

## 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. All of the required (FAA regulations) emergency procedures and those necessary for 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.

These procedures are suggested as a course of action for coping with the particular condition described, but are not a substitute for sound judgment and common sense. 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 a 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**

#### **ENGINE FIRE DURING START**

Starter ..... crank engine  
Mixture ..... idle cut-off  
Throttle ..... open  
Electric fuel pump ..... OFF  
Fuel selector ..... OFF  
Abandon if fire continues

#### **ENGINE POWER LOSS DURING TAKEOFF**

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 switch ..... UP  
Emergency gear lever (aircraft equipped with  
backup gear extender) ..... latched in **VERRIDE  
ENGAGED** position

If sufficient altitude has been gained to attempt a restart:

Maintain safe airspeed  
Fuel selector ..... switch to tank  
containing fuel  
Electric fuel pump ..... check ON  
Mixture ..... check RICH  
Alternate air ..... OPEN  
Emergency gear lever ..... as required  
If power is not regained, proceed with power off landing.



**FIRE IN FLIGHT**

Source of fire ..... check

Electrical fire (smoke in cabin):

Master switch ..... OFF

Vents ..... open

Cabin heat ..... OFF

Land as soon as practicable.

Engine fire:

Fuel selector ..... OFF

Throttle ..... CLOSED

Mixture ..... idle cut-off

Electric fuel pump ..... check OFF

Heater and defroster ..... OFF

Proceed with power off landing procedure.

**LOSS OF OIL PRESSURE**

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

**LOSS OF FUEL FLOW**

Electric fuel pump ..... ON

Fuel selector ..... check on tank  
containing usable fuel

**ENGINE DRIVEN FUEL PUMP FAILURE**

Throttle ..... retard

Electric fuel pump ..... ON

Throttle ..... reset as required

*CAUTIONS*

If normal engine operation and fuel flow is not immediately re-established, the electric fuel pump should be turned OFF.

The lack of a fuel flow indication while the electric fuel pump is on could indicate a leak in the fuel system or fuel exhaustion.

### HIGH OIL TEMPERATURE

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

### ELECTRICAL FAILURES

ALT annunciator light illuminated  
Ammeter ..... check to verify  
inop. alt.

If ammeter shows zero  
ALT switch ..... OFF

Reduce electrical loads to minimum  
ALT circuit breaker ..... check and reset  
as required  
ALT switch ..... ON

If power not restored  
ALT 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.

### ELECTRICAL OVERLOAD (alternator over 20 amps above known electrical load)

#### FOR AIRPLANES WITH INTERLOCKED BAT AND ALT SWITCH OPERATION

Electrical load ..... reduce

If alternator loads are not reduced  
ALT switch ..... OFF

Land as soon as practical. Battery is the only remaining source of power. Anticipate complete electrical failure.

FOR AIRPLANES WITH SEPARATE BAT AND ALT SWITCH OPERATION

ALT switch ..... ON  
BAT switch ..... OFF

If alternator loads are reduced  
Electrical load ..... reduce to minimum

Land as soon as practical.

NOTE

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

If alternator loads are not reduced  
ALT switch ..... OFF  
BAT switch ..... as required

Land as soon as possible. Anticipate complete electrical failure.

NOTE

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

**PROPELLER OVERSPEED**

Throttle ..... retard  
Oil pressure ..... check  
Prop control ..... full DECREASE rpm,  
then set if any  
control available  
Airspeed ..... reduce  
Throttle ..... as required to remain  
below 2700 rpm

### EMERGENCY LANDING GEAR EXTENSION

Prior to emergency extension procedure:

Master switch .....check ON  
Circuit breakers.....check  
Radio lights .....off (in daytime)  
Gear indicator bulbs.....check

If landing gear does not check down and locked:

Airspeed .....below 92 KIAS  
Landing gear selector.....DOWN  
Emergency gear lever (aircraft equipped with  
backup gear extender) .....**VERRIDE ENGAGED**  
(while fish tailing airplane)

If landing gear still does not check down and locked:

Emergency gear lever (aircraft equipped  
with lever release) .....**Hold** emergency gear lever in the  
**EMERGENCY DOWN** position, while fish  
tailing airplane, until gear is down and locked  
(under normal conditions will take approx.  
10 seconds to be down and locked)

Emergency gear knob (aircraft equipped  
with cable release).....**PULL**, while fish tailing airplane  
(under normal conditions will take approx.  
10 seconds to be down and locked)

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

### SPIN RECOVERY

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

**OPEN DOOR**

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 92 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

### **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 FIRE DURING START**

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

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

### **3.9 ENGINE POWER LOSS DURING TAKEOFF**

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. On aircraft equipped with the backup gear extender, latch the emergency gear lever in the **VERRIDE ENGAGED** position.

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

On aircraft equipped with the backup gear extender, the landing gear will extend automatically when engine power fails at speeds below approximately 103 KIAS. The glide distance with the landing gear extended is roughly halved. If the situation dictates, the landing gear can be retained in the retracted position by latching the emergency gear lever in the **VERRIDE ENGAGED** position.

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 Power Off Landing procedure (refer to the emergency checklist and paragraph 3.13).

### **3.11 ENGINE POWER LOSS IN FLIGHT**

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 3.13). An airspeed of at least 92 KIAS should be maintained.

If altitude permits, switch the fuel selector to another tank containing fuel and turn the electric fuel pump 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 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, turn OFF the electric fuel pump and adjust the mixture control as necessary.

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 other fuel tanks. 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 indications will be normal.

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 the emergency checklist and paragraph 3.13).

### **3.13 POWER OFF LANDING**

If loss of power occurs at altitude, lock emergency gear lever in OVERRIDE ENGAGED position before airspeed drops to 106 KIAS to prevent landing gear from inadvertently free falling on aircraft equipped with the backup gear extender, trim the aircraft for best gliding angle (80 KIAS, Air Cond. 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 no wind, with the engine windmilling and the propeller control in full DECREASE rpm, the aircraft will travel approximately 1.5 miles for each thousand feet of altitude in a no wind condition. 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, extend full flaps 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.

On airplanes equipped with the backup gear extender, the landing gear will free fall at airspeeds below approximately 103 KIAS and, under normal conditions, will take approximately 10 seconds to be down and locked. If a gear up landing is desired, it will be necessary to latch the override lever in the **OVERRIDE ENGAGED** position before the airspeed drops to 106 KIAS to prevent the landing gear from inadvertently free falling.

Touchdown should normally be made at the lowest possible airspeed.

(a) Gear Down Landing

When committed to a gear down emergency landing, select landing gear **DOWN**, close the throttle, turn the fuel selector valve to **OFF** and move the mixture to idle cut-off. After final flap setting, turn the master and ignition switches **OFF**. The seat belts and shoulder harness (if installed) should be tightened. Touchdown should be normally made at the lowest possible airspeed.

**NOTE**

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

**(b) Gear Up Landing**

On aircraft equipped with the backup gear extender, latch the emergency gear lever in the **VERRIDE ENGAGED** position to prevent the gear from inadvertently extending at airspeeds below 103 KIAS.

When committed to landing, close the throttle, turn the fuel selector valve to **OFF** and move the mixture to idle cut-off. After final flap setting, turn the master and ignition switches **OFF**. The seat belts and shoulder harness (if installed) should be tightened. Touchdown should be normally made at the lowest possible airspeed.

**3.15 FIRE IN FLIGHT**

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 smoke, or other indications since the action to be taken differs somewhat in each case.

Check for the source of the fire first.

If an electrical fire is indicated (smoke in the cabin), the master switch should be turned **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 master switch **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.

### **3.17 LOSS OF OIL PRESSURE**

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.

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.

### **3.19 LOSS OF FUEL FLOW**

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

If loss of fuel pressure is due to failure of the engine driven fuel pump the electric fuel pump will supply sufficient fuel flow.

After fuel flow and power are regained, turn the electric fuel pump OFF. If fuel flow starts to drop, turn the electric fuel pump ON and land at the nearest suitable airport as soon as possible and have the cause investigated.

#### *CAUTION*

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

### **3.21 ENGINE DRIVEN FUEL PUMP FAILURE**

If an engine driven fuel pump failure is indicated, retard the throttle and turn ON the electric fuel pump. The throttle should then be reset. A landing should be made at the nearest appropriate airport as soon as possible and the cause of the failure investigated.

#### *CAUTION*

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

### **3.23 HIGH OIL TEMPERATURE**

A. 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 FAILURES**

Loss of alternator output is detected through zero reading on the ammeter. Before executing the following procedure, insure 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 the alternator circuit breakers for a popped circuit.

The next step is to attempt to reset the overvoltage relay. This is accomplished by moving the ALT 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.

If the ammeter continues to indicate "0" output, or if the alternator will not remain reset, turn off the ALT switch, maintain minimum electrical load and land as soon as practical. All electrical load is being supplied by the battery.

**3.26 ELECTRICAL OVERLOAD (alternator over 20 amps above known electrical load)**

If abnormally high alternator output is observed (more than 20 amps above known electrical load for the operating conditions) it may be caused by a low battery, a battery fault or other abnormal electrical load. If the cause is a low battery, the indication should begin to decrease toward normal within 5 minutes. If the overload condition persists attempt to reduce the load by turning off non-essential equipment. For airplanes with interlocked BAT and ALT switch operation, when the electrical load cannot be reduced turn the ALT switch OFF and land as soon as practical. The battery is the only remaining source of electrical power. Also anticipate complete electrical failure.

For airplanes with separate BAT and ALT switch operations, turn the BAT switch OFF and the ammeter should decrease. Turn the BAT switch ON and continue to monitor the ammeter. If the alternator output does not decrease within 5 minutes, turn the BAT switch OFF and land as soon as practical. All electrical loads are being supplied by the alternator.

**NOTE**

Due to higher voltage and radio frequency noise, operation with the ALT switch ON and the BAT switch OFF should be made only when required by an electrical failure.

**NOTE**

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

### 3.27 PROPELLER OVERSPEED

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.

### 3.29 EMERGENCY LANDING GEAR EXTENSION

Prior to proceeding with an emergency gear extension, check to insure that the master switch is ON and that the circuit breakers have not opened. If it is daytime, the radio lights should be turned off. Check the landing gear indicators for faulty bulbs.

#### NOTE

Refer to Par. 4.39 for differences when emergency extension procedure is performed for training purposes.

If the landing gear does not check down and locked, reduce the airspeed to below 92 KIAS. Move the landing gear selector to the DOWN position. On aircraft equipped with the backup gear extender, place the emergency gear lever in the OVERRIDE ENGAGED position and fishtail the airplane.

If the landing gear still does not check down and locked:

- a. On airplanes equipped with the lever release, position and hold the emergency gear lever in the EMERGENCY DOWN position while fish tailing the airplane.
- b. On airplanes equipped with the cable release, PULL the emergency extend knob while fish tailing the airplane.

Under normal conditions, either of the above procedures, as appropriate, will require approximately 10 seconds for the gear to extend and lock down.

If all electrical power has been lost, the landing gear must be extended using the above procedures. The gear position indicator lights will not illuminate.

### **3.31 SPIN RECOVERY**

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.

### **3.33 OPEN DOOR**

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 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 92 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 ENGINE ROUGHNESS**

Engine roughness may be caused by dirt in the injector nozzles, induction filter 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.

The magneto switch should then be moved to "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.