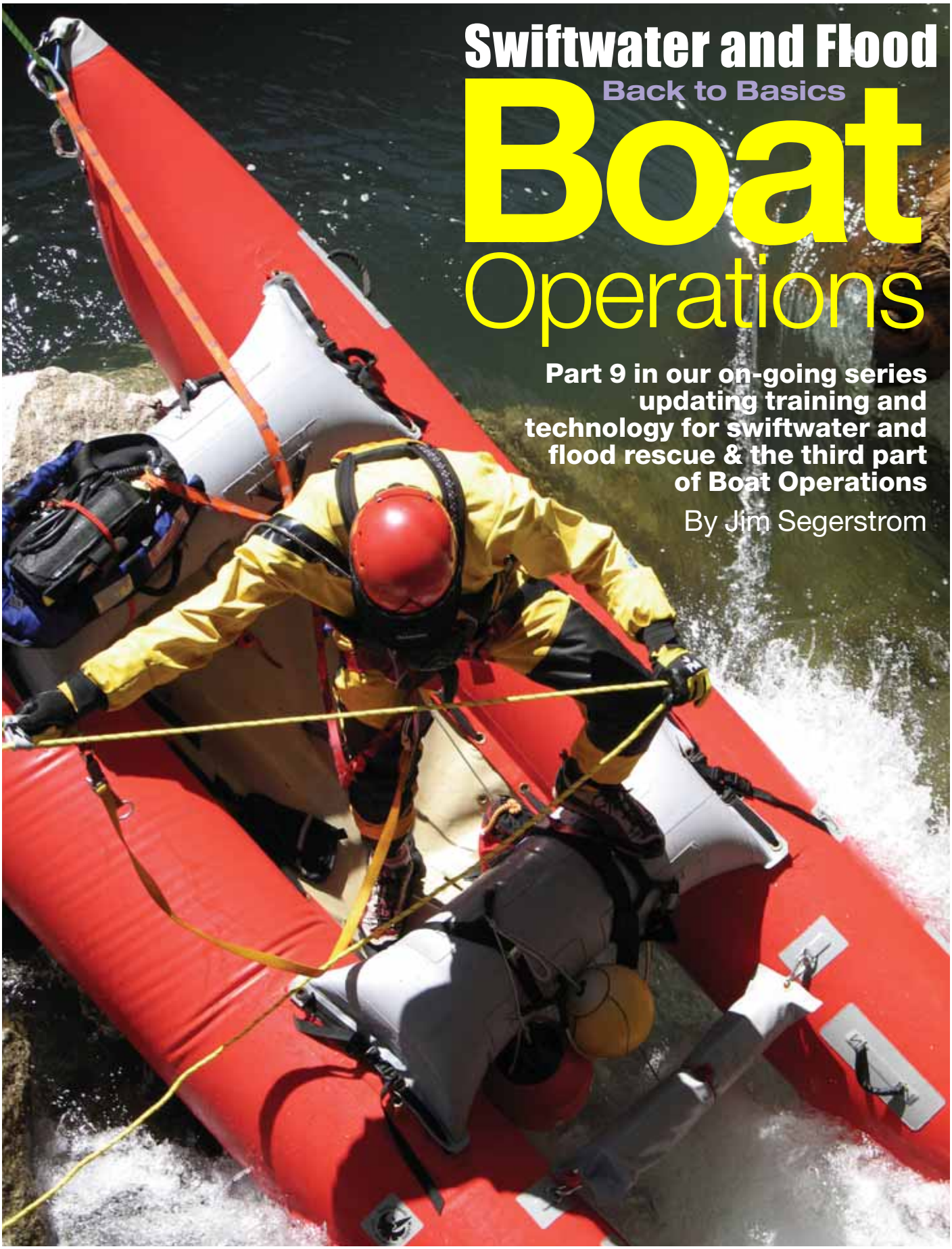


Swiftwater and Flood

Back to Basics

Boat Operations

Part 9 in our on-going series updating training and technology for swiftwater and flood rescue & the third part of Boat Operations

By Jim Segerstrom

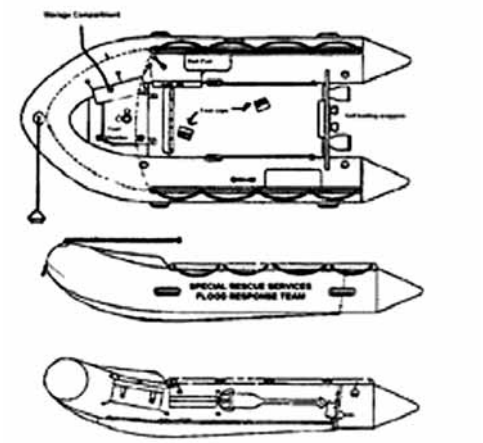
SAFETY NOTICE: *Once again it is important to comment that trying to utilize this article, or any of this series for that matter, as a sole training source, without seeking proficient practical instruction, is obviously dangerous and negligent— and unfortunately all too common in public safety agencies around the world. So if you attempt to do so, the resulting fiasco is your responsibility and entirely your fault.*

In issue 47 we covered basic boat handling, including paddling, recovering victims and swimmers, and onboard emergencies. Remembering from Part 1 in Issue 46, that there are several different types of boats that will work in various local conditions, we are finally ready to start the motor and get to work. For purposes of this discussion, however, we will assume a "standard" boat, an approximately 4 m. long inflatable or rigid-hulled inflatable, set up specifically for surf or swiftwater rescue. As mentioned earlier, many of these evolutions are designed to work regardless of boat type, but circumstances have—mistakenly—lead many, particularly in the fire service, to assume that the 4 m. inflatable is THE boat.

Why the IRB? It all started with our friends in coastal lifesaving. For a hundred years or more lifesaving crews went out in all weather in dory boats with banks of oars. Indeed a feature of surf lifesaving competitions around the world is still two man dory competitions. In the 1950's powered rigid dories became more prevalent, increasing in efficiency until the introduction of the first mid-hull propulsion systems and stern jet drives in the late 1960's. Following along behind British and French lifesaving groups, Australian Warren Mitchell of the Avalon Lifesaving Club in New South Wales trialed a 3.8 m. Dunlop inflatable boat as an "Inshore Rescue Boat," powered by a 20 horsepower outboard. While there was quite of bit skepticism from the rigid hull faction, many saw the potential of the inflatable. By 1985 there were 250 in service around Australia. US lifesaving personnel from Hawaii and the west coast were working with Australian lifeguards and brought the boats to the U.S. In 1980 San Diego lifeguards ran their IRBs in the Class III waters of the upper Tuolumne River in California. By 1985 IRBs and rigid-hulled inflatables were being used for rescue and safety in rivers along the west coast as far north as Canada.

The transition into the little craft could be daunting. I remember well going to a USLA course on the rugged northern California coast in 1986, trying to learn to read the wave sets and get the IRB off the beach and "outside" with the same grace as the experienced lifeguards teaching the course. It was a steep learning curve, my first four attempts ending up under the boat inside the surf zone.

While surf lifeguards have largely moved on to the use of PWCs towing rescue boards, inshore rescuers continue to use



variations of powered, paddled, and rowed inflatables. The 4 m. inflatable with a 25 to 40 hp short-shafted outboard with a prop guard remains the most common. It was chosen early on because it was air transportable, and can still be easily carried and launched even over broken terrain.

TRAINING

The evolutions covered below are part of the course developed by the author and others over a 10-year period, initially for the private sector, and then adapted by the California Governor's Office of Emergency Services for delivery to the states Type 1 Swiftwater/Flood Strike Teams. The target audience assumptions were that the students were already Swiftwater/Flood Rescue trained at least to the technician level, but that they had no boat handling training in the environment. The skills build from simple to complex, and the workload escalates as the coxswains and deckhands progress from the static to moving water environments. That escalating methodology is critical to the safety reputation these courses have developed over the last 10 years with the IRIA-affiliated rescue companies teaching them.

The training regime is designed so that no more than 4 students are assigned to each boat, to assure maximum "throttle" time, with a fully certified instructor for two boats maximum. Some of the basic skills have already been covered in this series, including paddling, flips and rights, victim recoveries, and crew overboard drills.

The next logical progression in such training is to familiarize the students with the boats, the motor and hull configurations, operating the motor, minimal equipment, motor emergencies, trailer loading and backing, and other operational safety issues. Most of these issues can be covered in practical sessions indoors, but backing a trailer is almost a course in itself, and provides tremendous entertainment for onlookers during boat rescue courses.

As set up for surf and inshore work, the IRB has been modified. Some boats use specially designed foam floors, rather than the hinged aluminum ones supplied. The drawings feature the use of an inflatable fuel bladder, fastened in the nose of the boat for purposes of weight shift. There are two paddles, at least 4.5 foot whitewater paddles, fastened on the inside of the tubes. Pre-set "flip" lines are stuffed in small pockets on each side. Foot cups are set strategically to help the deckhand brace in the front right corner of the boat, and for the coxswain on the left rear. The coxswain is trained to work the motor from that position due to the tiller/throttle positioning on most outboard motors. From the left corner he or she can "throw" the motor at a full arc each direction moreso than from the traditional right side.

Other alterations include the self-bailing scuppers in the transom. These scuppers are made of glued repair material that is templated and then glued and screwed to the outside of the transom. These scuppers are designed like Heimlich valves, the water pressure on the outside pushing the flaps shut. But when the boat is underway, these 4 " square valves will empty the boat in about 20 seconds.

Additional equipment includes a dive knife in its sheath attached to the inside of the transom, an extra "dead man's" lanyard in the gear bag in the bow, an extra throwbag, and a pair of rescue fins. The gear bag can also contain a small repair kit, and compressed air horn, wire cutters, and extra spark plug, spark plug wrench, a spray can of lubricant, an pull start rope for electric start engines, and a aerial flare. In California the boats also have two extra PFDs tied to the floor, for victim wear.

While most of these boats are designed for outboards in the 25 horsepower range, recent legislation requiring 4 stroke engines has lead to many agencies going to 40 horsepower plants. Lower units engender much discussion, the two schools being those that suggest jet drives; the other props with prop guards. A smaller third school champions the several variations on the turbine fan. The reality is that jets are certainly safer in shallows and where there are swimmers in the water, but they lose pushing efficiency at lower rpm's and in aerated water. Turbines and jets tend to have more mechanical problems in debris filled waters and in gravel and sand shallows. The downside of props and guards is that even the guards are no guarantee against injury in the event that the boat goes across someone in the water.

Operational Crew Responsibilities and Riding Positions

As mentioned earlier, the program is designed to cross-train students in two roles—coxswain and deckhand. The deckhand is also expected to act as a rescue swimmer if the need arises. Cross-training is part of the program, and instructional philosophy strongly urges not allowing anyone in the boat during high risk swiftwater operations that is not prepared to self-rescue in an emergency.

As mentioned, the **coxswain**, or **boat operator**, sits on the left rear tube just forward of the tiller arm, with at least one foot pressed against the opposite tube. The chest is aligned with the long axis of the boat, the right hand on the tiller and the left holding on the boat's "chicken line," the "dead man" lanyard fastened to the PFD. The **deckhand** sits on the right front of the boat, at least one foot pressed against the left tube, holding on to the bowline with the left hand and the chicken line with the right.

The Coxswain is the "captain," with strategic and tactical authority for the boat, its occupants, and for navigation. He is trained throughout the course in maintaining 360-degree awareness as well as the specific maneuver underway, weight shifting during maneuvers, and communications.

The Deckhand identifies upcoming hazards, uses hand and arm signals to relay to the Coxswain hazards and clear channels, is responsible for pulling in victims, deploying throw lines, making potential swimming rescues, and acting as an "agile bowman" in the event that the boat must come into the bank in fast current, leaping from the boat and holding on to the bowline simultaneously. Basic hand and arm signals, in addition to those already covered in this series, include:

- Pointing straight-armed at dangers, floating objects and obstructions;
- Using a chopping arm motion in the suggested direction of safe travel; and
- Indicating by a flat palm pushing down that depth is decreasing or to slow down.

The deckhand is also trained to periodically look aft down the right side of the boat to make sure the outboard motor is still producing an effective cooling stream.

Another critical role of the deckhand is to shift his or her weight during maneuvers initiated by the coxswain, including:

- Throwing weight forward over the nose of the boat when getting up on plane;
- Positioning for and aft to keep the boat trimmed on plane;
- Moving as far back as possible when "plowing" the boat to a quick stop; and
- Moving to the back and inside of the boat during tight left and right turns.

Launching and Landing

These first training tasks are boring and mundane for the student, but still critical. Performed first in flat water, the students later will try in current. The deckhand pushes the boat away from the bank until the coxswain can drop the lower unit and start the motor in neutral. At the signal of the coxswain the deckhand pushes the boat back and jumps in. The coxswain then applies just enough power to either move away slowly from the bank, or to hover slightly away from the bank in current, until the deckhand is situated.

The boat then moves away and returns to the bank. This part of the evolution is a chance for the coxswain to work on timing—accelerating briefly just before the water becomes too shallow, then shutting the motor off and pulling it up, while the deckhand jumps from the boat and either pulls the boat up, or stops it from running too far up, the bank.

I generally have the students practice at the boat launch, and then move to various banks and edges, then finally progressively faster currents. Like many aspects of the course, even this simple exercise has high entertainment value, particularly involving grounding props and "agile bowmen" demonstrating various states of grace as they fall into and out of the boat.

Attitude and Posture, during Idle, Plough, and Plane

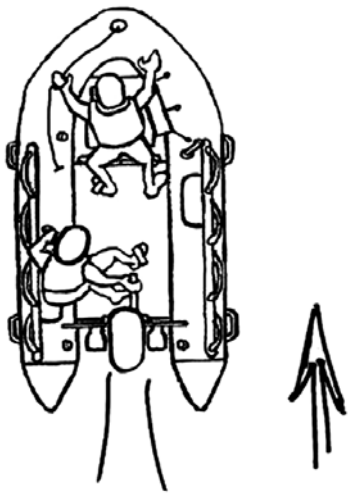
This training gives students the chance to "feel" the boat, the time

it takes to throttle up and stop, how weight shifts affect performance, and how critical maintaining a 360 degree awareness is for safety. It is generally the first time many students will have to run the boat, and the tendency towards tunnel vision is hard to avoid.

The first and most critical message is that students need to learn that the coxswain calls commands, giving a warning of he or she intends, and then calls "now!" when the command is executed.

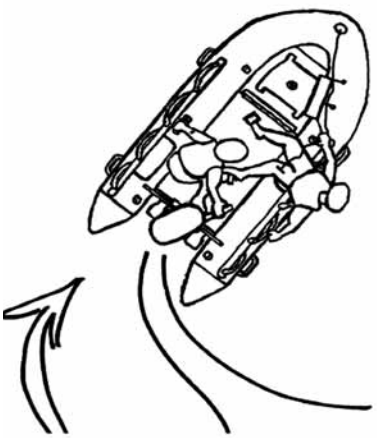
Stop, to Plow, to Plane to Plow, and Stop

At the command "*throttle up, now*," the deckhand moves forward



as far as possible, if necessary over the bow, helping to get the boat up on plane quickly. As soon as the boat is on plane, the deckhand moves back to the normal position.

After a few seconds at full throttle, the coxswain calls, "stopping, now," the deckhand moves back as far as possible to the stern. As the coxswain comes off the throttle, the weight shift to the stern will cause the boat to "plow" to a halt, the stern partially submerging and dragging the boat to a stop virtually within its own length.



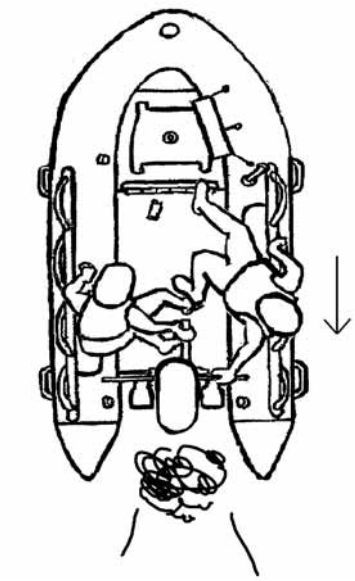
Students continue practicing this skill until they can execute weight shifts from a plane and back to a plowed stop without commands. The plowing becomes critical later as the students learn to make tight, "J" turns.

"Peel Turns"

Effectively entering and leaving eddies, especially across strong eddy lines, or is leaving an upstream hover and turning downstream under power, requires quick and effective weight shifts as well, only this time laterally in the boat.

At this point students are starting to figure out that being the deckhand is a very physical position.

This drill is conducted first in flat water, then moving to slow current, and finally into and out of eddies and faster currents. The operator calls the side he is going to turn to; the deckhand replies



"ready," and on "now," the deckhand throws his weight to that side of the boat, the coxswain also leaning in that direction while putting the tiller full over and accelerating.

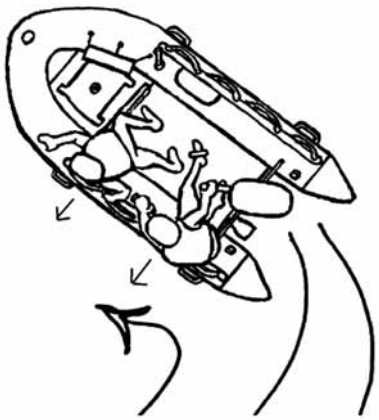
The result will be the boat standing up on its aft end of the inside tube and turn in it's own length. The crew continues the turn for a couple of revolutions while they refine their positions, and the coxswain then calls "recover." The deckhand returns to his normal position and the coxswain brings the tiller back straight, and retards to neutral. The boat will then lie back down.

The crew then conducts the turn in the opposite direction.

A good drill at this point is to set out a couple of buoys about 75 m. apart. Each coxswain then maneuvers the boat in a figure 8 pattern. Accelerating in the straights, slowing as the boat enters the turn, the deckhand shifting his weight as they enter the turn and resuming normal position as the boat enters the next straight.

Another drill is to have each student attempt the same drills by themselves, solo, requiring the operator to lean forward and to the center of the boat in order to get the boat on a plane, and then shifting his weight in and out of the turns. This drill is worthwhile in the event that the deckhand either falls out of the boat or has to get into the water to assist a victim. The critical points to reinforce at this point are:

- Communications and coordination between the crew members
- Maintaining 360-degree awareness at all times.
- If the deckhand is too far back the coxswain can't drive the boat.
- If the deckhand is to far forward the boat won't stand up and the turns are flat and wide with the engine cavitating.
- If weight is too far to the inside



of the turn the prop "ventilates" and looses power.
- The point again is to get the "feel" of the boat at speed.

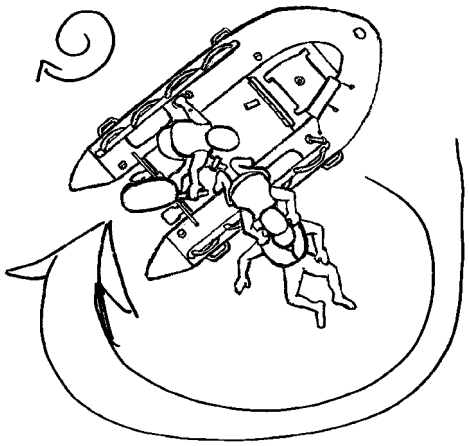
"J" Turns

Even sharper "J" turns are made when coming downstream on a plane, passing a victim in the water and then turning upstream and coming to a hover, waiting for the victim to reach the boat. They are also handy for tight turns in narrow rivers, and for pulling victims into the boat.

Again the skill is practiced in flat water first. After the boat is up on plane, the coxswain alerts the deckhand by yelling, "Left J Turn!" He then throttles off sharply while keeping the tiller amidships. As the bow reaches the highest point of the plow he calls "Now!," at which point the deckhand moves as far back on the left tube as possible while the coxswain putts the tiller over as far as possible and accelerates. Just before the 180 degree turn is completed, the coxswain calls "Recover!." The deckhand moves back to the right side mid-tube, the tiller is returned to amidships, and the throttle is retarded to slow ahead.

The maneuver is the repeated to the right. The crew switches positions and continue to practice until the maneuver is second nature.

AQUATIC COMPANIES



The crew then moves to fast current, practicing coming downstream past a target and then J turning upstream and going into a hover so that the floating target can float down alongside the boat. We use ring buoys or beach balls for this drill.

Students need to maintain 360-degree awareness during this drill, try to "feel" the "sweet spot," (when the bow is highest in the plow,) and be aware that one or the other of them may fall out of the boat during this drill.

Victim Pickup During "J" Turn

In previous sections of this series we discussed how to pull a victim or another rescuer into the boat in several different ways, including backwards, forwards, with a strap to assist and parbuckling.

Picking a swimming victim out of the water from a moving IRB, or picking up a moving victim from an IRB holding a hover requires a combination of those skills and "J" turns to be effected quickly and safely.

Practice sessions involving using the ring buoy or beach ball again. Moving upstream the coxswain brings the boat to a hover and to neutral, at which point the deckhand throws out the target. The coxswain maintains neutral for a few seconds, then engages forward in a hover, but tillers away from the target at a ferry angle. Once the target is clear of the boat, the coxswain calls a J turn downstream, goes up on a plane and moves downstream 25 to 50 m. He then calls a J turn upstream and assumes a hover.

The deckhand uses his chopping arm to point the boat in the proper direction while talking to the coxswain about the position of the target. As the target comes alongside, the deckhand calls "got it!" The coxswain then goes into neutral and puts the tiller away from the target.

The deckhand moves to the rear of the boat, feet in the bottom of the boat and knees on the tube, simulating lifting a victim into the boat. When the deckhand says "ready," the coxswain goes into forward, accelerates, and J turns in the direction of the victim. This dips that corner of the tube and allows the deckhand to easily pull the victim into the boat. The operator continues the sharp turn until the "victim" is completely in the boat, or the boat is again facing upstream, and again returns to a hover. The drill can be done on either side of the boat. However the right side allows the operator a clear view of the drill and reduces the chances of the deckhand falling out, or flipping the boat. Left sided drill requires careful balance on the part of the deckhand.

Once each crewman has traded places and practiced pulling the "target" into the boat in flat water and current, they load a live victim in the boat.

Safety Caution: Whenever putting a live victim in the water during a drill one of the crew MUST blow a whistle loudly and put both hands up. Go into hover; go to neutral with tiller away. Swimmer goes into water. Wait 5 seconds. Go into forward gear and ferry away. J turn downstream and go into drill.

Safety Caution: Continuously emphasize 360-degree awareness. Insist on tiller away and neutral whenever a swimmer is next to the boat. As technique improves students may start to simply put the tiller away and idle forward.

The final J turn skill set involves putting the deckhand into the water, so that the coxswain can execute this maneuver by him or herself. When the J turn is executed the deckhand pulls him or herself into the boat with a one-hand assist from the coxswain.

PWC with the RDC

Personal Watercraft, (or as proponents would prefer "Rescue Watercraft" are a recent addition to swiftwater and flood response capabilities. Used first in the mid-1990s for some flood responses, they have since expanded in usage with the addition of the various surf rescue "sleds" attached for the victim and rescue swimmer. The upside of the sleds is that they provide stability and flotation, (though a wild ride at speed) for the victim. The downside is that with the driver, swimmer and one victim, the combination PWC/sled is at maximum capacity.

A recent innovation has been the use of Oceanid's Rapid Deployment Craft, (the RDC, as a towed option. Oceanid makes a special shield for the front of the RDC and towing hardware to attach it to the PWC. This combination is extremely stable, even at speed, and capable of handling multiple victims and rescuers.

All the drills described can be conducted with the RDC/PWC combination. Additional benefits are that the RDC can be uncoupled and used as a conventional raft in some of the other swiftwater/flood rescue options described earlier in this series, or used as a straight paddle boat.

Equipment descriptions are available at www.oceanid.com

In the next issue we will talk about more advanced rescue methods using powerboats, more involved emergencies, towing boats in strong currents, and other advanced skils.

Next Section:

Bags from boat
Rescue swimmer from boat
Tethered rescue from boat
Towing another boat.
Other advanced skills