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#### EMERGENCY PROCEDURES

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**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 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 check list 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 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.

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**3.3 EMERGENCY PROCEDURES CHECK LIST**

**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**

See also AFMS at end

If sufficient runway remains for a normal landing, land straight ahead.

If insufficient runway remains:

Maintain safe airspeed.

Make only shallow turn to avoid obstructions.

Flaps as situation requires.

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

Carburetor heat ..... ON

Primer ..... locked

If power is not regained, proceed with power off landing.

**ENGINE POWER LOSS IN FLIGHT**

See also AFMS at end

- Fuel selector ..... switch to tank containing fuel
  - Electric fuel pump ..... ON
  - Mixture ..... RICH
  - Carburetor heat ..... ON
  - Engine gauges ..... check for indication of cause of power loss
  - Primer ..... check locked
- If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:

- Carburetor heat ..... OFF
  - Electric fuel pump ..... OFF
- If power is not restored prepare for power off landing.  
Trim for 76 KIAS.

**POWER OFF LANDING**

- Locate suitable field.
- Establish spiral pattern.
- 1000 ft. above field at downwind position for normal landing approach.
- When field can easily be reached slow to 66 KIAS for shortest landing.

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

When committed to landing:

- Ignition ..... OFF
- Master switch ..... OFF
- Fuel selector ..... OFF
- Mixture ..... idle cut-off
- Seat belt and harness ..... tight

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 PRESSURE

See also AFMS at end

Electric fuel pump.....ON

Fuel selector.....check on full tank

HIGH OIL TEMPERATURE

Land at nearest airport and investigate the problem.

Prepare for power off landing.

**ELECTRICAL FAILURES**

See also AFMS at end

NOTE

When operating with light electrical load and a fully charged battery, the Alternator Inop. Light may illuminate due to minimal alternator output. If the alternator is functional, a slight increase in electrical load should extinguish the Inop. indication.

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 reduced:

ALT switch.....OFF

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



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

**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.

**SPIN RECOVERY**

Throttle ..... idle  
Ailerons ..... neutral  
Rudder ..... full opposite to  
direction of rotation  
Control wheel ..... full forward  
Rudder ..... neutral (when  
rotation stops)  
Control wheel ..... as required to smoothly  
regain level flight altitude

**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 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 latched position

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

**CARBURETOR ICING**

Carburetor heat ..... ON  
Mixture ..... adjust for maximum  
smoothness

**ENGINE ROUGHNESS**

Carburetor heat ..... ON

If roughness continues after one min:

Carburetor heat ..... OFF  
Mixture ..... adjust for maximum  
smoothness

Electric fuel pump ..... ON

Fuel selector ..... switch tanks

Engine gauges ..... check

Magneto switch ..... L then R  
then BOTH

If operation is satisfactory on either one, continue on that magneto at reduced power and full RICH mixture to first airport.

Prepare for power off landing.

### **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 valves 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, land straight ahead.

If insufficient runway remains, maintain a safe airspeed and make only a shallow turn if necessary to avoid obstructions. Use of flaps depends on the circumstances. Normally, flaps should be fully extended for touchdown.

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 carburetor heat should be ON and the primer checked to insure that it is locked.

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 check list 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 76 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 carburetor heat to ON. Check the engine gauges for an indication of the cause of the power loss. Check to insure the primer is locked. If no fuel pressure is indicated, check the tank selector position to be sure it is on a tank containing fuel.

When power is restored move the carburetor heat to the OFF 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 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 pressure 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 check list and Paragraph 3.13).

### **3.13 POWER OFF LANDING**

If loss of power occurs at altitude, trim the aircraft for best gliding angle 76 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. 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 66 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.

Touchdown should normally be made at the lowest possible airspeed.

When committed to a landing, close the throttle control and shut OFF the master and ignition switches. Flaps may be used as desired. Turn the fuel selector valve to OFF and move the mixture to idle cut-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 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 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. Proceed with power off landing procedure.

**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 PRESSURE**

If loss of fuel pressure occurs, turn ON the electric fuel pump and check that the fuel selector is on a full tank.

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

### **3.21 HIGH OIL TEMPERATURE**

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.

### **3.23 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.

**3.24 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.



### **3.25 SPIN RECOVERY**

Intentional spins are prohibited in this airplane. If a spin is inadvertently entered, immediately move the throttle to idle and the ailerons to neutral.

Full rudder should then be applied opposite to the direction of rotation followed by control wheel full forward. When the rotation stops, neutralize the rudder and ease back on the control wheel as required to smoothly regain a level flight attitude.

### **3.27 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 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 then the top latch.

### **3.29 CARBURETOR ICING**

Under certain moist atmospheric conditions at temperatures of  $-5^{\circ}\text{C}$  to  $20^{\circ}\text{C}$ , it is possible for ice to form in the induction system, even in summer weather. This is due to the high air velocity through the carburetor venturi and the absorption of heat from this air by vaporization of the fuel.

To avoid this, carburetor preheat is provided to replace the heat lost by vaporization. Carburetor heat should be full on when carburetor ice is encountered. Adjust mixture for maximum smoothness.

### **3.31 ENGINE ROUGHNESS**

Engine roughness is usually due to carburetor icing which is indicated by a drop in RPM, and may be accompanied by a slight loss of airspeed or altitude. If too much ice is allowed to accumulate, restoration of full power may not be possible; therefore, prompt action is required.

Turn carburetor heat on (See Note). RPM will decrease slightly and roughness will increase. Wait for a decrease in engine roughness or an increase in RPM, indicating ice removal. If no change in approximately one minute, return the carburetor heat to OFF.

If the engine is still rough, adjust the mixture for maximum smoothness. The engine will run rough if too rich or too lean. The electric fuel pump should be switched to ON and the fuel selector switched to the other tank to see if fuel contamination is the problem. Check the engine gauges for abnormal readings. If any gauge readings are abnormal, proceed accordingly. Move the magneto switch to L then to R, then back to BOTH. If operation is satisfactory on either magneto, proceed on that magneto at reduced power, with mixture full RICH, to a landing at the first available airport.

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

**NOTE**

Partial carburetor heat may be worse than no heat at all, since it may melt part of the ice, which will refreeze in the intake system. When using carburetor heat, therefore, always use full heat, and when ice is removed return the control to the full cold position.

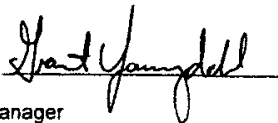
**FAA APPROVED**  
**AIRPLANE FLIGHT MANUAL SUPPLEMENT**  
**FOR**  
**Piper PA-28 Series Aircraft**  
**See Applicable Model and Serial Number List**

Registration Number OE-KBS

Serial Number 28-8390087

This Supplement must be attached to the FAA Approved Airplane Flight Manual applicable to that particular airplane when the airplane has been modified in accordance with STC SA2660CE. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED



*for* Margaret Kline, Manager  
Aircraft Certification Office  
Federal Aviation Administration  
Wichita, Kansas

## **2. PROCEDURES SECTION:**

### **Emergency Procedures**

#### **Fuel Management**

When operating on auto gas, including when auto gas is intermixed with aviation gasoline:

- a) Right fuel quantity less than  $\frac{1}{4}$  tank – Land using left fuel tank.

**NOTE:** Operating on the left tank may make the airplane more susceptible to vapor formation than the right tank.

#### **Fuel System:**

**Fuel Pump Failure** SA2660CE equips PA-28's with two separate electric fuel pumps. If one pump fails, throw the three way fuel pump switch to engage the second, redundant electric fuel pump. If the other electric fuel pump is also inoperative, check to make sure the Master switch is ON, check circuit breakers.

If the engine is running rough or not at all, lower the nose, reduce throttle setting to 75% or less, Mixture to FULL RICH, Carb Heat ON, and switch fuel tanks. Choose a suitable off airport landing location or if possible continue flight to the nearest airport.

### **Normal Procedures:**

#### **Fuel Management:**

When operating on auto gas, including when auto gas is intermixed with aviation gasoline:

- a) Before Takeoff
  - (1) Fuel Selector – Right Tank

- b) Cruise

(1) Fuel Selector – Use right and left tank positions to maintain lateral fuel balance.

**NOTE:** Vapor formation is more likely when operating at ambient temperatures of 85F or above. Additional vapor margin is provided from the right tank due to its larger fuel supply line, and when the fuel quantity in the right tank is maintained at or above the  $\frac{1}{4}$  full indication. Plan flight so as to have  $\frac{1}{4}$  tank or more fuel remaining in the right tank for landing and possible go-around.

- c) Before Landing

(1) Fuel Selector – Right tank.

**PROCEDURES SECTION:** (CONT'D)

**Normal Procedures:**

**Fuel System:**

**Auxiliary Fuel Pumps:**

There are two pumps, Pump A and Pump B controlled by an electric switch on the pilot's instrument panel. Either Pump A or Pump B must be ON for takeoff, landing, ground taxi and climb operations. The selected fuel pump may be turned OFF (center position) during cruise operations only, provided proper fuel pressure values are maintained (See Limitations Section in basic Airplane Flight Manual). It is recommended that Pump A and Pump B be used alternately to obtain approximately even usage.

Before starting engine:

- 1) With Master switch ON, check auxiliary fuel pumps, Pump A and Pump B one at a time as follows:
  - a. Listen for pump operation
  - b. Verify proper fuel pressure is obtained.
- 2) Turn fuel pumps OFF

**Engine Priming:**

To prime the engine before starting:

**Manual Priming**

- 1) Aircraft equipped with manual engine priming pump. With the Mixture FULL RICH, pull the primer out then push it in 3 to 5 times. Make certain that the primer pump is in the closed and locked position (pushed in and rotated till locked) before activating a fuel pump or starting the engine.

**Electrical Priming**

- 2) Aircraft equipped with electric engine priming system:
  - a. Turn Master Switch ON
  - b. Turn fuel selector switch to the Right tank.
  - c. Depress the electric priming switch with one hand.  
(this opens the primer solenoid valve)
  - d. While depressing the fuel primer solenoid valve switch, throw the fuel pump toggle switch either up or down with the other hand to activate one Pump.
  - e. Run the pump for only a short time (one to three seconds)
  - f. Shut the pump off and release electric priming solenoid switch.
  - g. Start the engine.
  - h. After the engine starts, activate either the Pump A or Pump B switch so that a fuel pump remains on for taxi, takeoff, and climb.

Manual or Electrically Primed: After the engine starts and during warm up, allow the engine to run with the electric fuel pumps off to verify that the engine driven fuel pump is operating properly. Before taxi activate either Pump A or Pump B so that one of the electric fuel pumps remains on for taxi, takeoff, and climb.

-----END-----



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**Service Bulletin**  
**PA-28-160, -161, -180, -181**  
Bulletin No. 05-3  
Revision No. (-)  
Date April 12, 2005

**Subject:**

**VERIFYING THAT THE PRIMER CONTROL IS CLOSED AND LOCKED PRIOR TO ELECTRIC FUEL PUMP OPERATION.**

**Effectivity:**

This Service Bulletin applies to all PA-28-160, -161, -180, -181 aircraft on which STC SA2660CE has been installed.

**Reason:**

It has come to our attention that an unlocked manual primer control may allow fuel to be directed both to the carb and directly to the cylinders via the priming system upon activation of the electric fuel pumps. This could result in an a mixture that is too rich for proper engine operation, or could increase the possibility of fire during engine-startup. Worn o-rings in the primer could result in similar situations.

**Instructions:**

Following normal engine priming make certain that the primer control knob is in the closed and locked position (pushed in and rotated till locked) before activating a fuel pump or starting the engine. Check the integrity of the primer o-rings at each annual or 100 hour inspection.