

# Session 5C



# Square Rigged Masterclass



**William Sabatini**

# Brig Maneuvers

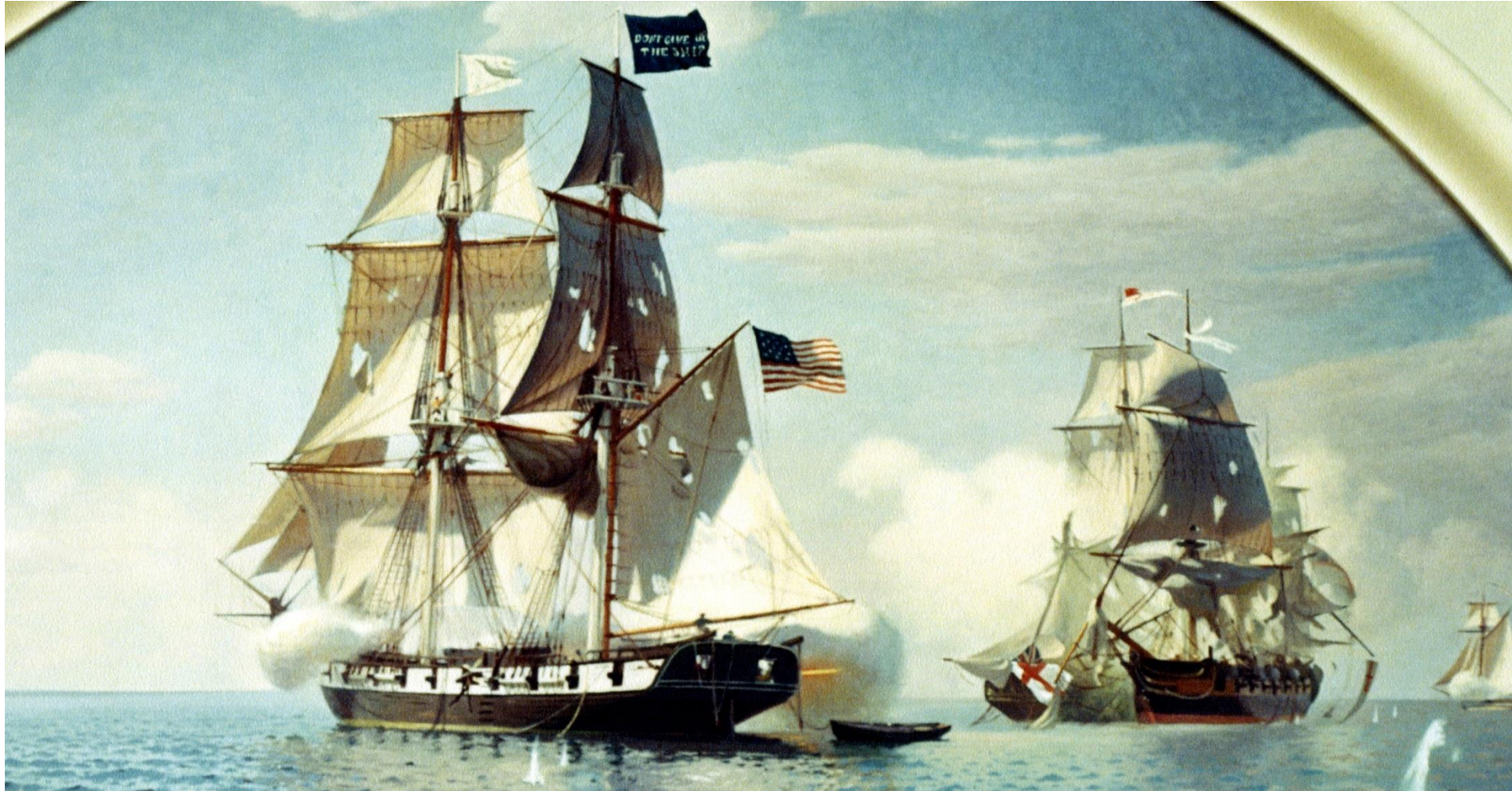


Captain William Sabatini

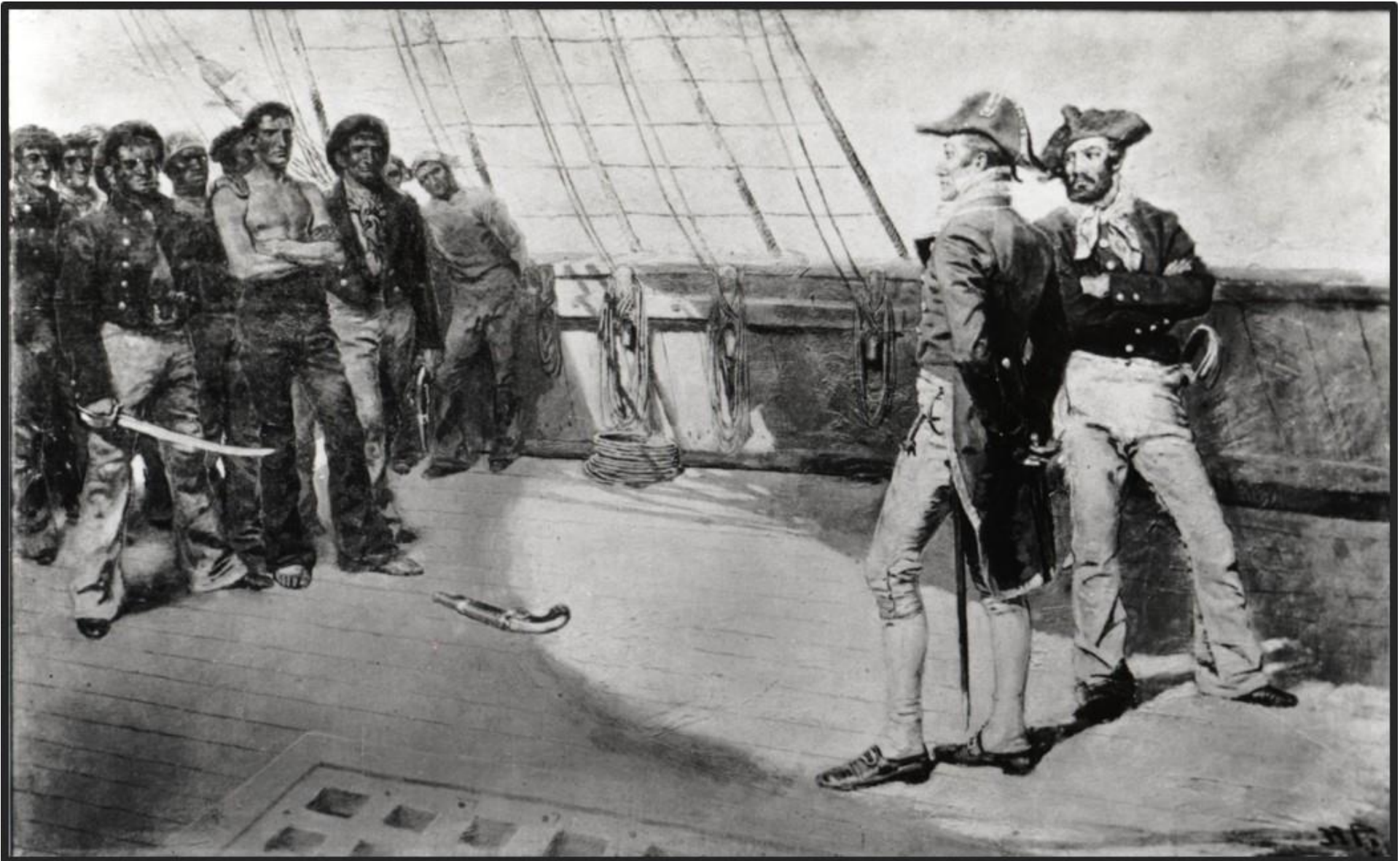
U.S. Brig Niagara

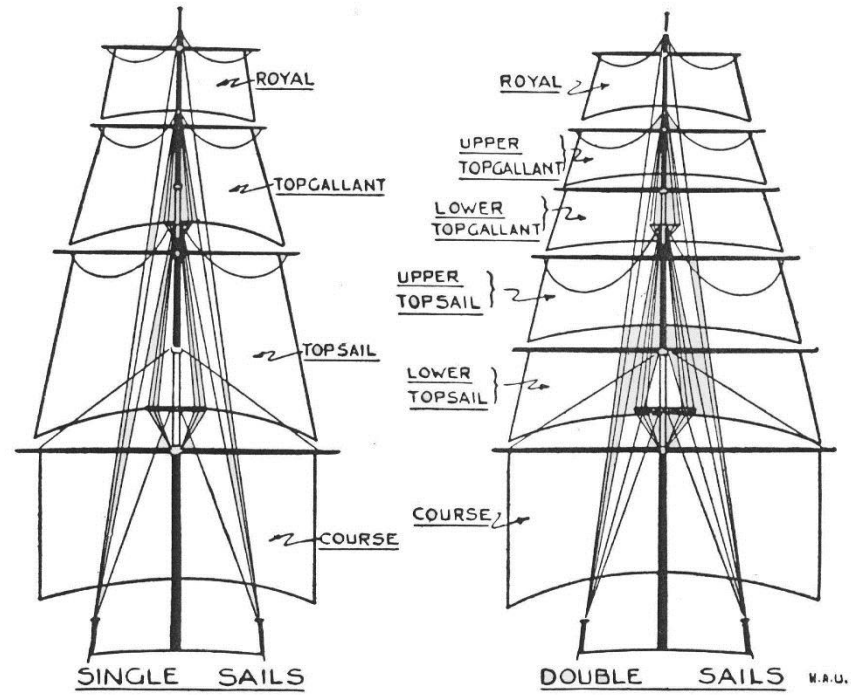
Erie, PA, USA

# Age of Fighting Sail

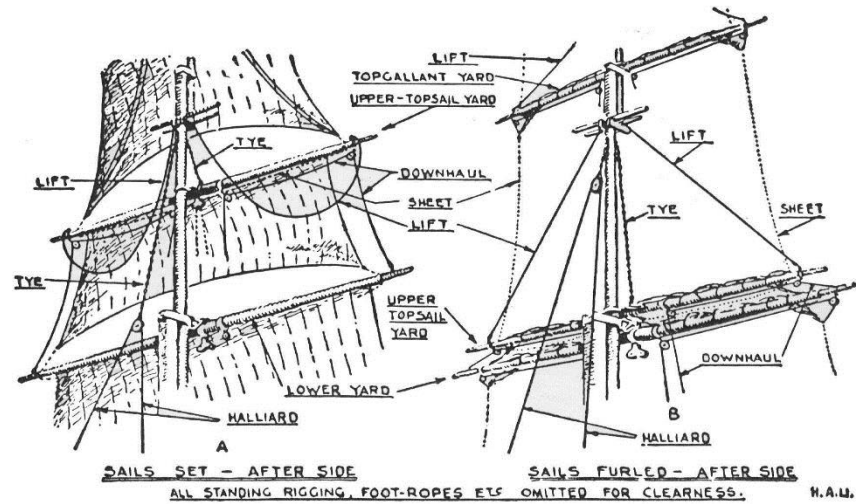


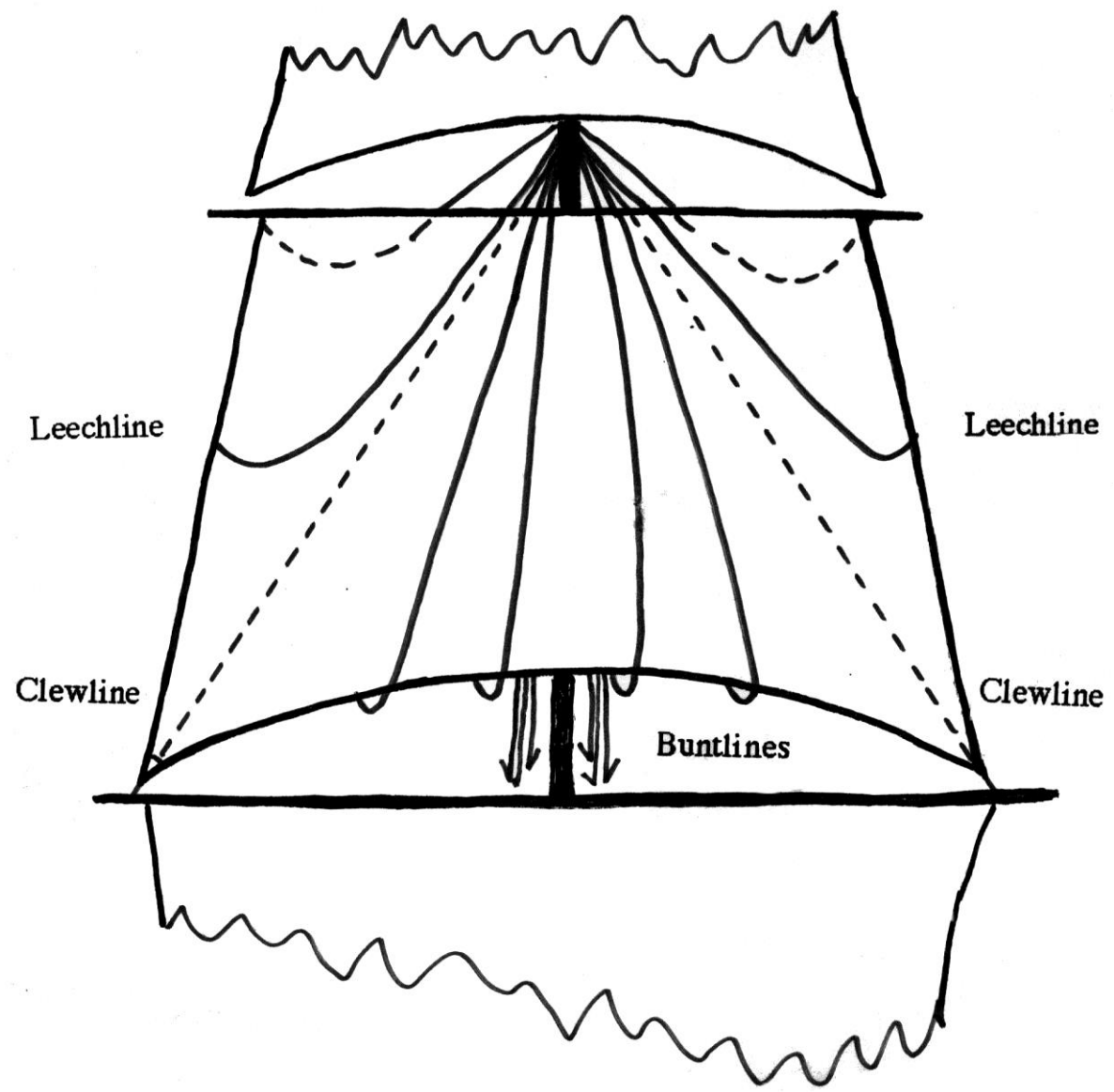
- Needs to be highly maneuverable in tight quarters
- Sacrifice mechanical advantage for speed
- Nearly unlimited manpower





Single sails were common in the old clippers, and double sails in the more modern sailing ships.



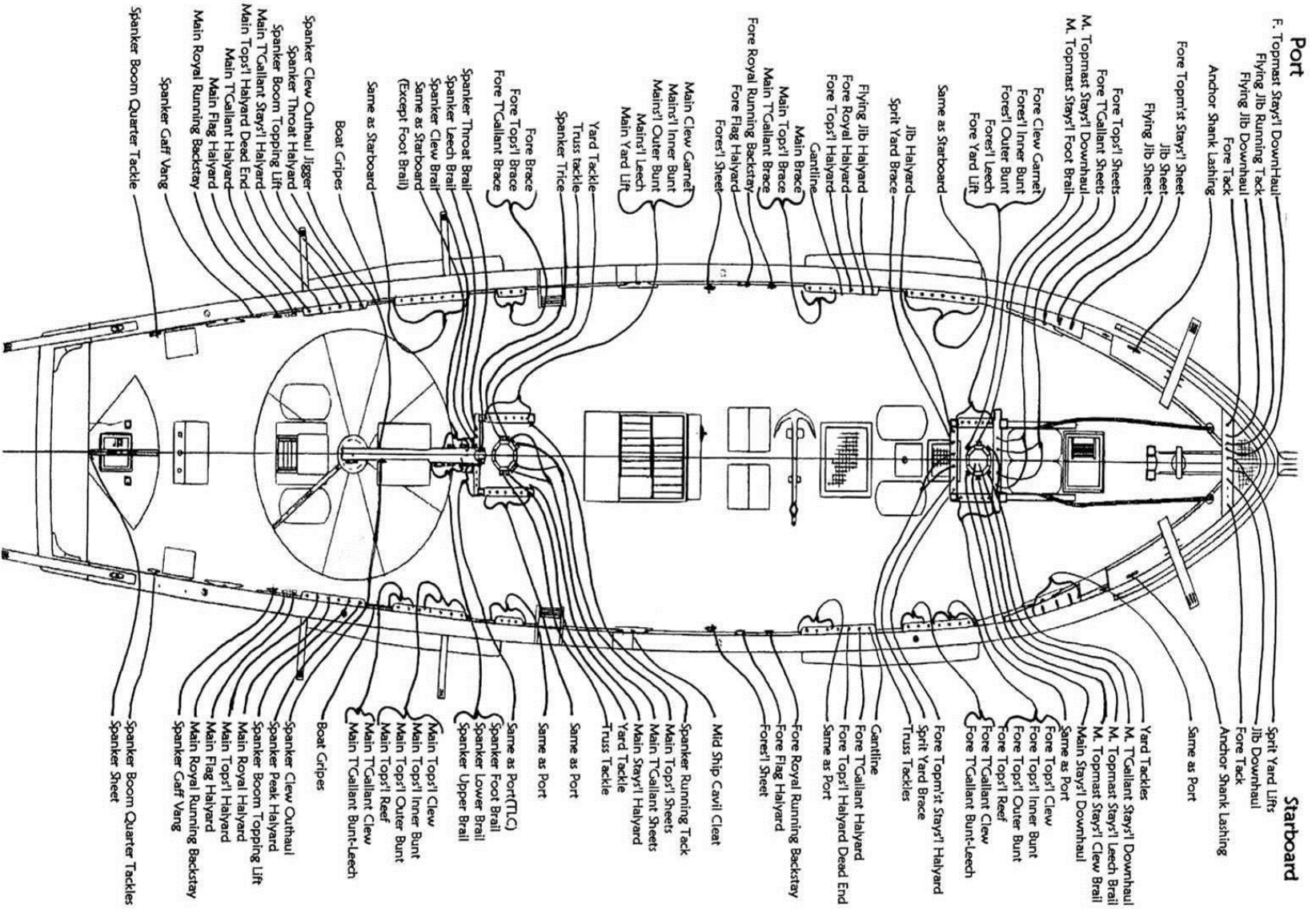












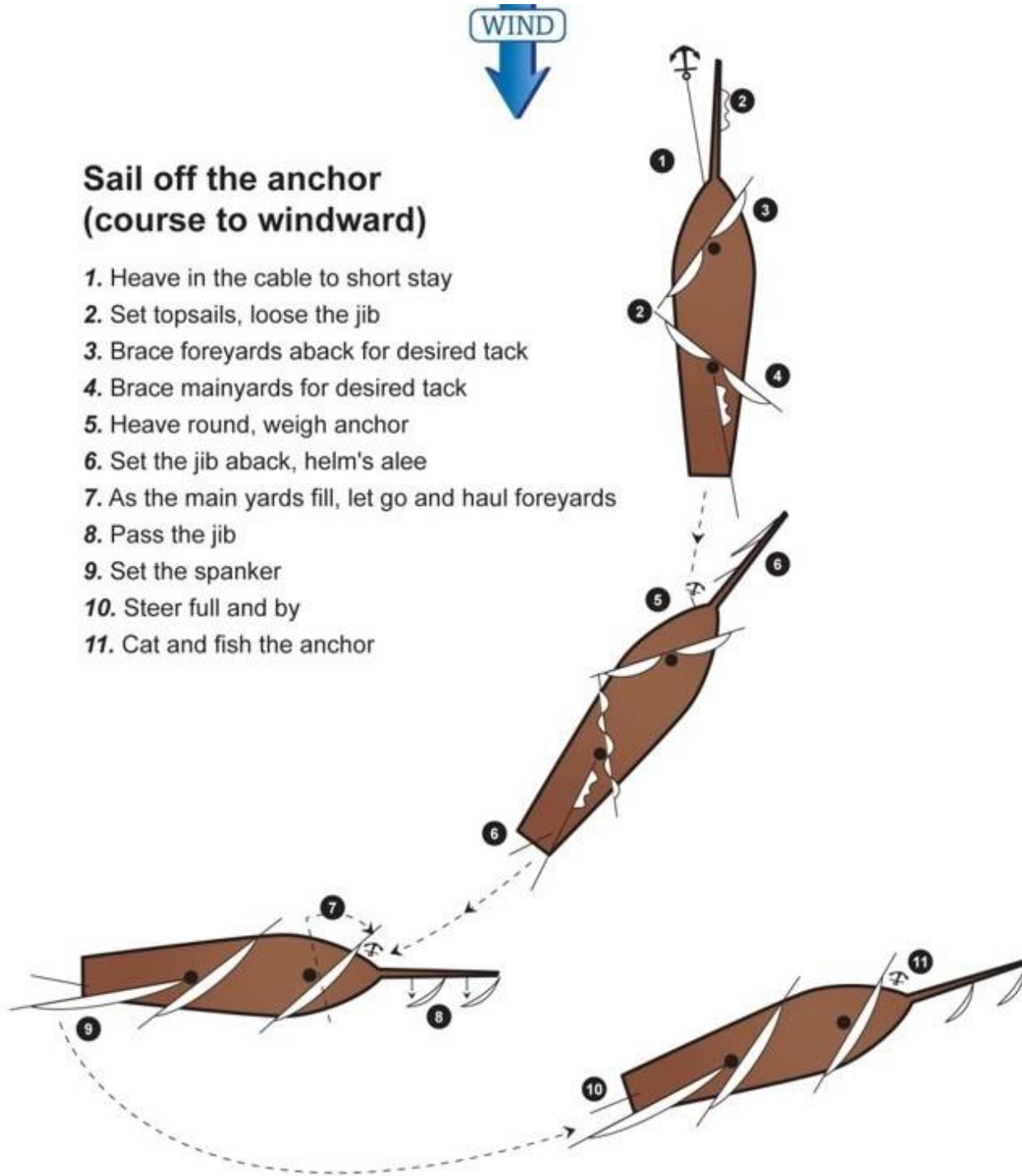
Port

Starboard

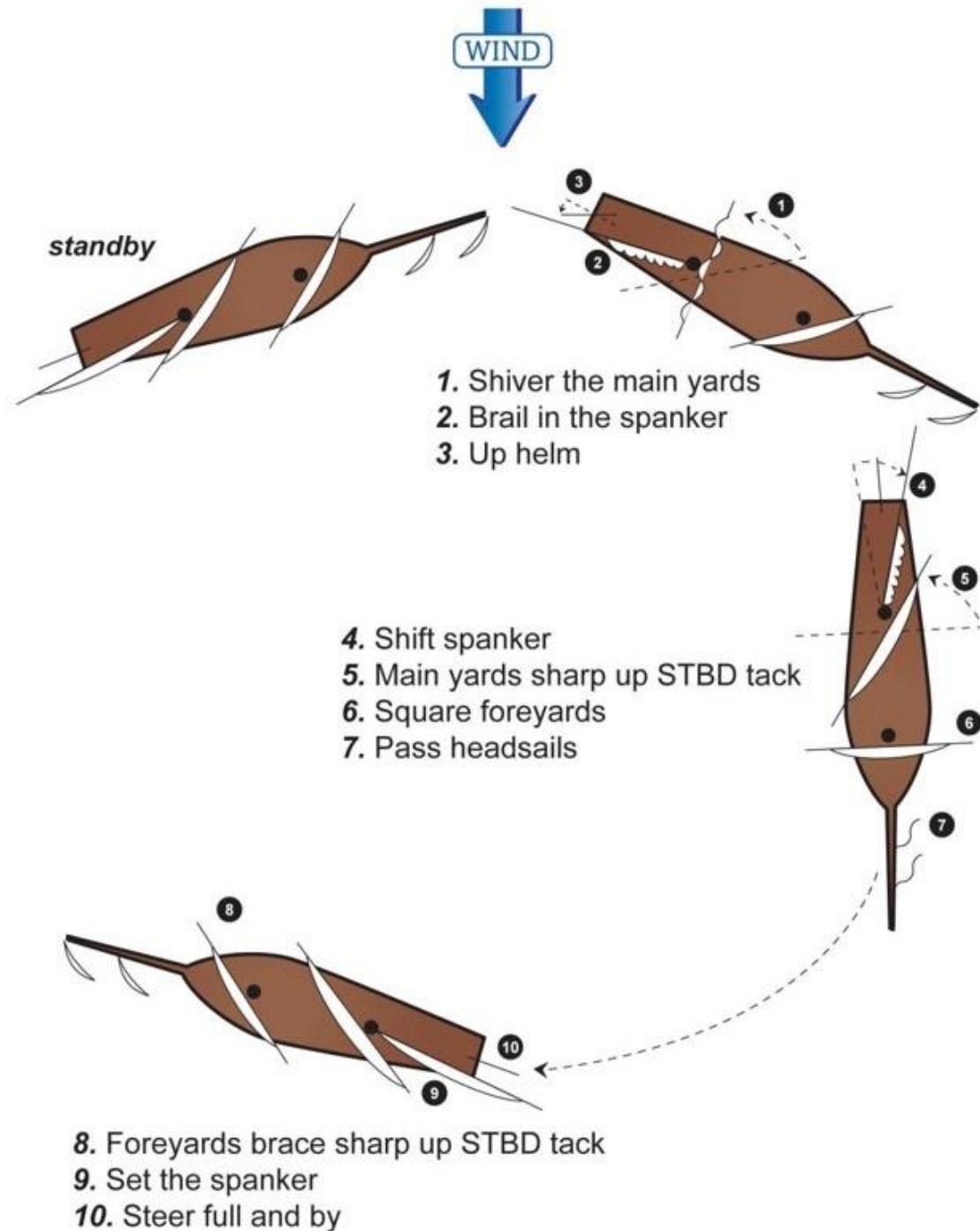
# Getting a Brig Underway from Anchor

## Sail off the anchor (course to windward)

1. Heave in the cable to short stay
2. Set topsails, loose the jib
3. Brace foreyards aback for desired tack
4. Brace mainyards for desired tack
5. Heave round, weigh anchor
6. Set the jib aback, helm's alee
7. As the main yards fill, let go and haul foreyards
8. Pass the jib
9. Set the spanker
10. Steer full and by
11. Cat and fish the anchor



# Wearing a Brig

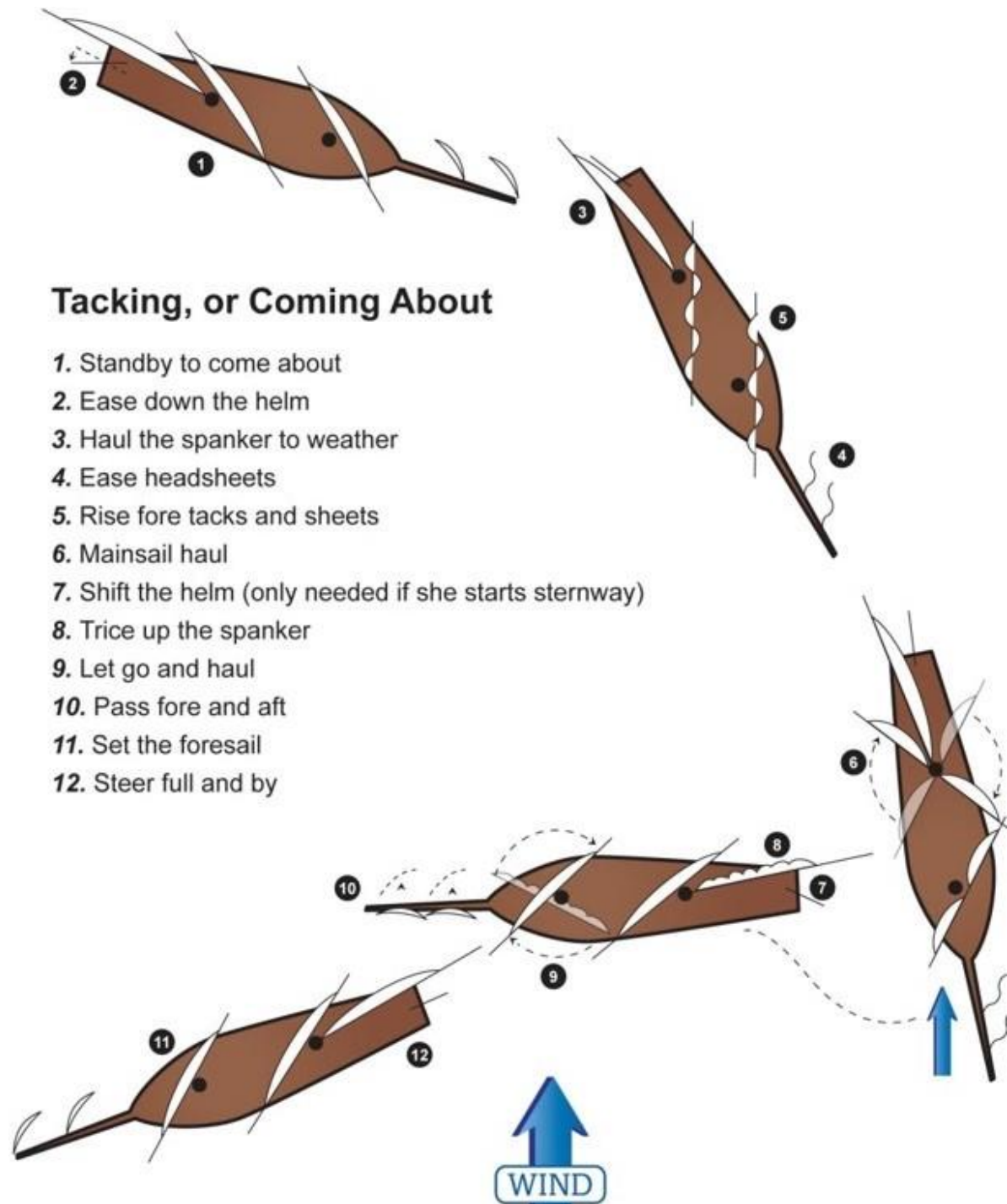




# Tacking a Brig

## Tacking, or Coming About

1. Standby to come about
2. Ease down the helm
3. Haul the spanker to weather
4. Ease headsheets
5. Rise fore tacks and sheets
6. Mainsail haul
7. Shift the helm (only needed if she starts sternway)
8. Trice up the spanker
9. Let go and haul
10. Pass fore and aft
11. Set the foresail
12. Steer full and by



# Sailing on to the Anchor

## Sailing up to an anchor

### 1. Approaching the anchorage

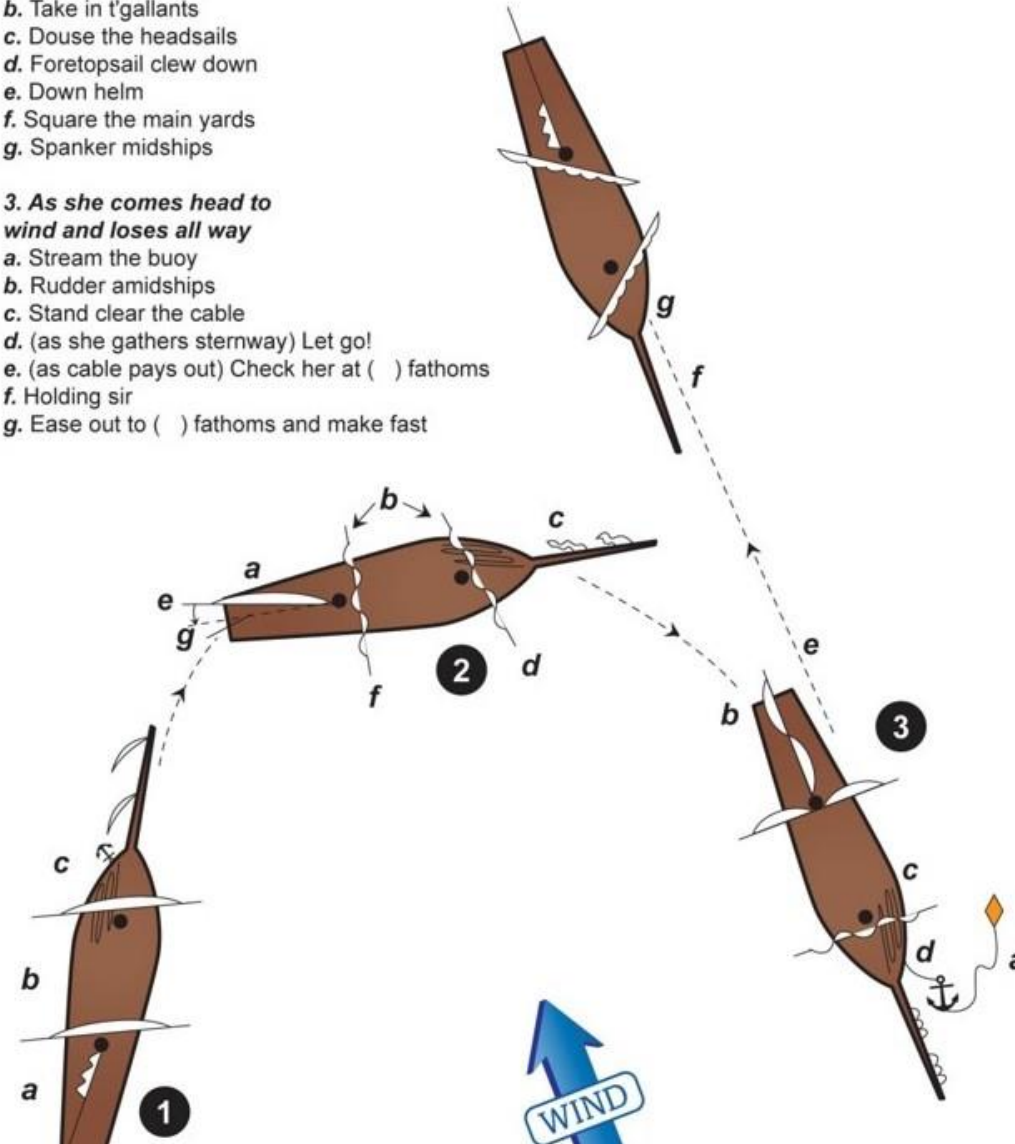
- Shorten sail, clew up on the courses
- Range the cable on deck
- Cat the anchor & rig the anchor buoy

### 2. Nearing the berth, wind abeam (able to head up or fall off)

- Set the spanker
- Take in t'gallants
- Douse the headsails
- Foretopsail clew down
- Down helm
- Square the main yards
- Spanker midships

### 3. As she comes head to wind and loses all way

- Stream the buoy
- Rudder amidships
- Stand clear the cable
- (as she gathers sternway) Let go!
- (as cable pays out) Check her at ( ) fathoms
- Holding sir
- Ease out to ( ) fathoms and make fast





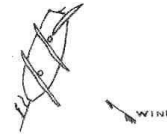
1. PORT TACK.



2. SPANKER TO WEATHER,  
DOWN HELM!



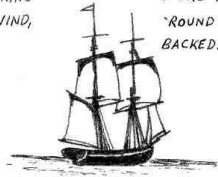
3. EASE HEAD SHEETS!



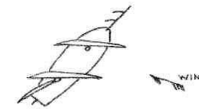
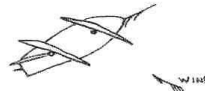
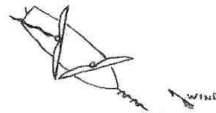
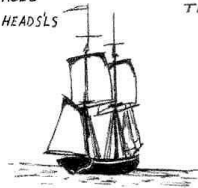
4. MAINSAIL HAUL!  
HEAD OF SHIP TURNING  
THROUGH EYE OF WIND,  
"IN STAYS."



5. LET GO AND HAUL!  
FORE YARDS BRACED  
"ROUND TO FILL, HEADSLS  
BACKED..."



6. PASS HEADSLS!  
ON STARBOARD  
TACK.



1.



2.



3.



6.



5.



4.

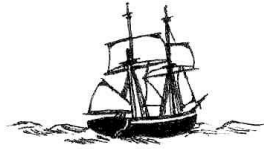


THE BASIC PRINCIPLES  
OF  
TACKING SHIP, IN 6 STEPS.

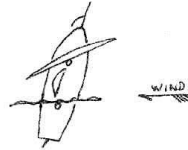


⊙ OBSERVER

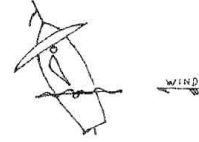
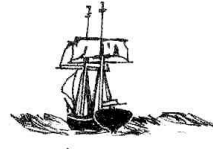
1. ON STARBOARD TACK...  
TAKE IN THE SPANKER!



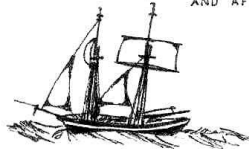
2. UP HELM!  
SHIVER THE MAIN YARDS!



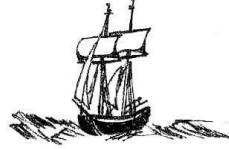
3. SQUARE THE FORE  
YARDS!



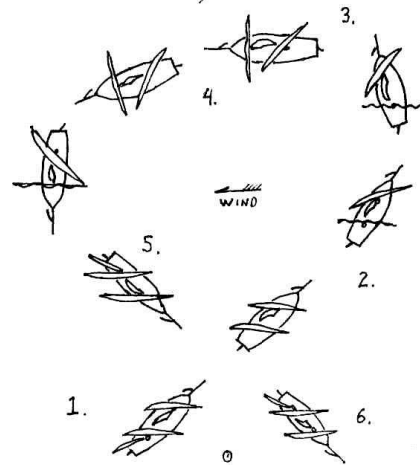
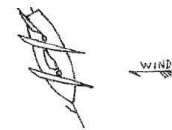
4. BEFORE THE WIND, PASS FORE  
AND AFT!



5. SET THE SPANKER!



6. BRACE UP SHARP, PORT  
TACK!



WEARING SHIP. GROUND  
LOST TO LEEWARD IS  
GREATER THAN DEPICTED.  
POSITION OF OBSERVER  
INDICATED BY ⊙  
NOTE THAT VESSEL CROSSES  
OWN TRACK.





**Pedro Mendes**



Sail Training International



APORVELA

# Handling a Square Rigger



**Pedro Mendes**  
STI / APORVELA / PO NAVY

# Handling a Square Rigger

**Sailing a square-rigger requires organization and teamwork to ensure that evolutions are safe and efficient.**

**The failure of a single crewmember to ease a line at the proper time can prevent the ship from tacking.**

**Throwing off a line at the wrong time can injure or kill a shipmate.**

**If any part fails, a ten minute operation can easily grow into an hour of hard labor.**

**That's why they are so good for training!**

# Handling a Square Rigger

**At the end of a voyage, the cadets faced calm and stormy weather, worked hard on the ships mission and:**

- **Show new group dynamics;**
- **Developed leadership qualities;**
- **Understand the organization of the ship;**
- **Know the traditions, how to behave on board and how to interact with the crew;**
- **Are courageous, self confident, and prepared for the unknown;**
- **Understand the sea and the wind and their effects on the ship.**

# Handling a Square Rigger

## Contents:



Setting sails



Trimming the sails



Polar Diagram



Use of engine against the wind



Tacking through & Wearing around



Emergencies and heavy weather



# Handling a Square Rigger

## SETTING SAILS



Square sails need sailors to climb the mast before and after use;



Sails are set upwards;



Removing top sails assures de effect of reefing;

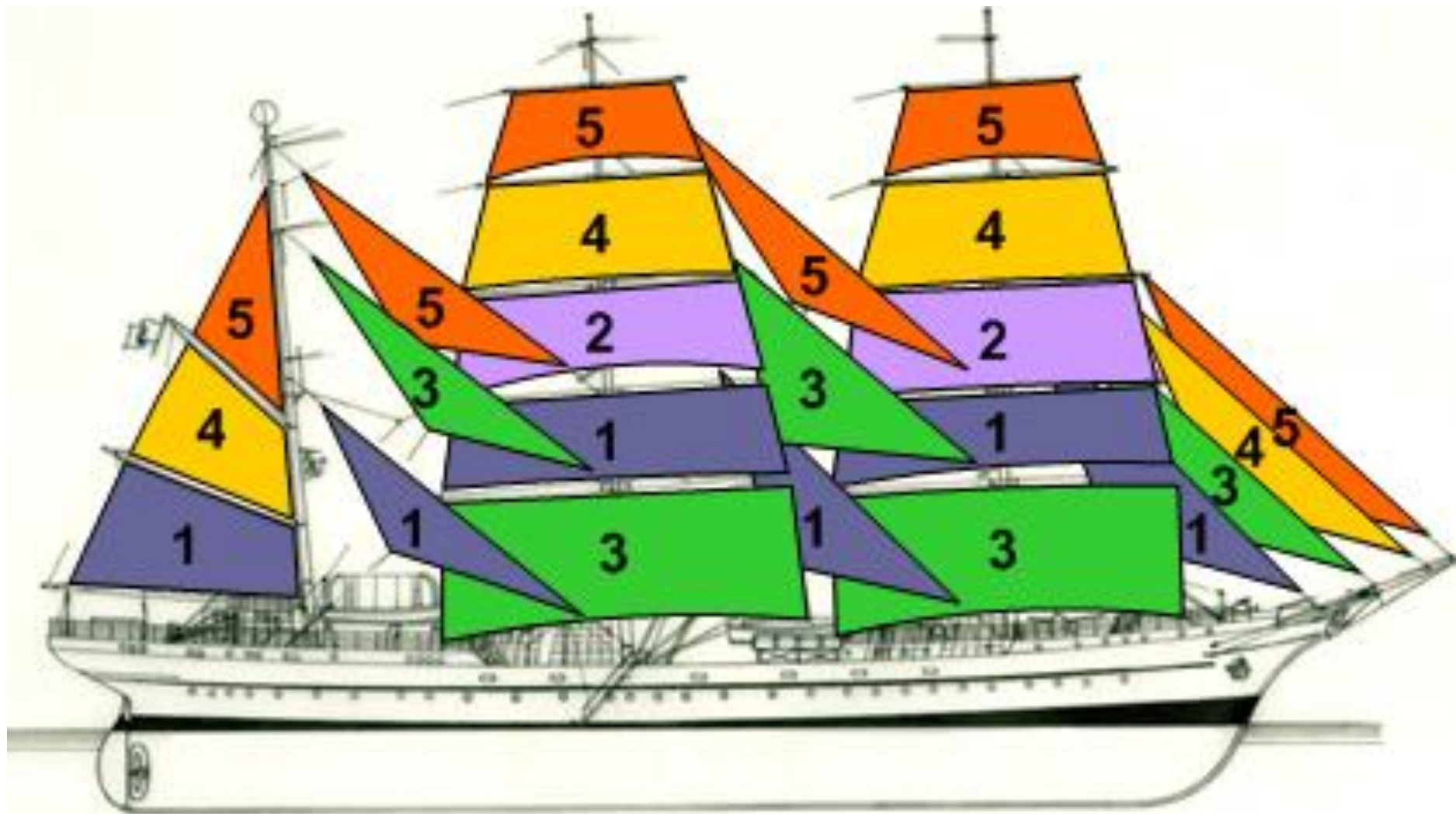


Sails allow for trimming and maneuvering;



# Handling a Square Rigger

## SETTING SAILS





# Handling a Square Rigger

## TRIMMING THE SAILS



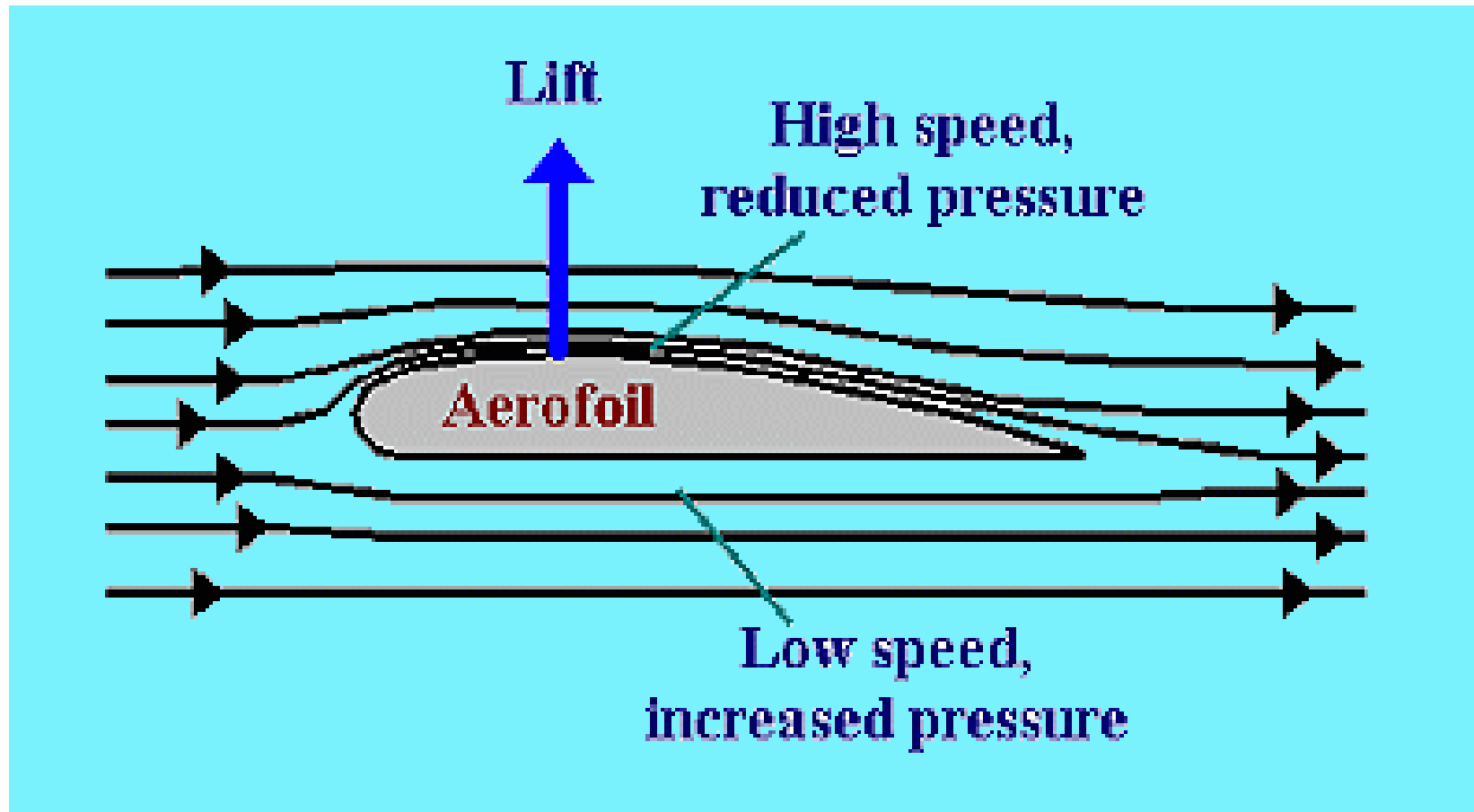
## Aerodynamic & Driving forces

### Push & Pull forces

# Handling a Square Rigger

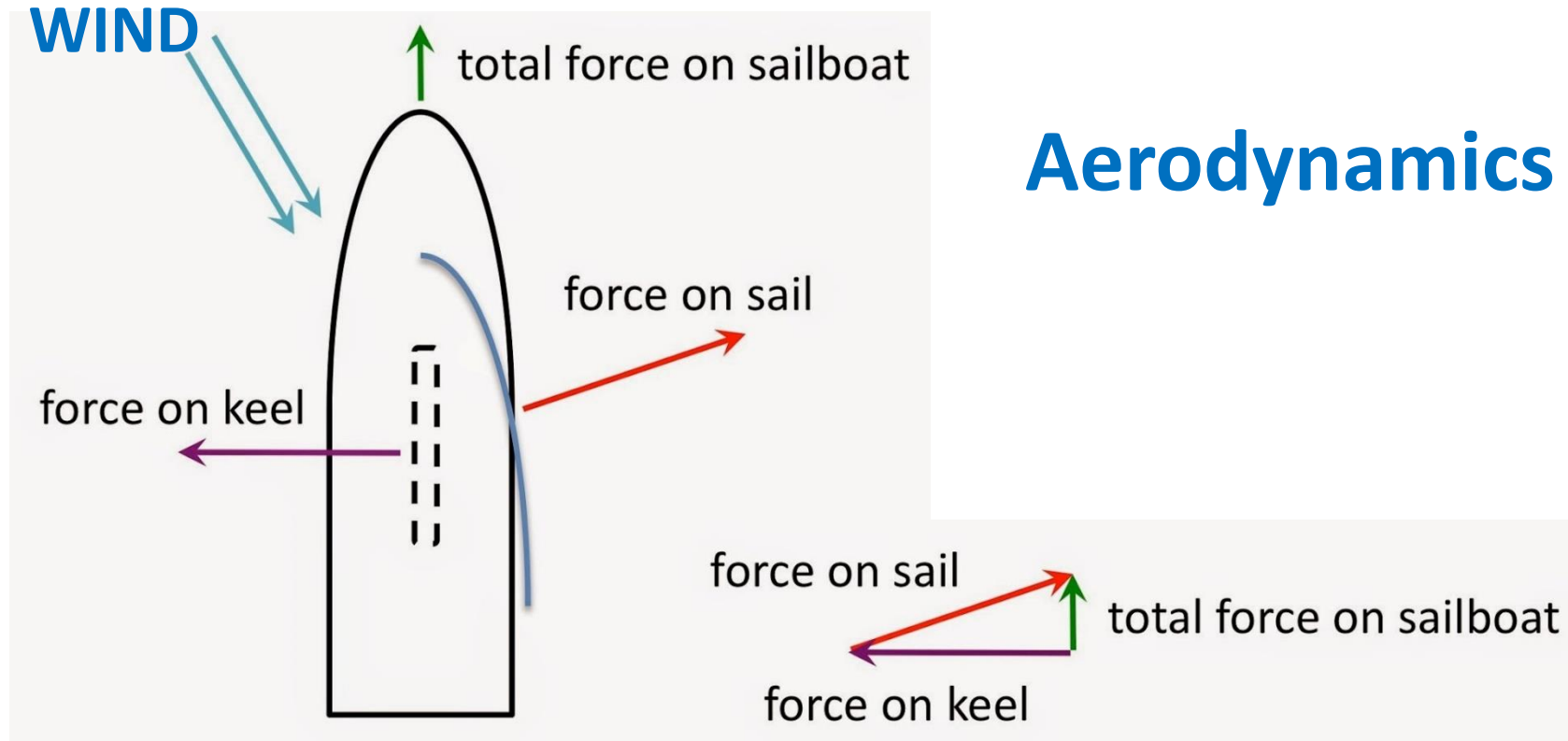
## TRIMMING THE SAILS

### Aerodynamics



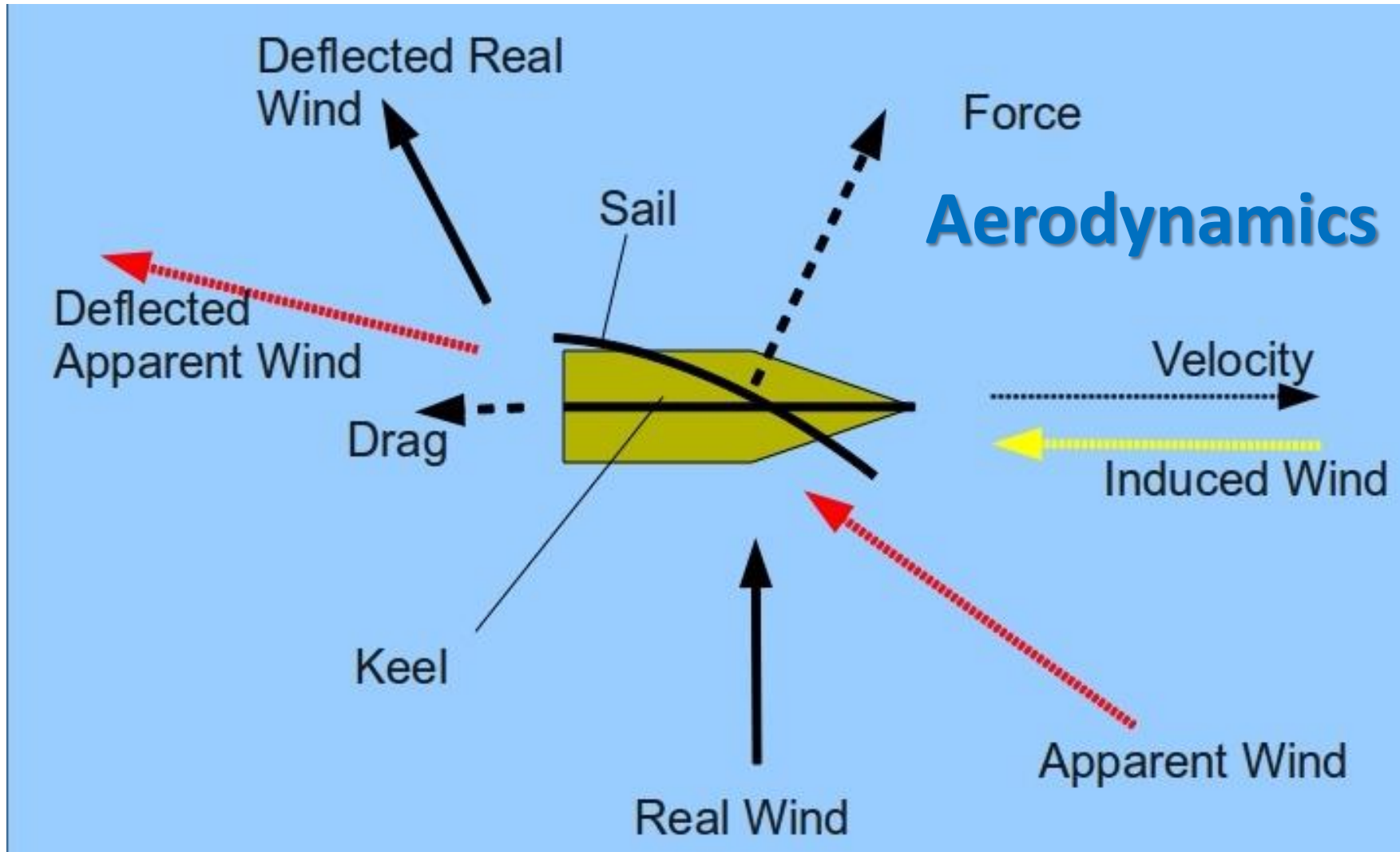
# Handling a Square Rigger

## TRIMMING THE SAILS



# Handling a Square Rigger

## TRIMMING THE SAILS

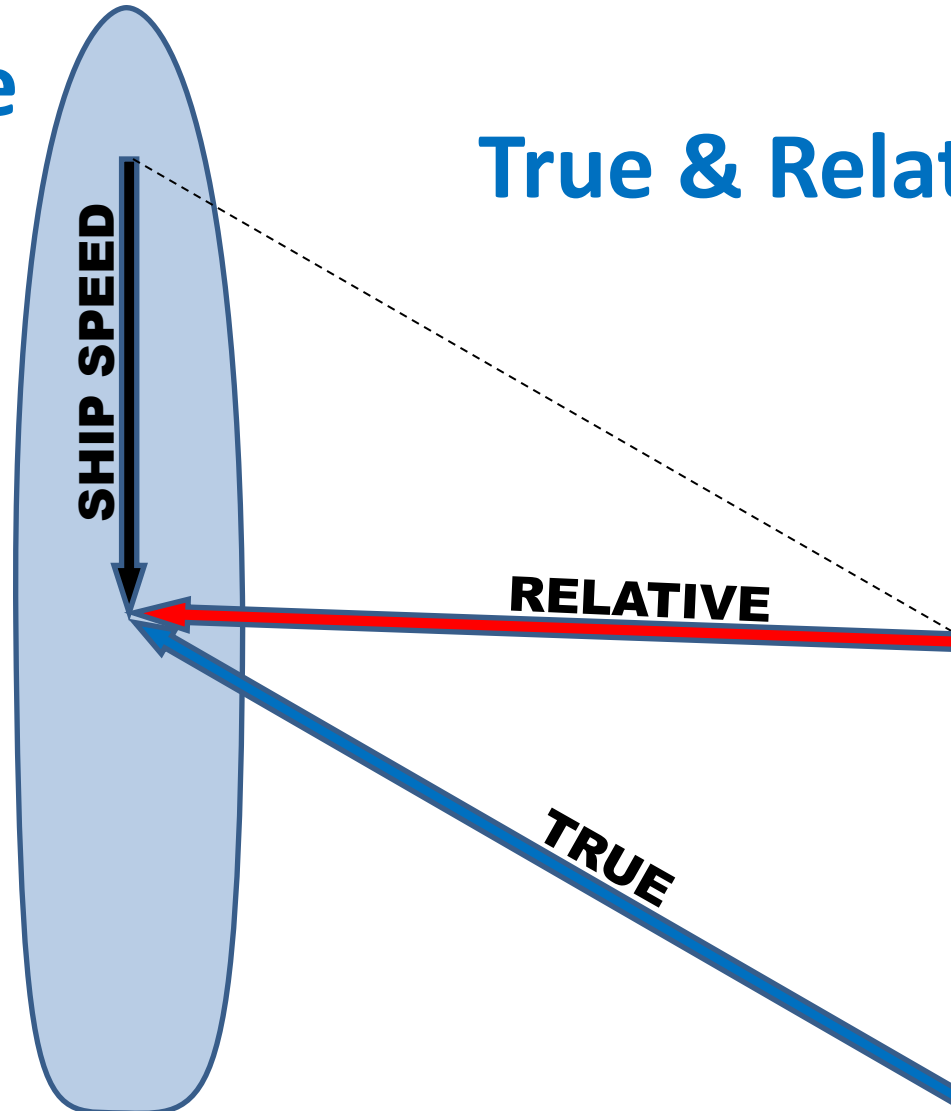


# Handling a Square Rigger

## TRIMMING THE SAILS

Driving force

True & Relative Wind



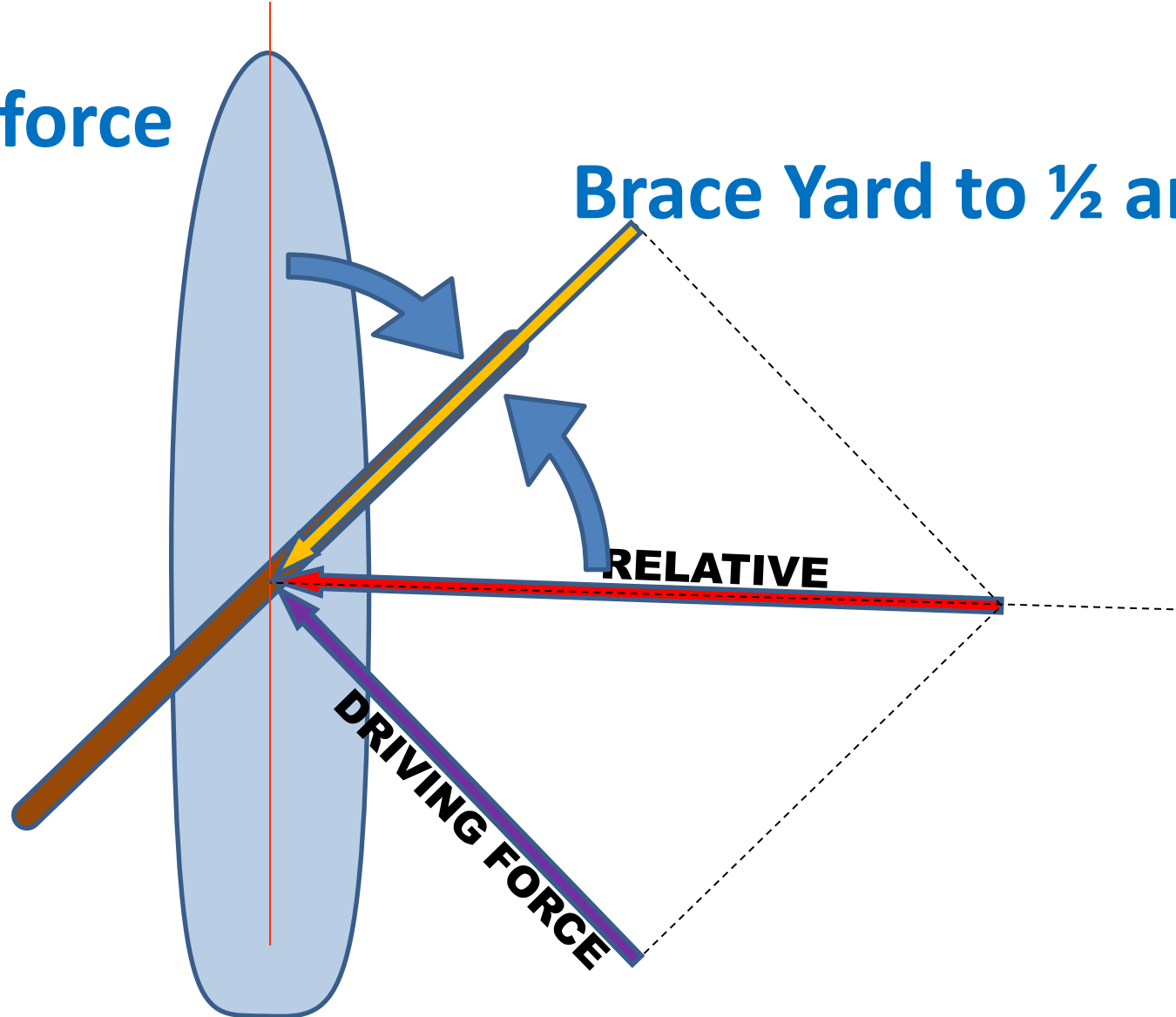


# Handling a Square Rigger

## TRIMMING THE SAILS

Driving force

Brace Yard to  $\frac{1}{2}$  angle

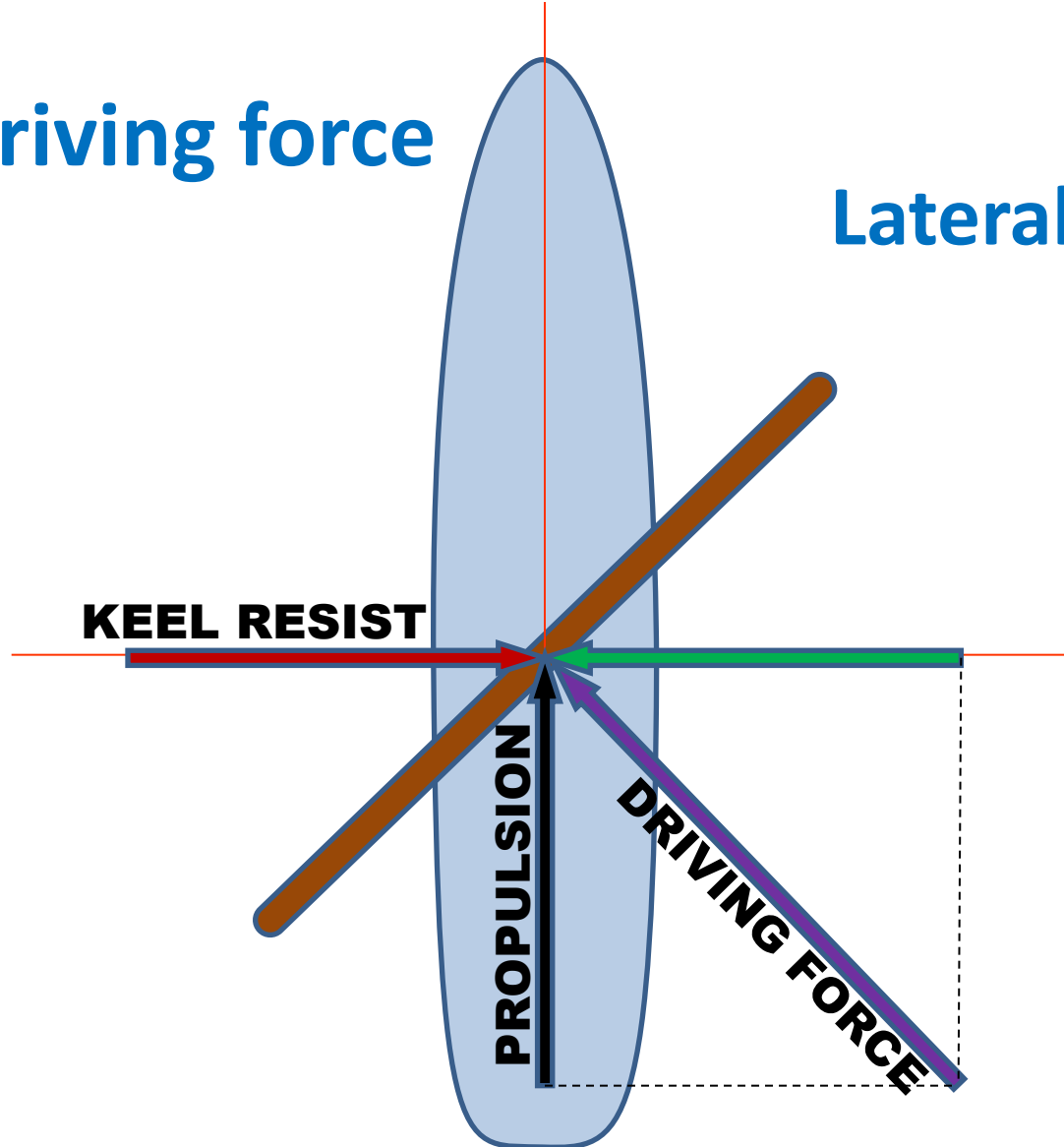


# Handling a Square Rigger

## TRIMMING THE SAILS

Driving force

Lateral & Forward Forces

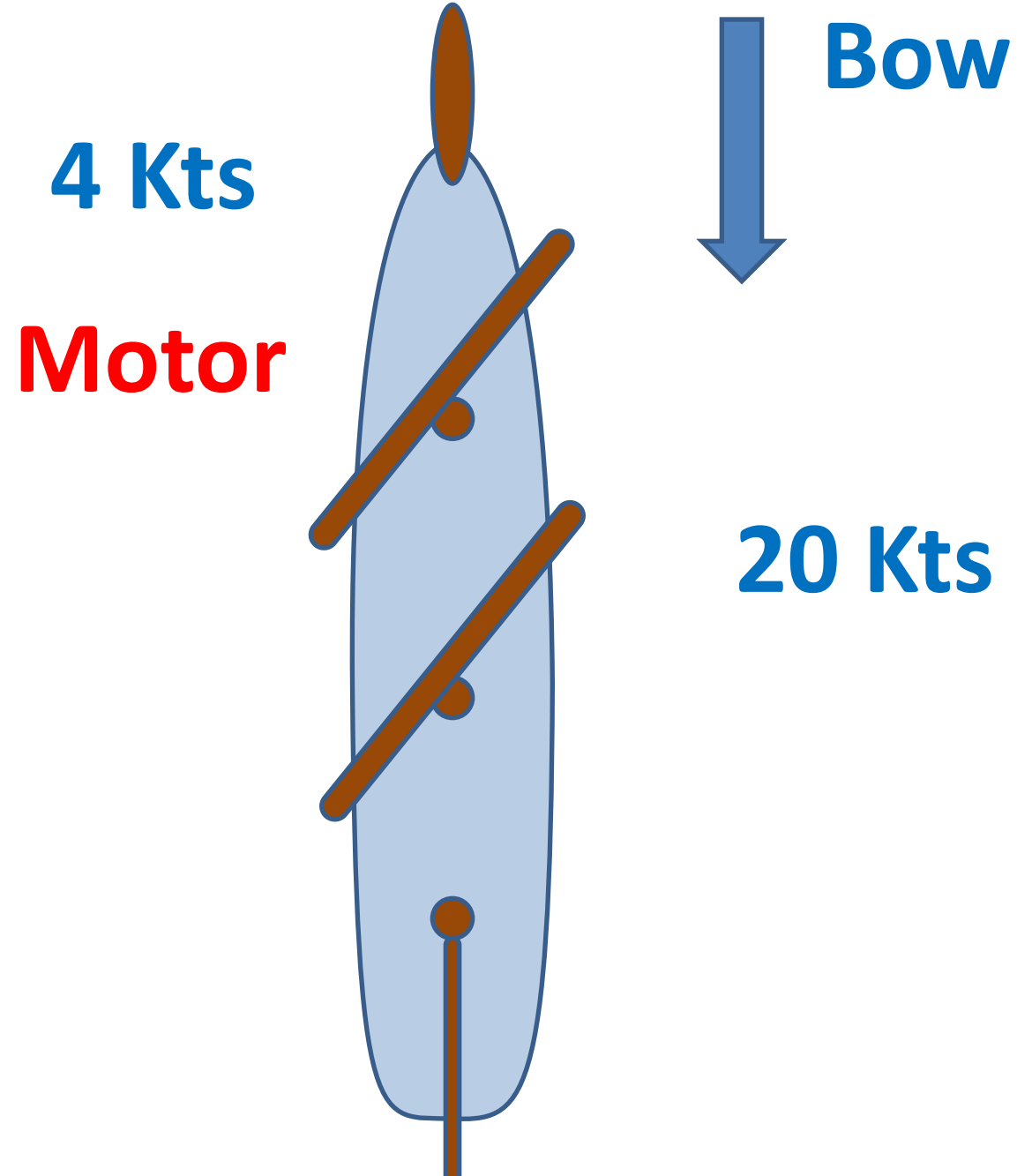


# Handling a Square Rigger

## TRIMMING THE SAILS

Relative wind (degrees)	Yard Fanning	Foresail Mast		Mainsail Mast		Boom
		Foresail yard	Royal yard	Mainsail yard	Royal yard	
40°	---	---	---	---	---	0,5 qq
<60°	Yes	6 qq	5 qq	5,5 qq	4,5 qq	1,0 qq
60°	Yes	5.5 qq	4.5 qq	5 qq	4 qq	1,5 qq
70°	Yes	4.5 qq	3.5 qq	4.5 qq	3.5 qq	
80°	Yes	3.5 qq	3 qq	3.5 qq	3 qq	2,0 qq
90°	Yes	2.5 qq	2 qq	2.5 qq	2 qq	
100°	No	2 qq		2 qq		2,5 qq
110°	No	1.5 qq		1.5 qq		
120°	No	1 qq		1 qq		Sharp
130°	No	0.5 qq		0.5 qq		
140°	No	0.5 qq		0.5 qq		
>150°	No	Square		Square		

# POLAR DIAGRAM





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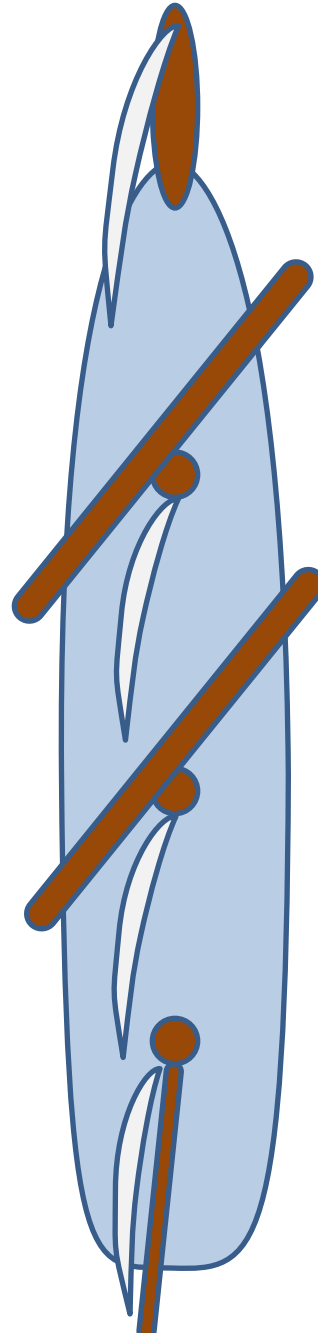


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# POLAR DIAGRAM

6 Kts

Motor



Stbd 30°



20 Kts



Marinha



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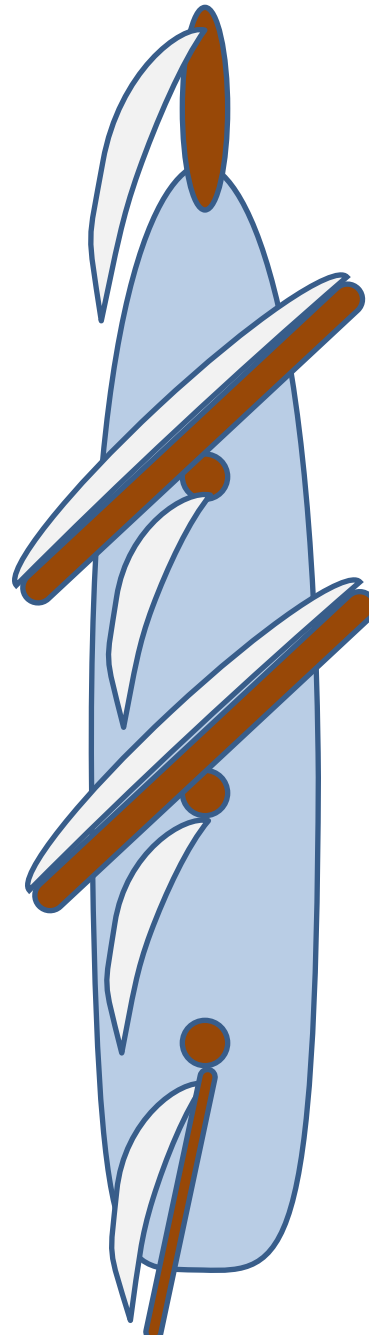


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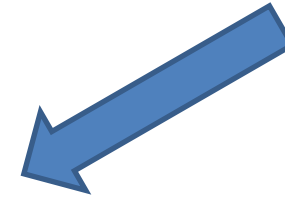
# POLAR DIAGRAM



8 Kts



Stbd 60°



20 Kts



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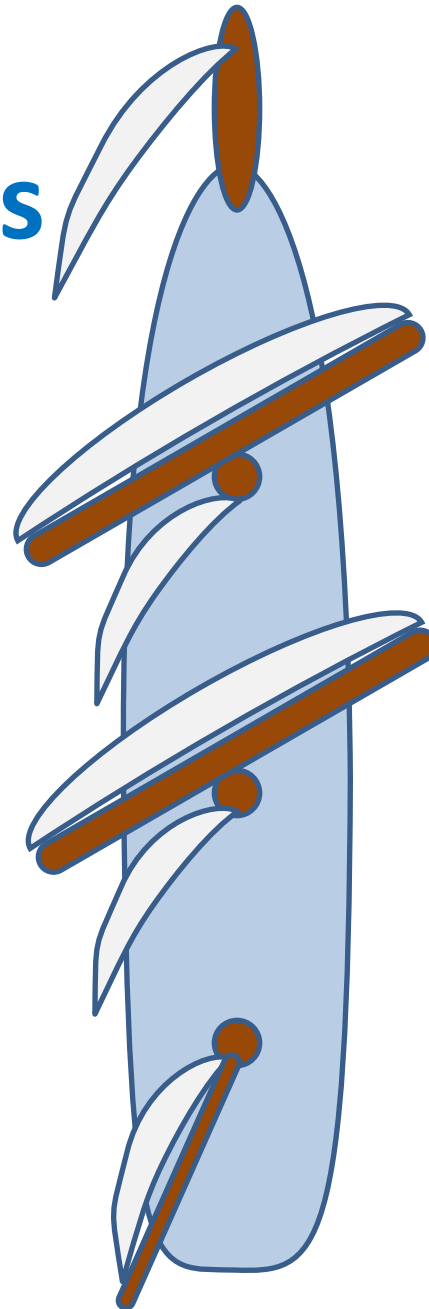


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# POLAR DIAGRAM



12 Kts



Stbd 90°

20 Kts ←



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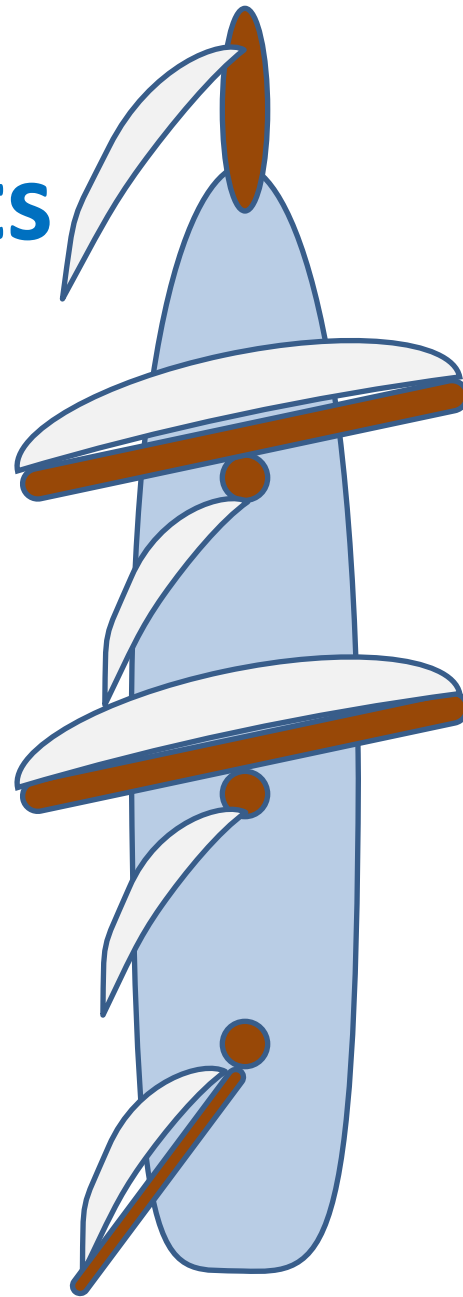


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# POLAR DIAGRAM



10 Kts



20 Kts

Stbd 120°





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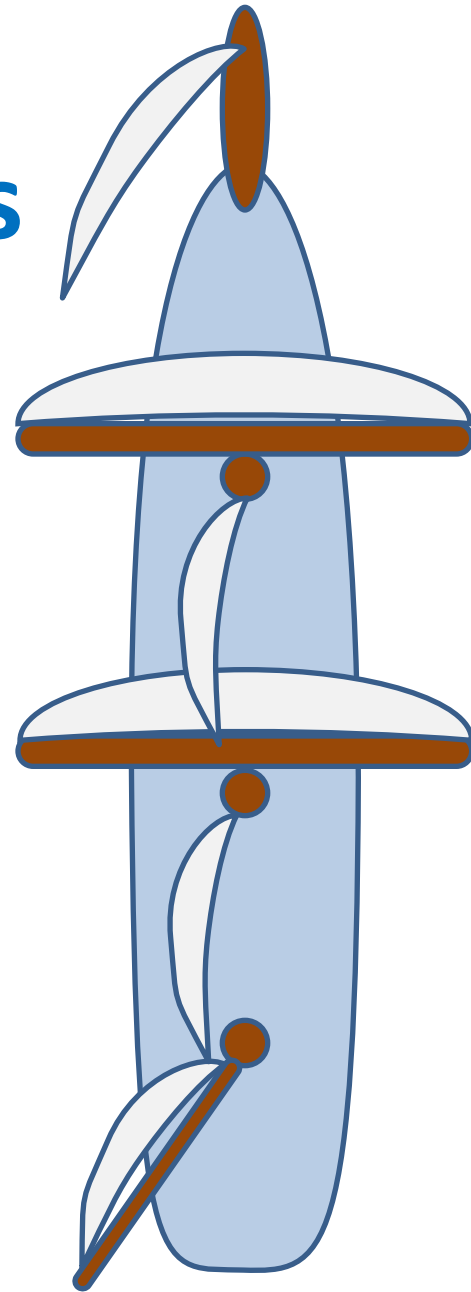


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# POLAR DIAGRAM

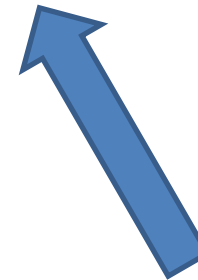


6 Kts



20 Kts

Stbd 150°

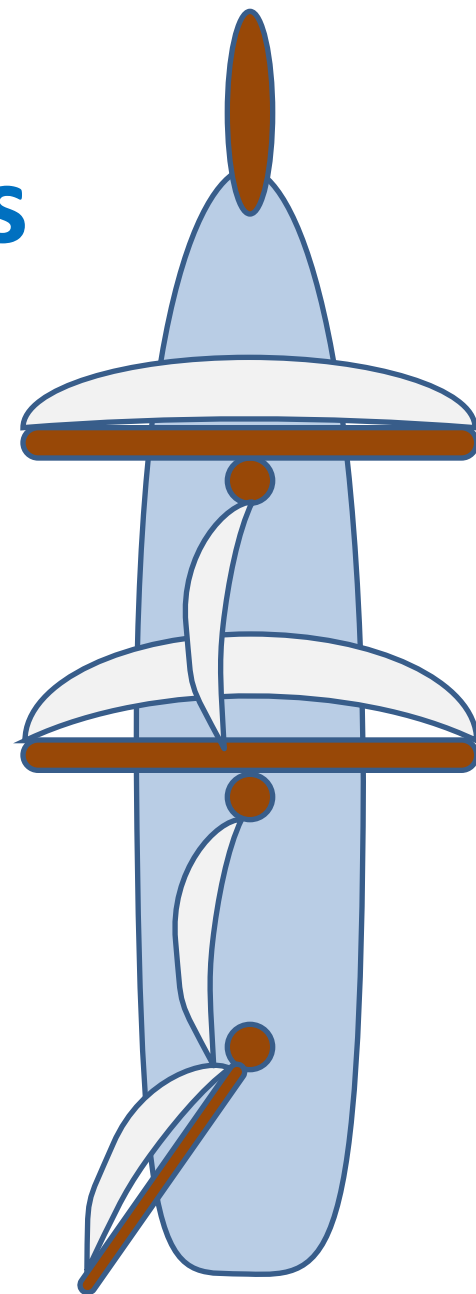




# POLAR DIAGRAM



5 Kts



20 Kts

180°



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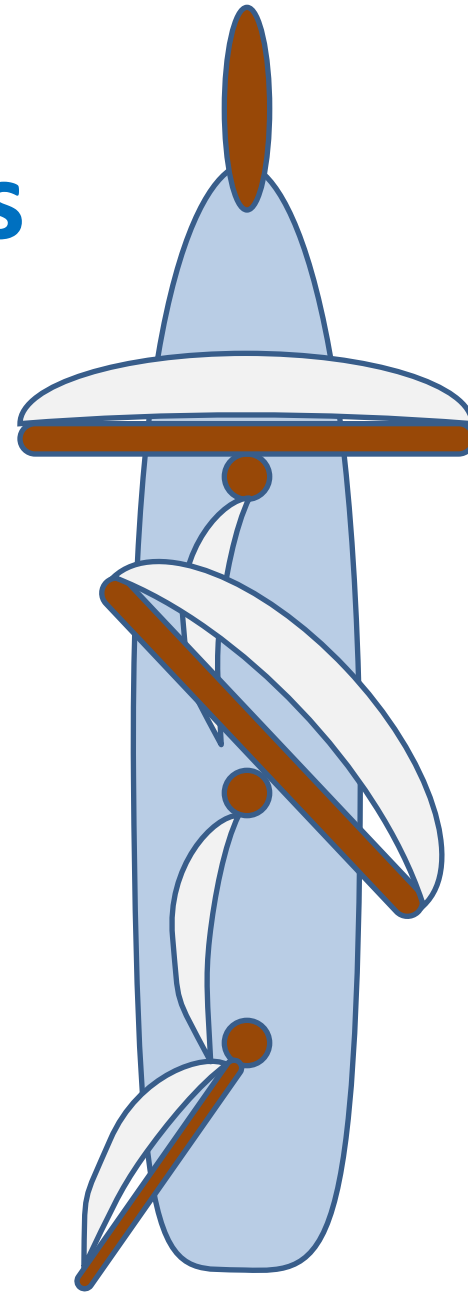


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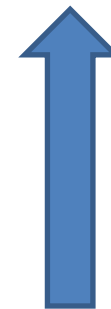
# POLAR DIAGRAM



5 Kts



20 Kts



180°



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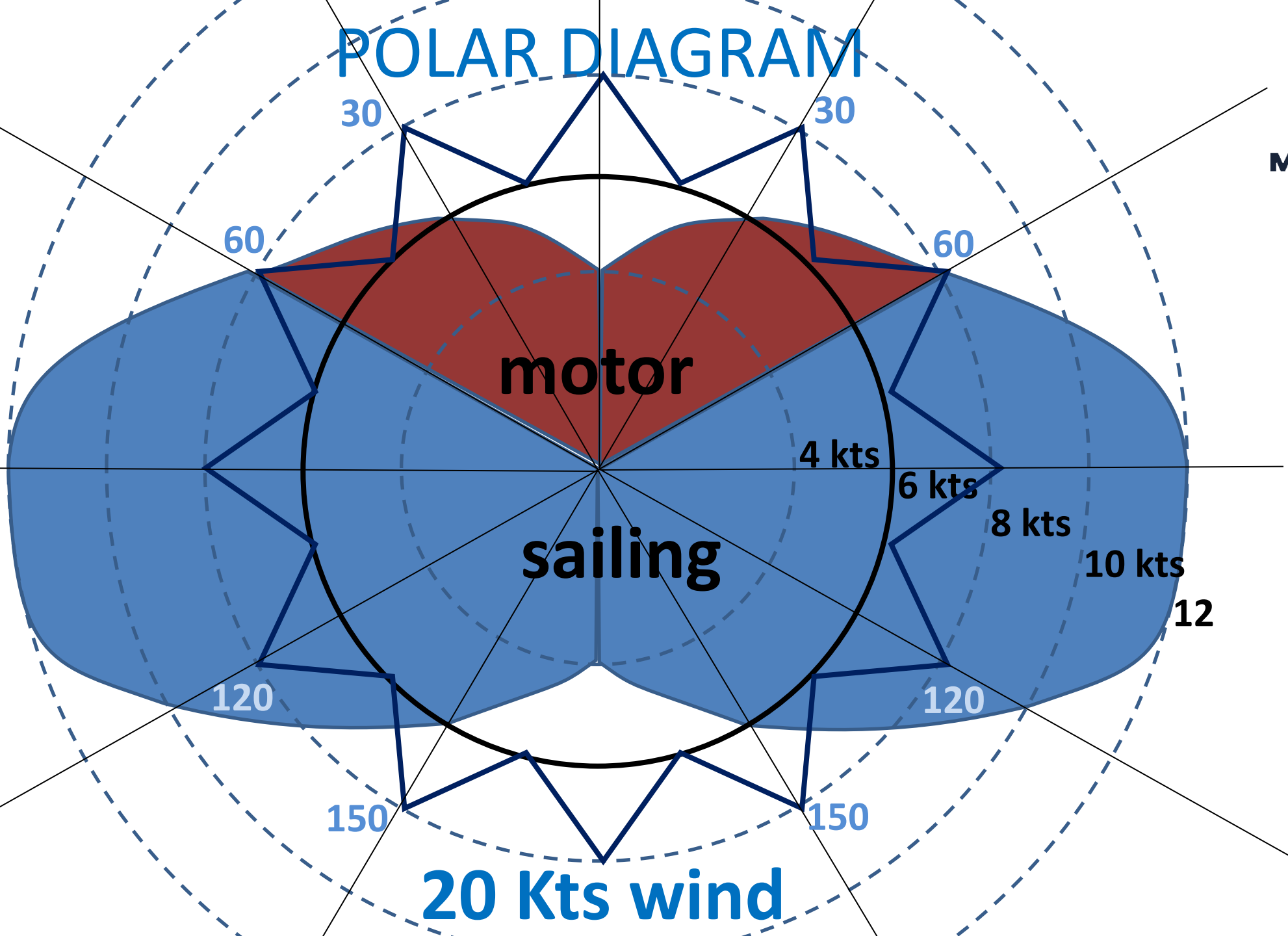


APORVELA



Marinha

# POLAR DIAGRAM



# Handling a Square Rigger

## TRIMMING THE SAILS



Yard  $\frac{1}{2}$  angle btw bow and relative wind;



Cockbill – keep yards horizontal;



Fanning – wind faster in altitude; Less friction;



Tension sheets with strong winds;



Let the wind flow when on the back;



Use sails ahead or astern to balance and reduce rudder brake;

# Handling a Square Rigger

## MOTORING



Put the wind on 30 degrees;



Align yards with the wind;



Use Latin sails ;



Sails will give support to the engine and stabilize the ship;

# Handling a Square Rigger

## TACKING



Gain distance upwind;



More difficult; Timing is critical;



All hands on deck;



Conditions: Wind 10 - 25Kts; Speed 5 – 12Kts;



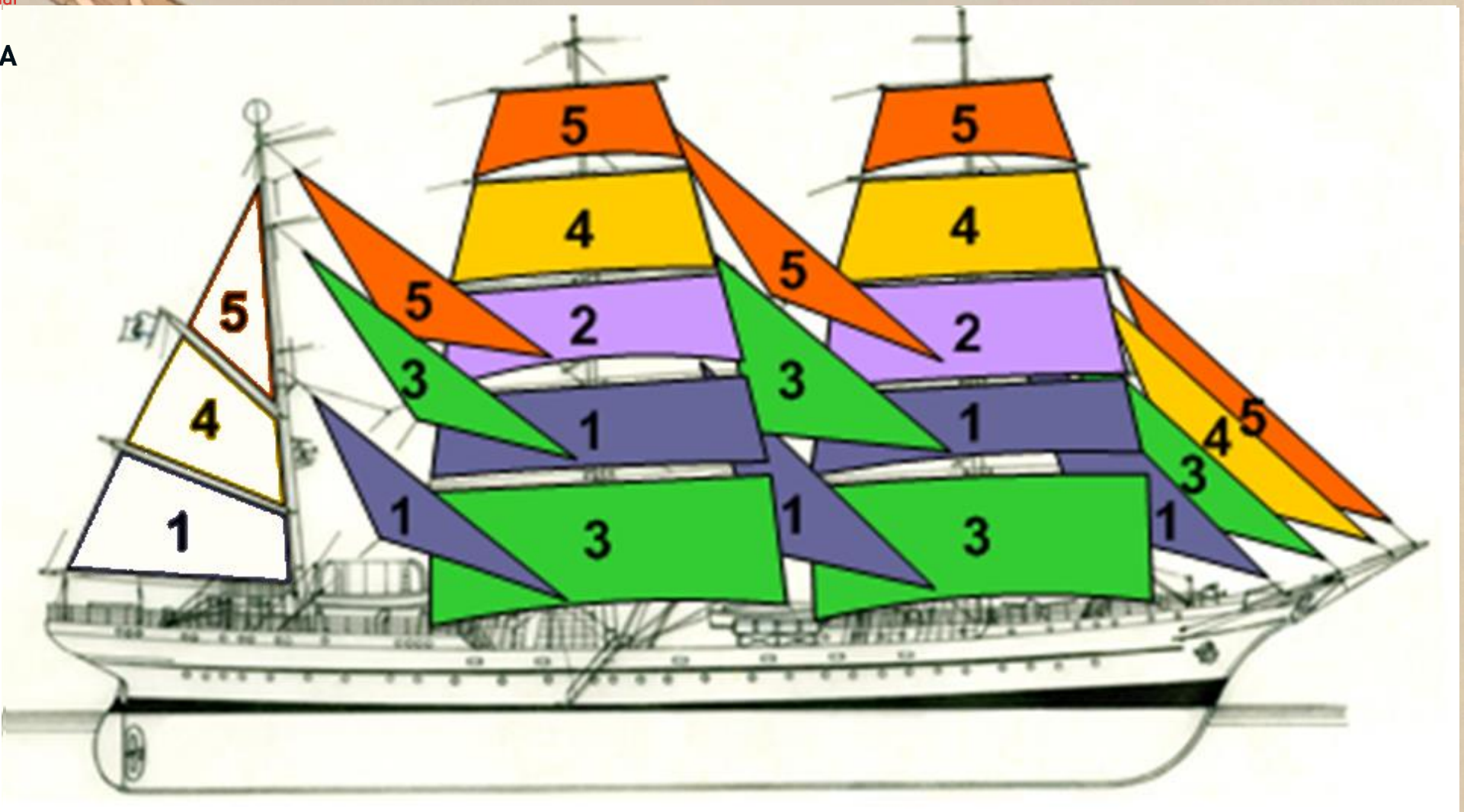
Trim the best; Gain speed;



Reduce contrary and exploit accordant forces;



Turn the ship;



Spanker amidships  
Port 15°  
Turn slowly into the wind

Douse staysails  
Brace main mast



# Handling a Square Rigger

## WEARING



Loose distance upwind;



More easy; More safe; Never fails;



Less hands on deck;



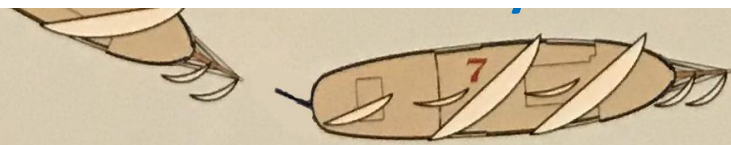
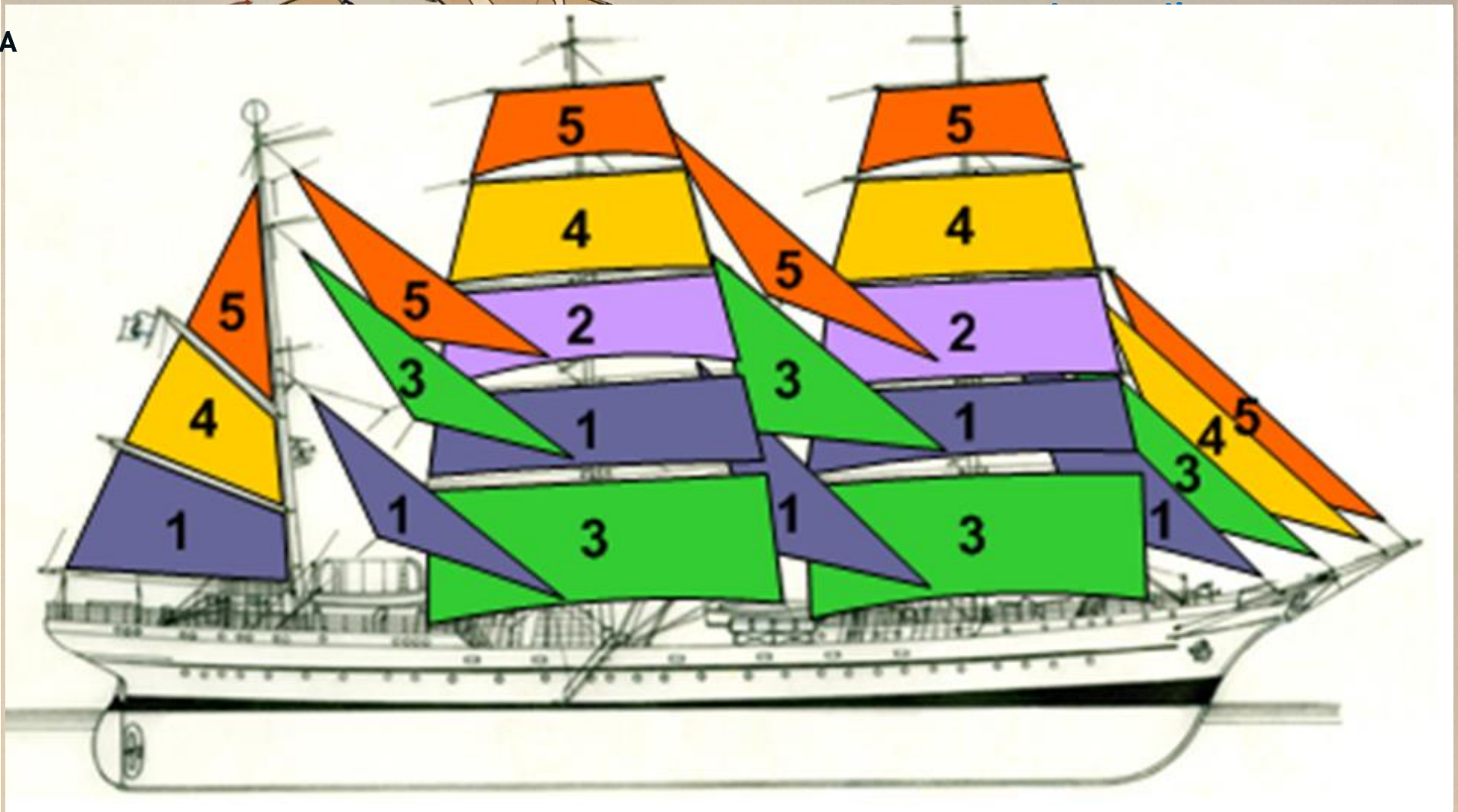
Conditions: Light or Strong Winds; Slow Ship;







Reduce contrary and exploit accordant forces;



Turn the ship;



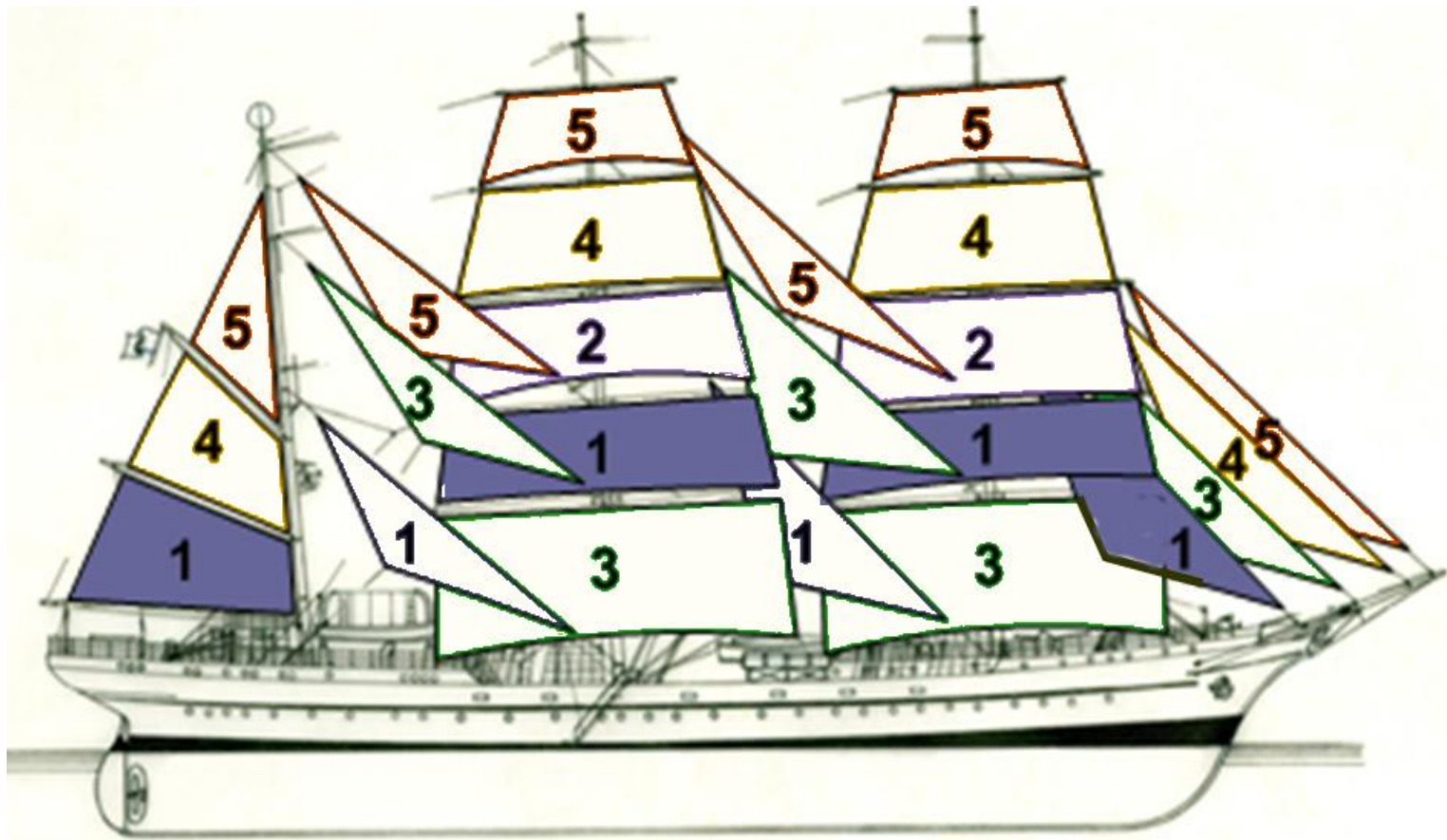
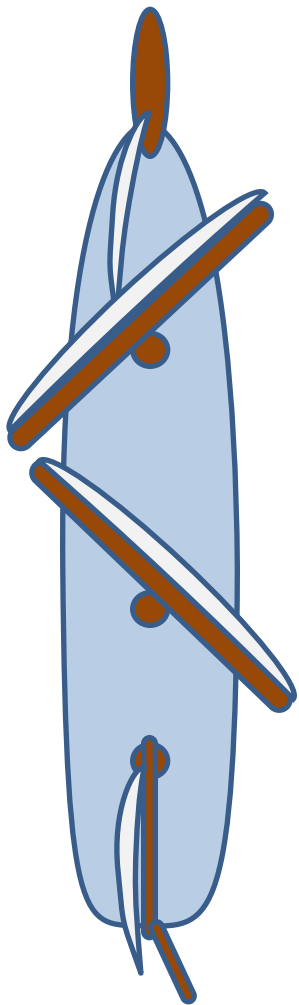
-  Pano redondo à sombra
-  Pano redondo a grivar
-  Pano latino à sombra
-  Pano cheio



R.P. SAGRES

# Handling a Square Rigger

## EMERGENCIES



# *Efeito turístico*





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# Handling a Square Rigger



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