MCRP 3-02C

Marine Combat Water Survival

U.S. Marine Corps

Coordinating Draft of 17 November 1999

DEPARTMENT OF THE NAVY
Headquarters United States Marine Corps
Washington, D.C. 20380-0001

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FOREWORD

1. PURPOSE

The Fleet Marine Force Reference Publication (FMFRP) 013, *Marine Combat Water Survival,* provides techniques, procedures, and training standards for Marine water survival. This publication addresses a Marine's ability to cross water obstacles and perform water rescues.

2. SCOPE

This publication guides individual Marines and small-unit leaders in the proper techniques and training requirements of combat water survival. Smallunit leaders should use this publication to prepare Marines for the Marine combat water survival program (MCWSP). Once a unit has completed the MCWSP, small-unit leaders should use this publication as a refresher course beforewater operations. The techniques and procedures contained in this publication reflect current Marine corps methodology.

3. SUPERSESSION

MCRP 3-02C supersedes previous Marine Corps and Red Cross guidance where differences exist.

4. CHANGES

Recommendations for improvements to this publication are encouraged from commands as well from individuals. Forward suggestions to--

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Marine Combat Water Survival
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Chapter 1

Introduction

Throughout history, water has posed special challenges to Marines and sailors in both peace and war. Combat units with confidence in their ability to work in and around water can use water to their advantage in combat. The inherent dangers of waterborne operations demand that personnel receive proper water survival training. History is filled with examples where proper preparation or training for survival in water has averted disaster. The following examples illustrate this point.

1. *U.S.S. Indianapolis*. On Sunday, July 29, 1945, the heavy cruiser *U.S.S. Indianapolis* was en route to the Philippine Sea, after dropping off the first atomic bomb. Shortly before midnight (about 39 hours out of port), the *Indy*, running blacked out and unescorted, was rocked by two explosions on her starboard side. With communications smashed, the ship was unable to signal its distress and sank within 15 minutes.

Three life rafts and a floater net supported a few survivors, but the rest drifted about, held up by rubber life belts or Mae Wests. About 60 seamen died the first night.

Survivors assumed the ship would be reported overdue in Leyte, and they would be rescued within 2 days. Throughout the next several days, intransit aircraft flew nearby without spotting the desperate seamen. As best they could, the men kept together, some tying long ropes to each other, floating like corks on a net.

By Monday evening, panic began to set in as some life jackets lost their buoyancy from the long immersion. Some men even fought over life jackets resulting in at least 25 deaths. No one dared sleep, for fear of losing his jacket.

Not until late Thursday morning, 3-1/2 days after the ship sank, were the men discovered. A plane on a routine flight over the area luckily spotted the survivors. When surface ships picked them up that night, the survivors learned they had never been reported overdue. Everyone of the 1,196 man crew, was a casualty. Eight hundred and eighty were listed dead or missing. In this instance, the innovative and expedient use of flotation devices and float techniques by the survivors helped save hundreds of lives.

2. *U.S.S. America.* On Thanksgiving night, November 23, 1995 a homesick Marine Lance Corporal Zachary Mayo, 20 thought of home as the carrier *U.S.S. America* made its way through the Arabian Sea. Unable to sleep, Lance Corporal Mayo made his way onto an open-air platform near the aircraft hangar bay three levels below the sleeping quarters to get some fresh air. While on the hangar bay, the ship veered suddenly, throwing Mayo through the platform's protective bars into the sea thirty feet below.

Frantic, Lance Corporal Mayo called out in vain to the watchmen on the flight deck 64 feet above him. It soon became clear to Mayo that the *U.S.S. America* would keep its course into the Gulf of Oman until his absence was discovered at morning muster. Zachary took a moment to consider his situation.

Since land was at least 100 miles away, swimming was suicide; he would have to stay afloat until a search party found him.

Using the techniques he learned during combat water survival training Lance Cpl. Mayo fashioned a floatation device out of his coveralls and tried to relax. Meanwhile, aboard the *U.S.S. America* business continued as usual. Since Lance Corporal Mayo was on special-assignment with the hazardous-materials division, his absence was not noticed by his ship mates until a petty-officer asked several sailors if they had seen their comrade recently. By the time an all-hands muster had been completed, Lance Corporal Mayo had been adrift at sea for over 24 hours. Although three fixed-wing Viking aircraft were deployed to search for the Marine, most aboard ship feared the worst.

It is a testament not only to Lance Corporal Mayo's incredible physical courage that he was discovered delirious but alive after 34 hours at sea by a Pakistani fishing boat but to the soundness of lifesaving techniques taught in combat water survival training.

Chapter 2

Water Survival

As a Marine, you face a variety of potential water emergencies. Ships and amphibious assault vehicles can sink, aircraft can crash at sea, and you can accidentally fall into the water. If properly applied, the techniques described in this section will protect you during water emergencies.

2001. Abandoning Ship

At the time of embarkation aboard a U.S. Navy ship, you will receive abandoning ship instructions from Navy personnel. Follow those instructions if ordered to abandon ship. Upon receiving the order to abandon ship, report to your designated assembly area. Take the following actions without further orders:

· Put on a life jacket. If the life jacket is inflatable, **DO NOT** inflate it until you enter the water and move away from the ship.

· Remove helmet and gas mask. Remove soft cover and place in a cargo pocket for later use.

· **DO NOT** remove clothing, boots, or shoes.

Use the following steps to abandon ship:

l. Grasp the nostrils firmly between the knuckles of one hand to close the nose. See figure 2-1A.

Figure 2-1A. Step 1.

Figure 2-1B. Step 3.

2 . Cross free arm over bent arm.

3. Grasp upper arm with free hand to lock bent arm against body. See figure 2-1B.

4. Step to the edge of the ship's deck.

5. Check the water below for debris or survivors. If clear, look straight ahead. If water is not clear, move to another location.

Figure 2-1C. Step 6.

6. Step off the side of the ship with a smooth 30 inch stride when ordered. **DO NOT JUMP OFF THE SHIP. DO NOT LOOK DOWN AT THE WATER.**

NOTE: Looking down at the water causes the body to tip forward in midair. This causes the face to strike the water's surface with great violence. This can render you unconscious or cause injuries.

7. Bring trailing leg forward during fall. Lock instep of trailing leg behind ankle of leading leg. See figure 2-1D.

Figure 2-1D. Step 7.

8. Continue looking straight ahead until you hit the water. See figure 2-1E.

Figure 2-1E. Step 8.

Figure 2-1F. Step 9.

9. Remain in the abandon ship position until descent has almost stopped. See figure 2-1F.

Figure 2-1G. Steps 10&11.

10. Swim forward and up. See figure 2-1G.

11. Extend one arm (palm up) to feel for obstructions.

1 l 2 . Move quickly away from the ship. **DO NOT LOOK UP AT THE SHIP**.

2 **Figure 2-1H. Step 12.**

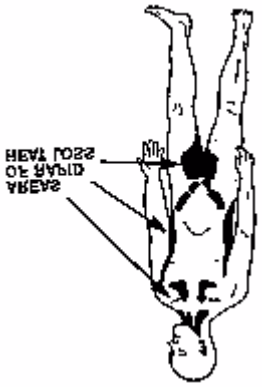
3 2002. Swimming in Cold Water

4 **DO NOT** swim to stay warm. Swimming, even with a slow and steady stroke, produces a lot of heat,
5 which the water steals from the body. Swimming produces hypothermia about three times faster than
6 remaining motionless.

7 **SWIM** if you have a flotation device and the shoreline is visible.

8 A. Individual Protection From the Cold

9 The head is the part of the body from which heat loss is greatest. Wearing a life jacket holds the head
10 above water and reduces heat loss. However, the throat, chest, and groin also lose heat rapidly. See fig-
11 ure 2-2.



12 **Figure 2-2. Heat Loss Areas.**

13 If equipped with a life preserver, assume the heat escape lessening position (HEL
14 This position protects major blood vessels near the body's surface. These areas la ıre
15 vulnerable to the chilling effects of cold water. The following steps protect vulnei

16 l. Tuck chin down tightly to cover throat.
17 **Figure 2-3.**

Protect vulnerable Areas

2. Clamp hands tightly inside the armpits.

3. Draw legs up in a fetal position to protect groin. See figure 2-3.

B. Group Protection From the Cold

Two or more Marines equipped with life preservers should wedge tightly together. Follow HELP procedures to protect vulnerable areas. Establishing contact with other swimmers provides several survival advantages:
(See figure 2-4.)

· Creates a larger target for search and rescue aircraft.

· Provides additional warmth in cold water.

· Improves morale.

· Reestablishes chain of command.

· Reduces shock and panic.

· Provides opportunity to administer first aid.

· Supports exhausted Marines.

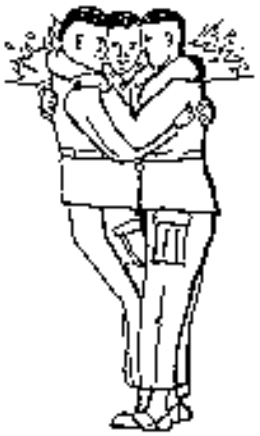


Figure 2-4. Group Protection

C. Life Preservers

U.S. Navy ships and landing craft issue kapok life preservers. The kapok life preserver is bulky and clumsy, but it will support heavy loads.

CAUTION

Do not cut or puncture the kapok life preserver's protective case. Kapok loses its buoyancy once it contacts water.

U.S. Marine Corps aircraft and amphibious assault vehicles have inflatable life preservers.

CAUTION

Do not inflate the life preserver until clear of the aircraft or vehicle.

D. Survival Without a Life Preserver

You may be in open water without a life preserver. In that situation, anything that floats can help you survive.

Floating With Inflated Shirt

You can float by a bubble of air trapped in the shoulders of your shirt. The air rises to the back and shoulders of the shirt and supports you at the water's surface. If necessary, assume the HELP to slow heat loss. The following steps produce a bubble of trapped air in a shirt:

l. Button the shirt's collar button.

2. Open the next lower button.

3. Take a deep breath and bend forward as far as possible. See figure 2-5A.

F

4. Hold open unbuttoned gap in shirt and blow in air. See figure 2-5B.

5 . Repeat with another lung full of air if required

6. Gather and hold the shirt front tightly in both hands to prevent the shirt from floating too high.

7. Repeat inflation as required.
.

Figure 2-5B. Step 4.

Floating With Inflated Trousers

In cold water, submerging the head to remove and inflate the trousers results in heat and energy losses that outweigh the benefit of using trousers as a flotation device. In warm water, trousers should be used as an expedient flotation device. There are three methods for removing and inflating trousers. Once inflated, you float motionless as if wearing a life preserver. If needed, assume the **HELP** to slow heat loss. Reinflate trousers as needed. As trousers and shirt dry, air leaks out of the legs. To slow this process, occasionally splash water on the fabric

Sling Method. The sling method works if you are a strong swimmer or naturally very buoyant. To inflate trousers using the sling method, take the following steps

1 l. Take a deep breath, bend over, and remove boots. See figure 2-6A.

2 **Figure 2-6A. Step 1.**

3 **NOTE**: If you can reach shore, tie boot laces together and suspend boots from shirt or hang them around
4 your neck so they rest on your chest. If you cannot reach shore, drop boots.

5 *2.* Remove trousers See figure 2-6B.

6 **Figure 2-6B. Step 2.**

7 3 . Tie the bottoms of the trouser legs in a square knot. See Appendix for knots and figure 2-6C.

8 **Figure 2-6C. Step 3.**
9 4. Button or zip the fly closed.

5. Hold trousers above water's surface and behind head. Grasp both sides of the waistband and open wide. See figure 2-6D.

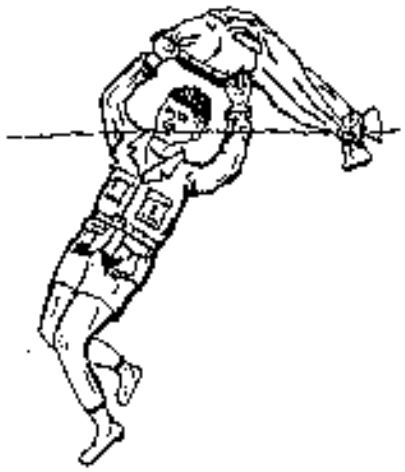


Figure 2-6D. Step 5.

6. Kick strongly to stay on top of water while slinging trousers over head. See figure 2-6E.

Figure 2-6E. Step 6.

NOTE: Slinging the trousers overhead scoops air into them. Once the waistband hits the water, air is trapped in the trousers' legs.

7. Hold waistband underwater to prevent air from escaping.

8. Slip inflated legs over head. Hold rolled waistband against chest. See figure 2-6F, #1.

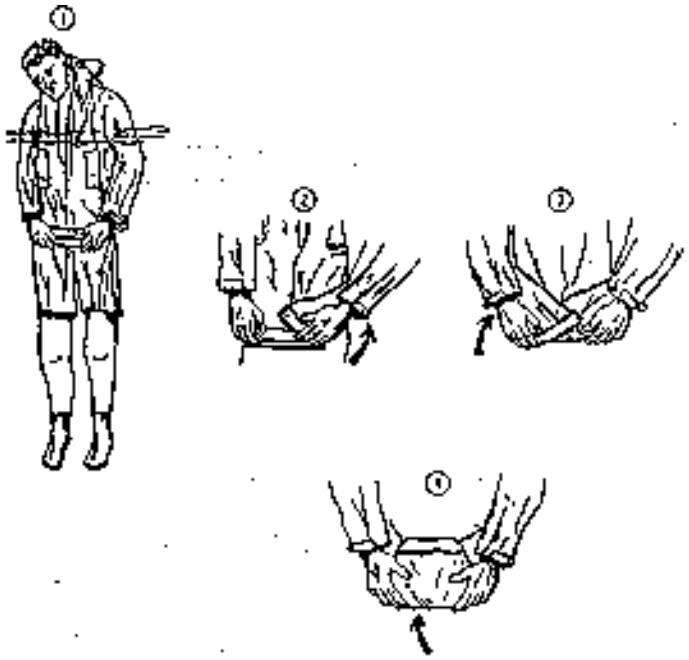


Figure 2-6F. Steps 8, 9.

9. Fold waistband's outside corners toward center to form a point. Fold point upward several times and hold. See figure 2-6F, #2-4.

10. Rest back of neck against knot.

11. Lie back and relax. See figure 2-7. 12. Re replace air in the trousers that escapes over time.

Splash Method. The splash method is an alternative to the u must kick strongly to remain at the surface. The following s method:.

1. Follow steps l--4 under the sling method.

2. Hold trousers just below water's surface. Grasp both sides of the waistband and open wide.

3. Extend hand 6 inches or more above water's surface.

4. Stroke downward, angling down across the body and toward waistband.

NOTE: This sends a mixture of water and air bubbles into the trousers. The water passes through the fabric, but the air remains trapped in the legs.

5 . Follow steps 8 - l 2 under the sling method.

Blow Method. The blow method is an alternative to the sling method. Use the blow method if you are a weak swimmer. The following steps show proper inflation with the blow method:

l. Follow steps l--4 under the sling method.

2. Hold trousers above water's surface. Grasp both sides of waistband and open wide.

3. Take a deep breath. See figure 2-10A.

4. Drop 2 feet below the water's surface pulling waistband underwater. See figure 2-10B below.

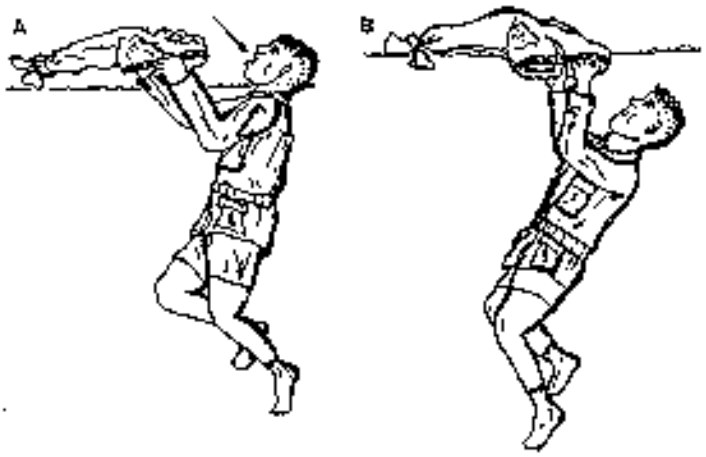


Figure 2-10A. Step 3. **Figure 2-10B. Step 4.**

5. Hold waistband open with both hands and blow air into trousers. See figure 2-11.

6. Repeat last two steps as required to inflate.

7 . Follow steps 8-11 under the sling method.

Fi

E. Survival With a Pack

You also face many water obstacles once ashore. These obstacles include rivers, creeks, lakes, ponds, and canals. Your pack is your key piece of equipment to survive water accidents once ashore. If the pack's contents are properly waterproofed, it can support you (with a combat load) in the water. Buoyed up by the waterproofed pack, you can emerge from the water with all the equipment (i.e., boots, helmet, flak jacket, weapon, etc.) you need to continue the mission.

The pack floats because of a physical law known as Archimedes' principle. The principle states that an object submerged in a liquid is buoyed up by a force equal to the weight of liquid displaced (pushed aside) by the object. If the weight of the displaced liquid is greater than the weight of the object, the object floats. If the weight of the displaced liquid is less than the weight of the object, the object sinks.

An object that sinks in water (e.g., a machine gun) still weighs less in the water than on land. Even though a machine gun sinks, it is still buoyed up by a force equal to the weight of water it displaces. For this reason, you should not try to hold yourself or your equipment any higher out of the water than they would naturally float. Doing so wastes energy and body heat.

F. Preparing Equipment

Items listed in table 2-1 are available through the supply system.

ITEM	NOMENCLATURE	SIZE	NSN
Waterproof bags			TAMCN=V4070
	Pistol bag	cover, plastic size #1	8"x18"
	Rifle bag	cover, plastic size #2	10"x56"
	Machine gun bag	cover, plastic size #3	15"x56"
	Multipurpose bag	cover, plastic size #4	20"x84"
Panama work vest	life preserver, vest		4020-00-55-9006
Small plastic bag	bag, plastic self-sealing	6"x6"	8105-00-837-7754
		bag, plastic self-sealing	12"x12"
Riggers tape	tape, 2 $^{1}/_{2}$" olive drab		7510-00-074-5100
Caulking	sealing compound, temporary seal		8030-00-264-3888
Willie peter bag	bag, waterproof clothing		TAMCN=K4030
			8465-00-261-6909

Table 2-1. Waterproofing Items.

Tape or pad equipment corners and sharp edges. Place items to be packed inside plastic bags. Plastic trash bags work well for bulky equipment (e.g., sleeping bags, field jackets, gas masks, shelter halves). Use small plastic bags for small items (e.g., shaving gear).

NOTE: If the gas mask must be carried outside the pack, cover it with a waterproof bag.

You may have rubberized "waterproof" bags in which to carry sleeping bags or with which to line compartments of your pack. Often, such bags ARE NOT waterproof. They protect bags made of plastic, but may leak if used alone.

Tying a Plastic Bag

Do not inflate plastic bags with air because they can burst if pressed from the outside. Try to remove excess air from the plastic bag. Secure the mouth of the bag. See figure 2-12.

1 2 3 4 5

Figure 2-12. Tying a Plastic Bag.

Packing the Pack

Place plastic bags inside the pack. Handle them carefully to avoid rips. Load sharp items (e g., tent pegs, poles) so as to prevent punctures in the bag. Place items in the pack in order of expected use. Close the pack and its compartments. Attach sleeping mats or bags as high as possible on the outside of the pack.

G. Swimming With the Pack

There is no one specific technique for swimming while wearing a pack. You can float nearly vertical and propel yourself forward with bicycle style kicks and breast stroke style arm sweeps. You can also use the combat travel stroke which is faster but more tiring. The objective is to move forward and still perform your mission when you exit the water (see figure 2-13). , Experiment with various techniques during water survival training to find the most effective method for you.

H. Survival Swimming

An object that floats has positive buoyancy. An object that sinks has r e have positive buoyancy and will float at the water's surface. (See ***Buoyancy*** you naturally float or sink, you can remain at the surface for extended peri you apply the appropriate survival stroke. The stroke to use depends on w

Regardless of which survival stroke you use, the following principles ples with the acronym SAFE.

Slow easy movements. Move slowly to conserve energy and minimiz

Apply natural buoyancy. Use natural buoyancy to support the body.

Full lung inflation. Fill the lungs with each breath. Do not hold air in the cheeks.

Extreme relaxation. Tight muscles are denser than relaxed ones and do not float as well.

Buoyancy Test

To test your buoyancy, stand in waist-deep water, take a full breath, bend slowly forward, and grip ankles. Relax and wait. If you have positive buoyancy, you will slowly rise to the surface. If you have negative buoyancy, you will sink.

Combat Travel Stroke

The combat travel stroke is the basic stroke for water survival. It permits you to move toward safety and is the best survival stroke if you have negative buoyancy. The combat travel stroke can be performed while wearing. A combat travel stroke cycle consists of the following steps:

1. Float in a vertical position with legs dangling. See figure 2-14A.

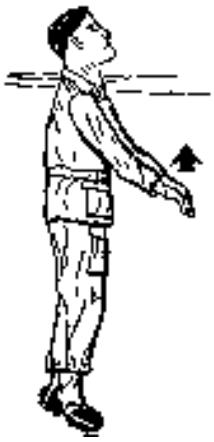


Figure 2-14A. Step 1.

2. Bring hands up, extend arms in front of chest, and begin a slow cycling movement with legs. See figure 2-14B.

Figure 2-14B. Step 2.

3. Hold head out of water. Tilt head slightly back. Breathe normally. See figure 2-14C.

Figure 2-14C. Step 3.

4 . Move arms through heart-shaped stroke (the same as the breast stroke). Continue cycling legs.

The Sweep

The sweep works well if you have slight to excellent positive buoyancy. A sweep cycle consists of the following Steps:

1. Float face down in the water, arms and legs dangling, and head hanging down. Relax all muscles. See figure 2-15.

Figure 2-15.

2. Spread feet slowly to prepare for a single kick. Figure 2-16.

Figure 2-16. Step 2.

3. Bring hands together, palms down, in front of face. See figure 2-17.

Figure 2-17. Step 3.

4. Kick feet together and exhale while tipping head back enough to clear water's surface with chin. See figure 2-18.

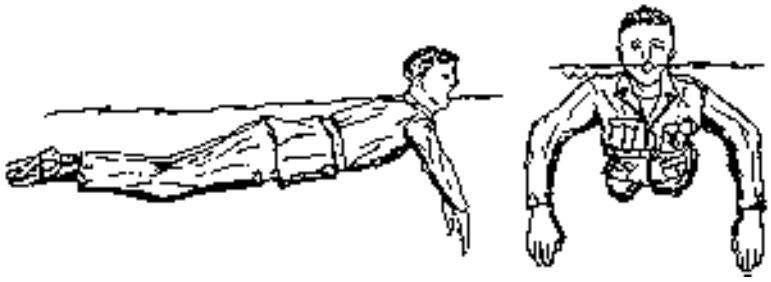


Figure 2-18. Step 4.

5. Bring hands down and to sides while inhaling deeply. Keep fingers together and palms turned downward against water. See figure 2-19.

Figure 2-19. Step 5.

6. Rotate head back into water and drop arms downward. Clap hands together in a stroke strong enough to prevent sinking.

Swimming Under Burning Fuel or Debris

Sometimes sinking ships and downed aircraft release fuel. Fuel floats on the surface because it is lighter than water. Move out of floating liquids as quickly as possible. The quickest way to escape floating liquids is to swim into the wind or current. Swimming under burning fuel for an extended distance is one of the

most exhausting techniques of water survival. To reduce fatigue, perform underwater swimming strokes as accurately as possible.

NOTE: If you have a kapok or inflated life preserver, you cannot swim under burning fuel. Instead, use techniques for swimming through burning fuel.

If ignited, fuel poses a serious threat. Burning fuel will not harm you if you are below the surface of the water. Escape from burning fuel involves swimming under water until clear of the fire. Perform the following steps if the burning fuel has spread too far to swim underwater in one breath:

1. Submerge to a depth of 6 feet.

NOTE: This depth is necessary to ensure that the swimmer does n o early.

2. Swim forward using a full arm pull until you need a breath. See

NOTE: Self-confident swimmers should use a breast stroke ki ıse a flutter (scissors) kick.

3. Prepare to surface.

4. Slowly turn the body upward until vertical. See bottom of figure

5. Extend arms overhead as far as possible.

1 6. Wave arms back and forth vigorously while slowly moving upward to splash a hole . Splash as long as
2 possible. See top of figure 2-21.

3 7 . Raise head above water and take one breath. See bottom of figure 2

4
5).

6 8. Quickly return below the surface. For extra speed, reach as low as possil

then pull extended arms strongly upward with palms out and up. See figure 2-22.

9. Return to a depth of 6 feet and continue to swim.

10. Repeat this cycle as often as necessary.

Swimming Through Burning Fuel or Debris

Instead, use the following steps to swim through burning fuel or debris:

1. Use a modified breast stroke. Head remains above surface throughout the stroke cycle, and chin is just clear of the water. See figure 2-23A.

2. Swim toward clear area.

Figure 2-22. Step 8.

3 . Kick legs in a constant frog kick. Unlike a normal breast stroke, this technique has no glide.

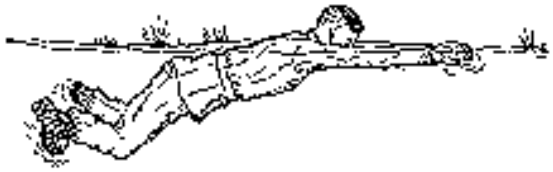


Figure 2-23A. Step 1.

4. Use arms and hands to sweep away debris, oil, or burning liquids.

5. Extend arms (palms outward) forward on the surface. Arms are a shoulder width apart.

6. Pull hands in and back toward chest. See figure 5-23B.

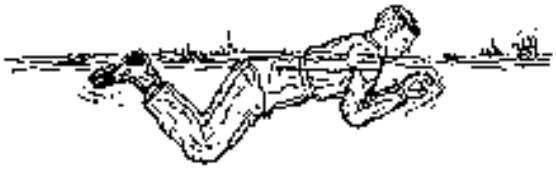


Figure 2-23B. Step 6.

7 . Stop hands in front of face and rotate so palms face forward (roughly halfway out of the water).

8. Sweep arms forward to a full extension at shoulder width. This splashes debris, oil, or burning liquids aside. See figure 2-23C.

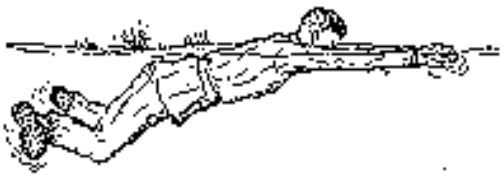


Figure 2-23C. Step 8.

9. Time kicks to coincide with the forward sweep.

Chapter 3

Water Rescues

Beginning at the combat water survival, second-class (CWS-2) level (see **app A**), the Marine combat water survival program (MCWSP) stresses rescue techniques suitable to military operations. Avoid entering the water with the victim. A drowning victim reacts with unexpected violence and can seize and drown the rescuer. Enter the water as a last resort. Attempt a swimming rescue only if you are in good condition and there is no other way to help the victim. Instructions for tying knots to use in water rescues are found in Appendix X.

3001. Rescue Techniques

A. Reach. From a safe position at the water's edge, reach out to the victim. Talk constantly to calm the victim. Retain partial contact with land or some solid support structure (e.g., pier, bridge). If the victim is close but still beyond reach, extend an object (e.g., stick, rifle with magazine removed and chamber empty, ALICE pack etc.) that the victim can grasp. Once the victim is close to shore, enter the water to seize the victim. See **figure 3-1**

NOTE A foot can also be extended to the victim if the rescuer can retain a secure grip on a solid support structure.

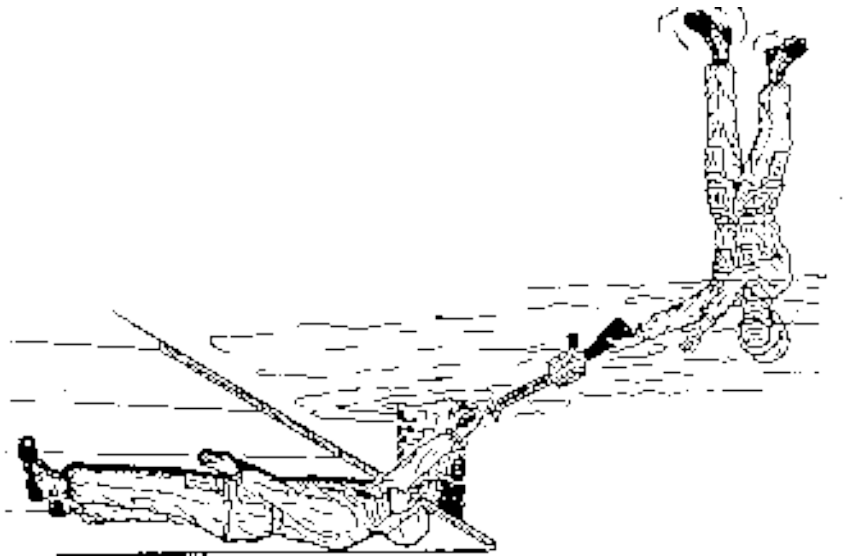


Figure 3-1. Reach Technique.

B. Wade. Do not enter water deeper than your chest. Talk constantly to calm the victim. If possible, do not directly touch the victim. Extend an object (e.g.., a stick, a rifle with magazine removed and chamber empty, a pack) that the victim can grasp. Once the victim grasps the object, pull the victim slowly to safety. See **figure 3-2**

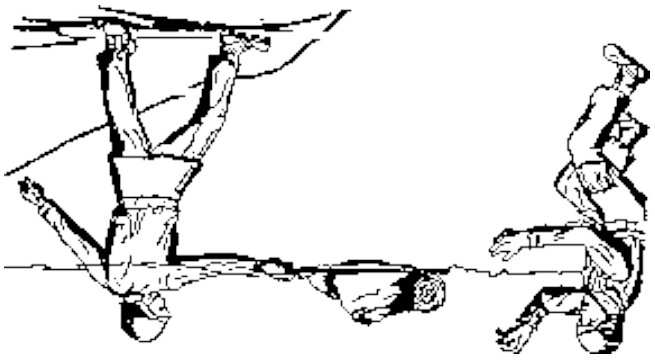


Figure 3-2. Wade Technique.

C. Throw. Use an expedient heaving line to throw a lifesaving device to the victim. Talk constantly to calm the victim. If a stream crossing appears dangerous, post a Marine with an expedient heaving line to rescue distressed swimmers. The following steps show preparation and use of an expedient heaving line during a throw rescue. Once the victim grasps the line, pull at a steady pace. Pull should keep the victim's head above the water's surface. DO NOT pull so strongly as to break the victim's grip on the line..

Throw Procedure

1. Tie a bowline at one end of the rope. (See Appendix B for

2. Unfasten the lid of a partially-filled canteen. See top of **figure 3-3**

3. Place bowline around neck of canteen.

4. Refasten lid so canteen hangs from bowline loop.

5. Wrap one end of the rope around a foot to secure it. Stand with

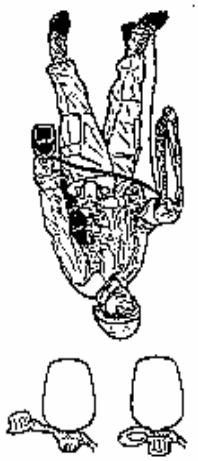


Figure 3-3. Ready to Throw.

6. Coil 20 to 30 yards of the rope, and hold in a non throwing hand.

7. Place the canteen in throwing hand. See **figure 3-3**

8. Use an underhand throw to pitch the canteen and coil a short distance past the victim. The rope should trail across the victim's outstretched arms. Keep the non throwing hand open so the second half of the coil can unfold freely. **See figure 3-4**

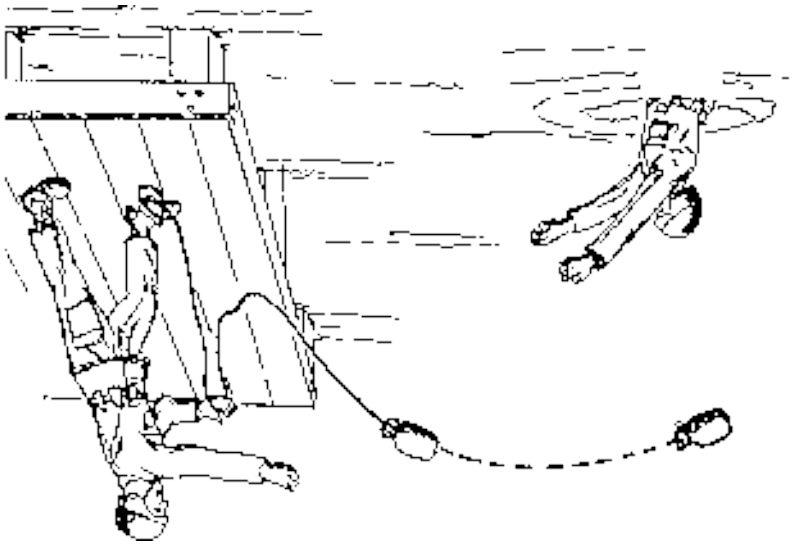


Figure 3-4. Throw Technique.

9. Retrieve the line if the throw is inaccurate or the victim fails to grasp it. Recoil the line as it is retrieved.

10 Divide the coil and throw again.

D. Wrist Tow Use the wrist tow to rescue a victim floating face down. Do not use the wrist tow on a struggling victim. Swim toward the victim using a modified breast or crawl stroke. Stop within 6 feet of the victim to assess the victim's condition. The following steps show proper wrist tow procedures:

1 Approach the victim from the front.

2 Grasp the underside of the victim's left wrist with the right hand, or the right wrist with the left hand.

3. Lean away, pulling and kicking strongly to move the victim into a horizontal face up position.

4. Twist the wrist to rotate the victim into a face up position.

5. Swim toward safety using the sidestroke or elementary backstroke.

6. Retain a firm grip on the victim's wrist.

7. Keep towing arm fully extended. This allows you to escape if the victim revives and begins to struggle.

8. Ensure the victim's head does not go underwater during the recovery part of your stroke cycle. See **figure 3-5**

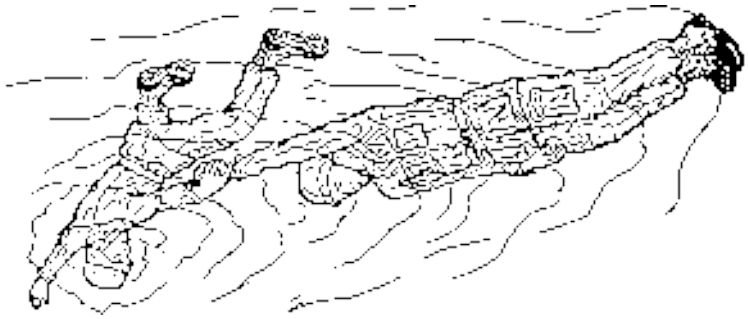


Figure 3-5. Wrist Tow Technique.

CAUTION

The cross-chest carry is very fatiguing even if you are in excellent physical condition.

E. Cross-Chest Carry. Use the cross-chest carry to rescue victims struggling at the water's surface. Talk constantly to calm the victim. Swim toward the victim using a modified breast or crawl stroke. Stop within 6 feet of the victim to assess the victim's condition. The following steps illustrate proper cross-chest carry procedures:

1. Grasp victim's right armpit with right hand, or left armpit with left hand.

2. Lean away, pulling and kicking strongly to move the victim into a horizontal face-up position. See **figure 3-6**

Figure 3-6. Moving Victim into Position

3. Retain a grip on the victim's armpit and reach over the victim with a free hand to encircle the victim's chest.

4. Release armpit once grip on victim's chest is secure.

5. Swim toward safety using sidestroke or elementary backstroke. See **figure 3-9**

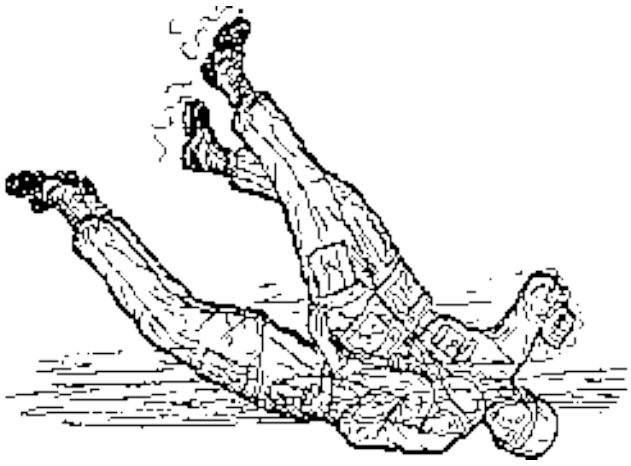


Figure 3-7. Cross-Chest Carry Technique.

These procedures bring the victim's face and shoulders clear of the water and usually cause him to cease struggling. Keep a firm grip on the victim's chest. Sometimes, the victim will fight during the swim to safety. If this happens, release the victim and reassess the situation.

3002. Rescue of an Unconscious Victim

Evaluate an unconscious drowning victim. Immediate first aid can save the victim's life and prevent possible brain damage. First, open the airway and check for breathing. If the victim is not breathing, give two breaths of air and remove the victim from the water as soon as possible. Once out of the water, check for a pulse. If a pulse is present and the victim is not breathing, start rescue breathing. If a pulse is not present, start CPR. Continue CPR until medical help arrives.

3003. Defense Against Drowning Victims

A struggling drowning victim poses great danger to anyone near him. Driven by panic, the victim can grab you with great strength in an effort to climb out of the water. This can result in the death of both you and the victim. The following techniques can be used to defend against a drowning victim. These techniques work well, but the best defense against attack by the victim is to stay out of his reach. Do not sacrifice your life in an attempt to save the victim.

A. Block

The block technique prevents the victim from grasping you if you have unwisely approached the victim from the front. If the victim lunges toward you, react as follows:

1. Place an open hand against the victim's upper chest.

2. Lean backwards and submerge rapidly. Keep blocking arm extended.

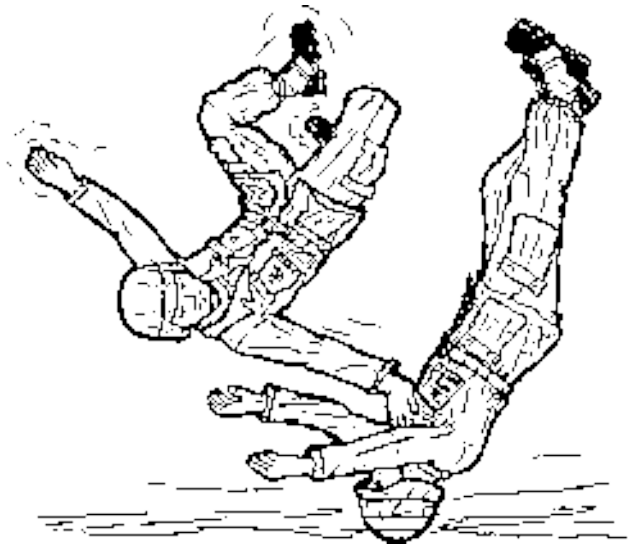


Figure 3-8. Block Technique.

3. Swim underwater away from the victim, and return quickly to the surface.

4. Reassess the victim's condition from a distance of 6 feet.

5. Determine an appropriate course of action.

B. Wrist Escape Technique.

The wrist escape is used when a victim grabs your arm or wrist. If a victim grabs your arm or wrist, quickly submerge the victim by reaching across with your free hand and pushing down on the victim's shoulder while kicking upward for better leverage. This leverage allows the rescuer to pull his hand free. You may also reach down with your free hand to grab your other hand, and jerk upward. Swim clear of the victim and reassess the victim's condition.

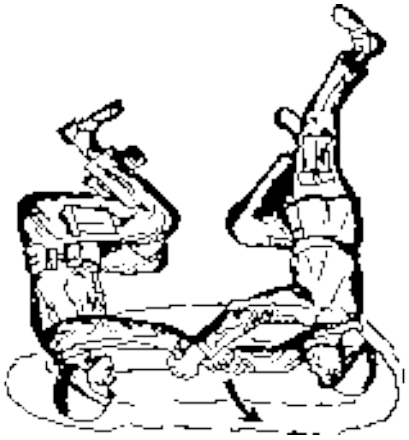


Figure 3-11. Wrist Escape Technique.

C. Front Head Hold Escape Technique

The front head hold escape technique allows you to escape from a victim who has thrown his arms around your head and neck. React as follows:

1. Take a quick breath and tuck your chin into a shoulder while shrugging your shoulders upwards. See figure **3-10A**

Figure 3-10A. Step 1.

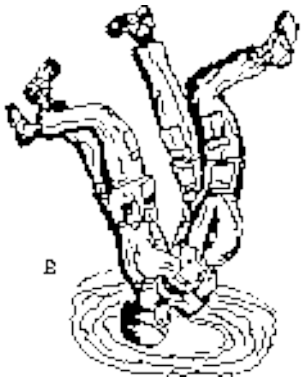


Figure 3-10B. Step 2.

2. Take a strong stroke and submerge instantly. This drags the victim below the water.

3. Grasp the victim's elbows or underside of upper arms. (See figure **3-10B**)

4. Thrust the victim's arms upward and away.

5. Keep chin tucked and shoulders shrugged to protect throat.

6. Swim underwater away from the victim, and return quickly to the surface. (See **3-10C**.)

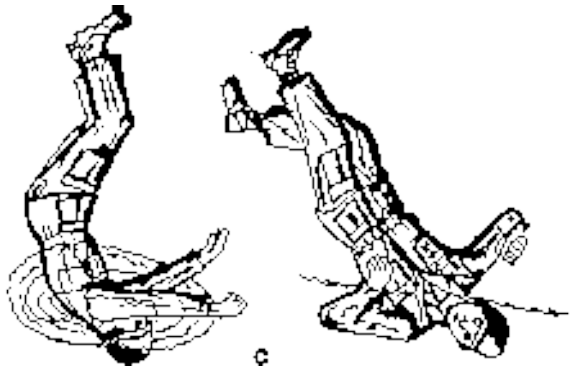


Figure 3-10C. Step 3.

7. Reassess the victim's condition from a distance of 6 feet away.

8. Determine an appropriate course of action.

D. Rear Head-Hold Escape Technique

The rear head hold escape technique allows you to escape from a victim who has thrown his arms around your head and neck. React as follows:

1. Take a quick breath.

2. Tuck your chin down, turn head to either side, raise your shoulders to protect your throat, and submerge with the victim. See figure **3-11A**.

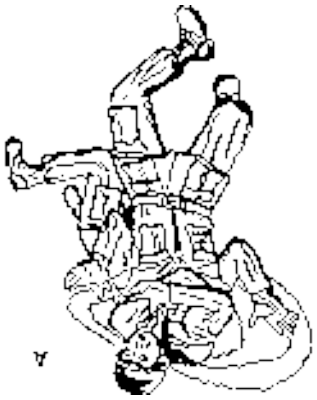


Figure 3-11A. Step 2.

3. Take a strong stroke and submerge instantly. This drags the victim below the water.

4. Grasp the victim's elbows or underside of upper arms. See **figure 3-11B**

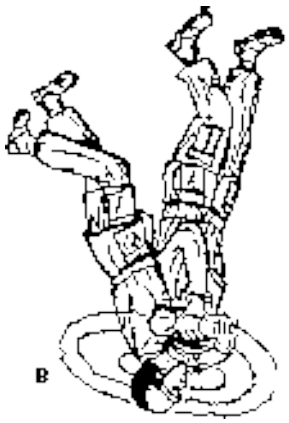


Figure 3-11B. Step 4.

5. Thrust the victim's arms upward and away.

6. Twist your head and shoulders until free.

7. Swim underwater away from the victim, and return quickly to the surface. See **Figure 3-11C**.

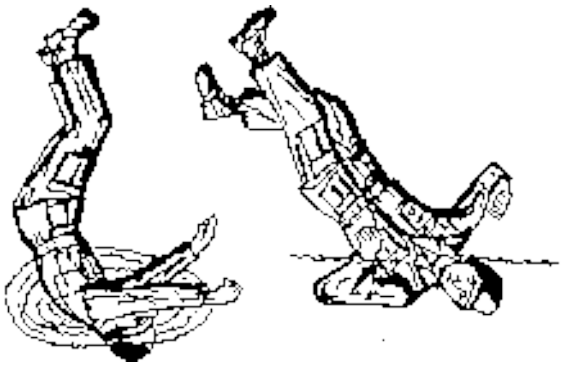


Figure 3-11C. Step 7.

8. Reassess the victim's condition from a distance of 6 feet.

9. Determine an appropriate course of action.

Chapter 4

Treatment of Casualties

4001. Drowning

Drowning is a form of suffocation. A drowning victim inhales water into the lungs, or his throat closes by reflex so that little or no water enters the windpipe. In either case, a victim can no longer breathe.

A. Freshwater Drowning. Freshwater drowning is difficult to treat. As a victim loses consciousness and slips beneath the water, the heart is still beating but the airway is blocked. After the victim loses consciousness, throat muscles relax and the airway opens. Water rushes into the lungs and enters the bloodstream. Within seconds, the volume of liquid in the bloodstream increases by as much as 50 percent. Meanwhile, the heart races at a very high rate because of the lack of oxygen. The heartbeat continues to increase as the blood thins. The increased strain on the heart, combined with thinning of the blood, makes cardiopulmonary resuscitation (CPR) less effective. Begin CPR immediately and continue CPR until medical help arrives.

B. Saltwater Drowning. Saltwater drowning is similar to freshwater drowning. The major difference is the water's saline content and its effect on the lungs. Salt water draws blood into the lung tissue and makes it difficult for the lungs to transfer oxygen to the blood. Begin CPR immediately and continue CPR until medical help arrives.

C. Drowning Symptoms. A drowning victim often calls for help and has an expression of dread or panic. Another symptom includes thrashing at the water's surface. If the victim stops or grows calmer, he or she is overcome by fatigue, hypothermia, or a lack of air. At this stage, the victim has 1 or 2 minutes before going under the surface.

D. Treatment If the victim is not breathing, begin rescue breathing. Place the victim on his back, pinch the nose, and give two full breaths. Check for a pulse. If a pulse is present, but the victim is not breathing, continue rescue breathing. If a pulse is not present, begin CPR. See MCRP 4-52, *First Aid,* for rescue breathing and CPR details.

4002 Hypothermia

Hypothermia is the abnormal lowering of the body's internal temperature. Hypothermia occurs when the body loses heat faster than the body produces it. The chilling effects of cold air, wind, and water produce hypothermia. Water poses the greatest threat because it saps a victim's body of heat 25 times faster than air.

In water of temperatures less than 70 degrees Fahrenheit, a victim's skin and outer tissues cool qu and the heart and brain begin to cool. A hypothermia victim loses the ability to move quickly, slips semi consciousness, lapses into a coma, and dies when internal temperatures drop too low. Depen on the water temperature, this process can take only a few minutes.

Sudden contact with cold water can set off a body reaction known as the mammalian diving reflex reflex can greatly increase survival time (especially for women and children) in or under cold wate The mammalian diving reflex shuts off blood circulation except the flow between the heart, lungs, brain. The small amount of oxygen left in the blood and lungs is saved for the body's vital organs. mammalian diving reflex has allowed people to survive over half an hour under cold water with no brain damage. Therefore, a cold water drowning victim should be treated as though he is still alive

WARNING

*If the victim **has no pulse or is not breathing**, **GIVE CPR OR RESCUE BREATHING IMMEDIATELY**. Continue first aid until medical help arrives.*

*If the victim **has a pulse or is breathing**, DO NOT GIVE CPR. CPR could prove fatal.*

A. Hypothermia Symptoms. Once the body's core temperature drops, the victim will show one or more of the following symptoms:

· Violent and uncontrollable shivering as the body tries to warm itself.

· Slow or slurred speech.

· Disorientation or poor coordination

· Loss of color, blue and pinched lips

· Cessation of shivering and rigid torso and limbs..

B. Survival Time. The hypothermia victim's survival depends on the water temperature and the time spent in the water. The following can increase the length of survival time:

· Extra clothing.

· Inactivity -- (remaining motionless in the water.)

· Body fat.

· Large body build..

NOTE: A small body build cools faster than a large build. This offsets a woman's extra bo advantage. As a result, women cool about 15 percent faster than men. Children cool faster than ad See paragraph 2002 for details on swimming in cold water.

C. Treatment. Treat hypothermia as quickly as possible. Consciousness of the victim determines the treatment that should be pursued. A victim must be warmed **to prevent** further heat loss. The following treatment procedures are recommended:

WARNING

*If the victim **has no pulse or is not breathing**, GIVE CPR OR RESCUE BREATHING IMMEDIATELY; Continue first aid until medical help arrives.*

*If the victim **has a pulse or is breathing,** DO NOT GIVE CPR. CPR could prove fatal.*

· Get the victim out of the elements and into shelter.
· Remove the victim's wet clothing.
· Put the victim in dry clothing.
· Place the victim in a sleeping bag if one is available. It may be necessary to place another Marine the sleeping bag with the victim.
· Place as much insulation as possible between the victim and the ground.
· Use hot water bottles, electric blankets, or blankets heated in an oven or by a campfire to apply h to the victim's neck, groin, and sides of chest.

CAUTION

Do not apply heat to extremities.

· Give warm fluids of the victim is conscious. Give candy or sweetened foods of the victim is able t eat..

· If unconscious, place the victim on his back with head tilted back to ensure open airway.

· Do not massage the victim. Massage can break blood vessels and create swelling, internal pressu and blocked blood circulation.

· Do not give alcohol to the victim.

· Seek medical help immediately.

D. Determination of Death. Unconscious hypothermia victims may not be breathing, lack a pulse, and appear dead. Nevertheless, proceed with treatment procedures. A corpsman or medical officer should decide if the victim can be revived.

Chapter 5

Negotiating Water Obstacles

Marines face water obstacles in salt, fresh, or brackish water where fresh and salt water meet. These water environments differ considerably, and pose distinct sets of problems for Marine tactical units and swimmers. Saltwater obstacles include tides, surf, and currents. Freshwater obstacles include rivers and canals. Brackish water obstacles include back bays.

5001. Tides

Tides are periodic changes in the surface level of oceans, bays, gulfs, inlets, and rivers. The Moon's and Sun's gravitational pull causes tides. Tides can create problems as when they make rivers too deep to ford or alleviate them as when the cover barriers with enough water for boats or swimmers to pass. Direction, level of change, and amount of change determine tidal nomenclature.

Tides that show change in *direction* are flood tides and ebb tides. Rising tides are known as flood tides. Falling tides are known as ebb tides.

Tides that show extreme *levels of change* are high tides and low tides. High tide is the period that water is at its greatest depth. Low tide is the period that water is at its most shallow depth.

Tides that show *amount of change* are neap tides and spring tides. Neap tides have the least amount of change in water level between high and low tide. Neap tides occur at the half Moon when the Sun and the Moon are aligned at a 90 degree angle with the Earth. In this position, the Sun's and Moon's gravitational pull offset each other. Spring tides have the highest floods and lowest ebbs. Spring tides occur at or shortly after the new Moon or full Moon when the Sun, Moon, and Earth are approximately in line. In this position, the Sun's and Moon's gravitational pull are combined.

5002. Surf

Waves break upon entering shallow water and create surf. The offshore area where waves break is the surf zone. The surf zone presents many hazards. Type of wave determines survival technique.

Wave action moves you toward shore. Lie on your back or side with head pointing in the direction of the beach and feet pointing into the waves (see figure 5-1). As one wave approaches, another drains away from the beach; relax and do not swim against the draining water. When a new wave is within about 10 feet, start swimming toward shore. Continue to swim until the wave lifts you and moves you toward the beach. Once the wave loses forward momentum, relax and repeat the cycle. If nearing

rocks, turn your body and approach feet first to reduce the chance of striking your head and arms.

Figure 5-1. Using Wave Action.

Breaking waves often trap air bubbles and create a foamy appearance. Bubbles lower the water's density and decrease buoyancy. Move through foamy surf as quickly as possible.

A. Escaping Plunging Waves. A plunging wave is a breaker whose crest curls forward and falls ahead of its base. Because of its power and underwater turbulence, a plunging wave poses the greatest surf threat. If caught in a plunging wave, you can be pulled underwater and pitched about violently. This can create conditions leading to panic and increase the chance of drowning. Perform the following steps to escape a plunging wave:

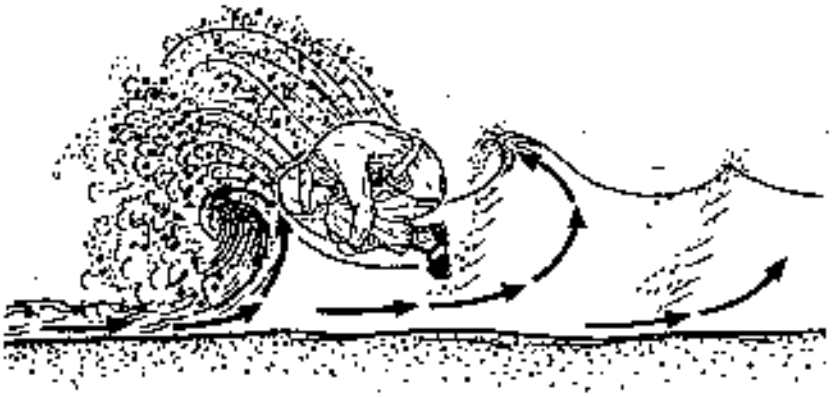


Figure 5-2. Escaping Plunging Waves.

1. Tuck into a ball with head against knees and forearms locked around legs just below the knees. See figure 5-2.

2. Relax in this position until turbulence subsides and you float to the surface. This can take 30 seconds or more.

3. Swim toward shore.

NOTE: If threatened by another plunging wave, dive underwater into the wave.

B. Escaping Spilling Waves. A spilling wave does not break. Instead, its crest slides forward without curling. A spilling wave creates less turbulence and poses less of a threat than a plunging wave. If caught in a spilling wave, relax and let the wave carry you to shore.

C. Escaping Surging Waves. A surging wave occurs on a beach with a steep underwater gradient. It never really breaks, but the crest rises while the base slides up the beach with great force and speed. Once the wave reaches its highest point on the beach, it rushes back as quickly as it surged forward. If you are standing on the bottom when a surging wave advances or retreats, the wave can knock you off your feet and pull you into the surf zone. If this happens, get in position for the next wave. Do not try to stand or walk on the bottom. Swim toward the beach as soon as possible.

5003. Currents

An offshore current occurs outside the surf zone. Typically, it occurs at bay entrances, in island channels, and between islands and the mainland. An offshore current flows parallel to or away from shore. If it is created by tides, the current strength and direction vary at different times of the day.

A rip current occurs when waves pile water against the shore faster than it can drain. The water flows rapidly along the beach until it is deflected seaward by a bottom obstruction. Then the rip current flows through the surf zone and into open water at a speed of up to two knots. This action can cut deep trenches in the sand. A rip current dies out once in open water (usually within a few hundred yards of the shore).

A long shore current occurs when a wave breaks against a beach at an angle. This current flows parallel to the shoreline and does not pose a great threat.

A. Escaping Offshore Currents

If caught in an offshore current, you may be carried in a direction you do not want to go. DO NOT try to swim directly to safety. If the current is moving directly away from the shore, relax and wait until the current dies out or turns toward land. Once the current subsides, use the combat travel stroke to swim toward shore. If the current is moving parallel to shore, use the combat travel stroke to move at an angle across the current and toward shore.

B. Escaping Rip Currents

A rip current poses two threats: it can pull you out to the open sea or you can step into a deep trench. If caught in a rip current, DO NOT try to swim against the current. A rip current moves faster than most people swim, and it is impossible to swim to shore once caught in it. Relax and stay afloat until the

current runs out. Once the current subsides, use the combat travel stroke to move parallel to the shore until you are out of the current. Then begin swimming toward shore.

C. Escaping Longshore Currents. If caught in a long shore current, use the combat travel stroke to swim across it at an oblique angle.

5004. Back Bays

Once on the beach, you often face one or more rows of low hills called dunes. Behind the dunes, you may encounter a low-lying stretch of ground thickly covered with scrub trees and bushes. This area gives way to wetlands known as back bays. Back bays consist of muddy islands that are almost submerged during flood tide and separated by channels of brackish water of varying depths. Channel bottoms usually contain soft mud. Back bays pose major obstacles to vehicular traffic. Infantry can cross back bays, but only with great effort. If crossing back bays by foot, consult detailed navigation charts, and use the following guidelines to plan your route:

5005. Rivers and Canals

A river is a large, natural stream of water that empties into a larger body of water. Slope of the riverbed and the volume of water in the river determine its current.

Canals resemble small rivers or streams in their width and depth, but usually lack any significant current. Climbing out of these waterways can be difficult if the canal is flanked by steep banks.

AVOID

Water less than waist deep; walking in shallow water or soft mud is extremely tiring.

Back Bay islands; these low-lying islands are usually too muddy to support foot traffic.

SEEK OUT

Deep water; floating with a pack is less tiring than walking through shallow water or soft mud.

Sand, shell, gravel, or stone bottoms; these firmer bottoms generally ease travel and help conserve energy.

Chapter 6

Fording Procedures

A ford is any site in a river, stream, or canal where the water is shallow enough for troops or vehicles to cross without using flotation devices. Canal bottoms are usually too soft to support fording vehicles, and wading infantry frequently stumble. Silent crossings are difficult. Station several strong swimmers at the water's edge to help anyone who has trouble crossing.

WARNING
Fords are dangerous. Cross as quickly as possible.

If you lose your footing and fall into the water, swim with the current to the closest shore. Swimming against the current is dangerous and quickly causes fatigue. Cross at an angle against the current

NOTE: The term "river" used in the following text refers to rivers, streams, and canals.

6001. Fording Locations

The tactical situation dictates the location of the fording site. Seek fords that are protected from enemy observation and allow for adequate supporting fires. A night fording takes at least half again as long as a daylight fording.

6002. Determine a Ford's Characteristics

Table 6-1 provides preferred fording area characteristics.

CHARACTERISTICS	COMMENTS
Concealment	The ford hides personnel and vehicle movement from enemy observation.
Accessibility	The ford should have low banks with gentle gradients. This allows a free flow of traffic at both the entrance and the exit.
Slow Current	The ford's current should not exceed 1.5 meters per second if possible.
Firm Footing	The ford's bottom, entry, and exit composition should be firm enough to support traffic. Do not drive a vehicle over any bottom composition

	that a 2-inch diameter stick can be pressed into more than 1 or 2 inches.
Gently Sloped Channels	The ford's entry and exit points should be gently sloped. If possible, locate a portion of the stream where the channel is not actively shifting.

Table 6-1. Fording Characteristics.

A. Determine The Slope. Slope is the amount of change in ground horizontal distance (run) and vertical change in elevation (rise) from one point to another. Slope is usually expressed as a percentage. Units move into and out of the water faster and quieter if entry and exit points are not steep or muddy. You can use a clinometer, map, or line of sight and pace to measure percentage of slope.

1. <u>Clinometer.</u> This instrument measures percentage of slope. It is organic to most engineer units.

2. <u>Map.</u> A map measures horizontal distance along a desired path. Determine difference in elevation between the path's starting and ending points. Both figures must be the same unit of measure (e.g., feet, meter, etc.). Divide the elevation (rise) by the distanc (run), and multiply by 100. See figure 6-1.

Rise = 165 - 120 = 45 meters

Run = 200 meters

% slope = $^{45}/_{200}$ x 100= 22.5%

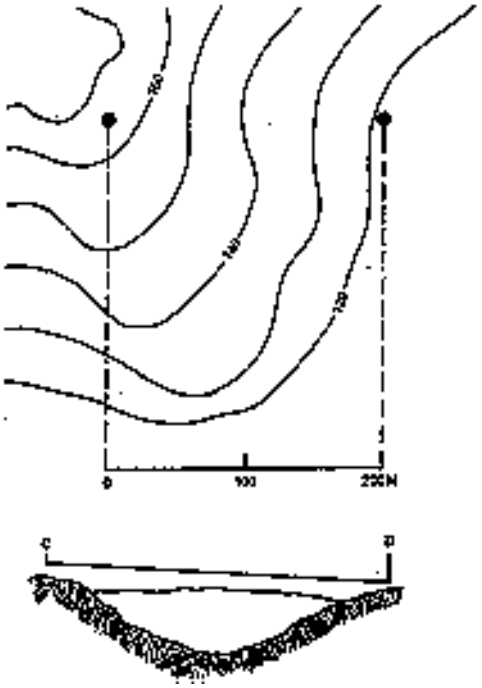


Figure 6-1. Determining Slope With a Map.

3. <u>Line of Sight and Pace.</u> Use the eye-level height above ground (usually 1.5 to 1.7 meters) and the length of a standard pace (usually 0.75 meters). Stand at the bottom of the slope. Keeping eyes level, pick a spot on the slope. Pace the distance. The number of paces times 0.75 meters gives run. The eye level height (1.5 to 1.7 meters) gives rise. Repeat this procedure for each spot (vertical and horizontal). Add vertical distances to provide total rise and the horizontal distances to provide total run.

B. Determine The Current Speed. Current speed increases as channels narrow. It may be necessary to locate a wider ford location to obtain a slower stream current. The following steps are used to calculate the speed of the current:

1. Measure the distance between points A and B.

2. Sight directly across the water from points A and B to locate points C and D.

3. Throw a floating object (e.g., a stick) upstream from points A and C and observe it.

4 . Record the amount of time it takes for the object to float from point C to point D. See figure 6-2.

5. Calculate the current speed as follows:

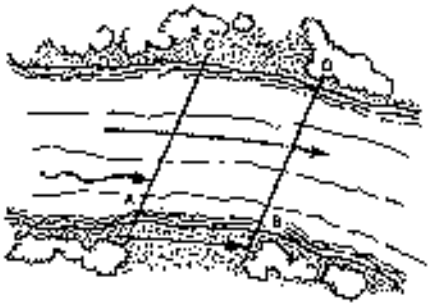


Figure 6-2. Determining Current Speed.

$$\frac{\text{Distance (meters) between points A and B}}{\text{Time (seconds) between points C and D}} = \text{Current Speed (meters per second)}$$

NOTE: Do not attempt to swim across currents moving faster than 1.5 meters per second. Equivalents of this speed include:

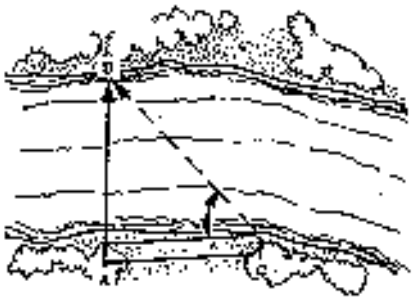
- Quick time march rate of 120 counts per minute with one 30-inch step at each count.

- 5 feet per second.

- 3.5 miles per hour.

- 5.5 kilometers per hour.

C. Measure River Width. Determining a river's width is usually more difficult than determining similar distances on land. A river's width can be estimated from the width of its symbol on a scaled topographic map. If this is not possible use the following compass techniques:



1. Stand at the water line (A).

2. Shoot an azimuth to a point on the opposite bank (B).

Figure 6-3. Measuring River Width.

3. Move upstream or downstream until you can shoot an azimuth 45 degrees larger or smaller than the original azimuth (C).

4. Measure the distance between points A and C. The distance calculated equals the river's width. See figure 6-3.

D. Calculate Downstream Drift. A river's current causes personnel and equipment to drift downstream. Personnel and equipment crossings must compensate for the effects of a river's current; i.e., entry is usually made upstream of the desired exit point. Personnel and equipment are *aimed* straight across the river; however, the current produces a *sideslip* downstream of the forward movement. Use the following to calculate downstream drift: (see figure 6-4)

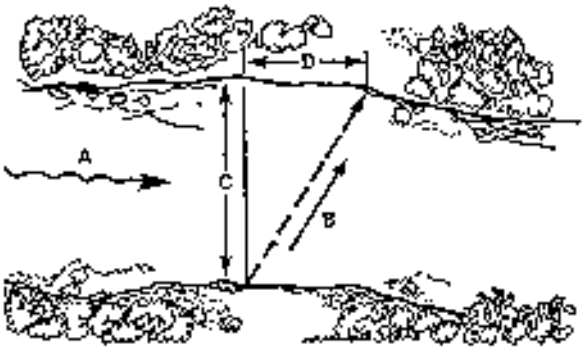


Figure 6-4. Calculating Downstream Drift.

$$\frac{\text{Current Speed (A)}}{\text{Crossing Speed (B)}} \times \text{River Width (C)} = \text{Downstream Drift (D)}$$

NOTE: The crossing speed for a swimmer across a river may vary, but is generally limited to 1 meter per second. All measurements must be in the same unit of measure (e.g., meters, feet, etc.).

6003. Buddy System

Whenever a Marine unit must enter or operate on the water, a “buddy system “ is employed in which every Marine is paired with a swimming partner. The buddy system matches an experienced swimmer with a weak swimmer. The experienced swimmer assists and encourages the weaker swimmer, and

bolsters confidence during night crossings. If a unit has an odd number of Marines, put the extra person with another pair to form a three person team.

6004. Care of Weapons

Marine infantry weapons and munitions are designed to be able to operate after immersion. However, take precautions to protect your weapons from moisture when possible.

Gas operated weapons can malfunction if water travels down the barrel and enters the gas tube. Close the weapon's bolt before entering the water. Seal the muzzle with a condom, balloon, plastic spoon wrapper, or other waterproof material. Tie or melt the protective cover to create a watertight seal.

When no longer needed, remove the muzzle's protective cover. Open the bolt and inspect the barrel. If the tactical situation permits, swab excess moisture from the barrel. Test fire automatic weapons if possible. Field strip and clean weapons as soon as possible. If time does not allow for a complete inspection, rinse inaccessible areas with small amounts of diesel fuel, then dry.

A. ISOMAT Raft. Construction of an ISOMAT raft is time-consuming. An ISOMAT raft should not be employed as part of an attack, but used for logistical purposes (e g., evacuating stretcher cases, transporting supplies). Use the following steps to build an ISOMAT raft:

1. Wrap ISOMAT sleeping pads arou sturdy sticks.

2. Use parachute cord and square knots t tie the pads securely in place and to stick ends together in a rectangle. Se figure 6-5.

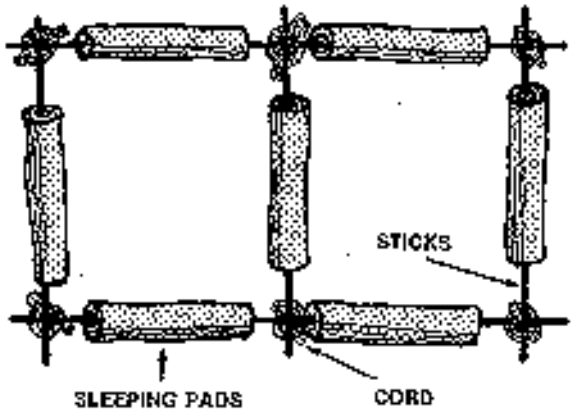


Figure 6-5. ISOMAT Raft.

NOTE: The ISOMAT raft pictured can support several hundred pounds. The cargo, however, will get wet if not properly waterproofed.

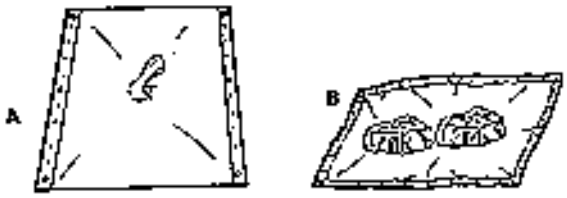
B. Poncho Raft. Use a poncho raft for long crossings. A poncho raft can support two Marines and their equipment. Use the following steps to build a poncho raft:

1. Inspect ponchos and ensure they are serviceable.

2. Lay one poncho flat on the ground, with the hood-side up..

3. Cinch hood tightly to form a *gooseneck.* (See figure 6-6A.)

4. Pad sharp edges of equipment and place in center of poncho. (See figure 6-6B.)



Figures 6-6A, B. Steps 3 & 4.

5 . Place the second poncho over the equipment, rubber side up, and hood down.

6. Snap edges together. (See figure 6-6C.)

7. Roll edges toward equipment. (See figure 6-6D.)

Figures 6-6C, D. Steps 6 & 7.

8. Roll edges into pigtails and tie off. (See figure 6-6E.)

9 . Pull pigtails together over the top and lash securely. (See figure 6-6F.)

Figures 6-6E, F. Steps 8 & 9.

10. Protect the raft from brush punctures while placing in the water. Swim across water obstacle while security elements are covering the far shore. See figure 6-6G.

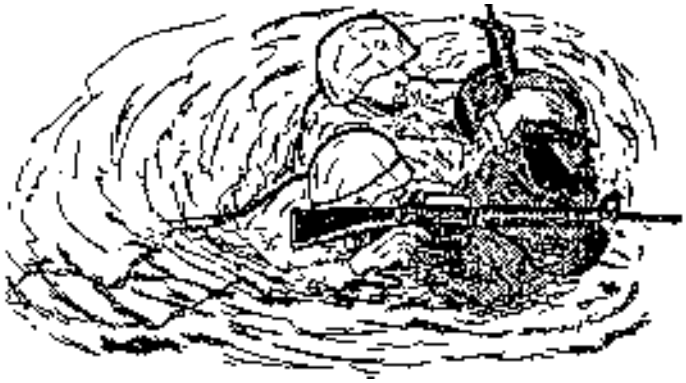


Figure 6-6G. Step 10.

C. Single-Rope Bridge. A single-rope bridge offers a temporary and quick way to cross streams and small rivers. A single-rope bridge provides extra security while crossing swift streams. At night, it prevents straggling, and guides units precisely from one side of the river to another. For planning purposes, provide for at least one single-rope bridge per platoon at night.

Construction

Use a squad-sized bridge team to construct a single-rope bridge. Use a nylon rope to cross gaps less than 20 meters. Use a manila rope to cross gaps larger than 20 meters. Nylon rope is normally coiled in 120 foot lengths. It is 6 inch in diameter, and has a breaking strength of about 3,840 pounds when new. Over time, a nylon rope stretches to as much as a third more than its original length. Stretching weakens the rope. If it is stretched, discard or use for light tasks. To prolong the life of a nylon rope, do not step on it or drag it on the ground. Pad the rope in places it contacts rocks or sharp corners. Do not leave rope knotted or stretched longer than necessary. Dry rope as soon as possible. Single-rope bridge construction is as follows:

l . Tie a sling rope around your waist using a square knot ar two half hitches.

2 . Attach a snap link to the sling rope. See figure 6-7A.

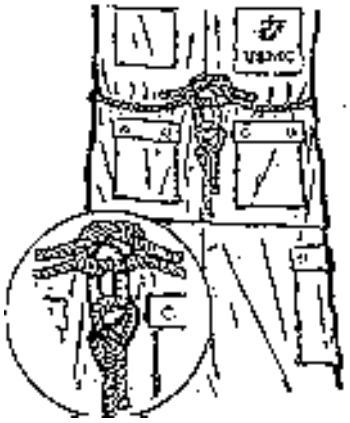


Figure 6-7A. Step 2.

3 . Tie a bowline knot in the running end of the bridge rope and attach it to the snap link.

Figure 6-7B. Step 4.

4. Enter and cross the water. See figure 6-7B.

NOTE: Carry only your weapon and ammunition.

5. Exit the water.

6. Prepare weapon for use. Unhook bridge rope from snap link, and tie bridge rope to a sturdy tree using a round turn and two half-hitches.

7. Conduct a box reconnaissance of the opposite shore.

8. On the near shore, prepare to tighten rope. Pull rope across and temporarily secure to an anchor point without tying a knot

Figure 6-7C. Step 9.

9. On the near shore, place a transport tightening system in the bridge rope by tying a double butterfly knot placing two snap links in the butterfly. See Appendix E for detailed information on knots, and figure 6-7C.

10. Pass the running end of the bridge rope around downstream side of the near side anchor point a through the two snap links.

11. Pull the butterfly knot distance across the river secure approximately a third of the bridge rope to anchor point using a round turn and two half-hitches. S figure 6-7D.

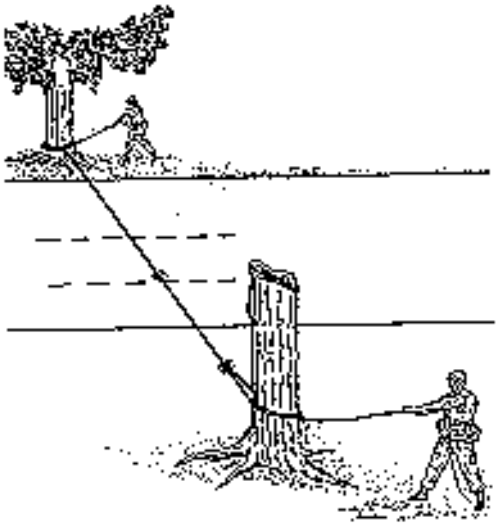


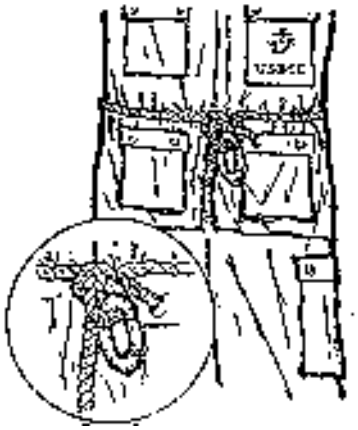
Figure 6-7D. Step 11.

12 . On the near shore, pull the slack out of the bridge rope until the butterfly knot is back on the near side. Tie bridge rope off against itself using two half-hitches with a quick release in the last half-hitch.

NOTE: The bridge must be as tight as possible so it will not sag when used.

High and Dry Crossings

If the single-rope bridge is high enough, suspend yourself below t single-rope bridge and above the water. Use the following steps tc suspend yourself from a single-rope bridge and Pull yourself acro the water:



1. Tie a sling rope around your waist using a bowline. Ensure kno evenly tight.

2. Attach a snap link through the bowline's loop. Snap link's gate faces up. See 6-8A.

Figure 6-8A. Step 2.

3. Secure helmet chin strap.

4. Face the bridge with left shoulder toward far shore.

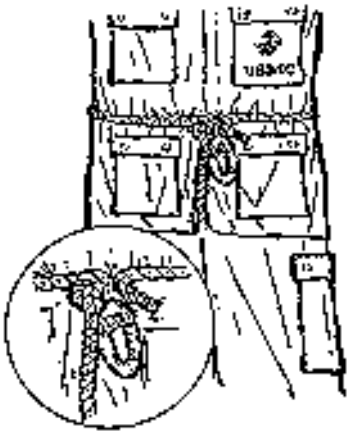
5. Grasp bridge rope in both hands.

6 . Swing body beneath bridge with head toward far shore. Cross ankles above bridge rope.

Figure 6-8B. Step 8.

7. Arch back until snap link contacts bridge rope. Connect snap link to bridge rope. Allow snap link to bear body's weight.

8 . Pull across bridge, hand over hand, to the far shore. See figur 6-8B.



Swift Current Crossings

A single-rope bridge prevents being knocked down and swept av by a swift current. Use the following steps to move through a sw current:

1. Tie one end of sling rope around waist using a bowline.

2 . Tie running end of sling rope in another bowline, and attach a snap link to bowline's loop. See figure 6-9A.

Figure 6-9A.

3. Step up to the bridge. Face upstream.

4. Hook the snap link to the bridge.

5. Walk sideways into river while grasping bridge rope in both hands.

6. Use the bridge for balance, and remain standing if possible..

7. Continue to move sideways through the river to the far shore. See figure 6-9B.

Figure 6-9B. Step 7.

Slow Current Crossings

If you face little or no current, it is not necessary to hookup to the bridge rope with a snap link. Lie on your back in the water beneath the bridge. Support body weight with your waterproof pack. Pull yourself across hand over hand using the bridge rope.

Removal

The final Marine remaining on the near shore waits until all personnel have crossed the single-rope bridge. He then pulls on the standing end of the rope to release the knot, and ties the rope around his waist using a bowline. Marines on the far shore pull him through the water.

Appendix A

Combat Water Survival Qualification Standards And Test Procedures

(Extract from Marine Corps Order (MCO) 1500.52B)

1. The following qualification standards and test procedures are applicable to Marine Corps combat water survival training. All testing procedures for Combat Water Survival Class 4 (CWS4) will be accomplished without combat gear. Testing for CWS3, CWS2, CWS1, and Water Survival Qualified (WSQ) will be accomplished while wearing full combat gear, unless otherwise stated. Full combat gear will consist of boots, utilities, helmet, flak jacket, H-harness, cartridge belt or Load Bearing Vest (LBV), two magazine pouches, two full canteens with covers, rubber rifle, and a standard 30 pound pack which has been properly waterproofed. The pack will consist of the appropriate uniform/782 gear items to approximate 30 pounds. Gas mask, first-aid kit, magazines, E-tool, pack frame, butt pack, sleeping mat, and sleeping bag will not be used during testing or training. All levels of qualification will include instruction on the following:

Fundamentals of Combat Water Survival:

a. S.A.F.E. (**S**low and easy movements, **A**pply natural buoyancy, **F**ull lung inflation, **E**xtreme relaxation).

b. Use of Voluntary Hyperventilation (repetitive deep breathing) **is strictly prohibited.** This technique can result in shallow-water blackout and subsequent drowning.

c. Adverse physiological effects caused by cold water (hypothermia) and the precautionary measures to be taken prior to exposure to such an environment.

d. Employment of standard and expedient rotation devices/equipment in a water survival situation.

e. Waterproofing of the Marine's individual gear.

2. **Standards and Procedures**

a. Combat Water Survival, Fourth Class (CWS4). Emphasis is on personal survival without gear. CWS4 training will include instruction on the Beginners Swimmer Stroke (front and back), drown-proofing, and treading water. Minimum skill level for all enlisted Marines (unless assigned MOS dictates otherwise). Requalification will occur every 2 years.

(1) Uniform is utilities only (no boots).

(2) Enter shallow water (minimum 1m).

(3) Swim 25m in shallow water Using either the beginner swimmer stroke (front or back) or demonstrating a basic knowledge of a survival stroke or any combination thereof, in shallow water (not over head).

(4) With an ease-in entry, enter deep water and perform personal water survival skills using one, or a combination of, water survival techniques (i.e., drownproofing, treading water, and/or trouser or blouse inflation) for a total of 4 minutes.

(5) Without exiting the water, from the side of the pool, swim 25m using either the beginner swimming stroke (back or front) or demonstrate basic knowledge of any survival stroke or combination thereof.

b. Combat Water Survival, Third Class (CWS3). To qualify Marines as CWS3 involves teaching and testing. Emphasis is on personal survival under combat situations and while on maneuvers. Teaching occurs throughout instruction/evaluation. Marine must have completed CWS4. Intermediate skill level for all active duty enlisted Marines and members of the SMCR (unless assigned MOS dictates otherwise). Requalification will occur every 3 years.

(1) Uniform is full combat gear and pack contents will be waterproofed.

(2) Enter shallow water (minimum 1m) with rubberized training rifle and wearing full combat gear.

(3) Walk 20m in shallow water (Minimum. 1m/waist deep) with weapon at port arms and wearing full combat gear.

(4) Walk 20m in chest deep water wearing full gear and weapon (weapon slung around neck).

(5) Travel for 20m in chest deep water with full gear and weapon using a modified breast stroke arm movement and modified combat stroke leg movement (bicycle stroke).

(6) Travel for 20m in deep water (over the head) with full gear and weapon using a modified breast stroke arm movement and modified combat stroke leg movement (bicycle stroke).

(7) From height of 5 feet, using the abandon ship technique, enter deep water with full gear and weapon (weapon inverted at sling arms), travel 10m, remove pack, and travel 15m with pack and weapon.

(8) From minimum height of 8 feet (maximum height of 15 feet), using the abandon ship technique and wearing utilities and boots only, enter deep water and travel 25m using either a beginner

swimming stroke (on front or back) or demonstrating a basic knowledge of any survival stroke or combination thereof.

c. Combat Water Survival, Second Class (CWS2). Emphasis is on the ability to assist an exhausted/wounded marine to safety as in a river crossing. Marine must have completed CWS3. Minimum skill level required of all officers, all officers/aircrew with waiver, and MOS 0313, 0481, 1371, and 1833. Requalification will occur every 4 years.

(1) Uniform is full combat gear and contents of pack will be waterproofed.

(2) With full combat gear minus pack, using one or a combination of survival strokes, travel 50m in deep water, with weapon slung across back (muzzle down).

(3) Wearing full combat gear, perform 25m collar-tow on wounded "victim" similarly dressed, simultaneously towing two packs. Weapons will be slung across the back (muzzle down). Victim will hold on to the two packs and will not assist in propulsion.

d. Combat Water Survival, First Class (CWS1). Emphasis is on the ability to survive under adverse conditions with full gear. Marine must have completed CWS2. Minimum skill level required for all aircrew without waiver, and MOS 0303/21, 0451, 1803, 8652/53/54, 9952/53, 9962 when filling a billet. Requalification will occur every 5 years.

(1) Survival Strokes. Demonstrate a working knowledge of the following while wearing utilities (no boots):

(a) 25m breaststroke.

(b) 25m sidestroke.

(c) 25m elementary backstroke.

(2) Splash Recovery Technique. While simulating a burning oil spill situation, wearing utilities and boots:

(a)Using abandon ship technique, enter water from a height greater than 8 feet and less than 15 feet.

(b) Without surfacing, travel 10m underwater.

(c) Using proper splash technique, surface.

(d) Remain on surface, and using modified breaststroke splashing technique, travel 15m.

(3) Enter the water with full combat gear, from a minimum height of 8 feet (Maximum of 15 feet), using the abandon ship technique (weapon inverted at sling arms). Remove pack, assume a reconnaissance position utilizing the pack, and travel 25m.

(4) Travel 250m using one or a combination of survival strokes.

e. Water Survival Qualified (WSQ). WSQ is the ultimate water survival goal of all Marines. Emphasis is on the ability to rescue yourself and assist a victim/distressed Marine to safety. Must have completed CWS1. Skill level is mission or command dependent but should be the ultimate goal of all Marines. Once attained, requalification will not be necessary.

(1) Rescue. Dry land drill, water demonstration, and student practice time of all three rescues. Students must properly demonstrate each rescue for qualification, utilizing an appropriate entry technique with victim 20m away. Rescuers must return victim to rescuer point of origin. Victims are passive during carry or tow.

(a) Rescuer, using a stride jump entry, enters the water and performs a breaststroke approach stroke and assumes a ready position 6-8 feet from the victim. Victim puts rescuer in a front head hold, rescuer performs a front head hold escape. With victim passive, rescuer performs front surface approach and wrist tow.

(b) Rescuer, using a stride jump entry, enters the water and performs a breast stroke approach stroke and assumes a ready position 6-8 feet from the victim. Victim puts rescuer in a rear head hold, rescuer performs rear head hold escape. With victim active, and back to rescuer, rescuer performs rear approach, double armpit level-off. With victim passive, rescuer performs a double armpit tow and then transitions to a cross chest carry.

(c) Rescuer, using a stride-jump entry, enters the water and performs a breast stroke approach stroke and assumes a ready position 6-8 feet from the victim. Victim puts rescuer in a double wrist grip, rescuer performs wrist grip escape. With victim active, rescuer performs a single armpit level-off. With victim passive, rescuer performs a single armpit tow and transitions to a collar tow.

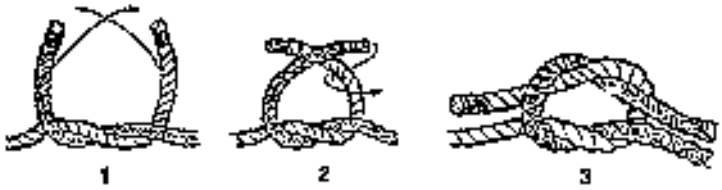
(2) Tread water or survival float in deep water, with utilities and boots, for 30 minutes without artificial flotation. Boots will be removed after 5 minutes and retained. Five minutes prior to completion of the 30 minute float, and without exiting from the water, replace the boots and swim 500m, using one or a combination of, survival strokes.

Appendix B

Knot-Tying

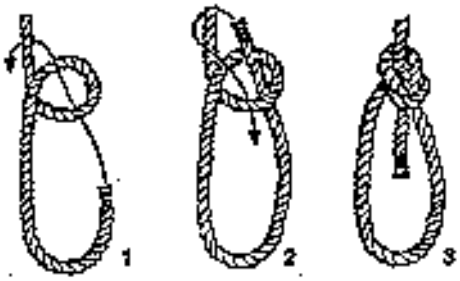
1. The following text and illustrations are provided to show the reader how to tie knots and the specific purposes behind particular knots.

2. **Square Knot**.



The square knot is used primarily to secure two ropes of equal diameter together so they will not slip, or to form one continuous rope.

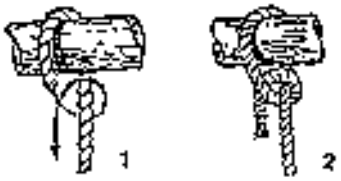
3**. Bowline**



The bowline forms a loop that will not tighten or slip under strain. It is easily untied.

4**. Hitches**. Hitches are used mainly to dress knots and secure loose ends.

Half Hitch



The half hitch is used to tie a rope to a tree or to a larger rope. It will hold against a steady pull, but is not a secure hitch. It is frequently used to secure the free end of a rope.

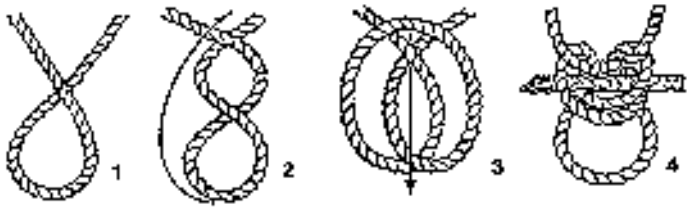
Two Half Hitches

Two half hitches can be used to secure the running end of a rope.

Round Turn and Two Half Hitches

A round turn and two half hitches can be used to fasten a rope to a tree. This hitch does not jam.

5. Butterfly Knot



The butterfly knot is used for anchor lines. Tied properly, it will not tighten on itself to the point that it cannot be easily untied. The butterfly knot can be used to pull a rope bridge taut. This knot can be used to tighten a fixed rope when mechanical means are not available. It will not jam if a stick is placed between the two upper loops

Appendix C

Glossary

CPR .....cardiopulmonary resuscitation
CWSl.....combat water survival, first class
CWS2 .....combat water survival, second class
CWS3 .....combat water survival, third class
CWSS .....combat water safety swimmer

HELP .....heat escape lessening position

MCITWS.....Marine combat instructor trainer of water survival
MCIWS.....Marine combat instructor of water survival
MCIWSP.....Marine combat water survival program

WSQ.....water survival qualified

Appendix D

References

Fleet Marine Force Reference Publication (FMFRP)

FMFRP 4-52	First Aid

Field Manuals (FMs)

FM 90-5	Jungle Operations
FM 90-13	River Crossing Operations

Technical Manual (TM)

TM 5-725	Rigging