the prss-to-test buttons located on either side of the ammeter to determine which alternator is inoperative. If both alternators show zero output, reduce electrical loads to the minimum. Turn OFF both alternator switches and then turn them momentarily ON one at a time while observing alternator output. The alternator showing the LEAST (but not zero) current should be turned ON. The other alternator should be left OFF. Electrical loads may be reinstated as required to a maximum of 60 amperes. If both alternator outputs cannot be restored, both alternator switches should be left OFF. Reduce the electrical load to essential systems and land as soon as practical. The battery is the only remaining source of electrical power.

If one alternator shows zero output, cycle its switch OFF and then ON. If this fails to restore output check the circuit breakers. The breakers may be reset once if required. If the alternator remains inoperative reduce electrical loads if necessary and exercise judgment regarding continued flight.

When the ammeter needle indicates to the left of center, the battery is being discharged; when the needle indicates to the right of center, the battery is being charged. During single alternator operation the feature can be used to determine how much the electrical load should be reduced.

Corrective maintenance actions should be performed prior to further flights.

NOTE

The markings on the ammeter (loadmeter) require mental interpolations to estimate the ampere values noted. Operating the alternators at less than 60 amperes will assure that the battery will not be depleted.

WARNING

Compass error may exceed 10° with both alternators inoperative.

If abnormally high alternator outputs are observed and persists (more than 30 amps above known electrical loads) they may be caused by a low battery, a battery fault, or other abnormal electrical load. If it is caused by a low battery the indication should begin to decrease towards normal within 5 minutes. If this condition is observed proceed with the following. Turn the battery switch OFF and the alternator output indications should decrease. Turn the battery switch ON. Should the alternator output indications not decrease, leave the battery switch OFF and land as soon as practical. All electrical load is being supplied by the alternators. Also anticipate complete electrical power failure.

NOTE

Operation with the alternator ON and the battery switch OFF should be made only when required by electrical failure, due to increased system voltage and radio frequency noise.

3.25 GYRO SUCTION FAILURES

A malfunction of the instrument suction system will be indicated by a reduction of the suction reading on the gauge. In the event of a vacuum system failure or a feathered engine, a low vacuum warning light on the annunciator panel will illuminate.

In the event of a suction system malfunction, (suction lower than 4.5 inches of mercury) increase engine RPM to 2600. Descend to an altitude at which 4.5 inches of mercury suction can be maintained, if possible. The electric turn indicator should be used to monitor the performance of the directional and attitude indicators.

3.27 SPINS

Intentional spins are prohibited in this airplane. In the event a spin is encountered unintentionally, immediate recovery actions must be taken.

To recover from an unintentional spin, immediately retard the throttles to the idle position. Apply full rudder opposite the direction of the spin rotation. Let up all back pressure on the control wheel. If the nose does not drop, immediately push the control wheel full forward. Keep the ailerons neutral. Maintain the controls in these positions until spin rotation stops, then neutralize the rudder. Recovery from the resultant dive should be with smooth back pressure on the control wheel. No abrupt control movement should be used during recovery from the dive, as the positive limit maneuvering load factor may be exceeded.

NOTE

Federal Aviation Administration Regulations do not require spin demonstration of multi-engine airplanes; therefore, spin tests have not been conducted. The recovery technique presented is based on the best available information.

3.29 EMERGENCY DESCENT

In the event an emergency descent becomes necessary, CLOSE the throttles and move the propeller controls full FORWARD. Adjust the mixture controls as necessary to attain smooth operation. Extend the landing gear at 130 KIAS and maintain this airspeed.

3.31 COMBUSTION HEATER OVERHEAT

In the event of an overheat condition, the fuel, air and ignition to the heater is automatically cut off. Do not attempt to restart the heater until it has been inspected and the cause of the malfunction has been determined and corrected.

3.33 OPEN DOOR (ENTRY DOOR ONLY)

The cabin door is double latched, so the chances of its springing open in flight at both the top and side are remote. However, should you forget the upper latch, or not fully engage the side latch, the door may spring partially open. This will usually happen at takeoff or soon afterward. A partially open door will not affect normal flight characteristics, and a normal landing can be made with door open.

If both upper and side latches are open, the door will trail slightly open, and airspeed will be reduced slightly.

To close the door in flight, slow the airplane to 90 KIAS, close the cabin vents and open the storm window. If the top latch is open, latch it. If the side latch is open, pull on the armrest while moving the latch handle to the latched position. If both latches are open, close the side latch then the top latch.

3.35 PROPELLER OVERSPEED

Propeller overspeed is usually caused by a malfunction in the propeller governor which allows the propeller blades to rotate to full low pitch.

If propeller overspeed should occur, retard the throttle. The propeller control should be moved to full "DECREASE rpm" and then set if any control is available. Airspeed should be reduced and throttle used to maintain 2600 RPM.

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) (cont)	4-34	Relocated info. from pg. 4-33; moved para. 4.49 to pg. 4-35.	
	4-35	Relocated para. 4.49 from pg. 4-34; moved para. 4.55 to pg. 4-36.	
	4-36	Relocated para. 4.55 from pg. 4-35; moved info. to pg. 4-37.	
	4-37	Relocated info. from pg. 4-36; moved para. 4.59 to pg. 4-38.	
	4-38	New pg; relocated para. from pg. 4-37.	
	6-i	Changed pg. nos.	
	6-11	Revised fig. 6-9.	
	6-12	Revised fig. 6-11.	
	6-32	Relocated items 147 thru 151 from pg. 6-33.	
	6-33	Moved items 147 thru 151 to pg. 6-32; added new item 154; relocated items 155 thru 159 from pg. 6-34.	
	6-34	Moved items 155 thru 159 to pg. 6-33; relocated item 173 from pg. 6-35.	
	6-35	Moved item 173 to pg. 6-34; removed previous item 177; added new items 177 and 178.	
	6-40	Revised item 223.	
	6-46	Added new items 264 and 265; renumbered item 266; moved items 271 and 273 to pg. 6-47.	