



Commercial Pilot Ground School

Day 15
Emergency Procedures



Agenda

- Emergency Procedures
- Emergency Descent
- Emergency Approach and Landing
- In- Flight Fire
- Partial Power Loss
- Door Opening in Flight
- Asymmetrical Flap Extension
- Emergency Equipment and Survival Gear

Emergency Procedures

- Although modern aircraft are extremely reliable, the possibility of emergencies in flight due to mechanical failure, fuel problems, or pilot error has not been eliminated. Problems resulting from these factors are not common, but they are frequent enough that you should be aware of them and know how to handle them if they occur.



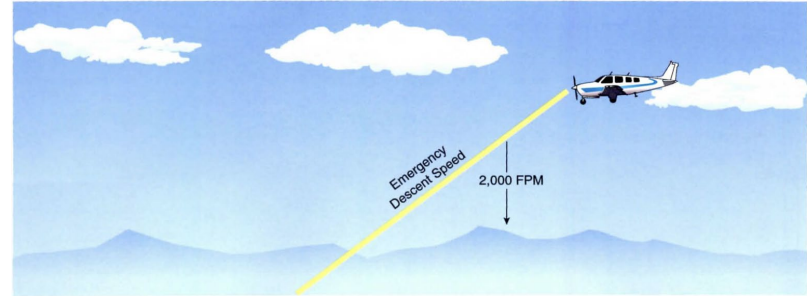
Emergency Procedures

- Unfortunately, not all in-flight emergencies will allow you sufficient time to reference your pilot's operating handbook or checklist. In fact, some emergencies may not be addressed in the POH at all. Therefore, when you fly, you need to be prepared for distress situations by knowing the emergency procedures for your airplane and by using good judgment in responding to the situation.



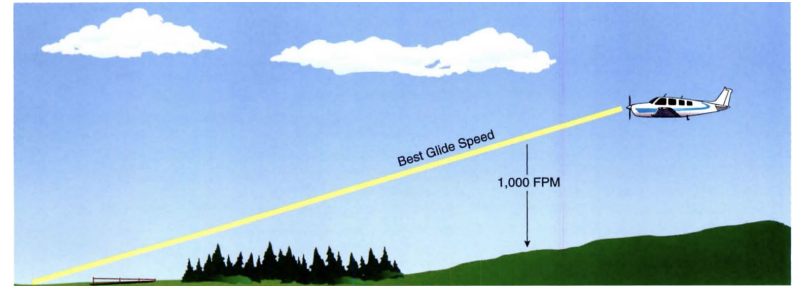
Emergency Descent

- An emergency descent is used to achieve the fastest practical rate of vertical descent to reach a safe altitude or landing during an emergency situation. You may need to perform this maneuver due to an uncontrollable fire, a sudden loss of cabin pressurization, or any other situation demanding an immediate and rapid loss of altitude. Your objective is to descend as quickly as possible without exceeding the airspeed limitations of the airplane.



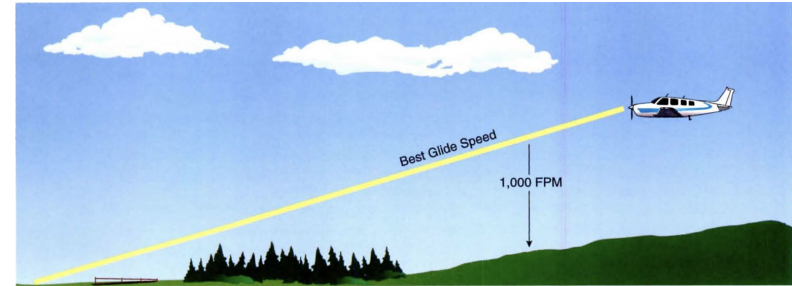
Emergency Descent Procedure

- To initiate the descent, reduce the throttle to idle, then roll into a bank angle of approximately 30 to 45 degrees in order to establish and maintain a positive load factor on the airplane. Doing so will help you remain within the safe operating limits of the airplane, and also will allow you to stay over, and closely observe, a potential landing area. If your airplane is equipped with a controllable propeller, set the prop control to low pitch (high RPM).



Emergency Descent Procedure

- This action allows the propeller to act as an aerodynamic brake preventing excessive airspeed buildup during the descent. Then, if recommended by the manufacturer, lower the landing gear and fully extend the flaps as quickly as practical. The drag produced by extending the landing gear and full flaps serves to increase the descent rate without increasing the airspeed.



Emergency Approach and Landing

- Your own fear of injury or of damage to the airplane may interfere with your ability to act decisively when you are faced with an emergency involving a forced landing. Records show, however, that survival rates favor those pilots who maintain their composure and know how to apply the recommended procedures and techniques that have been developed throughout the years.



Emergency Approach and Landing

- The key to dealing with these fears is to fly the airplane. Concentrate on maintaining your glide speed, adhering to the checklists, and managing resources, and this will help you keep your mind off what might happen and allow you to continue flying the airplane. If you practice simulated emergency procedures enough, you will be more confident in your ability to deal with an emergency approach and landing.



Emergency Approach and Landing

- When practicing emergency descents, make sure you clear the area below before you start. Begin recovery at an altitude high enough to ensure a safe return to level flight. In addition, emergency landings should be practiced only over favorable terrain in the event an actual emergency landing becomes necessary.



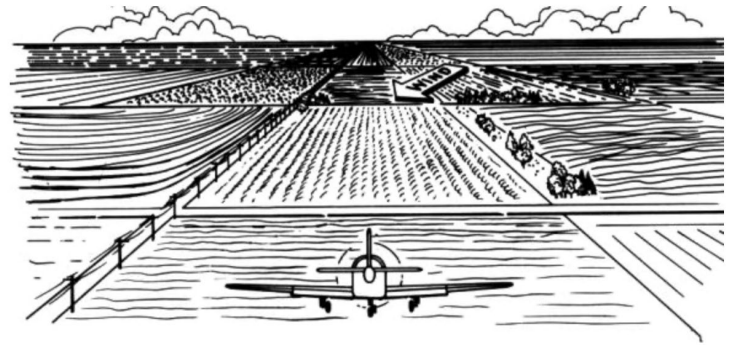
Emergency Approach and Landing

- Normally, in training, when all the prescribed procedures and airspeeds are established and stabilized, the maneuver should be terminated. In airplanes with piston engines, prolonged practice emergency descents should be avoided to prevent the excessive cooling of engine cylinders. Apply carburetor heat as recommended by the manufacturer.



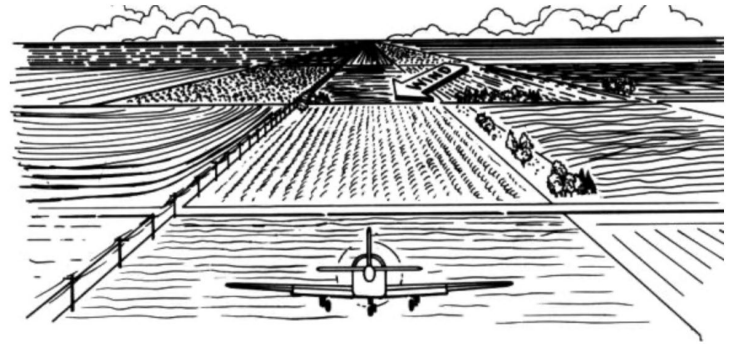
Emergency Approach and Landing

- Many factors are important in successfully executing an emergency approach and landing, the first of which is the landing field. A competent pilot normally is on alert for a suitable forced landing site. Ideally, the best option is an established airport, or hard-packed, long, smooth field with no high obstacles on the approach end and situated so you can land directly into the wind.



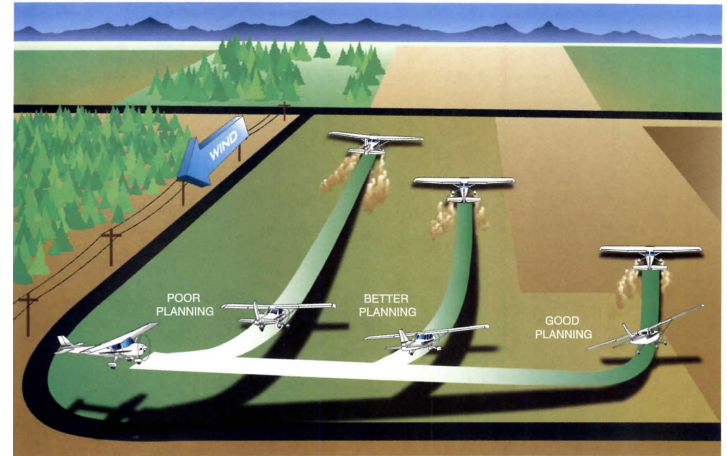
Emergency Approach and Landing

- Since these ideal conditions rarely present themselves, you must select the next best field available. Cultivated fields are generally satisfactory since they will be fairly level. Plowed fields may be acceptable as long as you land parallel to the furrows. If the field appears to be soft or snow covered, you may even consider a gear up landing, if your airplane has retractable gear. Otherwise, you should ensure that the nose wheel is not allowed to sink in and cause the airplane to nose over.



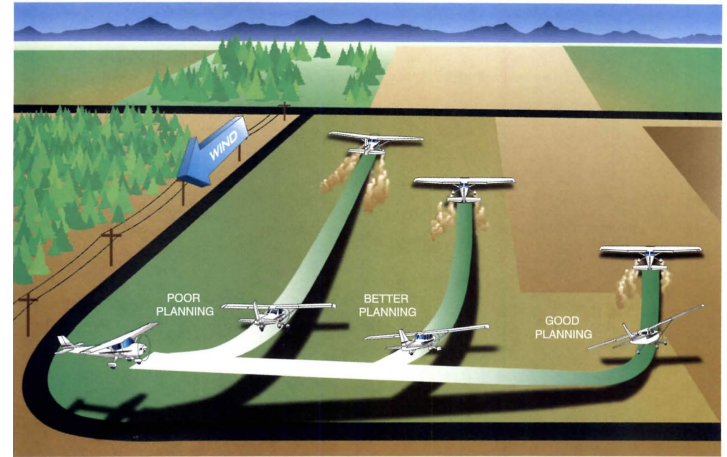
Emergency Approach and Landing

- Field size and wind direction are also important factors to consider in selecting an emergency landing site. Wind direction and speed will affect your airplane's gliding distance over the ground, the track along the ground during the approach, the ground speed at which the airplane touches down, and the distance required for deceleration after the landing.



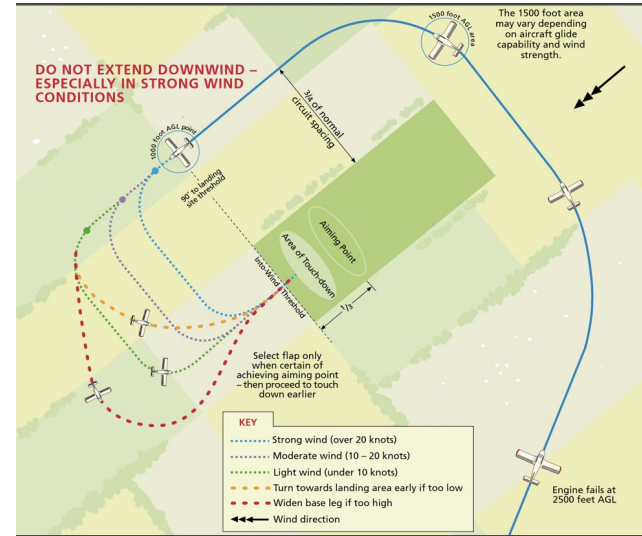
Emergency Approach and Landing

- These factors will be important in selecting your landing field. However, do not allow yourself to be locked into landing directly into the wind. For instance, limited options in an emergency may dictate making a downwind landing to clear obstacles or because the best field may be too far upwind to reach. Furthermore, the field you select should also be wide enough to allow you to extend the base leg before turning final in the event you have misjudged your airspeed or altitude.



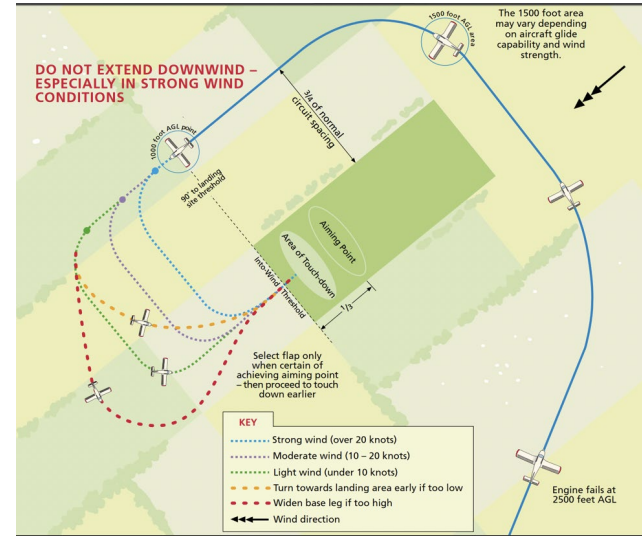
Emergency Approach and Landing

- In most cases, the altitude you have is the primary controlling factor in the successful accomplishment of a forced landing. The lower you are when a power loss occurs, the fewer your options.
- Should an engine failure happen prior to reaching a safe maneuvering altitude, your choice of actions will be limited to flying straight ahead or making shallow turns to avoid objects in your immediate path.



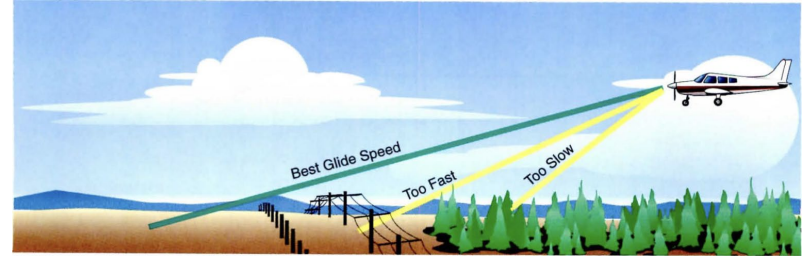
Emergency Approach and Landing

- When a forced landing appears imminent, regardless of your altitude, the main priority is to complete a safe landing in the best field available. This involves getting the airplane on the ground in as near a normal landing attitude as possible without striking obstructions.
- Large, abrupt turns near the ground in an attempt to avoid a poor landing area makes attitude control difficult. You can fly the airplane all the way to the ground and make a relatively normal landing, you increase the chances of completing the procedure without catastrophic consequences to you and your passengers.



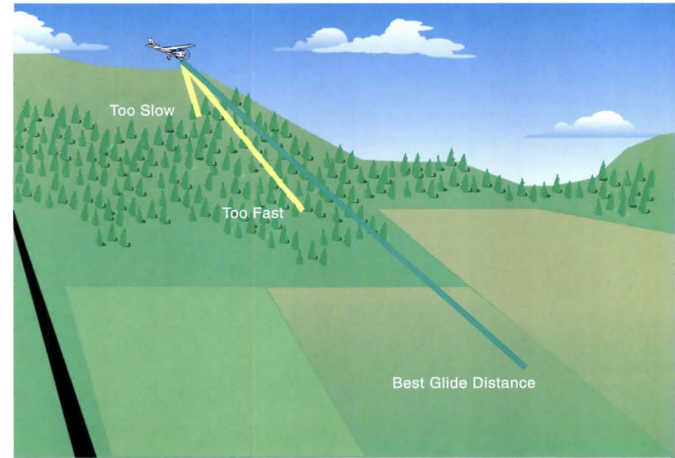
Emergency Approach and Landing

- Performing a safe approach and landing begins with airspeed control. For each particular airplane, the manufacturer recommends an airspeed and configuration that will provide the maximum glide distance. The best glide airspeed, found in the pilot's operating handbook, will determine the distance you can glide and consequently the number of landing areas available to you.
- In some airplanes, the best glide speed may change as gross weight changes. Of course, any deviation from best glide speed may negatively affect your ability to reach a suitable landing site.



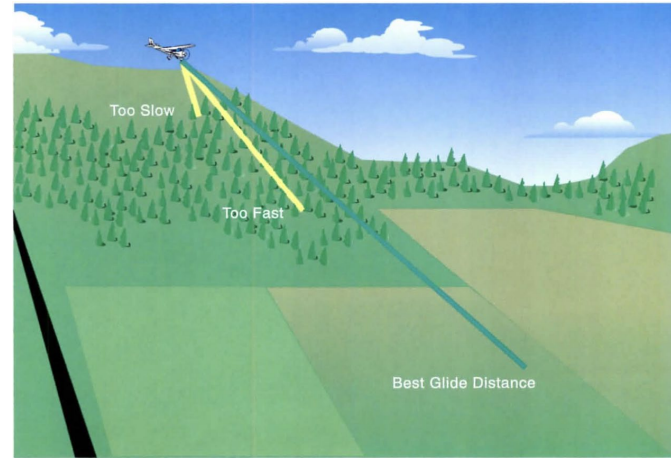
Emergency Approach and Landing

- To achieve best glide speed, the landing gear and flaps should be retracted immediately to eliminate unwanted drag. However, during a power loss immediately after takeoff you may want to keep the gear and flaps extended in preparation for touchdown. If your aircraft is equipped with a controllable propeller, set the prop control to a high pitch, low RPM setting as well.



Emergency Approach and Landing

- Unlike emergency descent procedures in which your focus is on a quick and controlled loss of altitude, your objective during an emergency approach is to remain airborne long enough to set up a safe landing. As a result, it is necessary to eliminate as much drag as possible by cleaning up the airplane. Next, adjust your airplane's pitch attitude to obtain best glide, and trim to maintain that pitch attitude while you follow the emergency checklist procedures.
- Remember, any deviation from best glide speed, as a result of poor pitch attitude control, will reduce your gliding distance and landing options.



Emergency Approach and Landing

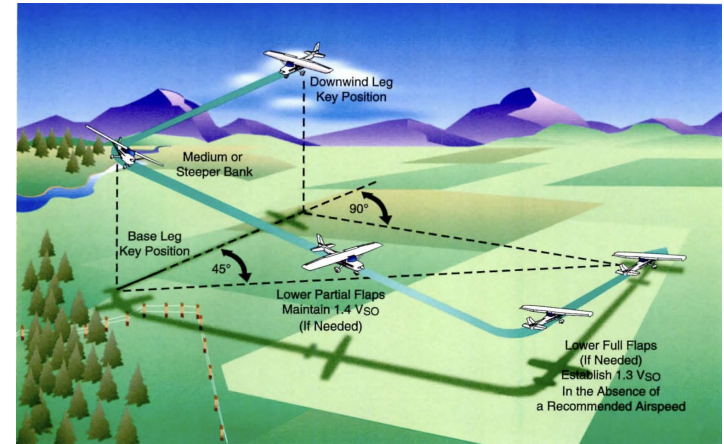
- Once the proper pitch attitude and airspeed have been established, complete the appropriate emergency checklist found in the POH for that particular airplane.
- However, during an engine failure, a generic cockpit checklist may be suitable, particularly in situations occurring at low altitude which do not provide time to reference the POH checklist.

EMERGENCY DESCENT CHECKLIST

- | | |
|--|---|
| 1. THROTTLE | IDLE |
| 2. BANK ANGLE | MAX 45 DEGREES |
| 3. CONTROL WHEEL | FORWARD |
| 4. AIRSPEED | <120 KIAS IN SMOOTH AIR, <V _A IN ROUGH AIR |
| 5. SHALLOW S-TURNS | PERFORM |
| To recover from the dive (no lower than 1500ft) | |
| 6. WINGS | LEVEL |
| 7. CONTROL WHEEL | SMOOTH BACK PRESSURE |
| 8. THROTTLE | AS NECESSARY |
| 9. EMERGENCY DESCENT CHECKLIST | COMPLETE |

Emergency Approach and Landing

- For a successful landing to happen, it is important to set it up properly. The FAA recommends using any combination of normal gliding maneuvers from wings level to spirals to arrive at a point from which a normal landing may be made. This point, or key position, may be abeam your intended touchdown zone or at the turn from base to final depending on whether you are making a 180 degree or 90 degree approach.
- Once at the key position, follow the recommended flap and gear extension procedures in the POH and add full flaps only when you know you can reach the touchdown point. From here, any miscalculations about the glide angle can be corrected with the use of flaps, slipping, or moving the touchdown spot if feasible.



In Flight Fire

- If you experience a fire while in flight, follow the checklist procedures specified in the POH for your airplane and declare an emergency by radio. The checklist may address only one type of in-flight fire or it might include procedures for different types of fires ranging from cabin and electrical fires to engine fires. In any event, follow the appropriate procedure for the situation. In addition, a general recommendation may be of benefit to you during such an emergency.

ENGINE FIRE IN FLIGHT CHECKLIST

1. MIXTURE CONTROL	IDLE CUT-OFF
2. FUEL SHUTOFF VALVE.....	OFF (Out Fully)
3. AUXILIARY FUEL PUMP	OFF
4. STBY BATTERY SWITCH	OFF
5. MASTER SWITCH	OFF
6. CABIN AIR/HEAT.....	OFF
7. AIRSPEED.....	INCREASE/EXTINGUISH
8. FORCED LANDING	EXECUTE
9. ENGINE FIRE IN FLIGHT CHECKLIST	COMPLETE



In Flight Fire

- Should the fire and flames be visible outside the cabin during the emergency descent, attempt to slip away from the fire as much as possible. For example, if the fire is observed on the left side of the airplane, slip to the right. This may move the fire away from the cabin.

ENGINE FIRE IN FLIGHT CHECKLIST

1. MIXTURE CONTROL	IDLE CUT-OFF
2. FUEL SHUTOFF VALVE.....	OFF (Out Fully)
3. AUXILIARY FUEL PUMP	OFF
4. STBY BATTERY SWITCH	OFF
5. MASTER SWITCH	OFF
6. CABIN AIR/HEAT.....	OFF
7. AIRSPEED.....	INCREASE/EXTINGUISH
8. FORCED LANDING	EXECUTE
9. ENGINE FIRE IN FLIGHT CHECKLIST	COMPLETE

Partial Power Loss

- It is possible that during a flight you may experience a partial loss of engine power. Two options might be available to you, depending on the degree of power loss and the airplane's resulting decrease in performance.
- You may be able to continue the flight in a reduced power condition as long as you are able to hold altitude or climb. In this situation, maintain an airspeed that will provide the best airplane performance available.



Partial Power Loss

- In most cases, the best performance airspeed will be approximately the best glide speed. However, it is also possible the engine will not continue to run in this condition and a forced landing will still need to be made. With an engine problem, you should continually monitor your engine instruments and update your choice of landing options.
- Alternatively, your airplane's performance with partial power may not be sufficient to maintain altitude. In this case, a forced landing is imminent. Consequently, you will need to declare an emergency with ATC and begin the emergency approach and landing procedures specified in your airplane's checklist.



Door Opening in Flight

- A cabin or baggage compartment door opening in flight can be a disconcerting event. Although a door generally will not open very far, the sudden noise can be startling. Regardless of the noise and confusion, it is important to maintain control of the airplane, particularly during departure. Accidents have occurred on takeoff because pilots have stopped flying the airplane to concentrate on closing cabin or baggage doors.



Door Opening in Flight

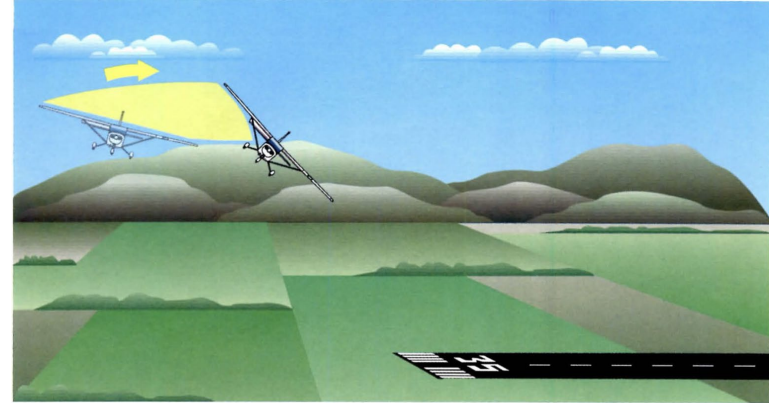
- While an open door does not normally compromise airplane control, it is possible that control will become more difficult. If such a condition should occur it may be necessary to increase airspeed in all phases of flight, including the approach, in order to ensure that you can control the airplane. Once you have adequate airplane control, land as soon as practical and secure the door.



Asymmetrical Flap Extension

An unexpected rolling motion during flap extension may be due to an asymmetrical or split flap condition. If one flap extends while the other remains in place, a differential in lift across the wing is the cause of the rolling motion. A split flap condition can be hazardous, particularly in the traffic pattern or during a turn at low altitude.

If the unexpected rolling motion occurs during flap extension, immediately return the flap control to the up, or the previous position, while maintaining control of the airplane. Should you be in the approach phase of the traffic pattern when an asymmetrical extension occurs, execute a go-around and adjust your airspeed for approach and landing.



Emergency Equipment and Survival Gear

Regulations only require you to carry flotation gear and a signaling device during certain overwater commercial operations. However, it is highly recommended that you include several other basic survival items in the event of an emergency. A survival kit should be able to provide you with sustenance, shelter, medical care and a means to summon help without a great deal of effort or improvisation on your part.



Emergency Equipment and Survival Gear

That is why a minimally equipped survival kit should be avoided. You can tailor the contents of your survival kit to the conditions of the flight. Any complete survival kit should contain a basic core of survival supplies around which you can assemble the additional items that are appropriate to the terrain and weather you would have to deal with in an emergency.



Emergency Equipment and Survival Gear

When making decisions about the emergency gear to take with you, consider the terrain you will be flying over, the climate or season during which the flight will be made, and what type of emergency communication equipment you may need. For instance, an emergency landing in mountainous terrain in December would require different survival gear than would a ditching in the ocean in August. Some general items you may consider as the basis on which to build a survival kit for all flight operations include: a comprehensive first aid kit and field medical guide, flashlight, supply of water, knife, matches, shelter, and a signaling device.

