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Buku Ajar

ILMU PELAYARAN DATAR

Dr. Iskandar, S.H., M.T.

BUKU AJAR

ILMU PELAYARAN DATAR

UU No 28 tahun 2014 tentang Hak Cipta

Fungsi dan sifat hak cipta Pasal 4

Hak Cipta sebagaimana dimaksud dalam Pasal 3 huruf a merupakan hak eksklusif yang terdiri atas hak moral dan hak ekonomi.

Pembatasan Pelindungan Pasal 26

Ketentuan sebagaimana dimaksud dalam Pasal 23, Pasal 24, dan Pasal 25 tidak berlaku terhadap:

i. Penggunaan kutipan singkat Ciptaan dan/atau produk Hak Terkait untuk pelaporan peristiwa aktual yang ditujukan hanya untuk keperluan penyediaan informasi aktual;
ii. Penggandaan Ciptaan dan/atau produk Hak Terkait hanya untuk kepentingan penelitian ilmu pengetahuan;
iii. Penggandaan Ciptaan dan/atau produk Hak Terkait hanya untuk keperluan pengajaran, kecuali pertunjukan dan Fonogram yang telah dilakukan Pengumuman sebagai bahan ajar; dan
iv. Penggunaan untuk kepentingan pendidikan dan pengembangan ilmu pengetahuan yang memungkinkan suatu Ciptaan dan/atau produk Hak Terkait dapat digunakan tanpa izin Pelaku Pertunjukan, Produser Fonogram, atau Lembaga Penyiaran.

Sanksi Pelanggaran Pasal 113

1. Setiap Orang yang dengan tanpa hak melakukan pelanggaran hak ekonomi sebagaimana dimaksud dalam Pasal 9 ayat (1) huruf i untuk Penggunaan Secara Komersial dipidana dengan pidana penjara paling lama 1 (satu) tahun dan/atau pidana denda paling banyak Rp100.000.000 (seratus juta rupiah).
2. Setiap Orang yang dengan tanpa hak dan/atau tanpa izin Pencipta atau pemegang Hak Cipta melakukan pelanggaran hak ekonomi Pencipta sebagaimana dimaksud dalam Pasal 9 ayat (1) huruf c, huruf d, huruf f, dan/atau huruf h untuk Penggunaan Secara Komersial dipidana dengan pidana penjara paling lama 3 (tiga) tahun dan/atau pidana denda paling banyak Rp500.000.000,00 (lima ratus juta rupiah).

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KATA PENGANTAR

Puji syukur kami panjatkan ke hadirat Allah Swt. atas selesainya penyusunan materi ajar Ilmu Pelayaran Datar untuk peserta Diklat Ahli Nautika Tingkat III (ANT-III).

Diharapkan dengan adanya buku ajar ini akan membantu para peserta diklat lebih memahami pengetahuan dan keterampilan dalam menentukan posisi dengan mempergunakan benda-benda bantu navigasi dengan baik dan benar serta memperhatikan aspek keselamatan.

Dalam penyusunan buku ajar edisi pertama ini, penyusun menyadari keterbatasan pengetahuan tentang peraturan-peraturan yang sedikit banyak mendasari tentang *Standar Training Certification and Watchkeeping* (STCW), *International Model Course 7.03*, kurikulum dan silabus serta *Quality Standard System* yang diberlakukan di Indonesia, sehingga memungkinkan masih terdapat kekurangan baik dalam penyajian maupun penggunaan istilah. Untuk itu saran dan pendapat sangat kami harapkan untuk penyempurnaan edisi berikutnya.

Semoga tujuan dan upaya peningkatan keterampilan bagi pelaut Indonesia dapat tercapai sesuai yang diharapkan.

Sorong, Juli 2020

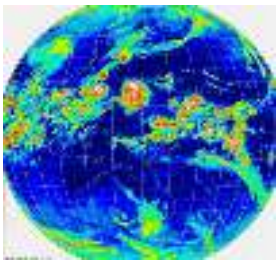
Dr. Iskandar, S.H., M.T.

DAFTAR ISI

BAB I
DEFINISI-DEFINISI

Bola Dunia (*Globe*)

Adalah suatu bentuk tiruan bola bumi yang dibuat dalam skala yang kecil untuk dapat lebih memahami bentuk asli planet bumi.

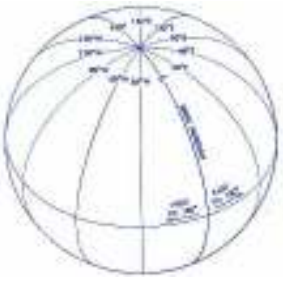


Lingkaran Kecil (*Small Circle*)

Adalah Lingkaran yang membagi luas bumi dalam dua bagian yang tidak sama besarnya.

Lingkaran Besar (*Great Circle*)

Adalah Lingkaran yang membagi luas bumi dalam dua bagian yang sama (titik pusatnya selalu berimpit dengan titik pusat bumi)



Bujur (*Meredian*)

Adalah lingkaran besar di bumi yang melalui kutub utara dan kutub selatan bumi

Bujur Nol (*Prime Meridian*)

Adalah bujur yang melalui Greenwich (bagian kota London).

Khatulistiwa (*Ekuator*)

Adalah lingkaran besar di bumi yang titik-titiknya terletak sama jauhnya terhadap kutub Utara dan kutub Selatan (bidangnya terletak tegak lurus pada poros bumi).

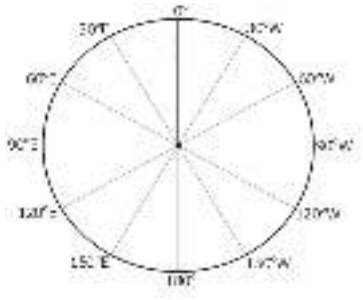
Kutub-kutub (Pole)

Adalah titik-titik potong dari poros bumi dengan permukaan bumi (Kutub Utara dan Kutub Selatan)

Derajat (Secara Lengkap, Derajat Busur), biasanya disimbolkan dengan °,

Adalah ukuran sudut yang dapat dibentuk pada sebuah bidang datar, menggambarkan 1/360 dari sebuah putaran penuh.

1 Menit (1') adalah 1/60 bagian dari satu derajat



Mil Laut (*Nautical Mile* atau *Sea Mile*)

Adalah suatu satuan panjang yang digunakan di seluruh dunia untuk keperluan maritim dan navigasi. Satuan ini digunakan juga pada hukum dan perjanjian internasional, terutama menyangkut batas wilayah perairan.

- 1 Mil laut = tepat 1.852 Meter
- 1 cable = 0.1 *Mile*
- Knot adalah satuan kecepatan dengan satuan *mile/hour* (mile/jam)

Garis Lintang (*Latitude*)

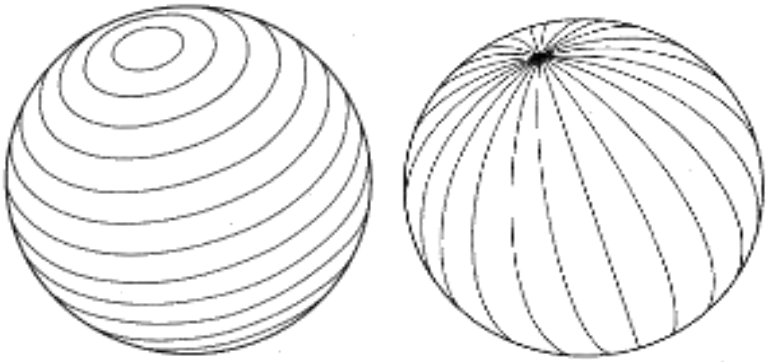
Yaitu garis khayal yang melintang pada permukaan bumi dari arah barat ke timur dan sebaliknya.

Garis khayal di atas permukaan bumi yang sejajar dengan khatulistiwa, untuk mengukur seberapa jauh suatu tempat di utara/selatan dari khatulistiwa

Garis Bujur (*Longitude*)

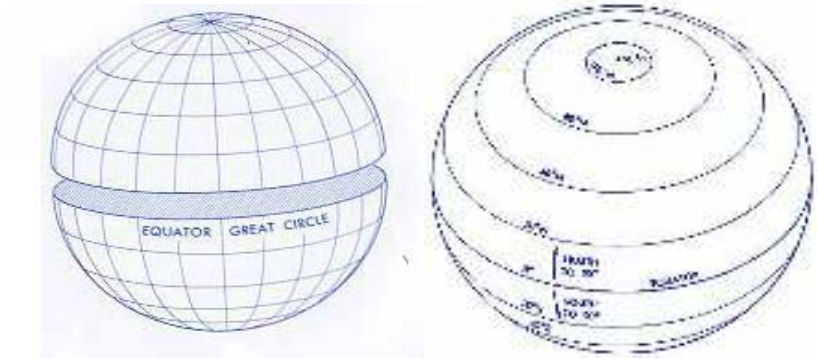
Adalah garis khayal yang menghubungkan kutub utara dan kutub selatan atau sebaliknya yang sama panjang.

Garis khayal yang menghubungkan kutub utara dan kutub selatan, mengukur seberapa jauh suatu tempat dari meridian.



Garis lintang dibedakan menjadi:

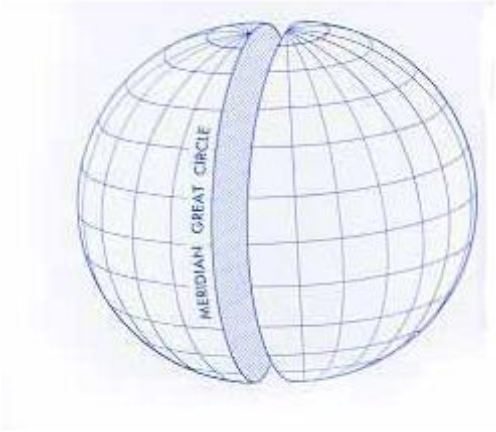
- Lintang Utara (LU) besarnya O ˚LU-90 ˚LU berada di utara khatulistiwa
- Lintang Selatan (LS) besarnya O ˚LS-90 ˚LS berada di selatan khatulistiwa



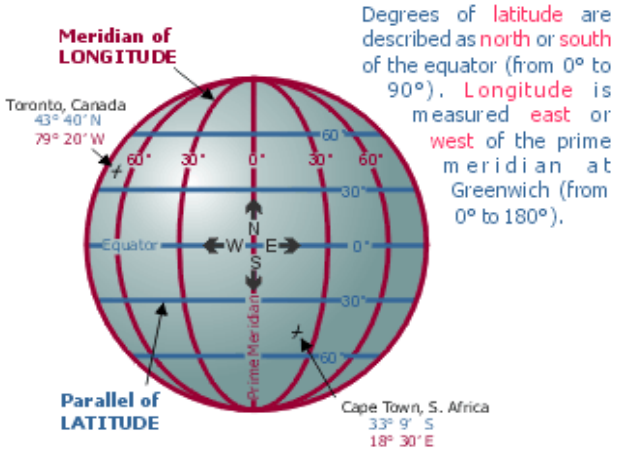
Garis bujur dibedakan menjadi:

Bujur Barat (BB) besarnya 0 ˚-180 ˚(searah barat)

Bujur Timur (BT) besarnya 0 ˚-180 ˚(searah timur)



Cara pembacaan lintang dan bujur (posisi)



Garis bujur 0 ˚ melalui kota Greenwich-London, dinyatakan sebagai meridian 0 ˚.

Sering disebut *Greenwich Mean Times* (GMT) sedangkan Garis Bujur 180˚ membujur di Samudera Pasifik disebut garis penanggalan internasional (*International Date Line*)

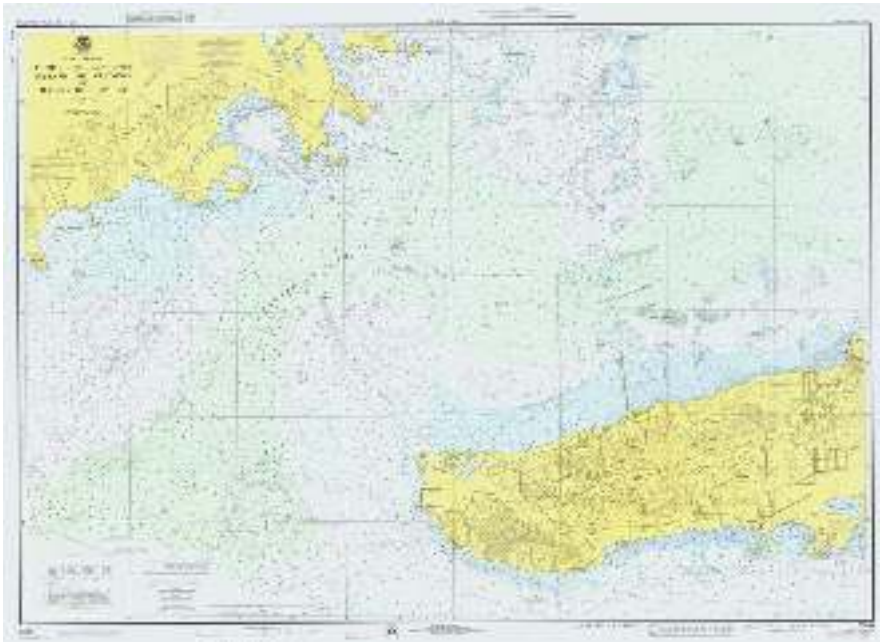
Garis Lintang 0 ˚

Disebut garis khatulistiwa (ekuator) yaitu garis yang membagi bumi menjadi 2 belahan yang sama besar yaitu belahan bumi utara dan selatan.

Garis khatulistiwa merupakan lintang terpanjang mengelilingi bumi dengan panjang 40.000 km.

BAB II
PROYEKSI PETA

Peta adalah gambaran seluruh atau sebagian dari permukaan bumi yang dilukiskan ke dalam bidang datar dengan perbandingan tertentu.



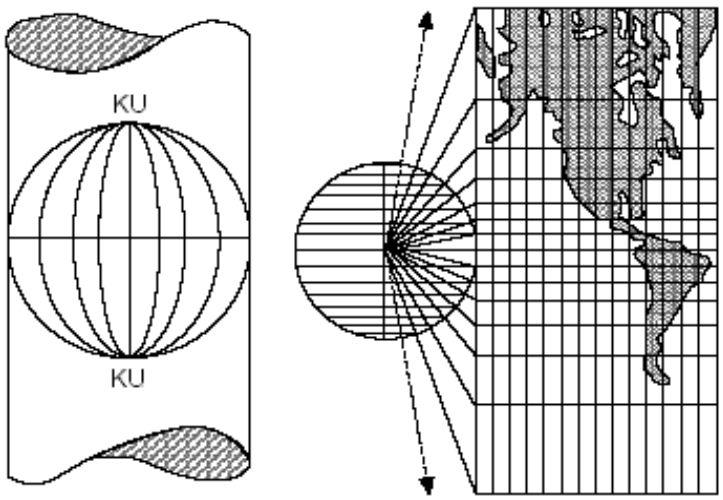
Dari pemindahan bentuk yang melengkung menjadi bentuk yang mendatar menyebabkan tidak ada suatu jenis peta yang dapat memberikan hasil yang sempurna sehingga setiap jenis peta pasti akan terdapat kekurangan-kekurangan. Oleh sebab itu dibuat

bermacam-macam proyeksi peta agar untuk penggunaan-penggunaan tertentu dapat dipilih jenis-jenis peta yang paling sesuai.

Macam-Macam Proyeksi Peta

I. Proyeksi Silinder (*Cylindrical Projection*)

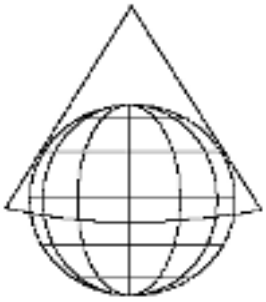
Proyeksi Silinder adalah suatu proyeksi permukaan bola bumi yang bidang proyeksinya berbentuk silinder dan menyinggung bola bumi.



Skema Proyeksi Silinder

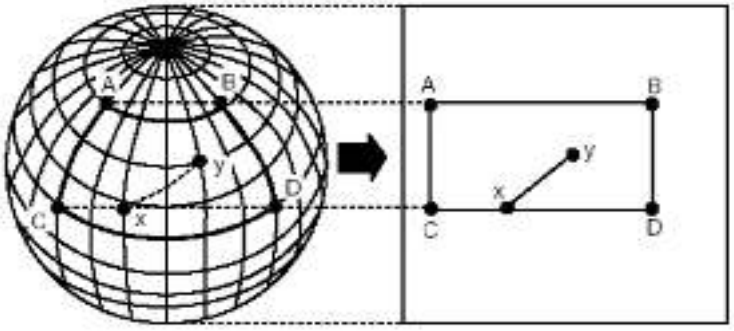
II. Proyeksi Kerucut

Pada proyeksi kerucut adalah proyeksi dari kulit bumi pada bidang kerucut yang puncaknya berimpit pada perpanjangan sumbu bumi dan kerucutnya menyinggung salah satu jajar di bumi.



III. Proyeksi Bidang Datar

Proyeksi bidang datar pada jenis proyeksi ini, permukaan bumi diproyeksikan pada sebuah bidang datar yang disinggungkan pada bola bumi.



Prinsip proyeksi berupa pembuatan peta dari bentuk bola (globe) ke bidang datar (peta)

Macam-Macam Proyeksi Silinder

1. Ekuatorial: yaitu hasil proyeksi apabila silinder menyinggung pada ekuator.
2. Polar: yaitu hasil proyeksi apabila silinder-silinder menyinggung pada meridian atau derajat.

3. Obligue. miring: yaitu hasil proyeksi apabila silinder menyinggung pada selain meridian atau ekuator.

Proyeksi merkator merupakan proyeksi silinder normal konform, di mana seluruh muka bumi dilukiskan pada bidang silinder yang sumbunya berimpit dengan bola bumi, kemudian silindernya dibuka menjadi bidang datar

Berhubungan bentuk bumi yang sebenarnya tidaklah bulat seperti bola, maka proyeksinya tidak dapat memberikan gambaran bumi mendekati yang sebenarnya (tidak sebangun). Kesalahan-kesalahan makin besar di dekat kutub, karena makin ke kutub jari-jari bumi makin kecil jika dibandingkan dengan jari-jari bumi di khatulistiwa. Kemudian peta merkator dibuat berdasarkan perhitungan (matematika) dengan menghitung pertumbuhan jajar ke arah kutub untuk mengimbangi pertumbuhan derajat-derajat di luar khatulistiwa. Oleh karena itu peta tersebut juga terkenal dengan peta lintang bertumbuh.

Sifat- Sifat Proyeksi Merkator

1. Hasil proyeksi adalah baik dan betul untuk daerah dekat ekuator, tetapi distorsi makin membesar bila makin dekat dengan kutub.
2. Interval jarak antara meridian adalah sama dan pada ekuator pembagian vertikal benar menurut skala.
3. Interval jarak antara paralel tidak sama, makin menjauh dari ekuator, interval jarak makin membesar.
4. Proyeksinya adalah konform.

5. Kutub-kutub tidak dapat digambarkan karena terletak di posisi tak terhingga.

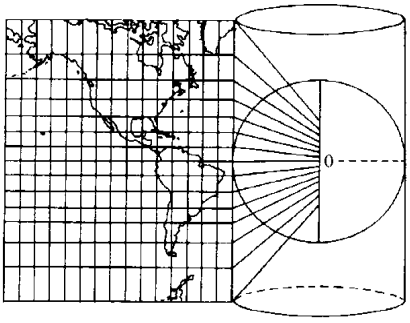


Figure 4–6. The Mercator conformal projection.

Proyeksi *Gnomonic*

Titik pusat proyeksi *gnomonic* adalah titik pusat bumi. Salah satu bentuk proyeksi *gnomonic* adalah peta lingkaran besar (*gnomonic chart*).

Contoh:

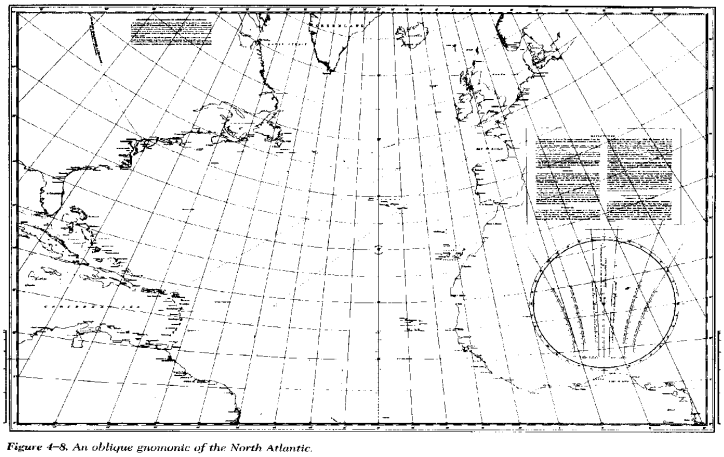


Figure 4–8. An oblique gnomonic of the North Atlantic.

SKALA PETA

- Skala dari sebuah peta ialah perbandingan dari satu satuan panjang di peta terhadap panjang yang sebenarnya di permukaan bumi.
- Pada dasarnya makin besar skala suatu peta, maka makin detail keterangan dan informasi yang dapat ditunjukkan sehingga keselamatan pelayaran lebih terjamin. Skala pada peta dapat ditemukan di bawah judul peta.

Jenis-jenis Skala peta:

1. Skala Natural

   Adalah perbandingan 1 satuan panjang di peta sama dengan 100.000 satuan tersebut, pada keadaan yang sebenarnya.

   Contoh: Skala 1: 200.000

   Artinya garis di peta itu harus dikalikan dengan 200.000 untuk mendapatkan panjang sebenarnya.

2. Skala Angka

   Adalah perbandingan menggunakan satuan yang sudah jelas.

   Contoh: Skala 1cm = 1 km

3. Skala Grafik

   Adalah skala yang berbentuk garis dalam *mile*, yard, km.

   Contoh: Skala mil 

PETA LAUT YANG BAIK

Peta laut yang kita pakai harus “baik”. Sebuah peta laut disebut baik apabila:

1. Survei waktu membuat peta mutakhir.
2. Kedalaman yang ditunjukkan letaknya berdekatan dan merata.
3. Garis-garis batas dalamnya air (*contour lines*) harus ada dan nyata.
4. Garis-garis pantai harus nyata tanpa terputus-putus.
5. Keterangan-keterangan serta tanda-tanda yang dibutuhkan seorang navigator tertera dengan nyata.
6. Berwarna dan jelas.
7. Judul peta juga terdapat dibelakang peta.
8. Tidak terlalu banyak koreksi kecil.
9. Bahan (kertas) peta yang baik atau sangat sedikit pemuaian dan penyusutannya.
10. Ukurannya normal.

KETERANGAN YANG UMUM TERDAPAT DI PETA LAUT

1. Nomor peta (*number of chart*). Dicetak pada sudut kanan bawah dan sudut kiri atas dari peta di luar garis peta. Kadang-kadang di keempat sudut dan kadang - kadang hanya pada satu sudut.
2. Nama peta (*title of chart*). Dicetak di tempat yang paling baik dan nyata dan tidak menutupi keterangan-keterangan penting maupun daerah lalu lintas (rute pelayaran utama) dari peta. Di bawah nama peta terdapat keterangan-keterangan sbb:
   - skala,
   - tahun survei,
   - harga peta,

- penerbit,
- patokan dalam air (*sounding*),
- patokan tinggi objek di darat (*height*),
- muka surutan (*chart datum*),
- jenis proyeksi,
- keterangan-keterangan penting (peringatan-peringatan), *caution* atau *warning*,
- pasang surut.

3. Tahun penerbitan, (*date of publication*). Dicetak di garis batas peta, di bagian bawah ditengah-tengah. Contoh: *published at the admiralty* 15th Jan 1897.
4. Tahun edisi baru (*cate of new edition*). Dicetak disebelah kanan dari tahun penerbitan. Contoh: *New edition* 6th Juni 1921. Suatu edisi baru dari suatu peta dikeluarkan apabila untuk peta tersebut diadakan percobaan-percobaan/ pembaharuan-pembaharuan secara umum. Dengan keluarnya peta edisi baru, maka koreksi-koreksi besar dan koreksi-koreksi kecil pada peta yang lama dihilangkan.
5. Koreksi besar (*large correction*). Dicetak disebelah kanan dari tahun edisi baru atau jika disebelah kanan tahun penerbitan sudah dicetak tahun edisi baru, maka sering kali koreksi besar ini dicetak di bawahnya. Koreksi besar memuat keterangan tentang tanggal, bulan dan tahun pembetulan peta secara besar-besaran. Contohnya: *Large correction* 23rd August 1946. Koreksi besar diadakan apabila sudah terlalu banyak keterangan-keterangan koreksi kecil pada peta tersebut. Dengan dikeluarkannya koreksi besar maka koreksi-koreksi kecil pada peta yang lama dihilangkan.

6. Koreksi kecil (*small correction*). Dicetak/ditulis diluar garis peta di sudut kiri bawah. Koreksi ini memuat keterangan tentang tahun, bulan dan dasar pembetulan peta.
   Koreksi ini berdasarkan:
   1) Berita pelaut (*notice to mariners*).
   2) Navigation warning.
   3) Informasi resmi, dll.

   Navigasitional warning dan informasi resmi lainnya diumumkan kembali dalam NTM. Di atas kapal-kapal koreksi ini dilakukan sendiri oleh Perwira Navigasi. Tahun dan nomor NTM atau keterangan yang lain harus ditulis di peta, di sebelah kiri bawah, contoh: *Small correction* 1947-3.18-4.22 1948-2.17. Apabila koreksi-koreksi ini hanya bersifat sementara, pembetulan pada peta dibuat dengan pensil dan di bawah koreksi tersebut ditulis (T) artinya *temporary*. Apabila pembetulan bersifat pendahuluan, berarti akan dipermanenkan atau diubah atau dihapuskan lagi kelak diberi tanda (P) artinya *preliminary*.
7. Tanggal pencetakan (*date of printing*). Dicetak di sudut kanan atas menurut hari atau minggu ke berapa pada tahun yang bersangkutan. Contoh:45.64 artinya hari yang ke 45 pada tahun 1964 berarti tanggal 14 Februari 1964.
8. Ukuran peta (*dimensions of chart*). Diberikan dalam satuan inci atau mm dan ditunjukkan di sudut kanan kurung dan menunjukkan ukuran peta yang diukur antara garis sebelah (*inner borders*). Keterangan ini berguna apabila kita mencurigai adanya distorsi. Contoh: (25.06 x 18.05).

9. Bahan yang dipakai pencetak peta. Dicetak di bawah ukuran peta. Contoh: Zc 1949 artinya bahan pencetak petanya dari Zinc.
10. Patokan untuk mencetak peta. Dicetak pada keempat sudut peta dengan tanda siku-siku kecil yang berwarna lembayung.
11. Keterangan pasang dan arus pasang (*tide and tidal stream information*). Keterangan pasang untuk beberapa pelabuhan di suatu peta, seringkali dimasukkan juga di peta yang bersangkutan, dan dicetak pada tempat yang baik di atas peta dengan tidak menutupi keterangan-keterangan ataupun lalu lintas pelayaran utama. Keterangan pasang biasanya berbentuk tabel atau tanda seperti belah ketupat dengan abjad atau angka sebagai pengenal, misalnya A atau 29 ataupun dengan keterangan-keterangan atau anak panah yang berarti keterangan tersebut untuk daerah yang mempunyai tanda yang serupa di dalam peta.
12. Dalam laut. Dinyatakan dalam depa (*fathom*) dan kaki (*feet*) atau dalam meter dan desimeter. Di bawah 11 depa selalu diberikan dalam depa dan kaki. contoh: 82 artinya 8 depa 2 kaki. Satuan untuk dalam laut dicetak dengan huruf-huruf yang terang di bawah nama peta. Misalnya: *soulding in fathoms*
13. Muka surutan (*chart datum*). Muka surutan adalah suatu permukaan khayalan dari mana dalam laut diukur. Setiap dalam laut yang tertera di peta dihitung sampai permukaan ini. Maka surutan yang dipakai oleh badan-badan hidrografi di dunia:

a. Indonesia: duduk terendah rata-rata dalam jangka ½ tahun.
b. Inggris: air rendah purnama rata-rata (*mean LW spring*) ialah rata-rata dari permukaan air pada waktu air rendah purnama.
c. Amerika: di Atlantik air rendah rata-rata (*mean LW*) ialah rata-rata dari semua air rendah pada suatu tempat. Di Pasifik air rendah terendah rata-rata (*mean Lower LW*) ialah rata-rata dari letak permukaan air yang terendah pada waktu air surut.
d. Belanda: air rendah terendah purnama rata-rata (*mean lower LW spring*) ialah rata-rata dari permukaan-permukaan air terendah pada waktu air rendah purnama.

14. Tinggi-tinggi, dinyatakan dalam kaki (*feet*) atau meter terhadap air tinggi purnama rata-rata (MLWS = *Mean High Water Spring*) ialah rata-rata dari permukaan air pada waktu air tinggi purnama. Tinggi sebuah pulau dinyatakan dengan angka di dalam tanda kurung dekat dengan pulau tersebut atau di pulaunya, agar tidak keliru dengan dalamnya laut. Contoh: (432) artinya tinggi pulau tersebut = 342 m atau 342 ft.
15. Tanda-tanda dan singkatan-singkatan (*symbol and abbreviation*) yang digunakan pada peta laut Inggris (*British Admiralty Charts*) ditunjukkan di dalam peta no. 5011. Pada peta-peta Amerika dan peta-peta Indonesia, maka tanda-tanda serta singkatan-singkatan tersebut ditunjukkan dalam peta no.1. Keterangan-keterangan yang sudah dibatalkan

tidak boleh dihapus, melainkan dicoret dengan tinta ungu yang rapi.

Chart Number, Title, Marginal Notes

1	Chart number in national chart series
2	Identification of a latticed chart (if any). D=Decca; LC=Loran-C; Om=Omega
3	Chart number in international chart series (if any)
4	Publication note (imprint)

5	Bar Code
6	Edition note. (In this example: Seventh edition published in June, 1996)
7	Source data diagram (if any). (For attention to navigators: use caution where surveys are inadequate.)
8	Dimensions of inner borders
9	Corner coordinates
10	Chart title
11	Explanatory notes on chart construction, etc. (to be read before using chart)
12	Seals. In this example, the national and International Hydrographic Organization seals show that this national chart is also an international one. Purely national charts have the national sea only. Reproductions of charts of other nations (facsimile) have the seals of the original producer (left), publisher (center), and the IHO (right).
13	Projection and scale of chart at stated latitude. (The scale is precisely as stated only at the latitude quoted)
14	Linear scale on large-scale charts
15	Reference to a larger-scale chart
16	Cautionary notes (if any). Information on particular features (to be read before using chart)
17	Reference to an adjoining chart of similar scale

KATALOG

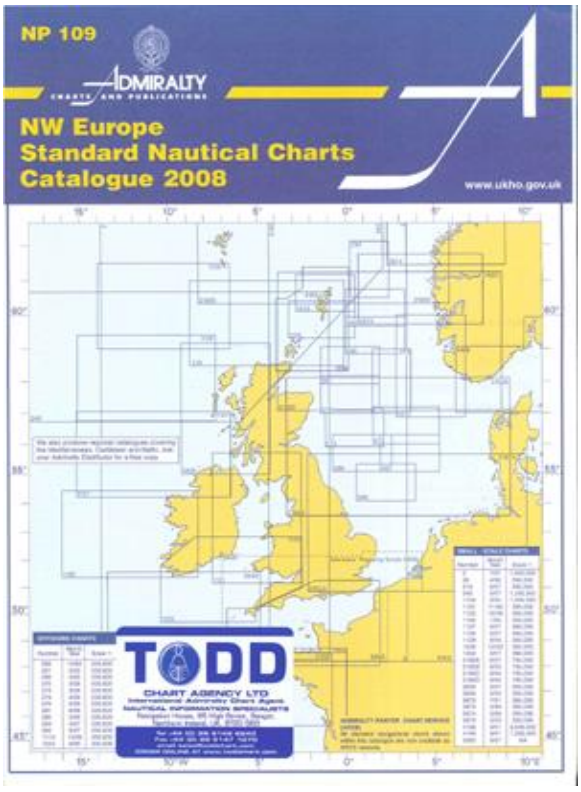
Katalog merupakan suatu buku yang berisi nama, seri nomor, harga dan lain-lain dari segala macam peta, baik *navigational charts*, maupun *non navigational charts* dan juga daftar dari penerbitan-penerbitan navigasi yang berguna bagi navigator.

Khusus mengenai peta laut terdapat *index* peta dari A s.d. W yang meliputi seluruh dunia. *Index* ini akan menunjukkan daerah-daerah di mana kita berada dan setelah kita menemukan daerah yang kita maksudkan, maka kita dapat mencari peta-peta mana

yang kita butuhkan. Katalog peta diterbitkan oleh tiap-tiap negara, sehingga apabila kita akan mencari peta yang kita gunakan untuk pelayaran maka harus menggunakan katalog yang sama dari negara yang menerbitkan

Contoh:

1. Kalau akan memakai Peta Indonesia untuk pelayaran maka dalam menyusun peta juga menggunakan Katalog Peta Indonesia.
2. Kalau akan memakai Peta BA untuk pelayaran maka dalam menyusun peta juga menggunakan BA katalog.



BERITA PELAUT (*NOTICE TO MARINERS*)

Berita pelaut merupakan suatu buku yang sebenarnya adalah kumpulan dari semua berita-berita dalam satu minggu yang kemudian diterbitkan per minggu. Berita pelaut diberi nomor menurut minggunya di dalam satu tahun (no.1 s.d. 52). Isinya antara lain adalah perubahan-perubahan/tambahan-tambahan/ pengurangan-pengurangan yang ada sangkut pautnya dengan peta laut serta pada publikasi-publikasi navigasi lainnya. Di Indonesia dikenal dengan nama BPI (Berita Pelaut Indonesia), dikeluarkan oleh HIDRAL. Di luar negeri khususnya di Inggris dan Amerika dikenal dengan nama N.T.M. (*Nitoce to mariners*) dan dikeluarkan oleh Badan Hidrografi negaranya masing-masing. Isinya antara lain adalah:

1. Index
2. Berita pelaut.
3. Koreksi daftar suar, semboyan-semboyan kabut, dan semboyan-semboyan waktu.
4. Amandemen pada NEMEDRI dan daerah-daerah yang berbahaya karena ranjau.
5. Berita-berita keamanan pelayaran (*navigational warnings*).
6. Berita-berita radio resmi pada kapal-kapal niaga Inggris.

Pada umumnya pengeluaran N.T.M. dimaksudkan agar peta-peta laut, buku-buku kepanduan bahari, daftar-daftar suar, daftar isyarat-isyarat radio dll. Selalu dapat *up to date* mengingat keamanan pelayaran.

Mengoreksi peta sehubungan dengan berita pelaut

1. Apabila ada beberapa peta yang harus dikoreksi, maka peta dengan skala yang besar harus didahulukan (dalam hal ini koreksi hanya satu, akan tetapi meliputi beberapa peta dengan skala yang berbeda-beda).
2. Dalam memasukkan tambahan-tambahan/koreksi-koreksi pada peta dengan ukuran skala besar maka harus digunakan simbol-simbol serta singkatan-singkatan dari peta laut no.5011 (Inggris) atau peta laut no. 1 (Amerika dan Indonesia).
3. Untuk peta-peta samudera, hanya suar yang mempunyai jarak tampak 15 mil dan lebih yang dimasukkan. Selisih dari jarak tampak, yang perlu lagi hanya warna dan sifatnya.
4. Pelaksanaan dalam mengoreksi peta ada 2 cara:
   a. Dengan ditulis memakai tinta lembayung (merah).
   b. Dengan tempelan. Koreksi yang berupa gambar tempelan yang dilampirkan dalam N.T.M. digunting, kemudian ditempelkan pada peta yang bersangkutan sedemikian hingga gambar-gambarnya bersambungan tepat dengan peta yang dikoreksi.

Contoh:

INDEX OF NOTICES AND CHART FOLIOS

Notice No.	Page	Admiralty Chart Folio	Notice No.	Page	Admiralty Chart Folio
PL	2.1	1, 2, 3, 7, 9, 17, 18, 24, 36, 41, 43, 45, 47, 54, 56, 66, 88, 98, 312	**2315**	2.25	47
			2316	2.25	47, 50
			2317	2.26	47, 50
2248*	2.14	7	**2318**	2.26	50
2249*	2.14	2	**2319**	2.26	52
2250	2.19	9	**2320**	2.26	50
2251	2.19	9	**2321**	2.26	50, 53
2252	2.22	27	**2322**	2.27	50
2253	2.25	50	**2323**	2.27	50
2254	2.27	55	**2324**	2.27	50
2255	2.29	63	**2325**	2.27	50, 53

II

[22/02]

ADMIRALTY CHARTS AND PUBLICATIONS NOW PUBLISHED AND AVAILABLE

NEW ADMIRALTY CHARTS AND PUBLICATIONS

Admiralty Charts published 10 May 2002

Chart	Title, limits and other remarks	Scale	Folio	Cartographer	UK (SBA)*
1483	Wales – North Coast, Conwy Bay and Approaches 53°21'·0N 53°21'·65N 3°48'·60W 3°51'·60W	1:25 000	3	22	8.9.01
	Conwy 53°16'·50N 53°18'·22N 3°48'·97W 3°50'·08W *Addition to existing chart cover, provides improved coverage of Conwy Bay and the inshore entrance to the Menai Strait, to supersede existing Chart 1406, the chart includes a large scale plan of the River Conwy and Conwy Marina*	1:5 000			

III

NAVIGATIONAL WARNINGS

See NM 13/02. Messages printed below are all in force on 21 May 2002. It is recommended that this reprint should be kept as a file or book during the week, followed by subsequent weekly reprints. Only the most convenient Admiralty Chart is quoted. For those areas originated by other authorities only selected important warnings are reproduced.

(1) **Navarea I** (NE Atlantic) *22nd Wind 20/5/02.*
NAVAREA I warnings in force 21/5/02. 2000 series: 097 103 173. 2001 series: 151 222 252 303 513.
2002 series: 125 128 138 140 163 169 180 186 191 193 195 196 197.

185 Cancelled. Cancel 152/01.

186 NORTH SEA. Dogger Bank. Chart BA 200. Wreck, least depth 15₂ metres, located 54°31'·0N 002°30'·3E and marked by East Cardinal lightbuoy fitted with Racon(D).

187 Cancelled. Cancel 185/01.

IV

[22/02]

AMENDMENTS TO ADMIRALTY SAILING DIRECTIONS

NP 11 Arctic Pilot Volume II (1996 Edition)

Iceland – Vestmannaeyjar – Heimaey
Northeastwards Restricted area; anchorage deleted

79

Paragraph 2.48 Reference chart Replace by:
Icelandic Chart 321 (see 1.9)

After Paragraph 2.48 Insert:
Restricted area
2.48a
1 Anchoring and fishing are prohibited within a submarine cable and pipeline area, shown on the chart, which lies between Heimaey and the mainland NE.

Paragraph 2.49 1 Replace by:
1 During S and SE winds, anchorage is possible N of the harbour. Attention is drawn to the Restricted area described above, and to a submarine cable shown on Icelandic Chart 321 which has its landing close W of Heimaklettur (2.47).

V

AMENDMENTS TO ADMIRALTY LIST OF LIGHTS AND FOG SIGNALS

Volume A, 2002/03, *Weekly Edition No. 22, dated 31st May, 2002.*
Last Amendment: Weekly Edition No. 21, dated 23rd May, 2002.

1600	[illegible] Victoria Pier Head, Port Control	49 11 5 2 05 3	.. .. ..	.. .. ..	The following International Port Traffic Signals, [illegible] Port Control, [illegible] additional long-range Experts Lights shown from the [illegible]. The International Port Traffic Signals are [illegible] Mola Harbour Small Boats and Ex Collects Yacht Berth

VI

AMENDMENTS TO ADMIRALTY LIST OF RADIO SIGNALS

Weekly Edition No. 22 dated 30 May 2002

VOLUME 1, 2001/02—PART 1

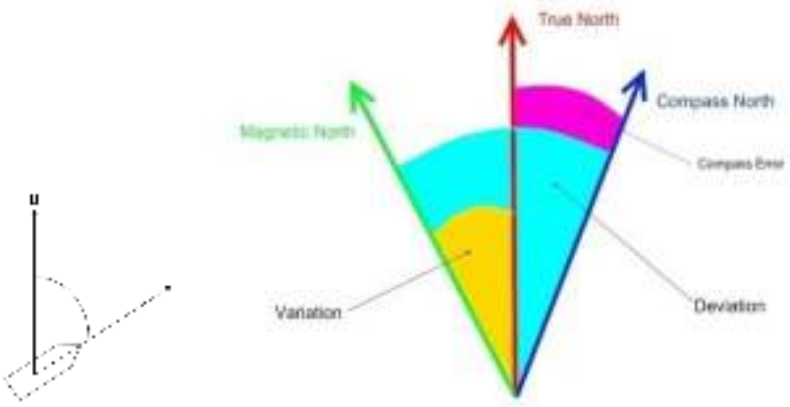
Published [illegible]

Last Amendments: Weekly Edition No. 16 dated 9 May 2002

BAB III
HALUAN

Definisi:

- Utara sejati (*true north*) adalah arah menuju kutub utara bumi.
- Utara magnet (*magnetic north*) adalah arah menuju kutub utara magnet bumi.
- Utara pedoman (*compass north*) adalah arah utara yang ditunjukkan oleh kompas.
- Haluan adalah sudut yang dibentuk antara garis lunas kapal dengan salah satu arah utara.



VARIASI

Variasi adalah sudut yang dibentuk antara Utara sejati (*true north*) dan utara magnet (*manetic north*). Nilai variasi suatu tempat di bumi dapat dicari:

1. Peta laut
2. Peta variasi
3. Buku kepanduan bahari

Besarnya nilai variasi tergantung dari:

1. Tempat
2. Tahun

Perubahan nilai variasi sangat lambat dari tahun ke tahun dan nilai perubahan ini dapat kita lihat pada mawar pedoman di peta:

Var'n 15 ˚W (1970) *decreasing about* 10´ *annually*

Var'n 10 ˚E (1970) *decreasing about* 5´ *annually*

Decreasing artinya berkurang dan *increasing* artinya bertambah

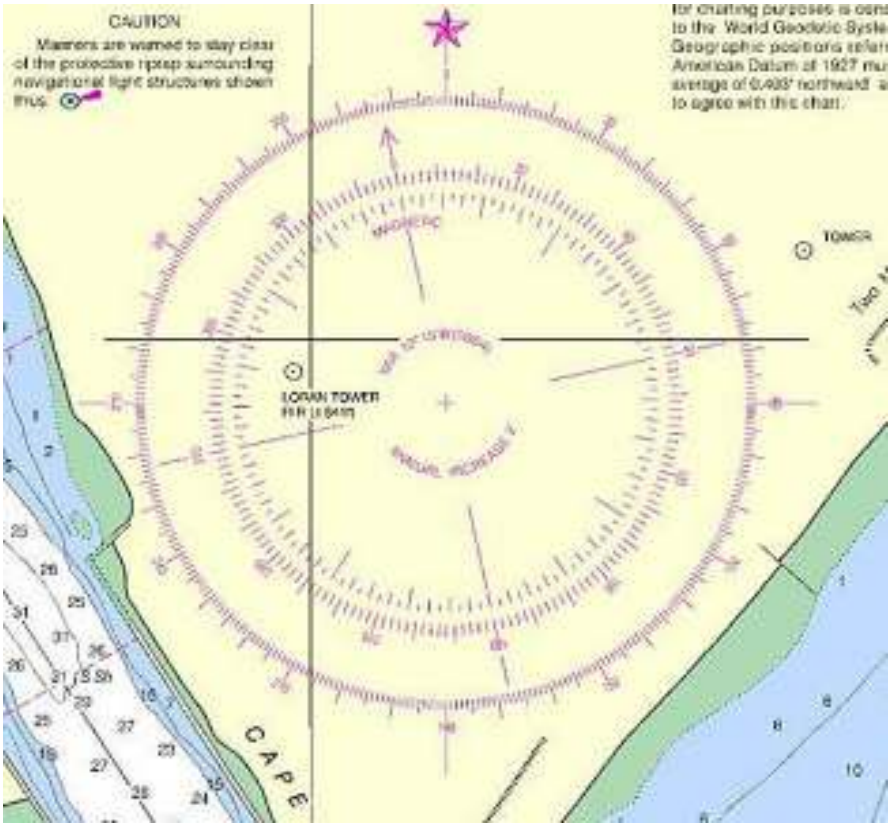
Contoh:

Var'n 15 ˚W (1970) *decreasing about* 10´ *annually*. Hitunglah nilai variasi tahun 2008.

Jawab:

- 15 ˚W - { (2008-1970) x 10 ' }
- 15 ˚W - {38 x 10 '}
- 15 ˚W-380 '
- 15 ˚W-6 ˚20'
- 8 ˚W 40'

Contoh Nilai variasi pada peta laut pada gambar berikut:



Pada mawar pedoman (*compass rose*), di mana terdapat 2 buah lingkaran di dalam mawar pedoman tersebut. Pada lingkaran bagian luar menunjukkan arah utara sejati sedangkan lingkaran bagian dalam menunjukkan utara magnet

Nilai variasi (+)/*east* apabila utara magnet berada disebelah timur dari utara sejati

Nilai variasi (-)/*west* apabila utara magnet berada disebelah barat dari utara sejati

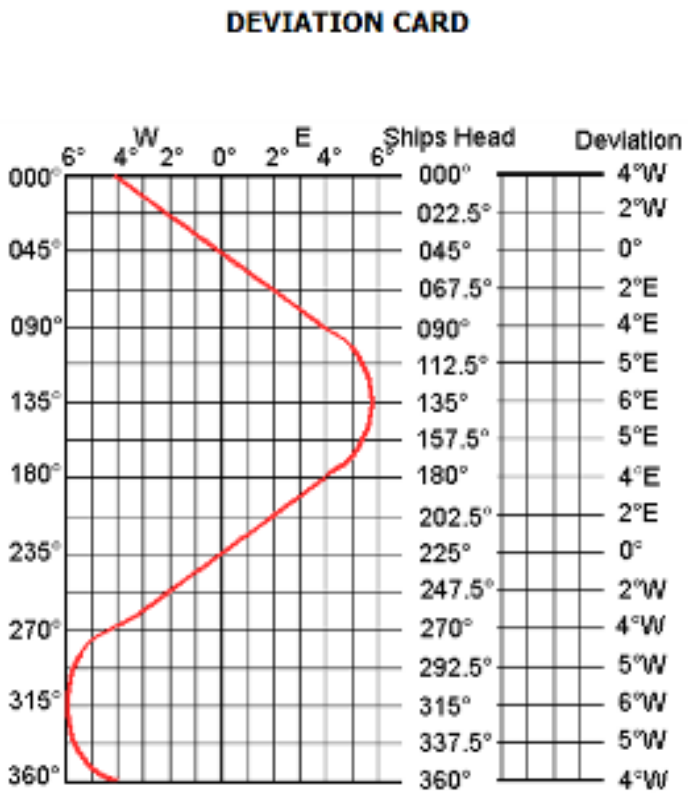
DEVIASI

Deviasi adalah sudut yang dibentuk antara utara Magnet dan utara pedoman

Besarnya deviasi di peta dipengaruhi oleh besi-besi di atas kapal dan sangat tergantung dari haluan pedoman magnet yang dikemudikan.

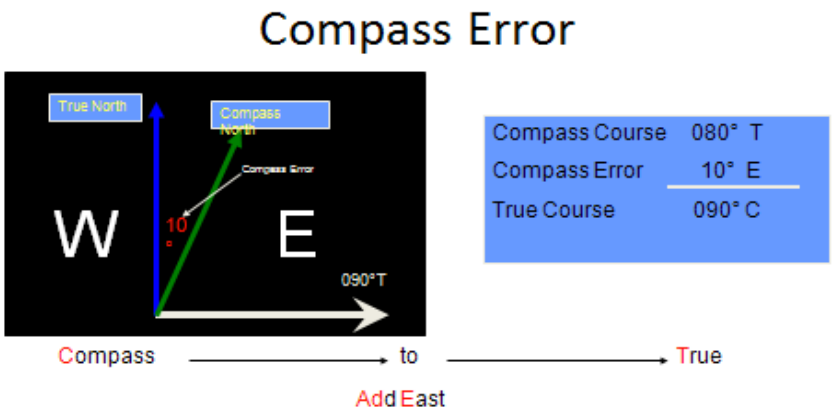
Nilai deviasi dapat diperoleh dari daftar deviasi yang ada di atas kapal.

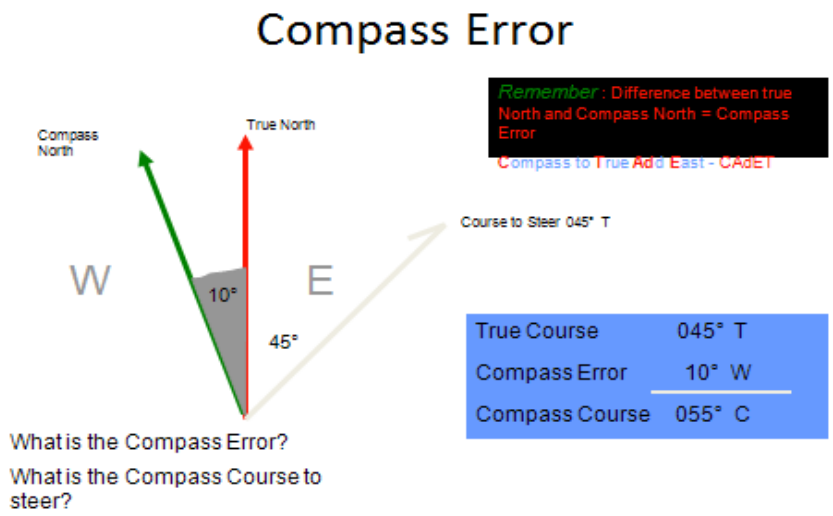
Contoh daftar deviasi:



COMPASS ERROR = DEVIATION + OR - VARIATION

Compass error sering disebut dengan sembir.





Deviation, Variation, Compass Error

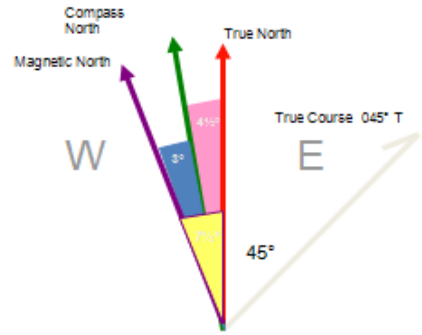
Deviation = 3°E, Variation = 7½°W, True Course = 045°T

What is compass error?

What is the compass course to steer?

Remember: Difference between true North and Magnetic North = **Variation**, and difference between Magnetic North and Compass North = **Deviation**. Difference between Compass North and True North = **Compass Error**.

Compass to True Add East - CAdET



Variation =	7½° W
Deviation =	3° E
Compass Error =	4½° W

True Course =	045° T
Compass Error =	4½° W
Compass Course =	049½° C

Put It All Together

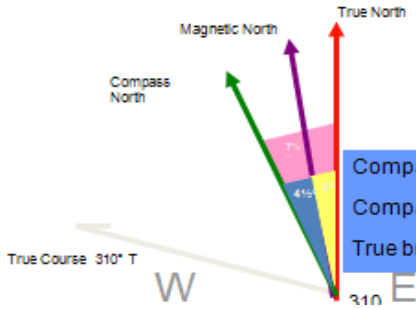
Deviation = 4½°W, Variation = 3°W True Course = 310°T

Observed three compass bearings 035°C, 082°C & 125°C @ 1130.

What is the compass error?

What is the compass course?

What are the true bearings to plot?



Variation =	3° W
Deviation =	4½° W
Compass Error =	7½° W

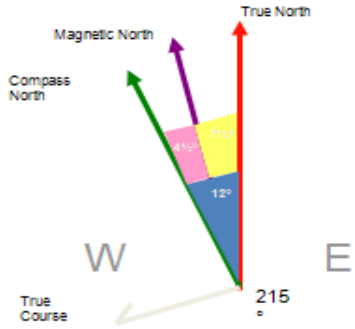
True Course =	310° T
Compass Error =	7½° W
Compass Course =	317½° C

Compass brgs	035°	082°	125°
Compass err	7½°	7½°	7½°W
True brgs	027½°	074½°	117½°

Put It All Together

Compass bearing 146°C True bearing 134°T True Course = 215°T Variation = 7½°W

What is the compass error?
What is the compass course?
What is the deviation?



Compass brg	146°	C
True brg	134°	T
Compass Error =	12°	W
Variation =	7½°W	
Deviation =	4½°W	

True Course =	215°	T
Compass Error =	12°	W
Compass Course =	227°	C

Dalam mengemudikan haluan kapal pada saat berlayar dapat digunakan kompas magnet ataupun kompas *gyro*. Pada umumnya dalam mengemudikan haluan hampir semua kapal menggunakan kompas *gyro* karena:

1. Haluan yang ditunjukkan oleh kompas *gyro* mendekati haluan sejati (kesalahan sangat kecil yaitu kurang dari 1˚).
2. Dapat digunakan pada saat kapal berlayar di daerah kutub bumi di mana kompas magnet tidak dapat digunakan.
3. Tidak dipengaruhi oleh besi atau material di sekitarnya.
4. Dapat dikombinasikan dengan peralatan navigasi yang lain seperti: Radar/Arpa, Ecdis, GPS dan lain-lain.

Walaupun kesalahannya (*gyro compass error*) kecil, namun dalam pelayaran harus dilakukan pengecekan sekali setiap jaga. Pengecekan *gyro compass error* dapat dilakukan dengan menggunakan:

1. Azimut benda angkasa (seperti: matahari, bulan, bintang atau planet).
2. *Leading light* pada saat kapal berlayar menggunakan penuntun pada *leading light* tersebut.

Figure 9–8A. A 5° westerly gyro error illustrated.

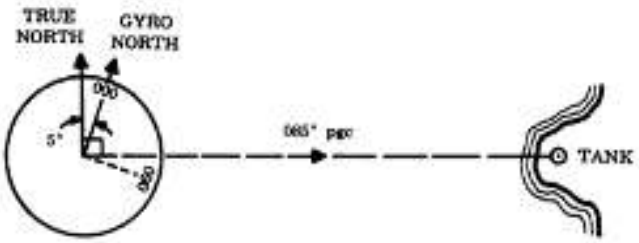


Figure 9–8B. A 5° easterly gyro error illustrated.

Gyrocompass Error

- To remember how to use the gyro error, two memory aids are commonly used:

1) "Gyro is best, error is west. Gyro is least, error is east."

2) Gyro + East = True (G.E.T.)

BAB IV
PENENTUAN POSISI

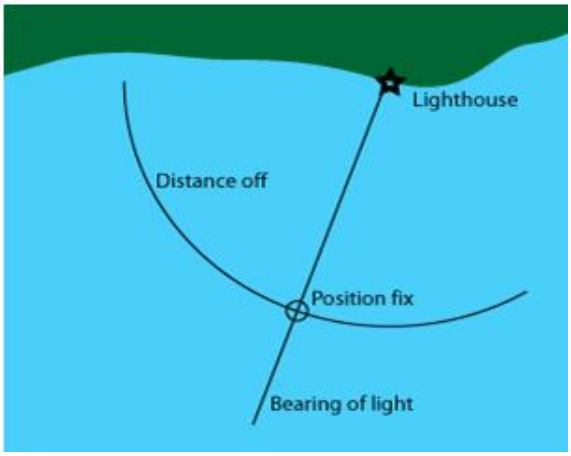
PERLENGKAPAN MEJA PETA

1. Katalog
2. NTM
3. Mistar jajar (*pararell ruler*)
4. 1 set penggaris segitiga (*triangle ruler/navigational square*)
5. Penggaris panjang (*long strait ruler*)
6. Jangka (*devider*)
7. Pensil
8. *Ballpoint*
9. Penghapus
10. Pemberat peta
11. Kaca pembesar (*magnifiying glass*)

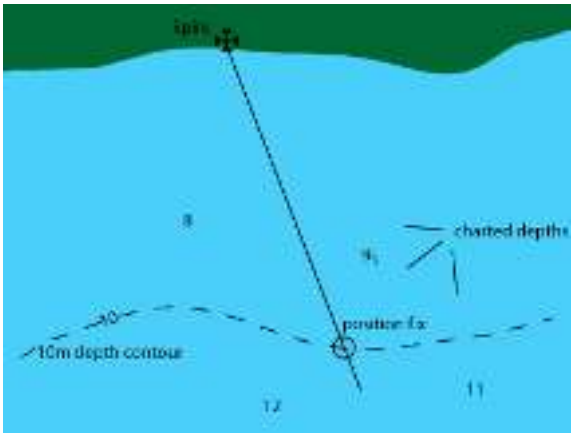
Seorang perwira jaga harus mempunyai kemampuan untuk menentukan posisi kapal secara cepat dan akurat. Tetapi bagaimana melakukannya? Bahwasanya permukaan laut tidak terdapat garis-garis lintang dan bujur. Untuk itu diperlukan peta agar dapat mengetahui keberadaan posisi kapal.

Penentuan posisi kapal dapat dilakukan dengan:

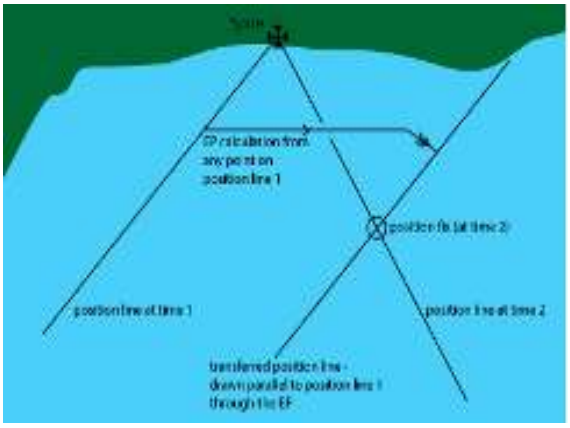
1. **Menggunakan satelit navigasi (GPS, SATNAV, LORAN)**
2. **Menggunakan baringan:**
   a. Baringan benda-benda darat (termasuk benda yang dilaut)
      1) Satu benda dibaring sekali:
         - Baringan dengan jarak



- Baringan dengan peruman



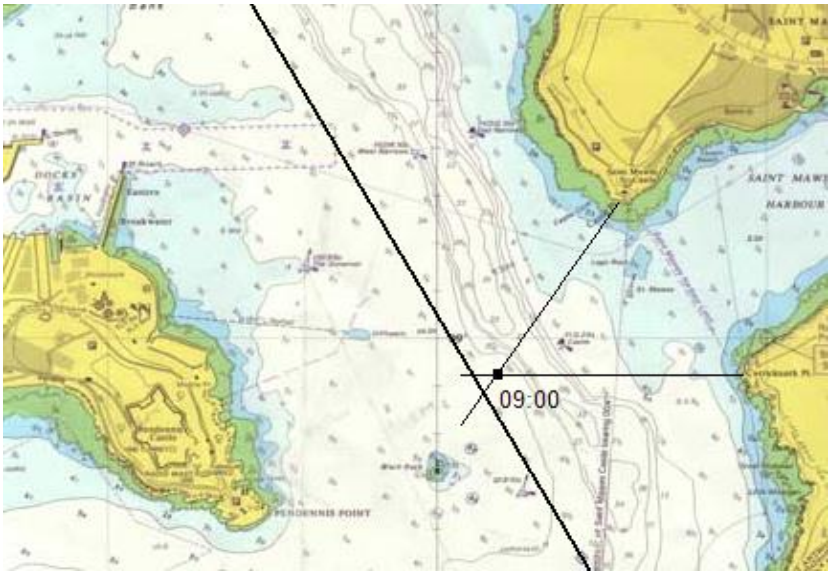
2) Satu benda dibaring dua kali
   - Baringan dengan geseran



   - Baringan sudut berganda
   - Baringan empat surat
   - Baringan istimewa

3) Dua benda dibaring

- Baringan silang



- Baringan silang dengan geseran
- Baringan dengan pengukuran sudut dalam bidang datar

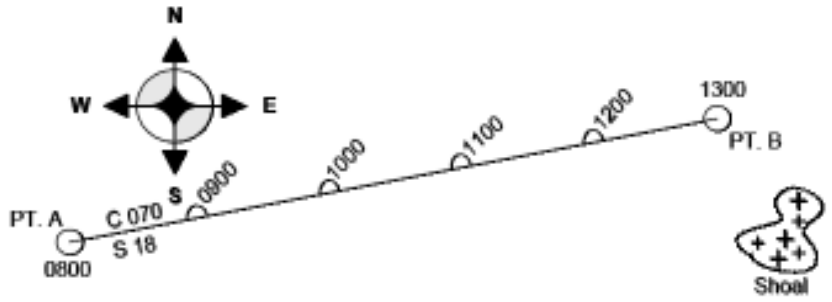
4) Tiga benda dibaring

- Baringan silang dan baringan pemeriksa

b. Baringan benda-benda angkasa
   - Azimut dan arah garis tinggi (agt)

3. Posisi Duga

Perhatikanlah gambar di bawah ini :



PENENTUAN POSISI DENGAN SATELIT NAVIGASI (GPS)

GPS merupakan salah satu satelit navigasi yang dapat memberikan posisi secara akurat. Posisi yang diberikan pada pesawat GPS berupa: *Latitude* (lintang) dan *longitude* (bujur).

Penentuan posisi di peta berdasarkan lintang (*latitude*) dan bujur (*longitude*):

1. Menentukan posisi pada peta seperti halnya pada penentuan koordinat pada matematika, hanya saja penentuan posisi pada peta dinyatakan dengan lintang (*latitude*) dan bujur (*longitude*).
2. Y - axis adalah skala lintang yang terletak pada tepi kanan dan kiri peta

Positif adalah Lintang utara

Negatif adalah lintang selatan

Garis lintang adalah garis yang horizontal

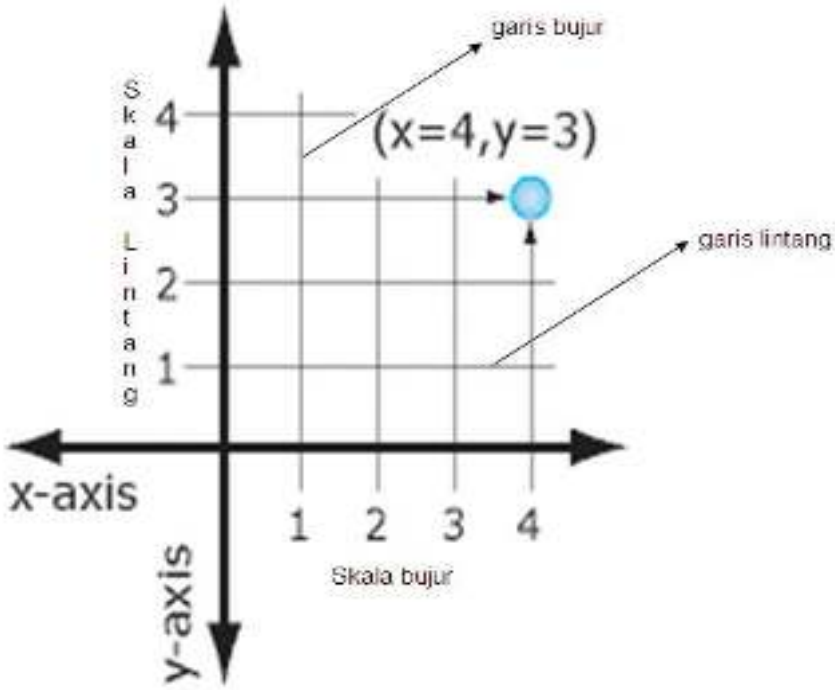
3. X - axis adalah skala bujur yang terletak pada bagian tepi atas bawah peta

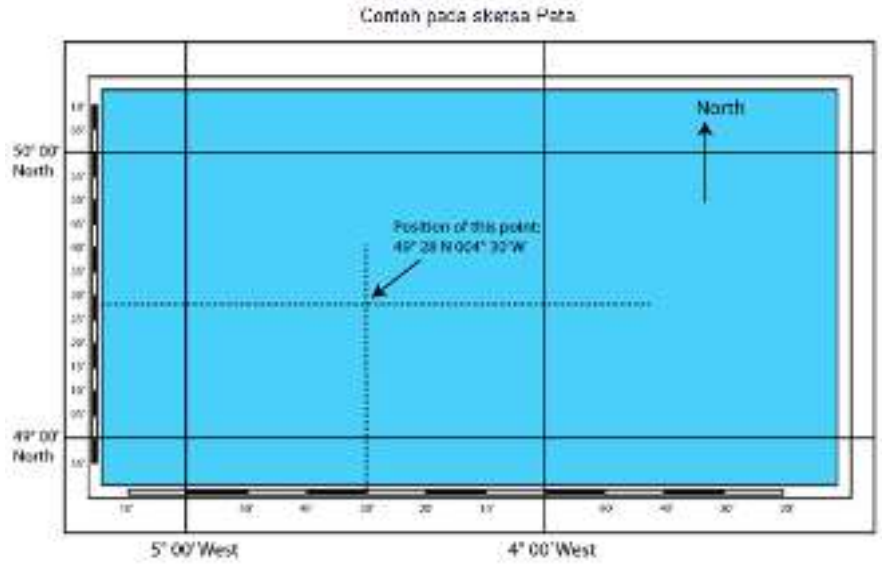
   Positif adalah bujur timur

   Negatif adalah bujur barat

   Garis bujur adalah garis yang vertikal

4. Sumbu horizontal (0) adalah ekuator dan sumbu vertikal (0) Greenwich meridian.





Tahapan-tahapan yang harus dipahami sebelum melakukan penentuan posisi:

1. Dapat mengenali ciri-ciri lintang itu utara atau selatan.
2. Dapat mengenali ciri-ciri bujur itu timur atau barat.
3. Mampu membaca skala peta.
4. Terampil menggunakan peralatan yang akan digunakan untuk menggambar posisi di peta.

Mengenali Lintang dan Bujur:

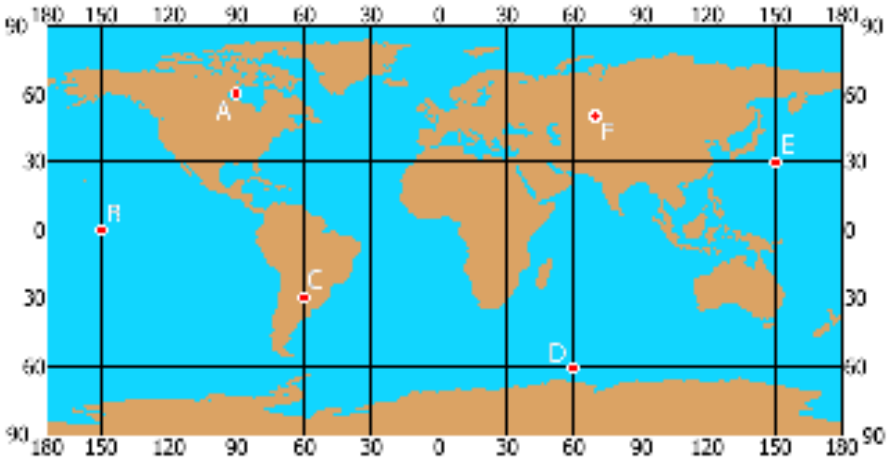
Untuk menentukan lintang apakah utara (*north*) atau selatan (*south*), dapat dilihat pada skala lintang yang berada pada tepi kiri dan kanan peta yaitu:

- Apabila pada skala tersebut nilai derajatnya makin ke atas semakin besar maka lintangnya adalah lintang utara (*north*).

- Apabila pada skala tersebut nilai derajatnya makin ke bawah semakin besar maka lintangnya adalah lintang selatan (*south*).

Untuk menentukan bujur apakah timur (*east*) atau barat (*west*), dapat dilihat pada skala bujur yang berada pada tepi atas dan bawah peta yaitu:

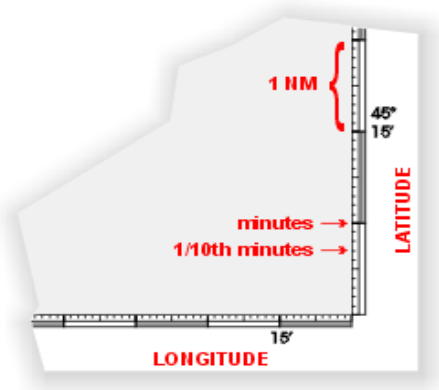
- Apabila pada skala tersebut nilai derajatnya makin ke kanan semakin besar maka bujurnya adalah bujur timur (*east*).
- Apabila pada skala tersebut nilai derajatnya makin ke kiri semakin besar maka bujurnya adalah bujur barat (*west*).



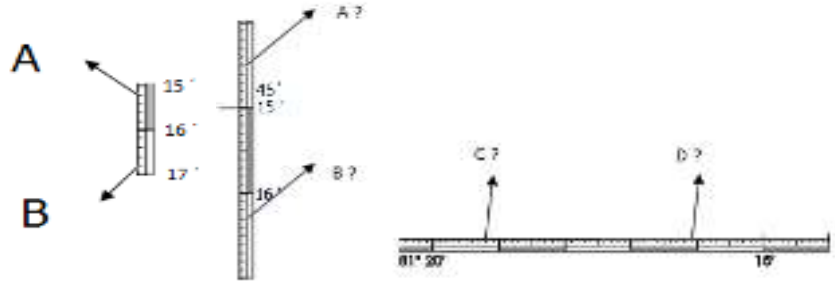
Membaca Skala Peta:

Untuk dapat membaca skala peta diperlukan ketelitian dan kemampuan dalam menghitung dari derajat ke menit, dari menit ke detik atau dengan kata lain mempunyai kemampuan untuk mengonversi.

Contoh:



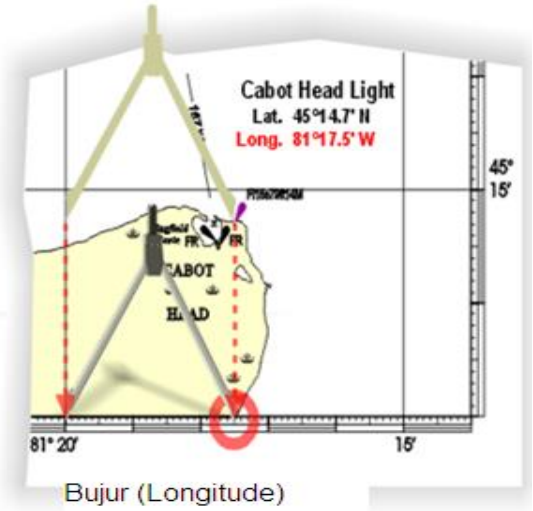
- 1 ˚= 60 ´
- 1 ´ = 10 bagian
- Berarti 1 bagian = 0,1 ´



Contoh:

Lintang (Latitude)

Cabot Head Light
Lat. 45°14.7' N
Long. 81°17.5' W



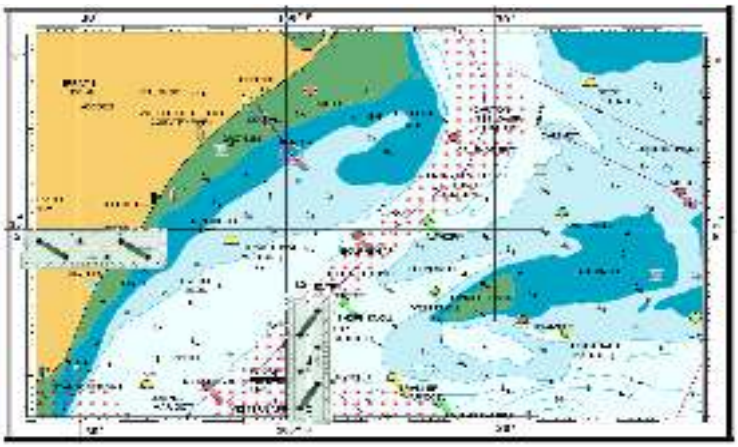
Menggunakan peralatan menggambar

1. **Mistar Jajar ( )**

Untuk menggambar garis lintang ataupun garis bujur pada peta adalah sebagai berikut:

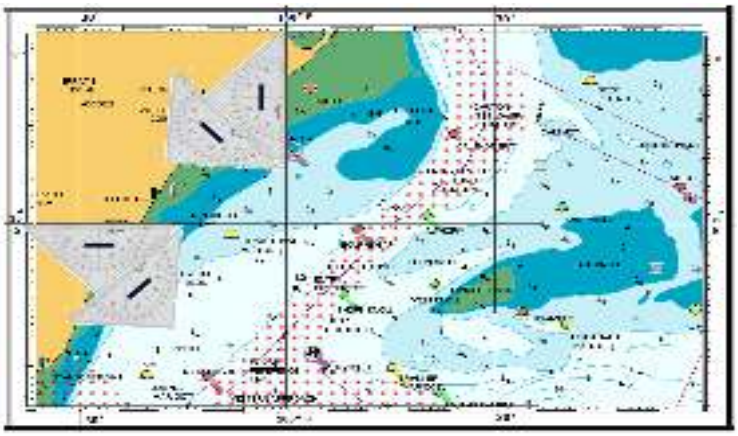
- Untuk menggambar garis lintang letakkanlah mistar jajar tepat segaris dengan garis bantu mendatar yang terdekat dengan titik posisi kapal.
- Untuk menggambar garis bujur letakkanlah mistar jajar tepat segaris dengan garis bantu tegak yang terdekat dengan titik posisi kapal.
- Geserkan mistar jajar tersebut menuju skala lintang dan bujur.
- Apabila Mistar jajarnya tidak cukup panjang untuk membuat garis perpotongan antara garis lintang dan garis bujur maka perlu menggeserkan dengan cara merapatkan kedua sisinya selama menggeser kesamping kiri dan kanan untuk garis

lintang dan menggeser ke atas dan ke bawah untuk garis bujur.



2. Penggaris Segitiga (*Nautical Protactor*)

Selain mistar jajar, sepasang penggaris segitiga dapat juga digunakan untuk menggambar posisi kapal dengan cara yang sama seperti halnya mistar jajar.



Ketika menjajarkan atau menggeserkan mistar-jajar, karena salah memegang mistar-jajar mengakibatkan mistar-jajar tidak lagi sejajar dengan garis bantu bujur atau lintang, maka pekerjaan harus diulangi lagi.

MEMBARING

Membaring adalah suatu pekerjaan yang dilakukan di atas kapal untuk menentukan kedudukan atau posisi kapal dengan cara menentukan arah/sudut (mulai 000˚ sampai dengan 359˚) sesuatu benda yang dibaring terhadap kapal. Benda-benda yang dapat dipakai sebagai benda baringan adalah semua benda, baik yang terdapat di darat maupun yang berada di laut bahkan yang berada di angkasa, dengan satu syarat bahwa semua benda-benda tersebut ada tertera di peta laut.

Benda-benda baringan yang berada di darat (termasuk yang di laut) misalnya Gunung, pulau, menara suar, Tanjung, dan benda lain yang terdapat di peta yang dikenali.

Baringan dapat dibedakan menjadi 3 yaitu:

1. Baringan sejati
2. Baringan magnetik
3. Baringan relatif

Syarat-syarat dalam membaring:

Syarat-syarat yang harus dipenuhi oleh baringan dapat diformulasikan sebagai berikut:

1. Titik yang dibaring harus merupakan titik yang dikenal.
2. Alat yang dipergunakan harus terpasang baik.

3. Baringan harus dilakukan dengan secermat dan seteliti mungkin.
4. Catat Haluan kapal yang dikemudikan.
5. Jabarkanlah baringan pedoman (Bp) menjadi baringan sejati (Bs).
6. Pilihlah benda-benda baringan sebaik-baiknya:
   - Benda-benda yang terdekat.
   - Urutan membaring, benda I di arah muka atau belakang, jadi yang terdekat dengan garis haluan dan benda II adalah yang melintang kapal.

Prosedur membaring:

1. Pasanglah alat baring pada kompas di kapal.
2. Pilihlah benda-benda yang akan dibaring (usahakan lebih dari satu) dan periksalah apakah benda-benda baringan tadi tertera di atas peta laut atau tidak.
3. Bidiklah terlebih dahulu benda baringan yang berada di arah depan/belakang dari kapal (misalnya tanjung A = Tj. A) dengan cara menempatkan mata kita di belakang dari alat baring kemudian arahkan ke benda baringan. Garis khayal yang menghubungkan mata kita dengan benda baringan akan "memotong" angka pada kompas (angka yang terletak antara titik tengah kompas dengan benda baringan, misalnya 350°). Angka tersebut adalah **baringan pedoman (Bp)** benda tadi terhadap kapal dan tulislah di buku tersendiri berikut waktunya (pukul berapa dilaksanakan membaring).

4. Kerjakanlah hal yang sama (butir 3 di atas) untuk benda baringan yang kedua, misalnya teluk B dengan Bp Teluk B = 1200 (Teluk B berada di bagian arah melintang kapal).
5. Perpotongan dua atau lebih garis baringan adalah posisi/ kedudukan kapal.

Pekerjaan membaring harus dilaksanakan dengan cepat dan tepat. Waktu yang diperlukan untuk membidik benda baringan yang satu ke benda baringan berikutnya harus cepat (dalam bilangan beberapa detik saja). Hal ini dimaksudkan agar tetap diperoleh sudut-sudut baringan yang faktual saat baringan dilakukan (karena kapal terus berjalan). Apabila ditemui dua atau lebih benda yang akan dibaring, ada beberapa hal yang perlu diperhatikan yaitu:

a. Baringlah terlebih dahulu benda yang berada didepan/ belakang kapal, baru kemudian benda baringan yang berada di belakang dari arah melintang kapal. Alasan: ketika sedang berlayar, maka sudut benda-benda baringan yang berada di depan dari arah melintang kapal akan lebih cepat berubah kedudukannya terhadap kapal daripada benda - benda yang berada di depan/belakang kapal.
b. Baringlah terlebih dahulu benda baringan yang terdekat baru kemudian yang lebih jauh kedudukannya dari kapal. Alasan: sudut benda baringan yang terdekat dengan kapal akan lebih cepat berubah bila dibandingkan dengan sudut benda baringan yang letaknya lebih jauh dari kapal (diasumsikan kapal sedang berjalan).
c. Usahakan untuk tidak memilih benda-benda baringan yang sudutnya satu dengan lainnya membentuk sudut lebih kecil

dari 10˚atau hampir mendekati 180 ˚atau pilihlah agar garis-garis baringan membentuk sudut + 90 ˚. Alasan: bila dua garis yang berpotongan membentuk sudut hampir membentuk satu garis, maka titik potongnya sulit untuk ditentukan, bandingkanlah jika kedua garis yang berpotongan itu membentuk sudut siku-siku.

PENENTUAN POSISI DUGA

Pada zaman dahulu kala, ketika para pelaut dengan gagah beraninya mengarungi samudera yang luas dan hanya berbekal pengetahuan ala kadarnya, maka mereka mengembangkan perhitungan untuk mengetahui posisi duga sebagai suatu usaha agar kapalnya tetap pada posisi lintasannya. Perhitungan atau penentuan posisi duga dalam bahasa Inggris dikenal dengan istilah *dead reckoning* yang disingkat DR. Istilah posisi duga diperoleh sebagai suatu kesimpulan atas perhitungan duga, prosesnya adalah dengan menghitung secara ilmu ukur sudut atas kecepatan dan haluannya mulai dari tempat tolak kapal. Meskipun pada era yang sudah modern seperti saat ini, namun istilah posisi duga masih tetap digunakan. Perhitungan posisi duga merupakan pengetahuan yang sangat mendasar dalam menavigasi kapal. Perhitungan posisi duga adalah suatu proses untuk menentukan posisi kapal dengan menggunakan posisi terakhir yang telah ditentukan dengan baik/pasti. Hal ini dimulai dengan mengacu haluan sejati kapal, menghitung jarak yang telah ditempuh (dan hubungannya dengan putaran motor/mesin induk) atau perhitungan atas pengukuran kecepatan dan haluan sejati kapal tanpa

memperhitungkan pengaruh arus; dengan memproyeksikan haluan dan kecepatan kapal berikutnya dari posisi terakhir maka posisi kapal berikutnya dapat diperhitungkan.

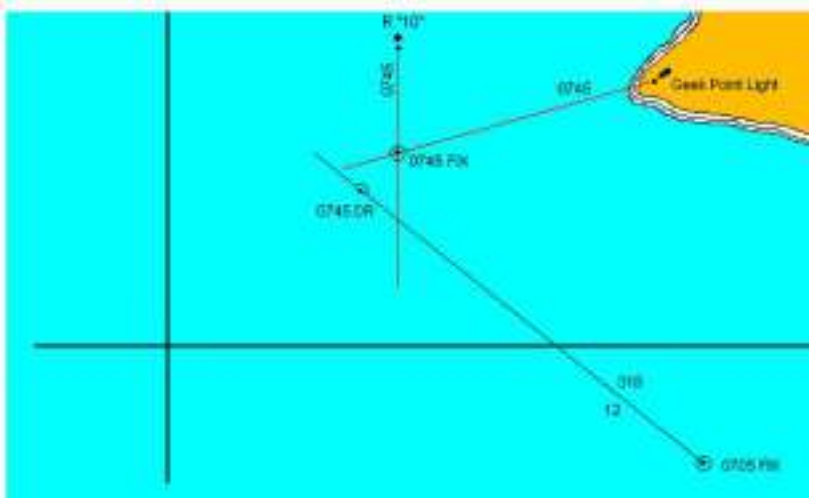
Prosedur Penentuan Posisi Duga

Penentuan posisi duga merupakan suatu proses yang umum dikerjakan di sebuah kapal guna mengetahui perkembangan pelayarannya. Penentuan posisi duga juga dilaksanakan dalam upaya mengembangkan rencana atau memproyeksikan rencana untuk arah pelayaran berikutnya. Unsur penting atau kunci dalam perhitungan posisi duga dapat disimpulkan sebagai berikut:

1. Hanya haluan sejati kapal yang diperhitungkan.
2. Jarak tempuh (jauh) yang diperhitungkan adalah yang sesuai dengan kecepatan putaran mesin induk kapal selama pelayaran berlangsung.
3. Penentuan posisi duga selalu dimulai dari posisi kapal yang terakhir (posisi pastinya atau *fixed position*).
4. Pengaruh arus tidak diperhitungkan. Di tengah laut tidak selalu kita dapat menetapkan secara pasti posisi kapal, hal ini mungkin disebabkan karena faktor cuaca, peralatan yang berfungsi kurang baik dan lain sebagainya. Pada kondisi seperti itu, seorang navigator harus mengandalkan perhitungan posisi duganya untuk menunjukkan keberadaan kapalnya saat itu. Penentuan posisi duga juga harus dilakukan pada keadaan yang ekstrem seperti di perairan yang dangkal atau pada daerah berbahaya lainnya. Jika kapal berlayar dengan haluan serta kecepatan sesuai dengan yang

telah diperhitungkan di mana pengaruh angin dan atau arus diabaikan, maka setiap waktu penentuan posisi duga akan menunjukkan posisi yang akurat. Sekalipun kondisi seperti itu sangat jarang terjadi, suatu penentuan posisi duga hanyalah sebuah perkiraan dari posisi sejati kapal, karenanya usaha untuk memelihara secara tetap dan akurat atas perhitungan posisi duga jelas harus tetap dilakukan.

Seorang navigator harus tahu posisi kapalnya, atau perkiraan posisinya untuk menunjukkan/menentukan kapan ia harus mengubah haluan sampai ditemukannya alat bantu navigasi lain untuk mengenal tanda-tanda adanya daratan. Penentuan posisi duga biasanya dikerjakan di atas peta laut yang sesuai dengan daerah di mana kapal sedang berlayar. Hasil penentuan posisi duga tadi memungkinkan navigator untuk menggambarkan atau memvisualisasikan posisi kapalnya terhadap daratan atau bahaya-bahaya navigasi lain.



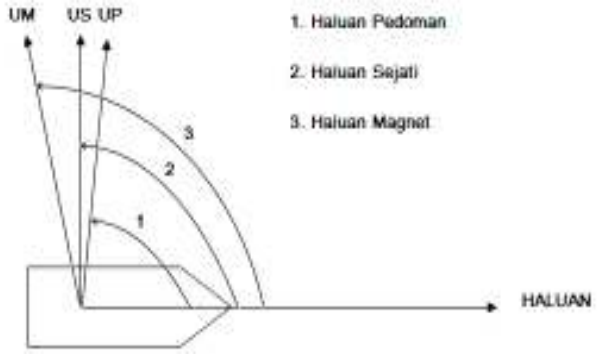
Sebagai tambahan atas simbol dan penandaan, ada 6 aturan dasar yang akan menuntun seorang navigator tentang kapan penentuan posisi duga dan pembuatan garis haluan dilakukan, yaitu:

1. Penentuan posisi duga harus dibuatkan jelas kapan waktu dilaksanakannya dalam setiap jam.
2. Penentuan posisi duga harus dibuat setiap perubahan haluan dilakukan.
3. Penentuan posisi duga harus dibuat ketika perubahan kecepatan kapal dilakukan.
4. Penentuan posisi duga harus dibuatkan jelas kapan waktu ditetapkannya posisi pasti atau "*running fix*".
5. Penentuan posisi duga harus dibuatkan jelas kapan waktunya ketika hanya diperoleh satu garis baringan.
6. Suatu garis haluan yang baru harus dibuat dari posisi yang pasti atau "*running fix*" segera setelah diketahui pasti kedudukannya di peta.

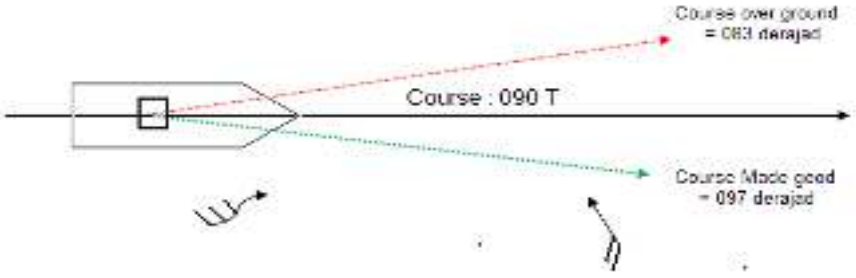
BAB V
MENJANGKA PETA UNTUK PELAYARAN

Definisi:

- HALUAN (*heading*) adalah sudut yang dibentuk antara garis lunas kapal dengan salah satu dari arah utara.
  Haluan selalu berubah dikarenakan pengaruh angin, ombak arus dan juga kesalahan di dalam mengemudikan



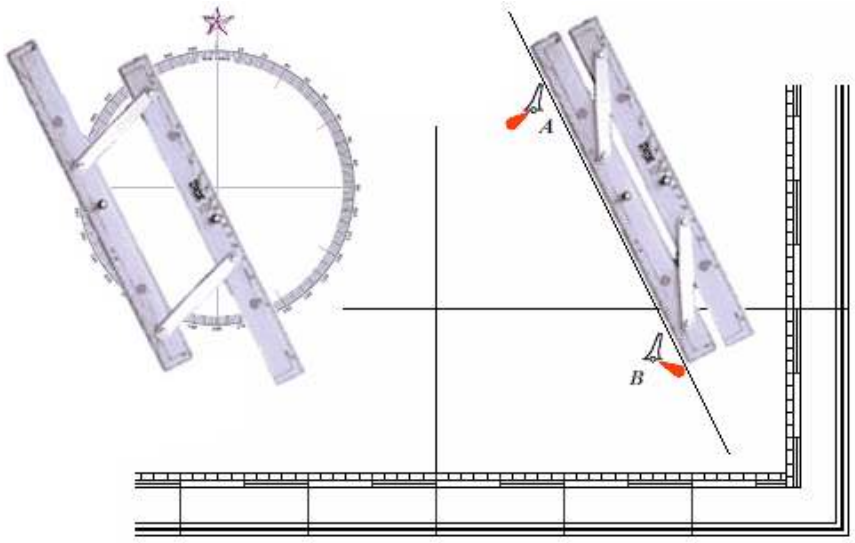
- *Course* adalah haluan di peta di mana kapal akan dikemudikan yang dinyatakan dalam derajat.



- *Distance* adalah jarak antara dua posisi (tempat) yang dinyatakan dalam satuan panjang, untuk navigasi laut maka satuan panjang yang digunakan adalah *nautical mile* (1 NM = 1852 meter).
- *Speed* adalah jarak yang ditempuh persatuan waktu.
  Contoh: Knot (NM/*hours*), KM/jam, meter/detik)
- *Speed through the* water adalah kecepatan kapal yang diukur berdasarkan air, di mana pengaruh arus belum diperhitungkan. *Speed through the water* ini dapat diperoleh pada alat pengukur kecepatan seperti: *shaft* RPM, *impeller log*, *pilot log, doppler speed log.*
- *Speed over ground* adalah kecepatan kapal yang diukur berdasarkan permukaan dasar laut/bumi. Nilai *speed over ground* dapat diperoleh dari GPS.

Cara menentukan haluan sejati (*true course*) antara 2 posisi pada peta:

1. Tariklah garis yang menghubungkan antara 2 posisi tersebut.
2. Ukurlah garis tersebut menggunakan garis mistar jajar atau sepasang penggaris segitiga dengan menggeserkan ke mawar pedoman (*compass rose*) yang terdekat atau menggunakan busur yang berada pada peralatan tersebut pada salah satu garis bujur yang terdekat.



Cara menentukan jarak pada peta:

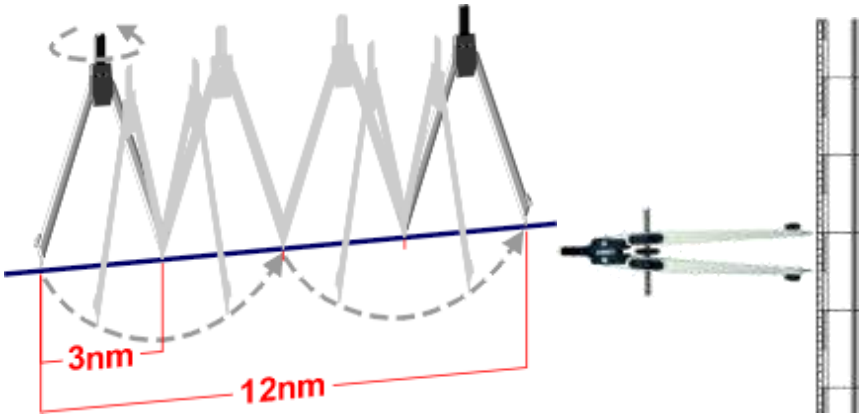
1. Secara manual (menjangka langsung)
2. Dengan perhitungan
   a. Perhitungan manual
   b. Menggunakan peralatan Navigasi seperti: GPS, Satnav, Loran

Penentuan jarak dapat juga menggunakan *distance table* (apabila mencari jarak estimasi antara dua pelabuhan/dua tempat

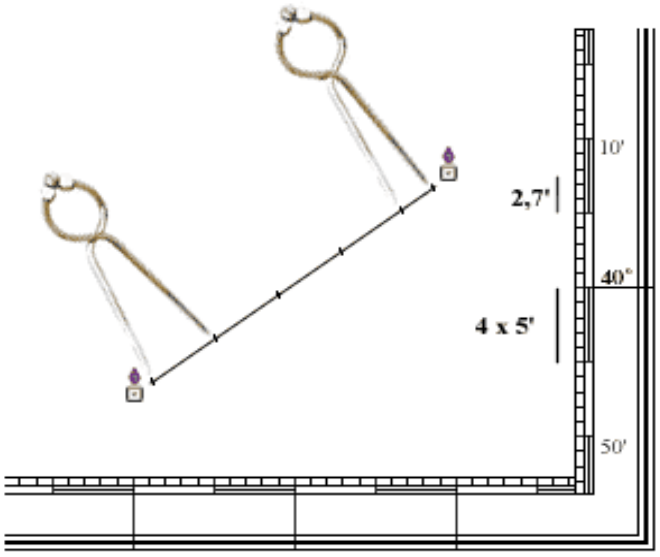
Pengukuran Jarak pada peta menggunakan jangka (*devider*) pada skala lintang

1. Pertama ambil jarak sesuai kebutuhan (misal: 1 *mile*, 5 *mile*, 10 *mile*, 15 *mile*, 20 *mile*, dst.) pada lintang menengahnya. (Ingat, hanya skala lintang yang digunakan untuk pengukuran jarak.)

2. Mulai menjangkakan jangka dari titik kesatu ke titik yang lain.
3. Kemudian mengukur sisa jarak pada lintang yang bersangkutan.



Contoh:



Cara menentukan kecepatan antara 2 posisi:

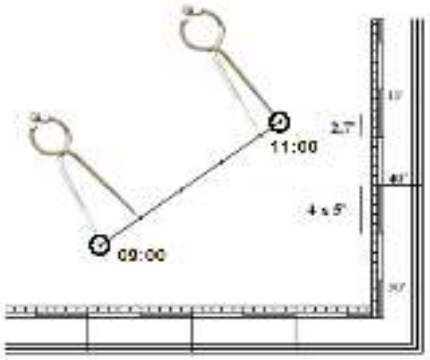
Kecepatan merupakan jarak yang ditempuh per satuan waktu, ada beberapa satuan kecepatan yang sering digunakan untuk menyatakan besarnya kecepatan di antaranya:

Km/jam, meter/detik, *mile*/jam (*knots*), dan lain-lain. Namun satuan kecepatan yang digunakan untuk mengukur kecepatan kapal yang lazim adalah *knots*.

Untuk dapat menghitung besarnya kecepatan kapal maka perlu diketahui jarak yang ditempuh dan waktu yang diperlukan selama pelayaran. Dalam menghitung kecepatan dapat menggunakan rumusan sebagai berikut:

Contoh: Lihat gambar

Kapal berlayar selama 2 jam (09:00 s.d. 11:00) menempuh jarak 22,7 *Mile* {(4x5') + 2,7'}



Maka kecepatan kapal tersebut dapat dihitung sebagai berikut:

v = S: t

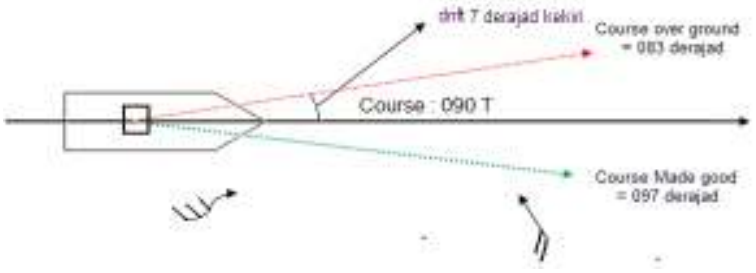
= 22,7 *mile*: 2 jam

= 11.35 *knots*

Menentukan Haluan yang dikemudikan akibat pengaruh angin dan arus:

Untuk dapat mengemudikan kapal sesuai *track* yang telah ditetapkan harus senantiasa memperhatikan faktor-faktor lingkungan di antaranya angin dan arus. Dalam bernavigasi sering disebutkan istilah *drift, course over ground* dan *course made good*. Apakah arti dari istilah tersebut di atas? Untuk lebih jelasnya marilah kita perhatikan penjelasan dan gambar berikut:

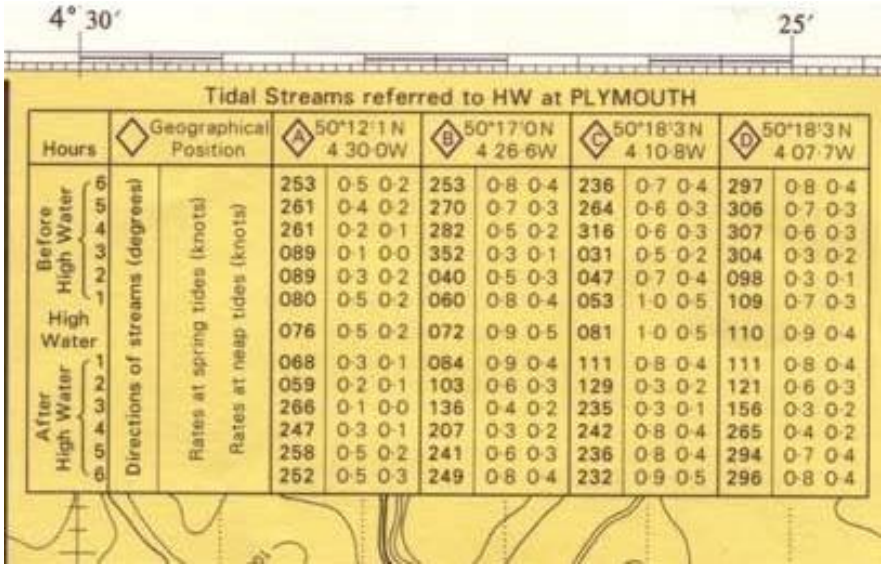
- *Drift* adalah penyimpangan arah kapal karena pengaruh arus dan angin.
- *Course over ground* adalah arah yang diikuti kapal karena adanya pengaruh angin dan arus.
- *Course made good* adalah Arah yang harus dikemudikan (untuk mengantisipasi pengaruh angin dan arus) supaya kapal bergerak sesuai haluan di peta (*track*) yang telah ditetapkan.



Menentukan besar kecilnya arus atau pasang surut dari peta.

Pada sebagian peta dengan skala besar kadang-kadang dijumpai tabel pasang surut untuk area setempat.

Contoh:



4° 30′ 25′

Tidal Streams referred to HW at PLYMOUTH

Hours	Geographical Position	A 50°12·1N 4 30·0W		B 50°17·0N 4 26·6W		C 50°18·3N 4 10·8W		D 50°18·3N 4 07·7W	
	Directions of streams (degrees)	Rates at spring tides (knots)	Rates at neap tides (knots)						
Before High Water 6		253	0·5	253	0·8	236	0·7	297	0·8
Before High Water 5		261	0·4	270	0·7	264	0·6	306	0·7
Before High Water 4		261	0·2	282	0·5	316	0·6	307	0·6
Before High Water 3		089	0·1	352	0·3	031	0·5	304	0·3
Before High Water 2		089	0·3	040	0·5	047	0·7	098	0·3
Before High Water 1		080	0·5	060	0·8	053	1·0	109	0·7
High Water		076	0·5	072	0·9	081	1·0	110	0·9
After High Water 1		068	0·3	084	0·9	111	0·8	111	0·8
After High Water 2		059	0·2	103	0·6	129	0·3	121	0·6
After High Water 3		266	0·1	136	0·4	235	0·3	156	0·3
After High Water 4		247	0·3	207	0·3	242	0·8	265	0·4
After High Water 5		258	0·5	241	0·6	236	0·8	294	0·7
After High Water 6		252	0·5	249	0·8	232	0·9	296	0·8

Pada table di atas yang digunakan untuk referensi perhitungan arus pasang surut adalah Pelabuhan PLYMOUTH

Tanda belah ketupat dengan huruf di dalam berwarna jingga menunjukkan posisi arus pasang surut pada peta.

Besarnya arus pasang surut diberikan 6 jam sebelum HW dan 6 jam setelah HW ditunjukkan dalam *knots* baik pada *spring tide* maupun *neap tide.*

Arah arus pasang surut ditunjukkan dengan angka yang dicetak tebal.

Contoh:

Tidal stream at tidal diamond C (which is marked on the main chart at the position given in the table) four hours after high water at Plymouth (Devonport) on a spring tide: it will be flowing in direction 242 ° (True) at a rate of 0.8 knots.

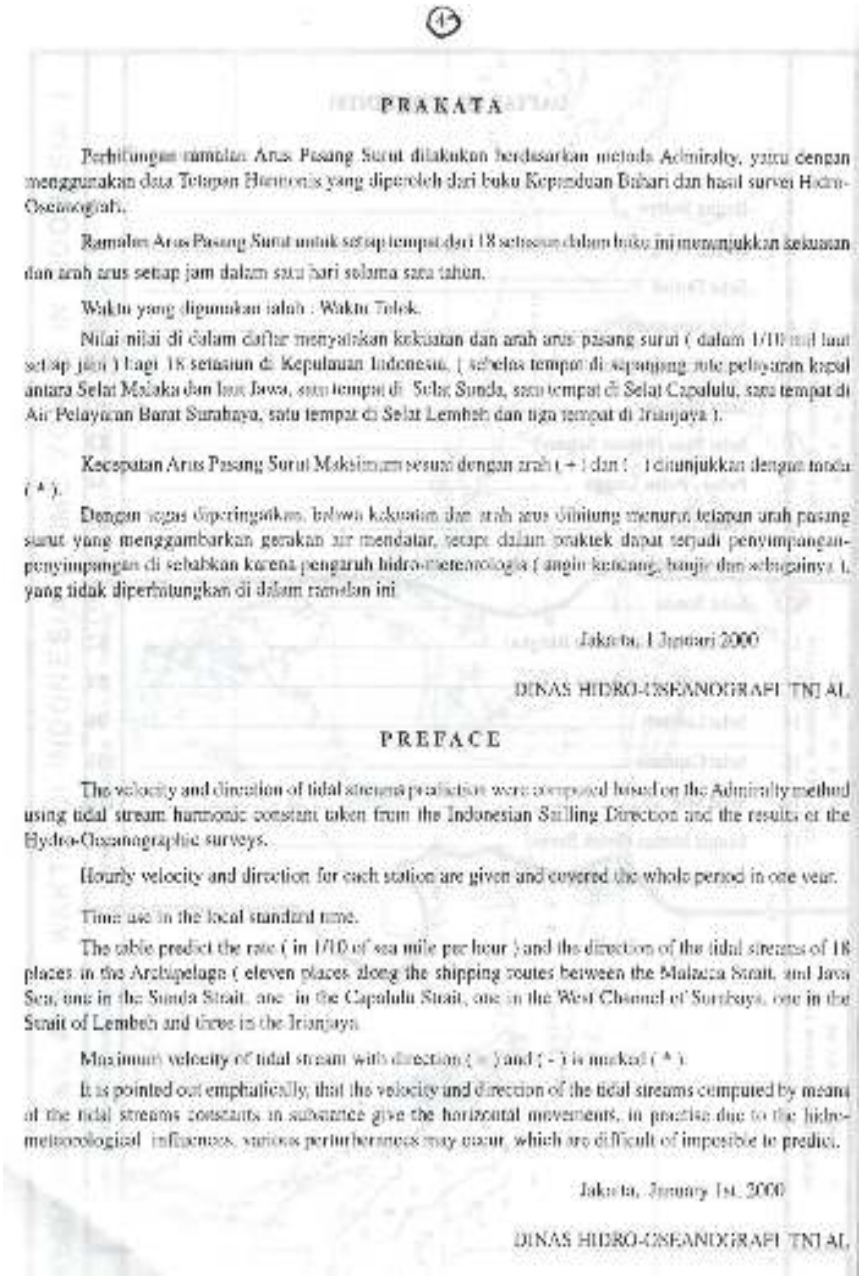
Tidal diamond A shows slack with the tide turning from west-going to east-going between four and three hours before HW, and the next slack (east-going to west-going) somewhere between 2 and 3 hours after HW.

Untuk menghitung pada waktu yang diinginkan maka besarnya arus pasang surut dapat ditentukan dengan cara interpolasi

Menentukan besar kecilnya arus dari daftar arus pasang surut (*tidal stream tables*).

Besar kecilnya arus pasang surut dapat dilihat pada daftar arus pasang surut (*tidal stream tables*) untuk masing-masing waktu dan area. Pada umumnya waktu yang diberikan adalah waktu setempat (*standard time*). Untuk itu sebelum menggunakan daftar arus pasang surut terlebih dahulu harus dibaca prakata (*preface*) pada daftar arus pasang surut yang akan digunakan.

Contoh daftar arus pasang surut:



PRAKATA

Perhitungan ramalan Arus Pasang Surut dilakukan berdasarkan metoda Admiralty, yaitu dengan menggunakan data Tetapan Harmonis yang diperoleh dari buku Kepanduan Bahari dan hasil survei Hidro-Oseanografi.

Ramalan Arus Pasang Surut untuk setiap tempat dari 18 setasiun dalam buku ini menunjukkan kekuatan dan arah arus setiap jam dalam satu hari selama satu tahun.

Waktu yang dipunakan ialah : Waktu Tolok.

Nilai-nilai di dalam daftar menyatakan kekuatan dan arah arus pasang surut (dalam 1/10 mil laut setiap jam) bagi 18 setasiun di Kepulauan Indonesia, (sebelas tempat di sepanjang rute pelayaran kapal antara Selat Malaka dan laut Jawa, satu tempat di Selat Sunda, satu tempat di Selat Capalulu, satu tempat di Alur Pelayaran Barat Surabaya, satu tempat di Selat Lembeh dan tiga tempat di Irianjaya).

Kecepatan Arus Pasang Surut Maksimum sesuai dengan arah (+) dan (-) ditunjukkan dengan tanda (*).

Dengan tegas diperingatkan, bahwa kekuatan dan arah arus dihitung menurut tetapan arah pasang surut yang menggambarkan gerakan air mendatar, tetapi dalam praktek dapat terjadi penyimpangan-penyimpangan di sebabkan karena pengaruh hidro-meteorologis (angin kencang, banjir dan sebagainya), yang tidak diperhitungkan di dalam ramalan ini.

Jakarta, 1 Januari 2000

DINAS HIDRO-OSEANOGRAFI TNI AL

PREFACE

The velocity and direction of tidal streams prediction were computed based on the Admiralty method using tidal stream harmonic constant taken from the Indonesian Sailing Direction and the results of the Hydro-Oceanographic surveys.

Hourly velocity and direction for each station are given and covered the whole period in one year.

Time use in the local standard time.

The table predict the rate (in 1/10 of sea mile per hour) and the direction of the tidal streams of 18 places in the Archipelago (eleven places along the shipping routes between the Malacca Strait, and Java Sea, one in the Sunda Strait, one in the Capalulu Strait, one in the West Channel of Surabaya, one in the Strait of Lembeh and three in the Irianjaya.

Maximum velocity of tidal stream with direction (+) and (-) is marked (*).

It is pointed out emphatically, that the velocity and direction of the tidal streams computed by means of the tidal streams constants in substance give the horizontal movements, in practice due to the hidro-meteorological influences, various perturberances may occur, which are difficult of impesible to predict.

Jakarta, January 1st, 2000

DINAS HIDRO-OSEANOGRAFI TNI AL

4. SELAT SINGAPURA

JANUARI 2000

Waktu : GMT + 07.30

J / T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	J / T
1	-2	-3	-3	-2	-0	2	5	8	11	13*	13	11	7	3	-2	-6	-10	-13*	13	-11	-9	-6	-4	-3	1
2	-3	-2	-2	-1	-0	2	5	9	12	15	16*	15	12	7	1	-3	-10	-14	-15*	15	-13	-10	-7	-4	2
3	-2	-2	-2	-1	-0	1	4	8	13	16	18*	18	16	12	6	-2	-8	-14	-17	-18*	17	-14	-10	-7	3
4	-4	-3	-2	-2	-1	0	3	7	11	15	19	21*	20	16	10	3	-3	-12	-17	-19*	19	-17	-14	-10	4
5	-5	-4	-3	-2	-2	-1	1	4	9	14	19	23*	22	20	15	8	-0	-8	-15	-19	-20*	19	-16	-12	5
6	-6	-5	-4	-3	-3	-2	-1	2	6	11	16	21	23*	22	19	12	3	-4	-11	-17	-19	-20*	17	-14	6
7	-11	-7	-4	-5	-4	-3	-2	-1	3	7	13	18	21	23*	21	16	9	1	-7	-13	-17	-19*	18	-15	7
8	-11	-7	-5	-5	-4	-3	-3	-2	-0	3	8	13	18	20*	20	18	12	6	-2	-9	-14	-16	-17*	16	8
9	-11	-8	-5	-4	-3	-2	-3	-3	-2	0	4	8	13	16	18*	17	14	8	2	-6	-10	-13	-15*	14	9
10	-11	-8	-5	-3	-1	-1	-2	-2	-3	-3	1	4	8	11	14*	14	11	6	0	-5	-1	-6	-10	-12*	12	10
11	-10*	-7	-4	-1	1	1	1	-0	-1	-2	-2	-2	-0	3	6	8	10*	10	8	3	1	-3	-7	-9	-10*	11
12	-9*	-7	-4	-1	2	3	4	3	2	0	+1	+1	-0	1	3	6	9*	9	6	1	-1	-4	-6	-9	12
13	-7*	-6	-3	-0	3	5	6*	6	5	4	2	-0	-2	-2	-2	-2	-1	-0	0	-0	-0	-1	-3	-4	-5	13
14	-6*	-5	-3	-0	3	6	8	9*	8	6	3	-0	-3	-5	-6*	-6	-5	-4	-4	-3	-3	-2	-4	14
15	-4	-4	-3	-1	2	5	9	11	12*	12	10	7	3	-1	-5	-8	-10	-10*	10	-8	-6	-5	-4	-3	15
16	-3	-3	-2	-1	1	4	8	12	14	15*	15	13	8	3	-3	-8	-12	-14*	14	-13	-11	-8	-6	-4	16
17	-3	-2	-2	-1	0	3	6	11	15	18	19*	17	14	8	1	-5	-11	-16	-17*	17	-15	-12	-8	-5	17
18	-3	-2	-2	-2	-1	1	4	8	13	17	20	21*	19	14	7	-1	-8	-15	-19	-20*	18	-16	-11	-7	18
19	-4	-3	-3	-2	-2	-1	1	5	10	15	20	23*	22	19	13	5	-4	-11	-17	-20*	20	-18	-14	-10	19
20	-6	-3	-3	-3	-2	-2	-1	2	6	12	17	21	23*	22	17	10	2	-7	-14	-19	-21*	20	-16	-12	20
21	-7	-4	-2	-1	-2	-3	-3	-1	2	7	13	18	22*	22	20	15	7	-1	-9	-15	-19*	19	-17	-13	21
22	-9	-5	-2	-1	-1	-3	-3	-3	-1	3	8	13	18	20*	20	17	11	4	-4	-11	-16	-18*	17	-14	22
23	-10	-6	-2	-1	-1	-1	-3	-3	-3	-0	4	8	13	17	18*	17	13	7	-0	-6	-11	-14	-15*	13	23
24	-10	-6	-3	-0	1	0	-1	-3	-5	-2	-0	4	8	11	14*	14	12	8	3	+2	-7	-11	-12*	11	24
25	-9*	-6	-3	-0	2	2	1	+1	-2	-5	-3	-0	3	6	8	10*	10	7	4	-0	-4	-7	-9*	-9	25
26	-7*	-5	-3	1	3	4	3	2	0	-1	-2	-2	-1	1	3	5*	5	4	3	0	-2	-5	-6	-7*	26
27	-6*	-4	-1	2	4	6*	6	5	3	1	-0	+2	-2	-2	+2	-1	-0	0	-0	-1	-3	-4	-4	-5	27
28	-4	-2	-0	3	5	7	8*	8	7	5	3	1	-2	-3	-5	-5*	-5	-5	-4	-4	-4	-4	-4	-4	28
29	-3	-2	0	3	6	7	9	10*	10	9	7	4	1	-3	-5	-8	-9	-9*	-9	-8	-7	-6	-4	-3	29
30	-2	-1	0	2	5	7	10	12	13*	13	12	9	5	0	-4	-8	-11	-13*	13	-12	-10	-8	-6	-4	30
31	-2	-1	-0	1	3	6	9	12	14	15*	15	13	10	6	-1	-7	-11	-13	-15*	15	-14	-11	-8	-5	31

FEBRUARI 2000

J / T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	J / T
1	-3	-2	-1	0	2	4	7	11	14	17	18*	17	14	10	5	-4	-10	-15	-17	-18*	16	-14	-10	-7	1
2	-4	-3	-2	-1	-0	3	6	12	16	19	20*	18	14	8	1	-6	-13	-17	-19*	18	-16	-12	-8	2
3	-5	-3	-2	-2	-2	-1	1	6	9	14	18	21*	21	18	13	6	-2	-9	-15	-18	-19*	17	-13	-8	3
4	-4	-3	-2	-2	-3	-3	-2	1	5	10	15	19	21*	20	17	10	3	-5	-12	-16	-18*	17	-14	-10	4
5	-3	-3	-2	-2	-3	-4	-4	-3	0	5	10	15	19	20*	18	14	7	-1	-8	-13	-16*	16	-16	-10	5
6	-4	-3	-0	-0	-2	-3	-5	-5	-3	0	5	10	15	18*	18	15	10	3	-4	-10	-13	-16*	15	-9	6
7	-5	-2	1	0	1	-2	-4	-6	-6	-4	0	5	10	14	15*	14	11	6	-0	-6	-10	-12*	11	-9	7
8	-7	-1	3	4	3	1	-2	-4	-6	-6	-4	-0	4	8	11*	11	10	8	2	-3	-7	-9	-10*	-8	8
9	-4	-0	3	5	6	4	2	-1	-4	-5	-6	-4	-1	2	5	7*	7	6	2	-2	-5	-7	-8*	-7	9
10	-4	-0	3	6	8*	7	5	2	-0	-1	-3	-3	-4	-3	-0	2	3	3	1	-1	-4	-5	-6*	-5	10
11	-2	-0	3	6	9	10*	9	7	4	1	-2	-4	-5	-5*	-5	-4	-3	-2	-2	-3	-4	-4	-5*	-4	11
12	-1	-1	2	6	8	11	11*	11	9	6	3	-0	-4	-6	-8	-8*	-8	-7	-7	-6	-5	-5	-4	-3	12
13	-1	-1	1	4	7	10	12	13*	13	11	8	5	0	-4	-8	-10	-12*	-12	-11	-10	-8	-6	-4	-3	13
14	-2	-1	1	2	5	8	11	13	15*	15	14	10	6	0	-5	-10	-13	-15*	15	-13	-11	-8	-5	-3	14
15	-2	-2	-0	1	3	5	8	12	15	17*	17	15	11	6	-1	-7	-13	-16	-17*	17	-14	-11	-7	-4	15
16	-2	-1	-1	-0	0	3	5	9	13	16	19*	19	16	11	5	-3	-10	-15	-18	-19*	17	-13	-9	-5	16
17	-2	-1	-0	-1	-1	-1	1	4	9	14	18	20*	19	16	10	3	-5	-12	-17	-19*	18	-16	-11	-6	17
18	-3	-2	-0	-1	-2	-3	-2	0	4	9	15	19	20*	19	15	8	0	-8	-14	-17	-18*	16	-12	-7	18
19	-3	-2	1	-0	-2	-4	-5	-4	-0	4	10	15	19*	19	17	11	5	-1	-10	-14	-16*	15	-12	-7	19
20	-2	0	2	2	-1	-3	-5	-6	-6	-4	-1	5	10	16	17*	17	14	8	1	-5	-11	-13	-14*	11	-7	20
21	-0	1	1	3	1	-2	-5	-7	-7	-5	-1	4	9	13	14*	13	9	4	-2	-7	-10	-11*	10	-6	21
22	-2	2	4	5	3	1	-3	-5	-7	-6	-4	-1	4	8	10*	10	8	5	-0	-4	-7	-8*	-8	-5	22
23	-1	3	5	7*	6	4	0	-3	-6	-7*	-6	-4	-1	2	5	6	6	4	1	-2	-5	-6	-6	-4	23
24	-1	3	6	8*	8	7	4	0	-3	-6	-8*	-8	-6	-3	-2	-0	1	2	1	-0	-3	-4	-5	-4	-1	24
25	0	3	6	9	10*	9	7	4	0	-3	-6	-8	-8*	-6	-5	-4	-3	-3	-3	-4	-4	-4	-4	-2	25
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27	0	3	5	8	10	11	12*	11	9	7	4	1	-3	-6	-8	-10	-10*	-10	-9	-8	-6	-4	-2	27
28	-0	2	4	6	8	10	12	13*	12	11	9	6	2	-3	-7	-10	-12	-13*	13	-12	-10	-8	-5	-3	28
29	-1	1	3	4	6	8	10	12	14*	14	13	10	6	2	-4	-9	-12	-15*	15	-14	-12	-9	-6	-3	29

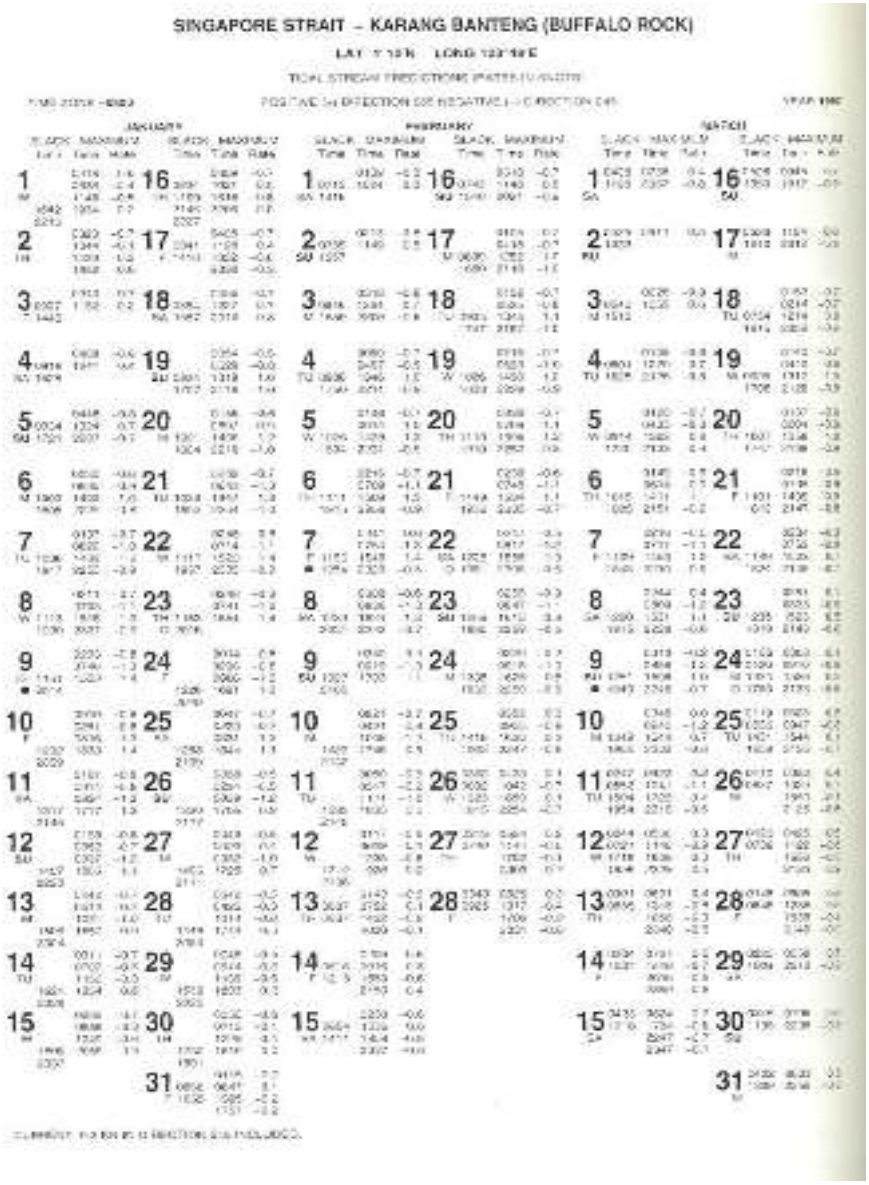
SINGAPORE - WESTERN ROADS

JANUARY 1987 LAT 01°14.0'N LONG 103°49.0'E HOURLY TOTAL STREAMS

POSITIVE(+) DIRECTION 090° NEGATIVE(-) DIRECTION 270° (RATES IN KNOTS)

DAY-HR	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	-0.1	-0.3	-0.3	-0.3	-0.3	-0.1	-0.4	-0.4	-0.4	-0.4	-0.5	-0.6	-0.6	-0.4	-0.1	0.2	0.4	0.6	0.7	0.8	0.8	0.7	0.5	0.1
2	0.1	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.1	0.1	-0.1	0.2	-0.2	-0.1	0.1	0.3	0.4	0.4	0.5	0.5	0.5	0.4	0.3
3	-0.1	-0.4	-0.5	-0.5	-0.5	-0.5	-0.4	-0.3	-0.1	0.1	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0
4	-0.2	-0.4	-0.5	-0.7	-0.7	-0.7	-0.6	-0.4	-0.1	0.3	0.5	0.7	0.7	0.7	0.6	0.3	0.4	0.2	0.2	0.1	-0.1	-0.1	-0.1	0.0
5	-0.3	-0.5	-0.6	-0.8	-0.9	-0.9	-0.8	-0.6	-0.2	0.2	0.7	1.0	1.1	1.2	1.1	1.0	0.7	0.4	0.2	-0.2	-0.3	-0.3	-0.3	-0.4
6	-0.5	-0.7	-0.7	-0.9	-1.0	-1.1	-1.1	-0.9	-0.5	0.0	0.6	1.1	1.4	1.4	1.3	1.0	1.0	0.6	0.3	-0.2	-0.4	-0.5	-0.5	-0.5
7	-0.6	-0.7	-0.9	-1.0	-1.1	-1.2	-1.3	-1.3	-1.0	-0.4	0.3	1.0	1.5	1.5	1.5	1.3	1.3	1.4	0.8	0.1	-0.3	-0.5	-0.6	-0.6
8	-0.7	-0.8	-1.0	-1.1	-1.1	-1.3	-1.4	-1.5	-1.4	-0.9	-0.2	0.5	1.3	1.3	1.1	0.3	0.2	1.0	1.4	0.6	0.0	-0.5	-0.7	-0.7
9 ●	-0.7	-0.8	-1.0	-1.1	-1.2	-1.3	-1.4	-1.5	-1.7	-1.4	-0.8	0.0	0.9	1.0	1.0	0.8	0.4	0.8	1.0	1.0	0.5	-0.2	-0.6	-0.7
10	-0.7	-0.7	-0.9	-1.0	-1.1	-1.2	-1.3	-1.5	-1.7	-1.7	-1.3	-0.6	0.2	1.0	1.8	2.1	2.0	2.4	2.2	1.7	1.0	0.4	0.2	0.0
11	-0.5	-0.5	-0.7	-0.9	-1.0	-1.0	-1.1	-1.3	-1.5	-1.7	-1.6	-1.1	-0.4	0.4	1.1	1.6	2.0	2.2	2.3	2.0	1.4	0.7	0.1	-0.3
12	-0.5	-0.5	-0.6	-0.7	-0.8	-0.8	-0.8	-1.0	-1.2	-1.4	-1.6	-1.4	-0.9	-0.2	0.6	1.1	1.5	1.6	2.0	1.9	1.8	1.0	0.4	0.0
13	-0.4	-0.5	-0.5	-0.6	-0.6	-0.6	-0.7	-0.7	-0.8	-1.0	-1.2	-1.3	-1.0	-0.6	-0.2	0.3	1.0	1.3	1.5	1.6	1.5	1.1	0.6	0.0
14	-0.2	-0.4	-0.4	-0.4	-0.4	-0.5	-0.4	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5	-0.7	-0.3	0.1	0.5	0.8	1.0	1.2	1.2	1.0	0.7	0.3
15	-0.1	-0.3	-0.4	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	-0.2	-0.3	-0.4	-0.5	-0.4	-0.3	-0.1	0.1	0.3	0.6	0.7	0.8	0.7	0.5	0.2
16	0.0	-0.3	-0.4	-0.5	-0.5	-0.4	-0.3	-0.1	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.4	0.4	0.3	0.0
17	-0.1	-0.3	-0.4	-0.6	-0.6	-0.6	-0.5	-0.2	0.1	0.3	0.5	0.3	0.6	0.9	0.4	0.3	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.0
18	-0.5	-0.4	-0.5	-0.6	-0.7	-0.8	-0.7	-0.4	-0.1	0.2	0.5	0.3	0.9	0.9	0.9	0.7	0.5	0.3	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2
19	-0.4	-0.5	-0.6	-0.7	-0.9	-1.0	-1.0	-0.7	-0.3	0.2	0.6	1.0	1.2	1.3	1.3	1.2	0.9	0.5	0.1	-0.2	-0.3	-0.3	-0.3	-0.3
20	-0.5	-0.6	-0.8	-0.9	-1.0	-1.1	-1.2	-1.1	-0.7	-0.1	0.5	1.0	1.3	1.5	1.6	1.5	1.3	0.9	0.4	0.0	-0.3	-0.3	-0.3	-0.1
21	-0.5	-0.6	-0.8	-0.9	-1.1	-1.2	-1.3	-1.3	-1.1	-0.5	0.1	0.8	1.2	1.6	1.7	1.8	1.8	1.5	0.8	0.8	-0.1	-0.3	-0.1	-0.1
22	-0.4	-0.6	-0.8	-0.9	-1.1	-1.2	-1.4	-1.5	-1.4	-0.8	-0.3	0.4	1.0	1.5	1.8	1.9	1.8	1.4	1.1	0.6	0.1	-0.2	-0.3	-0.3
23	-0.4	-0.5	-0.7	-0.8	-1.0	-1.2	-1.4	-1.6	-1.5	-1.3	-0.7	0.0	0.7	1.3	1.6	1.9	1.8	1.6	1.4	0.9	0.3	0.1	-0.3	-0.3
24	0.2	0.4	0.5	0.7	0.9	1.1	-1.3	-1.5	-1.6	-1.5	-1.1	-0.4	0.3	0.9	1.4	1.7	1.8	1.8	1.6	1.1	0.6	0.1	-0.2	-0.2
25	-0.2	-0.2	-0.3	-0.5	-0.7	-0.9	-1.1	-1.3	-1.5	-1.6	-1.3	-0.8	-0.1	0.6	1.1	1.5	1.7	1.7	1.6	1.2	0.7	0.2	-0.1	-0.2
26	-0.2	-0.2	-0.2	-0.3	-0.5	-0.5	-0.5	-1.1	-1.3	-1.5	-1.4	-1.0	-0.4	0.3	0.8	1.2	1.4	1.6	1.5	1.3	0.8	0.7	-0.1	-0.2
27	-0.2	-0.1	-0.1	-0.2	-0.3	-0.4	-0.5	-0.7	-1.0	-1.2	-1.3	-1.1	-0.6	0.0	0.5	0.9	1.3	1.2	1.3	1.2	0.9	0.4	0.0	-0.2
28	-0.3	-0.2	-0.1	0.1	-0.1	-0.2	-0.3	0.4	-0.6	-0.9	-1.1	-1.0	-0.7	0.2	0.5	0.8	0.2	1.0	1.1	1.2	0.8	0.4	0.0	-0.2
29	0.4	0.3	-0.1	0.0	0.0	0.1	-0.1	-0.2	0.3	-0.5	-0.7	-0.8	-0.7	-0.4	0.1	0.4	0.5	0.7	0.8	0.7	0.6	0.4	0.0	-0.2
30	-0.5	-0.4	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.4	-0.4	-0.3	0.0	0.2	0.4	0.5	0.5	0.5	0.4	0.2	0.0	-0.2
31	-0.5	-0.6	-0.4	-0.3	-0.1	0.0	0.1	0.2	0.3	0.3	0.2	0.1	0.0	-0.1	0.0	0.1	0.2	0.2	0.2	0.1	0.0	-0.1	-0.2	-0.3

CURRENT NIL



SINGAPORE STRAIT – KARANG BANTENG (BUFFALO ROCK)

LAT 1°19'N LONG 103°46'E

TIDAL STREAM PREDICTIONS (METRES/KNOTS)

TIMES (GMT) – 0800

POSITIVE (+) DIRECTION 035° NEGATIVE (–) DIRECTION 215°

YEAR 1982

JANUARY

Day	Time	Ht	Rate	Day	Time	Ht	Rate
1 M	0115	1.6		16 SA	0037	0.4	–0.1
	0642	3.4	–0.4		0709	3.7	0.2
	1254	1.7			1345	0.6	
	2010				2027		
2 TU	0302	1.7	–0.7	17 SU	0125	0.4	–0.1
	0844	3.4	–0.3		0751	3.7	0.2
	1459	1.5	0.5		1427	0.6	–0.6
	2122		0.6		2048		–0.5
3 W	0357	1.7	0.2	18 M	0206	0.4	–0.1
	1452	3.4			0827	3.7	0.2
					1502	0.6	
					2124		
4 TH	0439	1.7	–0.6	19 TU	0244	0.4	–0.1
	1547	3.4			0905	3.7	0.2
					1539	0.6	
					2157		
5 F	0524	1.7	–0.5	20 W	0321	0.4	–0.1
	1324	3.4	0.1		0942	3.7	0.2
	2007	1.7	–0.1		1614	0.6	1.2
					2230		–1.0
6 SA	0610	1.6	–0.4	21 TH	0359	0.4	–0.1
	1408	3.4	0.1		1017	3.7	0.2
	2054	1.8	–0.4		1650	0.6	1.3
					2304		–1.0
7 SU	0137	–0.7	–0.2	22 F	0436	0.4	0.1
	0652	1.5	–0.3		0914	3.7	0.1
	1452	3.4	0.1		1727	0.6	1.4
	2142	1.9	–0.3		2335		–0.3
8 M	0213	1.7	–0.1	23 SA	0513	0.4	–0.2
	0735	1.5	–0.1		1041	3.7	0.1
	1536	3.4	0.1		1805	0.6	1.4
	2227	2.0	–0.2				
9 TU	0250	–0.8	0.1	24 SU	0010	–0.3	–0.1
	0816	1.5	–0.1		0611	3.7	0.1
	1617	3.4	0.1		1842	0.6	1.3
	2309	2.0	–0.1				
10 W	0327	–0.8	0.2	25 M	0051	–0.2	–0.1
	0841	1.5	0.1		0651	3.7	0.1
	1656	3.5	0.1		1918	0.7	1.3
	2350	2.0	0.1				
11 TH	0403	–0.8	0.2	26 TU	0132	–0.2	–0.1
	0917	1.5	0.1		0731	3.7	0.1
	1737	3.5	0.1		1954	0.7	1.3
					2210		–0.5
12 F	0438	–0.8	0.2	27 W	0214	–0.2	–0.1
	0952	1.5	0.1		0811	3.7	0.1
	1817	3.5	0.1		2029	0.7	1.3
					2246		–0.5
13 SA	0513	–0.7	0.2	28 TH	0256	–0.2	–0.1
	1031	1.5	0.1		0852	3.7	0.1
	1857	3.5	0.1		2104	0.7	1.3
					2323		–0.5
14 SU	0551	–0.7	0.2	29 F	0338	–0.2	–0.1
	1102	1.5	0.1		0934	3.7	0.1
	1934	3.5	0.1		2139	0.7	1.3
					2359		–0.5
15 M	0628	–0.7	0.2	30 SA	0419	–0.2	–0.1
	1138	1.5	0.1		1017	3.7	0.1
	2011	3.5	0.1		2214	0.7	1.3
				31 SU	0459	–0.2	–0.1
					1100	3.7	0.1
					2249	0.7	1.3

FEBRUARY

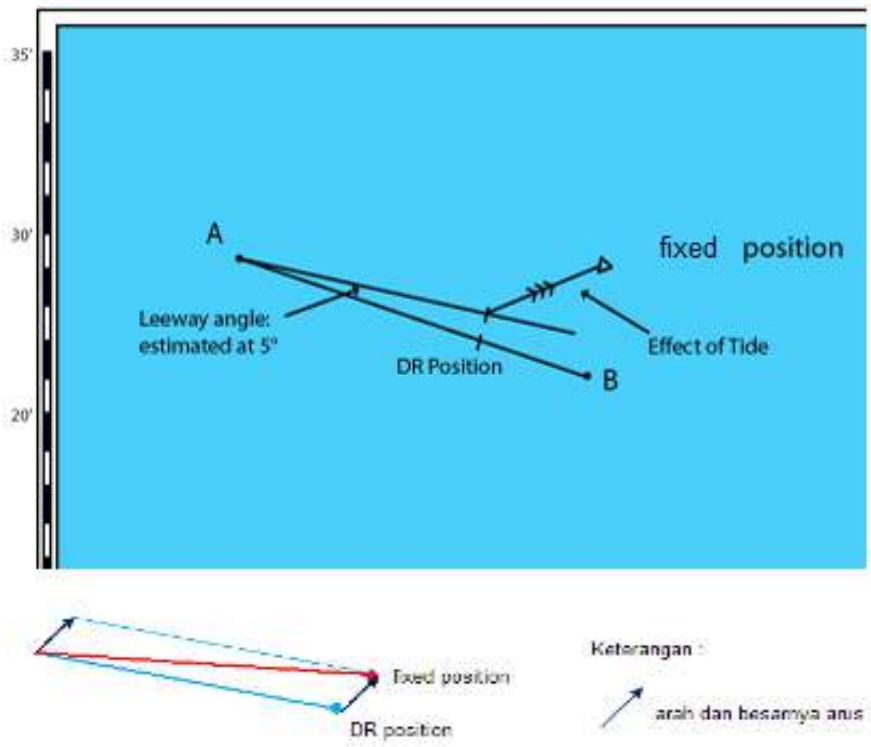
Day	Time	Ht	Rate	Day	Time	Ht	Rate
1 MO	0115	1.6	–0.2	16 TU	0142	0.4	–0.1
	0716	3.4	0.3		0740	3.7	0.2
	1416				1440	0.6	
					2047		–0.6
2 TU	0158	1.6	–0.2	17 W	0225	0.4	–0.1
	0757	3.4	0.3		0835	3.7	0.2
	1457				1535	0.6	
					2140		–0.6
3 W	0241	1.6	–0.2	18 TH	0310	0.4	–0.1
	0841	3.4	0.3		0934	3.7	0.2
	1544				1634	0.6	1.1
					2237		–0.6
4 TH	0329	1.6	–0.2	19 F	0358	0.4	–0.1
	0927	3.4	0.3		1033	3.7	0.2
	1636				1733	0.6	1.2
					2334		–0.6
5 F	0419	–0.2	–0.1	20 SA	0448	0.4	–0.1
	1014	3.4	0.3		1134	3.7	0.2
	1731				1833	0.6	1.2
							–0.6
6 SA	0512	–0.2	–0.1	21 SU	0539	0.4	–0.1
	1103	3.4	0.3		1237	3.7	0.2
	1829				1934	0.6	1.3
							–0.6
7 SU	0608	–0.2	–0.1	22 M	0033	0.4	0.1
	1155	3.4	0.3		0641	3.7	0.2
	1929				1337	0.6	1.4
					2035		–0.5
8 M	0707	–0.2	–0.1	23 TU	0134	0.4	0.1
	1249	3.4	0.3		0744	3.7	0.2
	2030				1441	0.6	1.4
					2137		–0.5
9 TU	0808	–0.2	–0.1	24 W	0236	0.4	0.1
	1344	3.4	0.3		0846	3.7	0.2
	2132				1542	0.6	1.4
					2239		–0.5
10 W	0910	–0.2	–0.1	25 TH	0339	0.4	0.1
	1440	3.4	0.3		0948	3.7	0.2
	2234				1644	0.6	1.4
					2341		–0.5
11 TH	1011	–0.2	–0.1	26 F	0442	0.4	0.1
	1537	3.4	0.3		1050	3.7	0.2
	2336				1746	0.6	1.4
					2443		–0.5
12 F	1112	–0.2	–0.1	27 SA	0544	0.4	0.1
	1634	3.4	0.3		1152	3.7	0.2
	2438				1848	0.6	1.4
					2545		–0.5
13 SA	1213	–0.2	–0.1	28 SU	0646	0.4	0.1
	1731	3.4	0.3		1254	3.7	0.2
	2540				1950	0.6	1.4
					2646		–0.5
14 SU	1314	–0.2	–0.1				
	1828	3.4	0.3				
	2642						
15 M	0000	–0.5	0.1				
	1415	3.4	0.3				
	1925	0.6	1.4				
	2743		–0.5				

MARCH

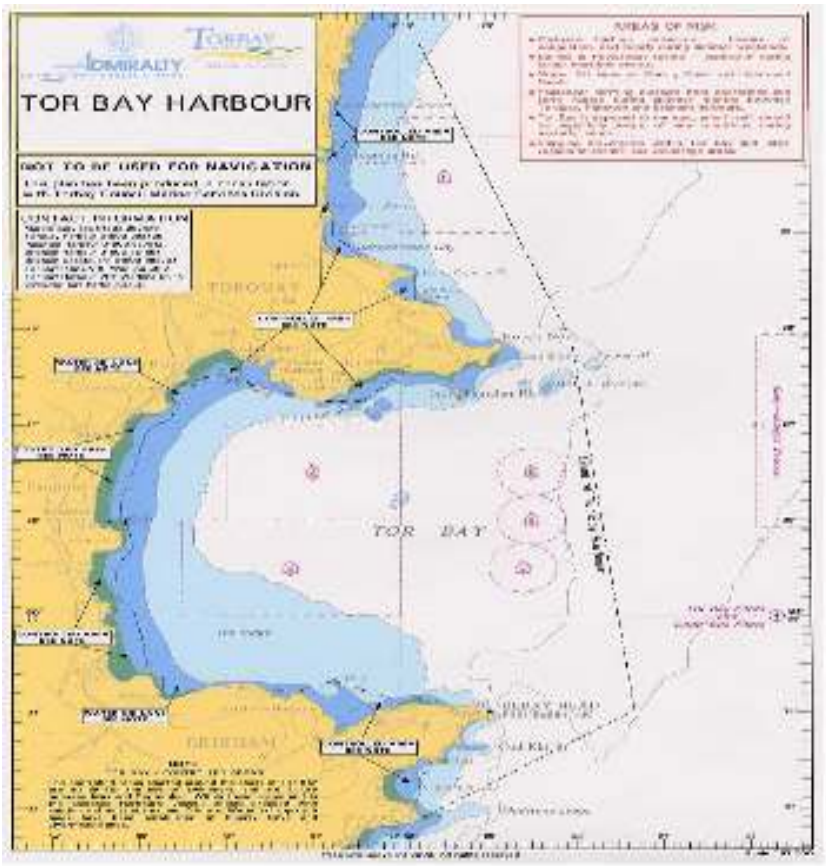
Day	Time	Ht	Rate	Day	Time	Ht	Rate
1 SA	0405	0.4	–0.1	16 SU	0406	0.4	–0.1
	1003	3.7	0.2		1003	3.7	–0.1
2 MO	0309	0.4	–0.1	17 M	0309	0.4	–0.1
	1011	3.7	0.2		1012	3.7	0.2
3 TU	0214	0.4	–0.1	18 TH	0214	0.4	–0.1
	1014	3.7	0.2		1014	3.7	0.2
4 W	0119	0.4	–0.1	19 F	0119	0.4	–0.1
	1016	3.7	0.2		1016	3.7	0.2
5 TH	0024	0.4	–0.1	20 SA	0024	0.4	–0.1
	1018	3.7	0.2		1018	3.7	0.2
6 F	0029	0.4	–0.1	21 SU	0029	0.4	–0.1
	1021	3.7	0.2		1021	3.7	0.2
7 SA	0034	0.4	–0.1	22 M	0034	0.4	–0.1
	1024	3.7	0.2		1024	3.7	0.2
8 SU	0039	0.4	–0.1	23 TU	0039	0.4	–0.1
	1027	3.7	0.2		1027	3.7	0.2
9 M	0044	0.4	–0.1	24 W	0044	0.4	–0.1
	1030	3.7	0.2		1030	3.7	0.2
10 TU	0049	0.4	–0.1	25 TH	0049	0.4	–0.1
	1033	3.7	0.2		1033	3.7	0.2
11 W	0054	0.4	–0.1	26 F	0054	0.4	–0.1
	1036	3.7	0.2		1036	3.7	0.2
12 TH	0059	0.4	–0.1	27 SA	0059	0.4	–0.1
	1039	3.7	0.2		1039	3.7	0.2
13 F	0104	0.4	–0.1	28 SU	0104	0.4	–0.1
	1042	3.7	0.2		1042	3.7	0.2
14 SA	0109	0.4	–0.1	29 M	0109	0.4	–0.1
	1045	3.7	0.2		1045	3.7	0.2
15 SU	0114	0.4	–0.1	30 TU	0114	0.4	–0.1
	1048	3.7	0.2		1048	3.7	0.2
				31 W	0119	0.4	–0.1
					1051	3.7	0.2

Menghitung besar kecil arus dan pasang surut sesungguhnya dari posisi DR dan posisi sejati.

Selain dari data di peta dan dari tabel, arus pasang surut dapat diketahui dengan observasi posisi duga dan posisi sejati pada peta dengan menjabarkan antara posisi duga dan posisi sejati ke dalam vektor, dengan demikian maka besarnya dan arah arus dapat diprediksikan.



BAB VI
INFORMASI PETA



Seorang mualim harus mempunyai kemampuan untuk membaca keterangan dan simbol-simbol yang terdapat di dalam peta. Untuk membantu memahami keterangan maupun simbol yang terdapat di dalam peta maka dapat digunakan:

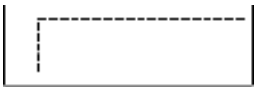
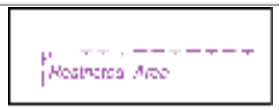
1. International *symbol and abbreviations* (*chart* 5011)
2. Peta No.1 (untuk Indonesia dan Amerika)

Berikut ini lampiran simbol dan keterangan *chart* 5011

Areas, Limits

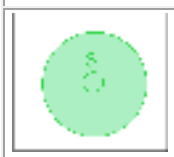
General

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Maritime limit in general, usually implying permanent obstructions	
	Maritime limit in general, usually implying NO permanent obstructions	
	Limit of restricted area	
	(Screen optional) Limit of prohibited area (no unauthorized entry)	

Anchorages, Anchorage Areas

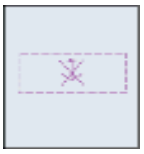
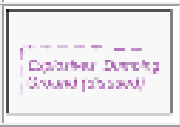
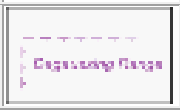
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Anchorage (large vessels)		
		Anchorage (small vessels)		
		Anchor berths		
		Anchor berths (swinging circle may be shown)		
		Anchorage area in general		
		Numbered anchorage area		
		Named anchorage area		
		Deep Water Anchorage area, Anchorage area for Deep Draft Vessels		
		Tanker anchorage area		
		Anchorage for periods up to 24 hours		

NOS	NIMA		IHO	Foreign NIMA Charts
		Explosives anchorage area		
		Quarantine anchorage area		
		Reserved anchorage		
Note: Anchors as part of the limit simbol are not shown for small areas. Other types of anchorage areas may be shown.				
		Sea-plane landing area		
		Anchorage for sea-planes		

Restricted Areas

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Anchoring prohibited		
		Fishing prohibited		
		Limit of reserve: Nature reserve, Bird sanctuary, Game preserve, Seal sanctuary		
		Explosives dumping ground		
		Explosives dumping ground (disused) Foul (explosives)		
		Dumping ground for chemical waste		
		Degaussing range		
		Degaussing range		

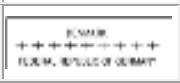
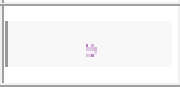
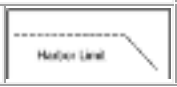
Military Practice Areas

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Firing danger area		
		Military area, entry prohibited		
		Mine-laying practice area		
		Submarine transit lane and exercise area		
		Mine field		

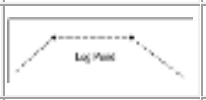
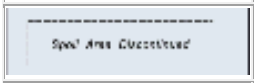
International Boundaries and National Limits

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		International boundary on land		
		International maritime boundary		
		Straight territorial sea baseline		
		Seaward limit of territorial sea		
		Seaward limit of contiguous zone		
		Limits of fishery zones		
		Limit of Exclusive Economic Zone		
		Customs limit		
		Harbor limit		

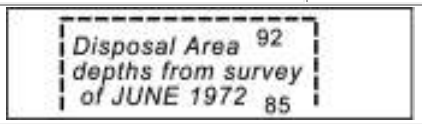
Various Limits

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO	Foreign NIMA Charts
	Limit of fast ice, ice front		
	Limit of sea ice (pack ice)-seasonal		
	Log pond		
	Spoil ground		
	Spoil ground (disused)		
	Dredging area		
	Cargo transshipment area		
	Incineration area		

Supplementary National Simbols

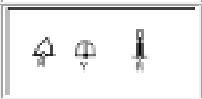
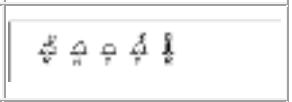
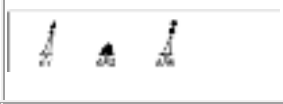
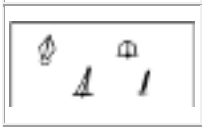
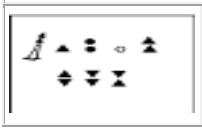
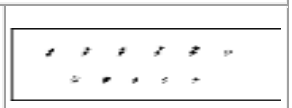
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA	
		COLREGS demarcation line
		Limit of fishing areas (fish trap areas)
		Dumping ground
		Disposal area (Dump Site)
		Limit of airport
		Reservation line (Options)
		Dump Site

Buoys, Beacons

Characteristics Common to Buoys and Beacons

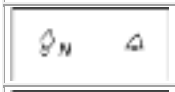
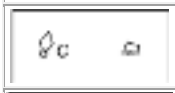
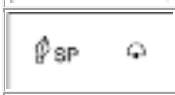
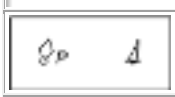
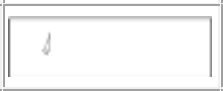
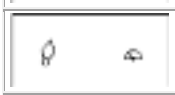
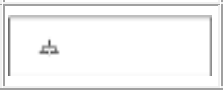
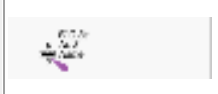
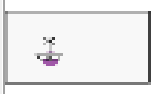
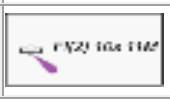
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

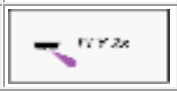
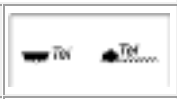
NOS	NIMA		IHO
		Position of buoy	
Colors of Buoys and Beacon Topmarks			
		Green and black	
		Single colors other than green and black	
		Multiple colors in horizontal bands. The color sequence is from top to bottom.	
		Multiple colors in vertical or diagonal stripes. The darker color is given first.	
Note: Retroreflecting material may be fitted to some unit marks. Charts do not usually show it. Under IALA Recommendations, black bands will appear blue under a spotlight.			
Lighted Marks			
		Lighted marks on standard charts.	
		Lighted marks on multicolored charts.	
Topmarks and Radar Reflectors			
		IALA System buoy topmarks (beacon topmarks shown upright)	

NOS	NIMA		IHO
		Beacon with topmark, color, radar reflector and designation	
		Buoy with topmark, color, radar reflector and designation	
Note: Radar reflectors on floating marks are usually not charted.			

Buoy Shapes and Types

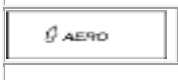
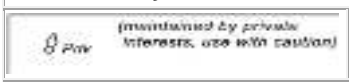
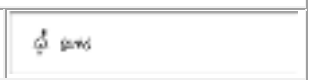
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Conical buoy, nun buoy		
		Can or cylindrical buoy		
		Spherical buoy		
		Pillar buoy		
		Spar buoy, spingle buoy		
		Barrel buoy		
		Super buoy		
Light Floats				
		Light float (unmanned light-vessel) as part of IALA System		
		Light float not part of IALA System		
Mooring Buoys				
		Mooring buoys		

NOS	NIMA		IHO	Foreign NIMA Charts
		Lighted mooring buoy (example)		
		Trot, mooring buoys with ground tackle and berth numbers		
		Mooring buoy with telegraphic communication		
		Mooring buoy with telephonic communication		
		Numerous moorings (example)		

Special Purpose Buoys, Seasonal Buoys

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Firing danger area (Danger Zone) buoy	
		Target	
		Marker Ship	
		Barge	
		Degaussing Range buoy	
		Cable buoy	
		Spoil ground buoy	
		Buoy marking outfall	
		ODAS (Ocean Data Acquisition System) buoy; Data-collecting buoy of superbuoy size	
		Special purpose buoys	
		Wave recorder, current meter	
		Seaplane anchorage buoy	
		Buoy marking recreation zone	
Seasonal Buoys			
		Buoy privately maintained (example)	
		Seasonal buoy (example)	

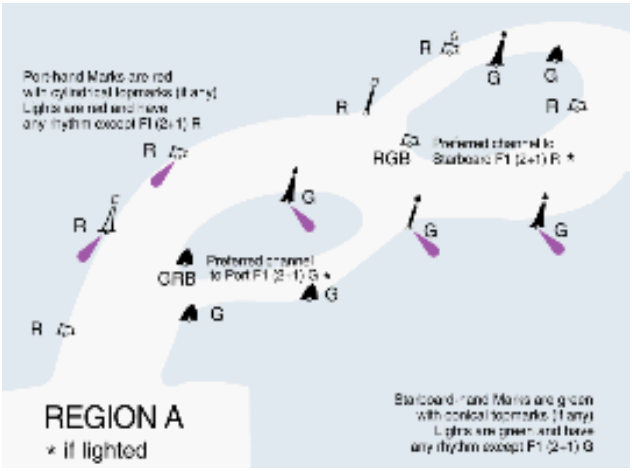
IALA Maritime Buoyage System

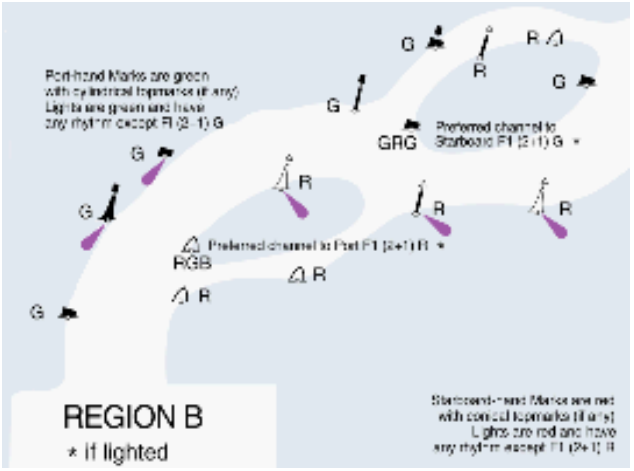
IALA International Association of Lighthouse Authorities

Where in force, the IALA System applies to all fixed and floating marks except lighthouses, sector lights, leading lights and leading marks, light-vessels and lanbys. The standard buoy shapes are cylindrical (can), conical, spherical, pillar and spar. Variations may occur; for example, light-floats. (See Buoy Shapes and Types for examples.) In the illustrations below, only the standard buoy shapes are used. In the case of fixed beacons (lit or unlit), only the shape of the topmark is of navigational significance.

Lateral Marks *are generally for well-defined channels. There are two international Buoyage Regions, A and B, where Lateral marks differ.*

IALA Buoyage Regions A and B





A preferred channel buoy may also be a pillar or a spar. All preferred channel marks have horizontal bands of color. Where for exceptional reasons an Authority considers that a green color for buoys is not satisfactory, black may be used.

Direction of Buoyage

The direction of buoyage is that taken when approaching a harbor from seaward or along coasts, the direction determined by buoyage authorities (normally clockwise around land masses).

	Simbol showing direction of buoyage where not obvious.
	Simbol showing direction of buoyage on multicolored charts.

IALA Maritime Buoyage System (continued)

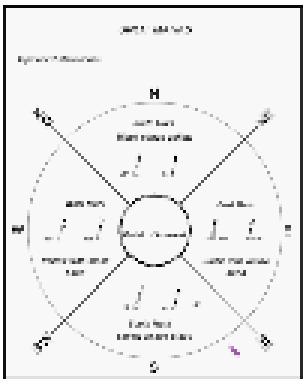
IALA International Association of Lighthouse Authorities

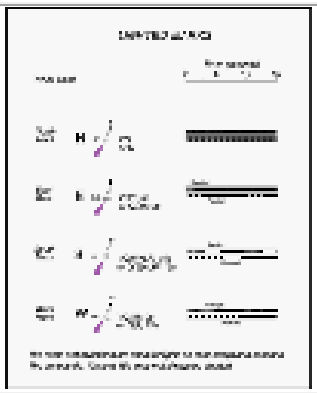
Where in force, the IALA System applies to all fixed and floating marks except lighthouses, sector lights, leading lights and leading marks, light-vessels and lanbys. The standard buoy shapes are cylindrical (can), conical, spherical, pillar and spar. Variations may occur; for example, light-floats. (See Buoy Shapes and Types for examples.) In the illustrations below, only the standard buoy shapes are used. In the case of fixed beacons (lit or unlit), only the shape of the topmark is of navigational significance.

In the illustrations below, all marks are the same in Regions A and B.

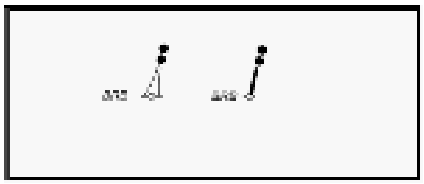
IALA Buoyage Regions A and B

Cardinal Marks *indicating navigable water to the named side of the marks.*

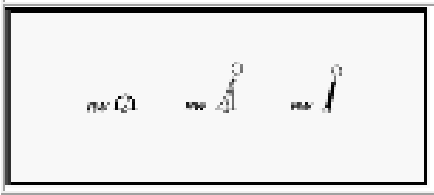




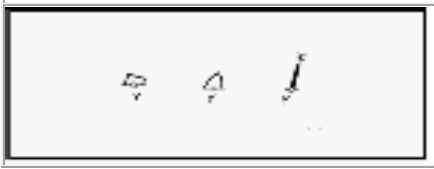
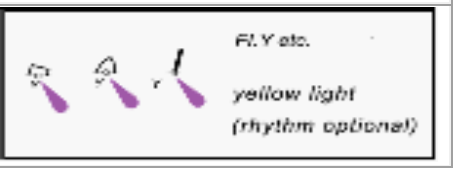
Isolated Danger Marks *stationed over dangers with navigable water around them.*
Body: black with red horizontal band(s).
Topmark: 2 black spheres.

Unlit Marks	***Lighted Marks***
	

Safe Water Marks *such as mid-channel and landfall marks.*
Body: red and white vertical stripes.
Topmark (if any): red sphere.

Unlit Marks	***Lighted Marks***
	

Special Marks *not primarily to assist navigation, but to indicate special features.*
Body (shape optional): yellow. ‡
Topmark (if any): yellow.
‡ In special cases, yellow can be in conjunction with another color.

Unlit Marks	***Lighted Marks***
	

BEACONS with IALA System topmarks are charted by upright symbols, eg. 

or, on smaller-scale charts: 

Beacon towers are charted:  etc. (occasionally lighted)

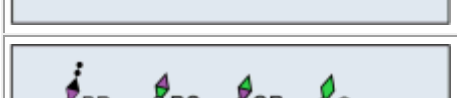
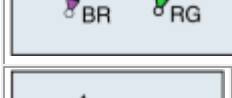
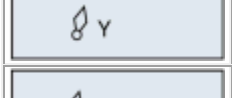
RADAR REFLECTORS on buoys and beacons are not generally charted.

COLOR ABBREVIATIONS under symbols, especially those of spar buoys, may be omitted, or may be at variance with symbols shown above.

LIGHT FLOATS: The IALA System is not usually applied to large lightfloats (replacing manned lightships) but may be applied to smaller lightfloats

Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		Foreign NIMA Charts
		Bell buoy	
		Gong buoy	
		Whistle buoy	
		Fairway buoy (RWVS)	
		Midchannel buoy (RWVS)	
		Starboard-hand buoy (entering from seaward, US waters)	
		Port-hand buoy (entering from seaward, US Waters)	
		Bifurcation, Junction, Isolated danger, Wreck and Obstruction buoys	
		Fish trap (area) buoy	
		Anchorage buoy (marks limits)	
		Black	

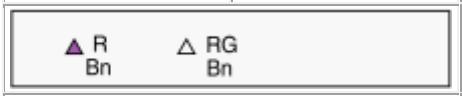
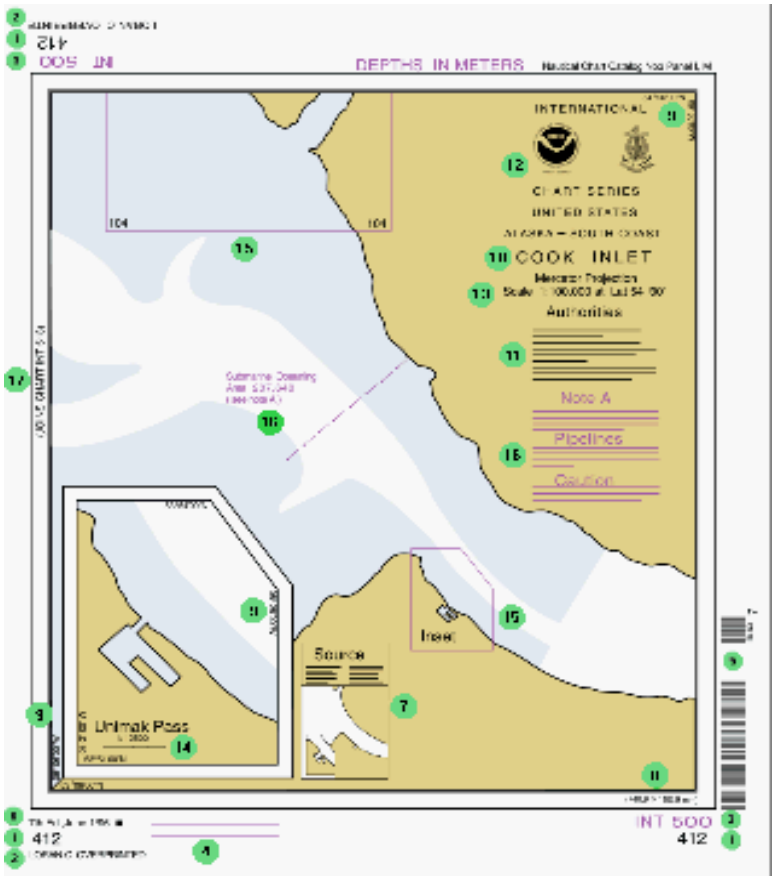
NOS	NIMA		Foreign NIMA Charts
		Triangular-shaped beacons	
		Beacon, color unknown	
		Mooring buoy with telegraphic communications	
		Mooring buoy with telephonic communications	
		Lighted beacon	

Chart Number, Title, Marginal Notes

Schematic Layout of an NOS chart

Hold your cursor over any green circle for details, or refer to the legend below this picture.



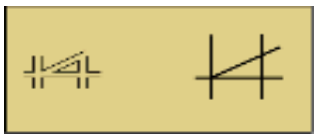
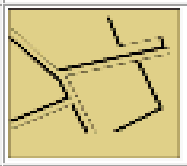
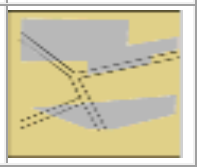
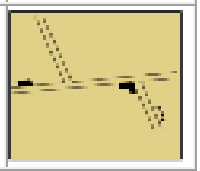
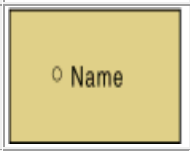
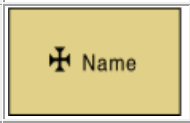
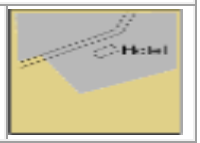
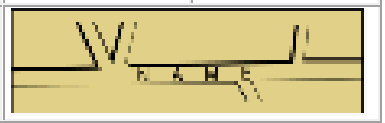
1	Chart number in national chart series
2	Identification of a latticed chart (if any). D=Decca; LC=Loran-C; Om=Omega

3	Chart number in international chart series (if any)
4	Publication note (imprint)
5	Bar Code
6	Edition note. (In this example: Seventh edition published in June, 1996)
7	Source data diagram (if any). (For attention to navigators: use caution where surveys are inadequate.)
8	Dimensions of inner borders
9	Corner coordinates
10	Chart title
11	Explanatory notes on chart construction, etc. (to be read before using chart)
12	Seals. In this example, the national and International Hydrographic Organization seals show that this national chart is also an international one. Purely national charts have the national sea only. Reproductions of charts of other nations (facsimile) have the seals of the original producer (left), publisher (center), and the IHO (right).
13	Projection and scale of chart at stated latitude. (The scale is precisely as stated only at the latitude quoted)
14	Linear scale on large-scale charts
15	Reference to a larger-scale chart
16	Cautionary notes (if any). Information on particular features (to be read before using chart)
17	Reference to an adjoining chart of similar scale

Cultural Features

Settlements, Buildings

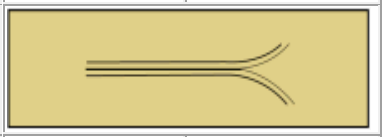
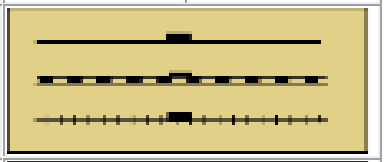
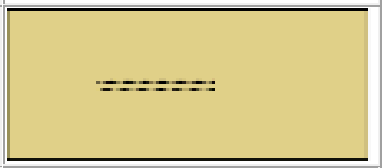
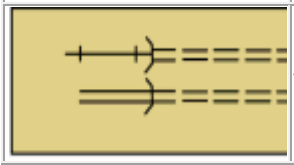
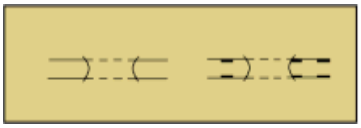
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

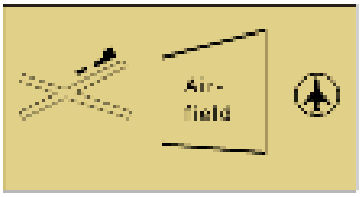
NOS	NIMA		IHO	Foreign NIMA Charts
		Urban area		
		Settlement with scattered buildings		
		Settlement (on medium- and small-scale charts)		
		Village		
		Buildings in general		
		Important building in built-up area		
		Street name, Road name		

NOS	NIMA		IHO	Foreign NIMA Charts
		Ruins, Ruined landmark		

Roads, Railways, Airfields

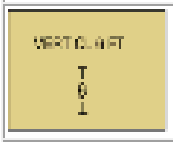
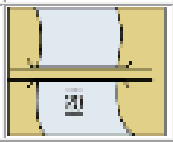
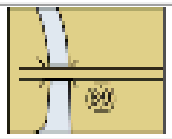
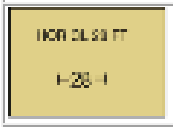
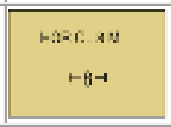
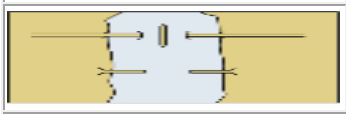
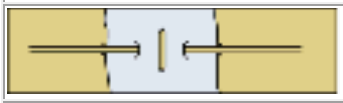
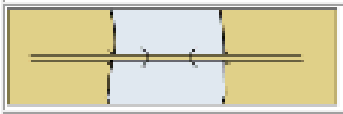
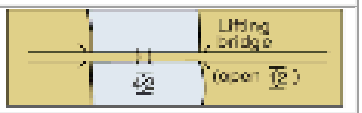
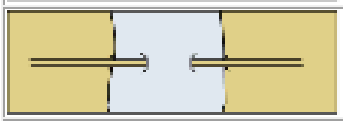
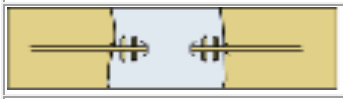
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

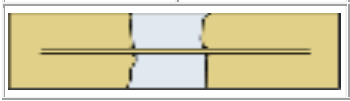
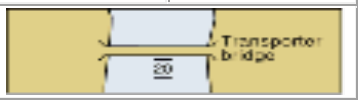
NOS/NIMA		IHO	Foreign NIMA Charts
	Motorway		
	Road (hard surfaced)		
	Track, Path (loose or unsurfaced)		
	Railway, with station		
	Cutting		
	Embankment		
	Tunnel		

NOS/NIMA		IHO	Foreign NIMA Charts
	Airport, Airfield		

Bridges, Clearance

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Vertical clearance above High Water		
		Horizontal clearance		
		Fixed bridge		
		Opening bridge (in general)		
		Swing bridge		
		Lifting bridge		
		Bascule bridge		
		Pontoon bridge		
		Drawbridge		

NOS	NIMA		IHO	Foreign NIMA Charts
		Transporter bridge		

Other Cultural Features

NOS National Ocean Service (US)
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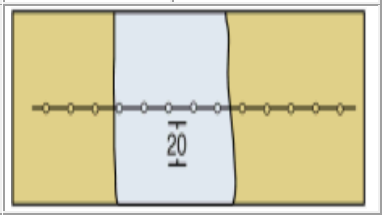
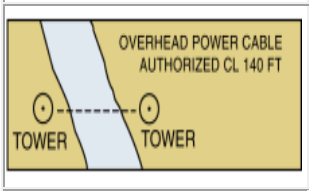
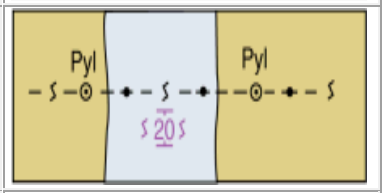
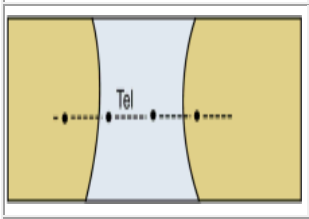
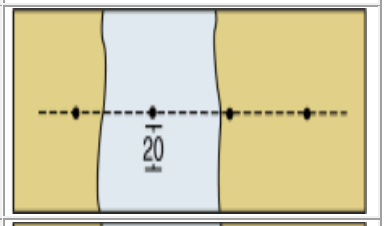
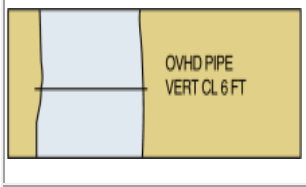
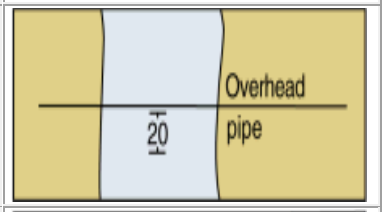
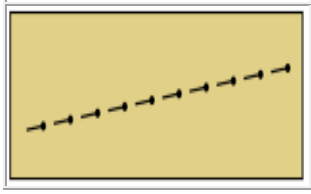
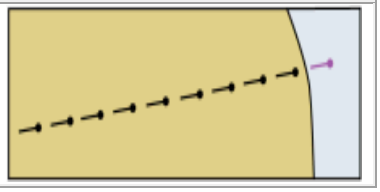
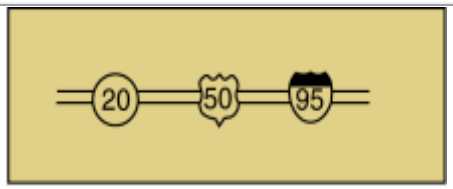
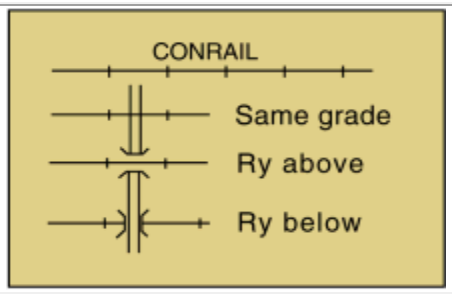
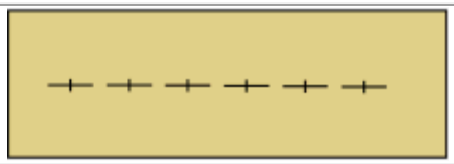
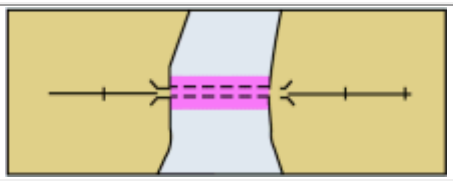
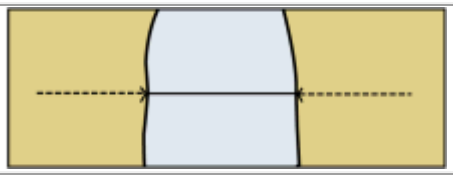
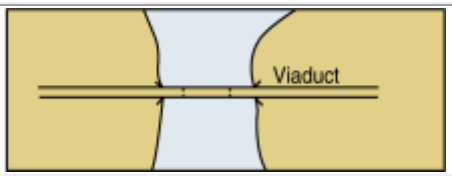
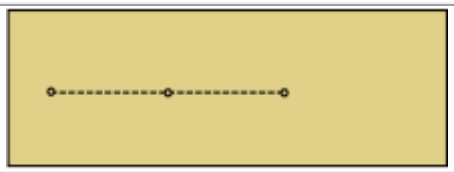
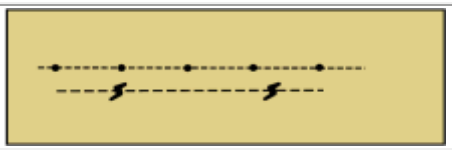
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Overhead transporter, Telepheric with vertical clearance		
		Power transmission line with pylons and safe overhead clearance		
		Overhead cable, Telephone line, Telegraph line		
		Overhead pipe with vertical clearance		
		Pipeline on land		

Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

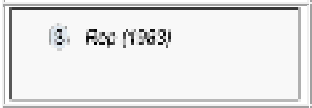
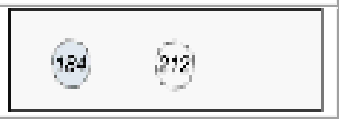
NOS/NIMA	
	Highway markers
	Railway (Ry), single or double track; Railroad (RR)
	Abandoned railroad
	Bridge under construction
	Footbridge

NOS/NIMA	
	Viaduct
	Fence
	Power transmission line

Depths

General

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA /TH>		IHO/Foreign NIMA Charts
ED	Existence doubtful	*ED*
SD	Sounding doubtful	*SD*
Rep	Reported, but not yet surveyed	*Rep*
	Reported (year of report), but not surveyed	*Rep (1973)*
	Reported, but not confirmed sounding or danger	

Soundings

NOS National Ocean Service (US)
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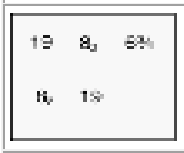
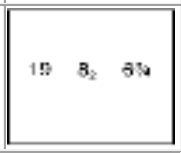
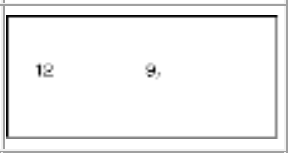
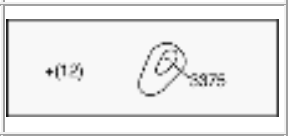
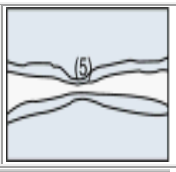
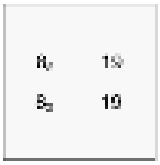
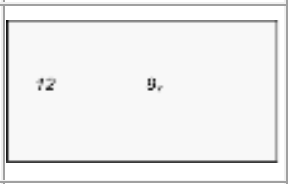
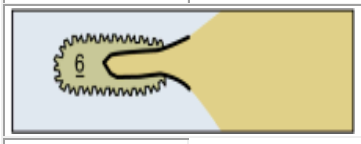
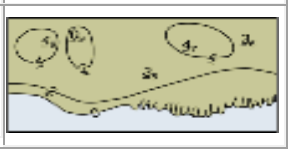
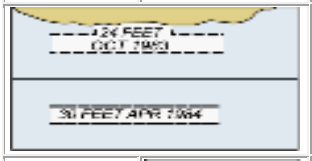
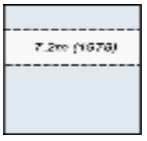
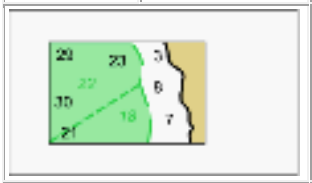
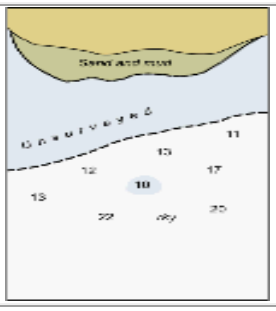
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Sounding in true position (NOS uses upright print on English unit charts, italics for Metric charts).	
		Sounding out of position	
		Least depth in narrow channel	
		No bottom found at depth shown	
		Soundings unreliable or taken from a smaller-scale source (NOS uses italics for English unit charts, upright print for Metric charts).	
		Drying heights above chart datum	

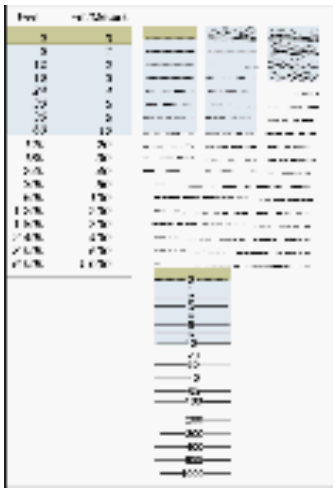
Depths in Fairways and Areas

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Limit of dredged area	
		Dredged channel or area with depth of dredging in meters	 
		Dredged channel or area with depth and year of the latest control survey	 
		Dredged channel or area with maintained depth	 
		Depth at chart datum, to which an area has been swept by wire drag. The latest date of sweeping may be shown in parentheses.	
		Unsurveyed or inadequately surveyed area; area with inadequate depth information	

Depth Contours

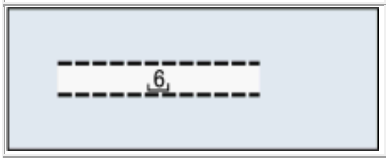
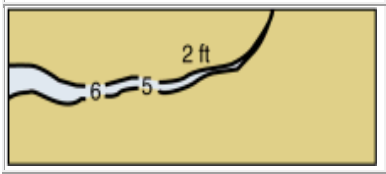
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Low water line One or two lighter blue tints may be used instead of the "ribbons" of tint at 10 or 20 m	
	Approximate depth contours	

Note: The extent of the blue tint varies with the scale and purpose of the chart or its sources. On some charts, contours and figures are printed in blue.

Supplementary National Simbols

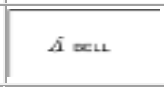
NOS	National Ocean Service (US)
NIMA	National Imagery and Mapping Agency (US)
IHO	International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Swept channel	
	Swept area, not adequately sounded (shown by purple or green tint)	
	Stream	

Fog Signals

General, Types, Examples, Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
General			
		Position of fog signal (type of fog signal not stated)	
Types of Fog Signals, *with Abbreviations*			
GUN		Explosive	Explos
DIA		Diaphone	Dia
SIREN		Siren	Siren
HORN		Horn (Nautophone, reed, tyfon)	Horn
BELL		Bell	Bell
WHIS		Whistle	Whis
GONG		Gong	Gong
Examples of Fog Signal Descriptions			
		Siren at a lighthouse, giving a long blast followed by a short one (N), repeated every 60 seconds	
		Wave-actuated bell buoy	
		Light buoy, with horn giving a single blast every 15 seconds, in conjunction with a wave-actuated whistle	
‡ The fog signal simbol may be omitted when a description of the signal is given.			
Supplementary National Simbol			
Mo		Morse Code fog signal	

Hydrographic Terms

Hydrographic Terms and Abbreviations

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	
Anch	Anchorage
Apprs	Approach, Approaches
B	Bay, Bayou
Bk	Bank
Chan	Channel
Co rf; Rf	Coral reef; Reef
Cr	Creek
Cr	Cove
Entr	Entrance
Est	Estuary
Fd	Fjord
G	Gulf
In	Inlet
L	Loch, Lough, Lake
Lag	Lagoon
Le	Ledge
Mt	Mount, Mountain
Mth	Mouth
Pass	Passage, Pass
Pk	Peak
Rd	Roads, Roadstead
Rf; Co rf	Reef; Coral reef

Sd	Sound
Shl	Shoal
Str	Strait
Other Terms	
anc	ancient
approx	approximate
D, Destr	destroyed
dist	distant
exper	experimental
Subm, subm	submerged

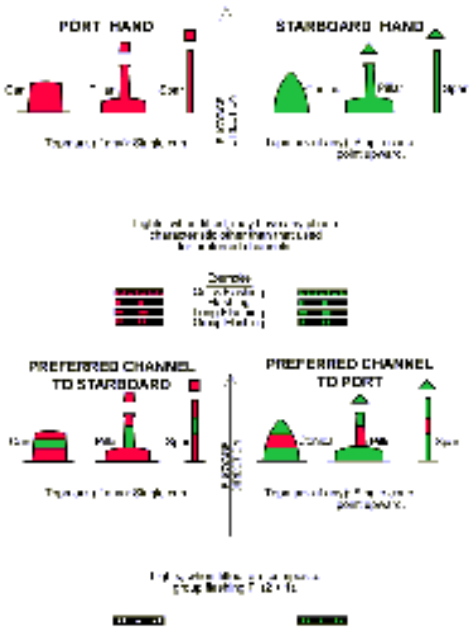
IALA Maritime Buoyage System

Lateral Marks (Region A)

IALA International Association of Lighthouse Authorities

Lateral Marks *are generally for well-defined channels. There are two international Buoyage Regions, A and B, where Lateral marks differ.*

IALA Buoyage Regions A and B

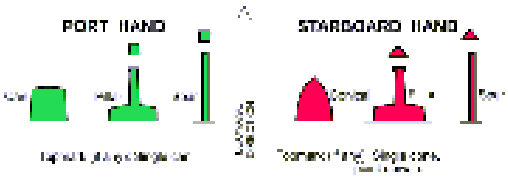


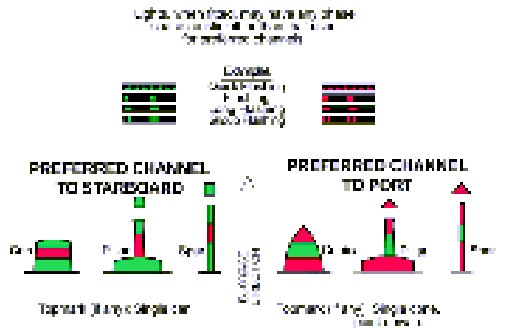
Lateral Marks (Region B)

IALA International Association of Lighthouse Authorities

Lateral Marks *are generally for well-defined channels. There are two international Buoyage Regions, A and B, where Lateral marks differ.*

IALA Buoyage Regions A and B



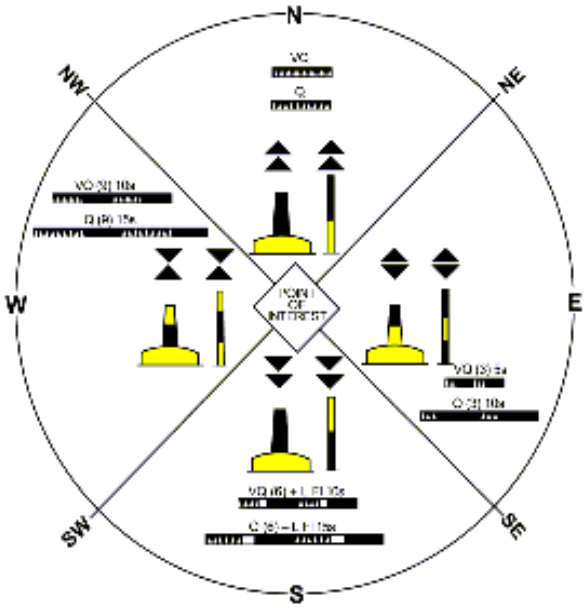


Cardinal Marks (Regions A and B)

IALA International Association of Lighthouse Authorities

IALA Buoyage Regions A and B

Topmarks are always fitted (when practicable).
Buoy shapes are pillar or spar.



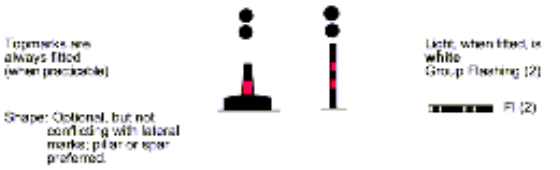
Lights, when fitted, are white. Very Quick Flashing or Quick Flashing at South mark each has a Long Flash immediately following the quick flashes.

Isolated Danger Marks, Safe Water Marks, Special Marks (Regions A and B)

IALA International Association of Lighthouse Authorities

IALA Buoyage Regions A and B

ISOLATED DANGER MARKS



SAFE WATER MARKS

SPECIAL MARKS

Index of Abbreviations (U.S.)

Abbreviations

A B C D E F G H I K L M N O P Q R S T U V W Y

A

AERO, Aero	Aero light	**Aero RBn**	Aeronautical radiobeacon
AERO RC	Aeronautical radiobeacon	**Al**	Alternating
ALP	Articulated Loading Platform	**Alt**	Alternating
Am	Amber	**anc**	ancient
ANCH, Anch	Anchorage		

B

B	Bay, bayou	**Bdy Mon**	Boundary monument
bk	Broken	**Bkw**	Breakwater
Bl	Blue	**BM**	Benchmark
Bn	Beacon	**Bn Tr**	Beacon tower
Br	Breakers	**brg**	Bearing
brk	Broken	**Bu**	Blue

C

c	Course	**C**	Can, cylindrical
C	Cove	**CALM**	Centenary Anchor Leg Mooring

Cas	Castle	**Cb**	Cobbles
cbl	Cable	**cd**	Candela
CD	Chart datum	**Cem**	Cemetery
CG	Coast Guard station	**Chan**	Channel
Ch.	Church	**Chy**	Chimney
Cl	Clay	**CL**	Clearance
cm	Centimeter(s)	**Co**	Coral
Co rf	Coral reef	**Cr**	Creek
crs	Course	**Cup, Cup.**	Cupola
Cus Ho	Customs house	**Cy**	Clay

D

D	Destroyed	**Destr**	Destroyed
dev	Deviation	**DIA, Dia**	Diaphone
Dir	Direction	**dist**	Distant
dm	Decimeter(s)	**Dn.**	Dolphin
Dol	Dolphin	**DW**	Deep Water route
DZ	Danger Zone		

E

E	East, eastern	**ED**	Existence doubtful
EEZ	Exclusive Economic Zone	**E Int**	Equal interval, isophase
Entr	Entrance	**Est**	Estuary
exper	Experimental	**Explos**	Explosive
Exting, exting	Extinguished		

F

f	Fine	**F**	Fixed
Fd	Fjord	**F Fl**	Fixed and flashing
FISH	Fishing	**Fl**	Flashing
Fla	Flare stack	**fm**	Fathom
fms	Fathoms	**fne**	Fine
Fog Det Lt	Fog detector light	**Fog Sig**	Fog signal
FP	Flagpole	**FS, FS.**	Flagstaff
ft	Foot, feet		

G

G	Gravel	**G**	Green
G	Gulf	**Gp Fl**	Group flashing
Gp Occ	Group occulting		

H

h	Hard	**h**	Hour
H	Pilot transferred by helicopter	**HAT**	Highest astronomical tide
Hbr Mr	Harbormaster	**Historic Wk**	Historic wreck
Hk	Hulk	**Hor**	Horizontally disposed
Hosp	Hospital	**hr**	Hour
hrd	Hard		

I

IALA	International	**In**	Inlet

	Association of Lighthouse Authorities		
Intens	Intensified	**IntQkFl**	Interrupted quick flashing
IQ	Interrupted quick flashing	**I Qk Fl**	Interrupted quick flashing
Iso	Isophase	**IUQ**	Interrupted ultra quick

K

km	Kilomter(s)	**kn**	Knot(s)

L

L	Loch, lough, lake	**Lag**	Lagoon
LANBY	Large Automatic Navigational Buoy	**Lat, lat**	Latitude
LASH	Lighter aboard ship	**LAT**	Lowest astronomical tide
Ldg	Landing	**Ldg**	Leading
Le	Ledge	**L Fl**	Long flashing
Lndg	Landing	**LNG**	Liquefied natural gas
Long, long	Longitude	**LOP**	Line of position
LPG	Liquefied petroleum gas	**LSS**	Life-saving station
Lt	Light	**Lt Ho**	Lighthouse
Lt V	Light vessel		

M

m	Meter(s)	**m**	Minute(s) of time
m	Medium (in reference to sand)	**M**	Mud, muddy
M	Nautical mile(s)	**mag**	Magnetic
MHHW	Mean higher high water	**MHLW**	Mean higher low water
MHW	Mean high water	**MLWN**	Mean high water neaps
MHWS	Mean high water springs	**Mi**	Nautical mile(s)
min	Minute of time	**Mk**	Mark
MLHW	Mean lower high water	**MLLW**	Mean lower low water
MLW	Mean low water	**MLWN**	Mean low water neaps
MLWS	Mean low water springs	**mm**	Millimeter(s)
Mo	Morse	**MON, Mon**	Monument
MSL	Mean sea level	**Mt**	Mountain
Mth	Mouth		

N

N	North, northern	**N**	Nun
NE	Northeast	**NM**	Nautical mile(s)
N Mi	Nautical mile(s)	**No**	Number
Np	Neap tide	**NW**	Northwest
NWS SIG STA	Weather signal station		

O

Obsc	Obscured	**Obscd**	Obscured
Obs spot	Observation spot	**Obstn**	Obstruction

Obstr	Obstruction	**Oc**	Occulting
Occ	Occulting	**Occas**	Occasional
ODAS	Ocean Data Acquisition System	**Or**	Orange

P

P	Pebbles	**P**	Pillar
PA	Position approximate	**Pass**	Passage, pass
PD	Position doubtful	**PLT STA**	Pilot station
Pk	Peak	**Post Off**	Post office
Priv, priv	Private	**Prod. Well**	Production well
PROHIB	Prohibited	**Pyl**	Pylon
P	Pebbles	**P**	Pillar
PA	Position approximate	**Pass**	Passage, pass
PD	Position doubtful	**PLT STA**	Pilot station
Pk	Peak	**Post Off**	Post office
Priv, priv	Private	**Prod. Well**	Production well
PROHIB	Prohibited	**Pyl**	Pylon

Q

Q	Quick flashing	**Qk Fl**	Quick flashing

R

R	Coast radio station providing QTG services	**R**	Red
R	Rocky	**Ra**	Radar reference line

Ra (conspic)	Radar conspicuous object	**Ra Antenna**	Dish aerial
Racon	Radar transponder beacon	**Radar Sc.**	Radar scanner
Radar Tr.	Radar tower	**Radome, Ra Dome**	Radar dome
Ra Ref	Radar reflector	**RBn**	Circular radiobeacon
RC	Circular radiobeacon	**Rd**	Roads, roadstead
RD	Directional radiobeacon	**RDF**	Radio direction finding station
Ref.	Refuge	**Rep**	Reported
Rf	Reef	**RG**	Radio direction finding station
Rk	Rock	**Rky**	Rocky
R Mast	Radio mast	**Ro Ro**	Roll on Roll off
R Sta	Coast radio station providing QTG services	**R Tower**	Radio tower
Ru	Ruins	**RW**	Rotating radiobeacon

S

S	Sand	**S**	South, southern
S	Spar, spindle	**s**	Second of time
SALM	Single Anchor Leg Mooring	**SBM**	Single Buoy Mooring
Sc	Scanner	**Sd**	Sound
SD	Sounding doubtful	**SE**	Southeast
sec	Second of time	**sf**	Stiff
sft	Soft	**Sh**	Shells
Shl	Shoal	**Si**	Silt

so	Soft	**Sp**	Spring tide
SP	Spherical	**Sp.**	Spire
Spipe	Standpipe	**SPM**	Single point mooring
SS	Signal station	**st**	Stones
stf	Stiff	**stk**	Sticky
Str	Strait	**Subm**	Submerged
Subm piles	Submerged piles	**Subm ruins**	Submerged ruins
sy	Sticky	**SW**	Southwest

T

T	True	**t**	Metric ton(s)
Tel	Telephone, telegraph	**Temp, temp**	Temporary
Tk	Tank	**Tr, Tr., TR**	Tower
TT	Treetops	**TV Mast**	Television mast
TV Tower	Television tower		

U

Uncov	Uncovers	**UQ**	Ultra quick

V

v	Volcanic	**var**	Variation
Vert	Vertically disposed	**Vert Cl**	Vertical clearance
Vi	Violet	**Vil**	Village
VLCC	Very large crude carrier	**vol**	Volcanic
VQ	Very quick	**V Qk Fl**	Very quick flash

W

W	West, western	**W**	White
Wd	Weed	**WGS**	World Geodetic System
Whf	Wharf	**WHIS, Whis**	Whistle
Wk	Wreck		

Y

Y	Yellow

Supplementary National Abbreviations

A B C D E F G H I K L M N O P Q R S T U V W Y

A

A	Apartment

B

B	Black	**bk**	Black
bl	Black	**Blds**	Boulders
br	Brown	**bu**	Blue

C

Cap	Capitol	**ch**	Chocolate
Chec	Checkered	**Ck**	Chalk
Cn	Cinders	**Co**	Company
Co Hd	Coral head	**COLREGS**	Collision regulations
Corp	Corporation	**cps**	Cycles per second
CRD	Columbia River Datum	**c/s**	Cycles per second
Ct Ho	Court house		

D

dec	Decayed	**deg**	Degree(s)
Di	Diatoms	**Diag**	Diagonal bands
Discol water	Discolored water	**dk**	Dark

E

Explos Anch	Explosives anchorage

F

Facty	Factory	**F Gp Fl**	Fixed and group flashing
fl	Flood	**fly**	Flinty
Fr	Foraminifera	**Fu**	Fucus

G

GAB, Gab	Gable	**GCLWD**	Gulf Coast Low Water Datum
Gl	Globigerina	**glac**	Glacial
gn	Green	**Govt Ho**	Government house
Grd	Ground	**Grs**	Grass
gty	Gritty	**GUN**	Fog gun
gy	Gray		

H

HECP	Harbor entrance control point	**HHW**	Higher high water
HS	High school	**ht**	Height
HW	High water	**HWF & C**	High water full and change
Hz	Hertz		

I

in	Inch	**ins**	Inches
Inst	Institute	**ISLW**	Indian springs low water

K

K	Kelp	**kc**	Kilocycle
kHz	Kilohertz	**kn**	Knot(s)

L

La	Lava	**LLW**	Lower low water
LOOK TR	Lookout tower	**lrg**	Large
lt	Light	**Ltd**	Limited
LW	Low water	**LWD**	Low water datum
LWF & C	Low water full and change		

M

m^2	Square meter(s)	**m^3**	Cubic meter(s)
Ma	Mattes	**Magz**	Magazine
Mc	Megacycle(s)	**Mds**	Madrepores
MHz	Megahertz	**Ml**	Marl
Mn	Manganese	**Mo**	Morse code
Ms	Mussels	**MTL**	Mean Tide Level

N

NAUTO	Nautophone

O

or	Orange	**Oys**	Oysters
Oz	Ooze		

P

Pav	Pavilion	**Pm**	Pumice
Po	Polyzoa	**Pt**	Pteropods

Q

Quar	Quarantine	**Qz**	Quartz

R

Rd	Radiolaria	**rd**	Red
rt	Rotten	**Ry**	Railway, railroad

S

Sc	Scoriae	**Sch**	Schist
Sch	School	**Sem**	Semaphore
Sh	Shingle	**S-LFl**	Short-long flashing
sml	Small	**Spg**	Sponge
Spi	Spicules	**spk**	Speckled
Stg	Sea-tangle	**St M**	Statute (mile)s
Str	Stream	**str**	Streaky
SUB-BELL	Submarine fog bell	**Subm crib**	Submerged crib
SUB-OSC	Submarine oscillator	**Sub vol**	Submarine volcano

T

T	Telephone	**T**	Short ton(s)
T	Tufa	**Tel**	Telegraph
Tel off	Telegraph office	**ten**	Tenacious

U

unev	Uneven	**Univ**	University
µs	Microsecond(s)	**µsec**	Microsecond(s)

V

vard	Varied	**vel**	Velocity
vi	Violet	**Vol Ash**	Volcanic ash

W

wh	White	**WHIS**	Whistle

Y

yd	Yard	**yds**	Yards
yl	Yellow		

International Abbreviations

Positions, Distances, Directions, Compass

PA	Position approximate
PD	Position doubtful
N	North
E	East
S	South
W	West
NE	Northeast
SE	Southeast
NW	Northwest
SW	Southwest
km	Kilometer(s)
m	Meter(s)
dm	Decimeter(s)
cm	Centimeter(s)
mm	Millimeter(s)
M	Nautical mile(s), Sea mile(s)

ft	Foot/feet
h	Hour
m, min	Minute(s) of time
s, sec	Second(s) of time
kn	Knot(s)
t	Ton(s)
cd	Candela (new candela)

Cultural Features

Ru	Ruin

Ports

Lndg	Landing for boats
RoRo	Roll-on, roll-off Ferry

Depths

ED	Existence doubtful
SD	Sounding doubtful

Rocks, Wrecks, Obstructions

Br	Breakers
Wk	Wreck
Obstn	Obstruction

Offshore Installations, Submarine Cables, Submarine Pipelines

Fla	Flare stack
Prod Well	Submerged Production Well

Tracks, Routes

Ra	Radar
DW	Deep Water

Areas, Limits

No	Number
DW	Deep Water

Hydrographic Terms

SMt	Seamount

Lights

Lt	Light
F	Fixed
Oc	Occulting
Iso	Isophase
Fla	Flashing
Q	Quick
IQ	Interrupted quick
VQ	Very quick
IVQ	Interrupted very quick
UQ	Ultra quick
IUQ	Interrupted ultra quick
Mo	Morse Code
W	White
R	Red
G	Green
Bu	Blue
Vi	Violet
Y	Yellow/orange/amber
Or	Orange
Am	Amber

Ldg	Leading light
Dir	Direction light
occas	occasional
R Lts	Air obstruction lights
Fog Det Lt	Fog detector light
Aero	Aeronautical

Buoys, Beacons

B	Black
Mk	Mark
IALA	International Association of Lighthouse Authorities

Fog Signals

Explos	Explosive
Dia	Diaphone
Whis	Whistle

Radar, Radio, Electronic Position-Fixing Systems

Ra	Coast Radar Station
Racon	Radar transponder beacon
RC	Circular (non-directional) marine radiobeacon
RD	Directional radiobeacon
RW	Rotating-pattern radiobeacon
RG	Radio direction-finding stations
R	QTG service, Coast radio stations
Aero RC	Aeronautical radiobeacon
WGS	World Geodetic System

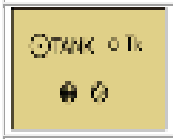
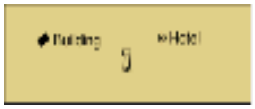
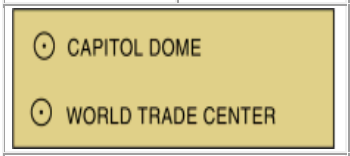
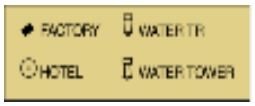
Services

H	Pilots transferred by helicopter
SS	Signal station
INT	international

Landmarks

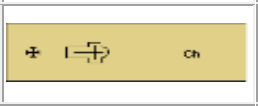
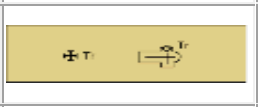
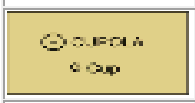
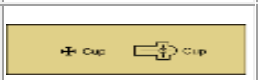
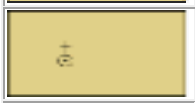
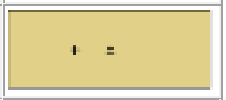
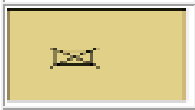
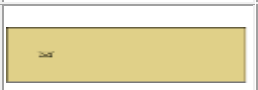
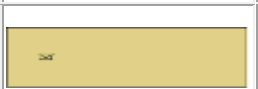
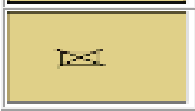
Landmarks, page 1 (General Examples)

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO
		Examples of landmarks	
		Examples of conspicuous landmarks	
		Pictorial simbols (in true position)	
		Sketches, Views (out of position)	
		Height of top of a structure above plane of reference for heights	
		Height of structure above ground level	

Landmarks, page 2

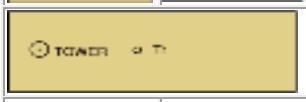
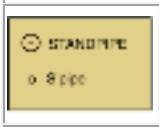
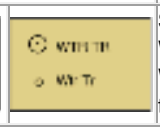
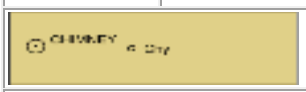
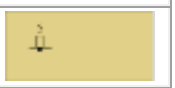
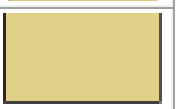
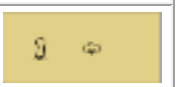
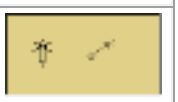
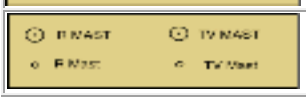
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO	Foreign NIMA Charts
	Church		
	Church tower		
	Church spire		
	Church cupola		
	Chapel		
	Cross, Calvary		
	Temple		
	Pagoda		
	Shinto shrine, Joss house		
	Buddhist temple		

NOS/NIMA		IHO	Foreign NIMA Charts
	Mosque, Minaret		
	Marabout		

Landmarks, page 3

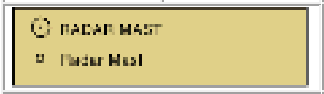
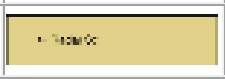
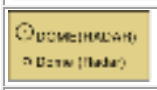
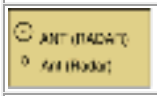
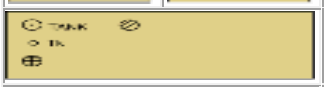
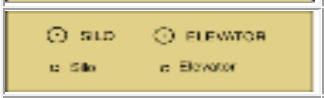
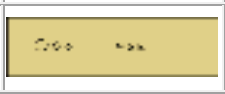
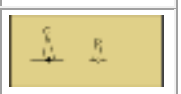
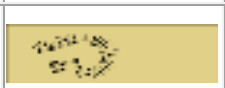
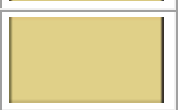
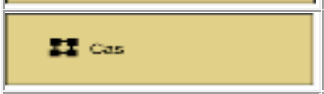
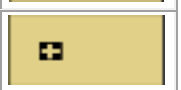
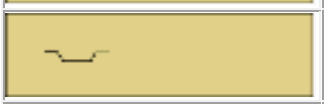
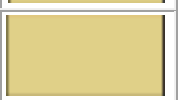
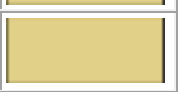
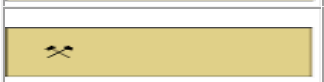
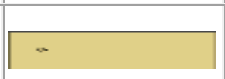
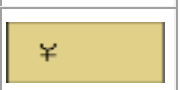
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

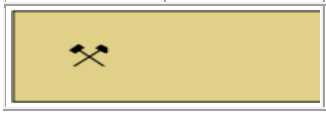
NOS	NIMA		IHO	Foreign NIMA Charts
		Cemetery (for all religious denominations)		
		Tower		
		Standpipe Water tower. Water Tank on a tower		
		Chimney		
		Flare stack (on land)		
		Monument		
		Windmill		
		Windmilll (wingless)		
		Flagstaff, Flagpole		
		Radio mast, Television mast		

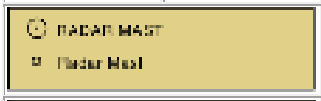
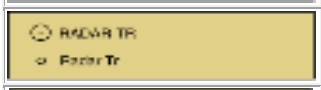
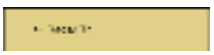
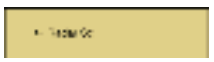
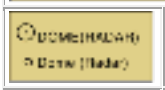
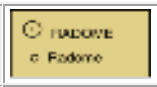
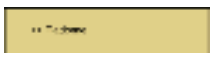
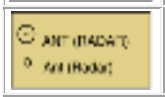
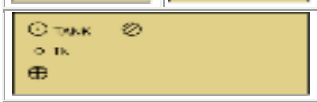
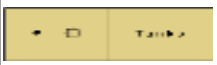
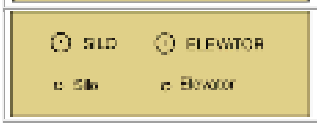
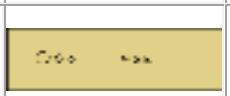
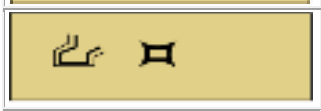
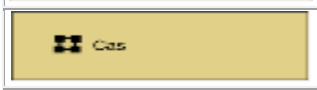
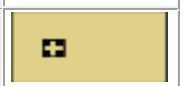
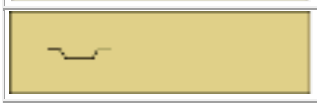
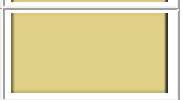
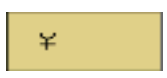
NOS	NIMA		IHO	Foreign NIMA Charts
		Radio tower, Television tower		

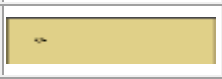
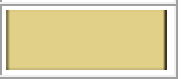
Landmarks, page 4

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Radar mast		
		Radar tower		
		Radar scanner		
		Radar dome		
		Dish aerial		
		Tanks		
		Silo, Elevator		
		Fortified structure (on large-scale charts)		
		Castle, Fort, Blockhouse		
		Battery, Small fort (on smaller-scale charts)		
		Quarry (on large-scale charts)		
		Quarry (on smaller-scale charts)		

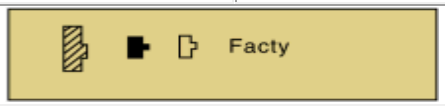
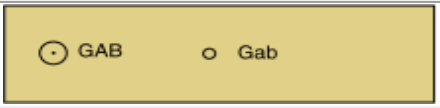
NOS	NIMA		IHO	Foreign NIMA Charts
		Mine		

NOS	NIMA		IHO	Foreign NIMA Charts
		Radar mast		
		Radar tower		
		Radar scanner		
		Radar dome		
		Dish aerial		
		Tanks		
		Silo, Elevator		
		Fortified structure (on large-scale charts)		
		Castle, Fort, Blockhouse		
		Battery, Small fort (on smaller-scale charts)		
		Quarry (on large-scale charts)		
		Quarry (on smaller-scale charts)		

NOS	NIMA		IHO	Foreign NIMA Charts
		Mine		

Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

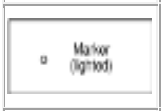
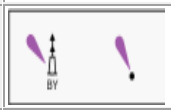
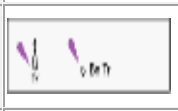
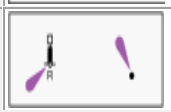
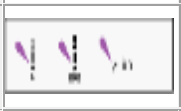
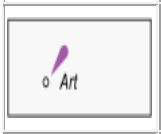
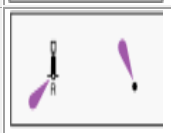
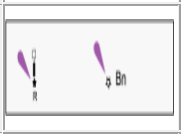
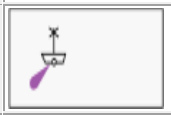
NOS	NIMA	
		Moslem Shrine
		Tomb
		Watermill (foreign charts only)
		Factory
		Well
		School
		Hospital
		University
		Gable
		Camping site
Tel; Tel Off		Telegraph office
Magz		Magazine

NOS	NIMA	
Govt Ho		Government house
Inst		Institute
Ct Ho		Courthouse
Pav		Pavilion
T		Telephone
Ltd		Limited
Apt		Apartment
Cap		Capitol
Co		Company
Corp		Corporation

Lights

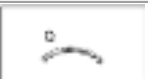
Light Structures, Major Floating Lights

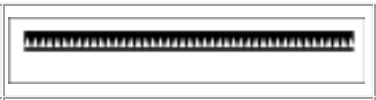
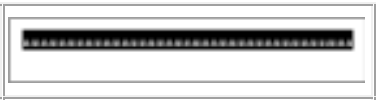
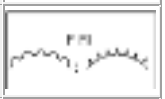
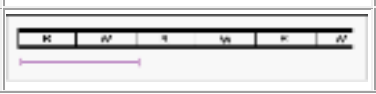
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Major light, minor light, lighthouse		
		Lighted offshore platform		
		Lighted beacon tower		
		Lighted beacon		
		Articulated light; Buoyant beacon, resilient beacon		
		Light vessel, Lightship, Normally manned light-vessel		
		Unmanned light-vessel, light float		
		LANBY, superbuoy as navigational aid		

Light Characters

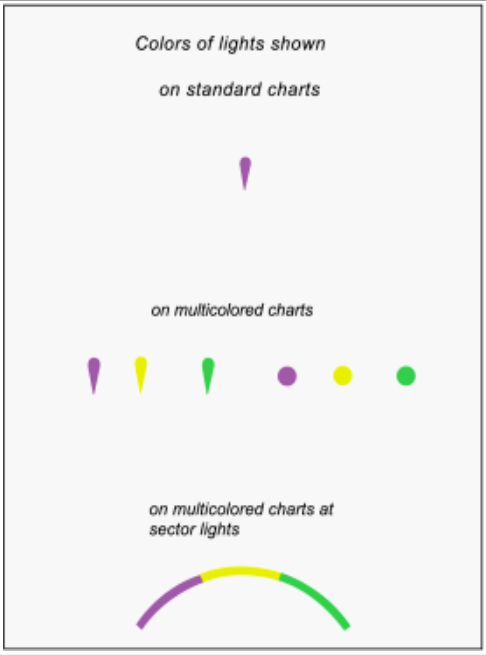
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

Abbreviation		Class of light	Illustration Period shown	
International	**National**			
F	F	Fixed		
Occulting *(total duration of light longer than total duration of darkness)*				
Oc	Oc	Single-occulting		
Oc (2) Example	Oc (2)	Group-occulting		
Oc (2+3) Example	Oc (2+3)	Composite group-occulting		
Isophase *(duration of light and darkness equal)*				
Iso	Iso	Isophase		
Flashing *(total duration of light shorter than total duration of darkness)*				
Fl	Fl	Single-flashing		
Fl (3) Example	Fl (3)	Group-flashing		
Fl (2+1) Example	Fl (2+1)	Composite group-flashing		
LFl	LFl	Long-flashing (flash 2 s or longer)		
Quick *(repetition rate of 50 to 79 - usually either 50 or 60 - flashes per minute)*				
Q	Q	Continuous quick		

Abbreviation		Class of light	Illustration Period shown ⊢—⊣	
International	National			
Q (3) Example	Q (3)	Group quick		
IQ	IQ	Interrupted quick		
Very quick *(repetition rate of 80 to 159 - usually either 100 or 120 - flashes per minute)*				
VQ	VQ	Continuous very quick		
VQ (3) Example	VQ (3)	Group very quick		
IVQ	IVQ	Interrupted very quick		
Ultra quick *(repetition rate of 160 or more - usually 240 to 300 - flashes per minute)*				
UQ	UQ	Continuous ultra quick		
IUQ	IUQ	Interrupted ultra quick		
Mo (A) Example	Mo (A)	Morse Code		
F Fl	F Fl	Continuous ultra quick		
Al. WR	AlWR	Alternating		

Colors of Lights

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
W	W	White (only on sector- and alternating lights	
R	R	Red	
G	G	Green	
Bu	Bu	Blue	
Vi	Vi	Violet	
Y	Y	Yellow	
Y; Or	Y; Or	Orange	
Y; Am	Y; Am	Amber	

Period, Elevation, Range, Disposition

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
Period			
90s		Period in seconds	90s
Elevation			
12m 36ft		Elevation of light, given in meters or feet	12m
Range *(Note: Charted ranges are nominal ranges given in Nautical miles)*			
15M		Light with single range	15M
10M	15/10M	Light with two different ranges (NOS: only lesser of two ranges is charted)	15/10M
7M	15-7M	Light with three or more ranges (NOS: only least of three ranges is charted)	15/10M
Disposition			
	(hor)	horizontally disposed	(hor)
	(vert)	vertically disposed	(vert)

Examples of a Full Light Description

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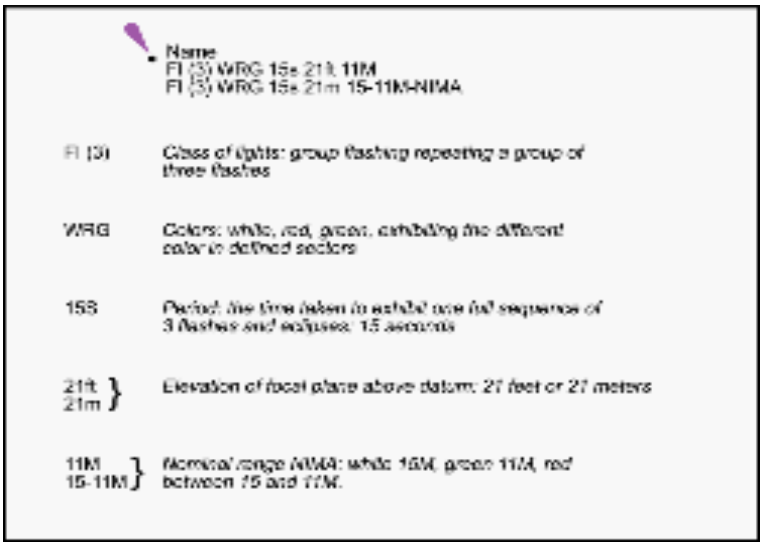
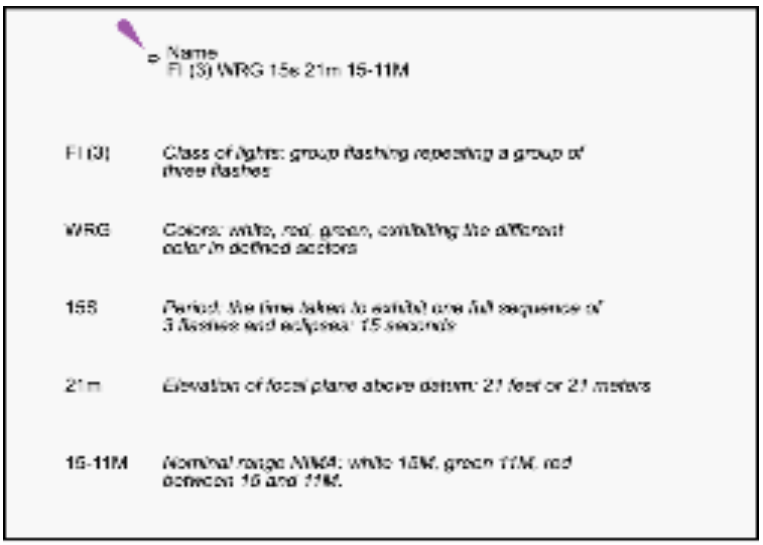
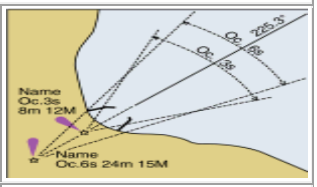
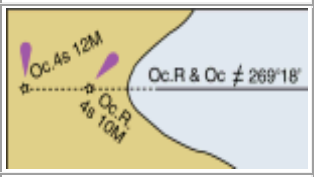
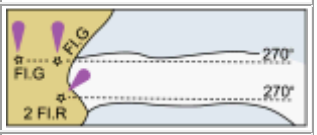
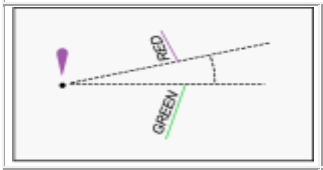
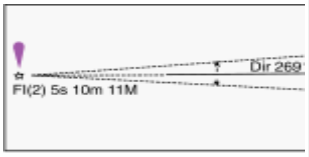
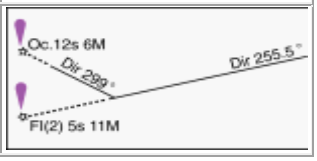
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

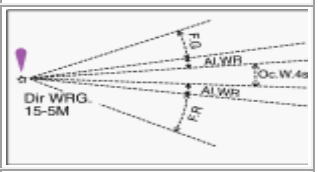
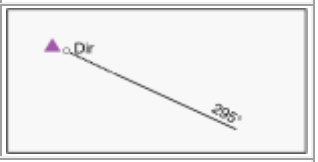




Lights Marking Fairways

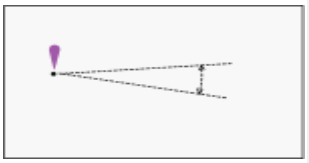
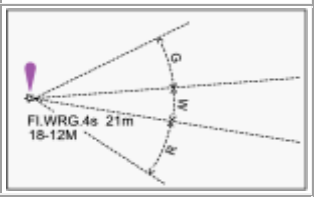
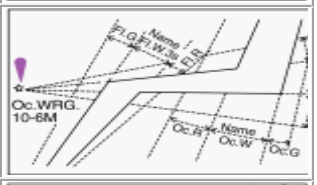
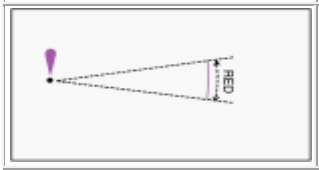
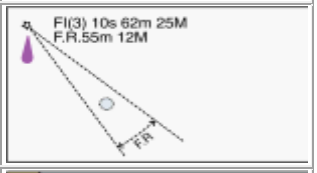
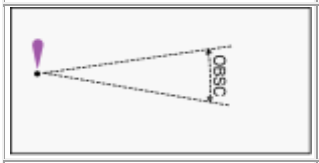
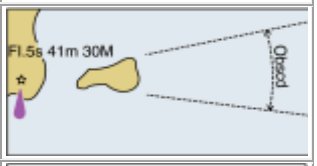
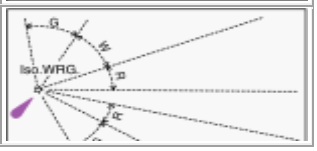
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

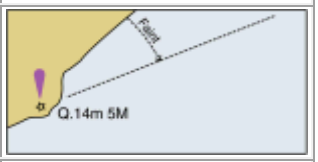
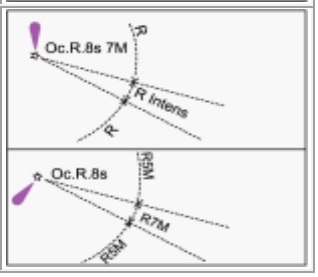
NOS	NIMA		IHO/Foreign NIMA Charts
Leading Lights and Lights in Line			
		Leading lights with leading line (firm line is fairway) and arcs of visibility; Bearing given in degrees and minutes	
		Leading lights ‡: any two objects in line Bearing given in degrees and minutes	
		Leading lights on small-scale charts	
		Lights in line, marking the sides of a channel	
		Rear or upper light	Rear Lt, Upper Lt
		Front or lower light	Front Lt or Lower Lt
Direction Lights			
		Direction light with narrow sector and course to be followed, flanked by darkness or unintensifed light	
		Direction light with course to be followed; uncharted sector is flanked by darkness or unintensified light	

NOS	NIMA		IHO/Foreign NIMA Charts
		Direction light with narrow fairway sector flanked by sectors of different character	
		Moiré effect light (day and night) Arrows show when course alteration needed	
Note: Quoted bearings are always from seaward.			

Sector Lights

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Sector light on standard charts	
	Sector light on standard charts, the white sector limits marking the sides of the fairway	
	Sector light on multicolored charts, the white sector limits marking the sides of the fairway	
	Main light visible all-round with red subsidiary light seen over danger	
	All-round light with osbscured sector	
	Light with arc of visibility deliberately restricted	

NOS/NIMA		IHO/Foreign NIMA Charts
	Light with faint sector	
	Light with intensified sector	

Lights with Limited Times of Exhibition

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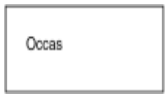
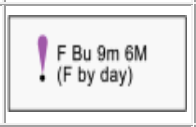
IHO International Hydrographic Organization

NOS	NIMA		IHO
		Lights exhibited only when specially needed (for fishing vessels, ferries), and some private lights	
		Daytime light (charted only where the character shown by day differs from that shown at night)	
		Fog light (exhibited only in fog, or else character changes in fog	
		Unwatched (unmanned) light with no standby or emergency arrangements	
		Temporary	(temp)
		Extinguished	(exting)

Special Lights

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Aero light		
		Air obstruction light of high intensity		
		Air obstruction lights of low intensity		
		Fog detector light		
		Floodlight, floodlighting of a structure		
		Strip light		
		Aero light		

Supplementary National Simbols

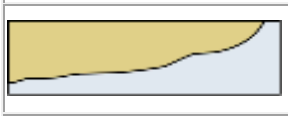
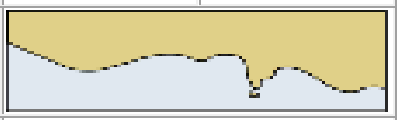
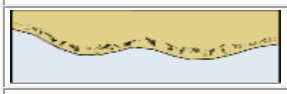
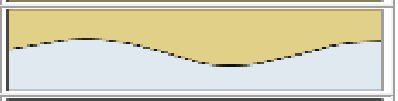
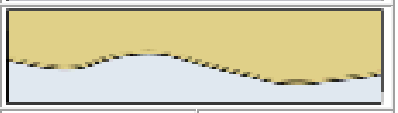
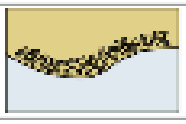
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

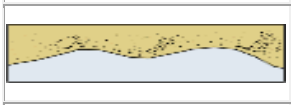
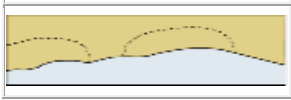
NOS	NIMA		IHO	Foreign NIMA Charts
		Riprap surrounding light		
		Short - Long Flashing		
		Group - Short Flashing		
		Fixed and Group Flashing		F Gp Fl

Natural Features

Coastline

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO	Foreign NIMA Charts
	Coastline, surveyed		
	Coastline, unsure eyed		
	Steep coast, Steep coast with rock cliffs, Cliffs		
			
			
	Coastal hillocks, elevation not determined		
	Flat coast		
	Sandy shore		
	Stony shore, Shingly shore		

NOS/NIMA		IHO	Foreign NIMA Charts
	Sandhills, Dunes		
	Apparent Shoreline		
	Vegetation or Topographic Feature Area Limit in general		

Relief

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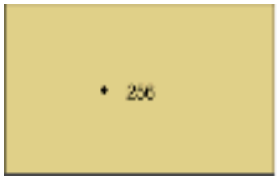
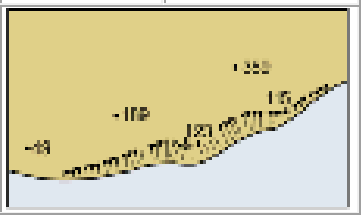
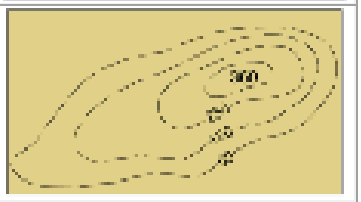
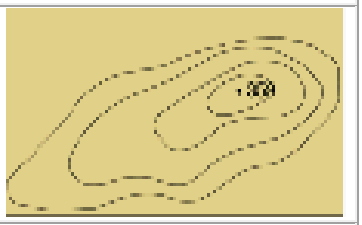
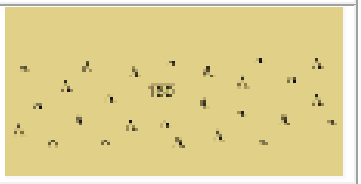
NOS/NIMA		IHO	Foreign NIMA Charts
	Contour lines with spot height		
	Spot heights		
	Approximate contour lines with approximate height		
	Form lines with spot height		
	Approximate height of top of trees (above height datum)		

Water Features, Lava

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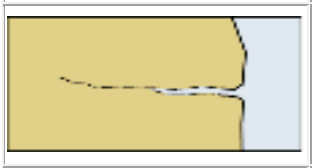
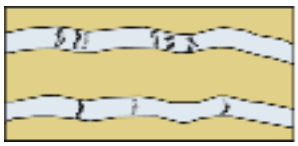
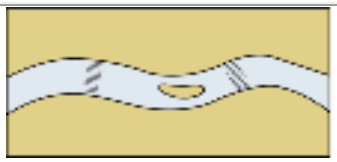
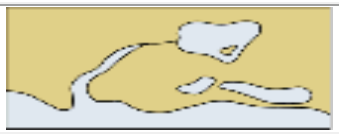
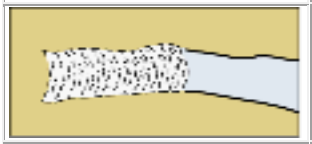
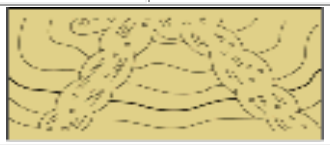
NOS/NIMA		IHO	Foreign NIMA Charts
	River, Stream		
	Intermittent river		
	Rapids, Waterfalls		
	Lakes		
	Salt pans		
	Glacier		
	Lava flow		

Vegetation

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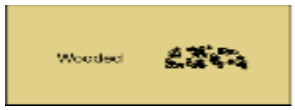
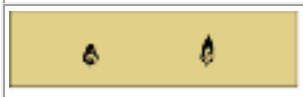
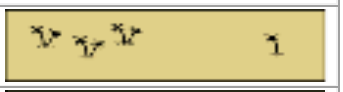
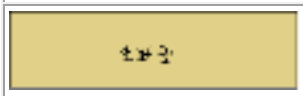
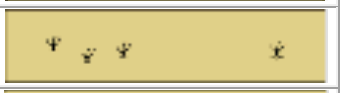
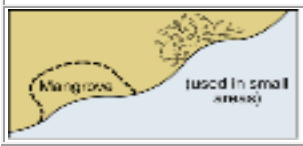
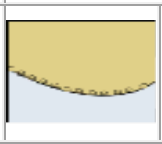
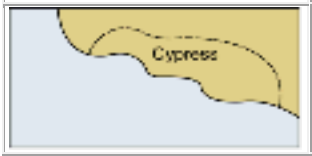
NOS/NIMA		IHO	Foreign NIMA Charts
	Wood, in general		
	Prominent trees (in groups or isolated); Deciduous tree		
	Evergreen (except conifer)		
	Conifer		
	Palm		
	Nipa palm		
	Casuarina		
	Filao		
	Eucalyptus		
	Mangrove		

NOS/NIMA		IHO	Foreign NIMA Charts
	Marsh Swamp		
	Cypress		

Supplementary National Simbols

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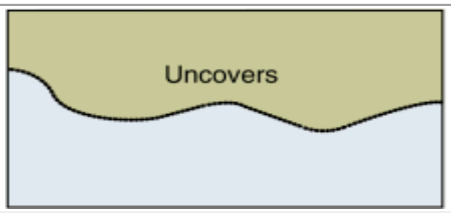
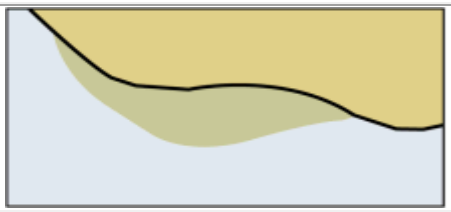
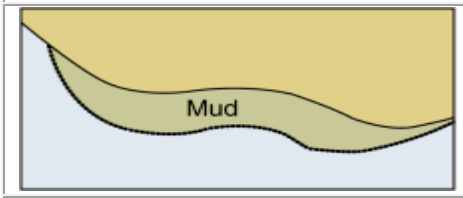
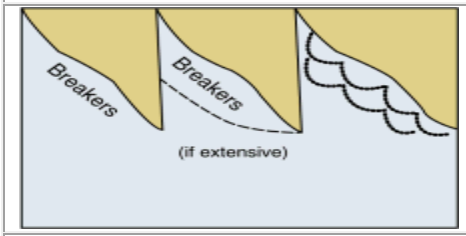
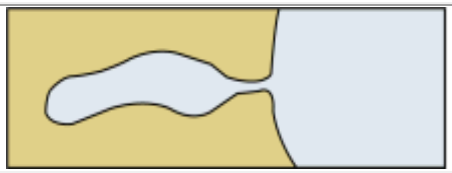
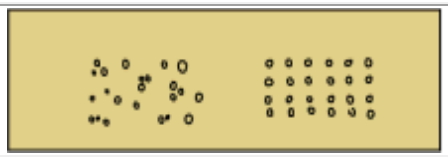
NOS/NIMA	
	Chart sounding datum line (surveyed)
	Approximate sounding datum line (inadequately surveyed)
	Foreshore, Strand (in general); Stones; Shingle; Gravel; Mud; Sand
	Breakers along a shore
	Rubble

NOS/NIMA	
	Hachures
	Shading
	Lagoon
	Deciduous woodland
	Coniferous woodland
	Tree plantation
	Cultivated fields
	Grass fields

NOS/NIMA	
	Rice fields (Paddies)
	Bushes

Nature of the Seabed

Types of Seabed, Intertidal Areas

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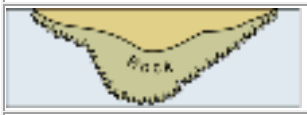
NOS/NIMA		IHO/Foreign NIMA Charts
S	Sand	*S*
M	Mud	*M*
Cy; Cl	Clay	*Cy*
Si	Silt	*Si*
St	Stones	*St*
G	Gravel	*G*
P	Pebbles	*P*
Cb	Cobbles	*Cb*
Rk; rky	Rock; Rocky	*Rk*
Co	Coral and Coralline algae	*Co*
Sh	Shells	*Sh*
S/M	Two layers (shown here: sand over mud)	*S/M*
Wd	Weed (including Kelp)	*Wd*
	Kelp, Seaweed	
	Mobile bottom (sand waves)	
	Freshwater springs in seabed	
	Area with stones, gravel or shingle	

NOS/NIMA		IHO/Foreign NIMA Charts
	Rocky area, which covers and uncovers	
	Coral reef, which covers and uncovers	

Qualifying Terms

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NOS/NIMA		IHO/Foreign NIMA Charts
f; fne	fine	*f*
m	medium (only used in relation to sand)	*m*
c; crs	coarse	*c*
bk; brk	broken	*bk*
sy; stk	sticky	*sy*
so; sft	soft	*so*
stf	stiff	*sf*
Vol	volcanic	*v*
Ca	calcareous	*ca*
h; hrd	hard	*h*

Supplementary National Abbreviations

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NOS	
bl; bk	Black
Blds	Boulders
br	Brown
bu	Blue
ch	Chocolate
Cir	Cirripedia
Ck	Chalk
Cn	Cinders
Co Hd	Coral head
dec	Decayed
Di	Diatoms
dk	Dark
fly	Flinty
Fr	Foraminifera
Fu	Fucus
Gl	Globigerina
glac	Glacial
gn	Green
Grd	Ground
Grs	Grass
gty	Gritty
gy	Gray
K	Kelp
La	Lava

NOS	
lrg	Large
lt	Light
Ma	Mattes
Mds	Madrepores
Ml	Marl
Mn	Manganese
Ms	Mussels
or	Orange
Oys	Oysters
Oz	Ooze
Pm	Pumice
Po	Polyzoa
Pt	Pteropods
Qz	Quartz
Rd	Radiolaria
rd	Red
rt	Rotten
Sc	Scoriae
Sch	Schist
sml	Small
Sn	Shingle
Spg	Sponge
Spi	Spicules
spk	Speckled
Stg	Sea-tangle
str	Streaky
T	Tufa
ten	Tenacious
unev	Uneven
vard	Varied

NOS	
vi	Violet
Vol Ash	Volcanic ash
wh	White
yl	Yellow

Offshore Installations

General

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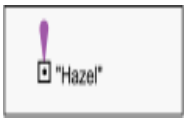
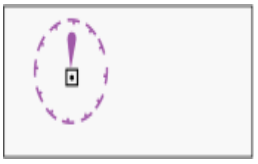
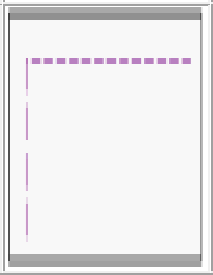
NOS	NIMA		IHO
		Name of oilfield or gasfield	
		Platform with designation/name	
		Limit of safety zone around offshore installation	
		Limit of development area	

Platforms and Moorings

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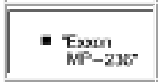
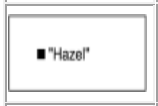
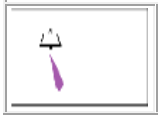
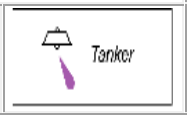
NOS	NIMA		IHO	Foreign NIMA Charts
		Production platform, Platform, Oil derrick		
		Flare stack (at sea)		
		Mooring tower, Articulated Loading Platform (ALP). Single Anchor Leg Moorings (SALM)		
		Observation/research platform (with name)		
		Artificial island		
		Oil or Gas installation buoy, Catenary Anchor Leg Mooring (CALM), Single Buoy Mooring (SBM)		
		Moored storage tanker		

Underwater Installations

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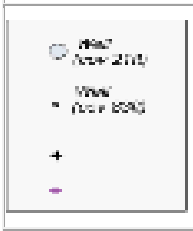
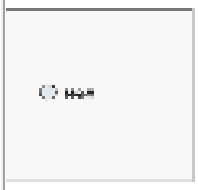
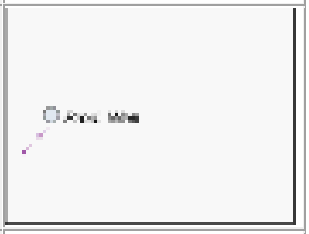
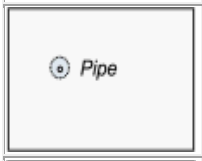
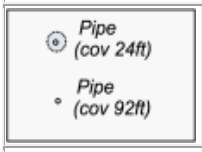
NOS	NIMA		IHO
		Submerged production well	
		Suspended well, depth over wellhead unknown	
		Suspended well, with depth over wellhead	
		Wellhead with depth above the bottom	
		Site of cleared platform	
		Above-water wellheads	

Submarine Cables

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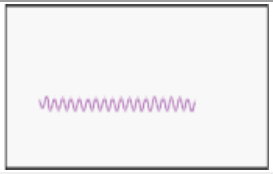
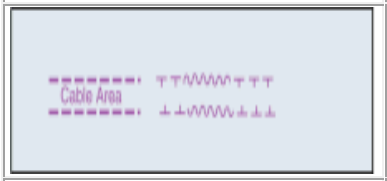
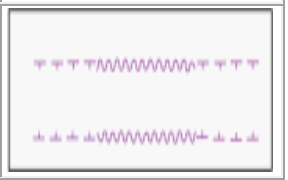
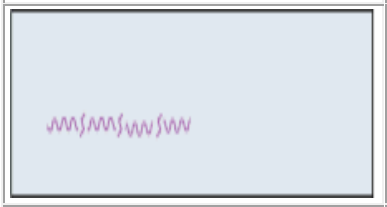
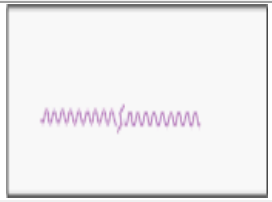
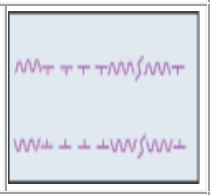
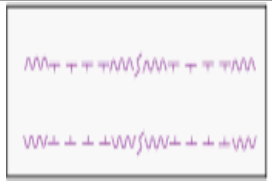
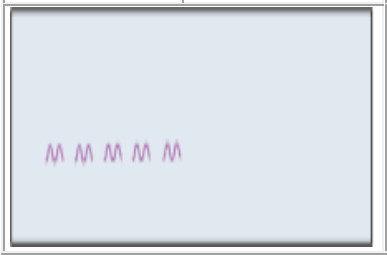
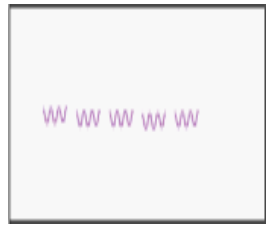
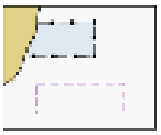
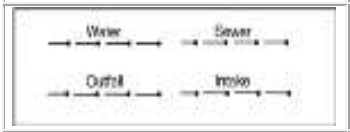
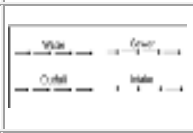
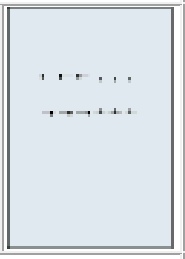
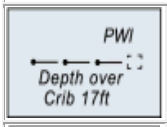
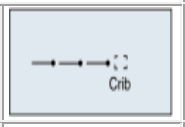
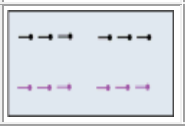
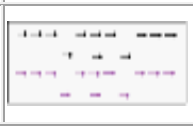
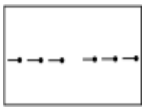
NOS	NIMA		IHO
		Submerged production well	
		Submarine cable area	
		Submarine power cable	
		Submarine power cable area	
		Disused submarine cable	

Submarine Pipelines

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Oil, Gas pipeline		
		Oil, Gas pipeline areas		
		Waterpipe, sewer, outfall pipe, intake pipe		
		Discharge pipeline areas		
		Buried pipeline pipe (with nominal depth to which buried)		
		Potable Water intake, diffuser, or drib		
		Oil, Gas pipeline areas		

Supplementary National Simbol

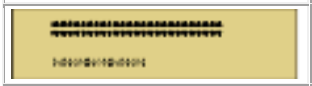
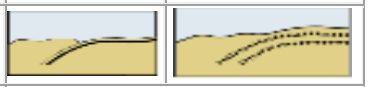
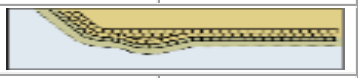
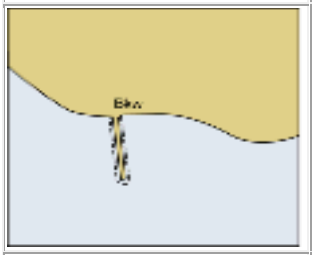
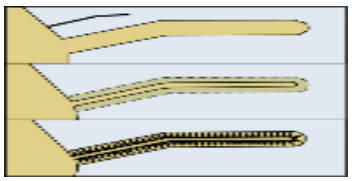
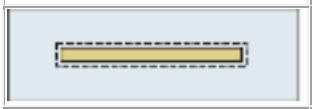
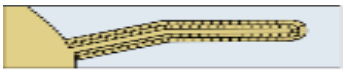
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

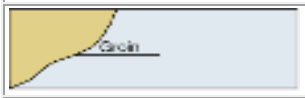
NOS	NIMA		Foreign NIMA Charts
		Oil, Gas pipeline	

Ports

Hydraulic Structures in General

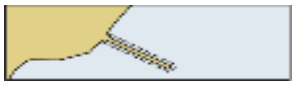
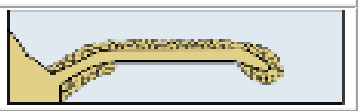
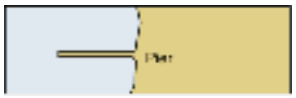
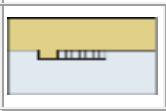
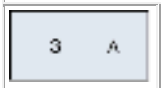
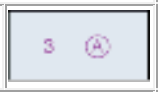
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO	Foreign NIMA Charts
	Dike, Levee		
	Seawall (on large-scale charts)		
	Seawall (on smaller-scale charts)		
	Causeway		
	Breakwater (in general)		
	Breakwater (loose boulders, tetrapods, etc.)		
	Breakwater (slope of concrete or masonry)		
	Training wall (partly submerged at high water)		

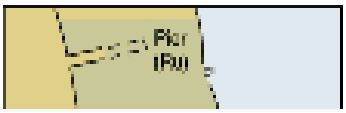
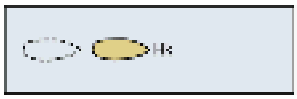
NOS/NIMA		IHO	Foreign NIMA Charts
	Groin (always dry)		
	Groin (intertidal)		
	Groin (always under water)		

Harbor Installations

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

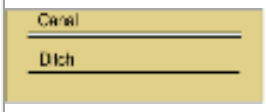
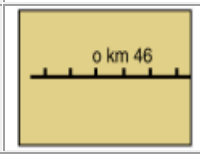
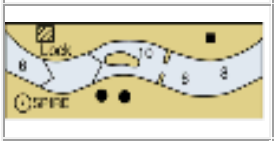
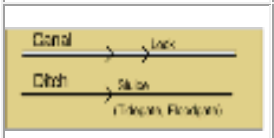
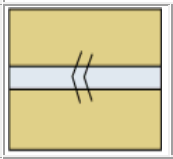
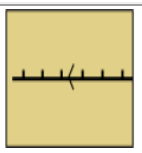
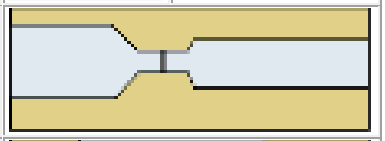
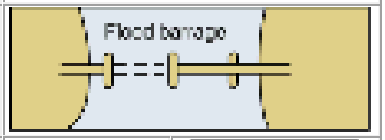
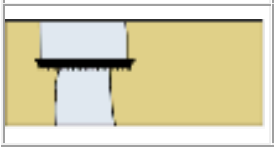
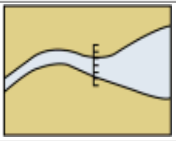
NOS	NIMA		IHO	Foreign NIMA Charts
		Fishing harbor		
		Mole		
		Quay, Wharf		
		Pier, Jetty		
		Promenade pier		
		Pontoon		
		Landing for boats		
		Steps, landing stairs		
		Designation of berth		
		Dolphin		

NOS	NIMA		IHO	Foreign NIMA Charts
		Deviation dolphin		
		Minor post or pile		
		Slipway, Patent slip, Ramp		
		Gridiron, Scrubbing grid		Gridiron
		Dry dock, Graving dock		Dry dock
		Floating dock		Floating dock
		Non-tidal basin, Wet dock		
		Tidal basin, Tidal harbor		
		Works on land, with year date		
		Works at sea, Area under reclamation, with year date		
		Works under construction, with year date		
		Ruins		

NOS	NIMA		IHO	Foreign NIMA Charts
		Ruined pier, partly submerged at high water. Submerged ruins		
		Hulk (actual shape on large-scale charts)		

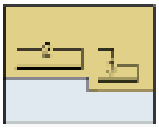
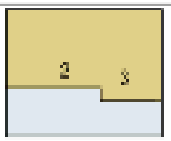
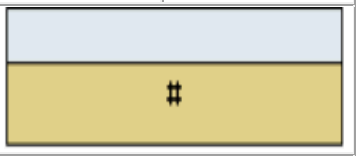
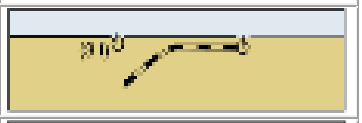
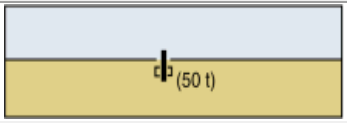
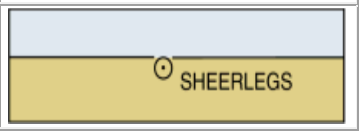
Canals, Barrages

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO	Foreign NIMA Charts
	Canal		
	Lock (on large-scale charts)		
	Lock (on smaller-scale charts)		
	Caisson		
	Flood barrage		
	Dam		

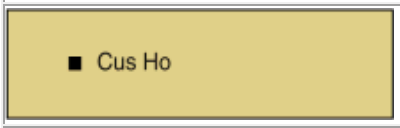
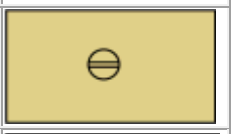
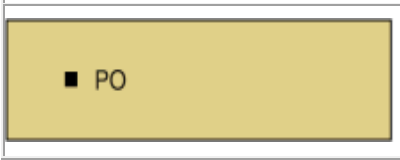
Transshipment Facilities

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Roll-on, Roll-off Ferry (Ro Ro Terminal)		
		Transit shed, Warehouse (with designation)		
		Timber yard		
		Crane with lifting capacity, crane (on railway)		
		Container crane with lifting capacity		
		Sheerlegs (conspicuous)		

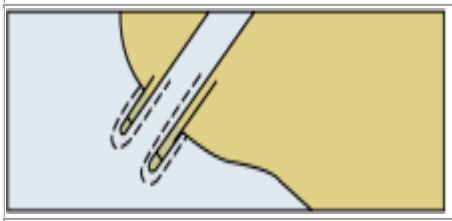
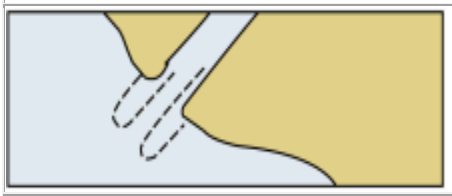
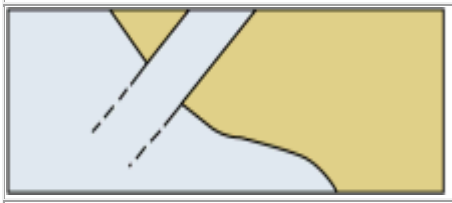
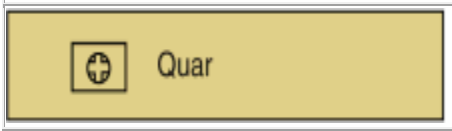
Public Buildings

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Harbormaster's office	
	Customhouse	
	Health officer's office	
	Hospital	
	Post office	

Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA	
	Jetty (partly below MHW) office
	Submerged jetty
	Jetty (small scale)
	Pump-out facilities
	Quarantine

Positions, Distances, Directions, Compass

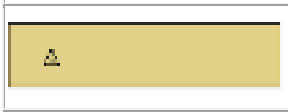
Geographic Positions

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO
Lat	Latitude	Lat
Long	Longitude	Long
°	Degree(s)	°
'	Minute(s) of arc	'
"	Second(s) of arc	"
PA	Position approximate	*PA*
PD	Position doubtful	*PD*
N	North, Northern	N
E	East, Eastern	E
S	South, Southern	S
W	West, Western	W
NE	Northeast	NE
SE	Southeast	SE
NW	Northwest	NW
SW	Southwest	SW

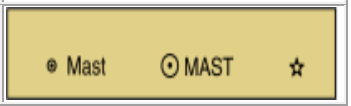
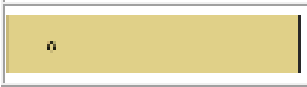
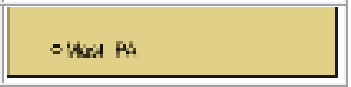
Control Points

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Triangulation point	
	Observation spot	
	Fixed point	
	Benchmark	
	Boundary mark	

Simbolized Positions (Examples)

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Simbols in plan: position is center of primary simbol	
	Simbols in profile: position is at bottom of simbol	
	Point simbols (accurate positions)	
	Approximate position	

Units

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO	Foreign NIMA Charts
km	Kilometer(s)	km	
m	Meter(s)	m	
dm	Decimeter(s)	dm	
cm	Centimeter(s)	cm	
mm	Millimeter(s)	mm	
M, Mi, NMi, NM	Nautical mile(s) (1852m) or sea mile(s)	M	
cbl	Cable(s) length		
ft	Foot/feet	ft	
fm, fms	Fathom(s)		
h, hr	Hour	h	
m, min	Minute(s) of time	m	min
s, sec	Second(s) of time	s	sec
kn	Knot(s)	kn	
t	Ton(s) (metric ton equals 2,204.6 lbs)	t	
cd	Candela (new candle)	cd	

Magnetic Compass

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
var, VAR	Variation	
mag	magnetic	
brg	Bearing	
T	true	
dev	Deviation	
	Note of magnetic variation, in position	Magnetic Variation 4°31'W 1995 (8'E)
	Note of magnetic variation, out of position	Magnetic Variation at 55°N 8°W 4°31'W 1995 (8'E)

Compass Roses, Isogonic Lines, Local Magnetic Disturbance

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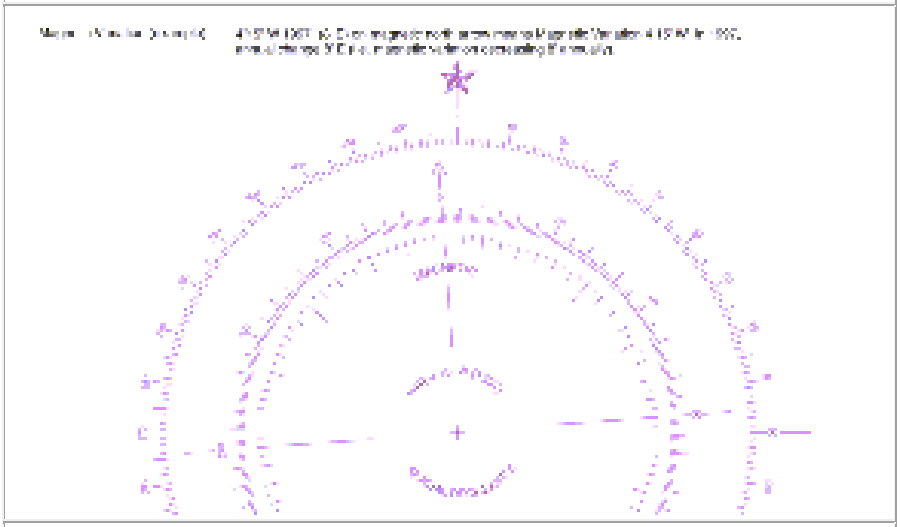
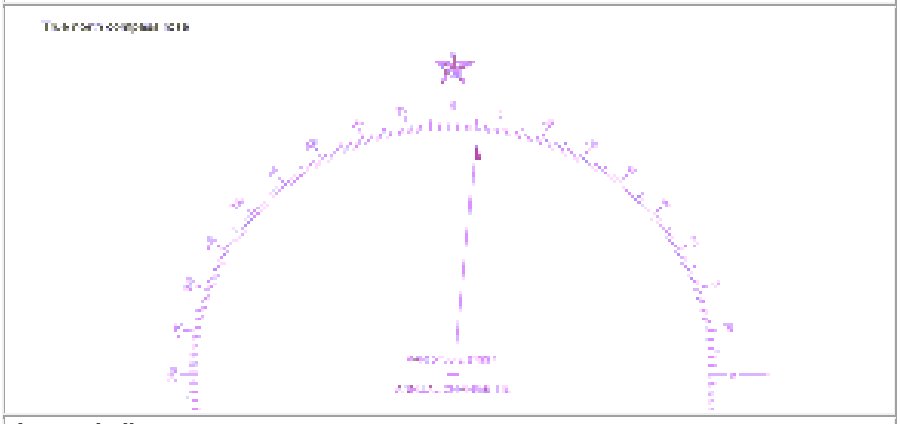
IHO International Hydrographic Organization

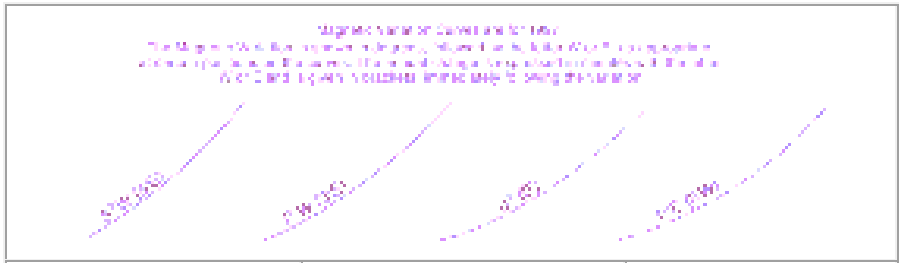
Compass rose, normal pattern *(smaller patterns of compass rose may be used)*



True North compass rose



Isogonic lines



+15°	Local magnetic disturbance. Within the enclosed area, the magnetic variation may deviate from the normal by the value shown.	±15°
Local Magnetic Disturbance (see Note)	Local magnetic disturbance. Where the area affected cannot be easily defined, a legend only is shown at the position.	

Supplementary National Simbols

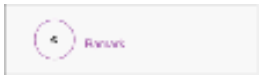
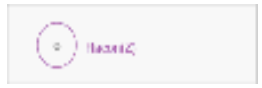
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA	
m^2	Square meter
m^3	Cubic meter
in, ins	Inch(es)
yd, yds	Yards
St M, St Mi	Statute mile
µsec, µs	Microsecond
Hz	Hertz
kHz	Kilohertz
MHz	Megahertz
cps, c/s	Cycles per second
kc	Kilocycle
Mc	Megacycle
T	Ton (U.S. short ton equals 2,000 lbs.)
deg	Degree(s)

Radar, Radio, Electronic Position-Fixing Systems

Radar

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Coast radar station, providing range and bearing service on request	
		Ramark, radar beacon transmitting continuously	
		Radar transponder beacon, with morse identification, responding within the 3-cm (X-) band	
		Radar transponder beacon, with morse identification, responding within the 10-cm (S-) band	
		Radar transponder beacon, with morse identification, responding within the 3-cm (X-) and the 10-cm (S-) band	
		Radar transponder beacon, with morse identification, responding on a fixed frequency outside the marine band	
		Radar transponder beacons with bearing line	

NOS	NIMA		IHO/Foreign NIMA Charts
		Floating marks with radar transponder beacons	
		Radar reflector	
		Radar-conspicuous feature	

Radar

NOS National Ocean Service (US)
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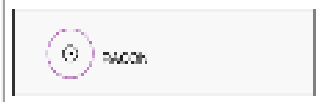
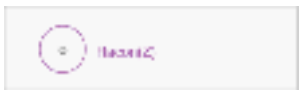
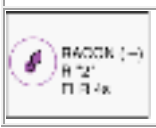
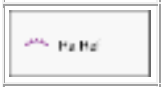
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Coast radar station, providing range and bearing service on request	
		Ramark, radar beacon transmitting continuously	
		Radar transponder beacon, with morse identification, responding within the 3-cm (X-) band	
		Radar transponder beacon, with morse identification, responding within the 10-cm (S-) band	
		Radar transponder beacon, with morse identification, responding within the 3-cm (X-) and the 10-cm (S-) band	
		Radar transponder beacon, with morse identification, responding on a fixed frequency outside the marine band	
		Radar transponder beacons with bearing line	
		Floating marks with radar transponder beacons	

NOS	NIMA		IHO/Foreign NIMA Charts
		Radar reflector	
		Radar-conspicuous feature	

Radio

NOS National Ocean Service (US)
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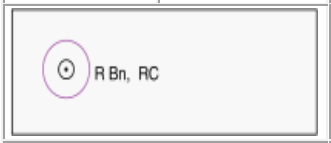
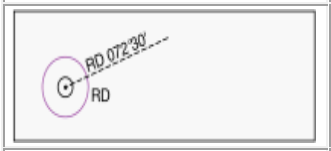
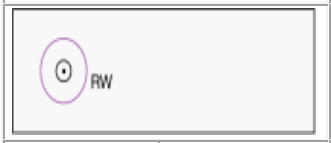
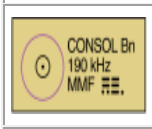
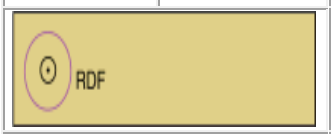
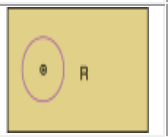
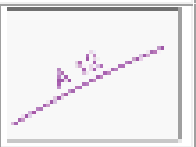
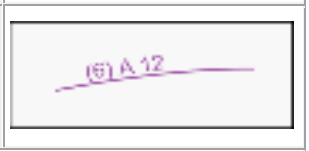
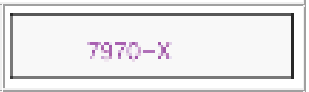
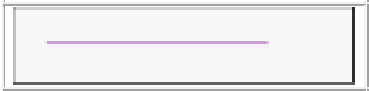
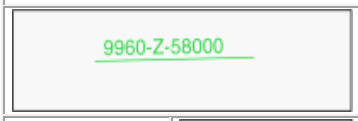
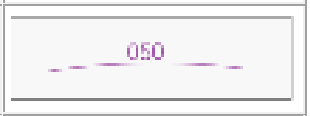
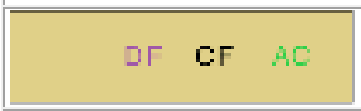
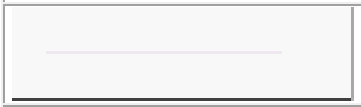
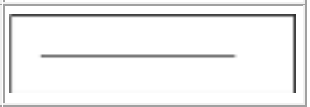
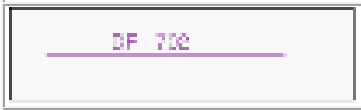
NOS	NIMA		IHO/Foreign NIMA Charts
		Circular (non-directional) marine or aeromarine radiobeacon	
		Directional radiobeacon with bearing line	
		Rotating-pattern radiobeacon	
		Consol beacon	
		Radio direction-finding station	
		Coast radio station providing QTG service	
		Aeronautical radiobeacon	

Electronic Position-Fixing Systems

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
Decca			
		Identification of Lattice Patterns	
		Line of Position (LOP)	
		Line of Position representing Zone Limit (or, on larger scales, other intermediate LOPs)	
		Half-lane LOP	
		LOP from adjoining Chain (on Interchain Fixing Charts)	
		Lane value, with Chain designator (Interchain charts only) and Zone Designator	
Loran-C			
		Identification of Loran-C Rates	
		Line of Position	
		LOP representing time difference value of an integral thousand µs (microseconds)	

NOS	NIMA		IHO/Foreign NIMA Charts
		LOP beyond reliable groundwave service area	
		LOP from adjoining Chain	
		LOP from adjoining Chain beyond reliable groundwave service areas	
		LOP labeled with rate and full µs value	
		LOP labeled with final three digits only	
Note: A Loran-C Chain Diagram may be given if rates from more than one Chain appear on a chart. An explanatory note is given if LOPs include propagation delays.			
Omega			
		Charted station pairs	
		Line of Position (LOP)	
		Lane values	
Note: A cautionary note draws attention to the need to consult Propagation Prediction Correction (PPC) tables. An explanatory note draws attention to the unreliability of LOPs within 450 n miles of a transmitter.			
Satellite Navigation Systems			
		World Geodetic System, 1972 or 1984	
Note: A note may be shown to indicate the shifts of latitude and longitude, in hundredths of a minute, which should be made to satellite-derived positions (which are referred to WGS) to relate them to the chart.			

Rocks, Wrecks, Obstructions

General

NOS National Ocean Service (US)
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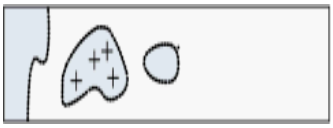
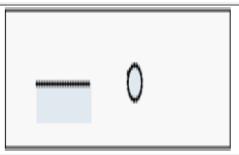
IHO International Hydrographic Organization

NOS	NIMA		IHO
		Danger line, in general	
		Swept by wire drag or diver	

Rocks

NOS National Ocean Service (US)
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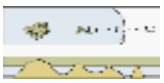
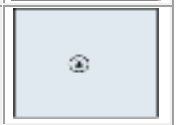
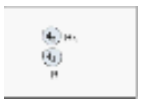
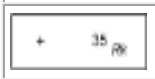
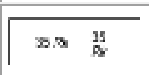
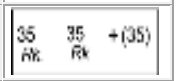
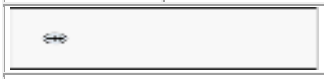
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Rock (islet) which does not cover, height above height datum		
		Rock (islet) which covers and uncovers, height above chart datum		
		Rock awash at the level of chart datum		
		Dangerous underwater rock of uncertain depth		
		Dangerous underwater rock of known depth		
		--in the corresponding depth area --outside the corresponding depth area		
		Non-dangerous rock, depth known		
		Coral reef which covers		
		Breakers		

Wrecks

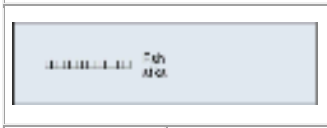
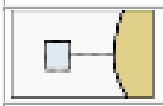
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

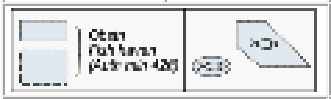
NOS	NIMA		IHO	Foreign NIMA Charts
		Wreck, hull always dry (on large-scale charts)		
		Wreck, covers and uncovers (on large-scale charts)		
		Submerged wreck, depth known (on large-scale charts)		
		Submerged wreck, depth unknown (on large-scale charts)		
		Wreck showing any portion of hull or superstructure at level of chart datum		
		Wreck showing mast or masts above chart datum only		
		Wreck, least depth known by sounding only		
		Wreck, least depth known, swept by wire drag or diver		
		Dangerous wreck, depth unknown		
		Sunken wreck, not dangerous to surface navigation		

NOS	NIMA		IHO	Foreign NIMA Charts
		Wreck, least depth unknown, but considered to have a safe clearance to the depth shown		
		Foul ground, non-dangerous to navigation but to be avoided by vessels anchoring, trawling etc.		
		Foul ground, non-dangerous to navigation but to be avoided by vessels anchoring, trawling etc.		

Obstructions

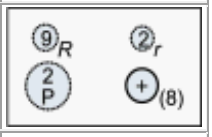
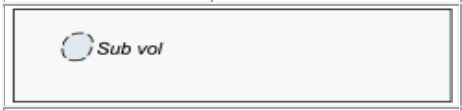
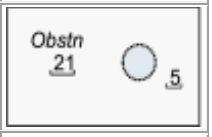
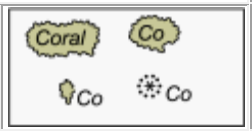
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

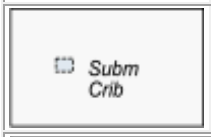
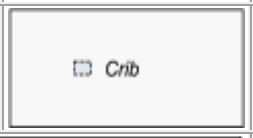
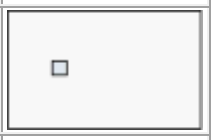
NOS	NIMA		IHO	Foreign NIMA Charts
		Obstruction, depth unknown		
		Obstruction, least depth known		
		Obstruction, least depth known, swept by wire drag or diver		
		Stumps of posts or piles, all or part of the time submerged		
		Submerged pile, stake, snag, well, deadhead or stump (with exact position)		
		Submerged pile, stake, snag, well, deadhead or stump (with exact position)		
		Fish trap, fish weirs, tunny nets		
		Fish trap area, tunny nets area		
		Fish haven (artificial fishing reef)		

NOS	NIMA		IHO	Foreign NIMA Charts
		Fish haven with minimum depth		
		Shellfish cultivation (stakes visible)		

Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

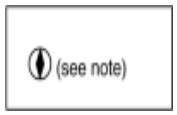
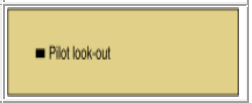
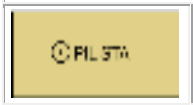
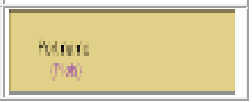
NOS	NIMA		Foreign NIMA Charts
		Rock awash (height unknown)	
		Shoal sounding on isolated rock or rocks	
		Sunken wreck covered 20 to 30 meters	
		Submarine volcano	
		Discolored water	
		Sunken danger with depth cleared (swept) by wire drag	
		Reef of unknown extent	
		Coral reef, detached (uncovers at sounding datum)	

NOS	NIMA		Foreign NIMA Charts
		Submerged Crib	
		Crib, Duck Blind (above water)	
		Submerged Duck Blind	
		Submerged Platform	

Services

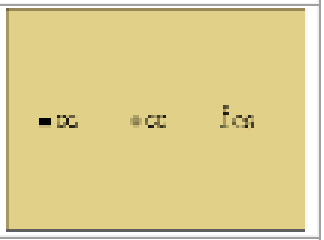
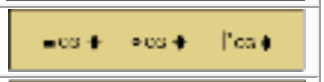
Pilotage

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Boarding place, position of a Pilot-Cruising Vessel	
		Boarding place, position of a Pilot-Cruising Vessel, with name (e.g. District, Port)	
		Boarding place, position of a Pilot-Cruising Vessel, with note (e.g. for Tanker, Disembarkation)	
		Pilots transferred by helicopter	
		Pilot office with Pilot look-out; Pilot look-out	
		Pilot Office	
		Port with Pilotage-Service	

Coast Guard, Rescue Stations

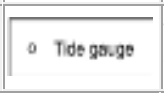
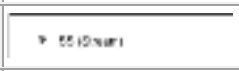
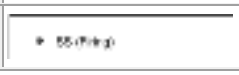
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Coast Guard station	
	Coast Guard station with Rescue station	
	Rescue station; Lifeboat station; Rocket station	
	Lifeboat lying at a mooring	
	Refuge for shipwrecked mariners	

Signal Stations

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Signal station in general		
		Signal station, showing International Port Traffic Signals	SS (INT)	
		Traffic signal station. Port Entry and Departure signals	SS (Traffic)	
		Port control signal station		
		Lock signal station.		
		Bridge passage signal station		
		Bridge lights including traffic signals		
		Telegraph station		
		Telegraph station		
		Storm signal station		
NWS SIG STA		National Weather Service signal station, Wind signal station		
		Ice signal station		
		Time signal station		

NOS	NIMA		IHO	Foreign NIMA Charts
		Tide scale or gauge		
		Automatically recording tide gauge		
		Tidal signal station		
		Tidal stream signal		
		Danger signal station		
		Firing practice signal station		

Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	
	Bell (on land)
	Marine police station
	Fireboat station
	Notice board
	Lookout station; Watch tower
	Semaphore
	Park Ranger station

Small Craft Facilities

Small Craft Facilities; Marinas

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Boat harbor, Marina	
		Camping site	

Marina Facilities

No	LOCATION	TIDES: APPROACH - FEET (REPORTED)	TIDES: ALONGSIDE - FEET (REPORTED)	DEPTH	SERVICES: RAMP - SURFACED - MOORINGS - BERTHS (TRANSIENTS)	SERVICES: REPAIRS - ELECTRICITY	SERVICES: MARINE RAILWAY - HULL - MOTOR - SAIL	SERVICES: LIFT CAPACITY - TONS	SERVICES: BOAT RENTAL - CANOE - ROW - MOTOR	SERVICES: CHARTER - HOUSE - SAIL	SERVICES: FOOD - LODGING - CAMPING	SERVICES: TOILETS - SHOWERS - LAUNDRY	SERVICES: PUMP - OUT STATION	SERVICES: WINTER STORAGE - WET - DRY	SUPPLIES: NAUTICAL CHART SALES	SUPPLIES: WATER - ICE	SUPPLIES: GROCERIES - HARDWARE	SUPPLIES: BAIT - TACKLE	SUPPLIES: DIESEL OIL - GASOLINE
1	LAS VEGAS BOAT			80	20		S	HM			M		F C	T P	WD	C	WI	GH	BT G
2	LAKE MEAD MAR			80	15	B E	S	HM			M		FL	T P	WD	C	WI		DG
3	HEMENWAY HARBOR			80			S												
4	TEMPLE BAR HAR			80	15		SN				M	H	FLC	TSL P	WD	C	WI	GH	BT G
5	ECHO BAY RESORT			35	35	BM	S	M			M	H	FLC	TSL P	WD	C	WI	GH	BT G
6	OVERTON BEACH			100			S				M		F C	TSL	WD		WI	G	BT G
7	CALLVILLE BAY M			100	40		S				M	H	F C	TS P	WD		WI	G	B G

(+) DENOTES HOURS LATER (-) DENOTES HOURS EARLIER
THE LOCATIONS OF THE ABOVE PUBLIC MARINE FACILITIES ARE SHOWN ON THE CHART BY LARGE PURPLE NUMBERS.
THE TABULATED "APPROACH - FEET (REPORTED)" IS THE DEPTH AVAILABLE FROM THE NEAREST NATURAL OR DREDGED CHANNEL TO THE FACILITY.
THE TABULATED "PUMPING STATION" IS DEFINED AS FACILITIES AVAILABLE FOR PUMPING OUT BOAT HOLDING TANKS.
(H) APPROACH DEPTH FLUCTUATES WITH LAKE LEVELS.

Tides, Currents

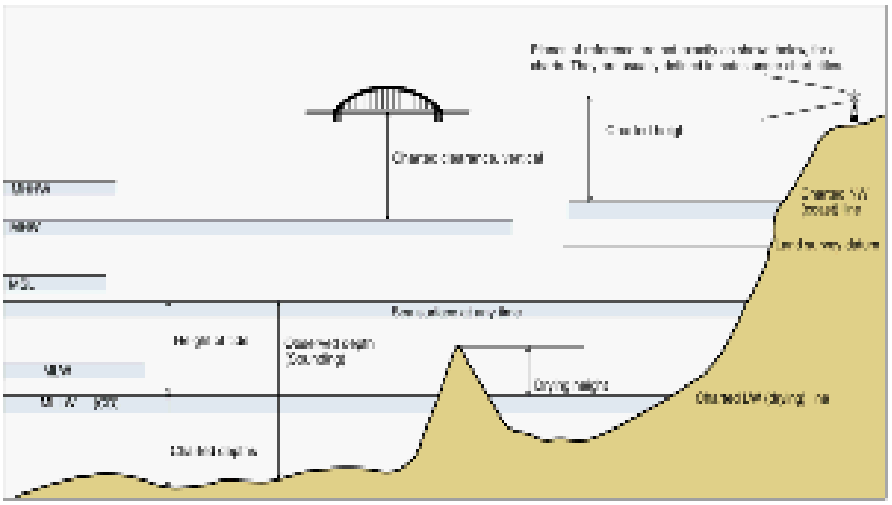
Terms Relating to Tidal Levels

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Chart Datum, Datum for sounding reduction	CD
	Lowest Astronomical Tide	LAT
	Highest Astronomical Tide	HAT
MLW	Mean Low Water	MLW
MHW	Mean High Water	MHW
MLWS	Mean Low Water Springs	MLWS
MHWS	Mean High Water Springs	MHWS
MLWN	Mean Low Water Neaps	MLWN
MHWN	Mean High Water Neaps	MHWN
MLLW	Mean Lower Low Water	MLLW
MHHW	Mean Higher High Water	MHHW
	Mean Higher Low Water	MHLW
	Mean Lower High Water	MLHW
Sp	Spring tide	Sp
Np	Neap tide	Np

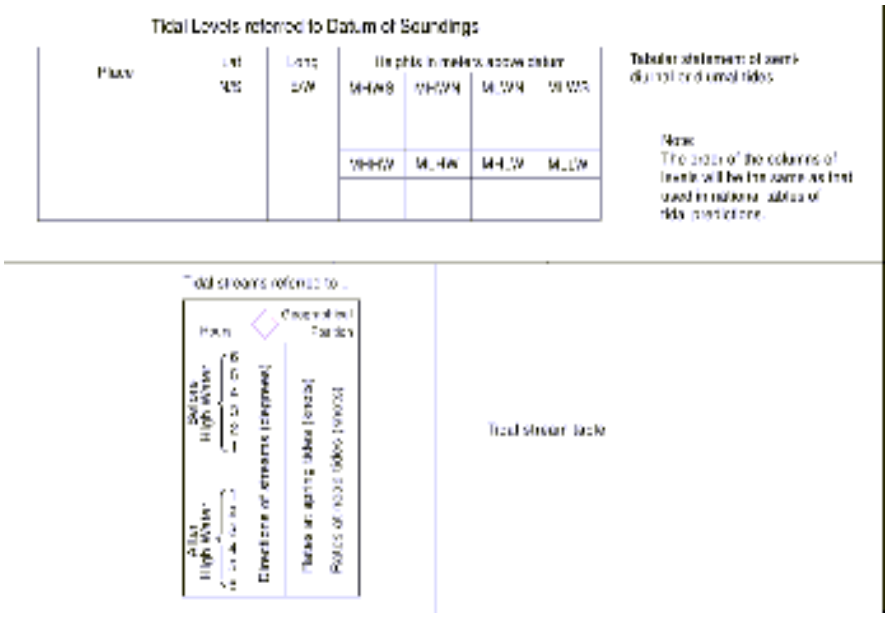
Tidal Levels and Charted Data

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization



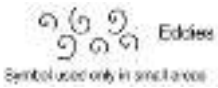
Tide Tables

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization



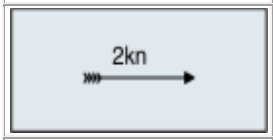
Tidal Streams and Currents

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
 <>	Flood stream (current) with rate	 <>
 <>	Ebb stream (current) with rate	 <>
	Current in restricted waters	<>
	Ocean current with rates and seasons	 <>
 <>	Overfalls, tide rips, races	 <>
 <>	Eddies	 <>
 <>	Position of tabulated tidal data with designation	 <>

Supplementary National Simbols

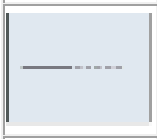
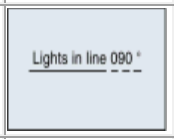
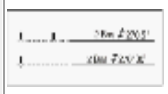
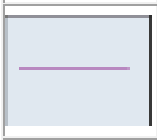
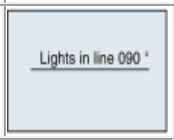
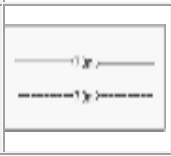
NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA	
HW	High water
HHW	Higher high water
LW	Low water
LWD	Low-water datum
MTL	Mean tide level
ISLW	Indian spring low water
HWF&C	High-water full and change (vulgar establishment of the port)
LWF&C	Low-water full and change
CRD	Columbia River Datum
GCLWD	Gulf Coast Low Water Datum
Str	Stream
	Current, general, with rate
vel	Velocity; Rate
Str	Stream
Kn	Knots
ht	Height
fl	Flood
Str	Stream
	New moon
	Full moon
	Current diagram

Tracks, Routes

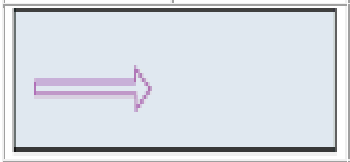
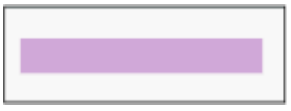
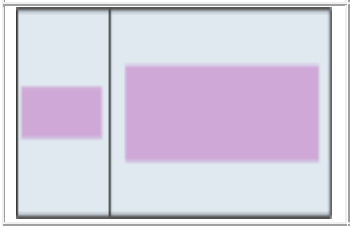
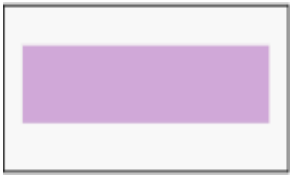
Tracks

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Leading line (solid line is fairway)		
		Transit, clearing line		
		Recommended track based on a system of fixed marks		
		Recommended tracks NOT based on a system of fixed marks		
		One-way track		
		Two-way track (including a regulation described in a note)		
		Track, recommended track with maximum authorized draft stated		

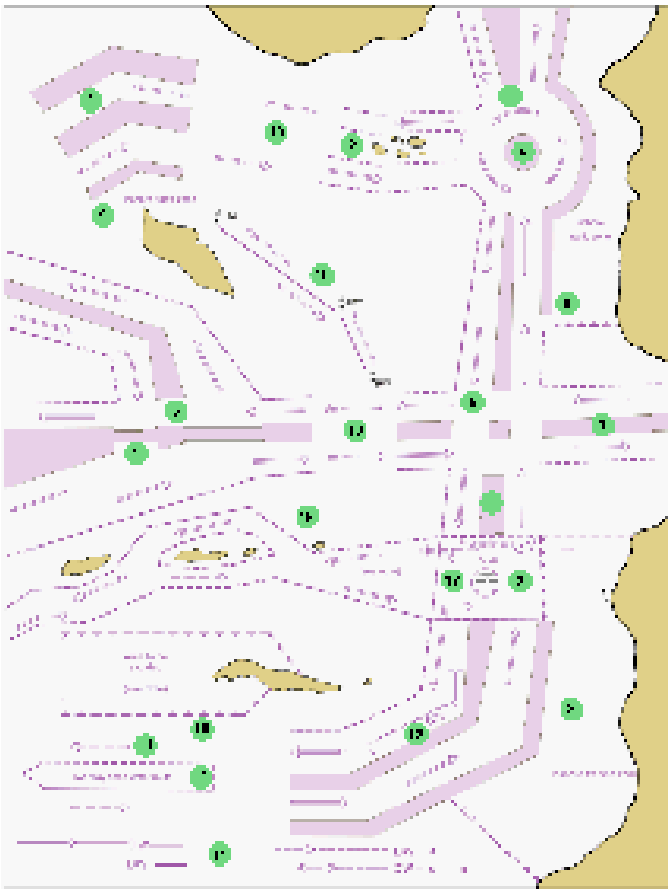
Routing Measures: Basic Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS / NIMA		IHO/Foreign NIMA Charts
	Established (mandatory) direction of traffic flow	
	Recommended direction of traffic flow	
	Separation line	
	Separation zone	
	Limit of restricted area	
	Maritime limit in general	
	Precautionary area	

Routing Measures: Examples

NOS	National Ocean Service (US)
NIMA	National Imagery and Mapping Agency (US)
IHO	International Hydrographic Organization



1	Traffic separation scheme; traffic separated by separation zone
2	Traffic separation scheme, traffic separated by natural obstructions
3	Traffic separation scheme with outer separation zone (separating

	traffic using scheme from traffic not using it)
4	Traffic separation scheme, roundabout
5	Traffic separation scheme, with "crossing gates"
6	Traffic separation schemes crossing, without designated precautionary area
7	Precautionary area
8	Inshore traffic zone, with defined end-limits
9	Inshore traffic zone without defined end-limits
10	Recommended direction of traffic flow, between Traffic separation schemes
11	Recommended direction of traffic flow, for ships not needed a deep water route
12	Deep water route, as part of one-way traffic lane
13	Two-way deep water route, with minimum depth stated
14	Deep water route, centerline as recommended. One-way or two-way track.
15	Recommended route (often marked by centerline buoys)
16	Two-way route with one-way sections
17	Area to be avoided, around navigational aid
18	Area to be avoided, because of danger of stranding

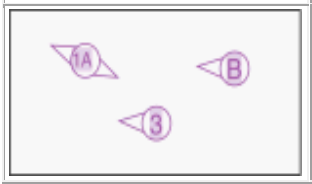
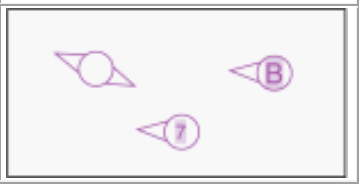
Radar Surveillance Systems

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO	Foreign NIMA Charts
		Radar Surveillance Station		
		Radar range		
		Radar reference line		
		Radar reference line coinciding with a leading line		

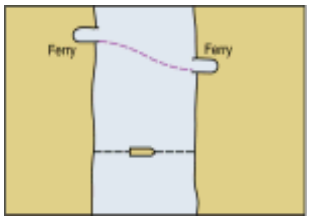
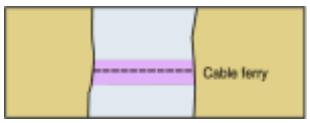
Radio Reporting Points

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Radio reporting (calling-in or way)points showing direction(s) of vessel movement with designation (if any)	

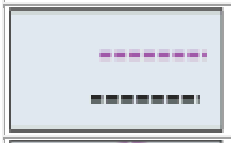
Ferries

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS/NIMA		IHO/Foreign NIMA Charts
	Ferry	
	Cable Ferry	

Supplementary National Simbols

NOS National Ocean Service (US)
NIMA National Imagery and Mapping Agency (US)
IHO International Hydrographic Organization

NOS	NIMA		IHO/Foreign NIMA Charts
		Recommended track for deep draft vessels (track not defined by fixed marks)	
		Depth is shown where it has been obtained by the cognizant authority	
		Alternate course	
		Established traffic separation scheme: Roundabout	
		If no separation zone exists, the center of the roundabout is shown by a circle	

SISTEM PERPELAMPUNGAN (*BOUYAGE SYSTEM*)

Sistem perpelampungan dibagi menjadi:

1. SISTEM LATERAL
   a. IALA -A
   b. IALA-B
2. SISTEM CARDINAL
3. ISOLATED DANGER MARK
4. SAFE WATER MARK
5. SPECIAL MARK

Perpelampungan ini digunakan untuk sarana bantu navigasi untuk menjamin keselamatan kapal dalam memasuki pelabuhan atau alur pelayaran. Tetapi kepercayaan yang berlebihan terhadap alat bantu navigasi ini dapat membahayakan dalam bernavigasi karena kemungkinan *bouy* mengalami hanyut (*out of position*), belum dipetakan, lampu tidak nyala bisa terjadi. Untuk itu perlu diadakan *cross check* dengan alat bantu navigasi yang lain. Untuk itu seorang mualim (*deck officer*) harus dapat mengidentifikasi pelampung-pelampung dengan tepat dan benar antara yang tertera di peta dan di laut.

Perpelampungan dapat dikenali dari berbagai macam cara yaitu:

a. Warna pelampung.
b. Bentuk pelampung.
c. Tanda puncak pelampung.
d. Karakter lampu pelampung.
e. Nomor pelampung.

Sistem lateral adalah sistem perpelampungan yang digunakan untuk menandai suatu alur pelayaran baik itu di pelabuhan atau alur pelayaran sempit guna menjamin keselamatan kapal

Sistem *cardinal* adalah sistem perpelampungan yang digunakan untuk menunjukkan sisi yang aman yang harus dilayari oleh kapal.

Isolated danger mark adalah pelampung yang digunakan untuk menandai bahwa di sekitar pelampung tersebut terdapat bahaya navigasi yang harus dihindari.

Safe water mark adalah pelampung yang digunakan untuk menyatakan bahwa disekitar pelampung tersebut adalah aman untuk dilayari atau menandakan ujung alur pelayaran ataupun *pilot station.*

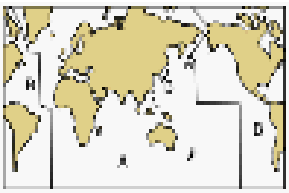
Special mark adalah pelampung yang menunjukkan bahwa ada kegiatan-kegiatan khusus yang sedang berlangsung di sekitar pelampung tersebut seperti reklamasi, latihan perang, pengerukan dan sebagainya sehingga kapal diharuskan menjaga jarak aman.

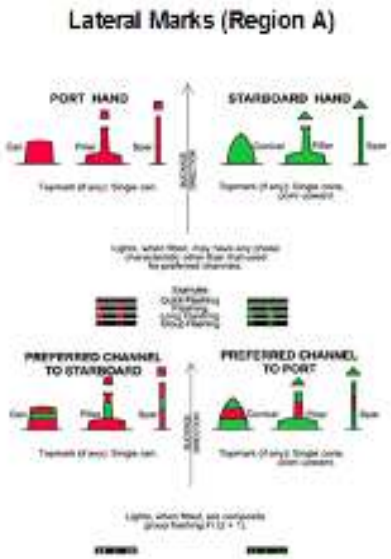
IALA Maritime Buoyage System

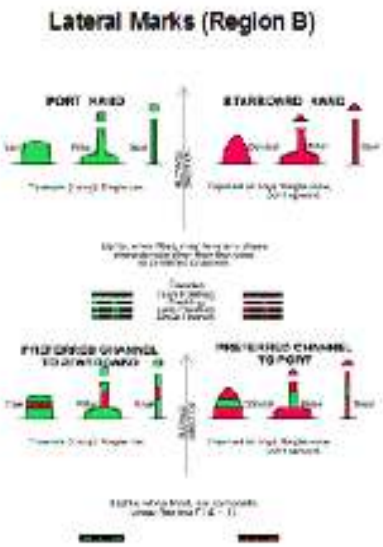
International Association of Lighthouse Authorities

Lateral Marks *are generally for well-defined channels. There are two international Buoyage Regions, A and B, where Lateral marks differ.*

IALA Buoyage Regions A and B



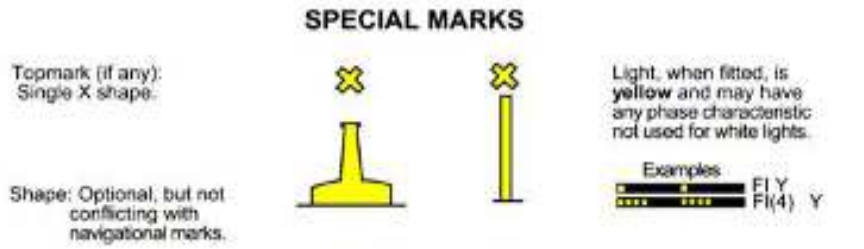




IALA Maritime Buoyage System

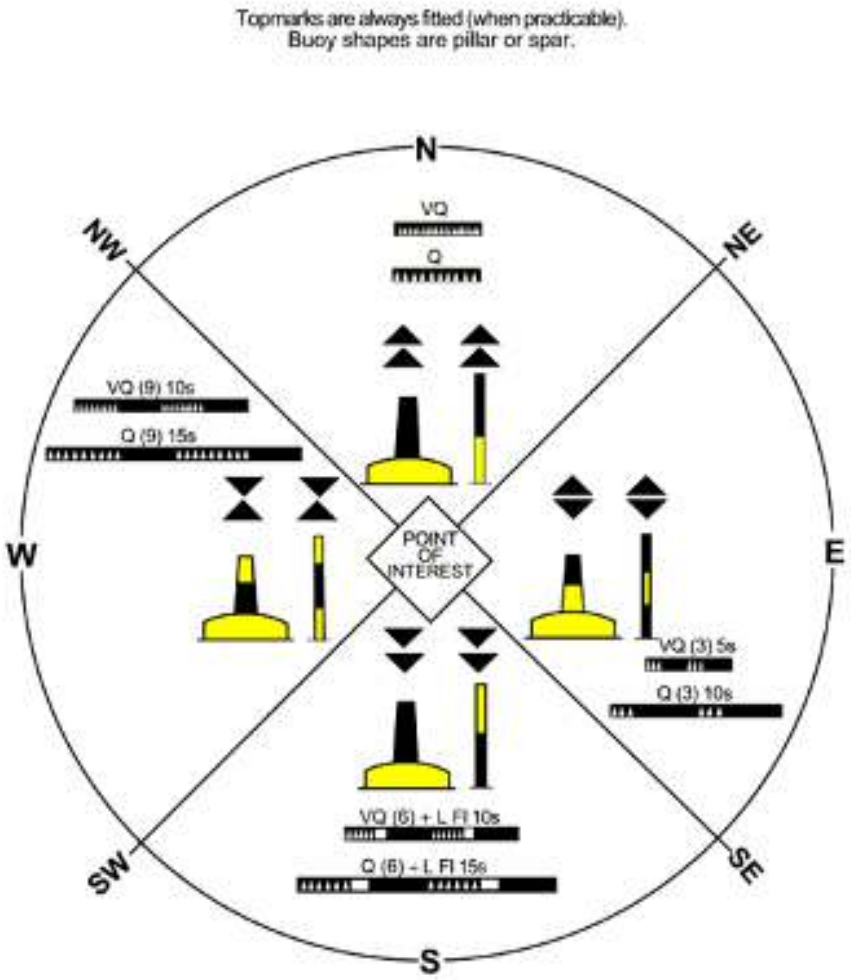
Isolated Danger Marks, Safe Water Marks, Special Marks

(Regions A and B)

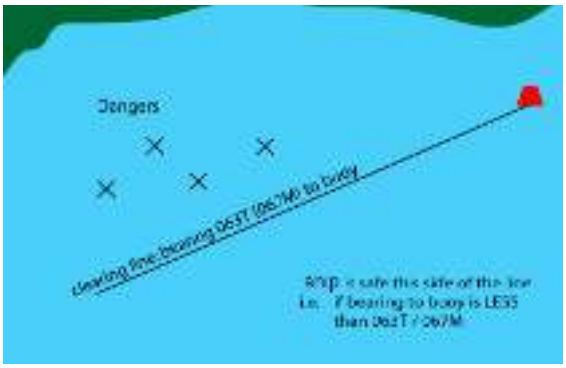


IALA Maritime Buoyage System

Cardinal Marks (Regions A and B)



Selain itu dengan *buoys* dapat kita gunakan untuk menentukan sudut bahaya horizontal untuk menjaga keselamatan dalam navigasi. Perhatikan gambar berikut:

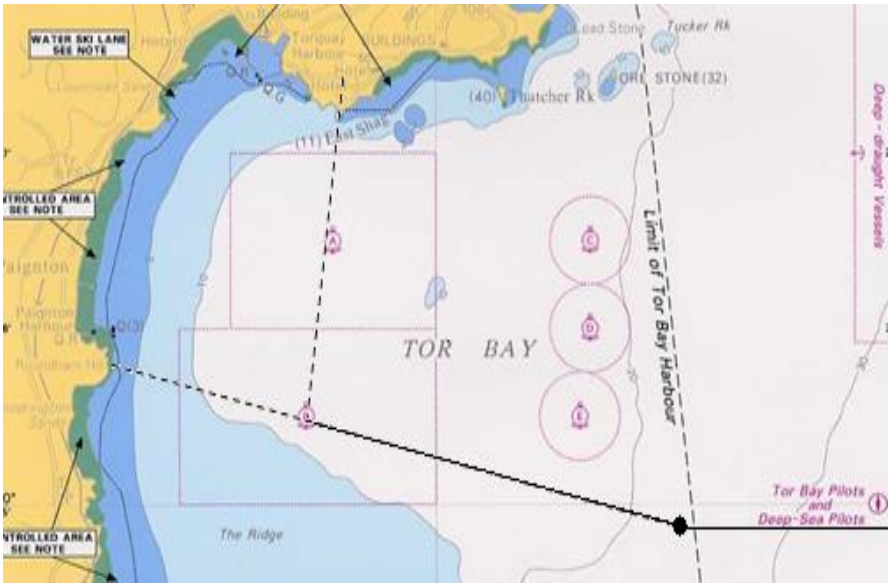


Mengenali alur pelayaran yang sesuai untuk mendekati tempat labuh jangkar

Di dalam memilih tempat berlabuh jangkar sebaiknya menggunakan area berlabuh jangkar yang sudah direkomendasikan di dalam peta, tetapi kadang-kadang tempat berlabuh dapat ditentukan sendiri dengan memperhatikan aspek-aspek keselamatan seperti:

a. Kedalam sehubungan *draft* kapal.
b. Jenis dasar.
c. Ada tidaknya (rintangan) *obstruction* pada area berlabuh seperti: kabel bawah laut, pipa bawah laut, kerangka kapal, dan lain-lain.
d. Arus pasang surut.
e. Keamanan dari pencurian dan perampokan.

Pada saat mendekati tempat berlabuh harus dipilih beberapa baringan (minimum 2 buah) yang pasti sehingga satu baringan dijadikan penuntun dan baringan yang lain digunakan sebagai kontrol untuk menuju tempat berlabuh yang sudah ditentukan.



RENCANA PELAYARAN

Rencana pelayaran harus dibuat terlebih dahulu sebelum kapal melaksanakan pelayaran dengan mempertimbangkan informasi-informasi yang relevan untuk menentukan *track* yang akan diikuti sebelum pelayaran dimulai. Rencana pelayaran ini juga harus dikonsultasikan kepada nakhoda dan *chief engineer* guna memastikan bahan bakar perbekalan dan perlengkapan yang akan diperlukan selama pelayaran cukup.

Sebelum melaksanakan pelayaran nakhoda harus menjamin bahwa *route-route* yang akan dilayari dari pelabuhan tolak ke pelabuhan tujuan direncanakan menggunakan peta-peta dan buku-buku publikasi lain yang memberikan informasi lengkap, valid, akurat sehubungan dengan keterbatasan dan bahaya navigasi baik yang permanen ataupun yang terprediksi untuk menjamin keselamatan dalam bernavigasi. Dalam merencanakan rute khususnya pada saat menyusuri pantai atau daratan harus diperhatikan *margins of safety and safe passing distances offshore*.

Referensi *nautical publication* yang dapat digunakan:

a. *ICS Bridge Procedure Guide*
b. *MPA Circulars*
c. *Ship Routeing*
d. *Routing charts or pilot charts*
e. *Notices to Mariners*
f. *Admiralty List of Radio Signals*
g. *Admiralty List of Lights*
h. *Admiralty or Local Tide Table and Tidal Stream Atlases*

i. *Admiralty Sailing Directions, as applicable*
j. *Admiralty Ocean Passages of the World, as applicable*
k. *Weather information*
l. *Load-line chart*
m. *Distance tables*
n. *Navigational warnings (including NAVTEX, radio navigational warnings)*
o. *Radio and local warnings*
p. *Information and guidelines from owner, charterers and other relevant sources*
q. *Ship's conditions (draught, trim, stability, cargo and etc.)*
r. *Mariner's handbook*
s. *IMO STCW 95 A-VIII/2*
t. *Relevant local regulations*
u. *Other relevant nautical publications*

MERENCANAKAN JALANNYA PELAYARAN

Pakailah selalu peta dengan skala yang terbesar.

1. Tariklah haluan-haluan yang akan diikuti pada peta skala kecil yang mencakup rute yang akan dilayari, kemudian pindahkan haluan-haluan tersebut pada peta skala besar.
2. Tentukan patokan-patokan yang dipakai untuk mengubah haluan kapal, misalnya: tanjung, suar, bukit, dll. Perubahan-perubahan haluan sedapat mungkin dengan patokan (penuntun atau baringan tegak lurus) untuk mencegah kekeliruan-kekeliruan pada saat mengubah haluan (*alter course*).

3. Garis haluan harus sedemikian rupa sehingga bebas dari bahaya-bahaya navigasi. Juga kemungkinan hujan atau kabut menutupi bahaya-bahaya ini harus diperhitungkan agar dalam keadaan seperti itu kapal masih tetap aman.
4. Hitunglah pasang surut untuk tempat-tempat yang tertentu.
5. Perkirakanlah kemungkinan adanya kapal-kapal lain pada perairan yang sama terutama perairan-perairan yang sempit
6. Hitunglah lamanya perjalanan

KETERANGAN YANG DITULISKAN PADA PETA-PETA ADALAH SEBAGAI BERIKUT:

- *Planned track showing the true course of each leg and leg distances.*
- *Turn radius for each course alteration, where appropriate;*
- *Maximum allowable off-track margins for each leg.*
- *Wheel over positions for each course alteration, where appropriate;*
- *Parallel indexing (not from floating objects unless they have been first checked for position);*
- *Chart changes;*
- *Methods and frequency of position fixing;*
- *Prominent navigation and radar marks;*
- *No-go areas (the excessive marking of no-go areas should be discouraged)*
- *Landfall targets and lights;*
- *Clearing lines and bearings;*
- *Transits, heading marks and leading lines;*

- *Significant tides or current;*
- *Safe speed and necessary speed alterations;*
- *Changes in machinery status;*
- *Minimum under keel clearance;*
- *Positions where the echo sounder should be activated;*
- *Crossing and high density traffic areas;*
- *Safe distance off;*
- *Anchor clearance;*
- *Contingency plans;*
- *Abort positions;*
- *VTS and reporting points;*
- *Extra-precautionary areas.*

Form No. & Title: **Passage plan (Ocean)**

Date:

PASSAGE PLAN

VESSEL : **Voy. No. :** **From :** **To:** **Date:**

W/P	Description	Position		Used Chart	UKC	Fixing Method	Interval	Course (T)	Distance (NM)	Total Distance	DTG (NM)	Remarks
		Latitude	Longitude									

Important Notice :

REMARKS:

Prepared by : _____ Checked by : _____ Acknowledged by : _____ _____ Page ____ of

2nd Officer Master Ch. Officer 3rd Officer

Checklist- Preparing a Voyage Plan (Ocean)

✓ **Indicates the check has been considered and/or prepared. N/A indicates the check is not applicable to the vessel or prevailing conditions.**	
Port of Departure-ETD (date/time) and Departure draft	
Port of Destination- ETA (date/time) and Arrival draft	
Total Distance	
Pilot to pilot distance	
Average speed and steaming time in open waters	
Charts-large scale for coastal waters & small scale for ocean passages-corrected up to date	
Charts-Routeing, climatic, pilot, load line zone	
Notices to Mariners, Local & NAVAREA Warnings, Navtex & T&P notices	
Nautical publications (Light list, ALRS, tide table, Sailing direction etc)	
Local information/ VHF Channels	
Tides and currents	
Pilots- time to notify	
Tugboats- time to notify	
Pilot embarkation/disembarkation areas	
Route planning- waypoints/courses/distances	
Alternative routes, emergency anchoring, no-go areas, abort positions	
Traffic separation/routing schemes, Ship Reporting System, VTS	
Under keel clearance- draught, speed and squat	
Position fixing methods	
Position fixing intervals	
Navigational marks, including parallel indexing	
Traffic likely to be encountered	
Obstructions and hazards to navigation	
Vessel's security including piracy taken into consideration	
Weather information and weather routeing	
Ship to Shore Master/Pilot Exchange form prepared	
Port guides studied including arrival/berthing restriction	

Passage plan signed by the officer who prepared it	
Passage plan approved and signed by the Master	
Any special route requirement for cargo on board	
Fuel, water, lubricants, chemicals, expendable and other spare parts, tools, suppliers and etc. (Discussed & confirmed with Chief Engineer)	

PASANG SURUT

Pengetahuan tentang pasang surut sangat diperlukan dalam transportasi laut, kegiatan di pelabuhan, pembangunan di daerah pesisir pantai, dan lain-lain.

Berikut contoh tabel pasang surut.

TIME ZONE (UT)
For Summer Time add ONE hour in **non-shaded areas**

ENGLAND – DARTMOUTH

LAT 50°21'N LONG 3°34'W

TIMES AND HEIGHTS OF HIGH AND LOW WATERS

MAY

	Time	m		Time	m
1	0426	1.6	**16**	0424	2.0
	1112	3.7		1055	3.5
SU	1657	1.9	M	1651	2.2
◑	2335	3.9	◐	2313	3.7
2	0556	1.8	**17**	0540	2.1
	1245	3.7		1215	3.4
M	1840	1.9	TU	1813	2.2
3	0114	3.9	**18**	0033	3.7
	0731	1.6		0656	1.9
TU	1413	3.8	W	1341	3.6
	2003	1.6		1925	2.0
4	0235	4.2	**19**	0155	3.8
	0840	1.2		0759	1.6
W	1518	4.1	TH	1442	3.8
	2105	1.2		2024	1.7
5	0336	4.4	**20**	0256	4.0
	0936	0.9		0854	1.3
TH	1612	4.4	F	1535	4.0
	2158	0.9		2117	1.4
6	0428	4.6	**21**	0350	4.2
	1025	0.6		0945	1.1
F	1658	4.6	SA	1623	4.3
	2246	0.6		2207	1.1

JUNE

	Time	m		Time	m
1	0045	4.1	**16**	0555	1.8
	0654	1.4		1228	3.7
W	1336	3.9	TH	1824	1.9
	1923	1.6			
2	0157	4.1	**17**	0040	3.9
	0800	1.3		0701	1.7
TH	1439	4.1	F	1332	3.8
	2027	1.4		1930	1.7
3	0259	4.2	**18**	0148	4.0
	0859	1.1		0801	1.5
F	1535	4.2	SA	1435	3.9
	2123	1.2		2030	1.5
4	0355	4.3	**19**	0255	4.1
	0952	1.0		0900	1.3
SA	1624	4.4	SU	1536	4.1
	2215	1.0		2129	1.3
5	0446	4.4	**20**	0400	4.2
	1041	0.9		0957	1.1
SU	1710	4.5	M	1633	4.4
	2302	0.9		2225	1.1
6	0530	4.4	**21**	0500	4.4
	1124	0.9		1053	1.0
M	1750	4.6	TU	1728	4.6
●	2344	0.9		2320	0.8
7	0611	4.4	**22**	0557	4.5
	1203	0.9		1146	0.8
TU	1825	4.6	W	1820	4.7
			○		

JULY

	Time	m
1	0111	4.0
	0711	1.5
F	1352	3.9
	1940	1.7
2	0218	3.9
	0816	1.6
SA	1453	4.0
	2046	1.6
3	0320	4.0
	0918	1.5
SU	1550	4.1
	2147	1.5
4	0417	4.0
	1013	1.4
M	1641	4.3
	2240	1.3
5	0506	4.1
	1102	1.3
TU	1725	4.4
	2326	1.2
6	0550	4.2
	1144	1.2
W	1804	4.5
●		
7	0007	1.1
	0629	4.3
TH	1223	1.1
	1840	4.5

Pengertian Pasang Surut

Pasang surut laut merupakan suatu fenomena pergerakan naik turunnya permukaan air laut secara berkala yang diakibatkan

oleh kombinasi gaya gravitasi dan gaya tarik menarik dari benda-benda astronomi terutama oleh matahari, bumi dan bulan. Pengaruh benda angkasa lainnya dapat diabaikan karena jaraknya lebih jauh atau ukurannya lebih kecil.

Faktor non astronomi yang mempengaruhi pasang surut terutama di perairan semi tertutup seperti teluk adalah bentuk garis pantai dan topografi dasar perairan.

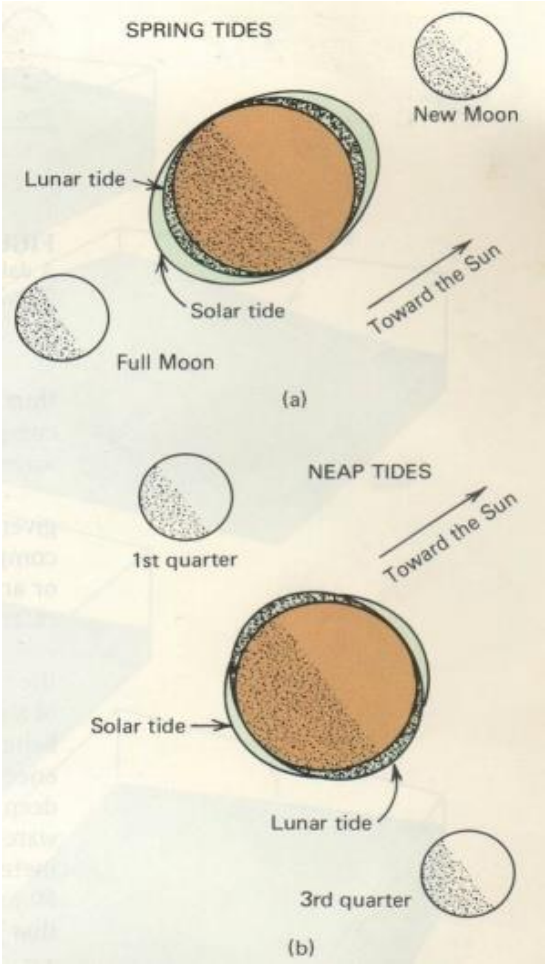
Puncak gelombang disebut **pasang tinggi** dan lembah gelombang disebut **pasang rendah**.

Perbedaan vertikal antara pasang tinggi dan pasang rendah disebut rentang pasang surut (*tidal range*).

Periode pasang surut adalah waktu antara puncak atau lembah gelombang ke puncak atau lembah gelombang berikutnya.

Pasang purnama (*spring tide*) terjadi ketika bumi, bulan dan matahari berada dalam suatu garis lurus. Pada saat itu akan dihasilkan pasang tinggi yang sangat tinggi dan pasang rendah yang sangat rendah. Pasang surut purnama ini terjadi pada saat bulan baru dan bulan purnama.

Pasang perbani (neap tide) terjadi ketika bumi, bulan dan matahari membentuk sudut tegak lurus. Pada saat itu akan dihasilkan pasang tinggi yang rendah dan pasang rendah yang tinggi. Pasang surut perbani ini terjadi pada saat bulan 1/4 dan 3/4.



Gambar. *Spring Tide* dan *Neap Tide*

Tipe pasang surut ditentukan oleh frekuensi air pasang dengan surut setiap harinya. Hal ini disebabkan karena perbedaan respons setiap lokasi terhadap gaya pembangkit pasang surut. Jika suatu perairan mengalami satu kali pasang dan satu kali surut dalam satu hari, maka kawasan tersebut dikatakan bertipe pasang

surut harian tunggal (*diurnal tides*), namun jika terjadi dua kali pasang dan dua kali surut dalam sehari, maka tipe pasang surutnya disebut tipe harian ganda (*semidiurnal tides*). Tipe pasang surut lainnya merupakan peralihan antara tipe tunggal dan ganda disebut dengan tipe campuran (*mixed tides*) dan tipe pasang surut ini digolongkan menjadi dua bagian yaitu tipe campuran dominasi ganda dan tipe campuran dominasi tunggal.

Selain dengan melihat data pasang surut yang diplot dalam bentuk grafik, tipe pasang surut juga dapat ditentukan berdasarkan bilangan Formzal (*F*) yang dinyatakan dalam bentuk:

$$F = [A(O1) + A(K1)]/[A(M2) + A(S2)]$$<!--[if gte vml 1]> <![endif]--><!--[if !vml]--><!--[endif]--><!--[if gte mso 9]> <![endif]-->

dengan ketentuan:

$F \leq 0.25$	:	Pasang surut tipe ganda (*semidiurnal tides*)
$0{,}25 < F \leq 1.5$	:	Pasang surut tipe campuran condong harian ganda (*mixed mainly semidiurnal tides*)
$1.50 < F \leq 3.0$	:	Pasang surut tipe campuran condong harian tunggal (*mixed mainly diurnal tides*)
$F > 3.0$	:	Pasang surut tipe tunggal (*diurnal tides*)

Di mana:

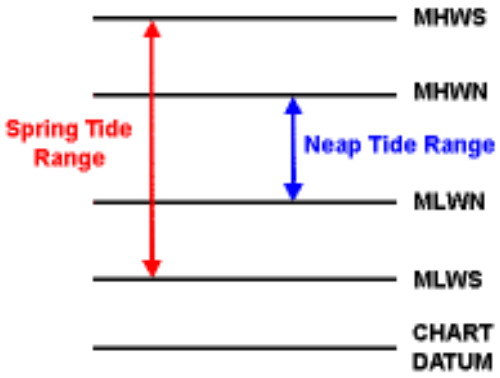
F	:	bilangan Formzal
AK_1	:	amplitudo komponen pasang surut tunggal utama yang disebabkan oleh gaya tarik bulan dan matahari
AO_1	:	amplitudo komponen pasang surut tunggal utama yang disebabkan oleh gaya tarik bulan
AM_2	:	amplitudo komponen pasang surut ganda utama yang disebabkan oleh gaya tarik bulan
AS_2	:	amplitudo komponen pasang surut ganda utama yang disebabkan oleh gaya tarik matahari

Karena sifat pasang surut yang periodik, maka ia dapat diramalkan. Untuk meramalkan pasang surut, diperlukan data amplitudo dan beda fasa dari masing-masing komponen pembangkit pasang surut. Komponen-komponen utama pasang surut terdiri dari komponen tengah harian dan harian. Namun demikian, karena interaksinya dengan bentuk (morfologi) pantai dan superposisi antar gelombang pasang surut komponen utama, akan terbentuklah komponen-komponen pasang surut yang baru.

Pada buku peramalan pasang surut yang dikeluarkan oleh DISHIDROS dan BOKOSURTANAL tertulis nilai komponen pasang surut tersebut baik amplitudo maupun fase pada beberapa lokasi di perairan Indonesia. Dengan mengetahui amplitudo komponen tersebut, maka dapat dihitungkan nilai bilangan Formzalnya sehingga tipe pasang surutnya dapat ditentukan.

Nah mungkin sedikit bingung tentang apa itu komponen M2, S2, O1, K1, P1, M4, MS4 dan lain-lain.

Istilah-istilah dalam Pasang-surut



***Mean Sea Level* (MSL) atau Duduk Tengah** adalah muka laut rata-rata pada suatu periode pengamatan yang panjang, sebaiknya selama 18,6 tahun.

***Mean Tide Level* (MTL)** adalah rata-rata antara air tinggi dan air rendah pada suatu periode waktu.

***Mean High Water* (MHW)** adalah tinggi air rata-rata pada semua pasang tinggi.

***Mean Low Water* (MLW)** adalah tinggi air rata-rata pada semua surut rendah.

***Mean Higher High Water* (MHHW)** adalah tinggi rata-rata pasang tertinggi dari dua air tinggi harian pada suatu periode waktu yang panjang. Jika hanya satu air tinggi terjadi pada satu hari, maka air tinggi tersebut diambil sebagai air tinggi tertinggi.

***Mean Lower High Water* (MLHW)** adalah tinggi rata-rata air terendah dari dua air tinggi harian pada suatu periode waktu yang panjang. Hal ini tidak akan terjadi untuk pasang surut harian (diurnal).

***Mean Higher Low Water* (MHLW)** adalah tinggi rata-rata air tertinggi dari dua air rendah harian pada suatu periode waktu yang panjang. Hal ini tidak akan terdapat pada pasang surut diurnal.

***Mean Lower Low Water* (MLLW)** adalah tinggi rata-rata air terendah dari dua air rendah harian pada suatu periode waktu yang panjang. Jika hanya satu air rendah terjadi pada satu hari, maka harga air rendah tersebut diambil sebagai air rendah terendah.

***Mean High Water Springs* (MHWS)** adalah tinggi rata-rata dari dua air tinggi berturut-turut selama periode pasang purnama, yaitu jika tunggang (*range*) pasang surut itu tertinggi.

***Mean Low Water Springs* (MLWS)** adalah tinggi rata-rata yang diperoleh dari dua air rendah berturut-turut selama periode pasang purnama.

***Mean High Water Neaps* (MHWN)** adalah tinggi rata-rata dari dua air tinggi berturut-turut selama periode pasang surut perbani (*neap tides*), yaitu jika tunggang (*range*) pasang surut paling kecil.

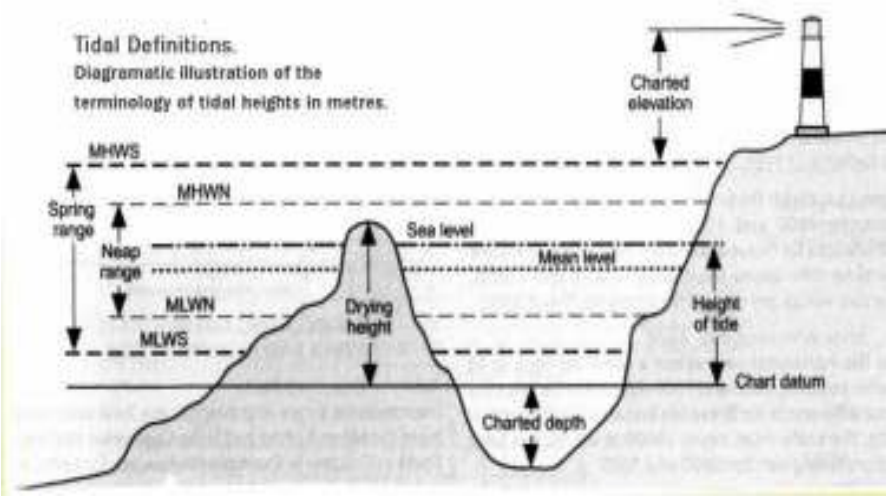
***Mean Low Water Neaps* (MLWN)** adalah tinggi rata-rata yang dihitung dari dua air berturut-turut selama periode pasang surut perbani.

***Highest Astronomical Tide* (HAT)/*Lowest Astronomical Tide* (LAT)** adalah permukaan laut tertinggi/terendah yang dapat diramalkan terjadi di bawah pengaruh keadaan meteorologis rata-rata dan kombinasi keadaan astronomi. Permukaan ini tidak akan dicapai pada setiap tahun. HAT dan LAT bukan permukaan laut yang ekstrem yang dapat terjadi, *storm surges* mungkin saja dapat menyebabkan muka laut yang lebih tinggi dan lebih rendah. Secara umum permukaan (level) di atas dapat dihitung dari peramalan satu tahun. Harga HAT dan LAT dihitung dari data beberapa tahun.

***Mean Range* (Tunggang Rata-rata)** adalah perbedaan tinggi rata-rata antara MHW dan MLW.

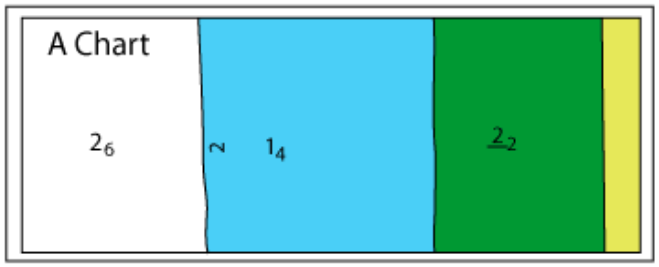
Mean Spring Range adalah perbedaan tinggi antara MHWS dan MLWS.

Mean Neap Range adalah perbedaan tinggi antara MHWN dan MLWN.

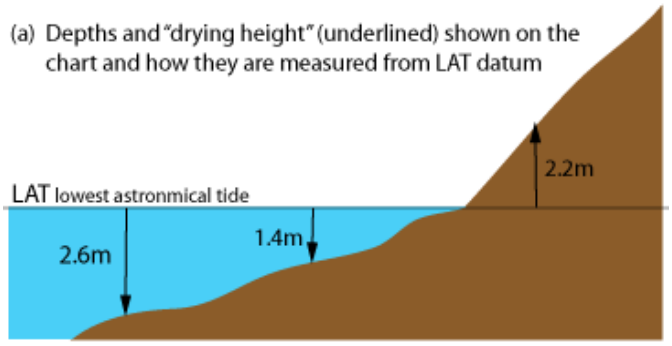


Melakukan perhitungan dengan UKC

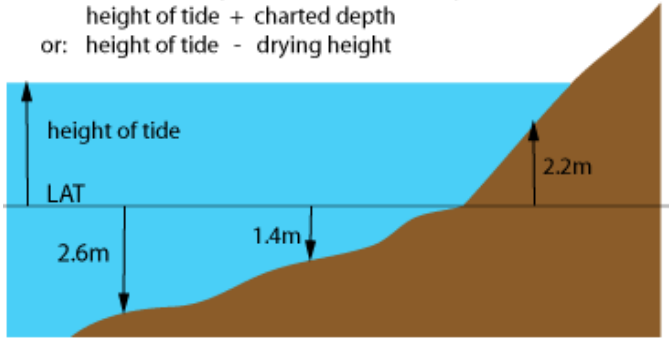
Under keel clearance adalah salah satu faktor penting dalam menjamin keselamatan pelayaran. Selama dalam pelayaran UKC harus senantiasa diperhitungkan khususnya pada saat kapal melayari daerah dangkal (*shallow water area*) dan alur pelayaran sempit (*narrow channel*). Kedalaman yang ditunjukkan di dalam peta adalah kedalaman pada saat muka surutan terendah (*lowest astronomical tide*) untuk memudahkan pemahaman mengenai kedalaman perhatikan penjelasan gambar berikut:



(a) Depths and "drying height" (underlined) shown on the chart and how they are measured from LAT datum

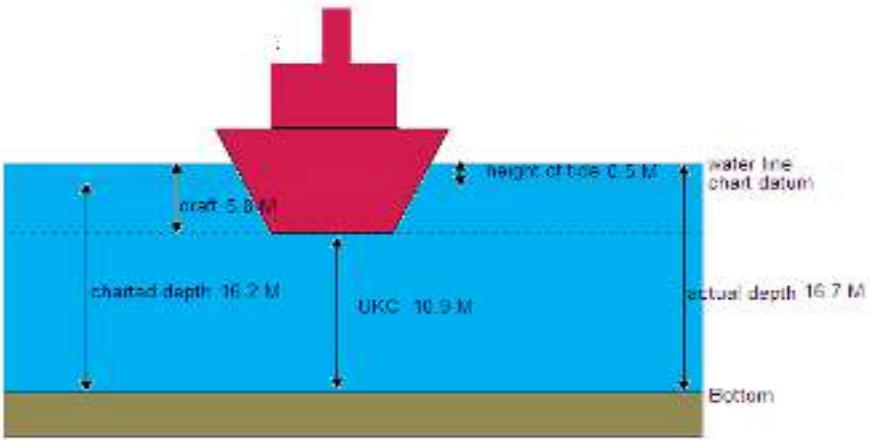


(b) water level is always above LAT. Actual depth of water is:
height of tide + charted depth
or: height of tide - drying height



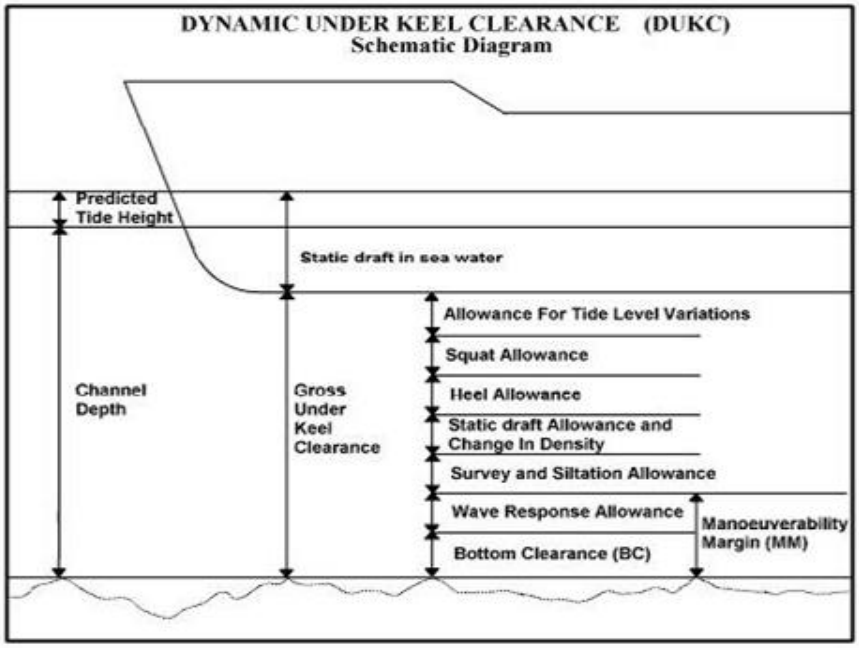
Contoh: kedalaman di peta ditunjukkan 16.2 meter, ketinggian air pasang 0.5 meter dan *draft* kapal 5.8 meter. Berapakah UKC?

Untuk menjawab UKC perhatikan gambar berikut:



Untuk memperhitungkan dinamik UKC pada saat *maneuovere* harus diperhitungkan faktor-faktor lain yaitu:

1. *Tides*
2. *Vessel Motions (caused by swell)*
3. *Squat*
4. *Heel*
5. *Change of density*



PENGISIAN LOG BOOK

Buku harian kapal diselenggarakan di atas kapal atas dasar:

1. Pasal 348, 349 dan 351 KUHD (penyelenggaraan umum dari buku harian);
2. Pasal 352a dan 349a KUHD (perihal pencatatan hukuman-hukuman dan penyelidikan terhadap kejahatan-kejahatan;
3. Pasal 46 dari peraturan perihal menyelenggarakan daftar-daftar pendaftaran warga Negara tentang pencatatan kelahiran di atas kapal;
4. Pasal 76 dari peraturan perihal menyelenggarakan daftar-daftar warga Negara tentang pencatatan kematian-kematian di atas kapal;

5. Pasal 18, ayat-ayat dari ordonansi kapal-kapal 1935 (cara bertindak dalam hal kerugian yang diderita diluar negeri);
6. Pasal 162 ayat-ayat 1, 3, 4 dari Undang-undang kapal 1935 (yang mana buku harian kapal diwajibkan).

Hal-hal yang perlu ditulis dalam *log book*:

a. Crewlist
b. Kelahiran di kapal.
c. Kematian di kapal.
d. Hukuman-hukuman dan Penyelidikan tentang pelanggaran.
e. Nasihat-nasihat kepada anggota ABK (ps 351 KUHD).
f. Kecelakaan (Kerusakan yang dialami kapal).
g. Naik dok, perbaikan-perbaikan yang penting.
h. Pembukaan dan penutupan pintu-pintu kedap air, dll.
i. Latihan-latihan berkala untuk kepentingan keselamatan.
j. Perawatan-perawatan Radio Telegraf, Radar, Perum-gema, Pedoman gasing, dll.
k. Pemuatan barang berbahaya, yang mana menurut pasal 155 "U.U. Kapal 1935" perlu dijelaskan.
l. Pemeriksaan alat-alat penolong.
m. Pemeriksaan alat-alat bongkar muat.
n. Pemeriksaan oleh Biro Pemeriksa yang sah.
o. Penanda tanganan buku harian kapal oleh Syahbandar/penyijil atau Pegawai. Konsul.
p. Aktivitas harian pada saat kapal berlayar maupun berada di pelabuhan
   - Waktu *commence discharge* atau *loading.*

- Keterangan secara rinci mengenai keterlambatan kapal karena alasan cuaca atau alasan lain.
- Jumlah kargo yang dimuat atau dibongkar setiap harinya.
- Kondisi selama pelayaran setiap jam jaga (posisi, haluan sejati, haluan yang dikemudikan, waktu, jarak yang ditempuh, kecepatan, arah dan kecepatan angin, keadaan awan, keadaan cuaca, keadaan laut, tekanan udara, suhu, keadaan tangki-tangki *ballast*, *non position*, ROB bahan bakar serta pemakaian dan lain-lain.

Hal-hal yang perlu diperhatikan dalam penulisan *log book*:

1. Semua keterangan-keterangan yang penting selama kegiatan di atas kapal harus ditulis secara cermat dan detail. Untuk itu pada umumnya sebelum keterangan-keterangan tersebut ditulis di dalam *log book* terlebih dahulu semua pencatatan dilaksanakan di *rough log*. Bila ada kesalahan di dalam penulisan *log book* tidak diperbolehkan di tipe-x tetapi cukup dicoret dan diparaf. *Log book* dapat digunakan sebagai barang bukti di dalam persidangan dalam penyelesaian masalah-masalah yang dialami oleh kapal.
2. Setiap halaman ditanda tangani oleh mualim setiap jaga sesuai periode jaganya.
3. Setiap halaman harus dievaluasi dan diteliti oleh nakhoda sebelum ditandatangani setiap hari.

MENGHITUNG ESTIMATE TIME ARRIVAL

Untuk menghitung ESTIMATE TIME ARRIVAL (ETA) harus diperhatikan hal-hal sebagai berikut:

1. *Estimate time departure* (ETD)
2. Total jarak (*total distance*)
3. Kecepatan rata-rata kapal (*average speed* kapal)
4. Perbedaan waktu antara pelabuhan tolak dan pelabuhan tiba.

Informasi ETD kapal dapat diperoleh dari nakhoda, agen atau Kepanduan, sedangkan total jarak dapat diperoleh dari data-data *passage* planning yang telah dibuat.

Dalam menentukan kecepatan rata-rata kapal harus diperhitungkan faktor lain di antaranya arus, angin maupun keadaan cuaca yang akan dialami selama pelayaran.

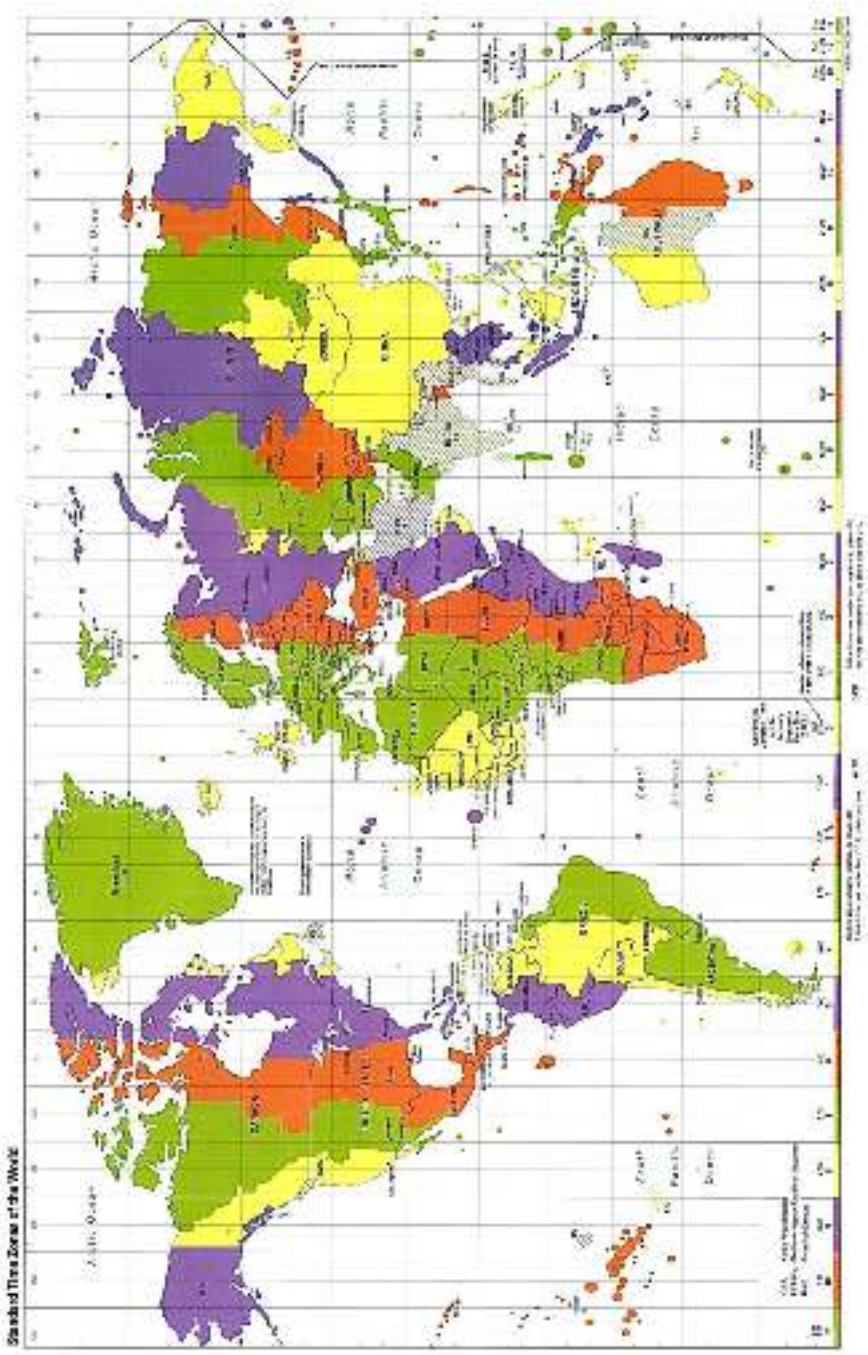
Untuk memperoleh keterangan penggunaan waktu *standard time* dari tiap-tiap Negara (pelabuhan tujuan) dapat menggunakan buku-buku di antaranya:

a. *Guide to port entry*
b. *Almanac nautika*
c. *Admiralty list of radio signals*

Untuk menyeragamkan waktu yang digunakan dilaut oleh kapal-kapal maka digunakan *uniform time system* yaitu berdasarkan area (15˚) yang dibatasi oleh garis-garis bujur hal ini bertujuan agar ada kesamaan antara waktu yang digunakan dikapal dengan waktu didarat pada area yang sama.

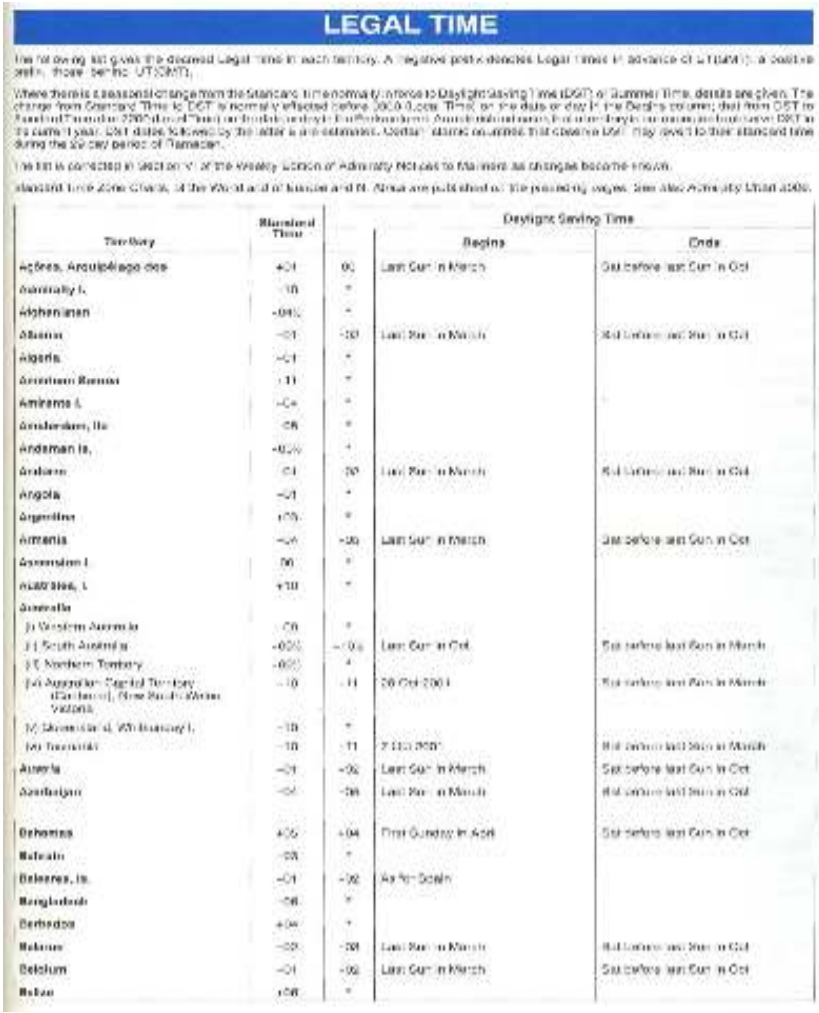
Pembagian waktu didunia ini dibagi menjadi 24 *zone time*. Dimulai dari *zone* 0 sebagai pusatnya adalah garis Greenwich meridian (*zone* 0 = 7.5˚W s.d. 7.5˚E)

Detail dari pembagian waktu dapat dilihat dari diagram berikut:



Apabila kapal melewati International *date line* dari barat ke timur (*easterly course*) maka penanggalan akan mundur sehari dan Apabila kapal melewati International *date line* dari timur ke barat (*westerly course*) maka penanggalan akan maju sehari.

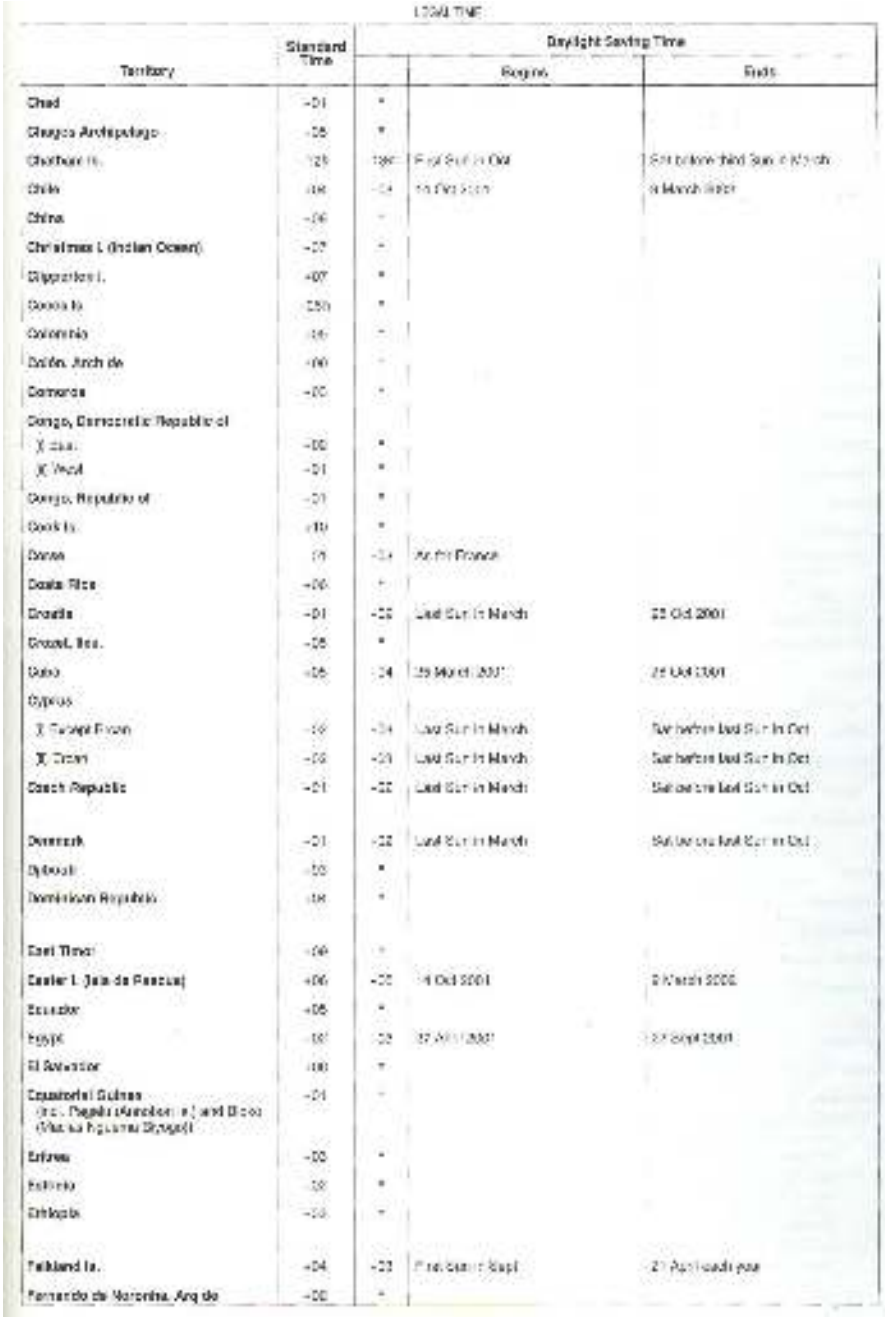
Untuk lebih jelasnya penggunaan *legal time* untuk masing-masing wilayah dapat dilihat pada tabel berikut:



LEGAL TIME

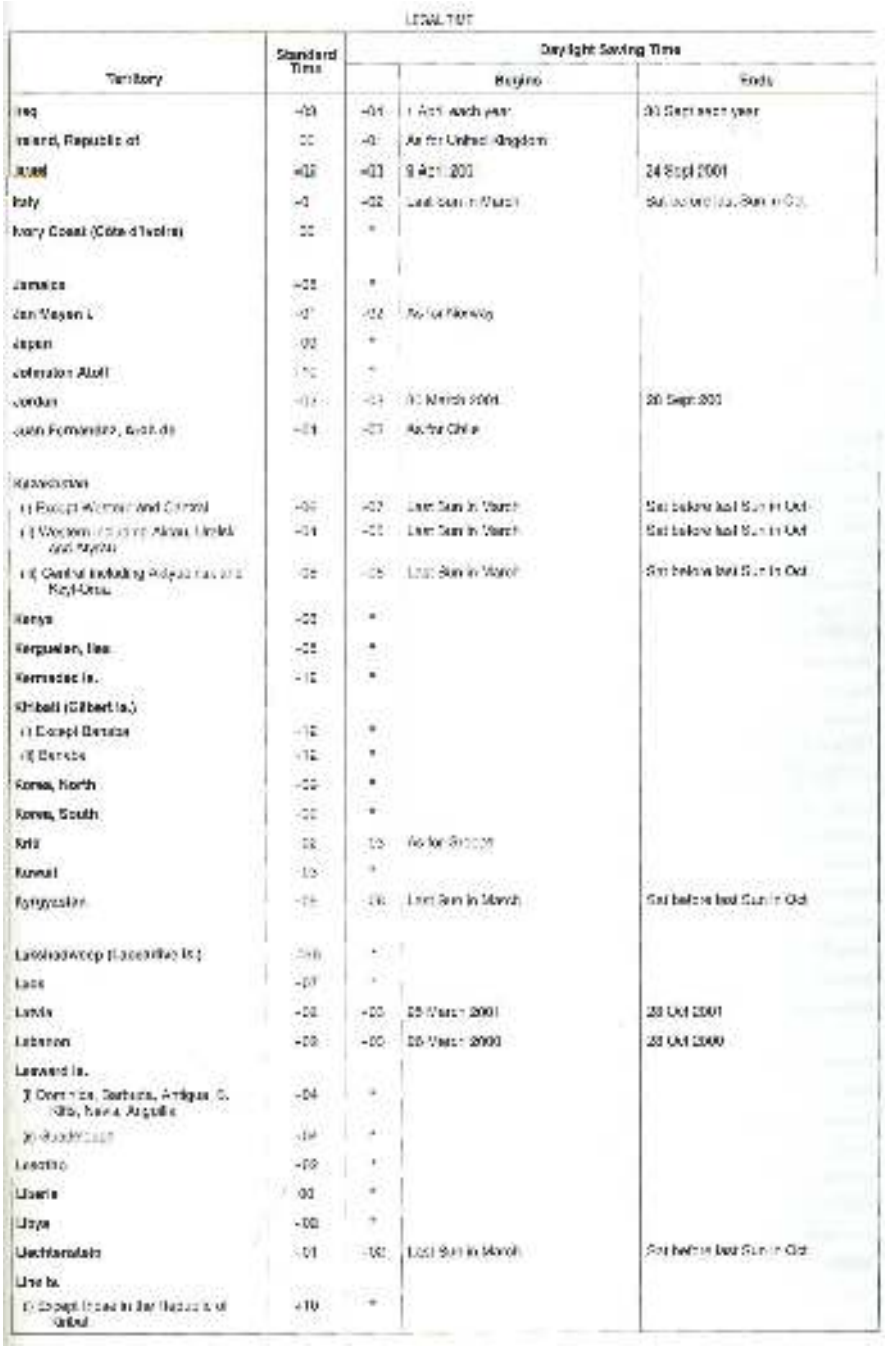
Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
Ağrées, Archipelago des	+01	01	Last Sun in March	Sat before last Sun in Oct
Australia I.	-10	*		
Afghanistan	-04½	*		
Albania	-01	-02	Last Sun in March	Sat before last Sun in Oct
Algeria	-01	*		
Amsterdam Island	-11	*		
Amirante I.	-04	*		
Amsterdam, Ile	-06	*		
Andaman Is.	-05½	*		
Andorra	-01	00	Last Sun in March	Sat before last Sun in Oct
Angola	-01	*		
Anguilla	+04	*		
Armenia	-04	-05	Last Sun in March	Sat before last Sun in Oct
Ascension I.	00	*		
Australia	+10	*		
Australia				
(i) Western Australia	-08	*		
(ii) South Australia	-09½	-10½	Last Sun in Oct	Sat before last Sun in March
(iii) Northern Territory	-09½	*		
(iv) Australian Capital Territory (Canberra), New South Wales, Victoria	-10	-11	26 Oct 2003	Sat before last Sun in March
(v) Queensland, Whitsunday I.	-10	*		
(vi) Tasmania	-10	-11	2 Oct 2005	Sat before last Sun in March
Austria	-01	-02	Last Sun in March	Sat before last Sun in Oct
Azerbaijan	-04	-05	Last Sun in March	Sat before last Sun in Oct
Bahamas	+05	+04	First Sunday in April	Sat before last Sun in Oct
Bahrain	-03	*		
Baleares, Is.	-01	-02	As for Spain	
Bangladesh	-06	*		
Barbados	+04	*		
Belarus	-02	-03	Last Sun in March	Sat before last Sun in Oct
Belgium	-01	-02	Last Sun in March	Sat before last Sun in Oct
Belize	+06	*		

Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
Benin	+1	*		
Bermuda	−04	−03	First Sunday in April	Sat. before last Sun. in Oct.
Bhutan	+06	*		
Bolivia	−04	*		
Bosnia and Herzegovina	+01	+02	Last Sun. in March	Sat. before last Sun. in Oct.
Botswana	+02	*		
Brazil				
(a) Eastern (except (b))	−03	−02	16 Oct. 2005	16 Feb. 2007
(b) North and East Parts of East Para	−03	*		
(c) Western (except (b))	−04	−03	16 Oct. 2005	16 Feb. 2007
(d) Fernando de Noronha, Mount Pascoal Archipelago and Para Isl.	−02	*		
(e) Acre and Tabatinga City	−05	*		
Brunei	+08	*		
Bulgaria	+02	+03	Last Sun. in March	Sat. before last Sun. in Oct.
Burkina Faso	+00	*		
Burma (Myanmar)	+06½	*		
Burundi	+02	*		
Cambodia	+07	*		
Cameroon	+01	*		
Canada				
(a) Newfoundland (except Labrador)	−03½	−02½	First Sunday in April	Sat. before last Sun. in Oct.
(b) Atlantic Zone (New Brunswick, Nova Scotia, Prince Edward Island, Labrador)	−04	−03	First Sunday in April	Sat. before last Sun. in Oct.
(c) Atlantic Zone (Eastern Quebec)	−04	*		
(d) Eastern Zone (Eastern ON, Western Quebec, Nunavut (except Mountain Zone))	−05	−04	First Sunday in April	Sat. before last Sun. in Oct.
(e) Eastern Zone (Western Ontario, Kitikmeot)	−06	*		
(f) Central Zone (Manitoba, Central ON, Territories, Cambridge Bay and Kugluktuk (Coppermine))	−06	−05	First Sunday in April	Sat. before last Sun. in Oct.
(g) Central Zone (Saskatchewan)	−06	*		
(h) Mountain Zone (Alberta, Mountain NW Territories)	−07	−06	First Sunday in April	Sat. before last Sun. in Oct.
(i) Mountain Zone (parts lower in B.C. to Creston)	−07	*		
(j) Pacific Zone (B.C. (except (i)), Yukon, Western NW Territories)	−08	−07	First Sunday in April	Sat. before last Sun. in Oct.
Canarias, Is.	00	+01	As for Spain	
Cape Verde	−01	*		
Caroline Is.				
(a) Palau	+09	*		
(b) Yap	+10	*		
(c) Pohnpei, Ponape, Kosrae	+11	*		
Cayman Is.	−05	*		
Central African Republic	+01	*		



Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
Chad	+01	*		
Chagos Archipelago	+06	*		
Chatham Is.	+12¾	+13¾	First Sun in Oct	3rd Sun before third Sun in March
Chile	+04	-04	1st Sun in Oct	2nd March Sun
China	+08	*		
Christmas I. (Indian Ocean)	+07	*		
Clipperton I.	+08	*		
Cocos Is	+6½	*		
Colombia	-05	*		
Colón, Arch de	+09	*		
Comoros	+03	*		
Congo, Democratic Republic of				
(Zaire	+01	*		
)(Rest	+02	*		
Congo, Republic of	+01	*		
Cook Is	-10	*		
Corsica	+01	+02	As for France	
Costa Rica	-06	*		
Croatia	+01	+02	Last Sun in March	25 Oct 2001
Crozet, Iles	+05	*		
Cuba	-05	-04	29 March 2001	28 Oct 2001
Cyprus				
)(Turkish Prov	+02	+03	Last Sun in March	Sat before last Sun in Oct
)(Greek	+02	+03	Last Sun in March	Sat before last Sun in Oct
Czech Republic	+01	+02	Last Sun in March	Sat before last Sun in Oct
Denmark	+01	+02	Last Sun in March	Sat before last Sun in Oct
Djibouti	+03	*		
Dominican Republic	-04	*		
East Timor	+09	*		
Easter I. (Isla de Pascua)	+06	+07	14 Oct 2001	3 March 2002
Ecuador	+05	*		
Egypt	+02	+03	27 April 2001	27 Sept 2001
El Salvador	-06	*		
Equatorial Guinea (incl. Pagalu (Annobon) and Bioko (Fernando Poo))	+01	*		
Eritrea	+03	*		
Estonia	+02	*		
Ethiopia	+03	*		
Falkland Is.	-04	-03	First Sun in Sept	3rd Sun in April
Fernando de Noronha, Arq de	-02	*		

Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
Fiji Is.	-12	*		
Finland	+02	+03	Last Sun in March	Sun before last Sun in Oct.
Faroyar	00	-01	As for Denmark	
France	+01	+02	Last Sun in March	Sun before last Sun in Oct.
Gabon	+01	*		
Gambia, The	00	*		
Gambier, I.	+09	*		
Georgia	04	05	[illegible]	[illegible]
Germany	01	02	Last Sun in March	Sun before last Sun in Oct.
Ghana	00	*		
Gibraltar	01	02	Last Sun in March	Sun before last Sun in Oct.
Gough I.	00	*		
Graham Land	+03	*		
Greece	+02	+03	Last Sun in March	Sun before last Sun in Oct.
Greenland				
(i) Ocean Thule, Scoresby Sund and Danmarkshavn	+00	+01	As for Denmark	
(ii) Thule	+04	+02	First Sun in April	Sun before last Sun in Oct.
(iii) Scoresby Sund	+01	00	As for Denmark	
(iv) Danmarkshavn	00	*		
Guam	-10	*		
Guatemala	-06	*		
Guinea	00	*		
Guinea-Bissau	00	*		
Guyana	-04	*		
Guyane Française	-03	*		
Haiti	-05	*		
Honduras	-06	*		
Hong Kong	+08	*		
Hornos, Isla de	-03	*		
Hungary	+01	+02	Last Sun in March	Last before last Sun in Oct.
Iceland	00	*		
India	+05	*		
Indonesia				
(i) Western Zone (Kalimantan (Borneo) (Barat, Tengah, Timur, Selatan), Jawa, Madura, Sumatera, Jawa Tengah, Timur, Kalimantan)	+07	*		
(ii) Central Zone (Bali, Nusa Tenggara Barat, Nusa Tenggara Timur, Kalimantan (Selatan, Timur), Sulawesi, Sumbawa, Timor Timur)	+08	*		
(iii) Eastern Zone (Irian Jaya, Maluku, Timor Timur)	+09	*		
Iran	+03½	+04½	22 March 2001	21 Sept 2001



LEGAL TIME

Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
Iraq	-03	-04	1 April each year	30 Sept each year
Ireland, Republic of	00	-01	As for United Kingdom	
Israel	-02	-03	9 April 2000	24 Sept 2000
Italy	-01	-02	Last Sun in March	Sat before last Sun in Oct
Ivory Coast (Côte d'Ivoire)	00	*		
Jamaica	-05	*		
Jan Mayen I.	-01	-02	As for Norway	
Japan	-09	*		
Johnston Atoll	-10	*		
Jordan	-02	-03	31 March 2000	29 Sept 2000
Juan Fernández, Archip.	-04	-03	As for Chile	
Kazakhstan				
(-) Except Western and Central	-06	-07	Last Sun in March	Sat before last Sun in Oct
(-) Western (Aktau, Aktyubinsk and Atyrau)	-04	-05	Last Sun in March	Sat before last Sun in Oct
(-) Central (including Kzyl-Orda)	-06	-05	Last Sun in March	Sat before last Sun in Oct
Kenya	-03	*		
Kerguelen, Iles	-05	*		
Kermadec Is.	-12	*		
Kiribati (Gilbert Is.)				
(-) Except Canton	-12	*		
(-) Canton	-13	*		
Korea, North	-09	*		
Korea, South	-09	*		
Kriti	00	-01	As for Greece	
Kuwait	-03	*		
Kyrgyzstan	-06	-07	Last Sun in March	Sat before last Sun in Oct
Laccadive Archipelago (Lakshadweep Is.)	-05	*		
Laos	-07	*		
Latvia	-02	-03	26 March 2000	29 Oct 2000
Lebanon	-02	-03	26 March 2000	29 Oct 2000
Leeward Is.				
(-) Dominica, Barbuda, Antigua, St. Kitts, Nevis, Anguilla	-04	*		
(-) Guadeloupe	-04	*		
Lesotho	-02	*		
Liberia	00	*		
Libya	-02	*		
Liechtenstein	-01	-02	Last Sun in March	Sat before last Sun in Oct
Line Is.				
(-) Except Ocean I. and Starbuck I. of Gilbert	-10	*		

Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
[illegible]	[illegible]	[illegible]		
Lithuania	+02	*		
Lord Howe I.	[illegible]	[illegible]	[illegible]	[illegible]
Loyalty, Iles	+11	*		
Luxembourg	+01	+02	Last Sun in March	Sat before last Sun in Oct.
Macau	+08	*		
Macedonia, Former Yugoslav Republic of	+01	+02	Last Sun in March	Sat before last Sun in Oct
Madagascar	+03	*		
Madeira, Arq. da	00	+01	Last Sun in March	Sat before last Sun in Oct
Malawi	02	*		
Malaysia	08	*		
Maldive Is.	+05	*		
Mali	00	*		
Malta	01	[illegible]	[illegible]	[illegible]
Marquises, Iles	-0930	*		
Marshall Is.				
[illegible]	12	*		
[illegible]	12	*		
Mauritania	00	*		
Mauritius	+04	*		
Mexico				
[illegible]	06	[illegible]	First Sun in May	Sat before last Sun in Sept
[illegible]	07	[illegible]	First Sun in April	Sat before last Sun in Sept
[illegible]	08	[illegible]	First Sun in May	Sat before last Sun in Oct
[illegible]	07	*		
Midway Is.	-11	*		
Moldova	+02	+03	Last Sun in March	Sat before last Sun in Oct
Monaco	+01	+02	Last Sun in March	Sat before last Sun in Oct
Mongolia	+08	+09	26 March 2006	Sat before last Sun in Sept
Morocco	00	*		
Mozambique	+02	*		
Namibia	+01	+02	3 Sept 2006 C	7 April 2007 C
Nauru	+12	*		
Netherlands Antilles	-04	*		
Nepal	+0545	*		
Netherlands	+01	+02	Last Sun in March	Sat before last Sun in Oct
New Zealand	+12	+13	First Sun in Oct	Sat before last Sun in March
Nicaragua	-06	*		
Nicobar I.	+0530	*		
Niger	+01	*		
Nigeria	+01	*		

LOCAL TIME

Territory	Standard Time		Daylight Saving Time	
			Begins	Ends
Niue I.	-11	*		
Norfolk I.	11:3	*		
Northern Mariana Is.	+10	*		
Norway	+01	+02	Last Sun in March	Sat before last Sun in Oct
Nouvelle Calédonie	+11	*		
Oman	+04	*		
Pakistan	+05	*		
Panama	+05	*		
Papua New Guinea (i.e. New Britain, New Ireland, Bougainville)	+10	*		
Paraguay	-04	-03	First Sun in Oct	Sat before last Sun in March
Passion, Ile de (Pasion I.)	+10	-10	[illegible]	
Peru	-05	*		
Philippines	+08	*		
Phoenix Is.				
(i) Occupied by the Republic of Kiribati	+13	*		
(ii) Occupied by the Republic of Kiribati	-10	*		
Pitcairn I.	-08	*		
Poland	+01	+02	Last Sun in March	Sat before last Sun in Oct
Portugal	00	+01	Last Sun in March	Sat before last Sun in Oct
Puerto Rico	-04	*		
Qatar	+03	*		
Rapa I.	-10	*		
Réunion	+04	*		
Rodrigues I.	+04	*		
Romania	+02	+03	Last Sun in March	Sat before last Sun in Oct
Rotuma I.	+12	*		
Russia				
Zone 1 (Kaliningrad)	+02	+03	Last Sun in March	Sat before last Sun in Oct
Zone 2 (Saint Petersburg, Moscow, Arkhangelsk, Astrakhan, Penza, Nizhniy Novgorod)	+03	+04	Last Sun in March	Sat before last Sun in Oct
Zone 3 (Izhevsk, Samara)	+04	+05	Last Sun in March	Sat before last Sun in Oct
Zone 4 (Yekaterinburg, Novyy Port, Tyumen, Nizhnevartovsk, Khanty-Mansiysk)	+05	+06	Last Sun in March	Sat before last Sun in Oct
Zone 5 (Omsk, Novosibirsk)	+06	+07	Last Sun in March	Sat before last Sun in Oct
Zone 6 (Krasnoyarsk, Barnaul, Ulan-Ude)	+07	+08	Last Sun in March	Sat before last Sun in Oct
Zone 7 (Irkutsk, Yakutsk, Ust Olsk)	+08	+09	Last Sun in March	Sat before last Sun in Oct

LOCAL TIME

Territory	Standard Time		Daylight Saving Time	
			Begins	Ends
Zone 8 (including Hobart, Melbourne, Sydney and Canberra)	+10	+11	Last Sun in March	Sat before last Sun in Oct
Zone 9 (including Adelaide)	+9½	+10½	Last Sun in March	Sat before last Sun in Oct
Zone 10 (including Perth, Kalgoorlie, Kwinana, Kwinana, Port Hedland)	+8	+9	Last Sun in March	Sat before last Sun in Oct
Australia	+10	*		
Saint Helena	00	*		
Saint Pierre and Miquelon	−03	−02	First Sun in April	Sat before last Sun in Oct
Samoa Is.	−11	*		
San Marino	+01	−02	Last Sun in March	Sat before last Sun in Oct
Santa Cruz I.	+11	*		
Sao Tomé e Principe	00	*		
Sardegna	+01	−02	As for Italy	
Saudi Arabia	+03	*		
Senegal	00	*		
Seychelles	04	*		
Sicilia	+01	−02	As for Italy	
Sierra Leone	00	*		
Singapore	08	*		
Slovakia	+01	−02	Last Sun in March	Sat before last Sun in Oct
Slovenia	+01	−02	Last Sun in March	Sat before last Sun in Oct
Society Is. (Tahiti)	−10	*		
Solomon Is.	11	*		
Somalia	+03	*		
South Africa	+02	*		
South Georgia	−02	*		
South Sandwich Is.	−02	*		
Spain and Islas Baleares	+01	−02	Last Sun in March	Sat before last Sun in Oct
Spanish Possessions in N Africa (Al Hoceima, Ceuta, Islas Chafarinas, Melilla, Peñon de Velez, Islas de Alboran)	01	−01	As for Spain	
Sri Lanka	+05	*		
Sudan	03	*		
Suriname	−03	*		
Svalbard	01	−02	As for Norway	
Swaziland	+02	*		
Sweden	+01	−02	Last Sun in March	Sat before last Sun in Oct
Switzerland	+01	−02	Last Sun in March	Sat before last Sun in Oct
Syria	+02	−03	1 April 2001	30 Sept each year

Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
[illegible]	[illegible]	*		
Taiwan	−08	*		
Tanzania	−10	*		
Thailand	07	*		
Togo	00	*		
Tokelau Is.	+13	*		
Tonga Is.	−13	−14	Last Sun in Nov	3rd before last Sun in Jan
Trinidad, Ilha da	+02	*		
Trinidad and Tobago	−04	*		
Tristan da Cunha	00	*		
Tuamotu Archipelago	−10	*		
Tuvalu	01	*		
Turkey	−02	−03	Last Sun in March	3rd before last Sun in Oct
Turkmenistan	−05	*		
Turks and Caicos Is.	−05	−04	First Sun in Apr	3rd before last Sun in Oct
Tuvalu	−12	*		
Uganda	−03	*		
Ukraine	02	03	Last Sun in Mar	3rd before last Sun in Oct
United Arab Emirates	−04	*		
United Kingdom	11	10	Last Sun in Mar	3rd before last Sun in Oct
United States of America				
(Eastern Area (excluding Indiana))	−05	−04	First Sun in Apr	3rd before last Sun in Oct
(Indiana	−05	*		
(Central Area	−06	−05	First Sun in Apr	3rd before last Sun in Oct
(Mountain Area (excluding Arizona)	−07	−06	First Sun in Apr	3rd before last Sun in Oct
(Arizona	−07	*		
(Pacific Area	−08	−07	First Sun in Apr	3rd before last Sun in Oct
(Alaska (East of 169°30'W)	−09	−08	First Sun in Apr	3rd before last Sun in Oct
(Hawaii (Alaska (West of 169°30'W)	−10	−09	First Sun in Apr	3rd before last Sun in Oct
(Aleutian Is.	−10	*		
Uruguay	−03	*		
Uzbekistan	−05	*		
Vanuatu	−11	*		
Venezuela	−04	*		
Vietnam	−07	*		
Virgin Is.	−04	*		
Wake I.	−12	*		
Wallis, Iles	−12	*		
Western Samoa	−11	*		
Windward Is.				
(St. Lucia, St. Vincent, St. Martin)	−04	*		

LEGAL TIME

Territory	Standard Time	Daylight Saving Time		
			Begins	Ends
(i) Martinique	+04	*		
Yemen	-03	*		
Yugoslavia, Federal Republic of (Montenegro)	-01	-02	Last Sun in March	Sat before last Sun in Oct
Zambia	-02	*		
Zimbabwe	-02	*		

Untuk mempermudah perhitungan dapat digunakan format sebagai berikut:

		Date	Hours	Minute	Second
Speed	ETD	=	.....		
	Steaming time	=	.....		
	Time different	=	.....		
	ETA	=	.....		

S : jarak (Mile)

v : Kecepatan (Knots)

t : Waktu tempuh (Jam)

Contoh : Hitunglah ETA apabila jarak yang ditempuh 2620 NM dengan kecepatan 13.0 knots ETD tanggal 05 januari 2009 jam 12:00 Local time perbedaan waktu adalah + 02 H 00 M

Jawab :

2620 NM : 13.0 knots = 201.5384615 jam : 24 jam = 8,397435 hari

(-) 8

0,397435 hari x 24 jam

(-)

9,53846 jam

(-) 9

0,53846 jam x 60 menit

(-)

32,30769 menit

(-) 32

0,30769 menit x 60 detik

(-)

18, 46153 detik 18

Speed = 13. 0 knots

		Date	Hours	Minute	Second
ETD	=	12	12	00	00
Steaming time	=	8	9	32	18
Time different	=		(+) 02	00	00
ETA	=	20	23	32	18

Jadi ETA 20 Januari jam 23:32:18

PERHITUNGAN HALUAN DAN JAUH

DEFINISI:

Tempat tolak	=	tempat dari mana kapal berlayar
Lintang tolak	=	lintang dari tempat tolak (lo)
Bujur tolak	=	bujur dari tempat tolak (B0)
Tempat tiba	=	tempat di mana kapal tiba (lintang/bujur tiba)
Lintang tiba	=	lintang dari tempat tiba (l1)
Bujur tiba	=	bujur dari tempat tiba (B1)
Lintang menengah	=	lintang pertengahan antara lintang tolak dan tiba (lm)

$$lm = \frac{l_o + l_1}{2}$$

Perubahan lintang = busur derajat antara jajar-jajar yang melalui tempat tolak dan tempat tiba (Δl)

- Lintang tolak dan lintang tiba senama

$$\Delta l = l_1 - l_o \text{ atau } \Delta l = l_o - l_1$$

- Lintang tolak dan lintang tiba tak senama

$$\Delta l = l_1 + l_o$$

Δl utara apabila kapal berlayar menuju utara dan Δl selatan apabila kapal berlayar menuju selatan

Perubahan bujur = bujur khatulistiwa antara derajat-derajat yang melalui tempat tolak dan tempat tiba (ΔB)

- Bujur tolak dan bujur tiba senama

$$\Delta B = B_1 - B_o \text{ atau } \Delta B = B_o - B_1$$

- Bujur tolak dan bujur tiba tak senama

$$\Delta B = B_1 + B_o$$

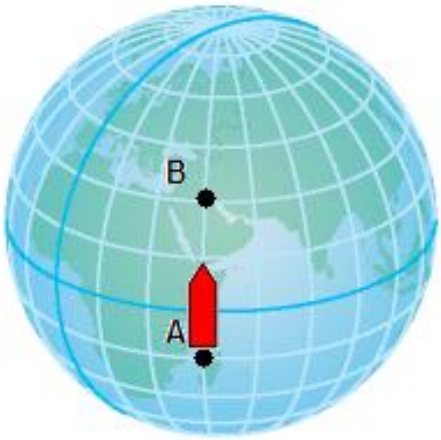
ΔB barat apabila kapal berlayar menuju ke barat dan ΔB timur apabila kapal berlayar menuju ke timur

Haluan Utara dan Selatan

Apabila kapal berlayar pada haluan Utara atau Selatan artinya kapal berlayar sepanjang derajat yang sama; jadi bujurnya tidak berubah, tetapi hanya berubah dalam lintangnya.

Pada haluan U dan S:

Δ l = jauh	Δ B = nol



Haluan timur dan barat

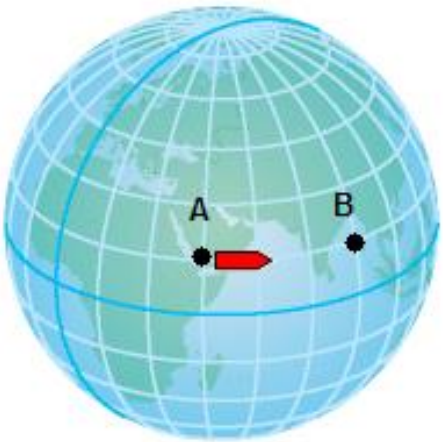
Pada haluan T dan B kapal berlayar mengikuti suatu jajar, maka di sini lintangnya tidak berubah, tetapi yang berubah hanya bujurnya.

Jadi pada haluan T dan B;

∆ lintang = nol	∆ bu = simp sec lintang

Hanya pada khatulistiwa, kita dapati:

∆ Bu = simp



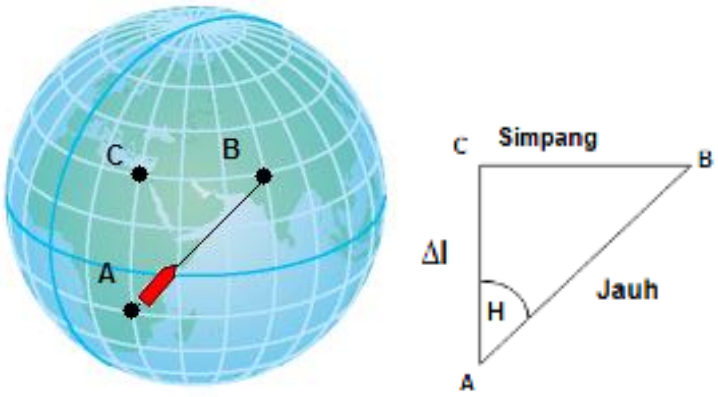
Jika kapal berlayar sepanjang jajar dari A ke B, maka AB adalah jauhnya dan di sini jauh disebut simpang

Haluan Serong

Pada haluan serong kapal tidak lagi berlayar mengikuti derajat ataupun jajar

Dalam hal ini maka lintang dan bujurnya mengalami perubahan dan kita sebut sekarang; kapal berlayar mengikuti loksodrom.

Loksodrom = garis lurus di peta laut yang membentuk sudut-sudut yang sama dengan semua derajat.



Dari gambar di atas diperoleh rumusan sebagai berikut:

$$\text{Tg H} = \frac{\text{Simpang}}{\Delta\text{l}}$$

$$\Delta\text{l} = \text{Jauh Cos H}$$

$$\text{Jauh} = \Delta\text{l Sec H}$$

$$\text{Simpang} = \text{Jauh Sin H}$$

Sedangkan untuk mencari Perubahan bujur dapat menggunakan rumusan:

Δ bu = simp sec lintang

Δ bu = Δ Lintang bertumbuh Tg H

Lintang bertumbuh = (10800/π) X ln (Sec lintang + Tg lintang)

Perhitungannya dapat dilakukan dengan:

1. dengan kalkulator,
2. daftar ilmu pelayaran.

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BIOGRAFI PENULIS

Iskandar lahir di Tanjung Karang, 21 Juni 1973. Penulis lulus sekolah dasar di SDN 1 Penengahan pada tahun 1987. Setelah itu, pada tahun 1990 penulis menyelesaikan sekolah menengah pertama di SMPN 1 Kedaton. Kemudian, penulis lulus sekolah menengah atas di SMA Negeri 3 Tanjung Karang pada tahun 1993. Pada tahun yang sama, penulis melanjutkan pendidikan tinggi di Fakultas Ekonomi Universitas Lampung. Pada tahun 1994, penulis melanjutkan pendidikan tinggi di AIP (Akademi Ilmu Pelayaran) BPLP Ujung Pandang dan lulus pada tahun 1998. Pada tahun yang sama, menjadi ASN (Aparatur Sipil Negara) di PIP (Politeknik Ilmu Pelayaran) Makassar. Kemudian, penulis menyelesaikan pendidikan Magister Teknik Kelautan di Institut Teknologi Sepuluh Nopember pada tahun 2010. Pada tahun 2015, penulis menyelesaikan pendidikan doktor bidang Manajemen Pendidikan di Universitas Negeri Surabaya. Selain itu, sebagai pelaut penulis menyelesaikan pendidikan Ahli Nautika Tingkat II pada tahun 2005 dan menyelesaikan Master Marine pada tahun 2018. Pada tahun 2001, penulis dipindahtugaskan di BP2IP yang berganti menjadi Politeknik Pelayaran Surabaya. Selanjutnya, pada tanggal 3 September 2019 mendapat tugas di Politeknik Pelayaran Sorong hingga sekarang.

Sebagai dosen Program Studi Nautika, penulis telah mengikuti beberapa pendidikan dan pelatihan, seperti Instructor Upgrading Training bidang Navigasi United State Merchant Marine Academy (2003), RADAR N ARPA Training Course for Instructor (Jepang), Training Course for Instructor based on IMO M.C. (International Maritime Organization Model Course) 6.09, Training of Train the Simulator Trainer and Assessor IMO M.C. 6.10, Training Course for Assessment, Examination and Certification IMO M.C. 3.12. Selain itu, penulis memiliki pengalaman berlayar sebagai perwira di kapal niaga selama empat tahun. Saat ini, penulis mengampu mata kuliah Ilmu Pelayaran pada Program D-3, Diklat Pelaut Pembentukan dan Peningkatan. Diharapkan dengan kehadiran buku ini dapat menambah referensi bagi pembaca tentang ilmu pelayaran datar dan tentunya menambah wawasan bagi taruna/i untuk mempelajari ilmu kepelautan.

Buku Ajar

ILMU PELAYARAN DATAR

Ilmu pelayaran datar adalah suatu cabang ilmu navigasi yang mempelajari bagaimana merencanakan, membawa, dan menentukan posisi kapal dengan bantuan benda-benda bumiawi untuk mendapatkan posisi kapal secara tepat dan cepat. Buku ini membahas tentang definisi lingkaran-lingkaran bumi, proyeksi peta dan peta laut, teknik penentuan posisi dengan menggunakan baringan benda darat dan peralatan menjangka peta, perhitungan haluan dan jauh, dan publikasi-publikasi yang dibutuhkan oleh para navigator dalam bernavigasi di atas kapal.

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