A-325R Academic Refresher

For

Water Ditching and Survival

Participant Workbook

Prepared by Office of Aviation Services - Training Division
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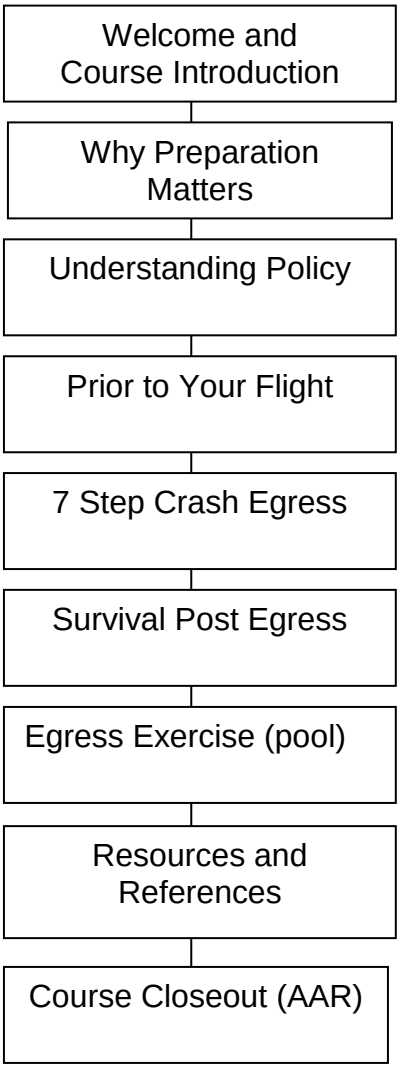
A-325R
Academic Refresher for Water Ditching and Survival

Course Map



Get to Know Your Classmates

Be prepared to share:

- Your name?
- Your position?
- What are some of the ways you use aviation support to accomplish your mission?
- Have you ever had prior training in Water Ditching Egress

objectives

At the conclusion of this course, you should be able to:

1. Explain the concept of having a positive mental attitude and why it is critical in surviving an aircraft water ditching.
2. Explain the difference between overwater flights and extended overwater flights in accordance with bureau policy.
3. List three important pieces of information that should be discussed in a briefing prior to an overwater flight.
4. Explain the flight situations in which a Personal Flotation Device (PFD) is required to be worn.
5. Explain the conditions under which an anti-exposure suit must be worn according to bureau policy.
6. List three pieces of Aviation Life Support Equipment (ALSE) that are associated with overwater flight activities.
7. Without assistance, verbalize the 7 step emergency egress process as it is delivered in this course.
8. List two methods of determining the direction to the water surface after exiting the aircraft.
9. List two potential hazards that may be encountered on the surface of the water following a water ditching.

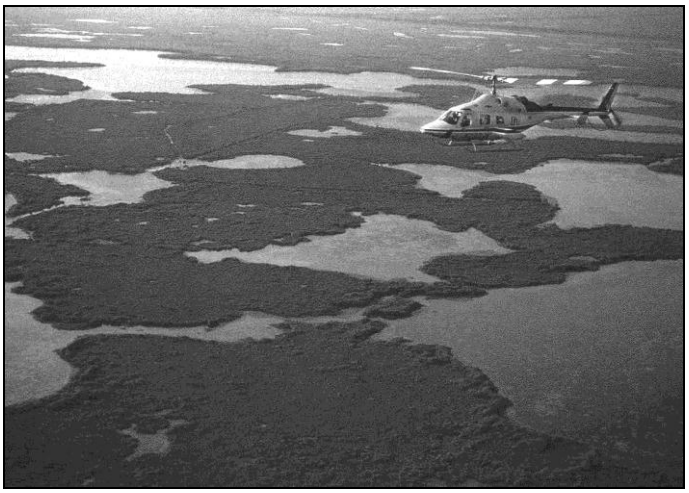
10. Demonstrate two group survival techniques which may increase the possibility of survival in a post water ditching scenario.
11. Demonstrate one method of conserving body heat while in the water, during a post water ditching scenario.
12. Accurately demonstrate a minimum of three egresses from simulated aircraft water ditching, using the 7 step process.

Why Does Preparation Matter?

Notes

If you fly over water then ditching is a distinct reality. When an in flight emergency occurs we don't often have many options or a great amount of time to react. Our preparation prior to flight could be the only foundation of knowledge we have to overcome a high stress emergency situation.

How far is "overwater"? When it comes to swimming, not very far if you had to make it back to shore. Especially under adverse conditions and in high stress situations.



You have heard that, "Chance favors the prepared mind!" Increasing your chances of survival during a water ditching will be affected by your level of preparedness.

Most fatalities are officially listed as drowning.

Disorientation, unfamiliarity with underwater escape procedures and the lack of personal flotation devices (PFD) contribute to this statistic.

Why Does Preparation Matter?

Notes

Surviving a Water Ditching is based on your ability to:

Stay Calm, Think Clearly, Remember Your Training

Fear and panic must not be the predominate driving force behind your actions!

Survival Depends Upon…

- *Protection from incapacitating injury*
- *Ability to locate and operate emergency exits*
- *Ability to hold breath & reach the surface with necessary survival equipment*

Understanding Policy…

Notes

"What are the requirements when conducting a mission over water?"

Take 2-3 minutes to list the policy questions that you have concerning overwater flights, then be prepared to share those questions with the group

Did you get the answers to your questions? If not be sure to ask one of your instructors…

Understanding Policy *Notes*

Definitions

Extended Overwater Operations – AIRPLANES: Operations over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline. HELICOPTERS: Operations over water at a horizontal distance of more than 50 nautical miles from the nearest shoreline and more than 50 nautical miles from an offshore heliport structure.

Operations Beyond Power-Off Gliding Distance to Shore- Operations occurring over water within 50 nautical miles of any shoreline at a distance where if the aircraft should lose power in flight , the shoreline would not be reached.

Personal Flotation Device –

- An inflatable PFD must be worn by all occupants in single engine aircraft and made immediately available to all occupants in multiengine aircraft that are operating off of or to water, or that operate beyond gliding distance from shore including water bucket dipping and snorkeling operations.
- Aircraft occupants must wear inflatable PFDs aboard DOI flights when performing water takeoffs or landings (including float and boat-hulled aircraft)

Reference – ALSE Handbook Ch2

Understanding Policy *Notes*

Anti Exposure Suits –

- An anti-exposure garment must be worn in single engine aircraft and readily available to occupants of multiengine aircraft when conducting extended overwater flights and when the water temperature is colder than 50° F.

Reference – ALSE Handbook Ch2

Life Raft –

- Life Rafts are required for extended overwater operations in accordance with 14 CFR 135.167

Reference – ALSE Handbook Ch4

Aircraft Floats –

- Single-engine helicopters and single-engine airplanes operated beyond power-off gliding distance of shore shall be float-equipped except where established traffic flow requires aircraft to operate beyond gliding distance to shore during takeoffs and landings.
- Multiengine aircraft operated at a weight that will allow it to climb, with the critical engine inoperative, at least 50 feet per minute, at an altitude of 1,000 feet above the surface may be operated over water without floats.
- DOI fleet land aircraft may be repositioned (ferried) with only flight crewmembers on board without the required floats.

Reference – 351 DM 2.2.C

Prior to Your Flight

Notes

Briefings –

"Pay attention to the briefing, it can save your life!"

Know the location of:

- Personal _____ Device
- Emergency _____
- _____Locator Transmitter
- Life _____
- _____ ____ Kit
- _____ Kit
- Fire _____

Flight Helmets -

Chapter 2 of the ALSE Handbook explains when flight helmets are required. Drowning victims frequently receive blows to the head that daze or render them unconscious, thus prevents their escape. By absorbing impact, flight helmets have prevented head injuries to many ditching survivors.

Flight helmets also protect by :

- Offering shielding from the sun
- Retaining heat
- Providing Flotation
- Providing eye protection

Make sure you know how to properly don and wear a flight helmet… It has saved lives!

Prior to Your Flight

Notes

Seatbelts -

- Use properly
- Know how to latch and unlatch
- Ensure the belt is positioned in a place where you know to reach for release (typically at your center waist)
- Do not remove until all violent motion has stopped and a reference point has been established
- Remove your belt with the opposite hand from the one holding your reference point

Cargo –

- Pilots and passengers can be fatally injured by flying cargo and improperly stowed equipment. They can be hampered in their egress or pinned inside the aircraft by shifting cargo. It is essential that all toolboxes, cargo and equipment be secured before each flight.
- Only those items needed inside the aircraft should be placed in the passenger compartment. All other equipment should be secured in cargo compartments.

Will Egress Be Possible?

Emergency Exits –

- Know the location and operation of the Emergency Exits before you take flight
- Be aware of the exit that is closest to you, however you should consider an alternate in the case this exit is blocked

Water Ditching Procedures *Notes*

1. **"I'm a Survivor"**
2. **Unplug Flight Helmet**
3. **Prior to Impact – Open Door – BRACE**
4. **Slow 4 Count, Sit Up**
5. **Locate & Clear Exit – *Reference Point***
6. **Release Seatbelt & Exit**
7. **Hand Up – Head Up – Investigate – Inflate**

Take a moment to write down the 7 steps, this may help in memorizing them.

1.

2.

3.

4.

5.

6.

7.

Water Ditching Procedures

Notes

1. "I'm a Survivor"; set the stage for a positive attitude. You will survive.

2. Unplug flight helmet/Headset mike jack from coil cord, this prevents getting "hung-up" when exiting the aircraft.

3. Prior to contact with the water, open aircraft door and lock open if you are seated next to one, then BRACE! External water pressure is reduced, making the door easier to open as the aircraft settles or submerges. Most doors are designed such that forward flight will not affect the door when opened. Keep in mind that the door may latch itself again upon impact. If this happens you may have to wait until the water pressure equalizes before being able to open it again.

4. Slowly count to four, sit up from your brace position. This allows time for all movement of the aircraft to come to a stop, and reduces the risk of you exiting into a potentially dangerous situation.

5. Locate & Clear Exit - *REFERENCE POINT*
If you are seated by a door or an emergency exit, LOCATE and OPEN IT. Your reference point would be either the door frame or the exit window, depending on which you are holding. Once you have established your reference point, **DO NOT REMOVE YOUR HAND** until it is safe to leave the aircraft. Be aware that you may need to climb hand over hand from one seat to another to reach an exit. **Never** let go with both hands at once.

This will keep you from becoming disoriented. If you are in another seat, not located by a door or emergency exit, establish a fixed reference point such as a seat back, or console. Do not let go until your departure path is clear.

6. Using your free hand and EXIT, hand over hand; release your seatbelt. Do not use your hand holding your reference point! Exit the aircraft following your reference hand**,** by moving hand over hand. Do not climb over other occupants in the aircraft. Wait until they are out. This will lessen confusion and actually speed-up the process.

7. Hand Up / Head Up / Investigate / Inflate; when you reach the surface investigate the area for danger before inflating your PFD. You might have to dive back under the water to move away from a dangerous situation!

Water Ditching Procedures

Notes

SURVIVING A WATER DITCHING

Your mind is your best survival tool. ***Fear and Panic must not be the driving force behind your actions.*** Panic is the natural tendency in a situation such as this. **You must make every effort to remain calm and think clearly.**

You must convince yourself that by using your knowledge, common sense, and a logical thought process you can survive the water ditching. Eliminate negative thoughts and images that may detract from your goal to survive.

Familiarity with the aircraft and a thorough understanding of emergency procedures are essential. You must have this knowledge to aid in your exit and survival of a ditching aircraft.

Submersion & Panic –

Aircraft have been known to rollover and sink immediately after impact. Many aircraft will float upside down with the cabin sub-merged for short periods of time due to buoyancy provided by the internal fuel cells. With the cabin inverted and underwater, problems of escaping become compounded, and **panic** is more likely to occur.

Not only must pilots and passengers be protected physically from impact forces, but they must also be mentally prepared to cope with the events that rapidly occur in a water ditching situation. To be simultaneously shaken up, turned end-for-end, possibly rolled upside down, and submerged beneath cold on-rushing water can be a great shock for even the most prepared person. The initial reactions of most ditching survivors have been disorientation, confusion and panic.

Water Ditching Procedures

Notes

Survivors experience not only these factors, but they must overcome other problems that may hamper their escape from the aircraft.

Potential problems:

- **On-rushing water.** The most frequently reported single problem, it is the greatest deterrent to escape. It forces cabin occupants into the rear corners of the cabin, sometimes disorienting them so that emergency exits cannot be located in the underwater darkness.
- **Difficulty, to locate and utilize personal flotation devices.**
- **Inability to see.** Because of darkness or murky water.
- **Difficulty reaching an exit.** Hampered by obstructions, injury, aircraft attitude, entangled clothing, survival gear, interphone cords or seat belts.
- **Inability to open emergency exits.**
- **Pinned in the aircraft.**
- **Difficulty releasing seatbelts.**
- **State of consciousness.**
- **Unable to hold breath long enough.**
- **Smoke, fire or spilled fuel.**

Reaching the Surface

Notes

It is very easy to become disoriented during the rolling and sinking of the aircraft. Personnel have frequently escaped from the aircraft and swam downward rather than upward.

Following the air bubbles to the surface will help in maintaining your surface orientation, or inflating your **PFD** at this point will assist you in reaching the surface, especially if injured.

Remember if hazardous conditions exist at the surface you will need to deflate your PFD to dive back under the water to move away from the danger.

Be aware of the potential for a water surface fire due to a fuel spill. If you find yourself in this situation try to stay beneath the water surface and swim to a point beyond the fire. If you surface into fire attempt to grasp a breath of air using your (PFD) as a shield, submerse yourself again and swim to a point of safety.

If unfamiliar with the use of a PFD, ask the pilot to demonstrate how to inflate it during the pre-flight briefing!

Do not deploy your PFD inside the aircraft. It will restrict your mobility when moving through aircraft doors or windows. It would also be susceptible to puncture by broken Plexiglas and ripped airframe metal.

Once clear of the aircraft activate your PFD by pulling down on the tabs, this will cause the CO2 cartridges to puncture and fill the air cells. If needed, your PFD also has a manual inflation tube, which when blown into will also fill the air cells.

Reaching the Surface

"List two methods of determining which direction is the surface of the water?"

Take a moment to write down at least three methods you could use to determine the direction you must travel to reach the surface of the water.

1.

2.

Reaching the Surface

"List two potential hazards that may be encountered on the surface of the water following a water ditching"

Take a moment to write down at least two hazards you may encounter once reaching the surface.

1.

2.

Reaching the Surface

EXPOSURE OR HYPOTHERMIA

If you are not able to get to a raft, the key to survival is to remain calm. From the standpoint of conserving body heat this is the best possible behavior. ***Struggling or swimming will cause maximum heat loss due to the flushing action of cold water against the body's critical heat-loss areas.*** Also the expenditure of calories produced by strenuous exercise will lessen your endurance.

KEY SURVIVAL POINTS

- A calm body floats better than a tense one.
- If a hypothermia victim is not shivering, they are at rest, and the heat loss through the head remains about 7%. But, this is important, if they are shivering, the percent of heat loss via the scalp can increase to upwards of 55%, so protecting the head well is a very important part of treating the hypothermia patient.
- Keeping your head out of the water and the flight helmet on will help minimize this heat loss, as well as provide additional buoyancy.
- The colder the water temperature the more harsh the environment becomes.

WATER TEMPERATURE---SURVIVAL TIME

F. Water Temp.	No Protection Exhaustion Unconsciousness Occurs within	Expected Time of Survival with Floation Device	Expected Time of Survival with Survival Suit
32.5	under 15 min.	15 to 45 min.	18 hours +
32.5 - 40	15 to 30 min.	30 to 90 min.	22 hours +
40 - 50	30 to 60 min.	1 to 3 hours	Indefinite
50 - 60	1 to 2 hours	1 to 6 hours	Indefinite
60 - 70	2 to 7 hours	2 to 40 hours	Indefinite

The cold facts on time and temperature.

Reaching the Surface *Notes*

Hypothermia Prevention Methods and Equipment Increase Survival Time		
Situation & Predicted Survival Time (Hours) in 50°F Water		
Without flotation device worn:		
	Drown Proofing	**1.5**
	Treading Water	**2**
With personal flotation device (e.g., vest or collar-type PFD):		
	Swimming	**2**
	Holding Still	**2.7**
	H.E.L.P. Position	**4**
	Huddling with Others	**4**
With hypothermia prevention:		
	Flotation Equipment	
	Insulated Flotation Jacket (float coat)	**3 to 9**
	Survival Suit	**Indefinite**

Notes

Reaching the Surface

Notes

H.E.L.P. POSITION

If you are alone in the water assume the H.E.L.P. (Heat Escape Lessening Posture) position. Draw the knees to the chest, lock hands over knees. This will also help retain critical body heat.

GROUP HUDDLE

Survivors should huddle together while afloat in the water. This aids in preventing heat loss and presents a larger target for rescuers to locate.

Reaching the Surface

Notes

SIGNALING FOR RESCUE

There are many signaling devices to help survivors increase their chances of being rescued. Each type of signaling device has a specific design and purpose, as well as definite operating limitations. The wider range of devices you have, the greater your chance of rescue.

Being able to alert the rescue party of your situation or whereabouts is essential. The chance of being spotted accidentally does not generally occur. The negative effect of heavy swells on the visibility of any floating object in the ocean is well understood by sailors. The chance of an alerted ship or aircraft pinpointing and reaching the position of the raft is slim, unless the survivor can provide a constant signal.

Hand-Held Rocket Flares: These are generally of two types, low altitude with a short bum span and high altitude with a long burn span.

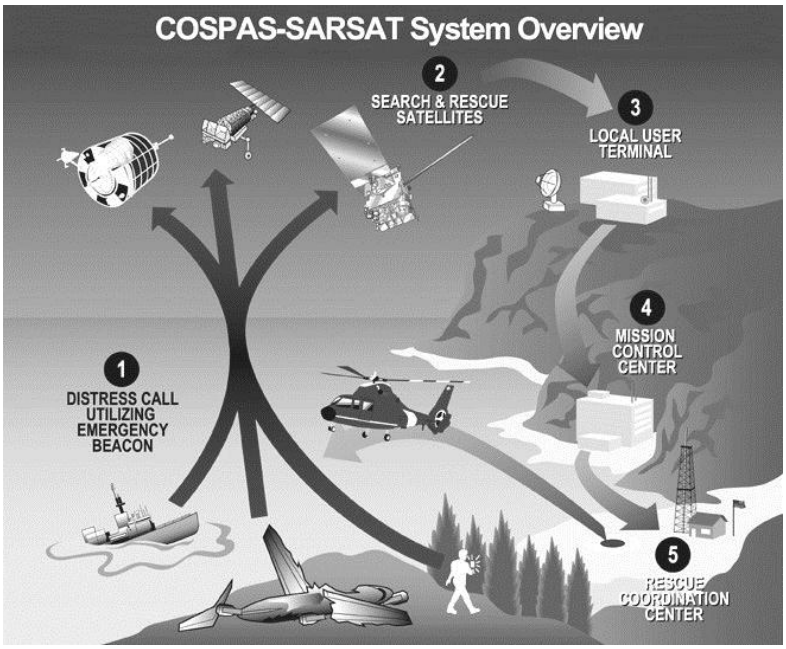
Pen Gun Flares: A 45-caliber cartridge is screwed into the end of the pen gun and fired by a spring-loaded pin. The flare generates a candle power of 4,000 and attains altitudes of 450 to 500 feet and has a burning time of between 5 and 10 seconds.

Pistol Launched Flares: These are generally available in 12 gauge, 25mm, and 37mm. They produce a candle power of 10,000 and have a burning time of between 10 and 30 seconds. They are also referred to as meteor flares, are capable of alerting ships from as far away as 20 miles and aircraft at around 10 miles depending on atmospheric conditions.

Reaching the Surface

Notes

EPIRB (Emergency Position Indicating Radio Beacon) is a modified version of the aviation ELT (Emergency Locator Transmitter). It is usually equipped with both a manual and a salt water activating system. This self-contained, battery-operated unit transmits an inaudible, electric oscillating or "swept" tone. The beacon is capable of transmitting a continuous distress signal 24 hours a day for the life of the batteries. The important benefit of an EPIRB is that the survivor need not be awake or be able to see the rescue vessel in order to alert it.



Search and Rescue Satellites: The latest in search and rescue technology is a satellite system called SARSAT (Search and Rescue Satellite). These satellites are equipped with special receivers that are tuned to standard international distress frequencies. Orbiting, these satellites are capable of receiving and pinpointing transmissions almost anywhere on earth.

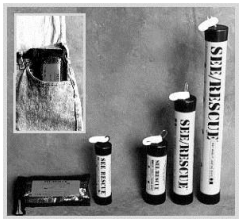
***** Once Activated EPIRBs or ELTs Should Be Left On Continuously *****

Reaching the Surface

Notes

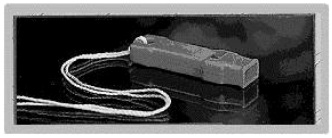
SIGNAL DEVICE CAPABILITIES & LIMITATIONS

Daytime Smoke Flares: Use only if you know aircraft or ships are in the area. These flares are adversely affected by poor visibility.
They are difficult for rescue personnel to see if they must look into the sun. They are also limited by relatively short bum times.

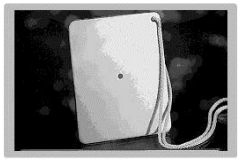


Lights (strobe, flash): These are effective only at night and have a limited battery life; carry extra batteries.

Whistle or Horn: Your position relative to the wind direction and the rescue vessel will influence their effectiveness. The most obvious limitation of a whistle or horn is distance.



Signal Mirror: There must be a workable angle between the sun and your mirror, and the sun and the rescue craft. Mirrors have proven effective at 10 miles plus. (Limited to daytime and sunny skies.)



Dyes: Are visible in the water at relatively close range only, one mile or less. Dye can best be seen by aircraft flying at higher altitudes, but have limited visibility at sea level from boats. Also, it will dissipate quickly in rough seas.

Reaching the Surface

Notes

Aerial Flares: Very effective at night or close range in daylight. These can be difficult to see against bright sunlight.

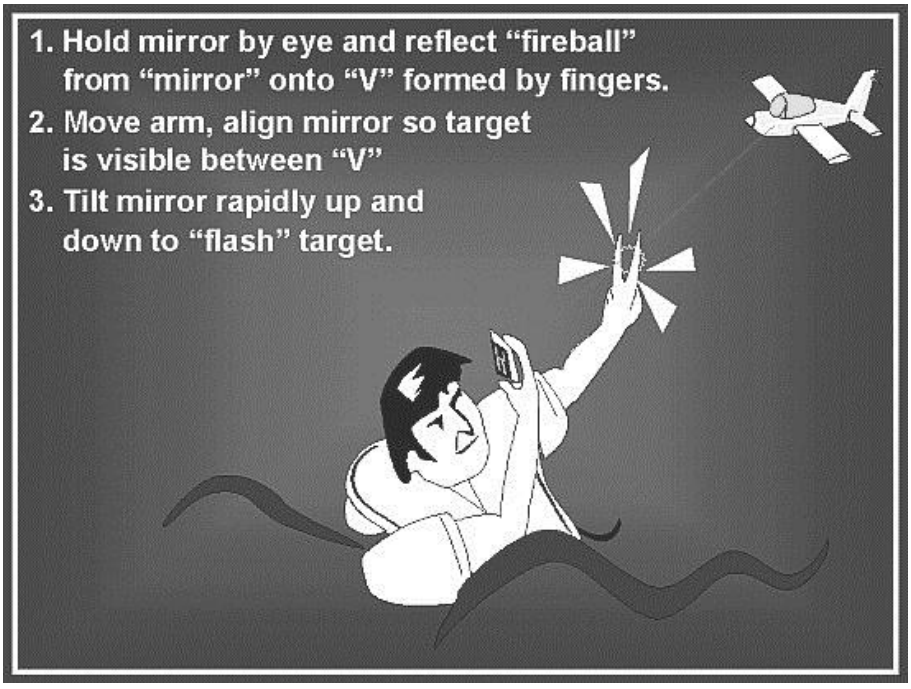
Rescue Lasers: Rescue lasers can be waterproof and have a long battery life. Used similarly to a signal mirror, it can be seen up to 3 miles away during daylight and up to 20 miles away at night.

By illustrating the multiple capabilities of signaling devices, and more importantly their individual limitations, the necessity of having a variety of devices should be apparent.

Reaching the Surface

Notes

Proper method for utilizing a signal mirror or rescue laser:



Reaching the Surface

Notes

RAFT DEPLOYMENT AND USE

1. Start exiting as soon as the rotors or props have come to a full stop.

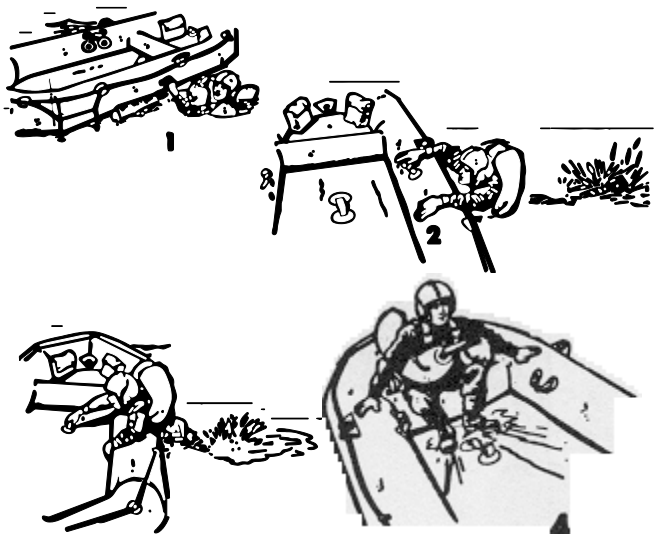
2. When deploying a life raft, maintain control of the lanyard, but do not secure the lanyard permanently to the aircraft (in case the aircraft sinks the raft will also).

3. Deploy the raft into the wind. This will cause the raft to stay in proximity of the aircraft, making entry much easier (must be careful not to puncture raft on sharp edges of aircraft).

4. ***Your PFD'S should be inflated prior to the transition*** between the aircraft and the raft.

In calm seas entry into the raft can be done directly from the aircraft. In rougher seas this is more difficult to accomplish, and entry into the water first is usually necessary. Enter the raft as quickly as possible in order to reduce the risk of hypothermia.

Make sure you are familiar with the raft onboard your aircraft.



Post Course Assessment

"During our time together we have discussed some important information"

Take a few minutes to complete the questions below. Your ability to answer these questions will ensure that you have met many of the instructional objectives introduced at the beginning of the course.

Be ready to share your answers with the group

1. Explain why having a positive mental attitude is critical to surviving an aircraft Water Ditching

2. Choose the scenario that would be defined as an extended overwater flight

   a. helicopter flight from shore to an oil platform 35 miles off the coast

   b. fixed wing flight below 500 feet AGL, counting water fowl along a river

   c. open ocean flight to map an underwater reef more than 50 miles off the coast

   d. helicopter flight from the mainland to an island 60 miles off the coast

3. List three things that should be discussed in a briefing prior to an overwater flight

4. A PFD is required to be worn during all single engine aircraft flights that extend beyond gliding distance from the shore

   ☐ TRUE
   ☐ FALSE

5. An Anti Exposure Suit must be worn when conducting extended overwater flights and which of the following situations exist (circle all that apply)

a. you are flying a multi-engine aircraft
b. you cannot swim
c. the water temperature is below 50° F
d. a physical barrier between you and the other passengers is needed
e. you are flying a single-engine aircraft

6. Fill in the following blank related to Aviation Life Support Equipment (ALSE)

- Personal _____ Device
- Emergency _____
- _____Locator Transmitter
- Life _____
- _____ ____ Kit
- _____ Kit
- Fire _____

7. After exiting the submerged aircraft, list two ways in which you could determine the direction to the surface

1.

2.

8. List two hazards you might encounter on the surface of the water, after an aircraft water ditching

1.

2.

9. Place the following water ditching steps in the correct order (draw a line from the step to the appropriate number)

1.	Prior to Impact – Open Door – Brace
2.	Hand Up / Head Up / Investigate / Inflate
3.	Release Seatbelt & Exit
4.	Locate & Clear Exit – Reference Point
5.	“I’m a Survivor”
6.	Slow 4 Count, Sit Up
7.	Unplug Flight Helmet

Appendix A

CEN10LA427

HISTORY OF FLIGHT

On July 24, 2010, about 1035 central daylight time, a Cessna 180J single engine airplane, N7812K, was substantially damaged during a water landing in the vicinity of Davant, Louisiana. The pilot receiving instruction was fatally injured and the certified flight instructor (CFI) was not injured. The airplane was registered to and operated by Southern Aviation, LLC, under the provisions of 14 Code of Federal Regulations Part 91 as an instructional flight. Day visual meteorological conditions prevailed and no flight plan was filed. The local flight originated about 1020 from Southern Seaplane Airport (65LA), Belle Chase, Louisiana.

A review of the flight track from New Orleans Approach Control radar data revealed the airplane departed 65LA and flew south bound at an altitude that varied between 1,000 feet to 1,600 feet mean sea level (msl), until 10:30:33. The airplane started a descent down to 1,400 feet msl and initiated a left turn down at 10:33:32. The last radar return was at 10:34: 44 when the airplane was at 300 feet msl, west of the accident location and northeast of Davant, Louisiana.

The CFI was seated in the right seat and the pilot receiving instruction was seated in the left seat. The CFI stated that neither he nor the pilot were using the shoulder harnesses because they restricted their full range of motion. The pilot receiving instruction was flying the airplane and was making a straight in water landing to a bayou that the CFI estimated was about 150-feet wide. The CFI stated, "I had my hands in front of the control yoke as a common practice to prevent the nose from going forward. The approach seemed normal. Upon touchdown the nose appeared to be slightly nose forward or flat. It was not far enough forward to deem the landing unsafe. As we landed, the aircraft seemed to decelerate rapidly. I cannot recall if the yoke hit my hands, but at this time I applied corrective pressure to pull back the yoke. As I pulled back on the yoke the aircraft had begun to flip over slowly."

According to the CFI, during the landing neither he nor the pilot used a gentle back pressure on the elevator control to compensate for any tendency for the nose to drop, or to close the throttle when the airplane was on the water to maintain the touchdown attitude until the airplane began to come off the step.

After the airplane came to rest inverted and partially submerged, the CFI exited the airplane through the right cabin door. The pilot did not exit the airplane. The CFI was unsuccessful in retrieving the pilot and waved down two fishermen in a boat. After several attempts the non-responsive pilot was pulled from the airplane after he had been in the water for an estimated 5 to 10 minutes. The fisherman who pulled the pilot out of the cockpit said the pilot’s seatbelt was already unfastened.


07/24/2010