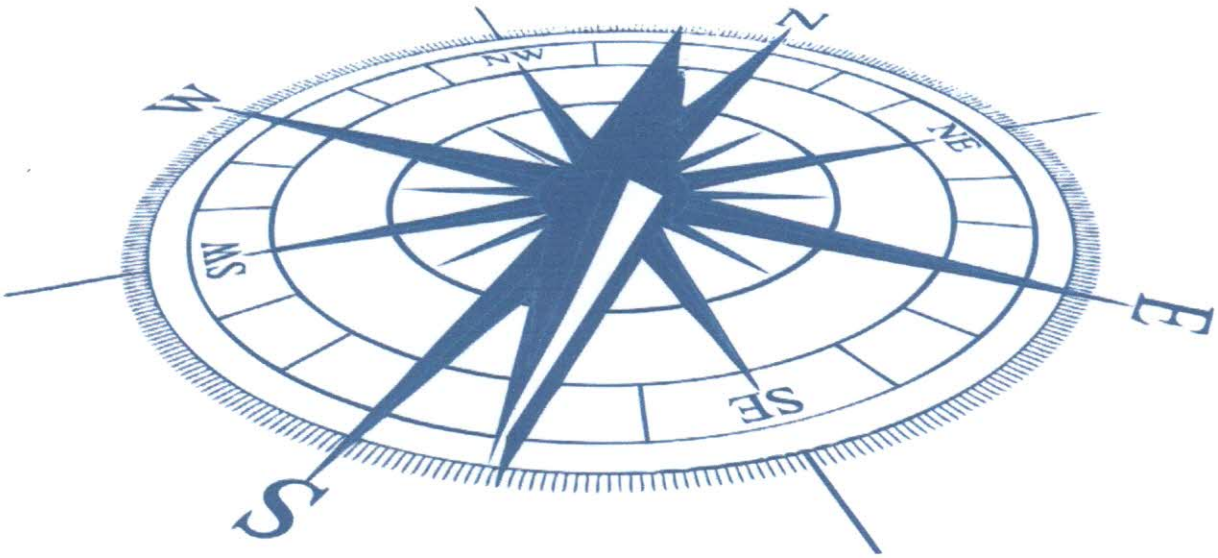
Hochsee.Schule

Gezeiten-Theorie



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4.1 INTRODUCTION

This chapter provides background information on the tidal data in Chapter 9 of this Almanac, where times and heights of HW and LW are shown for Standard Ports, and time and height differences for their associated Secondary Ports. Tides are predicted for average meteorological conditions. In the UK the average pressure is about 1013mb. A difference of 34mb can cause the tide to rise (lower pressure) or fall (higher pressure) by about 0·3m. See 4.8 for more details.

4.1.1 Admiralty Tide Tables (ATT) are the source for all tidal data in this Almanac; they are published in 4 volumes:

- Vol 1 (NP201) UK and Ireland (including Channel ports from Hoek van Holland to Brest);
- Vol 2 (NP202) Europe (excluding UK, Ireland and Channel ports), Mediterranean and the Atlantic;
- Vol 3 (NP203) Indian Ocean and South China Sea;
- Vol 4 (NP204) Pacific Ocean.

4.1.2 Spanish Secondary Ports referenced to Lisboa

In Areas 23 and 25, some Spanish secondary ports have Lisboa as Standard Port. Time differences for these ports, when applied to the printed times of HW and LW for Lisboa (UT), automatically give HW and LW times in the Zone Time for Spain (ie UT –1), *not* Portugal (UT). No other corrections are required, except for DST when applicable.

4.2 DEFINITIONS

Chart Datum (CD)
CD is the reference level from which heights of tide are predicted and charted depths are measured. In the UK it normally approximates to LAT, and the tide will not frequently fall below it. The actual depth of water in any particular position is the charted depth plus the height of tide.

Lowest Astronomical Tide (LAT)
LAT is the lowest level which can be predicted under average meteorological, and any combination of astronomical, conditions. This level will not be reached every year. Storm surges can cause even lower levels to be reached.

Highest Astronomical Tide (HAT)
HAT is the highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions, except storm surges. It is the level above which vertical clearances under bridges and power lines are measured; see 4.5.

Ordnance Datum (Newlyn)
Ordnance Datum (Newlyn) is the datum of the land levelling system on mainland England, Scotland and Wales, and to which all features on UK land maps are referred. The difference between Ordnance Datum (Newlyn) and CD is shown at the foot of each page of tide tables in this Almanac. Differences between CD and foreign land levelling datums are similarly quoted.

Charted depth
Charted depths are printed on charts in metres and decimetres (0·1m) and show the depth of water below CD. (Not to be confused with a sounding which is the actual depth of water (charted depth + height of tide) in a particular position.)

Drying height
A drying height is the height above CD of any feature which at times is covered by water. The figures, in metres and decimetres, are underlined on the chart. The depth of water over a drying feature is the height of tide minus the drying height. If the result is negative, then the feature is uncovered at that time.

Vertical clearances under bridges and power lines
These are measured above HAT. Some older charts may still show clearances above MHWS; see 4.5.

Elevation of lights
The charted height of a light (its elevation) is measured above MHWS.

Height of tide
The height of the tide is the vertical distance of the sea level above (or very occasionally below) CD. Predicted heights are given in metres and decimetres.

Rise/Fall of tide
The Rise of the tide is the amount the tide has risen since the earlier Low Water. The Fall of a tide is the amount the tide has fallen since the last High Water.

Duration
Duration is the time between LW and the next HW, normally slightly more than six hours. It can be used to find the approximate time of LW when only the time of HW is known.

Interval
The interval is a period of time quoted in hours and minutes before (–) or after (+) HW. Intervals are printed in hourly increments (–6hrs to +6hrs) along the bottom of each tidal curve diagram in Chapter 9.

Spring tides
Spring tides occur roughly every 16 days, near to Full ○ and New ● Moon, when the tide-raising forces of Sun and Moon are at a maximum. See 4.9 for phases of the Moon.

Neap tides
Neaps occur roughly every 16 days, near the Moon's first ◐ and last ◑ quarters, when the tide-raising forces of Sun and Moon are at a minimum. See 4.9 for phases of the Moon.

Mean High Water and Low Water Springs/Neaps
MHWS and MHWN are the means of predicted HW heights of Sp or Np tides over a period of 18·6 years. Similarly, MLWS and MLWN are the means of LW heights for Sp and Np tides respectively. Mean tide level (MTL) is the mean of the above values.

Mean Sea Level (MSL or ML)
This is the average level of the sea's surface over a long period, preferably 18·6 years.

Range
The range of a tide is the difference between the heights of successive HWs and LWs. Spring range is the difference between MHWS and MLWS, and Neap range is the difference between MHWN and MLWN.

Standard Ports have tidal characteristics observed over a long period and are suitable as a reference for secondary ports on the adjacent coasts.

Secondary Ports have similar tidal characteristics to those of their Standard Port. Time and height differences are applied to the Standard Port predictions. 'Secondary' does not imply lesser importance.

Tidal Coefficients indicate the range of a tide. Daily values are listed and explained in 9.0.9.

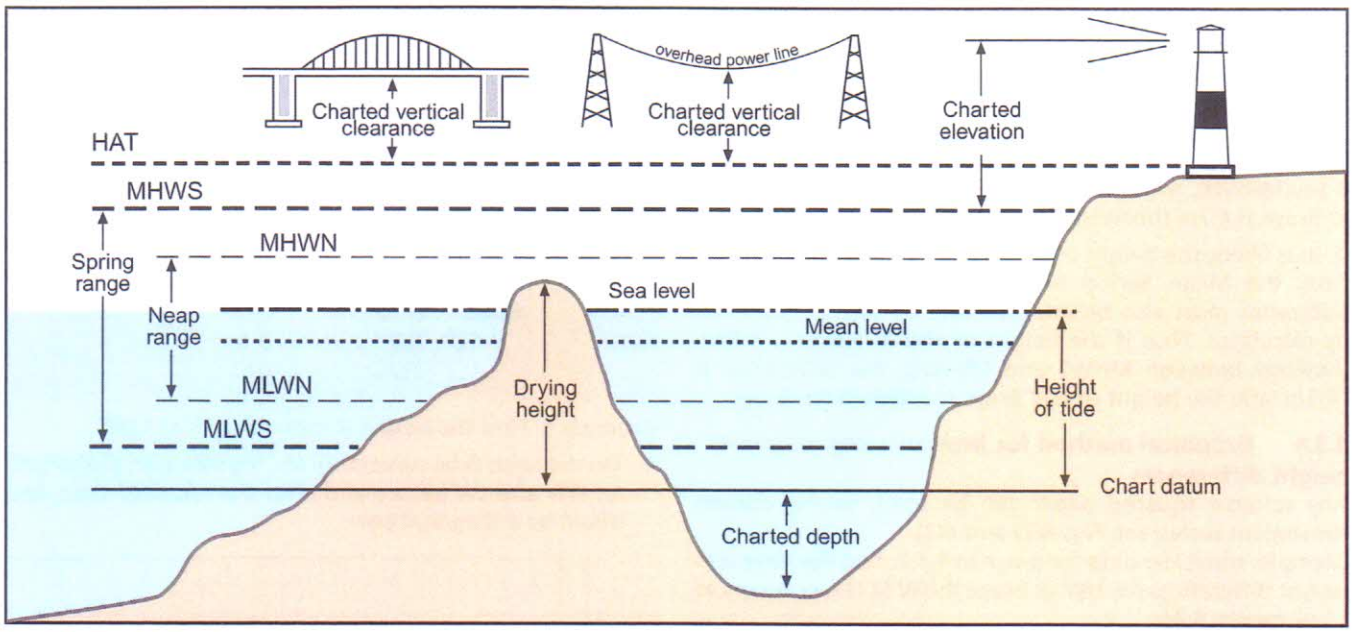

Fig 4(1) Tidal definitions

4.3 CALCULATING TIMES AND HEIGHTS OF HIGH AND LOW WATER

4.3.1 Standard Ports

The Standard Ports for which daily predictions are given in this Almanac are listed below by geographic Areas. Not all ports shown in the ATTs are included, but adjustments have been made to Secondary Port differences where necessary.

1 Falmouth, Plymouth, Dartmouth, Portland.
2 Poole, Southampton, Portsmouth, Chichester.
3 Shoreham, Dover.
4 Margate, Sheerness, London Bridge, Walton-on-the-Naze, Harwich, Lowestoft.
5 Immingham, R Tees, Tyne (North Shields).
6 Leith, Aberdeen.
7 Invergordon, Wick, Lerwick.
8 Stornoway, Ullapool, Oban.
9 Greenock.
10 Liverpool, Holyhead.
11 Milford Haven, Bristol (Avonmouth).
12 Dublin, Cobh, Tarbert Island.
13 Galway, River Foyle, Galway.
14 Esbjerg.
15 Helgoland, Cuxhaven and Wilhelmshaven.
16 Hoek van Holland, Vlissingen, Zeebrugge.
17 Dunkerque, Dieppe, Le Havre, Cherbourg.
18 St Malo.
19 St Peter Port, St Helier.
20 Brest.
22 Pointe de Grave.
23 La Coruña.
24 Lisboa.
25 Gibraltar.
26 Ponta Delgada, Casablanca.

Predicted times and heights of HW and LW are tabulated for each Standard Port. Note that these are only predictions and take no account of the effects of wind and barometric pressure (see 4.8). See 1.5 for Zone times and Daylight Saving Time (DST).

4.3.2 Secondary Ports – times of HW and LW

Each Secondary Port listed in Chapter 9 has a data block for calculating times of HW and LW. The following example is for Braye (Alderney):

TIDES –0400 Dover; ML 3·5; Duration 0545
Standard Port ST HELIER (⟶)

Times				Height (metres)			
High Water		Low Water		MHWS	MHWN	MLWN	MLWS
0300	0900	0200	0900	11·0	8·1	4·0	1·4
1500	2100	1400	2100				
Differences BRAYE							
+0050	+0040	+0025	+0105	–4·8	–3·4	–1·5	–0·5

In this example –0400 Dover means that, on average, HW Braye is 4 hours 00 minutes before HW Dover (the Range and times of HW Dover are in Area 3 and on the bookmark).

ML (or MSL) is defined in 4.2.

Duration 0545 means that LW Braye occurs 5 hours and 45 minutes before the next HW.

The arrow (⟶) after the Standard Port's name points to where the tide tables are in the book.

The most accurate method of prediction uses Standard Port times and Secondary Port time differences as in the block. When HW at St Helier occurs at 0300 and 1500, the difference is +0050, and thus HW at Braye occurs at 0350 and 1550. When HW at St Helier occurs at 0900 and 2100, the difference is +0040, and HW at Braye occurs at 0940 and 2140.

If, as will usually be the case, HW St Helier occurs at some other time, then the difference for Braye must be found by interpolation, either by eye, by the graphical method or by calculator.

So when HW St Helier occurs at 1200 (midway between 0900 and 1500), the difference is +0045 (midway between +0040 and +0050), and therefore HW Braye is 1245.

The same method is used for calculating the times of LW. Times thus obtained are in the Secondary Port's Zone Time. For calculating heights of HW and LW see 4.3.3.