MARK008
M<24mtrs

Maneuvre a Vessel

1

Planing and Displacement Hulls

Planing Hull

Planing Hull in Displacement mode

Displacement Hull

2

Hull Shapes

Advantages
This planing hull has a shallow draft. Good for fishing in small lakes and rivers.

Disadvantages
Rides roughly in choppy waters.

Flat Bottom Hull

3

Hull Shapes

Advantages
This planing hull gives a smoother ride than a flat bottom hull in rough water.

Disadvantages
Takes more power to move at the same speed as flat bottom hulls. May roll or bank in sharp turns

Deep Vee Hull

4

Hull Shapes

Advantages
This typical displacement hull moves easily through the water even at slow speeds.

Disadvantages
Has a tendency to roll unless it has a deep keel or stabilizers.

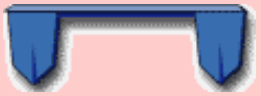
Round Bottom Hull

5

Hull Shapes

Advantages
Another example of a displacement hull, the multi-hull has greater stability because of its wide beam.

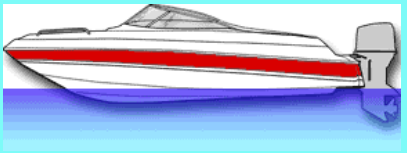
Disadvantages
Needs a large area when turning.



Multi-Hull

6

OUTBOARD AND INBOARD PROPULSION UNITS



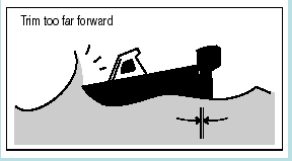
Outboard

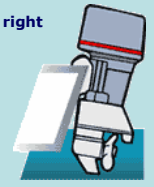
7

OUTBOARD ENGINES

Trimming In (Down)

- **Lowers the bow**
- **Results in quicker planing off, especially with a heavy load**
- **Improves the ride in choppy water**
- **Increases steering torque or pull to the right**



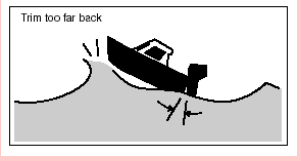


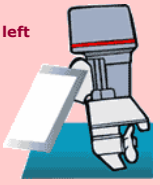
8

OUTBOARD ENGINES

Trimming Out (Up)

- **Lifts the bow**
- **Increases top speed**
- **Increases clearance in shallow waters**
- **Increases steering torque or pull to the left**
- **In excess, causes boat to bounce**



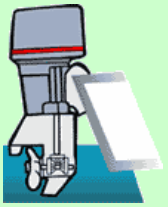


9

OUTBOARD ENGINES

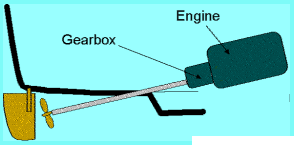
Neutral Trimming

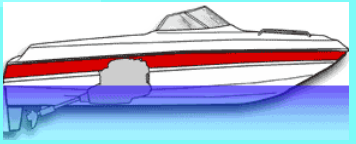
- Levels the bow
- Normally results in greater efficiency
- Note that the propeller shaft is parallel to the water surface



10

OUTBOARD AND INBOARD PROPULSION UNITS





Shaft Drive

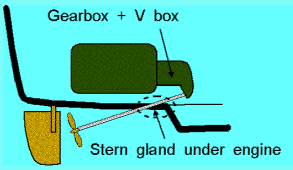
11

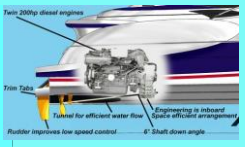
OUTBOARD AND INBOARD PROPULSION UNITS

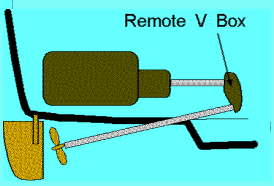
Trim Tabs

12

OUTBOARD AND INBOARD PROPULSION UNITS



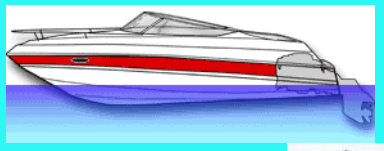




V Drive

13

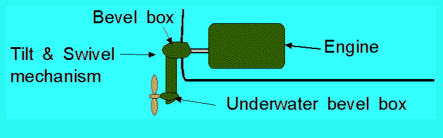
OUTBOARD AND INBOARD PROPULSION UNITS



Stern Drive (Inboard / Outboard

14

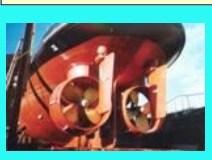
OUTBOARD AND INBOARD PROPULSION UNITS

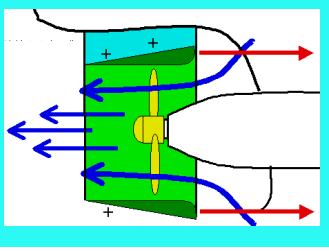


Z Drive

15

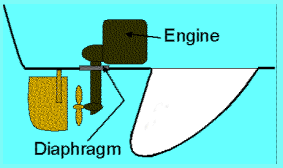
KORT NOZZLE





16

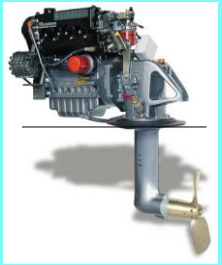
OUTBOARD AND INBOARD PROPULSION UNITS



Sail Drive

17

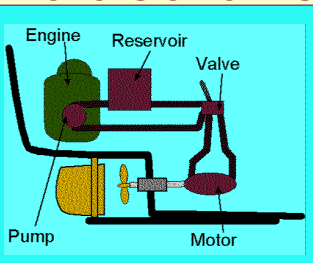
OUTBOARD AND INBOARD PROPULSION UNITS



Sail Drive

18

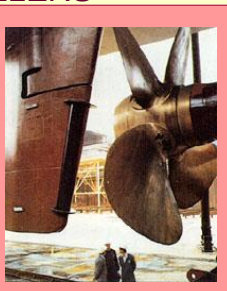
OUTBOARD AND INBOARD PROPULSION UNITS



Hydraulic Drive

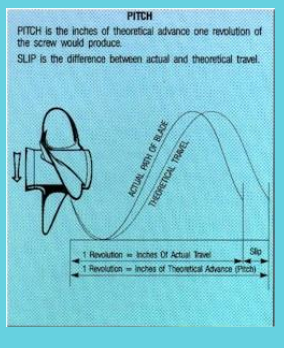
19

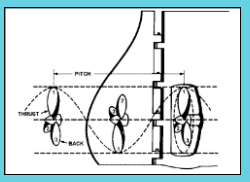
EFFECTS OF RUDDERS AND PROPELLERS



20

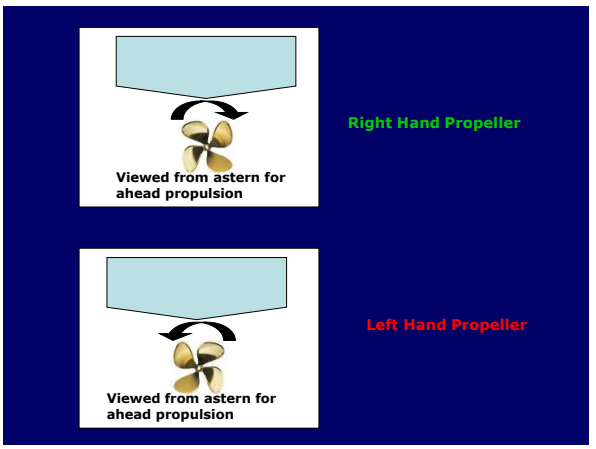
THE PROPELLER



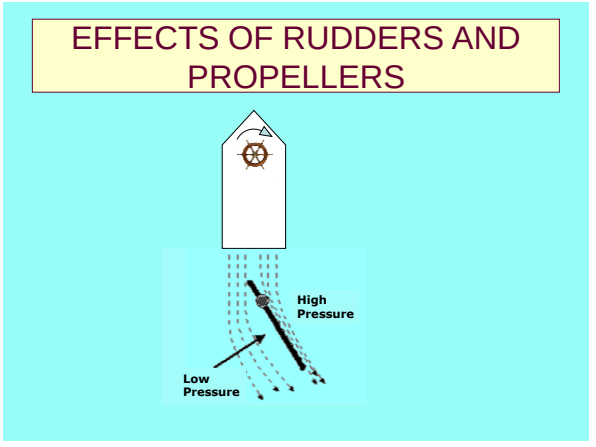


Prop measurement:
e.g., 30" x 32"
= Diameter x Pitch

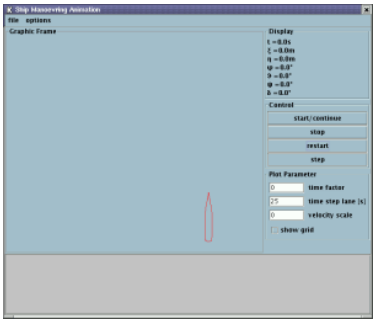
21


Viewed from astern for ahead propulsion
Right Hand Propeller
Viewed from astern for ahead propulsion
Left Hand Propeller

22

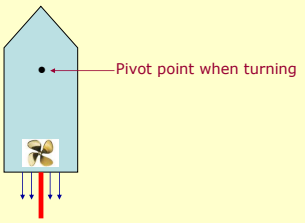

EFFECTS OF RUDDERS AND PROPELLERS
High Pressure
Low Pressure

23



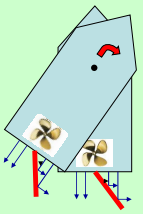
24

GOING AHEAD



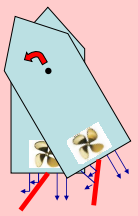
25

TURNING TO STARBOARD



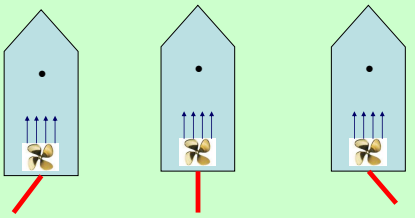
26

TURNING TO PORT



27

GOING ASTERN



Steering effect Rudder to PORT?

Steering effect rudder ahead?

Steering effect Rudder to STARBOARD?

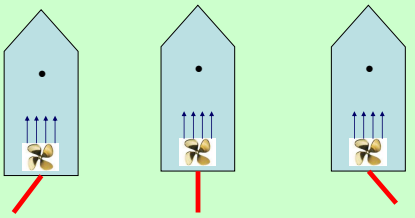
28

TRANSVERSE THRUST

"Paddlewheel effect of a turning propeller"

29

GOING ASTERN



On ASTERN engagement, TRANSVERSE THRUST noticeably dictates in which direction stern will initially move

30

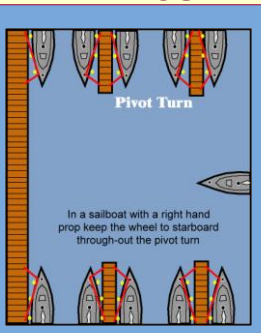
Right Hand Propeller

Transverse Thrust causes stern to move sideways to Starboard, and bow to Port

Transverse Thrust causes pronounced movement of stern sideways to Port, and bow to Starboard

31

APPLYING TRANSVERSE THRUST

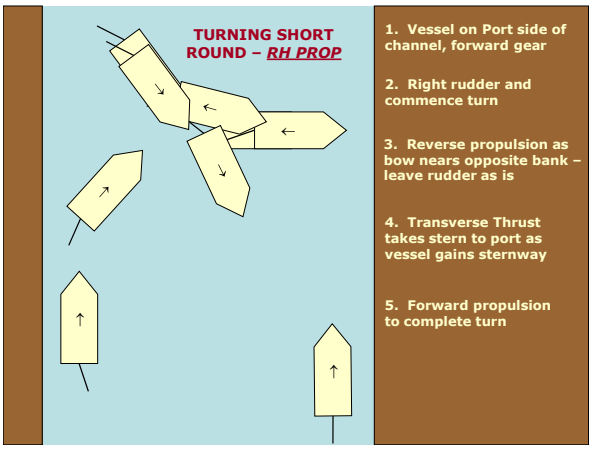


32

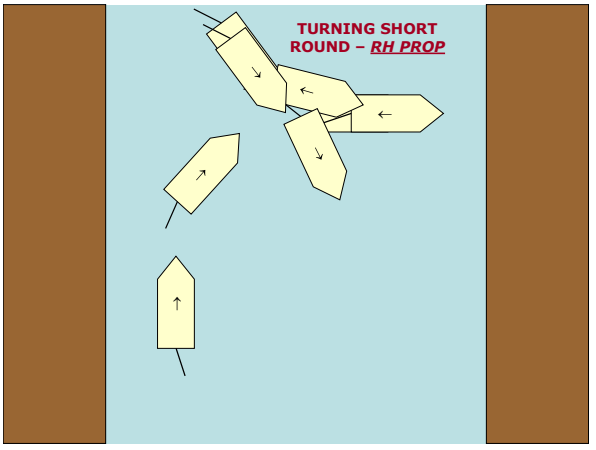
Turn short round in a narrow channel

(making efficient use of transverse thrust)

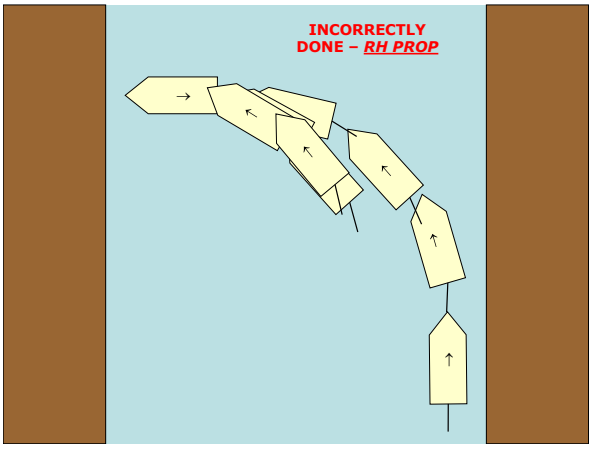
33


TURNING SHORT ROUND – RH PROP
1. Vessel on Port side of channel, forward gear
2. Right rudder and commence turn
3. Reverse propulsion as bow nears opposite bank – leave rudder as is
4. Transverse Thrust takes stern to port as vessel gains sternway
5. Forward propulsion to complete turn

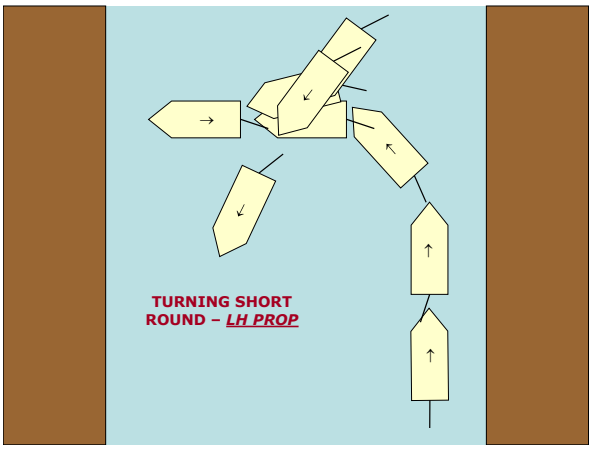
34


TURNING SHORT ROUND – RH PROP

35

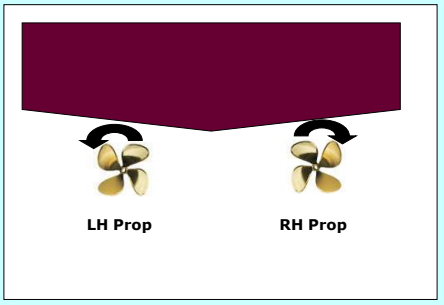

INCORRECTLY DONE – RH PROP

36



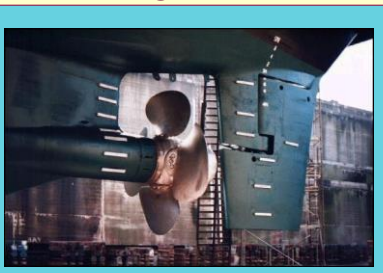
37

TWIN SCREW



38

VARIABLE AND FIXED PITCH PROPELLER



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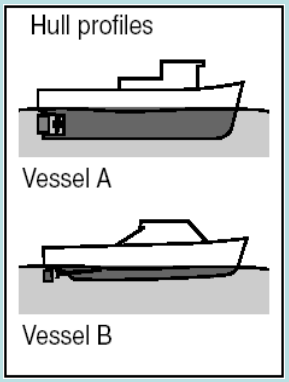
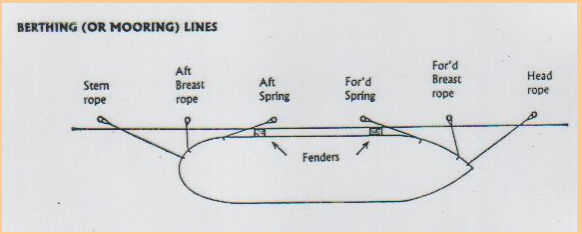
MANOEUVRING CHARACTERISTICS



- **Long straight keel**
  -Holds course well
- **Heavy large rudder**
  -Turns slowly due to heavy displacement
- **Large slow turning prop**
  -Poor steering astern due to Transverse Thrust
- **Short deep, fin keel**
  -Turns quickly
- **Rudder near water line**
  -Constant rudder to hold course
- **Small high speed prop**
  -Better steering astern due to less Transverse Thrust

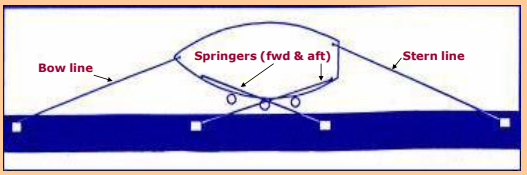
40

BERTHING and UNBERTHING



41

BERTHING and UNBERTHING



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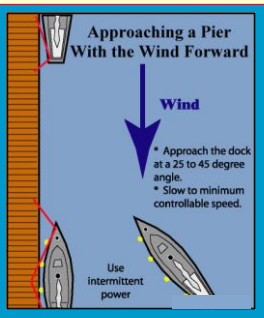
BERTHING – Small Vessel

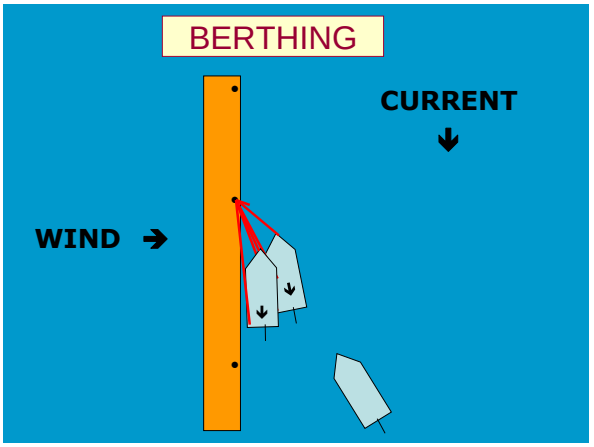
43

BERTHING



44

BERTHING



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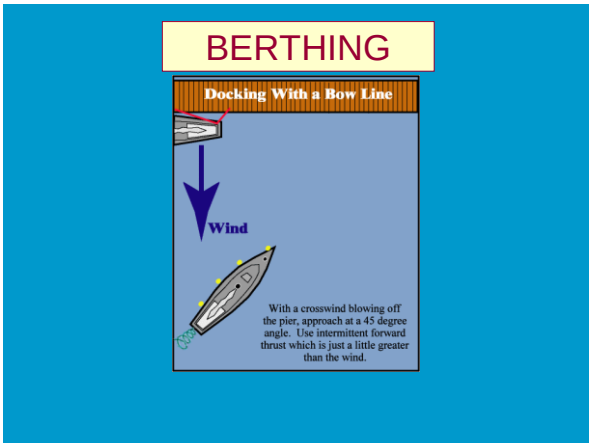
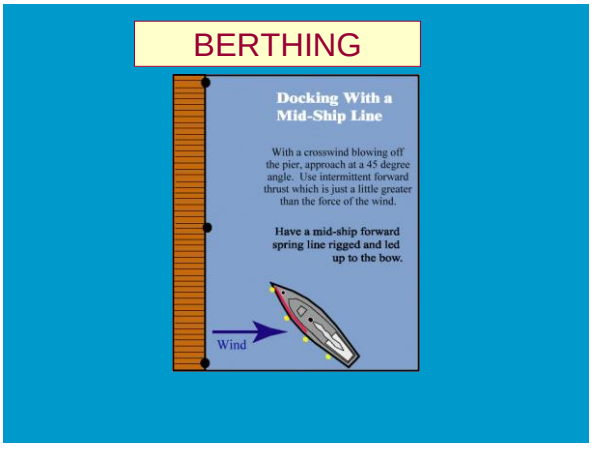
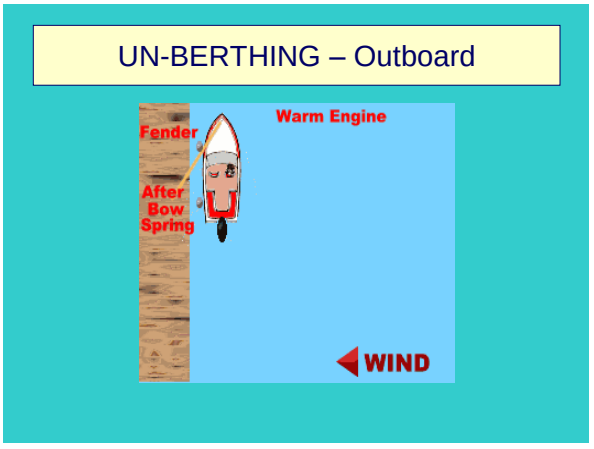

BERTHING
Docking With a Bow Line
Wind
With a crosswind blowing off the pier, approach at a 45 degree angle. Use intermittent forward thrust which is just a little greater than the wind.

46


BERTHING
Docking With a Mid-Ship Line
With a crosswind blowing off the pier, approach at a 45 degree angle. Use intermittent forward thrust which is just a little greater than the force of the wind.
Have a mid-ship forward spring line rigged and led up to the bow.
Wind

47


UN-BERTHING – Outboard
Warm Engine
Fender
After Bow Spring
WIND

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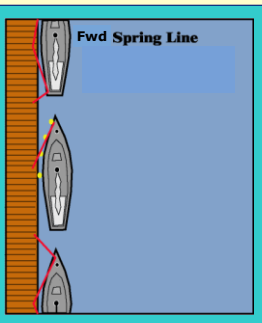
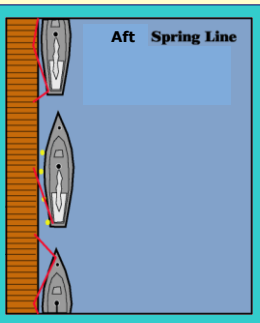
UN-BERTHING - INBOARD



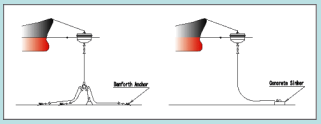
49

UN-BERTHING



50

SECURING TO A BUOY



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Selecting an Anchorage

Factors to consider:

- Shelter from prevailing/expected winds
- Easily accessible
- Sufficient swinging room
- Sufficient depth (all tides)
- Good holding bottom
- Location/distance of next safe anchorage
- In path of storm?
- Effect of storm surge at anchorage?
- Any submarine cables etc. which make anchorage unsafe

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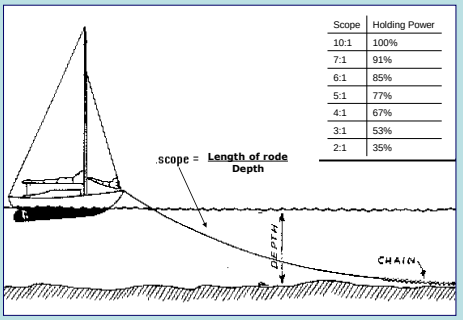
ANCHORING

- **Approach into wind/tide**
- **Anchor on "standby" for letting go**
- **Confirm depth/vessel position**
- **Stop engines**
- **Slight burst astern**
- **Let go anchor under slight tension if possible**
- **Apply brake slowly**
- **Wait until vessel "brought up" to confirm not dragging**
- **Small amount of astern power to confirm anchor is holding**

53

ANCHORING



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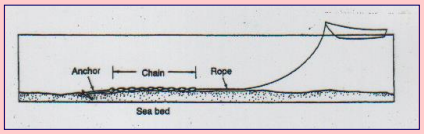
RECOMMENDED SCOPE

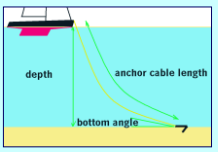
Sea Conditions	Anchor Cable	Scope
Favourable	Chain	3:1
Average	Chain	5:1
Rough	Chain	7:1
Favourable	Rope	5:1
Average	Rope	8:1
Rough	Rope	10:1



55

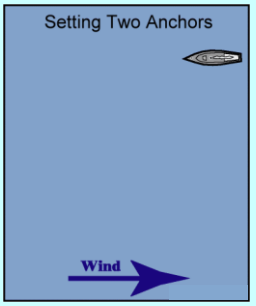
SOME ANCHORING TERMS

- **Veer**
  - To let out anchor rope/cable under control
- **Snub**
  - To stop anchor rope/cable from running out
- **Brought Up**
  - Vessel is riding to her anchor (anchor is holding)
- **Catenary**
  - Curve of anchor cable between vessel and seabed



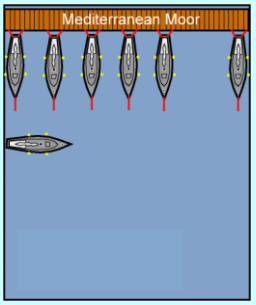
56

ANCHORING



57

ANCHORING

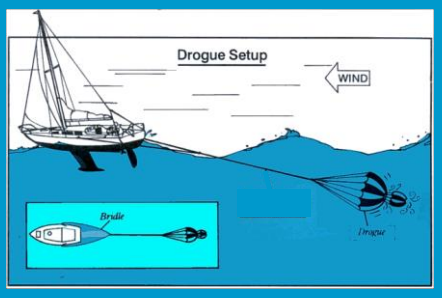


58

SEA ANCHOR

59

SEA ANCHOR



60

ANCHORS






61

ADMIRALTY ANCHOR

- Good holding power on most bottoms
- Take care in shallow water

62

STOCKLESS ANCHOR


- Can be heaved home in hawse pipe
- Holding power less than Admiralty anchor

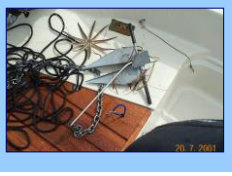
63

C.Q.R.
(PLOUGH)

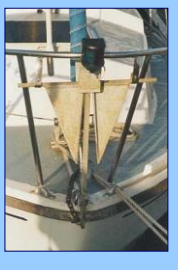
- **Excellent holding power (Sand)**
- **Difficult to stow**

64

DANFORTH ANCHOR



- **Good in sand/mud**
- **Good for stowing**



65

GRAPNEL ANCHOR

- **Good for Reef/Rock**
- **Not easily stowed**
- **Not for general purpose**

66

BRUCE ANCHOR

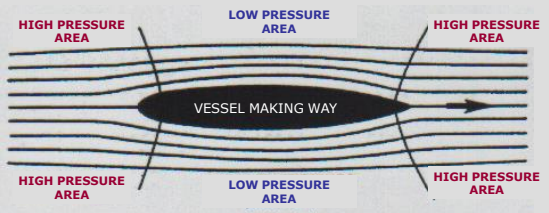
- Good over rock
- Very efficient anchor
- Difficult to stow

67

1. Interaction
2. Shallow Water Effect

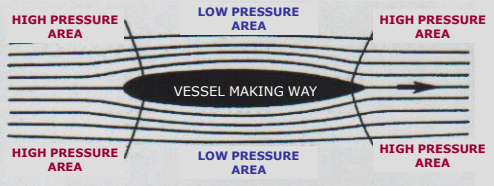
68

INTERACTION



69

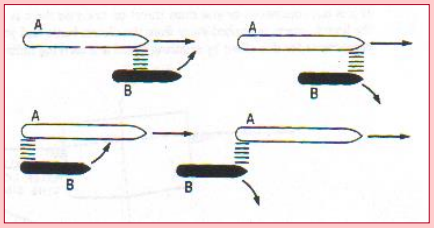
INTERACTION



Hydrodynamic interaction occurs when the normal flow of water around the hull is restricted by the influence of a nearby external source (i.e., a shoal, breakwater, bank, shallow water or close passage of another vessel)

70

INTERACTION

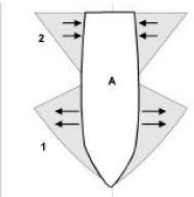


71

HYDRODYNAMIC INTERACTION
"CHANNEL EFFECT"

A. Vessel is in centre of channel

1. Water pushed aside by bow spreads out evenly. Any effect from interference with a bank balances out.
2. Water drawn in by propeller and to "fill in" behind boat comes in evenly from both sides. Effect of stern suction cancels out

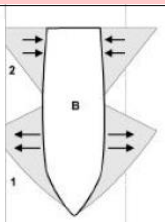


72

HYDRODYNAMIC INTERACTION
"CHANNEL EFFECT"

B. Vessel is to starboard side of channel

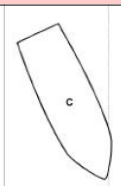
1. **Wedge of water on starboard side is limited by the near bank while water to port has more room to spread out. Difference in levels causes "bank cushion" which will cause bow to veer to port**
2. **On starboard side, water drawn in by propeller and that needed to fill in behind boat is limited by bank. Water from port side can fill in. "Bank suction" will cause stern to move to starboard**



73

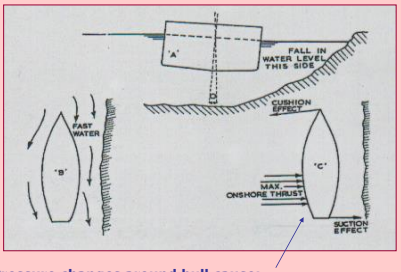
HYDRODYNAMIC INTERACTION
"CHANNEL EFFECT"

C. Resulting position from bank effect



74

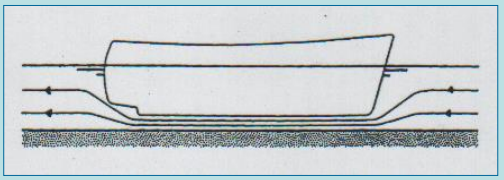
HYDRODYNAMIC INTERACTION
"CHANNEL EFFECT"



Pressure changes around hull cause:
•Bow/Stern to be repelled from bank, in conjunction with a bodily attraction towards the bank

75

INTERACTION
"SQUAT" or "SHALLOW WATER EFFECT"



Vessels may experience:
- Increase in draft by the stern (conventional hull)
- Stern wave (wash) moves forward and seems louder
- Reduction in speed for same RPM
- Difficulty in steering

- To counteract "squat" **REDUCE SPEED**

76

Calculating "SQUAT"

$$\text{Squat} = \frac{\text{Block Coefficient} \times \text{Speed}^2}{100}$$

Block Coefficient of Fishing vessel = 0.8

Block Coefficient of Container ship = 0.77

EXAMPLE

Squat of fishing vessel, speed 10 knots

$$\frac{0.8 \times 10^2}{100} = 0.8\text{m}$$

77

TO LESSEN THE EFFECTS OF INTERACTION, MARINERS SHOULD:

- **Give other vessels as wide a berth as possible**
- **Steer in the centre or deepest part of the channel (where possible)**
- **Reduce speed, consistent with safety, in ample time and before entering restricted waters, so as to limit the effect of pressure changes on the hull**

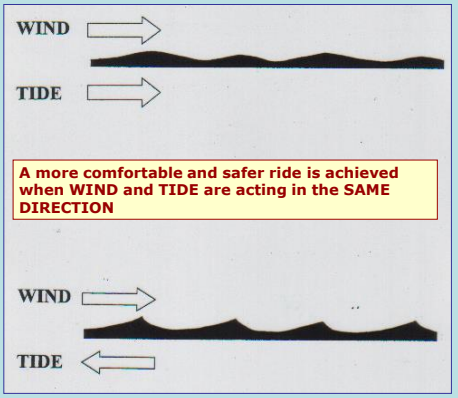
AMSA Marine Notice 3/1997

78

CROSSING A RIVER BAR

- Avoid out going tide, or if Wind and Waves in opposite direction
- If 1st time, check with locals before crossing

79



80

CROSSING A RIVER BAR
(Inward bound)

Consider the following:

- Advise Coast Guard of intentions
- All loose gear securely stowed
- Vessel at designed trim angle
- Check engines/steering
- Look for deeper water, smallest waves
- Otherwise monitor wave patterns (wait for larger set of waves)
- Position vessel on back of wave in front

81

CROSSING A RIVER BAR
(Outward bound)



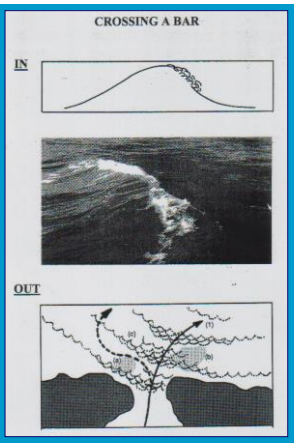
- Look for area of least breaking waves
- Otherwise, power slowly through each wave
- Keep waves slightly on bow for vessel to roll gently over crest

82

CROSSING A RIVER BAR

•Select path of least resistance after observing several wave sets





83

Heavy Weather Handling

Check:

- Anchor/gear secured
- Heavy objects stowed below decks
- Gear on deck secured – no loose objects
- Watertight doors/hatches secured
- Freeing ports clear
- Life line rigged
- Bilges pumped dry – slack tanks pressed up/pumped out
- Life saving appliances checked and at hand
- Engine/Steering gear checked
- Radio check including position report & voyage plan
- Simple meals prepared

84

BROACHING





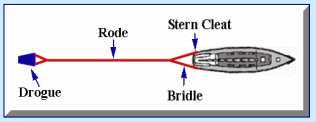
85

BROACHING


To avoid Broaching
- Keep on back of wave in front, or
- Travel at half wave speed, or
- Turn round and keep head into the sea

86

BROACHING



The drogue should be set so it is in the wave's trough when the boat is on a wave's crest. The bridle can also be adjusted to help steer the boat

87

POOPING

Wind and Sea

To avoid Pooping

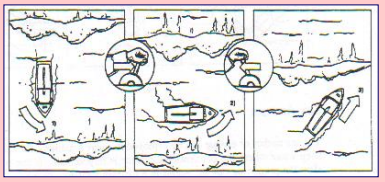
- Keep ahead of large waves, or
- Turn carefully and keep head to sea

88

Turning in Heavy Weather

89

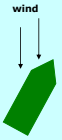
Turning in Heavy Weather



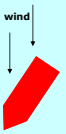
- Turn in "smooth" period
- Turn quickly before next big sea catches you beam on
- Avoid too much power under full helm (vessel heels to leeward)
- All a "matter of judgment"

90

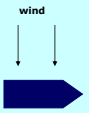
Heaving-to
(3 methods)



- Head to sea
  Preferred method
  Keep sea approx. 30° on bow (port bow for RH propeller)
  Just enough power to maintain steerage



- Stern to sea
  Most dangerous
  May lead to broaching
  -if so, square up



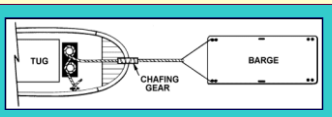
- Drifting Beam to sea
  Excessive roll could capsize vessel
  OK for small yachts w/- low centre of gravity

91

TOWING AND BEING TOWED

92

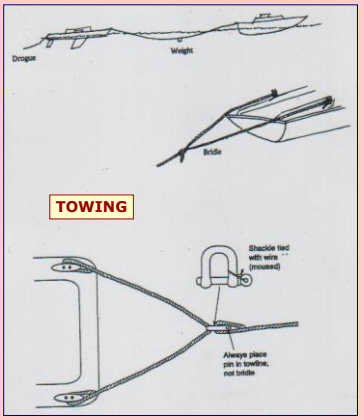
Towing and being Towed



Points to consider:

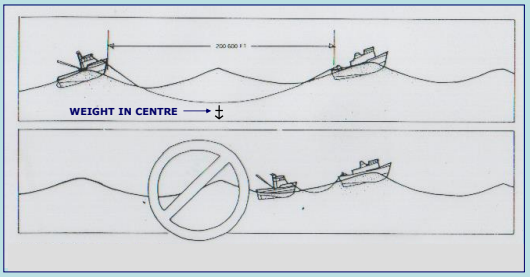
- Tow cable not chafing against sharp structure
- Lubricate cable at point of contact with vessel
- Ensure tow cable can be released quickly in an emergency ("eye" on tow vessel)
- Assist with steering if tow is manned

93



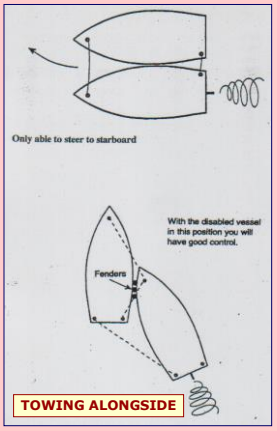
94

TOWING



KEEP TOW LONG AT SEA

95

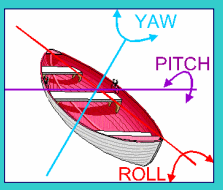


96

Towing and being Towed

To reduce Yawing or Shearing by towed vessel:

- Stream sea anchor behind towed vessel
- Trim by stern
- Alter course/speed



97

Towing and being Towed

- Be satisfied your vessel is strong enough to handle the tow
- Decide any risks to safety of your own vessel
- Ensure you have sufficient fuel (due to added drag of tow)
- Advise your vessel owners (in case they veto the operation)
- Ensure activity does not compromise your own insurance
- Clearly establish any salvage issues with Master of other vessel
- Ensure effective communications between vessels
- The tug controls the tow

98

Towing or Salvage?

Salvage - Applies when a vessel is in danger at sea

For Example: *hard aground*
stranded
on fire
sinking
and includes towing from the site

Where there is an immediate danger to other vessels, the marine environment, or the vessel in distress, the rescue ceases to be a simple tow and becomes a salvage operation.

99


LOF 2000

LLOYD'S

LLOYD'S STANDARD FORM OF SALVAGE AGREEMENT

(APPROVED AND PUBLISHED BY THE COUNCIL OF LLOYD'S)

NO CURE - NO PAY

To make a claim the salvor has to prove:

- The salvage was voluntary
- The salvage was successful
- The salvaged vessel, or the environment, was in danger

2 types of agreement

1. "Open form salvage agreement" – the value amount of the salvage is left undetermined and is to be decided later
2. "Pure salvage agreement" - a signed agreement where the salvage company retains its right to a salvage lien against the rescued vessel

100

Towing or Salvage?

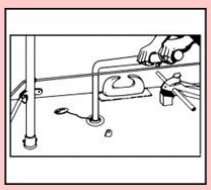
Towing - a situation that exists in the absence of peril

For Example: *running out of fuel*
soft grounding
flat batteries
engine breakdown
in which there is no immediate danger to the marine environment, the boat, or the persons on board

Towing implies that only one tow vessel is necessary, and that the vessel is not in a situation requiring to accept the first tow that arrives *(e.g. if the cost of towing is too dear)*

101

Loss of Rudder/Steering




EMERGENCY STEERING

OR?

102

Procedure for Rudder Loss or Malfunction

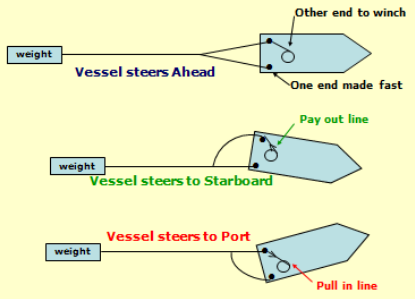
- Sound alarm
- Stop engines
- Check cause of failure – can it be rectified? – if repairs needed, face bow to wind (anchor/drogue)
- Fit Emergency Tiller (remember to disconnect mechanical actuating mechanism)

OR

- Rig jury rudder
- "Not Under Command" lights/shapes

103

To Rig a Jury Rudder



104

Procedure for Loss of Propulsion

- Sound alarm
- Stop engines
- Determine extent of damage
- Propeller lost?
- Shaft broken? – any water ingress through stern tube?
- Radio for assistance ("Pan Pan")
- Display lights/shapes (N.U.C.)
- Bow into wind for repairs (drogue/anchor)

105

Propeller Fouled (i.e. rope)

- May need to
  - send person over side to cut free
  - Shift weights/ballast to raise aft end
- Ensure engine/s off and locked out
- An observer at all times for person conducting repairs
- Once free:
  - Turn propeller shaft manually to check for free movement
  - Start engine and check for unusual noises in drive drain
  - Engage gear and gradually power on to check for vibration, noise, heat or leaks from stern gland (in case of damage to aft shaft bearing)

106

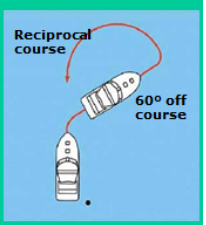
"Man Overboard"

- Shout "man overboard"
- Wheel hard over to the side person fell
- Throw lifebuoy or something buoyant close to person without hitting them
- Keep person in sight at all times
- Perform a "Williamson turn" for pickup in rough seas (or Elliptical turn in good conditions)

107

Williamson Turn

- *Note vessel's course*
- *Turn wheel hard over in direction of person overboard*
- *Keep wheel hard over until 60 degrees off course*
- *Then turn wheel hard over on opposite helm until on reciprocal course - approach with care*

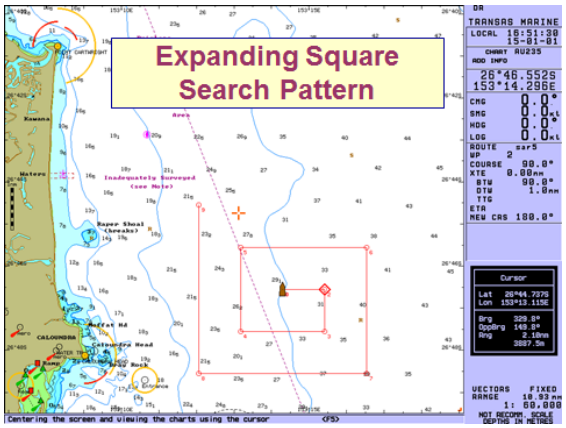


108

"Man" overboard

- Approach person from down wind
- Notify crew on what side to be picked up
- Stop vessel when person near beam section – ENSURE PROPELLER IS NOT OPERATING
- Retrieve person from water

109



110

Stranding / Grounding

- Sound alarm
- Check for injuries / headcount
- Stop engines if grounding severe
- Check for water ingress (sound bilges, check void spaces)
- Check for hull damage (may be better to stay grounded)
- Sound around vessel to determine extent of grounding
- Check tidal movement/predictions
- Check weather predictions
- Take position fix – attempt to determine reason for grounding

111

Stranding / Grounding

FOR A PARTIAL GROUNDING:

- Move passengers / weights to lighten grounded section of vessel
- Jettison unnecessary weights
- Care when applying astern power (avoid extra mud/sand under keel, blocked seawater strainers – could damage hull if rocky bottom)
- Lay out anchors to assist refloating (& prevent going further aground)
- Request assistance/tow if necessary
- Display appropriate lights/shapes
- Once clear, check vessel, engines, cooling systems, propulsion, steering, unusual vibrations
- Report to authorities
- Slip vessel to check beneath waterline

112

To prevent Foundering:

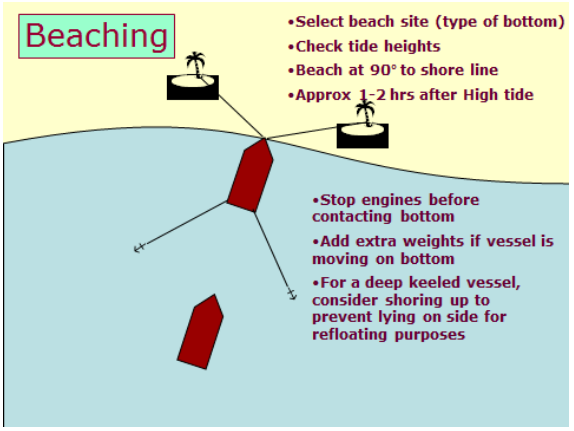
- Isolate holed compartments by closing watertight doors & pumping out water
- List vessel if damage near waterline to reduce ingress of water
- Plug hole (collision mats, pillows, bedding, cushions, mattresses……)

113

If partially or completely disabled (after collision or grounding):

- Determine "if" and "what" dangers there may be to crew/passengers
- Consider alternative means of propulsion / steerage
- Consider a tow (and prepare accordingly)
- Bring bow into wind (anchor/drogue)
- Advise Coast Radio station of position/situation
- Maintain adequate lookout until situation rectified
- Lights/shapes

114



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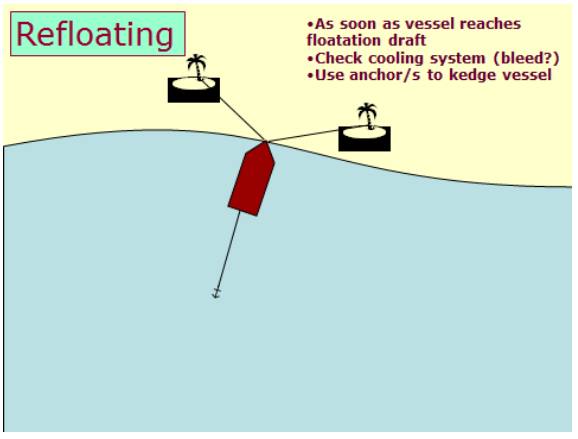

116

Collision Imminent

Where possible, you should try to reduce damage to "sensitive areas" by:

- Taking speed off vessel (full astern)
- Attempt a glancing blow instead of direct contact
- Bow to bow, or bow to quarter less damaging than cutting into another part of hull (i.e. engine room)
- Warn crew and Passengers ,

117

Actions after Collision

- Stop vessel
- Sound Emergency Muster Alarm
- Radio Distress message if necessary
- Passengers/Crew to emergency stations
- Ensure all persons are accounted for
- Check for injuries
- Determine extent of damage
- Sound tanks (rising or falling fluid levels)
- Look for signs of oil/fuel in water around vessel
- Inspect bilges for water ingress
- If damage has occurred:
  - Prepare lifesaving equipment
  - Prepare to abandon ship

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Actions after Collision

- With situation controlled:
  - Provide necessary assistance to other vessel
  - Attend to injured personnel
  - Produce documents (qualifications etc) and exchange particulars
  - Stay with other vessel until no further assistance required
  - Enter details of incident in Ship's Log
  - Appropriate lights/shapes if required
  - Undertake repairs – slip vessel in port
  - Advise authorities asap

119

END
VESSEL HANDLING

120