A-325R
Water Ditching and Survival Academic Refresher

Student Guide

Revised March 2018

Get to Know Your Classmates

Be prepared to share:

- Your name?
- Your position, agency and location?
- Type of flights you preform?
- What was your biggest take away from your water egress course?

Course Purpose
This course provides the participants with the knowledge of the proper procedures to follow in the event of water ditching of an aircraft; to include discussion on egress, hypothermia, utilization of PFD's, life raft, and water survival equipment. The course is an academic refresher ONLY. This refresher is required by USFWS only, but other bureaus/agencies may benefit as well.

Course objectives:

At the conclusion of this course, participants will be able to:

- ❖ identify the aviation life support equipment (ALSE) and personal protective equipment (PPE) policy requirements of the student's agency / bureau pertaining to overwater flights.
- ❖ explain the importance of the preflight briefing, ALSE and PPE related to over water flights
- ❖ describe the benefits of having survival equipment.
- ❖ explain how water survival techniques will increase survival.
- ❖ accurately verbalize and discuss the intent of the 6 Step egress process.

Survival Depends Upon…

MURPHY'S OVERWATER AVIATION LAW

Ways in which Murphy will try to drown overwater aviation users:

- Preventing Incapacitation on Impact – due to unconsciousness or physically debilitating injury
- Inability to locate and operate emergency exits
- Inability to locate, maintain reference point and exit aircraft
- Inability to hold breath long enough to exit aircraft and reach surface
- Hypothermia leading to unconsciousness – while waiting for rescue

What are you doing to increase your safety?

Policy

Aviation Life Support Equipment Handbook (ALSE) and your bureau's national or regional policy will dicitate the required PPE to be worn or available on the aircraft for your flight.

Extended Overwater Operations:

- **Airplanes:** Operations over water at a horizontal distance of more than 50 nautical mile 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

Federal Aviation Administration (FAA) Definitions
Link to FAA Definition

Operations Beyond Gliding Distance to Shore:

Overwater flights that occur beyond the point at which an aircraft that has lost all power can safely glide to shore

Explain that additional PPE and/or ALSE requirements are mandated for these flight profiles. Many of our policy requirements are differentiated based on the distinction between these definitions. Additionally, these requirements may change depending on a single versus multi engine aircraft.

If FAA rules mandate that a flight travel overwater as part of the takeoff or landing sequence, the flight profile is not considered to be 'beyond gliding distance to shore' and DOI PPE requirements do not apply for that portion of the flight.

Use the ALSE handbook to assist you with answering these question.

PFD – ALSE hand book

What is the ALSE handbook policy for PFD use?

Anti-exposure – ALSE handbook

What is the ALSE Handbook policy for Anti-exposure suit use?

Life raft - ALSE Handbook

When is a life raft required to be on board your aircraft?

Aircraft Float Policy

Floats are required for single-engine aircraft operating beyond power-off gliding distance to shore. Also applies to multi-engine aircraft that do not meet the exception below.

Exceptions to floats:

- Established traffic flow requires aircraft to operate beyond gliding distance to shore during takeoffs and landings
- Multi-engine aircraft operated at a weight that will allow it to climb, with the critical engine inoperative, at least 50 feet per minute
- DOI Fleet land aircraft repositioning (ferry) with only flight crewmembers onboard

Reference: DOI - 351 DM 2.2.C

Flight Helmets:

Flight helmets are required for most special use flights with the exception of multiengine airplanes (DOI Reference ALSE Handbook and OPM-29; USFS reference Interagency Helicopter Operations Guide (IHOG), Interagency SEAT Operations Guide (ISOG) and Interagency Aerial Supervision Guide (IASG)

- Protection from head injuries
- Protection from the sun
- Provides flotation
- Helps retain heat
- Provides eye protection

Bureau's Training Policy

What is your bureau's training policy related to overwater flights?

Prior to Your Flight - Pilot Passenger Briefings

Explain that if an emergency happens during the student's flight (especially during take-off or landing) they may have very little time to react. The ability to egress could depend on recalling previous training and the actions taken prior to flight!

Pay Attention - It Could Save Your Life!

Explain to the students that it is imperative they be engaged in the pre-flight briefing, as the pilot / aircrew member is relaying information that may save the student's life. Stress that even aircraft of similar make and model may have different exit configurations.

Emphasize the importance of ASKING QUESTIONS when any aspect of the briefing is not clear. When at all possible, students should practice operating the door exits (while seated), and ensure that emergency exit operation is known and understood.

Prior to Your Flight - Pilot Passenger Briefings

What preflight briefing items should be identified prior to your flight?

Seat belts:

- Use properly
  - All attachment points connected
  - Low and tight on lap; buckle centered under belly button if possible
  - torso restraint snug
- Know seat belt type (i.e. three-point belts that user must insert arm into. May affect reference point during egress) and operation
  - Students should know how to release all the different seat belts found in the aircraft
  - Stress the importance of practicing this operation prior to flight
- Do not remove until all violent motion has stopped and Reference Point is established!

Secondary Restraints: Know *before you go* what your plan is!

Emergency Exits: Know the location and operation of all Doors and Emergency Exits before you take flight!

Assessing your egress

What issues may prohibit you from egressing the aircraft?

Cargo:

All cargo must be:

- Weighed and manifested.
- Stowed according to pilot direction (weight and balance)
- Properly secured.

Loose cargo can cause serious or even fatal injuries!

Stress the importance of ensuring that life raft and survival kit are stowed in a location that allow for easy accessibility in an emergency.

6 Step Egress Procedures

Take a moment to write down the 6 steps egress procedures.

1.

2.

3.

4.

5.

6.

Barriers to Egress

Hazards that can prevent egress:

- *Inverted aircraft* - aircraft have been known to rollover and sink immediately after impact. Some aircraft will float upside down with the cabin submerged 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.

- *Onrushing water* - for unbelted passengers, it can
  - Be the greatest deterrent to egress
  - Force them into the rear corners of the cabin
  - Affect their gravitational reference and disorienting them to the point that an exit cannot be located

- *Entanglement Hazards:*
  - Avionics cords
  - PFD
  - Entangled clothing
  - Seat belts
- *Obstruction Hazards:*
  - Other passengers (unconscious or incapacitated)
  - Other passenger or pilot actions (e.g. pilot sliding seat rearward in small fixed-wing aircraft, trapping passenger's feet under seat)
  - Unsecured equipment or secured equipment that broke free during impact
- *Inability to see due to:*
  - Darkness or murky water
  - Smoke or fire
  - Spilled fuel

Students may encounter any combination of the hazards listed above, in addition to other potential problems.

Human factors that can prevent egress
- *Difficulty finding and/or releasing seatbelts*
- *Difficulty or inability opening doors or emergency exits*

What will guide you to the surface?

What might be waiting for them at the surface?

Case Study

Note damage to aircraft – this was done at normal landing speeds

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.

The pilot's only previous experience in seaplanes was 2.9 hours of instruction in a "Super Cub", and the 15 minutes of instruction in the accident airplane on the morning of the accident.

NTSB – CEN10LA427

Exposure / Hypothermia

"Hypothermia is a potentially dangerous drop in body temperature, usually caused by prolonged exposure to cold temperatures. The risk of cold exposure ….

Normal body temperature averages 98.6 degrees. With hypothermia, core temperature drops below 95 degrees. In severe hypothermia, core body temperature can drop to 82 degrees or lower."

From WebMD

Exposure is simply a measure of how quickly the body will become hypothermic based on its contact with the environment (i.e. the exposure to a body lying spread-eagle with no clothing in 50 degree water is much greater than one in a HELP position with clothing in the same water.)

"Conduction - through direct contact between objects, molecular transference of heat energy. Water conducts heat away from the body 25 times faster than air because it has a greater density (therefore a greater heat capacity). Stay dry = stay alive! Steel conducts heat away faster than water."

from: United States Search and Rescue Task Force Hypothermia and Cold Weather Injuries article

Keys to Survival:

- Remain calm, stay positive
- Keep your head (and as much of body as possible) out of the water
- Conserve body heat

"Physical exercise such as swimming causes the body to lose heat at a much faster rate than remaining still in the water. Blood is pumped to the extremities and quickly cooled. Few people can swim a mile in fifty-degree water. Should you find yourself in cold water and are not able to get out, you will be faced with a critical choice - to adopt a defensive posture in the water to conserve heat and wait for rescue, or attempt to swim to safety."

from: United States Search and Rescue Task Force Hypothermia and Cold Weather Injuries article

Remember to protect from heat loss by wearing a flight helmet or some other protective head gear. Since the head comprises about 7% - 10% of the total surface area of a person's body (British Medical Journal - 2008), a corresponding percentage of heat loss will occur at that area if it is not covered.

Heat Escape Lessening Posture (HELP) Position

Explain that if students are alone in cold water (with flotation), they should assume the HELP position:

- Draw the knees to the chest, lock hands over knees. This position will cover the most surface area of the body as possible.
- This position also covers and protects the areas of the body where arteries are very close to the skin, with very little insulation (muscle or body fat) separating them. Those areas include:
    - Groin
    - Head and neck
    - Rib cage and armpits
    - Backs of knees and insides of elbows

Huddle

Instructor should explain that students who are with a small group (with a PFD) in cold water should huddle with other survivors:

- While vertical in the water, form a circle, hip to hip and wrap arms around the waist of survivors on either side
- Keep legs straight and put feet together in center to form a “cone”.
- Goal is to use the survivor’s bodies to keep the colder water outside the huddle from mixing with the warmer water inside the huddle.

Benefits of huddle:

- Slows overall body heat loss of individuals, and of the group as a whole.
- Presents a larger target for rescuers than HELP position

Better for morale than being alone.

Carpet

Point out that for a large group of survivors (with PFDs), this technique is among the strongest for keeping the group together.

- Have students lay on their backs, thigh to thigh with heads at opposite ends.
- Intertwine each leg with the (opposite end / facing) student on either side, and lock elbows with same end / facing student on either side
- Remember: right foot rests on right shoulder and left foot rests on left shoulder.

Benefits of group carpet:

- Creates the largest visible target for rescue
- Can help facilitate assistance of injured, incapacitated or hypothermic personnel

The ALSE handbook - Personal Survival equipment (recommended)

Name the survival and signaling devices that you carry?

RAFT DEPLOYMENT AND USE

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

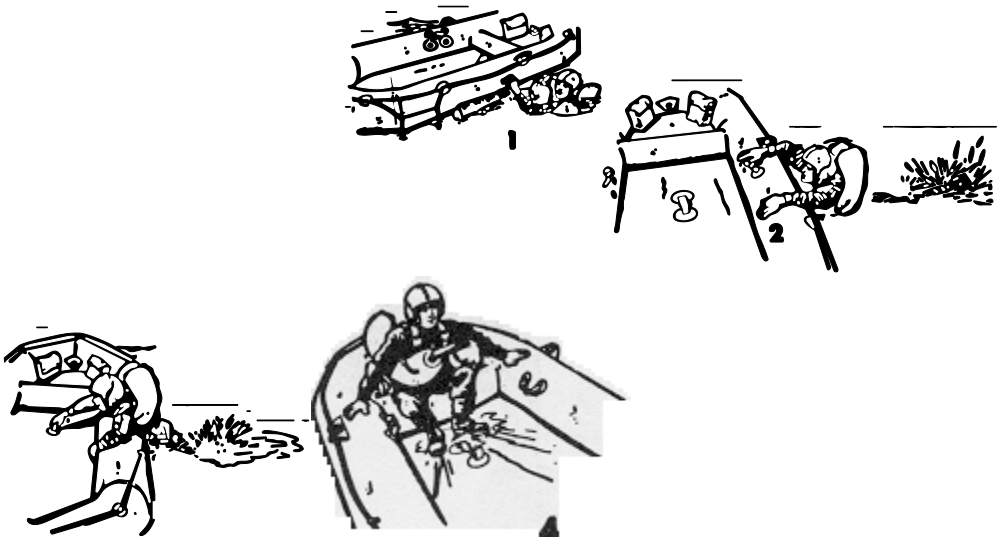
2. When deploying a life raft, maintain control of the lanyard, but do not secure the lanyard permanently to the aircraft (in case the aircraft sinks the raft will also).

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.



Cut out card 6 Step Egress Procedures – fold and then laminate

OAS-181 (8/17)

6 STEP Egress Procedures

1. Survivor
2. Unplug
3. Open Door; Brace
4. Wait for violent motion to stop; Sit up
5. Clear exit; Reference Point
6. Release seat belt; Exit "

"If you see something, say something"

Flight Preparation

Is a flight plan in place?

Have you received a mission and aircraft briefing?

Do you know the location of all the aviation life support equipment? How would you get it?

Are you prepared for extreme weather conditions?

Are survival items accessible on your person?

Have you planned your primary and secondary egress routes?

Are you proficient at opening the door and releasing your seat belt?