CHAPTER 8. BOAT HANDLING

A. INTRODUCTION. Boat handling is a complex skill which requires extensive knowledge and experience. Experienced coxswains are familiar with the characteristics of their boats. They know the limitations of their boats in varying weather and sea conditions. They are also aware of the risks and dangers involved when they get underway in rough weather. But they get underway with confidence in their ability to handle their boats against whatever the sea will throw against them. They know how to observe and interpret what the sea is doing and how to make their boats respond accordingly. Finally, they acutely realize that the safety of their crews and the safety of those in distress depends largely on the coxswain’s boat handling skills and knowledge of sea conditions. Obviously, there is no substitute for the learning resulting from actual experience. However, reading and study serves to provide background as well as to present necessary boat handling theory. The art of boat handling may be defined as the application of knowledge and skill acquired by study, observation, and experience. This chapter will discuss small boat handling theory and the forces affecting boat handling.

B. PROPELLER ACTION. Some general definitions and concepts are in order for you to understand why boats react the way they do when propelled by propellers.

1. Pitch. The distance a propeller would advance longitudinally (fore and aft) in one revolution if there were no slip. (See Figure 8-1).

Figure 8-1 Propeller Pitch
2. Slip. The difference between the distance a propeller should advance a vessel in one revolution if operating in a solid and the distance it actually travels in a fluid.

3. Cavitation: Is the formation of a vacuum around the propeller which results in an increase in revolutions per minute without an increase in thrust, thus resulting in a loss of effective power limiting of the boat's speed. Cavitation may occur when:
   a. Blade-tip speed is excessive for the size and shape of the propeller.
   b. The screw is near the surface of the water.
   c. Insufficient ventilation of propeller discharge from under the transom.
   d. Unequal pressure on the lower and upper blade surfaces.

4. Unequal blade thrust: An unequal thrust exerted by the ascending and descending blades of the propeller.

5. Water depth: A boat moving under constant power in calm water will experience a substantial speed reduction when passing from deep water to shallow water. As the water shoals, the boat is caught in a resistance trap; created by the bow and stern wave, the bow continues to rise. The stern tends to settle or squat due to the suction of the screw, the close proximity of the bottom and the unbalanced pressure of the water. When the depth of water has decreased sufficiently, there is danger of grounding by the stern due to the excessive squat and sinking of the stern.

C. PROPELLER ACTION.

1. A propeller draws it's supply of water from every direction forward and around the blades, forcing it in a stream forwards the stern. This produces a force known as "dynamic pressure". As the propeller revolves to go forward, the shape and pitch of each blade develops a thrust from a low-pressure area on the forward face of the blades and a high-pressure area on the after face of the blades. This force, set up by the displacement of water, is transmitted along the shaft and thrusts the boat ahead. The boat moves toward the low-pressure area. The flow of water caused by the propeller is called screw current. There are two types of screw current:
   a. Section screw current: water flowing into the propeller.
   b. Discharge screw current: water flowing away from the propeller.

2. Regardless of whether the propeller is going ahead or reversing, that part of the current which flows into the propeller is called "suction screw current." The part ejected from the propeller is the "discharge screw current." Discharge current exerts the greater pressure.

3. Side force (unequal blade thrust): caused by a difference in effective pitch of ascending and descending blades when the propeller is mounted on an inclined shaft. The descending blade exerts more thrust than the ascending blade due to the difference in angle between the shaft and water, that is, the shaft coming through the vessels hull causing the propeller to be less than vertical. This force is also commonly referred to as sidewise blade pressure. (See Figure 8-2)

4. Frictional wake current: is the body of water carried along by a small boat, as it moves through the water, as a result of friction on the hull. Frictional wake current at the waterline is zero at the bow, increasing to maximum at the stern. It is also maximum at the waterline and decreases with depth toward the keel. The effect of frictional wake current is: (See Figure 8-3)
   a. It decreases the efficiency of both the propeller and the rudder.
   b. It decreases the effect of side force.

Frictional wake current increases with the boat's speed and is greatest in shallow water.

D. RUDDERS. Rudders are located aft of the propeller(s) to benefit by the flow of the discharge current and obtain greater steering effect. Most twin screw boats have twin rudders (one behind each propeller) keeping their blades directly in the propeller's discharge current. (See Figure 8-4). As mentioned in Chapter 7, rudders control the direction of the boat and vary widely in size, design and method of construction and are classified as unbalanced, semi-balanced and balanced.

1. Response of the boat to propeller and rudder, single screw:
   a. Sternway: rudder amidsthip, the stern backs to port (with a "right-handed" screw) as a result of side force (unequal blade thrust) and the discharge current (See Figure 8-5).
SINGLE SCREW BOAT HAVE RIGHT HAND SCREWS TOP OF SCREW TURNS CLOCKWISE.

SIDE FORCE CAUSES STERN TO WALK IN THE DIRECTION OF SCREW ROTATION.

RIGHT HANDED

Figure 8-3 Side Forces, Single Screw Boats

8-3
b. No way on: commencing forward motion, side force (with a “right-handed” screw) throws the stern to starboard (See Figure 8-6).

c. Sternway: right rudder, at low speeds side force and discharge current tend to push the stern to port. As sternway speed increases, suction screw current tends to offset unequal blade force and screw current to bring the stern back towards starboard (See Figure 8-7).

d. Headway: right rudder, water flowing past the hull hits the rudder on the starboard side (rudder force), forcing the stern to port. Discharge screw current intensifies this effect by acting in the same manner and the boat’s bow turns to starboard (See Figure 8-8).

e. Sternway: left rudder, side force and discharge current moves the stern to port. Suction screw current, striking the back of the rudder blade, tends to move the stern to port (See figure 8-9).

f. Checking headway: to check “way” or forward motion of a boat, reverse your engine. The stern will swing to port with little effect from the rudder when it is amidships (See Figure 8-10).

2. Rudder effectiveness: boats are usually under better control with headway. The effect of discharge current on the rudder is very positive (the larger the rudder, the more positive). Until the boat has gathered headway, the stern has a tendency to swing to starboard due to side force. This is not counteracted until the discharge current builds enough to work against the rudder. The directional effect that the rudder will have on sternway will vary with the size of the rudder (the larger the rudder, the more directional stability).

E. BOAT HANDLING: SINGLE SCREW. In addition to all of the factors mentioned earlier (section B and C), boat handling is complicated by wind, tide, current and available maneuvering space. High freeboard, for example, causes a boat to be especially susceptible to the influence of the wind. Length, beam and other characteristics determine the success with which a boat can maneuver in the space available. The only way to become proficient is to learn, through experience, the characteristics of the
BALANCED AREA RELIEFS STRAIN FROM STEERING GEAR MAKING THE BOAT EASIER TO HANDLE. RUDDERS DIRECTS A BOAT THROUGH THE WATER.

Figure 8-4 Rudders
SIDE FORCE AND DISCHARGE CURRENT SWINGS Stern TO PORT

Figure 8-5 Single Screw Boat Backing, Rudder Amidship

8-6
Figure 8-6 Single Screw Boat Commencing Forward Motion, Rudder Amidship
SUCTION CURRENT TENDS TO OFFSET STERN FALLING TO PORT, RUDDER FORCE DEPENDS ON BOAT’S SPEED ASTERN.

Figure 8: Single Screw Boat Backing Right Rudder, Turning Boats Stern to Starboard
Figure 8-8 Single Screw Boat Going Ahead, Right Rudder
THE COMBINATION OF DISCHARGE CURRENT SUCTION SCREW CURRENT, SIDE FORCE AND RUDDER FORCE SWINGS TO Stern RAPIDLY TO PORT.

STERN SWINGS RAPIDLY TO PORT

Figure 8-9 Single Screw Boat Backing, Left Rudder
Figure 8-10 Single Screw Boat, Checking Headway by Reversing Engine
particular boat that you are operating. In open waters it is relatively easy to handle a boat, if the weather is fair and clear. If there is wind it will usually affect the bow and superstructure (sail area) more than the stern pushing the bow to leeward. The coxswain needs to allow for the tendency of most single screw boats to swing to starboard (most have "right-handed" propellers, creating starboard side force). Also, the helmsman's proficiency for holding a steady course needs to be acquired. Smart boat handling is smooth rather than flashy. The well-controlled boat comes alongside cleanly, with the coxswain having judged his approach so that there is no need to jam the throttle from forward to reverse at the last minute to avoid collision with the dock. Before attempting to moor or dock, you should get the feel of your boat. Include the following:

1. Advance: The distance your boat will maintain headway through the water after your clutch has been brought to neutral from either ahead or astern position. Planning hulls will settle and come to rest faster than displacement hulls.
2. Smoothness of throttle shift (forward to neutral, neutral to reverse, etc).
3. How quickly headway or sternway can be checked by reversing the direction of propeller rotation.
4. At what wind speed will your boat (single screw) back into the wind instead of to port.
5. How will your boat lie relative to the wind if allowed to drift.
6. How will your boat lie relative to the sea if allowed to drift.

It is desirable to take advantage of wind and current when docking or mooring. Whenever possible, for control, approach against the wind and current and moor on the protected side of the mooring (leeward side).

1. Basic maneuvers:
   a. **Clearing a dock with no wind or current (port side to).**
      1. When in the clear, there is no trick to leaving a dock. The coxswain sets the rudder amidships, moves ahead slowly until headway is gained, and applies right or left rudder EASILY. (Too much rudder will cause the stern to swing into the dock).
      2. The boat should either be pushed out from the dock or maneuvered to gain initial clearance.
      3. Never forget that the stern of the boat moves when rudder is applied, the bow pivots. The pivot point is usually 1/3 the way aft of the bow. (See Figure 8-11).
   b. **Clearing, port side to, current setting the boat against the dock. (port side to).**
      1. Leave the bow springline secured to the cleat, bit, or bollard. Place a fender well forward of the port bow. If conditions allow the same maneuver may be completed without the line.
      2. Put the rudder over toward the dock (left full).
      3. Go ahead slowly, until the stern swings well clear. When the stern is clear, place the throttle in neutral position. Keep fenders rigged until clear of the landing to prevent damage to the boat.
      4. Cast off bow springline, shift rudder to right full.
      5. Pull throttle in reverse and back down until well clear of the dock.
      6. Ease rudder and proceed ahead (See Figure 8-12).
   c. **Clearing between two boats (port side to).**
      The procedures described above may also be used when hemmed in between other boats (See Figure 8-13)
   d. **Turning in a narrow slip (port side to).**
      In a narrow slip, lying portside to, you may find no space to turn. Under these circumstances you should:
      1. Hold the bow springline and go ahead slowly, applying left full rudder to throw the stern out (to starboard).
      2. Pull the throttle to neutral, shift the rudder to right full and back slowly.
      3. Back as far as possible. Pull the throttle to neutral, shift the rudder to lef full and move forward until the stern moves out.

8-12
Figure 8-11 Single Screw Boat Clearing From Alongside, Port Side to, No Wind or Current
Figure 8-12 Single Screw Boat Clearing Alongside, Port Side to Wind/Current Setting the Boat Against the Dock
1. *Bow springline secured to dock, engine ahead, hard left rudder swinging the stern out.*

2. *Bow springline is cast off when stern is clear and engine reversed.*

3. *Underway, shifting rudder as necessary gaining headway slowly.*

*Figure 8-13 Single Screw Boat Clearing From Alongside, Between Two Boats, Port Side to.*
(4) Pull throttle to neutral, shift the rudder to right full and back slowly. Repeat this process until clear.

e. Turning in a limited area (port side to).
   (1) Push off the dock leaving rudder amidships. Move slowly ahead applying a small amount of "right rudder" as headway is gained.
   (2) Reverse engine applying "left rudder", swinging the stern to port.
   (3) Back as far as possible. Pull throttle to neutral, shift rudder and move ahead. (See Figure 8-14).

f. Mooring with the wind or current from astern (port side to).
   If the wind or current is from astern, a stern springline, led aft, is used instead of a bow springline. To complete the landing follow these maneuvers:
   (1) Ensure fenders are rigged.
   (2) Make the approach at an angle of approximately 20 degrees.
   (3) Maintain "right" rudder making the turn close to the dock.
   (4) When the bow is alongside the dock, quickly secure the springline to a cleat, bitt or bollard. Do not snub the springline too short.
   (5) Use right full rudder and kick ahead to bring the stern alongside the dock, if necessary.
   (6) Reverse the engine to check headway. This will also assist in bringing the stern alongside the dock. (See Figure 8-15).

g. Mooring with no wind or current (port side to).
   (1) Approach at an angle of approximately 20 degrees. You should be headed for a spot slightly forward of the position you intend to moor.
   (2) Give the boat "right" rudder to bring it parallel to the dock.
   (3) Reverse engine long enough to stop headway.
   (4) When the bow is alongside the dock quickly secure the bow springline to a cleat, bit, or bollard. (To allow the stern to swing into the dock, the springline should not be snubbed too tight.)
   (5) Back down until the stern is forced in against the dock. (Side force will walk the stern to port, toward the dock. If conditions permit, this maneuver may be completed without the springline.)

h. Mooring against the wind or current (port side to).
   (1) The approach must be made at an angle since the wind or current will tend to throw the bow out.
   (2) Maintain "right" rudder as necessary to keep desired heading.
   (3) Ensure that fenders are rigged, including the bow.
   (4) When the bow is alongside the dock, quickly secure the bow springline to a cleat, bitt or bollard. Do not snub either line too short.
   (5) Use right full rudder and kick ahead to bring the stern alongside the dock. (See Figure 8-16).
   (6) Secure stern and after springlines. Take in slack all lines.

i. Mooring between two boats with wind and current on bow (port side to).
   (1) Make a slow approach at a flat angle. The angle should be approximately 20 degrees to the dock, directing the boat slightly forward of the position you intend to moor.
   (2) Slowly apply right rudder to maintain desired heading.
   (3) Ensure fenders are rigged. When the bow is alongside the dock, quickly secure bow springline to a cleat, bitt, or bollard. Do not snub the springline too short.
   (4) Use right full rudder and kick ahead to bring the stern alongside the dock.
   (5) Reverse the engine to check headway. This will also assist bringing the stern alongside the dock. (See Figure 8-17).

j. Backing in a straight line.
   (1) Before you begin the backing maneuver, ensure that you have stopped all motion and that the boat is dead in the water. Single screw boats, in addition to backing to port, usually
1. RUDDER LEFT AMIDSHIP MOVING SLOWLY AHEAD, APPLYING SMALL AMOUNT OF RIGHT RUDDER AS HEADWAY IS GAINED.

2. REVERSE ENGINE APPLING LEFT RUDDER SWINGING STERN TO PORT

3. BACK AS FAR AS POSSIBLE. PULL THROTTLE TO NEUTRAL SHIFT RUDDER AND MOVE FORWARD.

4. UNDERWAY GAINING HEADWAY SLOWLY.

Figure 8-14 Single Screw Boat Turning in a Limited Space, Port Side to
MAINTAIN "RIGHT" RUDDER (DECREASE RUDDER SLOWLY) WHEN THE Stern IS ALONGSIDE THE DOCK SECURE A Stern SPRINGLINE TO THE Dock.

THE WIND OR CURRENT WILL FORCE THE BOW ALONGSIDE THE DOCK.
SECURE BOW SPRING LINE TO THE DOCK, DO NOT SNUB TOO SHORT AND USE HARD "RIGHT" RUDDER KICKING AHEAD TO SWING THE STERN INTO THE DOCK.

Figure 8-16 Mooring, Approaching Against the Wind or Current, Port Side to
Figure 8.17 Single Screw Boat Mooring Between Two Boats. Port Side to
back into the wind (especially those having high superstructures or freeboard producing a sail effect). This is an important factor to remember when attempting to back out of a tight space.

(2) With the boat at all stop, apply right full rudder. This is to offset side force when backing. Place the throttle in reverse and apply a short burst of power. Pick an object on the beach ahead of you to use as a reference point when backing.

(3) Once the boat is moving astern, ease the rudder. If you find it difficult to maintain a straight line, you may need an increase in speed for greater rudder effect. Once this is accomplished reduce your speed again. (See Figure 8-18).

k. Backing into a slip (port side to).
(1) Make a slow approach to the mooring area.
(2) When the boat is approximately 15 feet from the slip, start making your turn.
(3) As soon as the stern of the boat clears the first pile or end of the slip, apply right full rudder, placing the engine throttle in the clutch position. The rudder should remain in the right full position during the entire maneuver.
(4) When the second pile or end of the slip is approximately even with the boat’s pilothouse, place the engine throttle in reverse and back down.
(5) Place the engine alternately “ahead” and “astern”, (backing & filling) pivoting (jockeying) the boat approximately five feet from the slip.
(6) Back down until you are in the desired mooring position. (See Figure 8-19).

l. Clearing alongside (starboard side to).
Follow the same procedures as with the port side maneuver, with the exception that “right” rudder is applied rather than “left” rudder.

m. Clearing alongside with wind or current setting the boat against the dock (starboard side to).
(1) Leave bow springline secured to the cleat, bitt, or bollard. The bow springline ensures safety. If conditions warrant, the same maneuver may be completed without the line.
(2) Put rudder over toward the dock (full right).
(3) Go ahead until the stern swings clear. When the stern swings clear, place the throttle in the neutral position. (Keep fenders rigged until clear of the landing to prevent damage to the boat.)
(4) Cast off the bow springline.
(5) Pull throttle in reverse and back down until the bow is well clear.
(6) Ease rudder and proceed ahead. (See Figure 8-20).

n. Clearing from alongside between two boats (starboard side to).
Clearing the dock is achieved in a similar manner to port side to, with the exception of rudder application. To clear a dock when hemmed in by other boats, starboard side to, complete the following maneuvers:
(1) Leave the bow springline secured to the dock.
(2) Apply right full rudder, and go ahead on the engine until the stern swings clear.
(3) Cast off the springline, pulling-the throttle in reverse, and back until well clear, place the rudder amidship, place the throttle in the forward position, and slowly gain headway (See Figure 8-21).

o. Turning in a narrow slip (starboard side to).
(1) Hold the bow springline and go ahead slowly applying right full rudder to throw the stern out.
(2) Pull the throttle to neutral and cast the springline off.
(3) Back slowly until clear. Back and fill if necessary.
The above procedures can be used to turn a single screw boat in a narrow channel, just delete the springline. Remember that single screw boats are normally equipped with right handed propellers and back to port. For this reason in a limited space it is better to turn to starboard.

p. Turning in a limited space (starboard side to).
1. Come to a complete stop.

2. Apply hard right rudder to offset side force in backing, reverse the engine and apply a short burst of power/speed.

3. After having sternway return the rudder to amidship, backing off the throttle and steer the boat with the rudder.

Figure 8-18 Single Screw Boat Backing in a Straight Line
1. Make a slow approach.

2. Commencing making your turn slowly applying "right rudder."

3. Apply "full right rudder" engine at clutch speed.

4. Place engine in reverse and back down swinging the stern to port, jockey the boat as necessary.

5. Moored

Figure 3-13 Single Screw Boat Backing Into a Slip, Port Side to
1. Bow spring line secured to dock, engine ahead swinging the stern out.

2. Bow spring line is cast off when stern is clear and engine reversed.

3. Underway gaining headway slowly.

Figure 8-20 Clearing Alongside, Wind and/or Current Setting the Boat Against the Dock, Starboard Side to
3. UNDERWAY, SHIFTING RUDDER AS NECESSARY GAINING HEADWAY SLOWLY.

1. BOW SPRING LINE SECURED TO THE DOCK, ENGINE AHEAD, HARD RIGHT RUDDER SWINGING THE Stern OUT.

2. BOW SPRING LINE IS CAST OFF WHEN Stern IS CLEAR AND ENGINE REVERSED

Figure 8-31 Single Screw Boat Clearing From Alongside Between Two Boats, Starboard Side to
(1) Apply left full rudder, place the throttle in the reverse position and slowly back astern.
(2) Back as far as possible, shift the rudder when necessary then place the throttle in the forward position and slowly go ahead. (See Figure 8-22).

If space is not available for the above maneuvers do the following:
(1) Hold the bow springline and go ahead slowly applying right full rudder to swing the stern out.
(2) Cast the springline off and back slowly, steering the boat with the rudder. The boat should back reasonably straight, but may back to port. If not another maneuver is necessary.
(3) Back as far as possible, shift the rudder to left full and go ahead until the stern swings back. Shift the rudder to right full and back slowly. Repeat this process until clear.

q. Standard Procedures for securing a boat to a dock. At the appropriate moment during the approach, the boat coxswain will direct the crewmen to prepare for securing the boat to the dock. Depending upon weather conditions, the coxswain may decide to rig fenders. The coxswain will then direct one or more crewmen to prepare the mooring lines. The lines will then be broken out and made ready to cast to a person on the dock. The boat crewman tasked to heave the line will hold the bitter end of the line and cast the end with the eye in it. If wind or sea conditions prevent direct passing of the line, the boat crewman may have to bend a heaving line to it to ensure it reaches the dock. Once the person on the dock receives the mooring line it is secured to whatever mooring device is present (bitt, bollard, cleat, etc.). The boat crewman then hauls in on the line until the boat is in close proximity to the dock. Then the bitter end is secured to the appropriate deck fitting on the boat. Normally the after bow spring line is secured first, the bow line second, the forward quarter spring line third and the stern line fourth. The order may vary, however, with the particular situation as the boat coxswain evaluates it. When the boat is correctly secured to the dock enough slack should be present in the mooring lines so that they do not slip but with enough slack to allow for a rise and fall of tide.

r. Mooring with no wind or current (starboard side to). Making a starboard side to landing is more difficult than a landing to port. The angle of approach should be as flat as possible. In a starboard side to landing, the propeller effect walks the stern away from the dock. To complete the landing, follow these maneuvers:
(1) Give the boat "left" rudder to bring it parallel to the dock, as close as safely possible. Keep the angle of approach flat.
(2) Adjust your speed to avoid having to back down fast to check headway, with the resultant swing of the stern to port.
(3) Use left full rudder and come ahead to bring the stern alongside the dock.
(4) Back down long enough to check headway.
(5) When the bow is alongside the dock quickly secure the bow springline to a cleat, bitt, or bollard. (If conditions permit, this maneuver may be completed without the springline.)

If you cannot use a springline, follow these procedures:
(1) Time your turn so that, when alongside the point where you intend to swing, your bow is swinging out and your stern is swinging in.
(2) When it looks as though the stern will make contact with the dock, back down. As you lose headway, shift to right full rudder to slow your movement out from the dock.

s. Mooring from leeward, against the current (starboard side to).
(1) Approach at a sharp angle, since the wind or current will set the boat away from the pier. Begin your approach by aiming at a point at least one boat length aft of where you intend to moor. In a strong current you will continue to be set, although when in the lee of a pier the current may diminish and you may encounter eddies.
(2) Use the rudder as necessary to keep the desired heading.
(3) Ensure that fenders are rigged, including the bow.
(4) When the bow is alongside the dock, quickly secure the bow springline to a cleat, bitt or bollard. Do not snub the bow springline too short.

8-26
Figure 8-22 Turning in a Limited Space, Starboard Side to
(5) Use left full rudder and kick ahead to bring the stern alongside the dock. (See Figure 8-23).

t. Mooring from windward, current or wind setting the boat on the dock (starboard side to).
(1) Approach at a flat angle (as parallel as is safely possible). The wind or current (drift) will
set the boat toward the dock. The boat's bow will fall off more than the stern.
(2) Apply "left" rudder as necessary to maintain your desired heading.
(3) Ensure that fenders are rigged. Remember that you are being set toward the dock.
(4) When in the desired position, reverse the boat's engine to check headway. Do not be so far
off the dock that the wind current will have enough time to set the boat hard into the
dock.
(5) Put the throttle in the neutral position. The boat will drift alongside parallel to the dock.
(See Figure 8-24).
(6) Your boat should have no forward or aft movement when contacting the dock.
Use extreme caution in heavy wind. In severe conditions this maneuver may present too great
a hazard.

u. Mooring between two boats (starboard side to).
(1) Make a slow approach at a flat angle parallel as safely as possible. The angle should be
approximately 20 degrees to the dock, directing the boat slightly forward of the position
you intend to moor.
(2) Use the rudder as necessary to maintain desired heading.
(3) Ensure the fenders are rigged. When the bow is alongside the dock, quickly secure the
bow springline to a cleat, bitt, or bollard. Do not snub the line too short.
(4) Use left full rudder and kick ahead to bring the stern alongside the dock.
(5) Reverse the boat's engine to check headway. (See Figure 8-25).

v. Backing into a slip (starboard side to).
(1) Make a slow approach to the mooring area.
(2) When the boat is approximately 15 feet from the slip, start to make your turn.
(3) As soon as the stern of the boat clears the first pile or beginning of the slip, apply left full
rudder, placing the engine throttle in the clutch position.
(4) Direct your stern toward the far corner of the dock from your position and, at this point,
check your boat's headway by reversing the engine. Ensure that the boat is dead in the
water.
(5) Begin backing in a straight line toward the slip using your rudder as appropriate.
(6) Place the engine alternately "ahead" and "astern," pivoting (jockeying) the boat if neces-
sary.
(7) Back down until you are in the desired mooring position. At this point, you should shift
your rudder to right full and steer for the dock. As the bow approaches the dock, pull the
rudder left full to get the bow swinging to port before you back down. This should put you
alongside the dock. (See Figure 8-26).

F. BOAT HANDLING, TWIN SCREWS. The screws on twin screw boats are arranged so that the
tops of the blades turn outward. The starboard screw is RIGHT-HANDED, the port screw is LEFT-
HANDED. Both are outboard of the centerline, and produces a maximum of maneuverability. (See
Figure 8-27).
1. Basic Maneuvers:
   a. Port Screw Astern, Starboard Stopped. The side force (unequal blade thrust), discharge screw
currents, and the offset of the rotating screw from the centerline throws the stern away from
the reversing screw. The stern goes to starboard; the bow to port. (See Figure 8-28).
   b. Starboard Screw Astern, Port Stopped. The side force (unequal blade thrust), discharge screw
current, and the offset of the rotating screw from the centerline throws the stern away from
the reversing screw. The stern goes to port; the bow goes to starboard. (See Figure 8-29).
Figure 8-23 Mooring: Approaching From Leeward or Against the Current, Starboard Side to

SECURE BOW SPRING LINE TO THE DOCK
DO NOT SNUB TOO SHORT AND USE HARD "LEFT" RUDDER KICKING AHEAD TO SWING THE STERN IN TO THE DOCK.
Figure 8-24 Single Screw Boat, Mooring, Approaching From Windward With Wind and Current Setting the Boat on the Dock, Starboard Side to
1
MAKE A SLOW APPROACH PARALLEL AS SAFELY POSSIBLE

2
SECURE THE BOW SPRING LINE APPLYING HARD LEFT RUDDER AND KICKING AHEAD TO BRING THE Stern ALONGSIDE.

Figure 8-25 Single Screw Boat, Mooring Between Two Boats, Starboard Side to
1. MAKE A SLOW APPROACH

2. COMMENCING MAKING YOUR TURN SLOWLY APPLYING LEFT RUDDER.

3. APPLY FULL LEFT RUDDER ENGINE AT CLUTCH SPEED.

4. CHECK BOATS HEADWAY BY REVERSING THE ENGINE.

5. BEGIN BACKING IN A STRAIGHT LINE; JOCKEY IF NECESSARY.

6. SHIFT TO FULL RIGHT RUDDER AND STEER FOR THE DOCK.

Figure 8-36 Single Screw Boat, Backing Into a Slip, Starboard Side to
SIDE FORCE OF THE SCREWS CANCEL ONE ANOTHER OUT. PERMITS FORWARD MOTION WITH OUT STERN MOTION TO PORT OR STARBOARD.

PORT
LEFT HAND
SCREW TURNS COUNTERCLOCKWISE

STARBOARD
RIGHT HAND
SCREW TURNS CLOCKWISE

Figure 8.27 Twin Screw Boat, Side Force
SIDE FORCE AND DISCHARGE SCREW CURRENT AS A RESULT OF OFF-SET OF THE SCREW FROM THE BOAT'S CENTERLINE SWINGS THE Stern AWAY FROM THE DIRECTION OF THE SCREWS ROTATION.

Figure 8-28 Twin Screw Boat, Port Screw Aft, Starboard Screw Stopped

8-34
SIDE FORCE AND DISCHARGE SCREW CURRENT AS A RESULT OF OFF-SET OF THE SCREW FROM THE BOAT'S CENTERLINE SWINGS THE STERN AWAY FROM THE DIRECTION OF THE SCREWS ROTATION.

Figure 8-29 Twin Screw Boat, Starboard Screw Astern, Port Screw Stopped