



ASD TUG MANOEUVRING MANUAL

DAMEN

DAMEN SHIPYARDS GORINCHEM

Industrieterrein Avelingen West 20
4202 MS Gorinchem

P.O. Box 1
4200 AA Gorinchem
The Netherlands

phone +31 (0)183 63 99 11
fax +31 (0)183 63 21 89

info@damen.nl
www.damen.nl

Member of the DAMEN SHIPYARDS GROUP



DAMEN

Following the introduction of the Damen Azimuth Stern Drive (ASD) Tug in the early nineties a large number of these vessels have been delivered to owners and operators all around the world. These newly built ASD's have replaced older tonnage in the demand for increased power and capability. In many ports conventional tugs were replaced by ASD tugs in order to fulfil the requirements of safety and to be able to handle larger ships.

During the last decade a range of Damen ASD Tugs were developed and built. Over the years operators have expressed a demand for a significant increase of bollard pull. The most recent development is the keen interest of owners for very compact and extremely powerful harbour tugs. Because of ongoing product development the Damen ASD Tug has been subject to a vast increase of power, performance and operational capability.

To make use of the features that the Damen ASD Tug has to offer, proper training on the job is essential. In particular when masters and crew do not have previous experience with ASD tugs it is of the utmost importance that extensive and dedicated training are performed. As part of the Damen after sales and service organisation a dedicated department is at your disposal to offer training at different levels. Based on a careful assessment of the available experience and skills a tailor made training program can be prepared. Training can be either arranged following the ex yard delivery or on site. To ensure that the training takes place on the basis of a good understanding of the principles of the ASD design, we have prepared this Damen ASD Tug Manoeuvring Manual.

We trust that this Manual will provide the necessary support and reference in order to allow future ASD masters and crew to safely and successfully operate their Damen ASD Tug.

Damen offers their customers a wide range of training programs on site or at their yard(s). The training topics, duration and goals to be achieved are based on the requirements of the customer / trainee(s).



TRAINING PROGRAMS

During the construction and commissioning of a new vessel, the crew can be familiarized with the ship's systems, operation- and maintenance procedures.

Apart from crew training, special training courses can be offered such as:

- Captains-training
- Engineers-training
- Engine repair
- PMS (Planned Maintenance System)

SIMULATOR

Customized simulator training can be arranged for each type of ship on a Full Mission Bridge Simulator.

Target of this training is to get familiarized with the type of vessel, incident / calamity facilities, and vessel traffic management.

INQUIRIES

Enabling Damen to offer a tailor made training course at least, the following information is required:

- Number of trainees
- Subject(s) and goals to be achieved
- Duration

INTRODUCTION

CONTENTS

Special thanks to captains J.M. Touw, F. Bleiksloot and K. Viljanen.

DAMEN EQUIPMENT, PROJECT AND SYSTEM ENGINEERING

P.O. Box 1
4200 AA Gorinchem
The Netherlands

phone +31 (0)183 63 99 11
fax +31 (0)183 63 21 89
epse@damen.nl

TYPE	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	74	76	78	80	82	84	88
ASD TUG 3313															■	■	■	■	■	■	■	■
ASD TUG 3211											■	■	■	■	■							
ASD TUG 3111											■	■	■	■	■							
ASD TUG 3110					■	■	■	■	■	■												
ASD TUG 2810							■	■	■	■												
ASD TUG 2509		■	■	■	■	■	■															
ASD TUG 2411								■	■	■	■	■	■	■	■							



DAMEN TRAINING DEPARTMENT

DAMEN ASD TUG 2411

DAMEN ASD TUG
BOLLARD PULL RANGE

This manual will give you an idea of the types of manoeuvres possible with an ASD Tug. It will guide you from sailing an ASD Tug without a tow to all kinds of harbour operations and manoeuvres. Some of these manoeuvres are easy, some need a lot of practise. Besides the normal operations also some more specialized operations are mentioned.

FREE SAILING ASD TUG	2
HARBOUR ASSISTING METHODS	8
HANDLING SMALL VESSELS	18
MAKING FAST AT SPEED	20
ESCORTING	22
SAILING IN ICE	24
EXCERCISES	26
DAMEN TRAINING DEPARTMENT	28



FREE SAILING ASD TUG

DAMEN ASD TUG 3211

ILLUSTRATION 1

STATION KEEPING

Thrusters in neutral position, both engines running at same power.

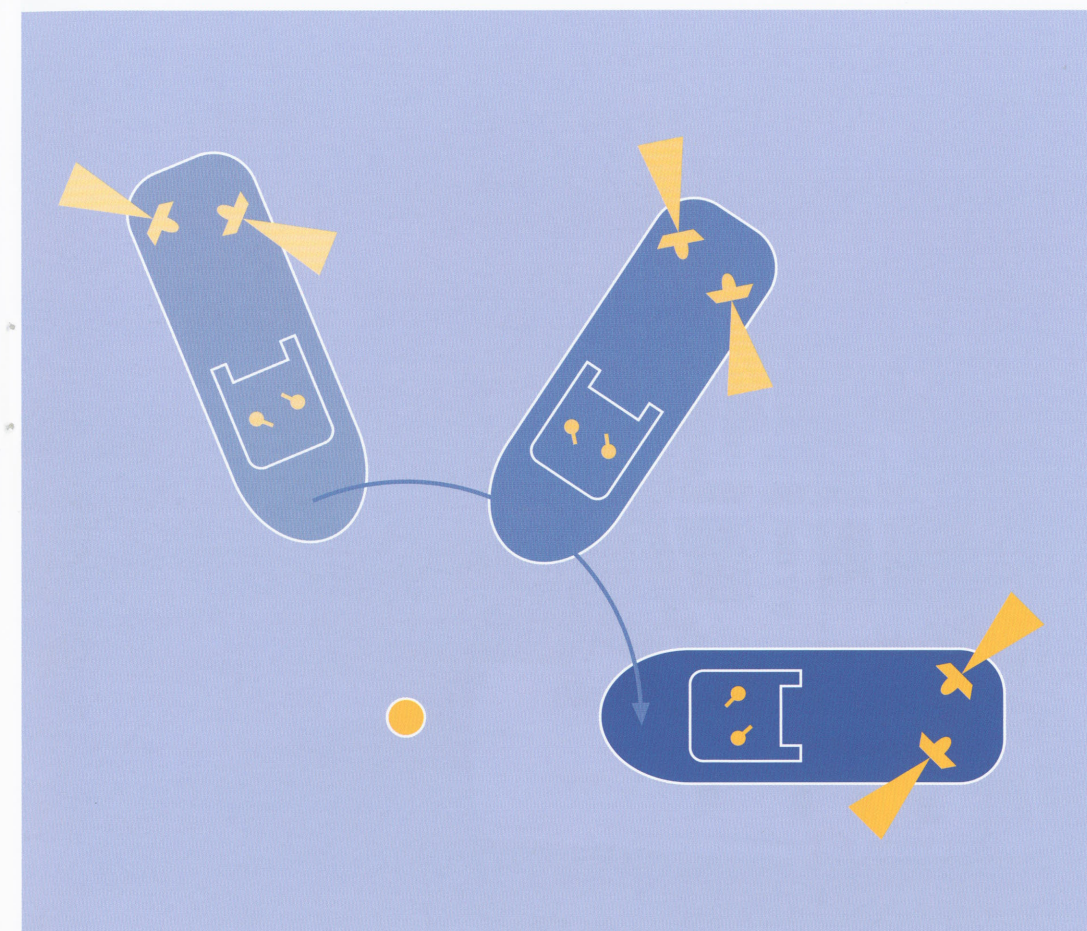
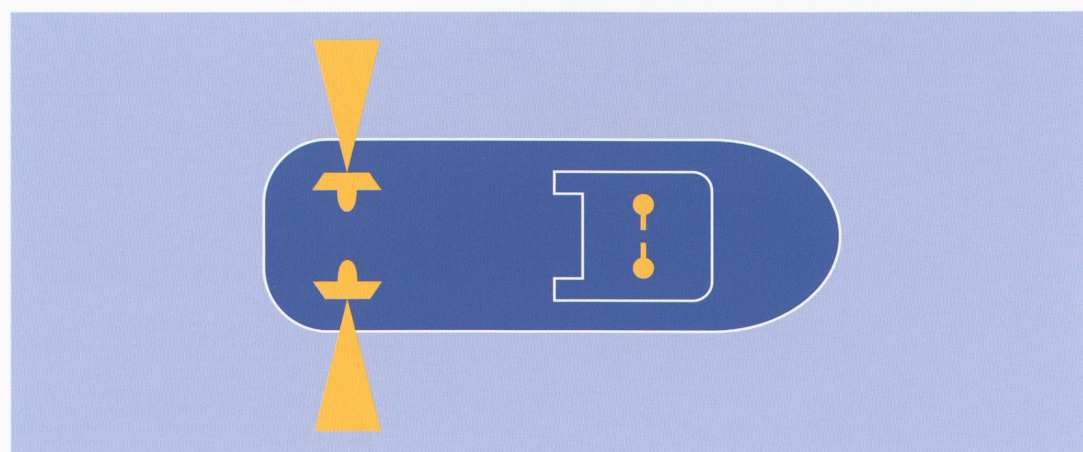


ILLUSTRATION 56

MANOEUVRING

Keep the bow at a constant distance from a dolphin, mooring buoy or quay corner. Keep slightly more power on the starboard thruster and steer with the port thruster.

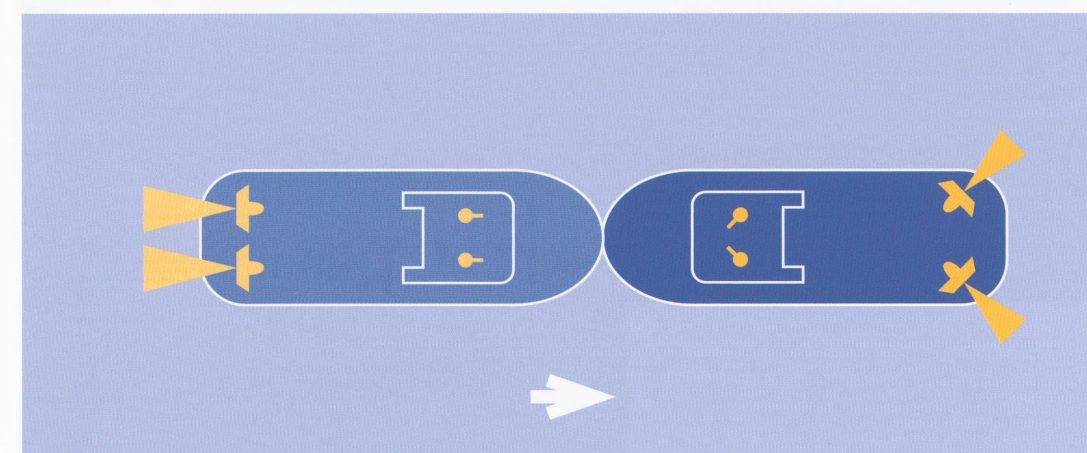


ILLUSTRATION 57

PUSHING WHEN GOING ASTERN

One tug is pushing the other. The one being pushed has to keep position and push back.

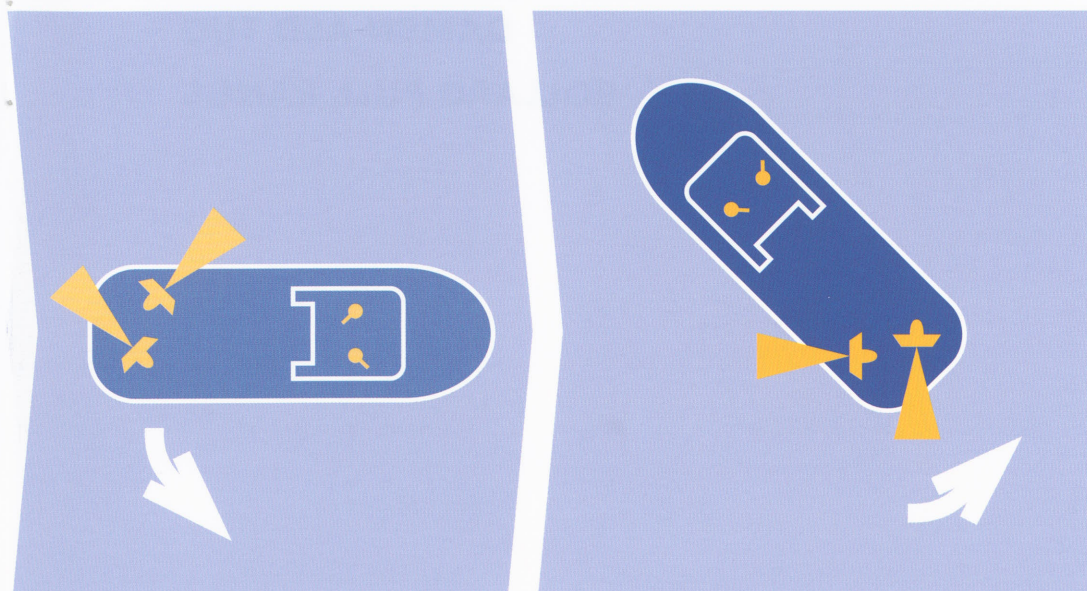
Note: only perform this exercise with tugs having good fendering.

27

ILLUSTRATION 58

FULL SPEED TURN

Turning on the spot without heel.





EXERCISES

DAMEN ASD TUG 2810

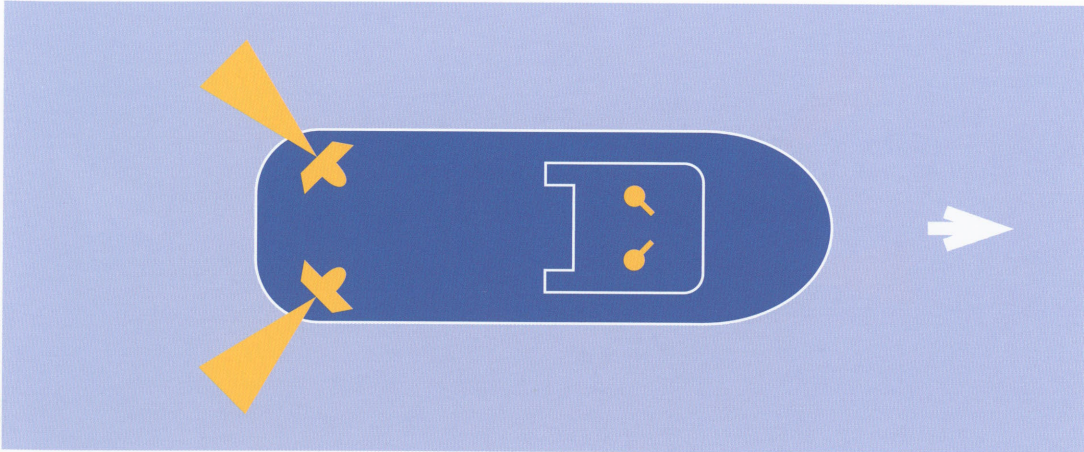


ILLUSTRATION 2
SAILING SLOW AHEAD

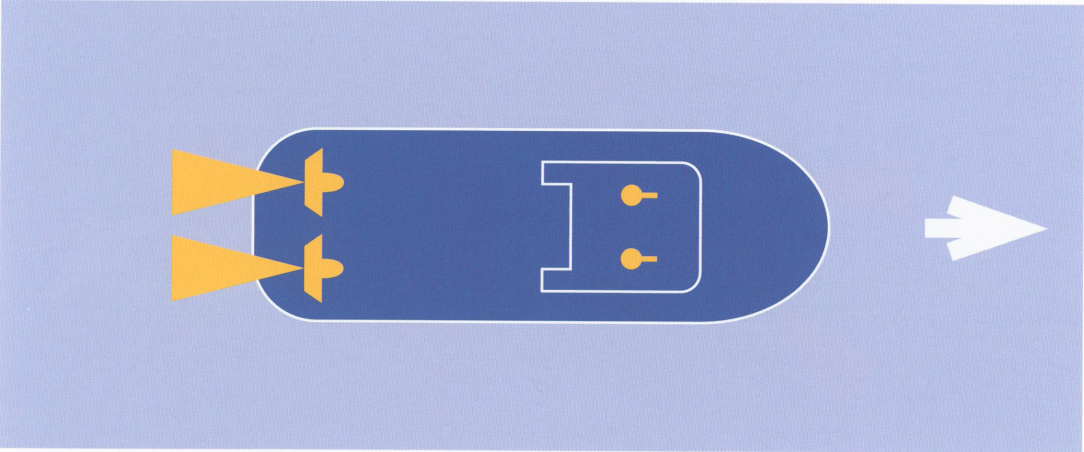


ILLUSTRATION 3
SAILING FULL AHEAD

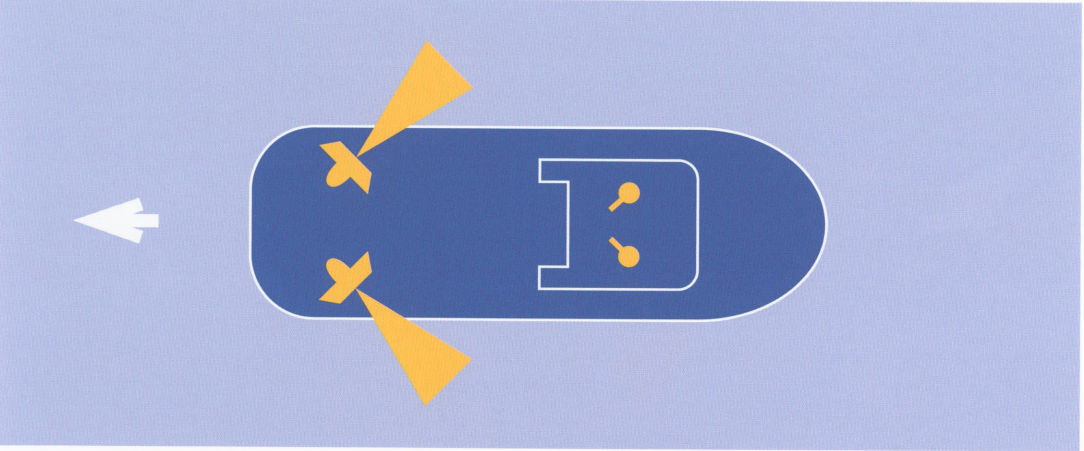


ILLUSTRATION 4
SAILING SLOW ASTERN

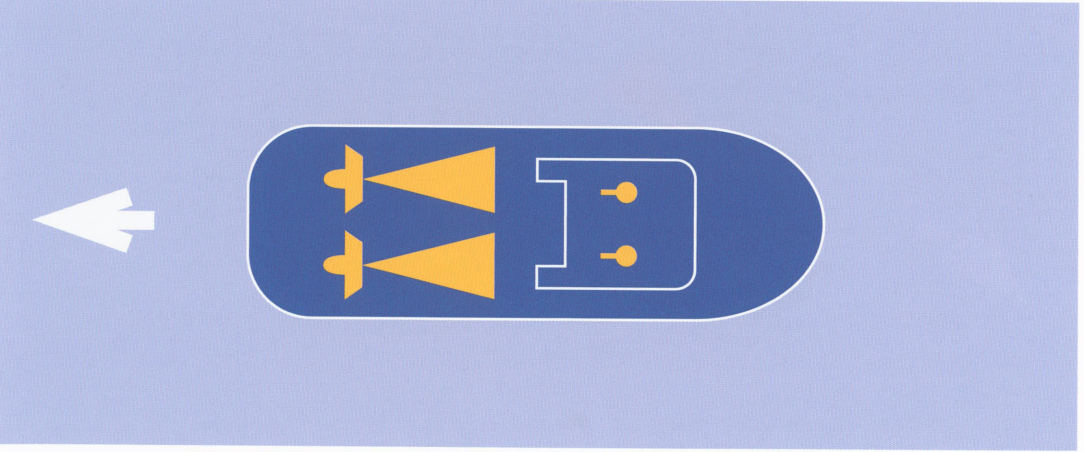


ILLUSTRATION 5
SAILING FULL ASTERN

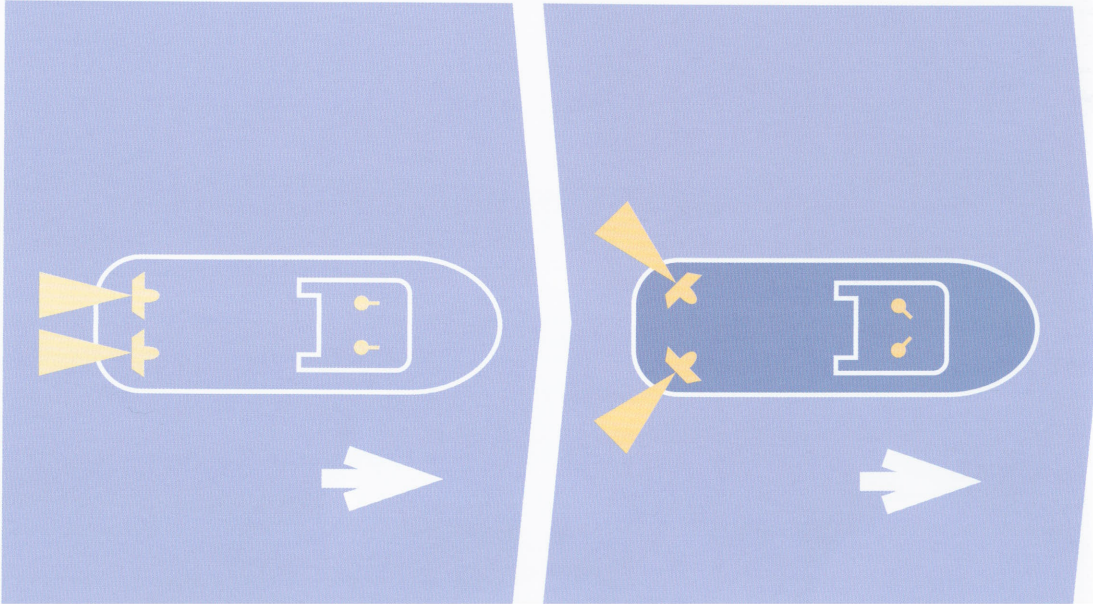


ILLUSTRATION 6

TURNING TO PORT

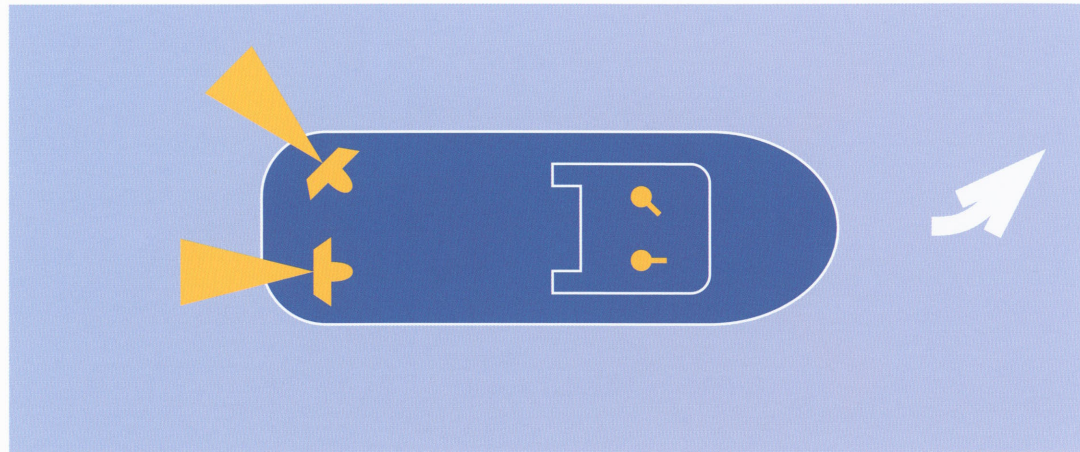


ILLUSTRATION 7

TURNING TO STARBOARD

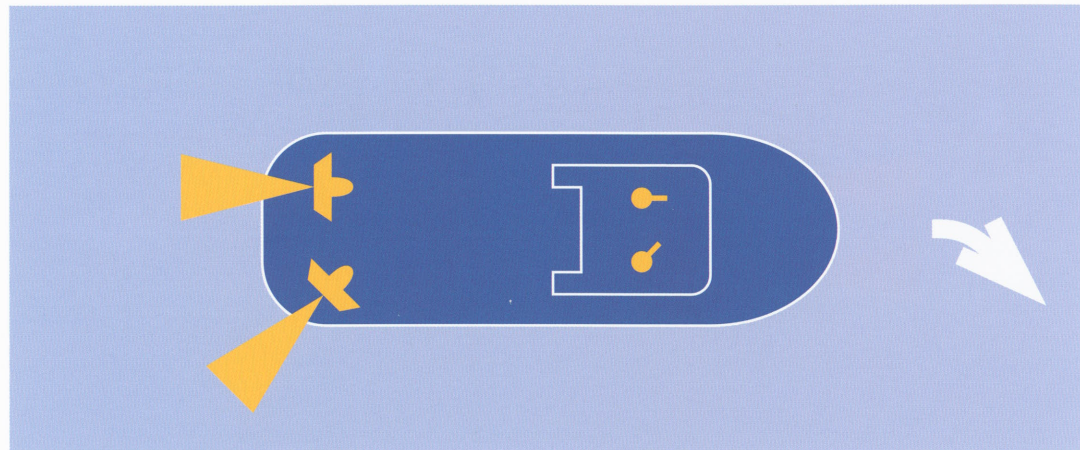


ILLUSTRATION 8

**TURNING TO PORT
STERN FIRST**

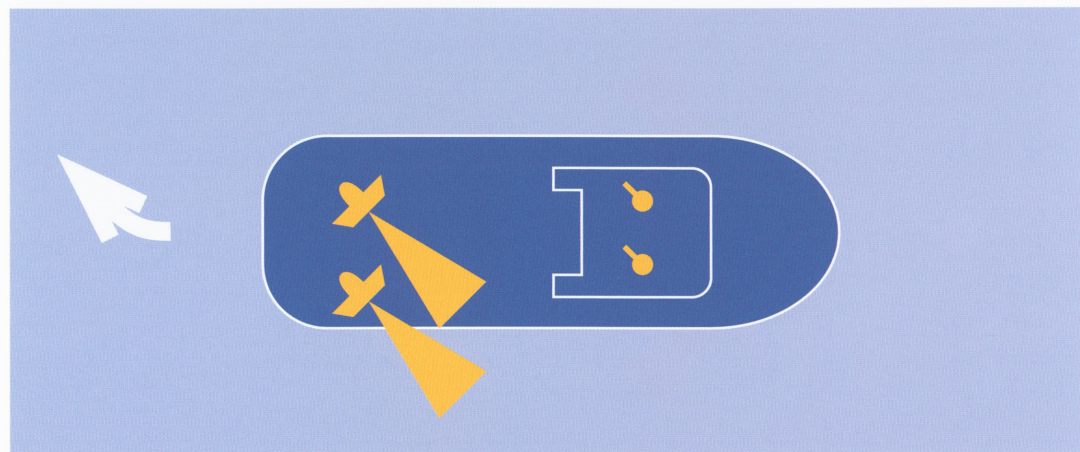


ILLUSTRATION 9

**TURNING TO STARBOARD
STERN FIRST**

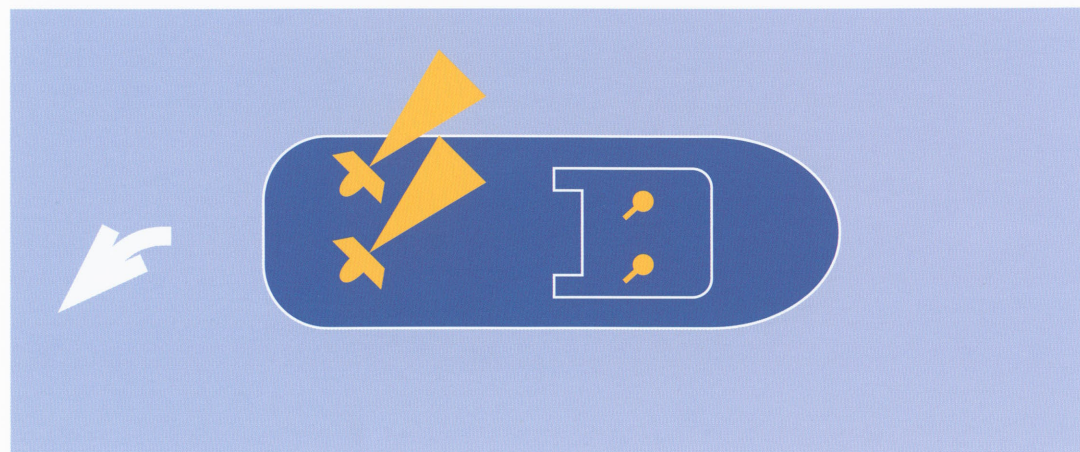
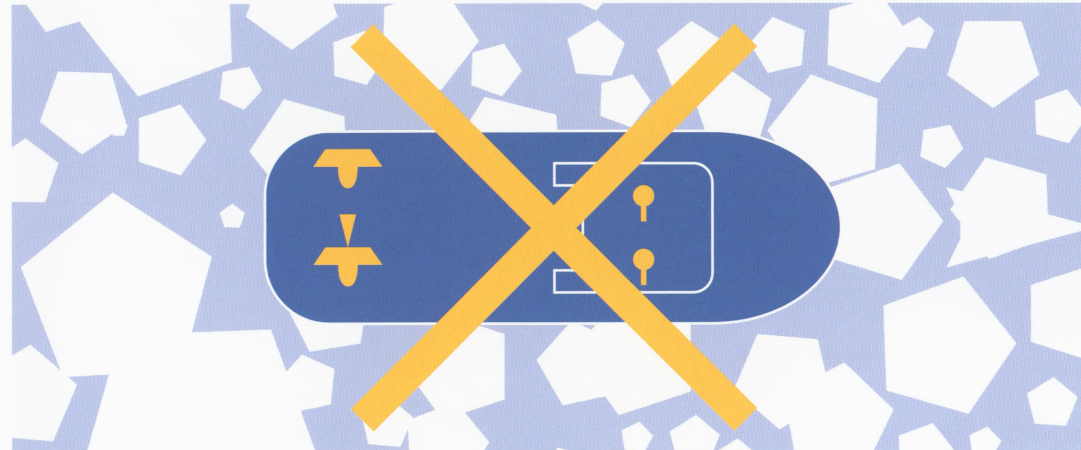
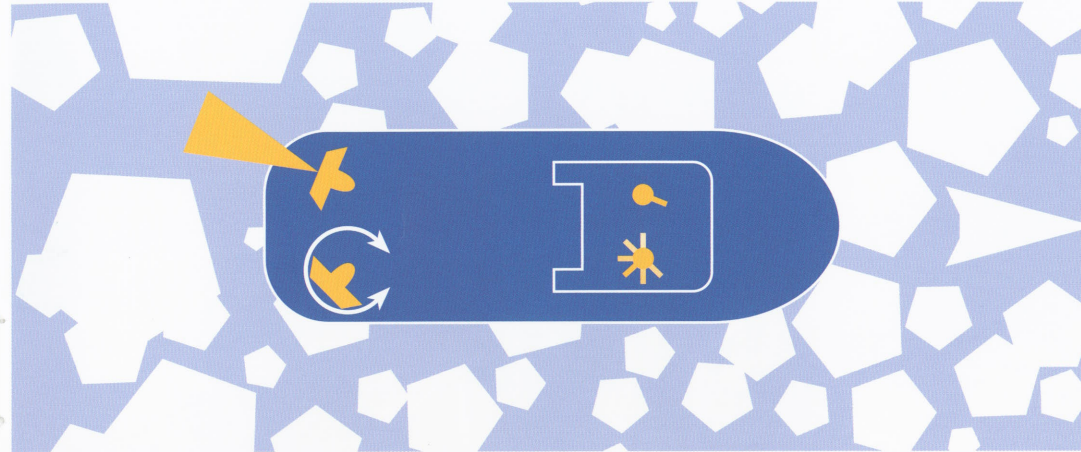


ILLUSTRATION 55

CLEARING A THRUSTER FROM ICE

When a thrusters is (going to be) blocked by ice, disengage the thruster and turn it around. The ice gets a chance to float out of the thruster. The other thruster is still available for sailing/manoeuvring.



When clearing the thruster by using the wash of the other thruster, there's the risk of the other thruster getting blocked as well.





SAILING IN ICE

DAMEN ASD TUG 2509

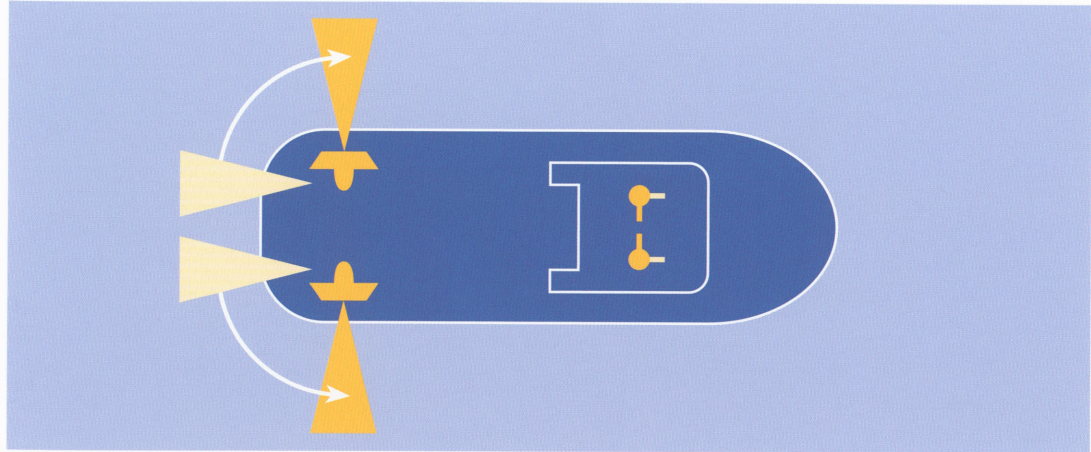


ILLUSTRATION 10
NORMAL STOPPING
Just move thrusters to neutral position.

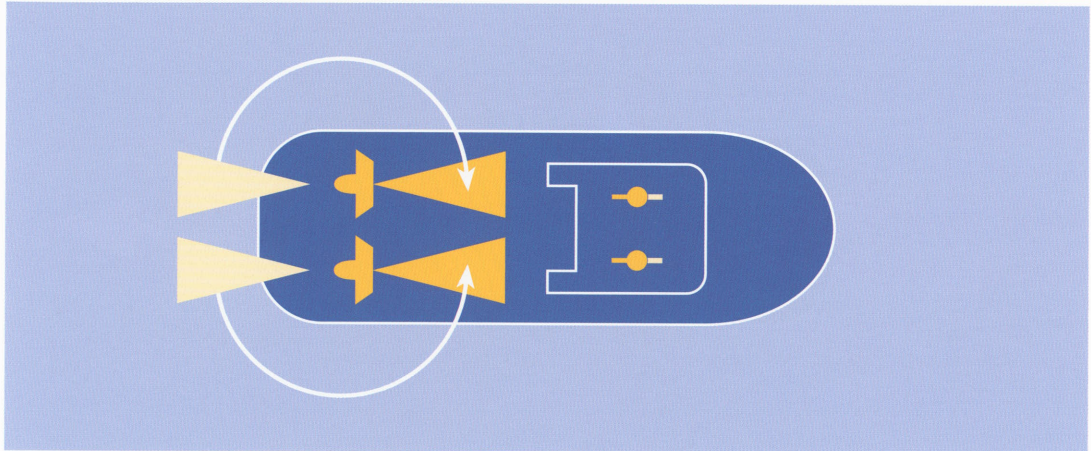


ILLUSTRATION 11
EMERGENCY CRASH STOP
Turn thrusters 180°, always point wash outwards!

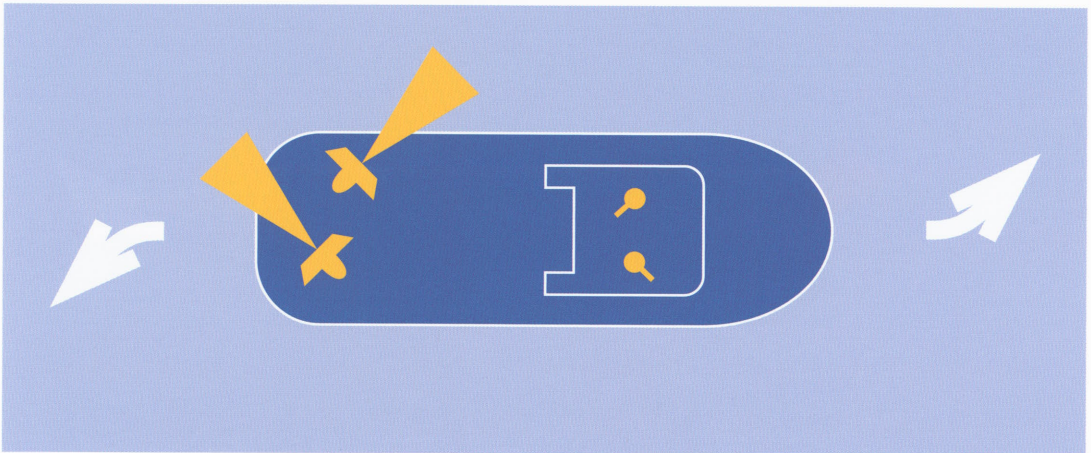


ILLUSTRATION 12
TURNING ON THE SPOT TO PORT
To prevent cavitation, avoid wash from one thruster entering the other thruster.

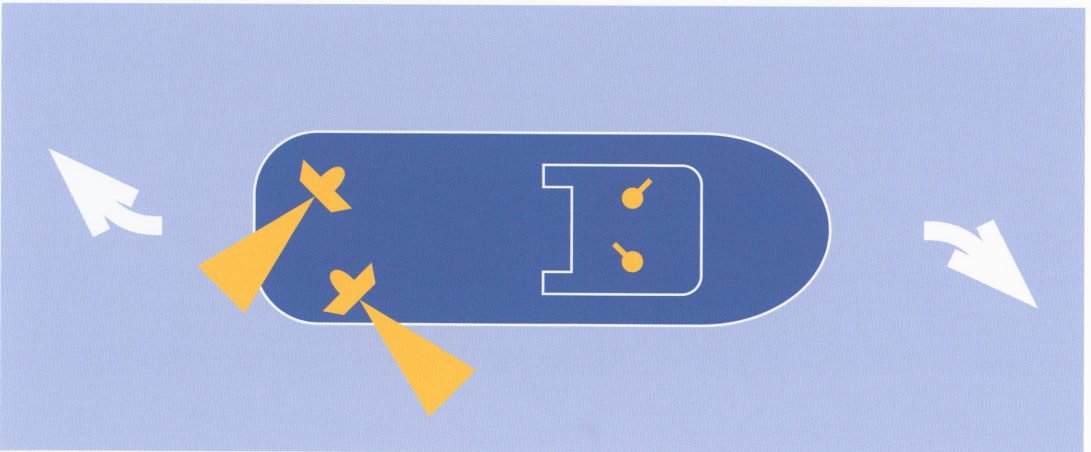


ILLUSTRATION 13
TURNING ON THE SPOT TO STARBOARD
To prevent cavitation, avoid wash from one thruster entering the other thruster.

ILLUSTRATION 14

**STATION KEEPING
MINIMUM WASH**

Thrusters in neutral position,
wash pointing inwards!
Both engines running at low power.

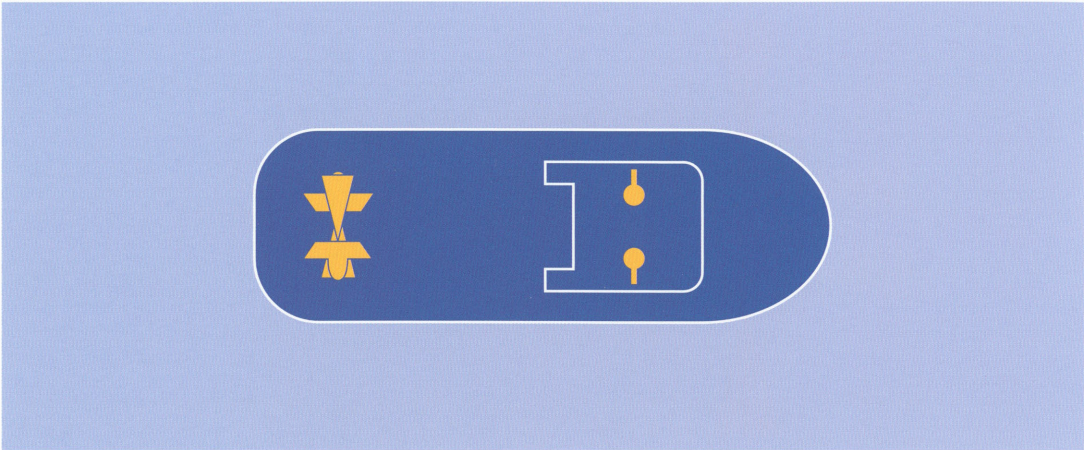


ILLUSTRATION 15

**SAILING SLOW AHEAD
MINIMUM WASH**

Low power only!

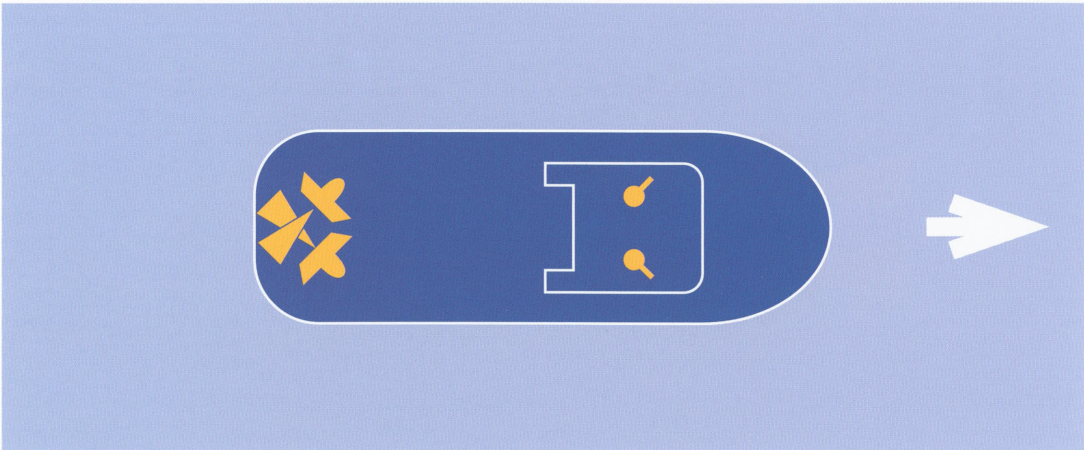


ILLUSTRATION 16

**SAILING SLOW AHEAD
TURNING TO PORT
MINIMUM WASH**

Increase power on starboard thruster.

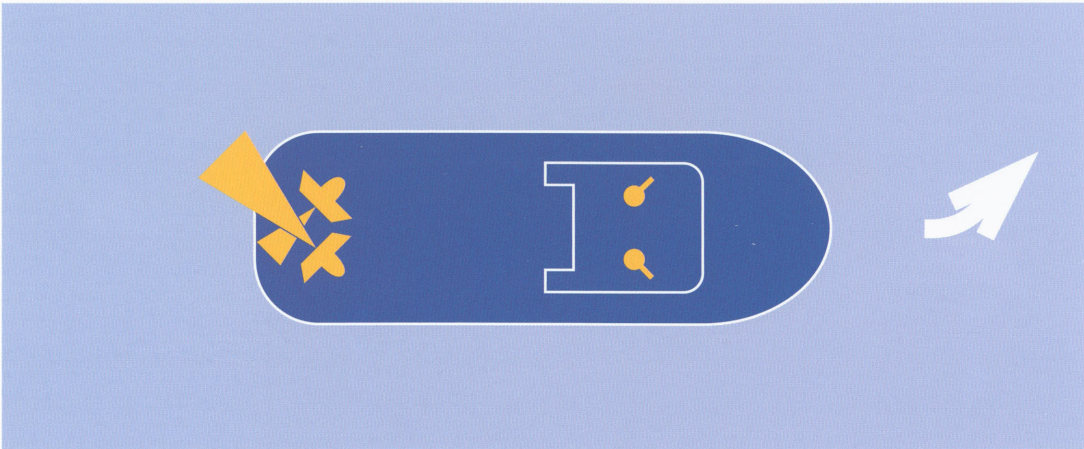


ILLUSTRATION 17

**SAILING SLOW ASTERN
TURNING TO STARBOARD
MINIMUM WASH**

Increase power on starboard thruster.

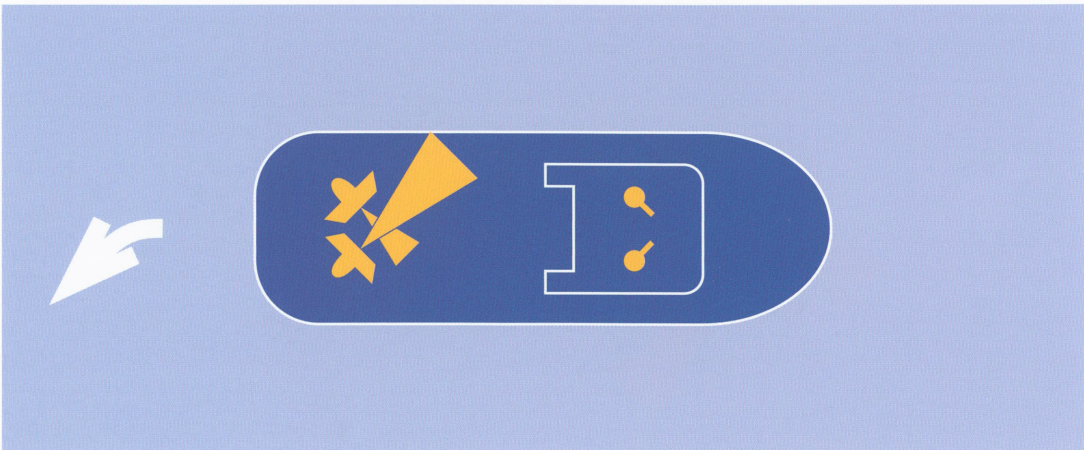


ILLUSTRATION 51

TRANSVERSE ARREST

Used for stopping a vessel.
Most effective at speeds *above* 7 knots.
When speed reduces, the thrusters can
slowly be turned to direct arrest mode.
[SEE ILLUSTRATION 52](#)

Please monitor the engine speed to
prevent stalling of the engines.

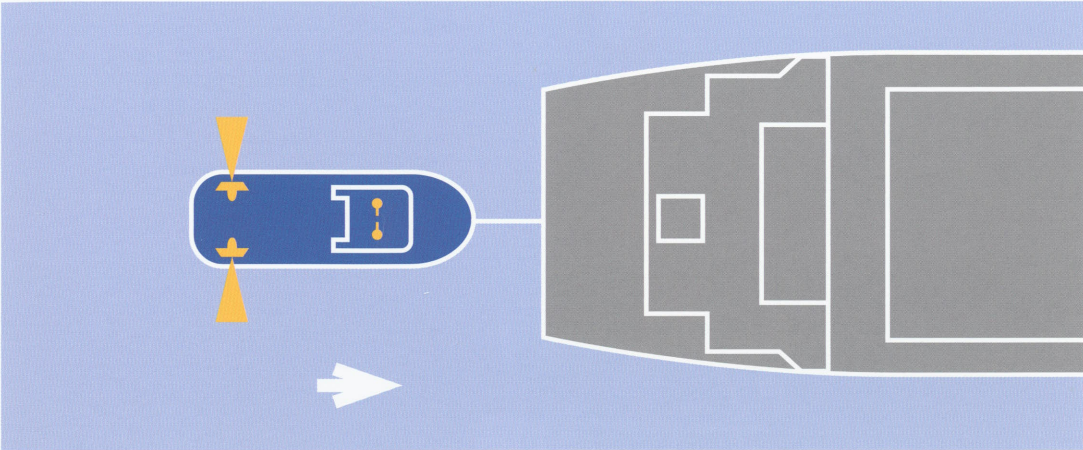


ILLUSTRATION 52

DIRECT ARREST

Used for stopping a vessel.
Most effective at speeds *below* 7 knots.

Please monitor the engine speed to
prevent stalling of the engines.

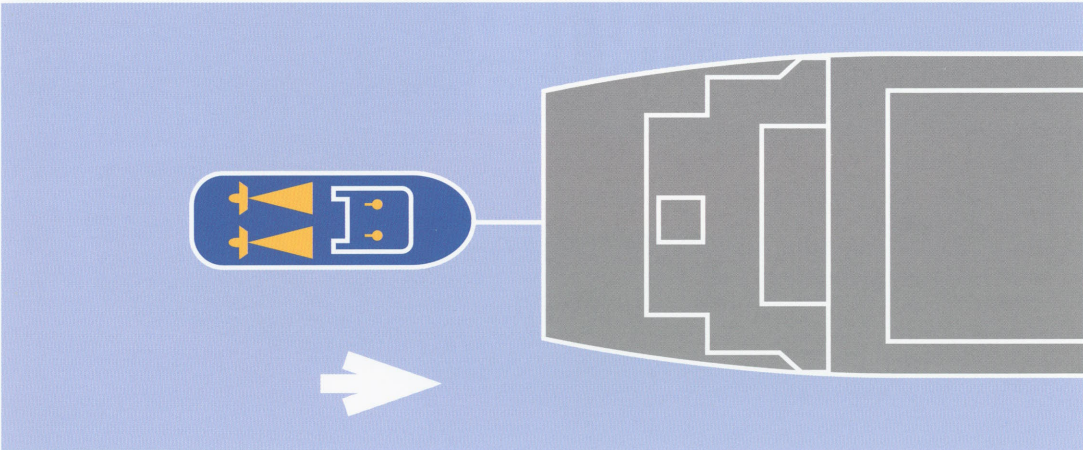


ILLUSTRATION 53

INDIRECT MODE

Used for turning a vessel
or keeping her on course.
Most effective at speeds
above 7 knots.

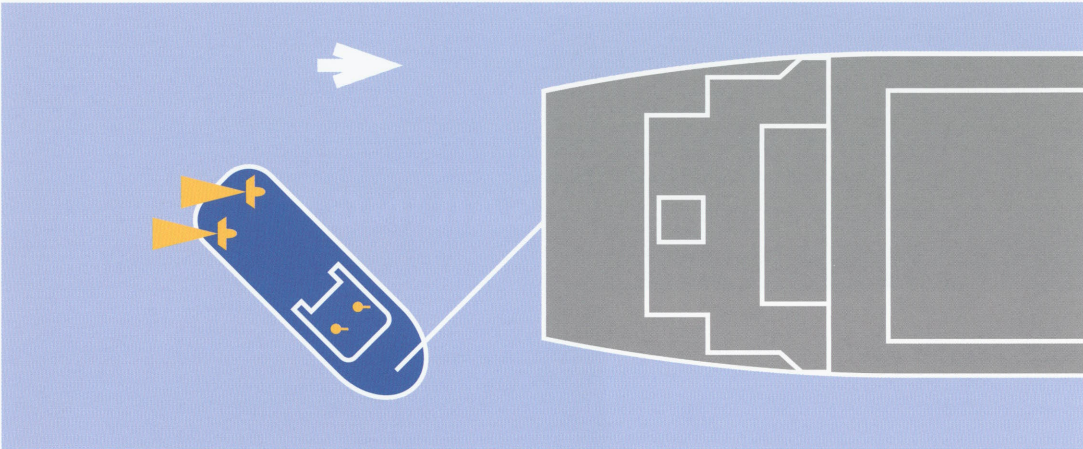
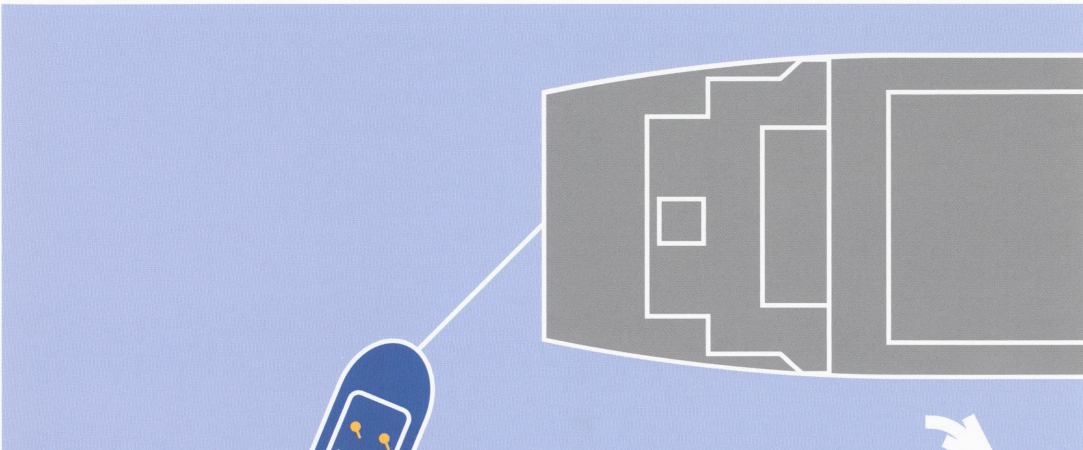


ILLUSTRATION 54

COMBINATION MODE

Used for turning a vessel
or keeping her on course.
Most effective at speeds
below 7 knots.





ESCORTING

DAMEN ASD TUG 3111

Escorting is defined as assisting ships at speeds above 6 knots. In case of an emergency the tug is used for braking and/or steering the assisted ship and secure her in a safe position. At these high speeds the tug uses hydrodynamic forces on the hull and skeg to generate towing forces, or a combination of hydrodynamic and thruster forces. A tension meter in the winch is very usefull. The tug master can see if he is gaining or loosing tow force and adapt his/her manoeuvres. Training the emergency scenarios in real life can be very difficult. Therefore it can be usefull to train these scenarios on a simulator.

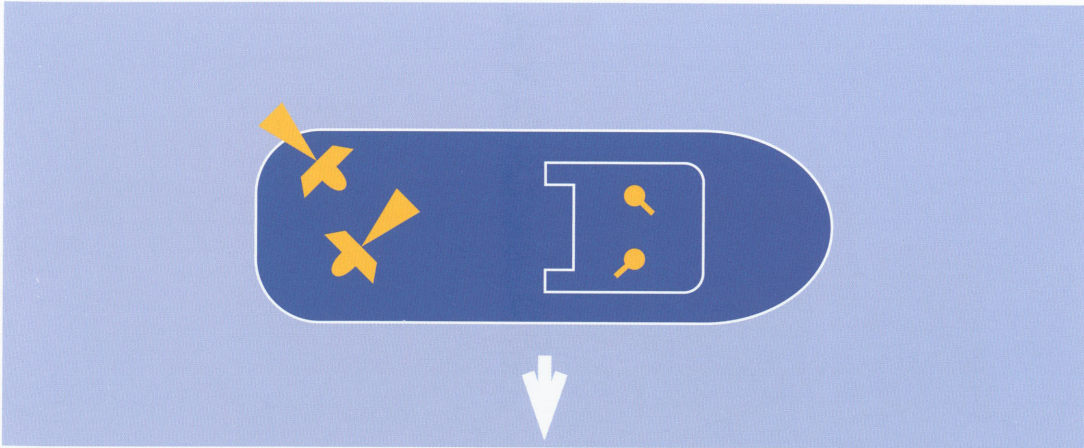


ILLUSTRATION 18
SLOW SIDE STEPPING TO STARBOARD
Often used for coming alongside a quay or vessel.

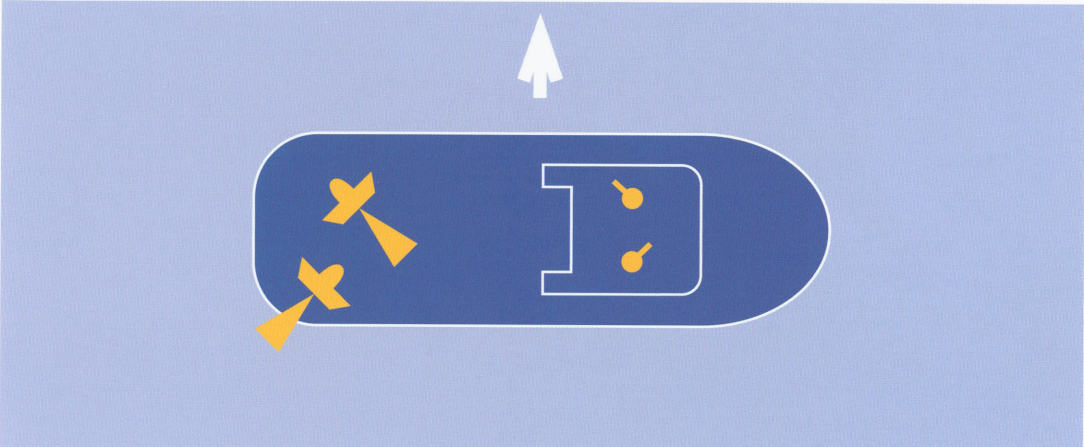


ILLUSTRATION 19
SLOW SIDE STEPPING TO PORT
Often used for coming alongside a quay or vessel.

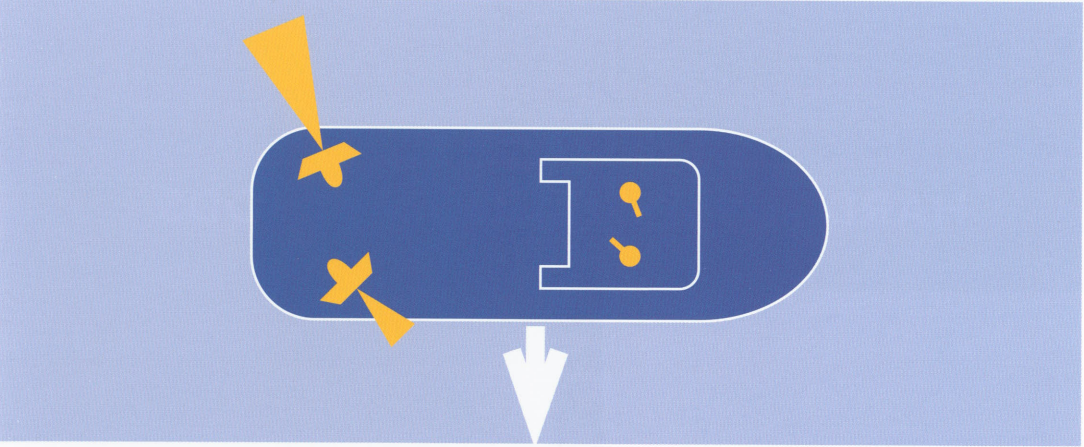


ILLUSTRATION 20
FAST SIDE STEPPING TO STARBOARD
A little more power on port thruster than on starboard thruster.

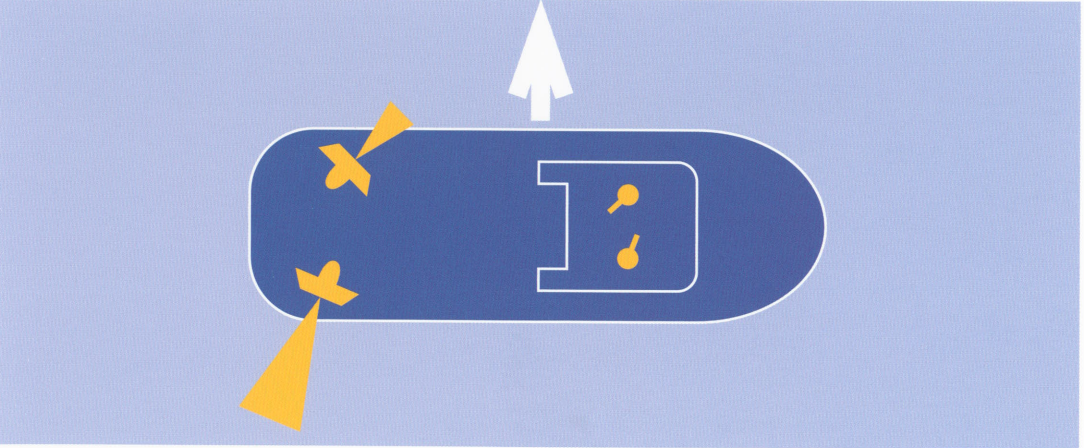


ILLUSTRATION 21
FAST SIDE STEPPING TO PORT
A little more power on starboard thruster than on port thruster.



HARBOUR ASSISTING METHODS

DAMEN ASD TUG 3111

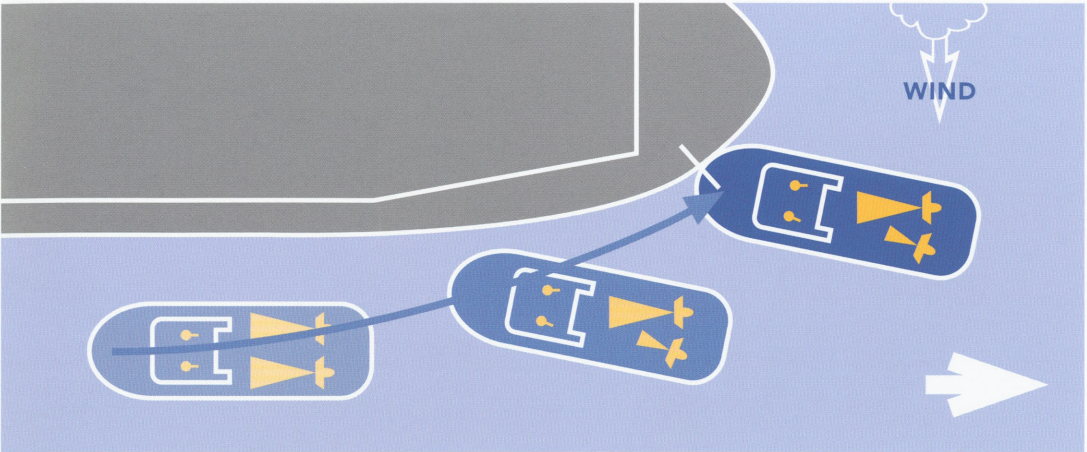


ILLUSTRATION 47

MAKING FAST ON THE FORWARD WINCH AT HIGH SPEEDS

Speed *higher* than about 4 to 5 knots. Keep to the sheltered lee side of the large vessels bow. If speed allows, keep outside unit dead slow astern. In case of an emergency, give full power on outside unit. The tug will gain speed and turn away from the bow.

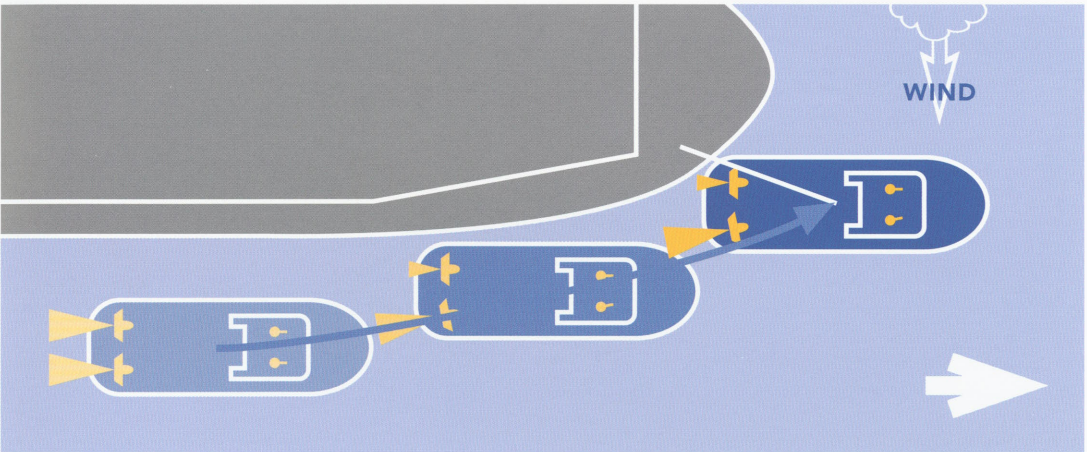


ILLUSTRATION 48

MAKING FAST ON THE AFT WINCH

Keep to the sheltered lee side of the large vessels bow. If speed allows, keep inside unit dead slow ahead. In case of an emergency, give full power on inside unit. The tug will gain speed and turn away from the bow.

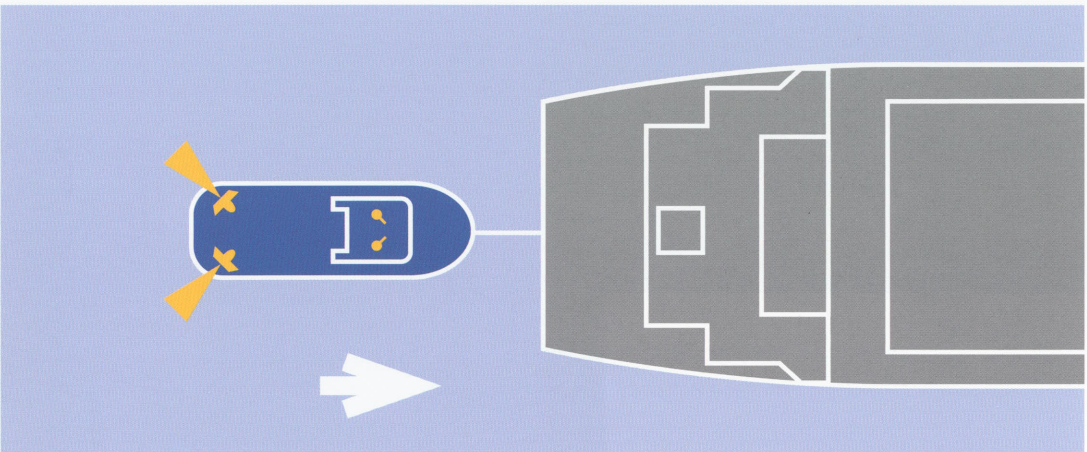


ILLUSTRATION 49

MAKING FAST IN ROUGH WAVE CONDITIONS

Use small thruster angles for quick response to waves and keeping clear from vessels transom.

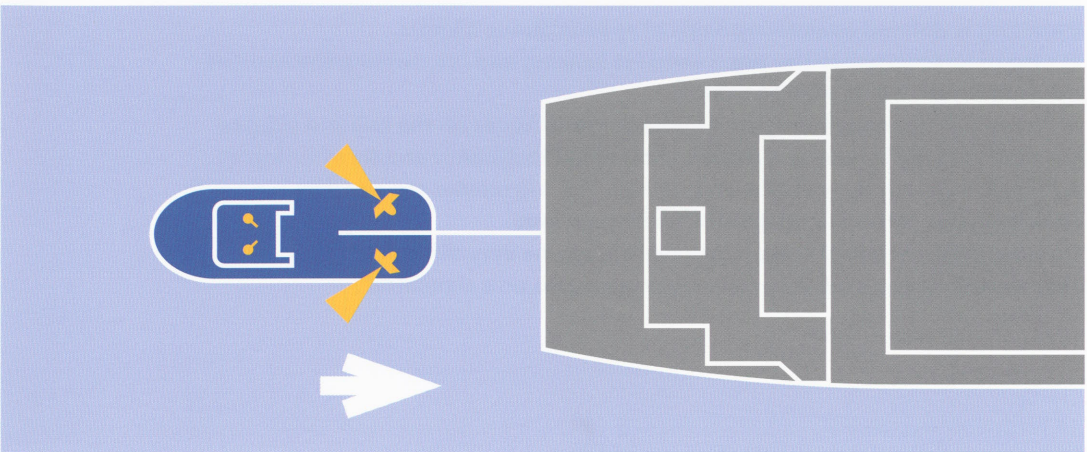


ILLUSTRATION 50

SWITCH WINCHES

In case fore winch brakes down, turn around and use aft winch (if fitted).

Note: use fore runner.



MAKING FAST AT SPEED

DAMEN ASD TUG 3110

ILLUSTRATION 46
MAKING FAST ON THE FORWARD WINCH AT LOW SPEEDS

Speed lower than about 4 to 5 knots.

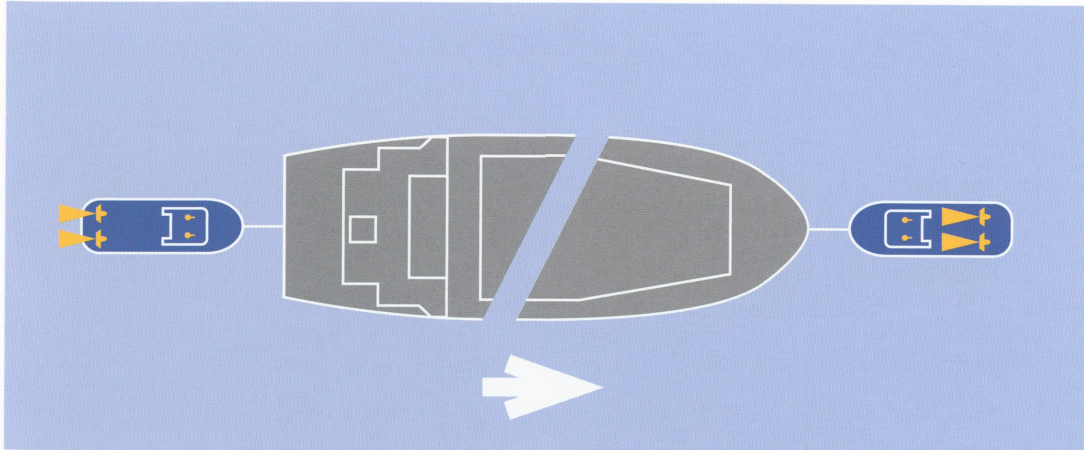
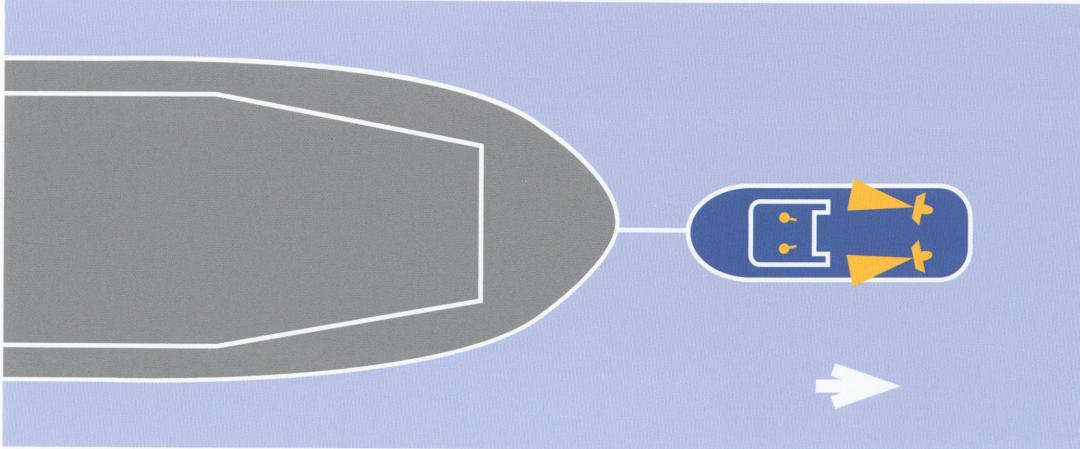


ILLUSTRATION 22
NORMAL STYLE
 Commonly used by ASD Tugs.

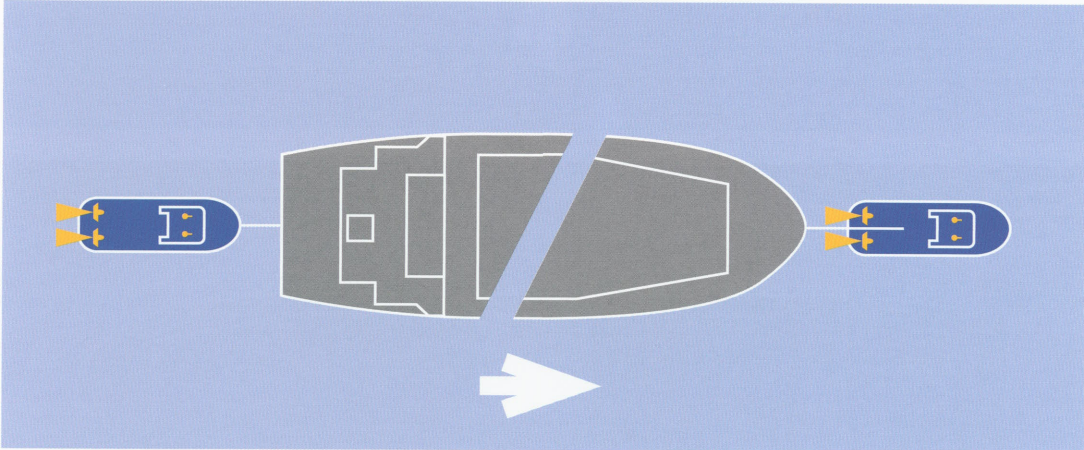


ILLUSTRATION 23
NORMAL STYLE
 Commonly used by ASD Tugs.

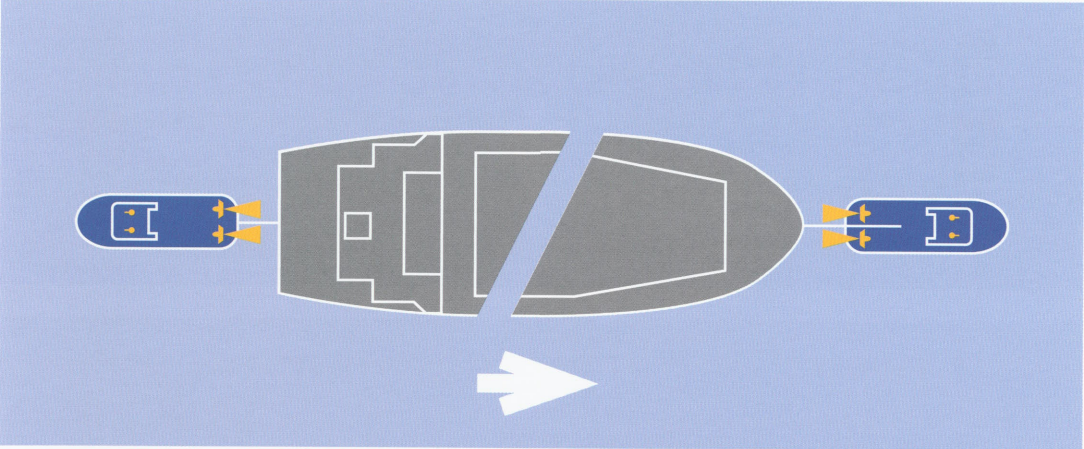


ILLUSTRATION 24
CONVENTIONAL STYLE
 Not common anymore for ASD Tugs, but possible.

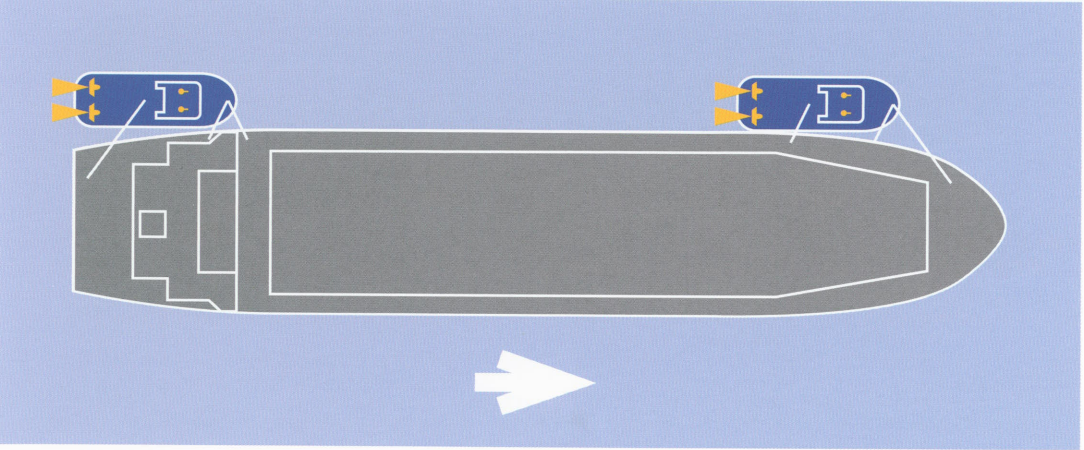


ILLUSTRATION 25
CONVENTIONAL STYLE
 Not common anymore for ASD Tugs, but possible.

ILLUSTRATION 26

PUSHING

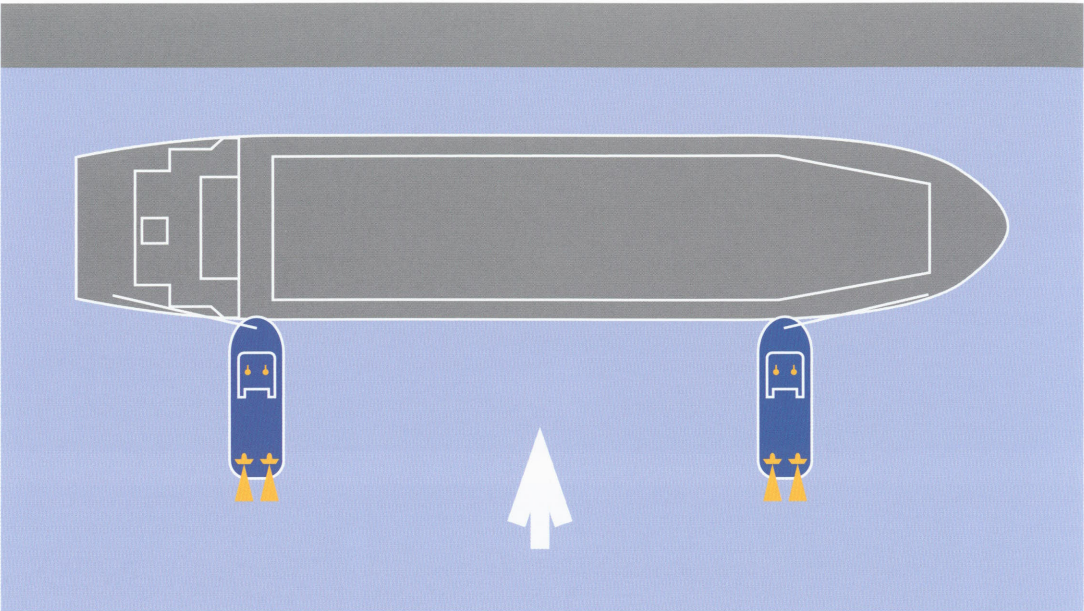


ILLUSTRATION 27

PULLING

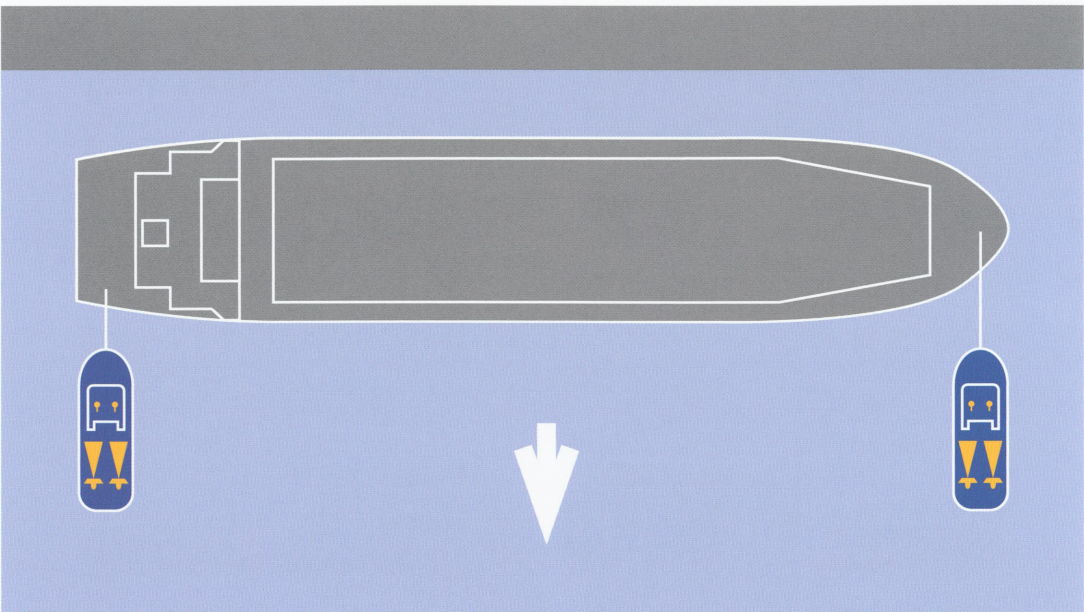


ILLUSTRATION 28

**PUSHING UNDER AN
OVER HANGING BOW OR STERN**

When the ship speed is *higher* than 3 knots, go to the flat area of the vessels side and move from there under the over hanging bow (or stern), constantly keeping contact.

This is the safest way!

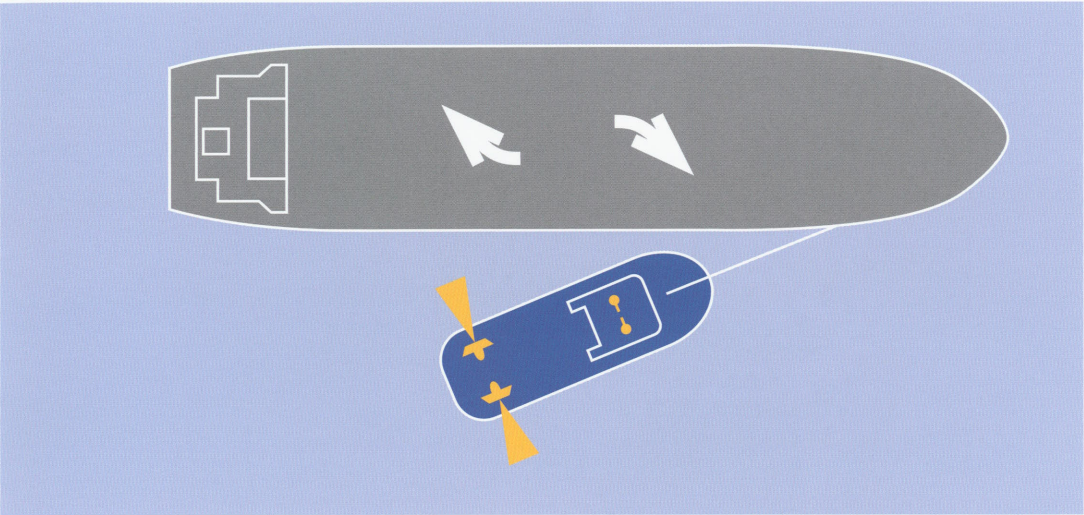
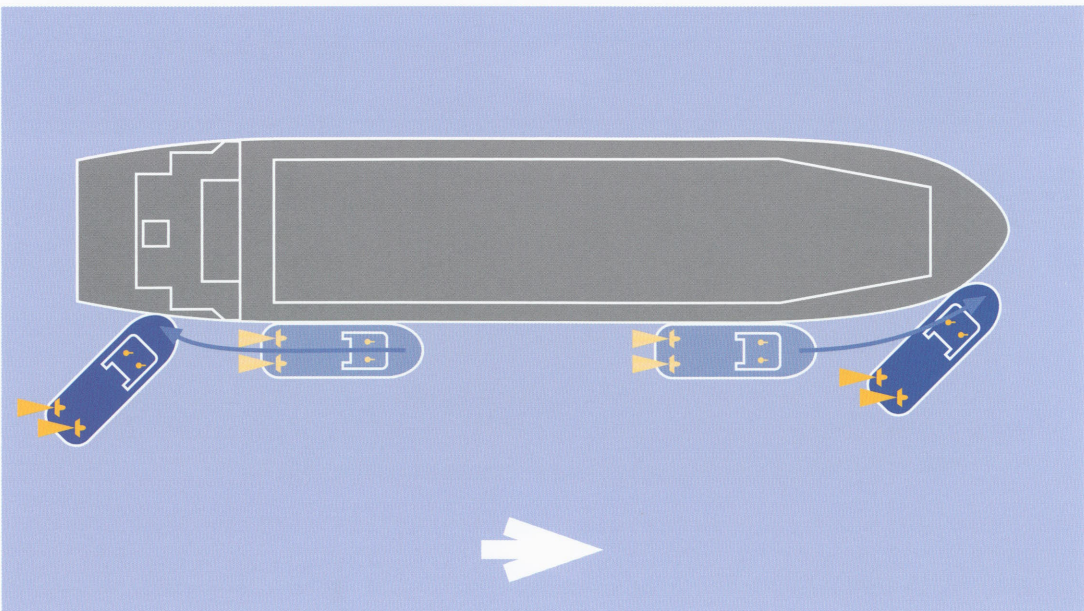


ILLUSTRATION 42

**TURNING VESSEL
ALMOST ON THE SPOT**

Wash of port thruster pushes against vessels stern.

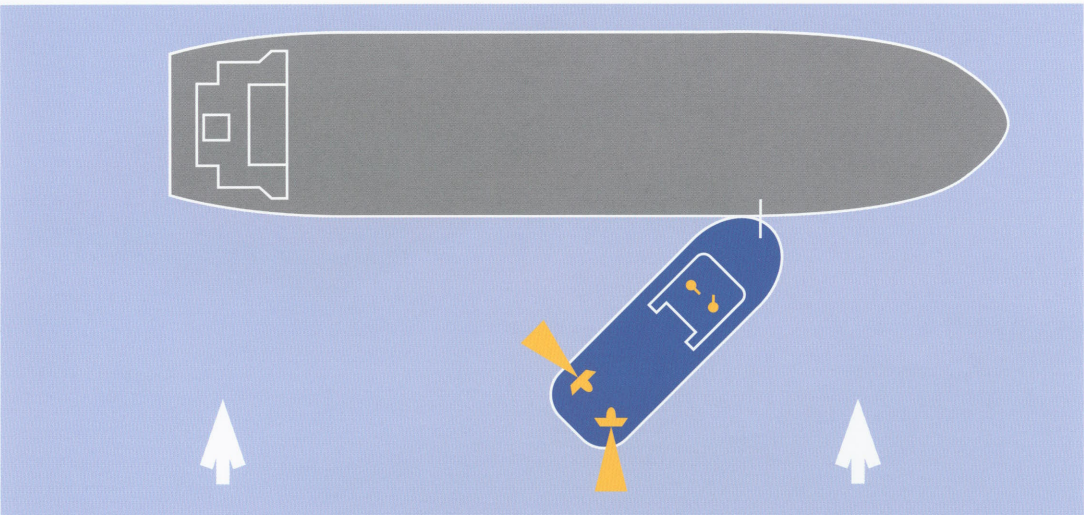


ILLUSTRATION 43

PUSHING VESSEL SIDE-WAYS

Pushing the bow of the vessel with the bow of the tug and pushing the stern of the vessel with the wash of the port thruster.

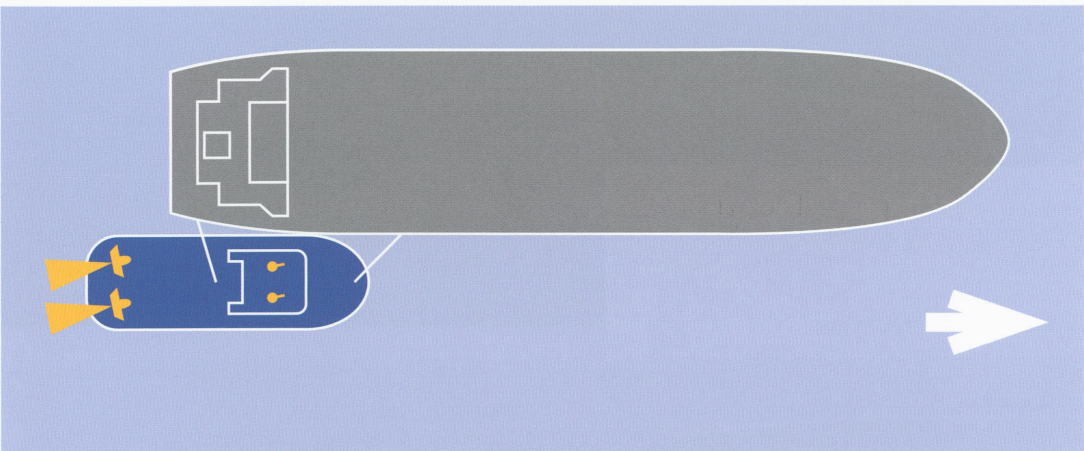


ILLUSTRATION 44

**SAILING AHEAD
WITH A DEAD SHIP
OR BARGE**

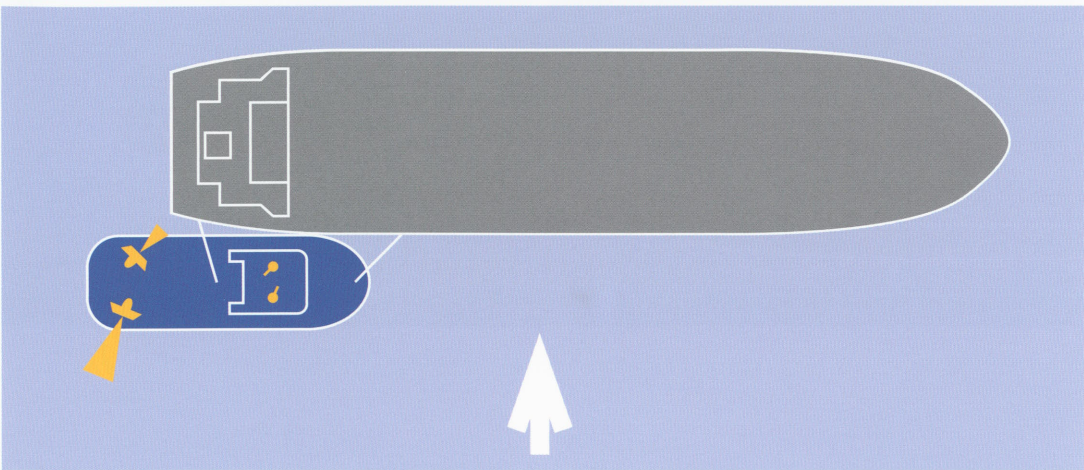


ILLUSTRATION 45

**SIDE STEPPING
WITH A DEAD SHIP OR BARGE**



HANDLING SMALL VESSELS

DAMEN ASD TUG 2810

**SAME METHODS AS WITH LARGE VESSELS
BUT WORKING WITH LESS POWER**

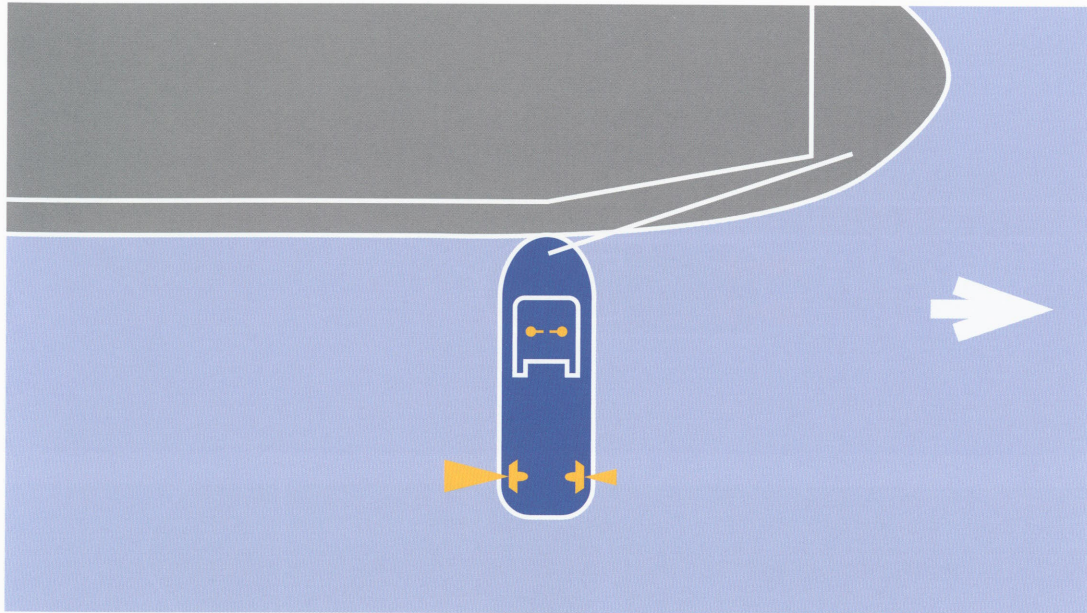


ILLUSTRATION 29
TRAVERSING STAND-BY POSITION

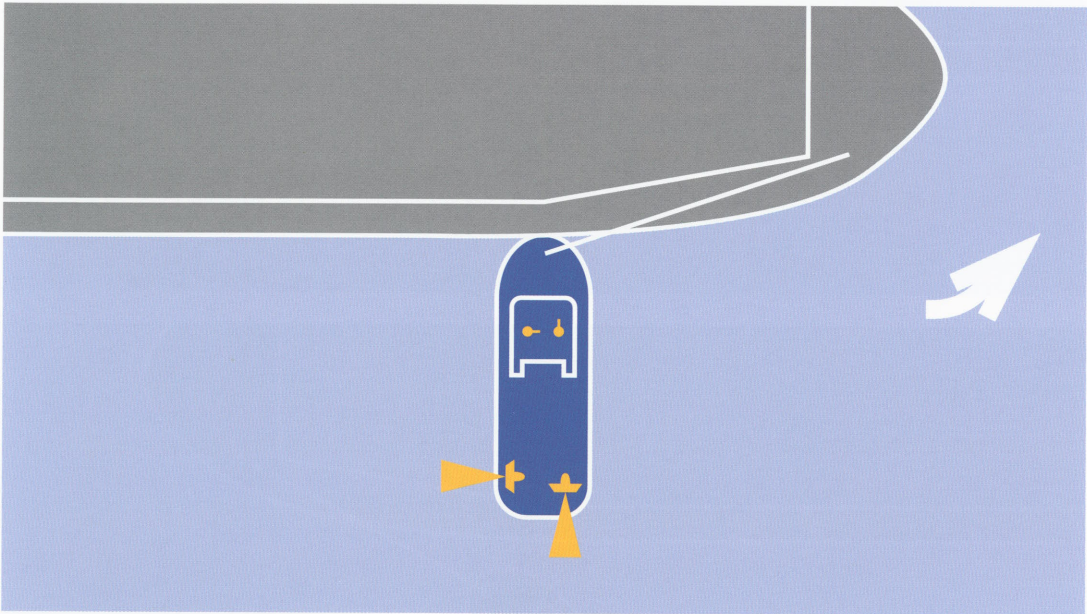


ILLUSTRATION 30
**PUSHING VESSEL
HAVING A LOW SPEED**

Vessel sailing at a speed
lower than 4 to 5 knots.

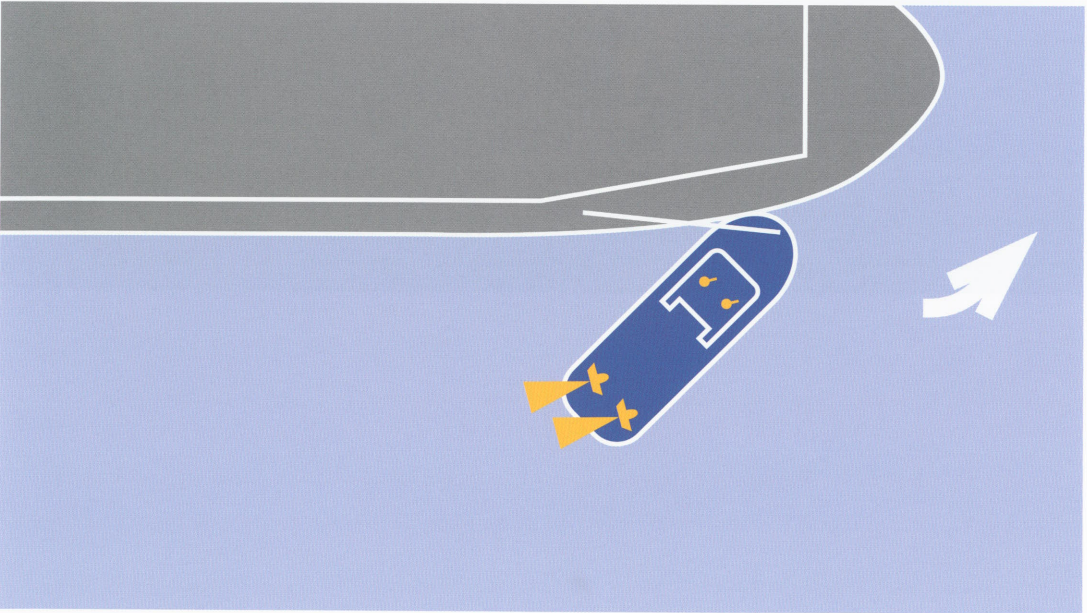


ILLUSTRATION 31
**PUSHING VESSEL
HAVING A HIGHER SPEED**

Vessel sailing at a speed
higher than 4 to 5 knots.

▶
BRAKING AND KEEPING VESSEL ON COURSE
SEE ILLUSTRATION 35



▶
PULLING
SEE ILLUSTRATION 27



◀
INDIRECT MODE
SEE ILLUSTRATION 53



▶
SAILING ALONG
SEE ILLUSTRATIONS 22 TO 28

ILLUSTRATION 32
HIGH SPEED STAND-BY

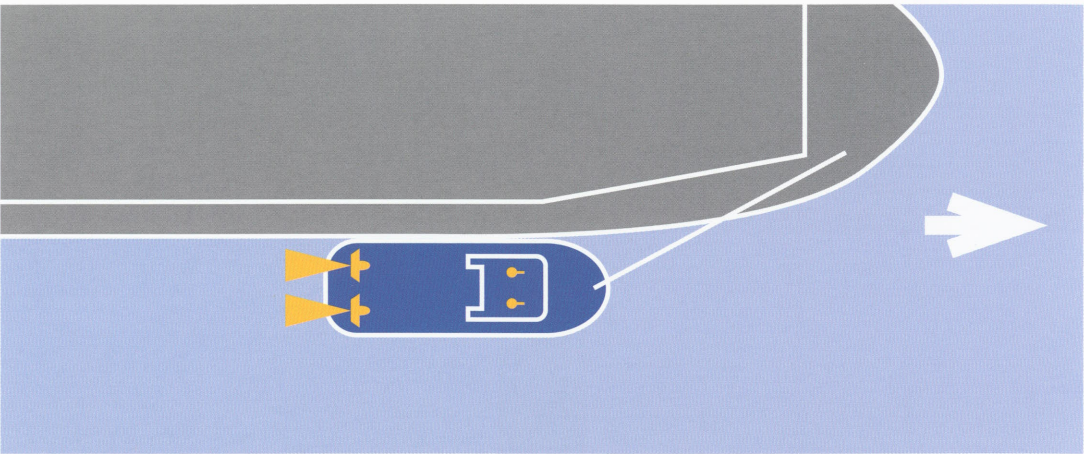


ILLUSTRATION 33
BRAKING AND
SLOWLY TURNING VESSEL
TO STARBOARD

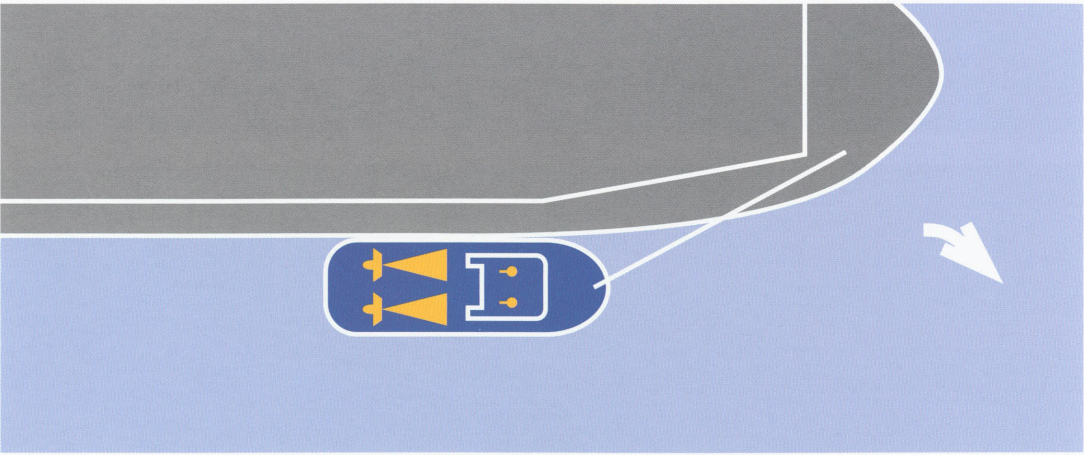
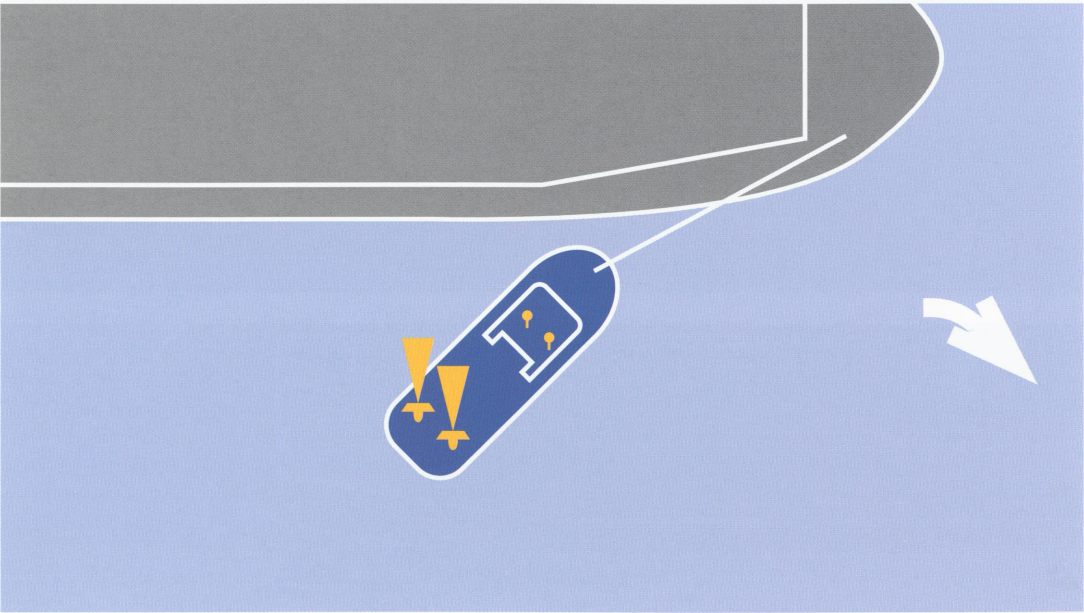


ILLUSTRATION 34
TURNING THE VESSEL
TO STARBOARD





◀ **SAILING FULL ASTERN**
SEE ILLUSTRATION 5



▼ **PUSH - PULL & NORMAL STYLE**
SEE ILLUSTRATIONS 22, 26 AND 27

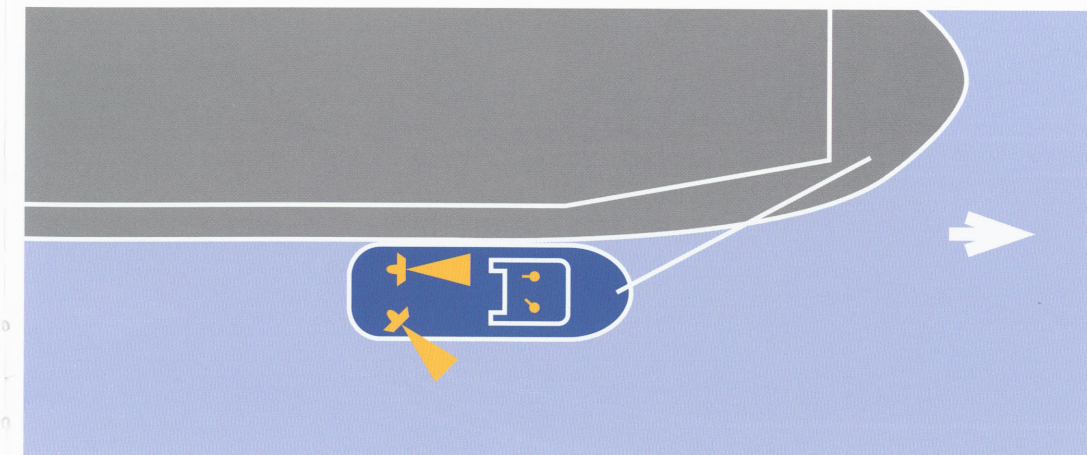


ILLUSTRATION 35
**BRAKING AND
KEEPING VESSEL ON COURSE**

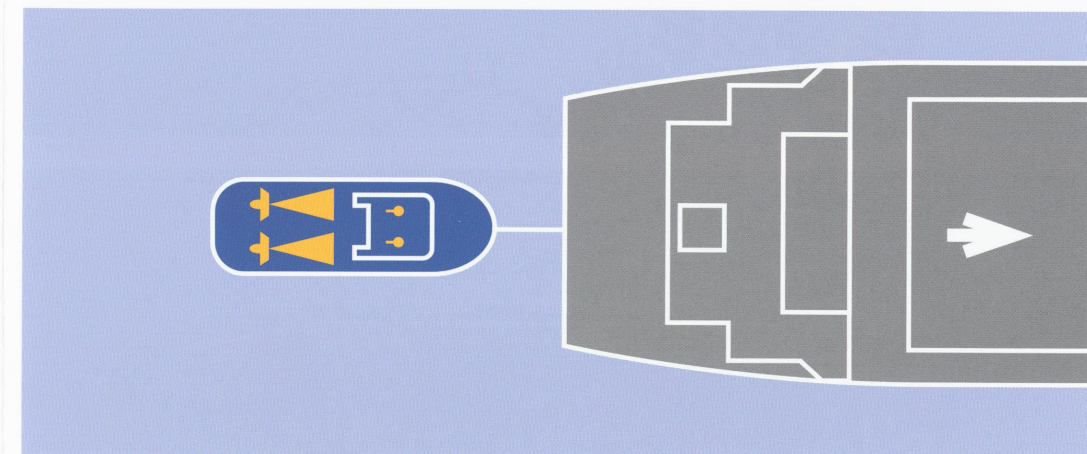


ILLUSTRATION 36
**BRAKING VESSEL
BY PULLING AT THE STERN**

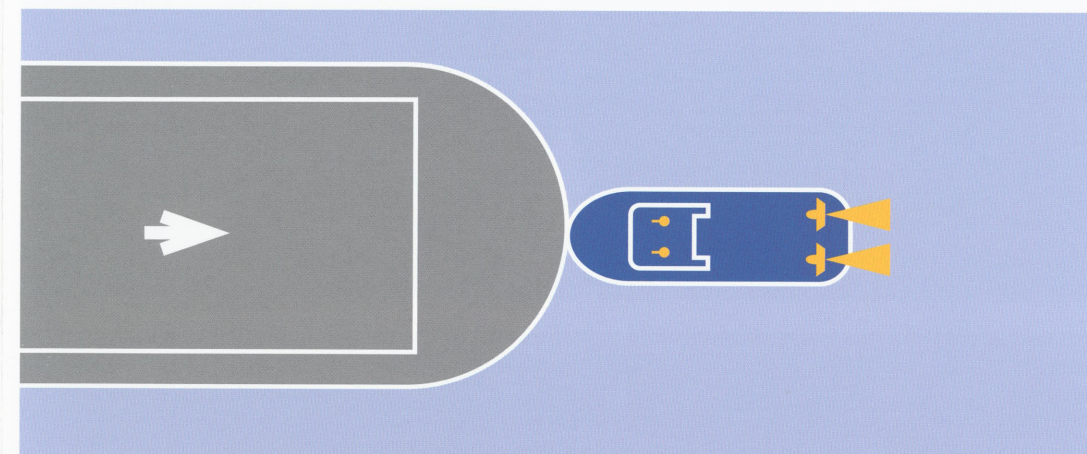


ILLUSTRATION 37
**BRAKING VESSEL
BY PUSHING AGAINST BOW**

Only possible at *lower speeds* on ships without bulbous bow.

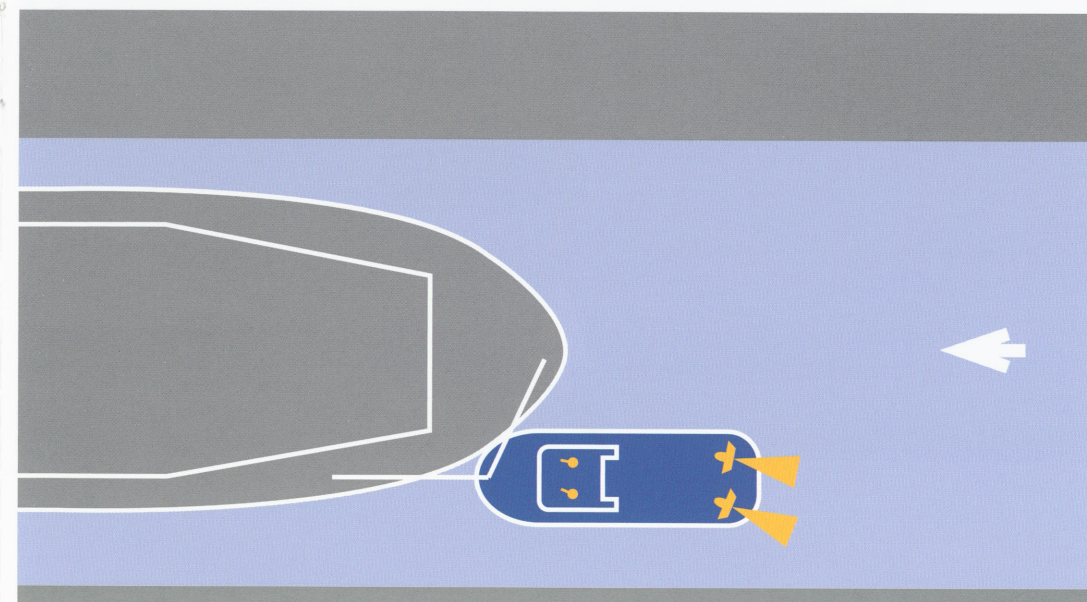


ILLUSTRATION 38
**PUSHING VESSEL
INTO A CONFINED SPACE**



▲▲ **HARBOUR ASSISTING METHODS**
SEE ILLUSTRATIONS 22 TO 28



ILLUSTRATION 39

**PULLING VESSEL ASTERN
AND KEEPING HER ON COURSE**

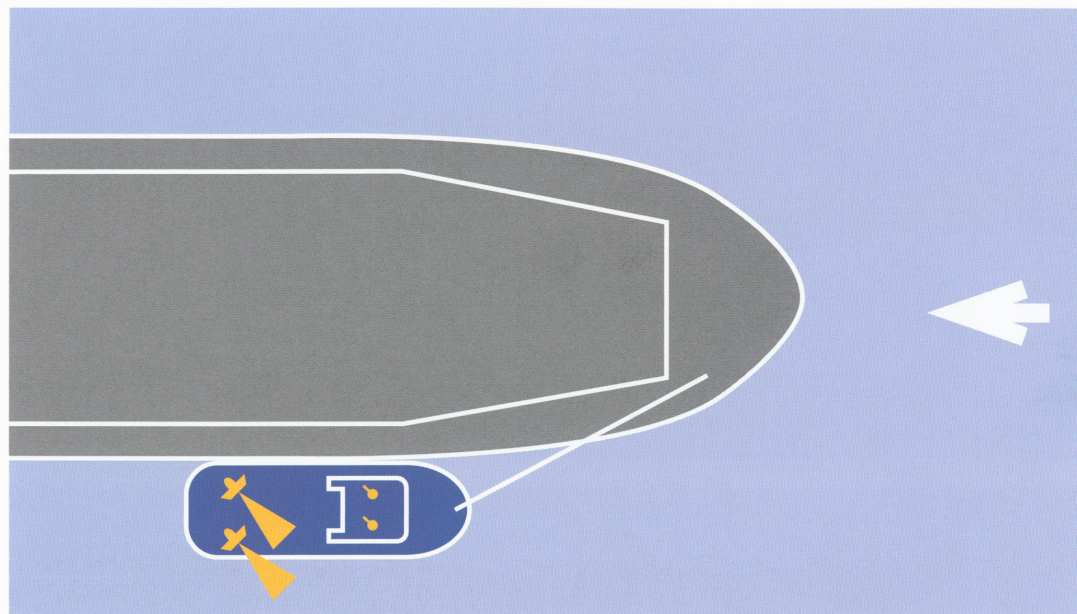


ILLUSTRATION 40

SIDE PUSHING IN NARROW AREAS

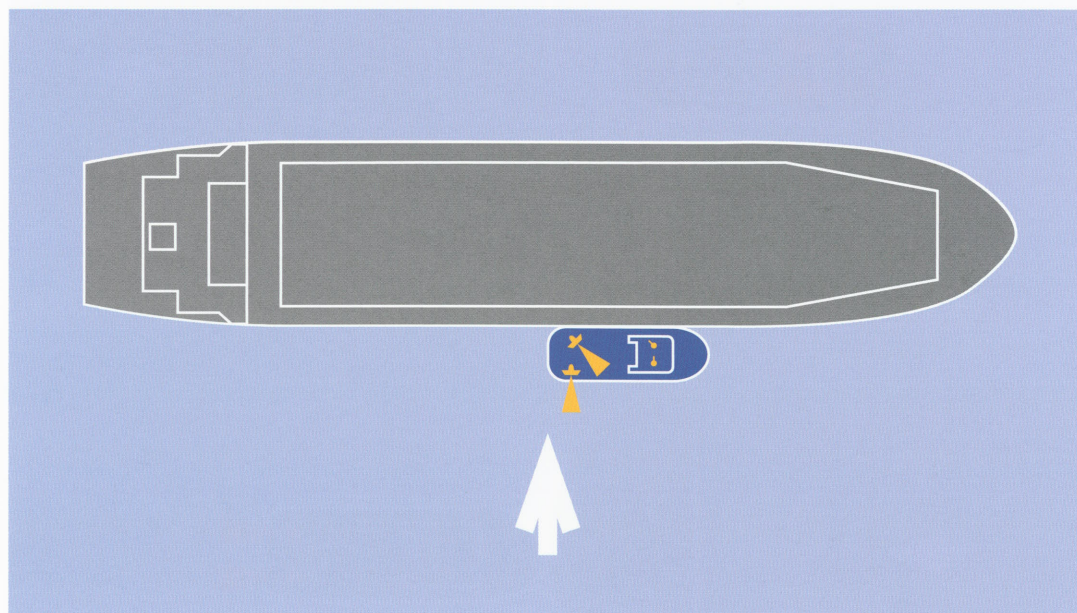


ILLUSTRATION 41

**PUSHING USING THE WASH
OF THE THRUSTERS**

Used for handling vulnerable vessels,
submarines, low freeboard vessels, etc.

Only applicable at speeds upto 2 knots.

