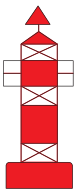
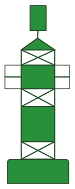
3.8.Aids to Navigation Boat PWC

3.8.1Buoyage system(IALA Maritime Buoyage Sytem, Region B)



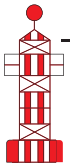
Starboard Hand Buoy

A red 'Cone' on top. The 'Cone' looks like the hat worn by Catholic Nuns many years ago; thus this Starboard hand buoy is called a 'Nun buoy". Even numbers. They line the right side of a channel when approached from the sea··· Thus, Red-Right-Return means to keep the Red buoy on your Right as you Return to port.



Port Hand Buoy

A green cylinder on top. The cylinder looks like a "can" and thus is called a "Can buoy". Odd numbers. They line the right side of a channel when approached from the port··· Thus, Green-Right-Go means to keep the Green buoy on your Right as you Go from port to sea.

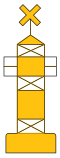


Safe Water Buoy

Red and White Vertical Stripe. A mark (or buoy) serving to indicate a deep-water channel (fairway).

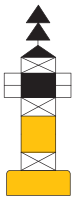
Isolated Danger Buoy

IIsolated Danger in the area: Sunken Reef, Shoal,Wreak, Etc.



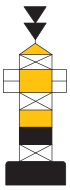
Special Buoy

Construction Area, Oceanographic Station



North Cardinal Buoy

Black over Yellow. Two triangles on top pointing up. Visualize: the two triangles point to North on a chart. Indicates safest water exists to the north of the buoy

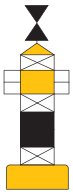


South Cardinal Buoy

Yellow over Black. Two triangles on top pointing down. Visualize: the two triangles point to South on a chart. Indicates safest water exists to the south of the buoy.

East Cardinal Buoy

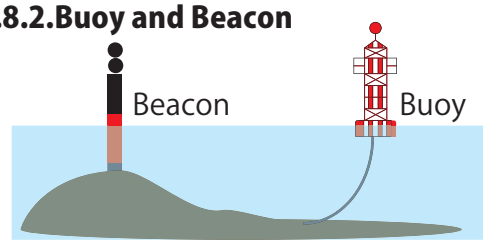
Black over Yellow. Top triangle points up. Visualize: top triangle is Sun Rising. Indicates safest water exists to the east of the buoy.



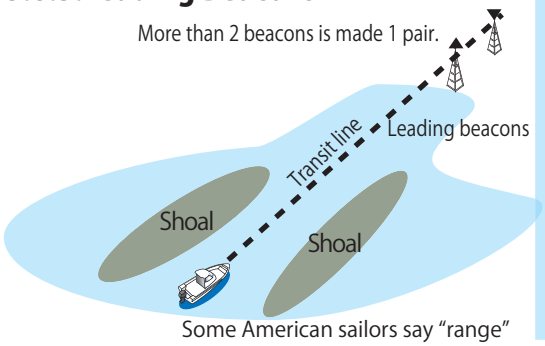
West Cardinal Buoy

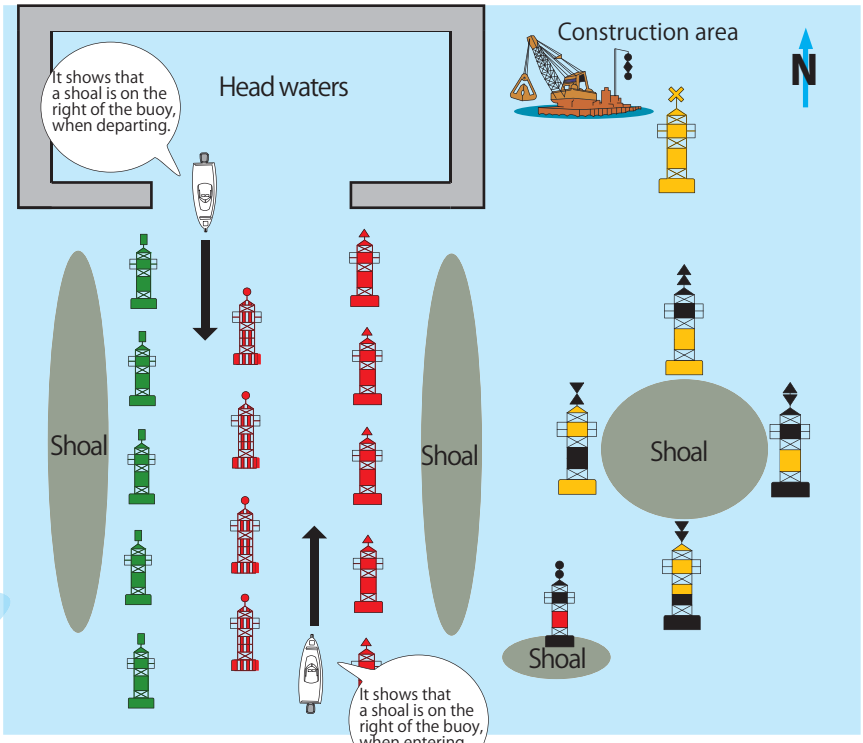
Yellow over Black. Top triangle points down. Visualize: top triangle is Sun Setting. Indicates safest water exists to the west of the buoy.

3.8.2.Buoy and Beacon



3.8.3.Leading Beacons

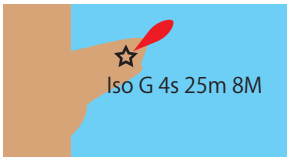




3.8.4.Lighthouse Boat

1. Lighthouses are found on the coast , islands, capes,and at entrances to ports.
2. They are lit from sunset until sunrise, and turned onunder limited visibility.

Chart abbreviations tell you the pattern of the light flashes,color timing, height of the light, and distance of visibility.(Iso G 4s 25m 8M)



3.8.5.light abbreviation sign Boat

Light character	Abbreviation	Illustration	Definement
Fixed	F		Fixed intensity of light is continued without darkness
Single Flashing	Fl	Duration of darkness; Period; Duration of light	A duration of darkness is longer than a duration of light
Single Occulting	Oc	Period	A duration of light is longer than a duration of darkness
Isophase	Iso	Period	A duration of light and a duration of darkness is same.
Fixed Alternating	Al	Period	The light of the different color alternately without darkness. The same duration of light of two colors
Group Flashing	Fl(2)	Period	Group Occulting Oc (2) Period

Iso (Isophase) **G**※1 (Green light) **4s** (Period 4 seconds) **25m** (Elevation 25m) **8M** (Range 8N.M.※2)

※1 Color indication is omitted in case that light color is white of one color. ※2 It is seen in the height of 5m from the average surface of the water.

3.9.Hydrographic Charts and Publications

3.9.1.Nautical Chart

1. Chart sizes: "General chart (˜1/4,000,000)", "Ocean chart(˜1/1,000,000)", "Nautical chart(˜1/300,000)", "Coast chart(˜1/50,000)", "Harbor chart(1/50,000˜)"
2. Small craft, which navigate along the coast, often uses a coast chart and a harbor chart.
3. "Yachting chart" are special charts for pleasure boats.
4. Always use the latest chart , don't fold it or get it wet.
5. Make chart navigation plans with a pencil.
6. Don't use a data from old Japanese Geodetic Datum (Tokyo Datum) on a current chart.

3.9.2Hydrographic publications

1. Pilot book....Describes various phenomena on the sea, traffic route, harbor, fishing port,anchorage, and coastal conditions in detail. There are "Information of harbor for small crafts"specified for the pleasure boat.
2. Tidal table....Tidal hour and level for one year at the major port, the direction and speed of a current of the main channel are reported in this book. The direction of the tide of the special time can't be judged on the chart.
3. Catalogue of charts and publications....Lists all charts and publications available..
4. Nautical chart symbols and abbreviations....Important book that lists all chart symbols and abbreviations. Available at The Maritime Safety Agency Ocean Information Bureau.

3.9.3Nautical chart symbols and abbreviations

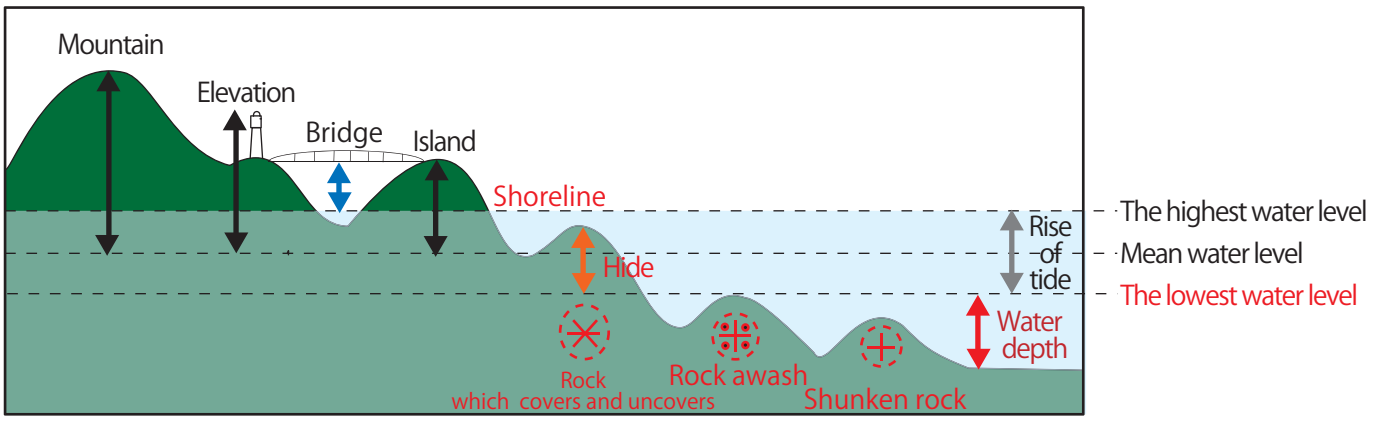
	Sunken rock	1.5kn	Flood tide stream
	Rock awash	1.5kn	Ebb tide stream
	Rock which covers and uncovers	1.5kn	Occean current
	(Sunken) wrecks		Fish Stakes
	Fish-haven		Overfalls
	Fisherman's Port		Eddies
	Marina	S	Sand
	Anchorage	St	Stones
		Sh	Shells
		M	Mud
		R	Rock
		Co	Coral

(1)Sunken rock・・Dangerous underwater rock of uncertain depth
(2)Rock awash・・Rock awash at the level of chart datum
(3)Limiting danger line・・When a vessel navigates, the boundary line of the dangerous depth of water.
(4)Flood tide stream・・Maximum speed and direction (knot)
(5)Ebb tide stream・・Maximum speed and direction (knot)

Danger line in general

12 7
R
Water depth 12.7m
(Bottom) sediments rock

3.9.4.Chart datum



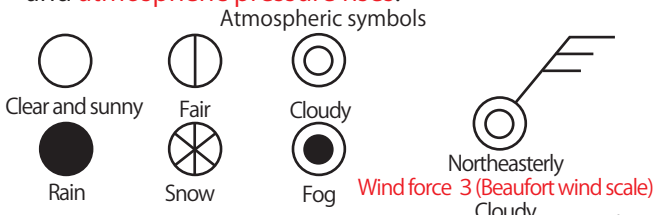
Datum	Height	Other
The highest water level	Hide・Tide	Water depth
Mean water level	Mountain・Island・Light of lighthouse・Eye level	
The lowest water level	Bridge・Overhead wire	Shoreline

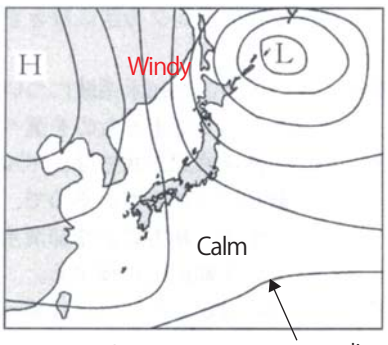
※The actual depth of water = The sea level height at that time + the depth of water on the chart.

4.1.Basic Knowledge of the Weather Boat PWC

4.1.1.Meteorological chart

1. When air temperature rises, air swells, becomes light, and atmospheric pressure drops.
2. When air temperature drops, air contracts, becomes heavy, and atmospheric pressure rises.





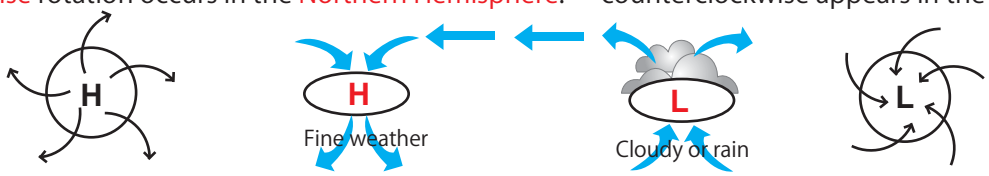
4.1.2.Wind

1. Winds blows from high-pressure areas to low-pressure areas.
2. The velocity of the wind (i.e.wind speed) is shown in m/s (meters per second) or knots. (1knot = approximately 0.5 m/s)
3. The velocity of the wind is announced in the mean for ten minutes. And, the maximum instantaneous wind speed may also be announced.
4. Wind force (Beaufort wind scale) is shown in 13 classes of 0 - 12. Generally the adaptive wind force for the small craft is said as 3 on the Beaufort scale. (the velocity of the wind 3 -5m/s).
5. The wind which blows from the north is termed northerly wind.
6. Winds will tend to be strong where the isobar lines (lines joining points of equal atmospheric pressure) are close together on a weather map (synoptic chart)
7. Generally, Japan enjoys slight southeaster in summer, and the strong northwestern in winter.(inshore of Japan)

4.1.3.Anticyclone and atmospheric depression

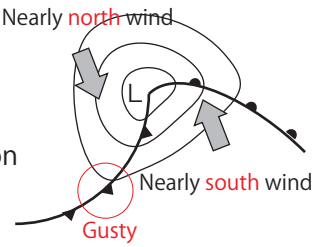
1.High-pressure system
The area where atmospheric pressure is higher than the surrounding locations . The descending air current of clockwise rotation occurs in the Northern Hemisphere.

2.Low-pressure system
The area where atmospheric pressure is lower than the surrounding locations.The ascending air current of the counterclockwise appears in the Northern Hemisphere.

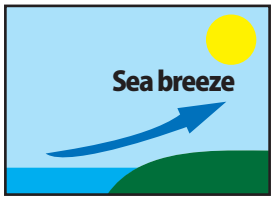


4.1.4.Weather Fronts

1.A weather front is a boundary separating two masses of air of different densities, and is the principal cause of meteorological phenomena outside the tropics. In surface weather analyses,fronts are depicted using various colored triangles and half-circles, depending on the type of front. The air masses separated by a front usually differ in temperature and humidity.
2.Cold front....May feature narrow bands of thunderstorms and severe weather, and may, on occasion, be preceded by squall lines or dry lines.Cumulonimbus clouds occurs. Gust and thunderstorm may occur.After it passes, temperature decrease and the wind direction changes to a north or west wind from the south wind.
3.Warm front....Warm fronts are usually preceded by stratiform precipitation and fog.A heavy layered cloud covers. Rainy weather. After it passes,temperature increases.
4.Stationary front....Warm air balances with the cold air. A front hardly moves.(Bai-u front)
5.Occluded front....The condition which a cold front catches up with air in the warm front.



4.1.5.Land and sea breeze



1.Characteristics of the wind which blows onto the seashore area on the fine day of summer.
2.Wind blowing from the sea to the land usually in the daytime is called a Sea Breeze.
3.Wind blowing from the land to the sea usually at nigh is called Land Breeze.
4.It may be windier in offshore waters than onshore.
5.The wind drops when a difference in temperature between the sea and the land disappears (in the morning and the evening).

4.1.6.Waves

1.North wave....Waves which come from the north. (direction)
2.Wind wave....The wave which appeared on the wind which blew in that place.
3.Swell....The wave that has traveled from the occurrence point. High waves during the dog days in summer times "Doyo-nami" in Japan.
4.Surf....The wave which swelled in the coastal shoal.the big one is dangerous to a boat.
5.Chopping wave....The wave that a direction is different interferes, and it is formed.The peak of wave became sharp.

4.1.7.Sources Reporting Weather Conditions

1.Weather conditions are available on TV, radio, newspapers, and the internet,Telephone weather-bulletin service(177)
2.Japanese weather changes from west to east by circumpolar westerlies.
3.Gusts are a sign that a cold front is approaching particularly when a cumulonimbus cloud and lightning are discovered in the western sky.

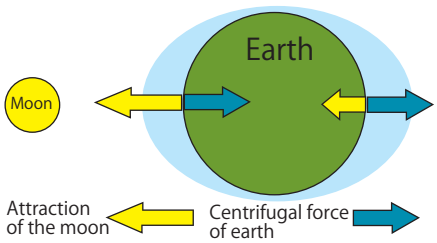
4.2.Basic knowledge of Tide and Tidal Current Boat PWC

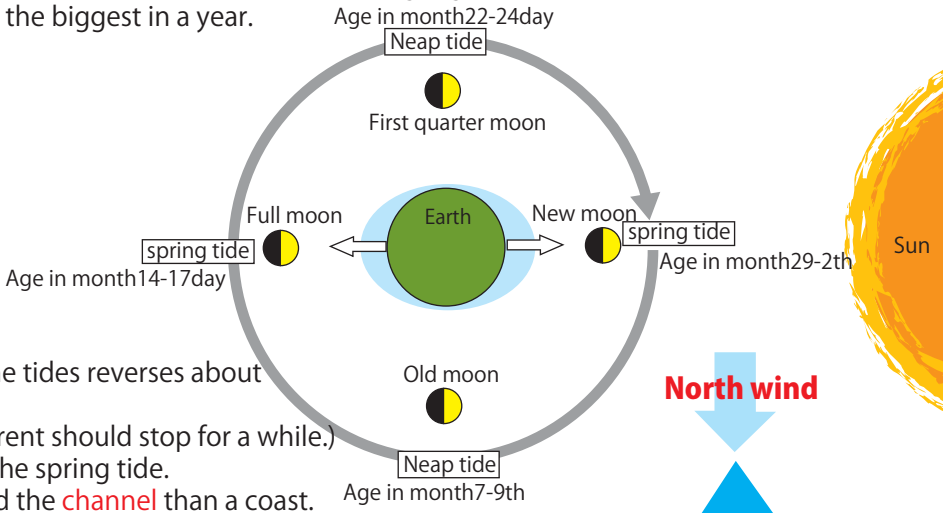
4.2.1.Tide

1, The gravitation of the moon and the sun, and the centrifugal force of the revolution of the earth make tide.
2. Usually, there are ebb tides and flood tides (low water and high water) two times on about every six hours in a day. (There are also unusual days when there is only one tide.)
3. Tidal range is the difference between high water (tide) and low water (tide).
4. The tidal range of two tides in one day isn't the same, and the interval is different, too.(Diurnal inequality)
5. Even at the same place, the ebb and flow don't happen in the same time every day, the ebb and flow time sea level height vary in the place, too.

4.2.2.Spring tides / Neap tides

1. During a full moon and new moon phase there is an increase in tidal range and water movement (called Spring Tides). The high tides are very high and the low tides are very low.Tidal range is maximized.
2. During the first quarter and third quarter moon phase there is decreased tidal range and water movement (called Neap Tides). The high tides are low and low tides are high. Tidal range is minimized.
(※ It actually varies because of the ocean current and the form of the geographical features.)
3. The range of the tide in the spring is the biggest in a year.





4.2.3.Tidal current

1. The current which appears due to the tides reverses about every six hours.
(Slack water....When it reverses the current should stop for a while.)
2.A current becomes the strongest at the spring tide.
3.A current is faster at the seashore and the channel than a coast.
4.The current of the outside is stronger than inside in the curving area.
5.The current of the shallow water is faster.
6.The current to flow north is termed the north current.

There are several different kinds of currents including oceanic, river, and wind-driven; all with their own driving force. This page addresses only the tidal currents.
Tidal currents (a horizontal motion) are a result of the rise and fall of the water level due to tides (a vertical motion). The effects of tidal currents on the movement of water in and out of bays and harbors can be substantial.

4.2.4.Some Tide Terminology

spring tide....when earth, sun, and moon are alined, new full moon
neap tide....when the moon is at 1/4 or 3/4 position relative to the earth
high tide....when the tide is very high because the moon is highest in the sky or on the complete opposite side of the planet
low tide....when the tide is very low because 1/2 between rising and setting and setting and rising flood tide tide coming in
ebb....tide tide going out
slack tide....time before tide turns, right at the peak of high tide or low tide
tidal range....vertical distance between high tide and the preceding low tide
rip tide....result of wave action, waves pile up on beach and move along shore because of contours or obstacles
tidal wave....rom a tsunami, a wave generated by an underwater earthquake
mean high tide....average high over a certain period of time
mean low tide....average low over a certain period of time
tidal current....the flow of water going in and out

4.2.5.Some Current Terminology

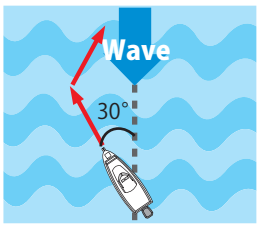
Set....The set of a current is the direction that it flows toward. Note that this is the opposite of the way winds are reported.
Drift....This is the speed of a current. On ocean waters it is usually stated in knots; in rivers, mph.
Velocity....As the typical term in physics infers, this is an indication of both speed and direction (set and drift).
Speed....How fast the water is moving in relation to a stationary object (e.g. shore, light house).
Flood Flow....The tidal current is in flood when it is coming from the sea to the shore (tide is coming in, or high tide is ensuing).
Ebb Flow....The tidal current is in ebb when it is coming from shore and returning to the sea (low tide ensuing).
Slack Water....The point between flood and ebb (or ebb and flood) currents when there is no horizontal movement.
Stand....The point where vertical changes stop as the tide reverses. This is not the same as slack water; this is a tidal (vertical) occurrence, not a tidal current (horizontal) occurrence.
Maximum Current....The normal maximum speeds of the ebb and flood currents. This does not include effects of weather or run off from rain or melting snow, which can significantly effect tidal currents.

4.3.Operation in Heavy Weather Boat

4.3.1Head sea

1. The shock of a wave from directly ahead of the boat can cause pitching and yawing .
2. The shock of a wave from diagonally ahead (about 30°) is easier and safer. (There is less pitching and yawning.)
3. When pitching increases, the propeller can run idle. Speed slows down, and navigation is difficult because a propulsion system is damaged.

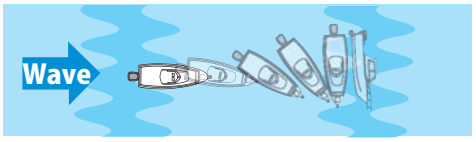
4.3.2.Beam sea

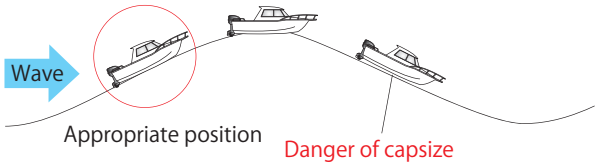


Definition: a sea whose surface motion is approximately at a right angle to the course of a vessel.
1.If there is a beam sea, the boat 's stability will be poor, the boat will roll
2.The boat may capsize

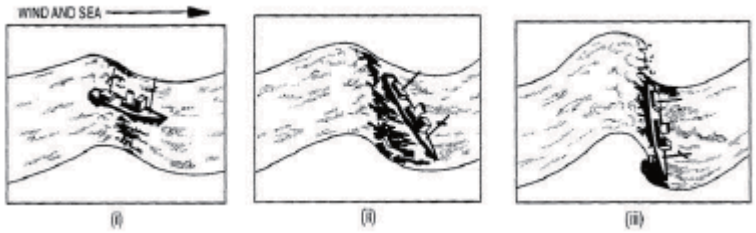
4.3.3.Following sea

Definition: a following sea refers to a wave direction that matches the heading of the boat. For example, if the waves of the body of water are heading in the same direction as the sailor, then the water is "following" the sailor's boat.
1.It is hard to keep a course when a boat navigates on a following sea.
2.The stern of a boat moves sideways on the downslope of a wave. There is danger of broaching.
3.As much as possible, speed is adjusted so that the boat continually keeps climbing the wave.





The unplanned turning of a vessel to expose its side to the oncoming waves. In heavy seas this could cause the boat to be knocked down.
Broad on the beam



4.3.4Preparation for heavy weather

1. When a navigation plan is organized, ports of distress are also selected.
2. All members will wear lifejackets. All rescue equipment will be available.
3. Shut all opening such as hatches and windows. Confirm whether the scuppers of a deck are not choked up.
4. Avoid chopping wave and surf. (Usually around a river mouth, the tip of the cape, a breakwater, a bridge pier.)