

**CHAPTER 6  
EMERGENCY FLOWS AND CHECKLISTS**

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## **General**

This chapter contains Bridgewater State University procedures for handling various emergencies while operating the C172R Skyhawk. The procedures are based on and in some cases expand on the manufacturer's procedural recommendations, as well as the guidance provided in the AIM.

## **Use of Emergency Checklists**

Emergency checklist flows (other than abnormal flows) *shall be accomplished from memory*. Although the completion of tasks will follow a specified sequence, some actions will be performed nearly simultaneously. Time and situation permitting, the accomplished flow tasks shall be verified with the printed checklist in-hand.

It is absolutely essential that pilots rehearse these procedures to achieve and maintain the expected level of proficiency. Due to rapid nature of emergencies it is critical that the emergency flows be accomplished from memory, accurately and efficiently, as the situation may not allow the time to either refer to a paper checklist or to correct any mistakes.

## ***ENGINE FAILURE / POWER LOSS***

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The following section contains checklists and SOPs addressing engine failures in various situations. Not all situations can be predicted or addressed by checklists. In all cases, the AFM guidance and FAA regulations must be followed, and solid PIC judgment exercised.

### **ENGINE FAILURE and POWER LOSS, DEFINED**

Engine failure / power loss can be defined as one or more of the following:

- Complete engine failure (propeller windmills or even stops if airspeed is extremely low, engine is relatively quiet and develops no power)
- Partial engine failure (engine runs and develops limited power well below normal levels)
- Loud noises and vibration from an engine with apparent total or partial power loss (may indicate a bad, randomly firing magneto, detonation due to incorrect grade of fuel, or other mechanical failure)

Regardless, all partial engine failure/power loss situations should be treated as either full or imminent engine failures. A partial engine failure is likely to be followed by a complete engine failure in a short time period, and the safest course of action is to assume that it will happen.

**In the following procedures, the words “failure” and “power loss”, as related to an engine, shall be used interchangeably, to mean either full or partial (imminent) engine failure.**

**CONTROL FLOW (ABCD flow / engine failure in-flight SOP)**

**NOTE**

Whenever the engine fails (completely or partially), the first and foremost goal is establishing and maintaining aircraft control at best glide airspeed. At low altitudes, any other course of action other than a relatively straight descent to a landing may be impossible. Reducing the pitch and an accompanying descent **MUST** be accepted to maintain best glide airspeed.

**This CONTROL FLOW SOP is the foundation of engine-out procedures and must be performed from memory, immediately and without hesitation when engine power loss is experienced.**

The steps following this SOP, such as troubleshooting, restart and forced landing/ditching, depend on a particular situation and will be addressed in the individual emergency procedures.

***CONTROL FLOW (engine failure in-flight immediate action SOP)***

- AIRSPEED ..... *BEST GLIDE***
  - ▶ ***POSITIVELY PITCH for V<sub>G</sub> and MAINTAIN*** ..... *COMPLETE*
  - ▶ ***TRIM (if prolonged flight at V<sub>G</sub>)*** ..... *BEST GLIDE PITCH ATTITUDE*
- BEST FIELD..... *HEAD TOWARDS***
  - ▶ ***DESCENT AT BEST GLIDE***..... *ACCEPTED*
  - ▶ ***SAFE BANK ANGLE*** ..... *MAINTAINED*
- CHECKLIST ..... *CONSIDER / EXECUTE***  
*(evaluate if ground contact is imminent, runway remains, or landing)*
  - ▶ ***FUEL PUMP*** ..... *ON*
  - ▶ ***FLAPS***..... *AS REQUIRED*
- DECLARE..... *EMERGENCY***
  - ▶ ***ATC / OTHER A/C / 121.5 / TRANSPONDER / ELT*** ..... *AS REQUIRED*

***CONTROL FLOW (engine failure in-flight immediate action SOP),  
EXPANDED***

- AIRSPEED ..... *BEST GLIDE***  
 If uncommanded full or partial power reduction is detected, or other indications of either complete or partial power loss of the engine appear, achieve and maintain best glide airspeed.
  - ▶ ***POSITIVELY PITCH for V<sub>G</sub> and MAINTAIN*** ..... *COMPLETE*  
 If at airspeeds above V<sub>G</sub>, initially hold level pitch and allow the airplane to slow down to V<sub>G</sub>. If at airspeed at or below V<sub>G</sub>, such as during climb, apply as much forward pressure as necessary on the yoke to achieve and maintain V<sub>G</sub>. The changes in control pressures may be significant.

- ▶ **TRIM (if prolonged flight at  $V_G$ ) ..... BEST GLIDE PITCH ATTITUDE**  
Unless ground contact is imminent and if continued flight at  $V_G$  is anticipated, TRIM for BEST GLIDE PITCH ATTITUDE, to minimize pilot workload during subsequent steps. Once the trim is set, only small adjustments to pitch attitude and control pressures will be required to maintain  $V_G$ .

**BEST FIELD ..... HEAD TOWARDS**

Head towards the best landing field that safety considerations and situation allows. It does not mean a radical turn if one is inadvisable. The best field may be a patch of clear ground straight ahead during very low altitude engine failures, even though there is a runway behind you. In the same spot over the ground, an aircraft at a safely higher altitude could consider turning for the runway, which would then become the best field. A particular situation and all available options must be considered.

- ▶ **DESCENT AT BEST GLIDE ..... ACCEPTED**  
Accept that a descent at best glide cannot be avoided and must be maintained until touchdown flare is initiated, regardless of the field chosen.
- ▶ **SAFE BANK ANGLE ..... MAINTAIN**  
Maintain safe bank angles while maneuvering. Remember that stall speed increases as bank angle increases. Maintain coordination, except in those situations where intentional forward slip at a safe airspeed becomes necessary to land in the available emergency landing area.

**CHECKLIST ..... CONSIDER / EXECUTE**  
(evaluate if ground contact is imminent, runway remains, or landing)

Consider if time and situation allow for a checklist flow execution, which checklist to execute, and then execute the appropriate checklist flow by memory. Evaluate if ground contact is imminent or sufficient runway is available for landing and decision is made to land immediately. Time permitting, backup the performed emergency flow with the checklist in hand.

- ▶ **FUEL PUMP ..... ON**  
If the engine failure is due to insufficient fuel pressure or failure of the engine driven fuel pump, the simple action of turning the fuel pump ON may restore engine power. With the aircraft under positive control at best glide airspeed, perform this step if appropriate to the situation.
- ▶ **FLAPS ..... AS REQUIRED**  
When established on a heading toward the best available field, immediately evaluate flap requirements. During high altitude engine failures when prolonged glide is desired, flaps will typically not be used until necessary for landing. However, in certain cases, when the best and only appropriate field is straight ahead, the approach is clearly high and a turn is inadvisable, flaps may be used immediately to land in the available landing area distance. With the aircraft under positive control at best glide airspeed, perform this step if appropriate to the situation.



**DECLARE ..... EMERGENCY**

With the aircraft under control, declare your emergency so that priority and assistance can be received, both during and after the landing. Especially after a survivable approach in an inhospitable terrain, it is critical that someone comes looking for you as soon as possible. Declaring your emergency while still in the air will avoid situations where no one knows that you are in need of assistance, and so no one comes looking. Do not rely on the automatic ELT activation alone, rather, view the ELT as a backup only to the pilot emergency declaration action.

**► ATC / OTHER A/C / 121.5 / TRANSPONDER / ELT ..... AS REQUIRED**

Use the most appropriate and complete means of declaring an emergency. At a towered airport, or when in two-way communications with any ATC facility, this could be as simple as transmitting to the tower / ATC. Outside of ATC communications, over terrain or at a non-towered airport, especially at night, other means must be used including contacting other a/c, transmitting on 121.5, activating the transponder on 7700 and, if landing off airport, activating the ELT.

**ENGINE FAILURE ON RUNWAY**

▶ **AIRCRAFT CONTROL** ..... **MAINTAIN**  
**THROTTLE** ..... **CLOSED**  
**STOP** ..... **STRAIGHT AHEAD**

**- IF INADEQUATE RUNWAY REMAINS -**

**BRAKING** ..... **MAXIMUM**  
**MIXTURE** ..... **IDLE CUT-OFF**  
**MASTER SWITCH** ..... **OFF**  
**MAGNETOS** ..... **OFF**  
**FUEL SHUTOFF VALVE** ..... **OFF**  
**STOP** ..... **AFTER AVOIDING OBSTACLES**  
▶ **AIRCRAFT** ..... **EVACUATE**

**ENGINE FAILURE ON RUNWAY, EXPANDED**

▶ **AIRCRAFT CONTROL** ..... **MAINTAIN**  
*The first priority is to maintain aircraft control. The goal is to bring the aircraft to a safe stop, preferably on the runway, while avoiding any obstacles.*

**THROTTLE** ..... **CLOSED**  
Reduce the throttle to idle immediately once decision to abort has been made.

**STOP** ..... **STRAIGHT AHEAD**  
Stop on the remaining runway by utilizing brakes as appropriate to the remaining runway length and condition.

**- IF INADEQUATE RUNWAY REMAINS -**

Evaluate if stopping on the remaining runway is possible.  
If any doubt exists, perform the following steps.

**BRAKING** ..... **MAXIMUM**  
Apply maximum effective braking to stop in the shortest possible distance.

**MIXTURE** ..... **IDLE CUT-OFF**  
Continue securing the engine by moving the mixture all the way back to IDLE CUT-OFF.

**MASTER SWITCH** ..... **OFF**  
Turn the electrical master switch OFF to minimize risk of electrical spark from energized electrical system.

**MAGNETOS** ..... **OFF**  
Continue securing the engine by moving the IGNITION key to the OFF position, which will turn the MAGNETOS OFF.



**FUEL SHUTOFF VALVE .....OFF**

Turn the FUEL SHUTOFF VALVE OFF (pull fully out) to cut the fuel at the source and thus minimize the risk of fire.

**STOP ..... AFTER AVOIDING OBSTACLES**

Use steering as necessary to avoid any obstacles while bringing aircraft to a stop in shortest possible distance.

**► AIRCRAFT ..... EVACUATE**

*Without unnecessary delay, evacuate the aircraft when it is safe to do so.*

**ENGINE FAILURE IN-FLIGHT**

AIRSPEED .....BEST GLIDE  
BEST FIELD ..... HEAD TOWARDS  
CCHECKLIST ..... CONSIDER / EXECUTE  
DECLARE .....EMERGENCY

**- IF LANDING IS IMMINENT -**

ENGINE SECURE IN-FLIGHT CHECKLIST ..... (as required) EXECUTE

**- IF AT OR ABOVE 1,000 AGL -**

ENGINE TROUBLESHOOT IN-FLIGHT Checklist..... EXECUTE  
 (situation permitting)

**ENGINE FAILURE IN-FLIGHT,  
EXPANDED**

**CONTROL FLOW SOP**

AIRSPEED .....BEST GLIDE  
BEST FIELD ..... HEAD TOWARDS  
CCHECKLIST MEMORY FLOW ..... CONSIDER / EXECUTE  
DECLARE .....EMERGENCY

*In the above steps, perform the CONTROL FLOW SOP as discussed earlier in this chapter.*

**- IF LANDING IS IMMINENT -**

These are general guidelines only. Not all situations can be foreseen. In general, when departing a runway during engine power loss shortly after rotation and during initial climb, a straight ahead landing will be inevitable. Best glide airspeed must be achieved and adhered to. Doing so will provide the airplane with maximum glide distance, allow a landing under control on whatever available surface, and the best outcome.

**ENGINE SECURE IN-FLIGHT CHECKLIST ..... (as required) EXECUTE**

When it is determined that a touchdown is imminent and the pilot is committed to a course of action, maintain aircraft control and secure the engine, time and situation permitting, to minimize the risk of fire should the aircraft become damaged after touchdown.

**WARNING**

**Maintain best glide airspeed and aircraft coordination at all times while performing flows/checklists and maneuvering for a landing.**

**If obstacles are encountered in the last moments before touchdown, they can be avoided provided the aircraft has sufficient airspeed.**

**Trying to stretch the glide by increasing the pitch beyond what is required to maintain best glide will result in increased rate of descent and, eventually, a stall and uncontrolled descent into terrain.**

**- IF AT OR ABOVE 1,000 AGL -**

The altitude guidance is provided as a general guideline only. Not all situations can be foreseen. Best glide airspeed must be achieved and adhered to, regardless. In general, with aircraft safely under control at best glide airspeed at or above 1,000 AGL, engine troubleshoot and restart attempt should be considered, situation permitting.

**ENGINE TROUBLESHOOT IN-FLIGHT Checklist .... (situation permitting) EXECUTE**

IF the decision is made to attempt to revive the inoperative engine, when time and situation permits, perform the ENGINE TROUBLESHOOT IN-FLIGHT Checklist.

**CAUTION**

*The altitudes are provided for general guidelines only. The decision to troubleshoot rests entirely with the PIC, depending on the actual situation, regardless of altitude.*

**ENGINE TROUBLESHOOT IN-FLIGHT**

- ▶ **AIRCRAFT CONTROL** ..... **MAINTAIN**
- FUEL PUMP** ..... **ON**
- FUEL SELECTOR** ..... (feel for detent) **BOTH**
- FUEL SHUTOFF VALVE** ..... **ON**
- MIXTURE** ..... **FULL RICH**
- THROTTLE** ..... **OPEN HALF WAY**
- MAGNETOS (try EACH SINGLE magneto)** ..... **CYCLE L / R / BOTH**
- ▶ **STARTER (if prop is stopped)** ..... **ENGAGE**
- **IF ENGINE POWER NOT RESTORED -**
- ENGINE SECURE IN-FLIGHT Checklist** ..... **EXECUTE**

**ENGINE TROUBLESHOOT IN-FLIGHT, EXPANDED**

▶ **AIRCRAFT CONTROL** ..... **MAINTAIN**  
*The first priority is to maintain aircraft control while performing any checklists or flows. Consider the safest course of action for the flight outcome before spending time troubleshooting.*

**FUEL PUMP** ..... **ON**  
 Turn the fuel pump ON immediately and leave it on. If the engine failure is due to insufficient fuel pressure or failure of the engine driven fuel pump, the simple action of turning the fuel pump ON may restore engine power.

**FUEL SELECTOR** ..... **(feel for detent) BOTH**  
 Ensure that the FUEL SELECTOR is on BOTH and securely engaged in the detent.

**FUEL SHUTOFF VALVE** ..... **ON**  
 Ensure that the fuel shutoff valve is ON (FULL IN).

**MIXTURE** ..... **FULL RICH**  
 Check that the mixture is FULL RICH (full forward).

**THROTTLE** ..... **OPEN HALF-WAY**  
 Set the throttle to approximately HALF-WAY open position, to allow air to enter the engine for possible restart.

**MAGNETOS (try EACH SINGLE magneto)** ..... **CYCLE L / R / BOTH**  
 It is possible for one bad magneto to disable the engine despite the second remaining good magneto. Try cycling the engine magnetos to eliminate bad magneto as a possible cause for the power loss. First, check that both magnetos are ON, with the ignition switch on BOTH. Then, turn the ignition key to the LEFT MAGNETO (L). If power is not restored, turn the ignition key to the RIGHT MAGNETO (R). If power is not restored, turn the ignition key back to BOTH.

*If the engine begins to run with the ignition switch in either L or R position, leave the switch in that position and do not move it again until after flight is terminated.*

► **STARTER (if prop is stopped) .....ENGAGED**

*If the propeller is stopped, which may occur at very low airspeeds, crank the engine to allow the engine shaft to turn and the propeller to windmill, which is a pre-requisite for a successful engine restart.*

**- IF ENGINE POWER NOT RESTORED -**

If all troubleshooting attempts have failed to restore engine power and it is advantageous to discontinue further troubleshooting attempts and secure the engine, perform the following step(s).

**ENGINE SECURE IN-FLIGHT Checklist ..... EXECUTE**

If troubleshooting attempts have failed to restore the power, or if time and situation preclude completion of engine troubleshoot, perform the ENGINE SECURE IN-FLIGHT Checklist.

**ENGINE SECURE IN-FLIGHT**

▶ <b>AIRCRAFT CONTROL</b> .....	<b>MAINTAIN</b>
<b>FUEL SHUTOFF VALVE</b> .....	<b>OFF</b>
<b>MIXTURE</b> .....	<b>IDLE CUT-OFF</b>
<b>FUEL PUMP</b> .....	<b>OFF</b>
<b>MAGNETOS</b> .....	<b>OFF</b>
<b>FORCED LANDING / DITCHING CHECKLIST</b> .....	<b>EXECUTE</b>

**ENGINE SECURE IN-FLIGHT,  
EXPANDED**

▶ **AIRCRAFT CONTROL** ..... **MAINTAIN**

The first priority is to maintain aircraft control while performing any checklists or flows. Consider the safest course of action for the flight outcome before securing the engine.

**FUEL SHUTOFF VALVE**..... **OFF**  
Turn the red fuel shutoff valve next to the fuel selector OFF (pull FULL OUT).

**MIXTURE**..... **IDLE CUT-OFF**  
Move the mixture to IDLE CUT-OFF (FULL OUT) to cut the fuel supply to the engine.

**FUEL PUMP** ..... **OFF**  
Turn the fuel pump OFF to prevent fuel from entering the secured engine.

**MAGNETOS** ..... **OFF**  
Turn the IGNITION switch to OFF. This turns off both magnetos and cuts the spark to the engine.

**FORCED LANDING / DITCHING CHECKLIST**..... **EXECUTE**  
Execute the appropriate forced landing or ditching checklist flow, as time allows and situation requires.

***FIRES and EMERGENCY DESCENT***

**ENGINE FIRE IN-FLIGHT**

▶ <b>AIRCRAFT CONTROL</b> .....	<b>MAINTAIN</b>
<b>FUEL SHUTOFF VALVE</b> .....	<b>OFF</b>
<b>MIXTURE</b> .....	<b>IDLE CUT-OFF</b>
<b>FUEL PUMP</b> .....	<b>OFF</b>
<b>MASTER SWITCH</b> .....	<b>OFF</b>
<b>MAGNETOS</b> .....	<b>OFF</b>
<b>CABIN HEAT and AIR (except overhead vents)</b> .....	<b>CLOSED</b>

**EMERGENCY DESCENT (SOP)** ..... **EXECUTE**

**ENGINE FIRE IN-FLIGHT,  
EXPANDED**

▶ **AIRCRAFT CONTROL** ..... **MAINTAIN**  
*Maintain positive aircraft control while securing the problem engine and, altitude permitting, preparing for single engine emergency descent.*

**FUEL SHUTOFF VALVE** ..... **OFF**

Turn the Fuel Shutoff Valve OFF (FULL OUT) to cut the fuel at the source.

**MIXTURE** ..... **IDLE CUT-OFF**

Move the mixture to IDLE CUT-OFF (FULL OUT) to cut the fuel supply to the engine.

**FUEL PUMP** ..... **OFF**

Turn the fuel pump OFF to prevent fuel from entering the engine.

**MASTER SWITCH** ..... **OFF**

Turn both sides of the Master Switch OFF to cut a potential source of ignition to the engine.

**MAGNETOS** ..... **OFF**

Turn the IGNITION switch to OFF. This turns off both magnetos and cuts the spark to the engine.

**CABIN HEAT and AIR (except overhead vents)** ..... **CLOSED**

Close the cabin heat and air knobs (push FULL IN after depressing the button), located next to the co-pilot yoke (right side). Close all the other air vents except for the overhead vents, as the smoke is not likely to enter through the overhead vents.

**EMERGENCY DESCENT (SOP)** ..... **EXECUTE**

If altitude and situation permit, immediately execute Emergency Descent SOP to create an incombustible mixture and expedite putting out the fire, then land as soon as practical.

**EMERGENCY DESCENT (SOP)**

Emergency descent is a course of action elected by the PIC in situations where rapid loss of altitude and landing as soon as practical is desired, such as during fire, serious passenger health condition or other emergencies.

***EMERGENCY DESCENT (SOP)***

**THROTTLE** ..... **IDLE**  
**MIXTURE** (if with engine power, or simulating emergencies) ..... (as required) **RICH**  
**FLAPS** ..... **UP**  
 ► **MODERATE BANK**..... (as required) **INITIATE**  
**AIRSPEED**..... **INCREASE**

***EMERGENCY DESCENT (SOP),  
EXPANDED***

**THROTTLE** ..... **IDLE**

Reduce the throttle to IDLE to minimize thrust.

**MIXTURE** (if with engine power, or simulating)..... (as required) **RICH**

When performing an emergency descent with engine power, or when simulating emergencies, set the mixture to RICH to ensure smooth engine operation during and after the descent. In an actual emergency, such as engine fire, where the mixture lever has been intentionally set to IDLE CUT-OFF, be careful not to accidentally move the mixture lever and possibly restart the fire.

**FLAPS**..... **UP**

In situations requiring maximum increase in airspeed, check that the flaps are UP. If the flaps are down, bring them up in increments during initial stages of the descent.

► **MODERATE BANK**..... (as required) **INITIATE**

Situation, terrain and altitude permitting, consider using a moderate bank to clear the descent area and to increase the descent rate due to increased load factor without additional airspeed increase.

**AIRSPEED** .....(as required) **INCREASE**

Pitch to increase the airspeed to Vno (maximum airspeed during simulated emergencies), or as appropriate to the situation (during actual emergencies).

**ENGINE FIRE ON THE GROUND**

**- IF ENGINE HAS NOT STARTED -**

- STARTER ..... ENGAGE/CONTINUE CRANKING
- FUEL PUMP ..... OFF
- THROTTLE..... FULL OPEN
- MIXTURE ..... IDLE CUT-OFF
- CRANKING..... CONTINUE
- FUEL SHUTOFF VALVE (while holding the starter) ..... OFF
- ▶ *EVACUATION (after a few seconds)* ..... COMPLETE

**- IF ENGINE HAS STARTED -**

- THROTTLE..... FULL OPEN
- MIXTURE ..... IDLE CUT-OFF
- FUEL SHUTOFF VALVE ..... OFF
- ▶ *EVACUATION (after a few seconds)* ..... COMPLETE

▶ **AIRCRAFT** ..... **EVACUATE**

**ENGINE FIRE ON THE GROUND,  
EXPANDED**

**- IF ENGINE HAS NOT STARTED -**

If the engine has not started and there are signs of engine fire, perform the following steps. Even if it feels counterintuitive, resist the natural tendency to release the starter switch. Continue cranking the starter, as the following few seconds will determine if the fire can be drawn back into the engine. Consult POH / AFM.

- STARTER** ..... **ENGAGE and CONTINUE CRANKING**  
Engage cranking of the starter and HOLD key in the START position, continuously cranking the engine to try to draw the fire into the engine.
- THROTTLE** ..... **FULL OPEN**  
Open throttle (FULL FORWARD)
- FUEL PUMP** ..... **OFF**  
Verify the fuel pump is OFF.
- MIXTURE** ..... **IDLE CUT-OFF**  
Move the mixture to IDLE CUT-OFF (FULL OUT) to cut the fuel supply to the engine.
- CRANKING** ..... **CONTINUE**  
Continue cranking the engine throughout the previous and subsequent steps.

**FUEL SHUTOFF VALVE (while holding the starter) ..... OFF**

Turn the fuel shutoff valve OFF (pull FULL OUT) while continuing to crank the starter.

▶ **EVACUATION (after a few seconds) ..... COMPLETE**

*Evaluate the results and if the fire is not out within a few seconds, immediately evacuate the aircraft and obtain external assistance.*

**- IF ENGINE HAS STARTED -**

If the engine has started and there are signs of engine fire, perform the following steps, simultaneously attempting to draw the fire back into the engine and cutting off further fuel supply to the engine. Consult POH / AFM.

**THROTTLE ..... OPEN**

Open throttle to increase RPM and attempt to draw the fire into the engine.

**MIXTURE ..... IDLE CUT-OFF**

Move the mixture to IDLE CUT-OFF (FULL OUT) to cut the fuel supply to the engine.

**FUEL SHUTOFF VALVE ..... OFF**

Turn the fuel shutoff valve OFF (pull FULL OUT).

▶ **EVACUATION (after a few seconds) ..... COMPLETE**

*Evaluate the results and if the fire is not out within a few seconds, immediately evacuate the aircraft and obtain external assistance.*

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▶ **AIRCRAFT ..... EVACUATE**

*EVEN IF THE FIRE APPEARS TO BE OUT, EXPEDITE EVACUATING THE AIRCRAFT AND OBTAINING EXTERNAL ASSISTANCE ON THE CHANCE THAT THE FIRE MAY RESTART AND CONTINUE.*

**WING FIRE IN-FLIGHT**

**BEACON / LDG / TAXI / NAV / STROBES** .....OFF  
**PITOT HEAT** .....OFF  
**SIDESLIP** ..... **FLAMES AWAY FROM CABIN / FUEL TANK**

**WING FIRE IN-FLIGHT,  
EXPANDED**

**BEACON / LDG / TAXI / NAV / STROBES**.....OFF

Turn off ALL lights and electrical switches associated with electrical wiring in the wings. Specifically, turn off the BEACON, the LANDING, the TAXI, the NAV and the STROBE lights, to eliminate a source of ignition to the fire.

**PITOT HEAT** .....OFF

Turn off the PITOT HEAT switch to eliminate a potential source of ignition to the fire.

**SIDESLIP** ..... **FLAMES AWAY FROM CABIN / FUEL TANK**

Sideslip the airplane to keep the flames away from the cabin and the fuel tank, if possible. Consider the possibility and practicality of Emergency Descent, if time and situation permit.

**CABIN ELECTRICAL FIRE or SMOKE IN-FLIGHT**

MASTER SWITCH..... OFF  
 CABIN HEAT, AIR and OVERHEAD VENTS ..... CLOSED  
 FIRE EXTINGUISHER..... (as required) ACTIVATE  
 ALL ELECTRICAL SWITCHES ..... (as required) OFF  
 NEAREST AIRPORT ..... DIVERT IMMEDIATELY  
 ► *EMERGENCY DESCENT* ..... (as required) EXECUTE

CABIN (when fire out) ..... VENTILATE  
 ► *LAND*..... AS SOON AS POSSIBLE

**CABIN ELECTRICAL FIRE or SMOKE IN-FLIGHT, EXPANDED**

**MASTER SWITCH..... OFF**  
 Immediate action must be taken if smoke and/or flames are visible in the cabin. The most likely fire source in the cabin would be the electrical system. Turn the Master switch OFF if it has been determined that the electrical system has likely caused the fire.

**CABIN HEAT, AIR and OVERHEAD VENTS .....CLOSED**  
 Close ALL cabin HEAT and AIR vents to stop fresh oxygen from entering the cabin and potentially feeding the fire.

**FIRE EXTINGUISHER..... (as required) ACTIVATE**  
 Determine the source of fire and activate the fire extinguisher. Do not delay further action. Situations involving smoke and fumes in the cockpit are known to deteriorate extremely fast if immediate action is not taken. Do not risk worsening or restarting the fire by delaying, or turning on the electrical equipment if the flight and the emergency can be concluded safely without it.

**ALL ELECTRICAL SWITCHES .....(as required) OFF**  
 Turn all electrical switches to OFF position.

**WARNING**

Execute an immediate landing at the nearest suitable airport. Accomplish appropriate emergency procedures, but do not delay the landing for any reason.

**NEAREST AIRPORT.....DIVERT IMMEDIATELY**  
 Immediately divert to the nearest suitable airport to terminate the flight as soon as possible.

► **EMERGENCY DESCENT** ..... (as required) EXECUTE  
*If the situation is deteriorating and the decision is made to put the aircraft down on the ground as quickly as possible for safety, initiate the Emergency Descent SOP as described in this chapter. This action may be necessary if the fire cannot be controlled.*



**CABIN (when fire is out)..... VENTILATE**

Ventilate the cabin of smoke, fumes and fire extinguisher discharge once it is determined that the fire is out.

▶ **LAND ..... AS SOON AS POSSIBLE**

*While it is desirable to land at an airport, there may be situations where a forced off-airport landing must be considered for the safest outcome for the aircraft occupants, as previously discussed.*

## OFF-AIRPORT LANDINGS

In the situations where a forced landing/ditching situation becomes necessary, *the flight crew must accept that an off-airport landing is required, that this is a real situation, and that it is happening NOW.* Doing so in a decisive manner clarifies the tasks at hand and reduces the risk of denial of the situation, resultant poor planning, and an unsuccessful/unsurvivable outcome. The crew should broadcast the situation (“squawk and talk”) and enlist support from ATC, company dispatch, or other aircraft, as appropriate to the situation.

### **WARNING**

**In a situation where a forced landing/ditching is deemed the only available option, the FIRST AND ONLY PRIORITY IS THE SAFETY AND SURVIVABILITY OF THE OCCUPANTS.**

### **FORCED LANDING**

▶ **ENGINE** ..... SECURE  
 RADIO (ATC/121.5) TRANSMIT ..... “MAYDAY”  
 TRANSPONDER ..... 7700  
 ELT (if off airport) ..... ACTIVATE  
 LOOSE ITEMS..... SECURE  
 SEATBELTS ..... SECURE  
 WING FLAPS..... (as required) SET  
 MASTER SWITCH (on final approach) ..... OFF

**- - WHEN LANDING IS ASSURED, PRIOR TO TOUCHDOWN -**

DOORS..... UNLATCHED  
 ▶ **AIRCRAFT** ..... EVACUATE

### **FORCED LANDING, EXPANDED**

- ▶ **ENGINE** ..... SECURE  
*Ensure that the engine is secure in accordance with the Engine Secure In-Flight Checklist or Engine Fire In-Flight Checklist, as appropriate.*
- ▶ *With aircraft under control, declare your emergency so that priority and assistance can be received, both during and after the landing. Especially after a survivable approach in an inhospitable terrain, it is critical that someone comes looking for you as soon as possible. Declaring your emergency while still in the air will avoid situations where no one knows that you are in need of assistance, and so no one comes looking.*

- ▶ *Some of the steps below presume electrical power is available, as it would be after Engine Secure In-Flight Checklist. In situations after Engine Fire In-Flight Checklist, electrical power would not be available. The PIC shall make a determination for the best course of action and weigh the risks. The Master Switch then could be activated momentarily to use the radio and the flaps, and then turned off, if appropriate. Alternatively, the landing could be continued without reactivating the electrical system, if, in PIC judgment, there is risk of restarting the fire.*

**RADIO (ATC/121.5) TRANSMIT ..... “MAYDAY”**

At a towered airport, or when in two-way communications with any ATC facility, transmit your emergency to the tower / ATC using accepted terminology (Refer to AIM). Outside of ATC communications, over terrain or at a non-towered airport, especially at night, transmit on 121.5, contact other a/c, etc.

**TRANSPONDER ..... 7700**

Activating the transponder on 7700 will alert any ATC facility having monitoring capabilities that there is an aircraft in distress, and could serve as the means of alerting ATC if radio communication is not possible.

**ELT (if off airport) ..... ACTIVATE**

if landing off airport, activate the ELT with the remote switch on the aircraft panel. Do not rely on the automatic ELT activation alone, but rather view the ELT as a backup only to the pilot emergency declaration action. Even if electrical power is not available, the ELT can still be activated with the switch, and may be the only available means of transmitting on emergency frequency.

**LOOSE ITEMS ..... SECURE**

Secure all loose items to prevent injury during touchdown and subsequent, possibly very rapid, deceleration. Any loose item can become a dangerous projectile or an object to be struck by aircraft occupants during the rapid deceleration following the touchdown.

**SEATBELTS / HARNESSSES ..... SECURE**

Ensure that all occupants have secured the seatbelts and shoulder harnesses properly positioned and tightened around their bodies. Proper shoulder harness position is critical in order to prevent deceleration related injuries.

- ▶ *If coats / jackets are available, fold them and utilize them as cushions between aircraft occupant heads and potential objects to be struck (e.g. control yoke).*

**FLAPS ..... (as required) SET**

Consider the amount of flap necessary for a safe approach and landing. In all cases, the priority is landing and stopping the airplane in the available landing area, with the main concern being the safety of the occupants, not the airplane condition after the landing.

**MASTER SWITCH (on final approach) ..... OFF**

Once established on final approach, turn both sides of the Master switch OFF to eliminate the battery and the alternator as potential fire ignition sources after touchdown.

- **WHEN LANDING IS ASSURED, PRIOR TO TOUCHDOWN** -  
Perform the following steps when landing is assured and on short final.

**DOORS..... UNLATCHED**

Unlatch the doors before touchdown, to prevent the doors from getting jammed during the landing, and to facilitate evacuation after aircraft comes to a stop.

**► AIRCRAFT ..... EVACUATE**

*Even if there appears to be no fire after the aircraft comes to a stop, expedite evacuating the aircraft and obtaining external assistance. There is a chance that fuel is leaking from ruptured fuel tanks and fire risk exists.*

**DITCHING**

**WARNING**

“The use of **power** in ditching is so important that when it is certain that the coast cannot be reached, the pilot should, if possible, **ditch before fuel is exhausted.**”

“Remember one axiom– *AVOID THE FACE OF A SWELL.*”

**From AIM 6-3-3: Ditching Procedures**

The Aeronautical Information Manual highlights the following as important for any flight crew planning to ditch the aircraft:

- It is vital to determine the condition of the water, and remember that the direction of the swells may not follow the direction of the wind. Landing into the wind without consideration of swell direction or directions (with multiple swell systems) greatly increases the risk of aircraft damage and loss of the occupants.
- Flight crews should avoid landing on the “face” of a swell, which is the side facing the observer regardless of swell direction. Doing so may result in the aircraft being rapidly swamped or thrown into the air, only to drop into the next swell.

If engine power remains available, fly over the intended landing area at a low enough but safe altitude to survey the sea surface and wind conditions.

- If landing parallel to the swells, there is little difference whether the aircraft lands on top of the crest or in the trough. Attempt to land at the top or on the backside of the swell, and select the heading that allows the greatest into-the-wind component.
- If landing in a confused sea (multiple swell systems moving in various directions) select the direction of the primary swell as the determining factor, and attempt to land on the backside of the secondary swell, if possible.
- If power is not available, conduct the approach so as to arrive over the water with enough airspeed to break the glide earlier and more gradually before the aircraft touches down.
- Once the pilot sees a stretch of water that appears favorable, cut power or, if power is not available, pitch up slightly to induce the stall and touch down at the best recommended speed as fully stalled as possible.

**NOTE**

These ditching procedures are based on the best available information and have not been demonstrated in an actual aircraft. Refer to AIM and other official publications.

**DITCHING**

▶ **ATC EMERGENCY NOTIFICATION** ..... **COMPLETE**  
**SWELL FACE** ..... **AVOID**

**- DETERMINE APPROACH DIRECTION -**

**LIGHT WINDS** ..... **PARALLEL TO SWELLS**  
**HIGH WINDS** ..... **INTO THE WIND**

**WING FLAPS** ..... **DOWN** with power / **UP** with no power  
**POWER** (if available) ..... **MINIMUM RATE OF DESCENT (300 FPM)**  
**AIRSPEED** ..... **55 KIAS** with power / **65 KIAS** with no power  
**DOORS** ..... **UNLATCHED**  
**TOUCHDOWN** ..... **LEVEL ATTITUDE AT 300 FPM**

**DITCHING,  
EXPANDED**

▶ **ATC EMERGENCY NOTIFICATION** ..... **COMPLETE**  
*Via all available means, **notify ATC** of the emergency:*

- ✓ *Use the **radio** to broadcast: “Mayday-Mayday-Mayday, Tail #, Ditching, Location (include body of water and land reference), # of Souls Aboard” on current frequency (Approach, Tower, etc.) or on 121.5, as appropriate. Continue transmitting and listening for a response as long as time permits.*
- ✓ *Set **transponder** to 7700 and **IDENT**.*
- ✓ *Engage the remote **ELT** switch on the instrument panel.*

**SWELL FACE** ..... **AVOID**  
Remember to avoid the face of a swell!!!

**- DETERMINE APPROACH DIRECTION -**

**LIGHT WINDS** ..... **PARALLEL TO SWELLS**  
**HIGH WINDS** ..... **INTO THE WIND**

Select approach in accordance with sea direction and swell height and type, as recommended by AIM and POH/AFM. Accept a higher crosswind component and avoid flying approach into a swell system if possible. Consult POH/AFM and AIM for specific recommendations.

**WING FLAPS** ..... **DOWN** with power / **UP** with no power  
Use 20-30° of flaps if power is available. If no power is available, approach with flaps UP.

**POWER (if available)..... MINIMUM RATE OF DESCENT (300 FPM)**

If power is available, use it to maintain minimum descent rate all the way through touchdown.

**AIRSPEED ..... 55 KIAS with power / 65 KIAS with no power**

If power is available, maintain 55 KIAS with the recommended flap settings. If no power is available, maintain 65 KIAS with flaps UP.

**DOORS..... UNLATCHED**

Unlatch the doors prior to touchdown.

**TOUCHDOWN..... LEVEL ATTITUDE AT 300 FPM**

Set pitch and bank attitude during touchdown to sea, NOT to horizon. Touchdown in level pitch attitude at established descent rate.