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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 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 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 CHECK LIST

SPEEDS

Stall speeds

1670 lbs. (0° flap) (Outboard Flow Strips Installed)	48 KIAS
1670 lbs. (full flap) (Outboard Flow Strips Installed)	47 KIAS
1670 lbs. (0° flap) (Outboard and Inboard Flow Strips Installed)	52 KIAS
1670 lbs. (full flap) (Outboard and Inboard Flow Strips Installed)	49 KIAS

Maneuvering speeds

1670 lbs.	103 KIAS
1277 lbs.	90 KIAS

Never exceed speed..... 138 KIAS

Power off glide speeds

1670 lbs. (0° flap)	70 KIAS
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ENGINE INOPERATIVE PROCEDURES

ENGINE POWER LOSS DURING TAKEOFF (NOT AIRBORNE)

Sufficient runway remaining:

Throttle	close immediately
Brakes	apply as required
Stop straight ahead.	

Insufficient runway remaining:

Throttle	close immediately
Brakes	apply as required
Mixture	IDLE CUT-OFF
Fuel selector	OFF
Master switch	OFF
Magnetos	OFF
Maintain directional control and maneuver to avoid obstacles.	

ENGINE POWER LOSS DURING TAKEOFF (IF AIRBORNE)

Sufficient runway remaining:

Airspeed	maintain above stall
Directional control	maintain
Land straight ahead.	

Insufficient runway remaining:

Airspeed	maintain above stall
Throttle	close
Mixture	IDLE CUT-OFF
Fuel selector	OFF
Master switch	OFF
Magnetos	OFF
Flaps	as situation requires
Directional control	maintain - make only shallow turns to avoid obstacles.

If sufficient altitude has been gained to attempt a restart:

Airspeed	maintain above stall
Fuel selector	switch to other tank containing fuel
Electric fuel pump	ON
Mixture	RICH
Carburetor heat	ON
If power is not regained proceed with power off landing.	

ENGINE POWER LOSS IN FLIGHT

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

If power has not been restored:

Ignition switch	L then R, then back to BOTH
Throttle and mixture	try different settings

When power is restored:

Carburetor heat	OFF
Electric fuel pump	OFF

If power cannot be restored:

Trim for best glide angle (70 KIAS) and prepare for power off landing.

POWER OFF LANDING

Trim for best glide angle (70 KIAS).  
Locate most suitable landing area.  
Establish spiral pattern.  
1000 feet above field at downwind position for normal landing approach.  
When field can be easily reached, slow to 62 KIAS\* or 67 KIAS\*\* for shortest landing with a full stall touchdown. 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 belts and harness ..... tight

FIRE

ENGINE FIRE DURING START

Starter ..... crank engine  
Mixture ..... IDLE CUT-OFF  
Throttle ..... open  
Electric fuel pump ..... OFF  
Fuel selector ..... OFF  
Abandon airplane if fire continues.

FIRE IN FLIGHT

Source of fire ..... check

Engine fire:  
Fuel selector ..... OFF  
Throttle ..... closed  
Mixture ..... IDLE CUT-OFF  
Electric fuel pump ..... OFF  
Cabin heat ..... OFF  
Defroster ..... OFF  
Prepare for power off landing.

\*Outboard Flow Strips Installed

\*\*Outboard and Inboard Flow Strips Installed

Electrical fire (smoke in cabin):  
Master switch ..... OFF  
Cabin heat ..... OFF  
Defroster ..... OFF  
Vents ..... open to clear cabin  
Land as soon as practicable.

LOSS OF OIL PRESSURE

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

LOSS OF FUEL PRESSURE

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.

ALTERNATOR FAILURE

Verify failure  
Reduce electrical load as much as possible.  
Alternator circuit breaker ..... check  
Alt switch ..... OFF (for 1 second),  
then ON

If no output:  
Alt switch ..... OFF

Reduce electrical load and land as soon as practical.

SPIN RECOVERY (UNINTENTIONAL SPIN)

Ailerons ..... neutral  
Rudder ..... full opposite to  
direction of rotation



If sufficient altitude has been gained to permit a restart attempt, maintain a safe airspeed and switch the fuel selector to another tank containing fuel. Check the electric fuel pump to ensure that it is ON. Check that the mixture control is set RICH and that carburetor heat is ON. If engine failure was caused by fuel exhaustion, power will not be regained after switching tanks until the empty fuel lines are filled. This may require up to ten seconds.

If the propeller has stopped turning, it will be necessary to engage the starter to execute a restart. If power is not regained, proceed with a Power Off Landing.

### ENGINE POWER LOSS IN FLIGHT

A complete loss of power is usually caused by a fuel flow interruption, in which case power will be restored shortly after fuel flow is restored. If power loss occurs at a low altitude, the first step should be to prepare for an emergency Power Off Landing. Maintain an airspeed of at least 70 KIAS.

If altitude permits, attempt a restart. Switch the fuel selector to another tank containing fuel. Turn ON the electric fuel pump, set the mixture RICH, and turn ON carburetor heat.

Check the engine gauges for an indication of the cause of the power loss. Be sure that the primer is locked if one is installed. If no fuel pressure is indicated, check the fuel selector to be sure that it is on a tank containing fuel. If fuel exhaustion is the problem, it may take up to ten seconds after switching tanks for empty fuel lines to fill and for power to be restored. If there is water contamination of the fuel, fuel pressure indications will be normal. Water in the fuel could take some time to be passed through, and allowing the propeller to windmill may restore power. If the propeller has stopped turning, engage the starter.

When power is restored and the engine is operating smoothly, turn OFF the carburetor heat and the electric fuel pump.

If the preceding steps do not restore power, prepare for an emergency Power Off Landing. If time permits, try turning the ignition switch to L, then to R, then back to BOTH. Try moving the throttle and mixture controls to various 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.

If power is not regained, proceed with preparations for a Power Off Landing.

### POWER OFF LANDING

If loss of power occurs at altitude, trim the airplane for best gliding angle (70 KIAS), and look for a suitable landing area. If the procedures for restoring power are not effective, and if time permits, check charts for airports in the immediate vicinity; it may be possible to reach one if the airplane's altitude is sufficient. If possible, notify the FAA by radio of the situation and intended course of action. If another pilot or a passenger is aboard, that person may assist.

After locating the most suitable landing area, establish a spiral pattern around the field. Try to be at 1000 feet above the field at the downwind position to make a normal landing approach. When assured of reaching the field, slow to 62 KIAS\* or 67 KIAS\*\* for the shortest landing. Excess altitude may be lost by widening the pattern, extending flaps, slipping, or a combination of these methods.

Once committed to a landing, shut OFF the ignition, the master switch, and the fuel selector. Pull the mixture to IDLE CUT-OFF. Tighten seat belts and shoulder harness.

Flaps may be used as deemed necessary. Normally a full stall touchdown should be made at the lowest possible airspeed with flaps fully extended.

### 3.9 FIRE

#### ENGINE FIRE DURING START

Engine fires during start are usually the result of overpriming. The first step in extinguishing the fire is to cut off the source of fuel and to keep the engine turning to use up excess fuel.

Continue cranking the engine with the starter, while pulling the mixture control to IDLE CUT-OFF and advancing the throttle fully open. Turn OFF the electric fuel pump and the fuel selector. Radio for assistance if possible.

If the engine has started, it should be left running. If the engine is not running, continue cranking with the starter. This is an attempt to draw the fire back into the engine.

\*Outboard Flow Strips Installed

\*\*Outboard and Inboard Flow Strips Installed

If the fire continues, leave the fuel selector OFF and the mixture at IDLE CUT-OFF, and abandon the airplane, applying the best external extinguishing means available.

If the fire is on the ground near the airplane, it may be possible to taxi to safety.

### FIRE IN FLIGHT

The presence of fire is indicated by smoke, smell, or heat. 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 in each case.

If an engine fire is indicated, immediately turn the fuel selector OFF and close the throttle. Pull the mixture control to IDLE CUT-OFF. Be sure that the electric fuel pump is OFF. Turn OFF the cabin heat and defroster. If radio transmission is not required, turn OFF the master switch. Proceed with a Power Off Landing.

#### 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.

If smoke or fumes in the cabin indicate an electrical fire, turn OFF the master switch. Turn OFF the cabin heat and defroster, and open the vents to clear smoke and fumes from the cabin. Land as soon as practicable.

#### NOTES

When the master switch is turned off, the stall warning system will not function.

During night flight a flashlight should be in hand before turning off the master switch.

### 3.11 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 allow investigation of the cause and to 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 power off landing can be accomplished. Do not 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.

### 3.13 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 tank containing fuel.

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

### 3.15 HIGH OIL TEMPERATURE

An abnormally high oil temperature indication may be caused by a low oil level, an obstruction in the oil cooling installation, damaged or improper baffle seals, a defective gauge, or other causes. Land as soon as possible 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.

### 3.17 ALTERNATOR FAILURE

Loss of alternator output is detected through zero reading on the ammeter and illumination of the alternator warning light on the instrument panel. 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 breaker for a popped circuit breaker.

The next step is to attempt to reset the overvoltage relay. This is accomplished by turning the ALT switch OFF for one second and then 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 zero 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.

### 3.19 SPIN RECOVERY (UNINTENTIONAL SPIN)

Intentional spins are permitted only with flaps fully retracted for utility category operation. Should a spin be entered inadvertently, the following procedure should be initiated:

- (a) Neutralize the ailerons.
- (b) Apply and maintain full rudder opposite the direction of rotation.
- (c) As the rudder hits the stop, push the control wheel fully forward. As the stall is broken, relax forward pressure to prevent an excessive airspeed build up.
- (d) Close the throttle.
- (e) As rotation stops, neutralize the rudder and ease back on the control wheel to recover smoothly from the dive.
- (f) Retract the flaps if they have been extended.

### NOTES

For more detailed information, see Spins in Section 4 - Normal Procedures.

Inappropriate use of the spin recovery procedure, such as during stall recovery, may induce a spin entry.

### 3.21 OPEN DOOR

The cabin doors on the Tomahawk are double latched; so the chances of one springing open in flight at both the top and side are remote. However, if improperly latched, a 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 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 arm rest while moving the latch handle to the latched position. If both latches are open, close the side latch then the top latch.

### 3.23 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.

3.25 LOSS OF PITOT-STATIC PRESSURE

If loss of either pitot or static pressure or both occurs, the alternate source must be used. The control lever located under the left side of the control quadrant should be pushed forward to the open position.

Operation on an alternate static source will cause deviations in the altimeter, rate of climb indicator and airspeed indicator readings. See the correction card mounted on the left side of the control quadrant cover for deviations.

If the problem is in the pitot head or pitot line and is caused by icing or heavy rain conditions, the optional pitot heat may be activated if it is installed. The switch for the heated pitot is located on the electrical switch panel to the left of the control panel. A partially or completely blocked pitot head will give erratic or zero readings on the airspeed indicator.

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