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SECTION 3**EMERGENCY PROCEDURES****3.1 GENERAL**

This section provides the recommended procedures for coping with various emergency or critical situations. All of the emergency procedures required by the FAA as well as those necessary for operation of the airplane, as determined by the operating and design features of the airplane, are presented.

Emergency procedures associated with optional systems and equipment which require handbook supplements are presented in Section 9, Supplements.

This section is divided into two basic parts. The first part contains the emergency procedures checklists. These checklists supply an immediate action sequence to be followed during critical situations with little emphasis on the operation of systems. The numbers located in parentheses after each checklist heading indicate where the corresponding paragraph in the amplified procedures can be found.

The second part of the section provides amplified emergency procedures corresponding to the emergency procedures checklist items. These amplified emergency procedures contain additional information to provide the pilot with a more complete description of the procedures so they may be more easily understood. The numbers located in parentheses after each paragraph heading indicates the corresponding checklist paragraph.

Pilots must familiarize themselves with the procedures given in this section and must be prepared to take the appropriate action should an emergency situation arise. The procedures are offered as a course of action for coping with the particular situation or condition described. They are not a substitute for sound judgment and common sense.

Most basic emergency procedures are a normal part of pilot training. The information presented in this section is not intended to replace this training. This information is intended to provide a source of reference for the procedures which are applicable to this airplane. The pilot should review standard emergency procedures periodically to remain proficient in them.

3.3 AIRSPEEDS FOR SAFE OPERATION

3.3a STALL SPEEDS

2750 lbs (Gear Up, 0 Flap)	60 KIAS
2750 lbs (Gear Down, 40 Flap)	55 KIAS

3.3b MANEUVERING SPEEDS

2750 lbs	118 KIAS
1865 lbs	96 KIAS

3.3c NEVER EXCEED SPEED

Never Exceed Speed	183 KIAS
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3.3d POWER OFF GLIDE SPEED

2750 lbs (Gear Up, 0 Flap)	79 KIAS
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3.5 EMERGENCY PROCEDURES CHECKLIST**3.5a ENGINE FIRE DURING START (3.9)**

StarterCRANK ENGINE
MixtureIDLE CUT-OFF
ThrottleOPEN
Electric Fuel PumpOFF
Fuel SelectorOFF
Abandon if fire continues.

3.5b ENGINE POWER LOSS DURING TAKEOFF (3.11)

If sufficient runway remains for a normal landing, leave gear down and land straight ahead.

If area ahead is rough or if it is necessary to clear obstructions:

Gear Selector SwitchUP

If sufficient altitude has been gained to attempt a restart:

Maintain safe airspeed.

Fuel SelectorSWITCH to tank
containing fuel

Electric Fuel PumpCHECK ON

Mixture..CHECK RICH

Alternate Air.....OPEN

If power is not regained, proceed with power off landing (3.5d).

3.5c ENGINE POWER LOSS IN FLIGHT (3.13)**If at low altitude:**

AirspeedMAINTAIN 79
KIAS minimum

Prepare for power off landing (3.5d).

If altitude permits:

Fuel SelectorSWITCH to tank
containing fuel

3.5c ENGINE POWER LOSS IN FLIGHT (3.13) (continued)

- Electric fuel pump.....ON
- Mixture.....RICH
- Alternate Air.....OPEN
- Engine Gauges.....CHECK for indication
of cause of power loss

If no fuel flow/pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

- When power is restored:
- Alternate AirCLOSE
 - Electric Fuel PumpOFF
- If power is not restored, prepare for power off landing.
Trim for 79 KIAS.

3.5d POWER OFF LANDING (3.15)

- Trim for 79 KIAS.
- Locate suitable field.
- Establish spiral pattern.
- 1000 ft. above field at downwind position for normal landing approach.
- When field can be easily reached, slow to 72 KIAS for shortest landing.

Gear Down Emergency Landing (3.15a)

Touchdowns should normally be made at the lowest possible airspeed with full flaps.

- When committed to landing:
- Landing Gear Selector.....DOWN
 - Flaps.....AS DESIRED
 - Throttle.....CLOSE
 - Mixture.....IDLE CUT-OFF
 - IgnitionOFF
 - BATT MASTR SwitchOFF
 - ALTR Switch.....OFF
 - Fuel Selector.....OFF
 - Seat Belts and Harness.....TIGHT

NOTE

If battery master switch is OFF, the landing gear cannot be retracted.

3.5d POWER OFF LANDING (3.15) (continued)**Gear Up Emergency Landing (3.15b)**

In the event a gear up landing is required, proceed as follows:

FlapsAS DESIRED
Throttle.....CLOSE
MixtureIDLE CUT-OFF
IgnitionOFF
BATT MASTR SwitchOFF
ALTR Switch.....OFF
Fuel Selector.....OFF
Seat Belt and HarnessTIGHT
Contact surface at minimum possible airspeed.

3.5e FIRE IN FLIGHT (3.17)

Source of FireCHECK

Electrical Fire (Smoke in Cabin):

BATT MASTR SwitchOFF
ALTR Switch.....OFF
VentsOPEN
Cabin Heat.....OFF
Land as soon as possible.

Engine Fire:

Fuel Selector.....OFF
Throttle.....CLOSED
MixtureIDLE CUT-OFF
Electric Fuel Pump.....CHECK OFF
Heater and DefrosterOFF
Proceed with power off landing procedure (3.5d).

NOTE

The possibility of an engine fire in flight is extremely remote. The procedure given is general and pilot judgement should be the determining factor for action in such an emergency.

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3.5f LOSS OF OIL PRESSURE (3.19)

Land as soon as possible and investigate cause.
Prepare for power off landing.

3.5g LOSS OF FUEL FLOW/PRESSURE (3.21)

Electric Fuel PumpON
Fuel SelectorCHECK on tank
containing fuel

3.5h HIGH OIL TEMPERATURE (3.23)

Land at nearest airport and investigate the problem.
Prepare for power off landing.

3.5i ELECTRICAL FAILURE (3.25)

ALT annunciator light illuminated:
Ammeter.....CHECK to VERIFY
inop. alt.

If ammeter shows zero:

ALTR Switch.....OFF

Reduce electrical loads to minimum:

ALTNTR. FIELD

Circuit Breaker.....CHECK and RESET
as required

ALTR Switch ON

If power not restored:

ALTR Switch.....OFF

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

3.5j ELECTRICAL OVERLOAD (Alternator over 20 amps above known electrical load) (3.27)

BATT MASTR Switch.....OFF

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3.5j ELECTRICAL OVERLOAD (Alternator over 20 amps above known electrical load) (3.27) (Continued)**If ammeter reading does NOT decrease:**

ALTR Switch.....OFF
Land as soon as possible. Use Emergency Landing Gear Extension
(3.5m) to lower landing gear.

If ammeter reading DOES decrease:

BATT MASTR SwitchON
AmmeterMONITOR

If ammeter reading does NOT begin to decrease within five minutes:

BATT MASTR Switch.....OFF
Land as soon as possible.

CAUTION

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

NOTE

Due to increased system voltage and radio frequency noise, operation with ALTR switch ON and BATT switch OFF should be made only when required by an electrical system failure.

If ammeter reading DOES begin to decrease within five minutes:

Proceed with flight.
AmmeterMONITOR

3.5k PROPELLER OVERSPEED (3.29)

Throttle.....RETARD
Oil Pressure.....CHECK

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3.5k PROPELLER OVERSPEED (continued)

Propeller Control.....FULL DECREASE
rpm, then set if any
control available.
Airspeed.....REDUCE
Throttle.AS REQUIRED to
remain below 2700 rpm

3.5m EMERGENCY LANDING GEAR EXTENSION (3.31)

NOTE

Refer to paragraph 4.39 for differences when
emergency gear extension is being performed for
training purposes.

Prior to emergency extension procedure:

BATT MASTR Switch.....CHECK ON
ALTR Switch.....CHECK ON
Circuit BreakersCHECK
NAV LIGHT Switch.....OFF (in daytime)
Gear Indicator BulbsCHECK

If landing gear does not check down and locked:

Airspeed.....REDUCE BELOW
87 KIAS
Landing Gear Selector Switch.....GEAR DOWN
POSITION

If gear has still failed to lock down, move and *hold* the emergency
lever down to the Emergency Down position.

If gear has still failed to lock down, yaw the airplane abruptly from
side to side with the rudder.

If the nose gear will not lock down using the above procedure, slow
the aircraft to the lowest safe speed attainable using the lowest power
setting required for safe operation and accomplish the following:

Landing Gear Selector Switch.....GEAR DOWN
POSITION

If landing gear does not check down, recycle gear through up position
and then select gear DOWN.

3.5n SPIN RECOVERY (3.33)

Rudder.....FULL OPPOSITE to
DIRECTION of ROTATION
Control Wheel.....FULL FORWARD WHILE
NEUTRALIZING AILERONS
Throttle.....IDLE
Rudder.....NEUTRAL (when rotation stops)
Control Wheel.....AS REQUIRED to SMOOTHLY
REGAIN LEVEL FLIGHT ATTITUDE

3.5o OPEN DOOR (3.35)

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 87 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 LATCH position If both latches are
open.....LATCH SIDE LATCH
then TOP LATCH

3.5p ENGINE ROUGHNESS (3.37)

Mixture.....ADJUST for maximum smoothness

Alternate Air.....OPEN

Electric Fuel Pump.....ON

Fuel Selector.....SWITCH TANKS

Engine Gauges.....CHECK

Magneto Switch.....L then R then
BOTH

If operation is satisfactory on either magneto, proceed on that magneto at reduced power, with full RICH mixture, to a landing at the first available airport.

If roughness persists, prepare for a precautionary landing.

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3.7 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.

3.9 ENGINE FIRE DURING START (3.5a)

Engine fires during start are usually the result of overpriming. The first attempt to extinguish the fire is to try to start the engine and draw the excess fuel back into the induction system.

If a fire is present before the engine has started, move the mixture control to idle cut-off, open the throttle and crank the engine. This is an attempt to draw the fire back into the engine.

If the engine has started, continue operating to try to pull the fire into the engine.

In either of the above cases, if fire continues for more than a few seconds, the fire should be extinguished by the best available external means.

The fuel selector valves should be OFF and the mixture at idle cut-off if an external fire extinguishing method is to be used.

3.11 ENGINE POWER LOSS DURING TAKEOFF (3.5b)

The proper action to be taken if loss of power occurs during takeoff will depend on the circumstances of the particular situation.

If sufficient runway remains to complete a normal landing, leave the landing gear down and land straight ahead.

If the area ahead is rough, or if it is necessary to clear obstructions, move the gear selector switch to the UP position.

If sufficient altitude has been gained to attempt a restart, maintain a safe airspeed and switch the fuel selector to a tank containing fuel. Place the electric fuel pump to ON. Check that the mixture is RICH. The alternate air should be open.

3.11 ENGINE POWER LOSS DURING TAKEOFF (3.5b) (continued)

If engine failure was caused by fuel exhaustion, power will not be regained after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

If power is not regained, proceed with the Power Off Landing procedure (refer to the emergency checklist and paragraph 3.15).

3.13 ENGINE POWER LOSS IN FLIGHT (3.5c)

Complete engine power loss is usually caused by fuel flow interruption and power will be restored shortly after fuel flow is restored. If power loss occurs at a low altitude, the first step is to prepare for an emergency landing (refer to paragraph 3.15). An airspeed of at least 79 KIAS should be maintained.

If altitude permits, switch the fuel selector to another tank containing fuel and turn the electric fuel pump to ON. Move the mixture control to RICH and the alternate air to OPEN. Check the engine gauges for an indication of the cause of the power loss. If no fuel flow/pressure is indicated, check the tank selector position to be sure it is on a tank containing fuel.

When power is restored move the alternate air to the CLOSED position and turn OFF the electric fuel pump.

If the preceding steps do not restore power, prepare for an emergency landing.

If time permits, turn the ignition switch to L, then to R, then back to BOTH. Move the throttle and mixture control levers to different settings. This may restore power if the problem is too rich or too lean a mixture or if there is a partial fuel system restriction. Try the other fuel tank. Water in the fuel could take some time to be used up, and allowing the engine to windmill may restore power. If power loss is due to water, fuel flow/pressure indications will be normal.

3.13 ENGINE POWER LOSS IN FLIGHT (3.5c) (continued)

If engine failure was caused by fuel exhaustion power will not be restored after switching fuel tanks until the empty fuel lines are filled. This may require up to ten seconds.

If power is not regained, proceed with the Power Off Landing procedure (refer to emergency checklist and paragraph 3.15). Trim for 79 KIAS.

3.15 POWER OFF LANDING (3.5d)

If loss of power occurs at altitude, trim the aircraft for best gliding angle (79 KIAS, air conditioner off) and look for a suitable field. If measures taken to restore power are not effective, and if time permits, check your charts for airports in the immediate vicinity; it may be possible to land at one if you have sufficient altitude. At best gliding angle, with the engine windmilling, and the propeller control in full DECREASE rpm, the aircraft will travel approximately 1.6 miles for each thousand feet of altitude. If possible, notify the FAA by radio of your difficulty and intentions. If another pilot or passenger is aboard, let him help.

When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1000 feet above the field at the downwind position, to make a normal landing approach. When the field can easily be reached, slow to 72 KIAS with flaps down for the shortest landing. Excess altitude may be lost by widening your pattern, using flaps or slipping, or a combination of these.

Whether to attempt a landing with gear up or down depends on many factors. If the field chosen is obviously smooth and firm, and long enough to bring the plane to a stop, the gear should be down. If there are stumps or rocks or other large obstacles in the field, the gear in the down position will better protect the occupants of the aircraft. If, however, the field is suspected to be excessively soft or short, or when landing in water of any depth, a wheels-up landing will normally be safer and do less damage to the airplane.

Touchdown should normally be made at the lowest possible airspeed.

3.15 POWER OFF LANDING (3.5d) (continued)

3.15a Gear Down Emergency Landing (3.5d)

When committed to a gear down emergency landing, select landing gear DOWN. Flaps may be used as desired. Close the throttle control and move the mixture control to idle cut-off. Shut OFF the ignition, battery master (BATT MASTR), and alternator (ALTR) switches. Turn the fuel selector valve to OFF. The seat belts and shoulder harness should be tightened. Touchdown should normally be made at the lowest possible airspeed.

NOTE

If the battery master switch is OFF, the landing gear cannot be retracted.

3.15b Gear Up Emergency Landing (3.5d)

When committed to a gear up landing, CLOSE the throttle, move the mixture to idle cut-off, and shut OFF the ignition, battery master (BATT MASTR), and alternator (ALTR) switches. Turn OFF the fuel selector valve. Seat belts and shoulder harness should be tightened. Touchdown should normally be made at the lowest possible airspeed with full flaps.

3.17 FIRE IN FLIGHT (3.5e)

The presence of fire is noted through smoke, smell and heat in the cabin. It is essential that the source of the fire be promptly identified through instrument readings, character of the smoke, or other indications since the action to be taken differs somewhat in each case.

Check for the source of the fire first.

If smoke in the cabin indicates an electrical fire, turn the battery master (BATT MASTR) and alternator (ALTR) switches OFF. The cabin vents should be opened and the cabin heat turned OFF. A landing should be made as soon as possible.

If an engine fire is present, switch the fuel selector to OFF and close the throttle. The mixture should be at idle cut-off. Turn the electric fuel pump OFF. In all cases, the heater and defroster should be OFF. If radio communication is not required select the battery master (BATT MASTR) and alternator (ALTR) switches OFF. If the terrain permits, a landing should be made immediately.

NOTE

The possibility of an engine fire in flight is extremely remote. The procedure given is general and pilot judgment should be the determining factor for action in such an emergency.

3.19 LOSS OF OIL PRESSURE (3.5f)

Loss of oil pressure may be either partial or complete. A partial loss of oil pressure usually indicates a malfunction in the oil pressure regulating system, and a landing should be made as soon as possible to investigate the cause and prevent engine damage.

A complete loss of oil pressure indication may signify oil exhaustion or may be the result of a faulty gauge. In either case, proceed toward the nearest airport, and be prepared for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until such time as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss.

3.19 LOSS OF OIL PRESSURE (3.5f) (continued)

Depending on the circumstances, it may be advisable to make an off airport landing while power is still available, particularly if other indications of actual oil pressure loss, such as sudden increases in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stoppage occurs, proceed with Power Off Landing.

3.21 LOSS OF FUEL FLOW/PRESSURE (3.5g)

The most probable cause of loss of fuel flow/pressure is either fuel depletion in the fuel tank selected, or failure of the engine driven fuel pump. If loss of fuel flow/pressure occurs, check that the fuel selector is on a tank containing fuel and turn ON the electric fuel pump.

If the problem is not an empty tank, land as soon as practical and have the engine driven fuel pump and fuel system checked.

3.23 HIGH OIL TEMPERATURE (3.5h)

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooler, damaged or improper baffle seals, a defective gauge, or other causes. Land as soon as practical at an appropriate airport and have the cause investigated.

A steady, rapid rise in oil temperature is a sign of trouble. Land at the nearest airport and let a mechanic investigate the problem. Watch the oil pressure gauge for an accompanying loss of pressure.

3.25 ELECTRICAL FAILURE (3.5i)

Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, ensure that the reading is zero, and not merely low, by actuating an electrically powered device, such as the landing light. If no increase in the ammeter reading is noted, alternator failure can be assumed.

The electrical load should be reduced as much as possible. Check for an open alternator field circuit breaker.

Next, attempt to reset the overvoltage relay by moving the ALTR switch to OFF for one second and then to ON. If the trouble was caused by a momentary overvoltage condition (16.5 volts and up) this procedure should return the ammeter to a normal reading.

3.25 ELECTRICAL FAILURE (3.5i) (continued)

If the ammeter continues to indicate ZERO output, or if the alternator will not remain reset, turn off the ALTR switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

3.27 ELECTRICAL OVERLOAD (Alternator over 20 amps above known electrical load) (3.5j)

An abnormally high alternator output may be caused by a low battery, battery fault, or other abnormal electrical load.

Should an abnormally high alternator output be observed, turn the BATT MASTR (battery master) switch OFF. If the ammeter reading does NOT decrease, turn the ALTR (alternator) switch OFF and land as soon as possible. The landing gear must be lowered using the Emergency Landing Gear Extension procedure (3.33).

If, after turning the BATT MASTR switch OFF, the ammeter reading DOES decrease, turn the BATT MASTR switch ON, and continue to monitor the ammeter. If the ammeter reading does not begin to decrease within five minutes, turn the BATT MASTR switch OFF and land as soon as possible.

CAUTION

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

NOTE

Due to increased system voltage and radio frequency noise, operation with ALTR switch ON and BATT MASTR switch OFF should be made only when required by an electrical system failure.

If the ammeter reading DOES begin to decrease within five minutes after the BATT MASTR switch is turned ON, proceed with flight while continuing to monitor ammeter.

3.29 PROPELLER OVERSPEED (3.5k)

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

If propeller overspeed should occur, retard the throttle and check the oil pressure. 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 2700 rpm.

3.31 EMERGENCY LANDING GEAR EXTENSION (3.5m)

NOTE

Refer to paragraph 4.39 for differences when emergency gear extension is being performed for training purposes.

Prior to initiating the emergency extension procedure, check to ensure that the battery master (BATT MASTR) and alternator (ALTR) switches are ON, and that the circuit breakers have not opened. If it is in daytime, the NAV LIGHT switch should be turned OFF. Check the landing gear indicators for faulty bulbs.

If the landing gear does not check down and locked, reduce the airspeed below 87 KIAS. Move the landing gear selector switch to the DOWN position.

If the gear has still failed to lock down, move and *hold* the emergency gear lever down to the EMERGENCY DOWN position.

If the gear has still failed to lock down, yaw the airplane abruptly from side to side with the rudder.

If the nose gear will not lock down using the above procedure, slow the airplane to the lowest safe speed attainable using the lowest power setting required for safe operation. Move the landing gear selector switch to the gear DOWN position. If the landing gear does not check down, recycle the gear through the UP position and then select the DOWN position.

3.33 SPIN RECOVERY (3.5n)

Intentional spins are prohibited in this airplane. If a spin is inadvertently entered, immediately apply full rudder opposite to the direction of rotation. Move the control wheel full forward while neutralizing the ailerons. Move the throttle to IDLE. When the rotation stops, neutralize the rudder and ease back on the control wheel as required to smoothly regain a level flight attitude.

3.35 OPEN DOOR (3.5o)

The cabin door is double latched, so the chances of its springing open in flight at both the top and bottom are remote. However, should the upper latch be overlooked or the side latch not fully engaged, 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 the 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 87 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 first, and then the top latch.

3.37 ENGINE ROUGHNESS (3.5p)

Engine roughness may be caused by dirt in the injector nozzles, induction system icing, or ignition problems.

First adjust the mixture for maximum smoothness. The engine will run rough if the mixture is too rich or too lean.

Move the alternate air to OPEN and then turn ON the electric fuel pump

Switch the fuel selector to another tank to see if fuel contamination is the problem.

Check the engine gauges for abnormal readings. If any gauge readings are abnormal proceed accordingly.

3.37 ENGINE ROUGHNESS (3.5p) (Continued)

The magneto switch should then be moved L, then R, then back to BOTH. If operation is satisfactory on either magneto, proceed on that magneto at reduced power with full RICH mixture to a landing at the first available airport.

If roughness persists, prepare for a precautionary landing at pilot's discretion.