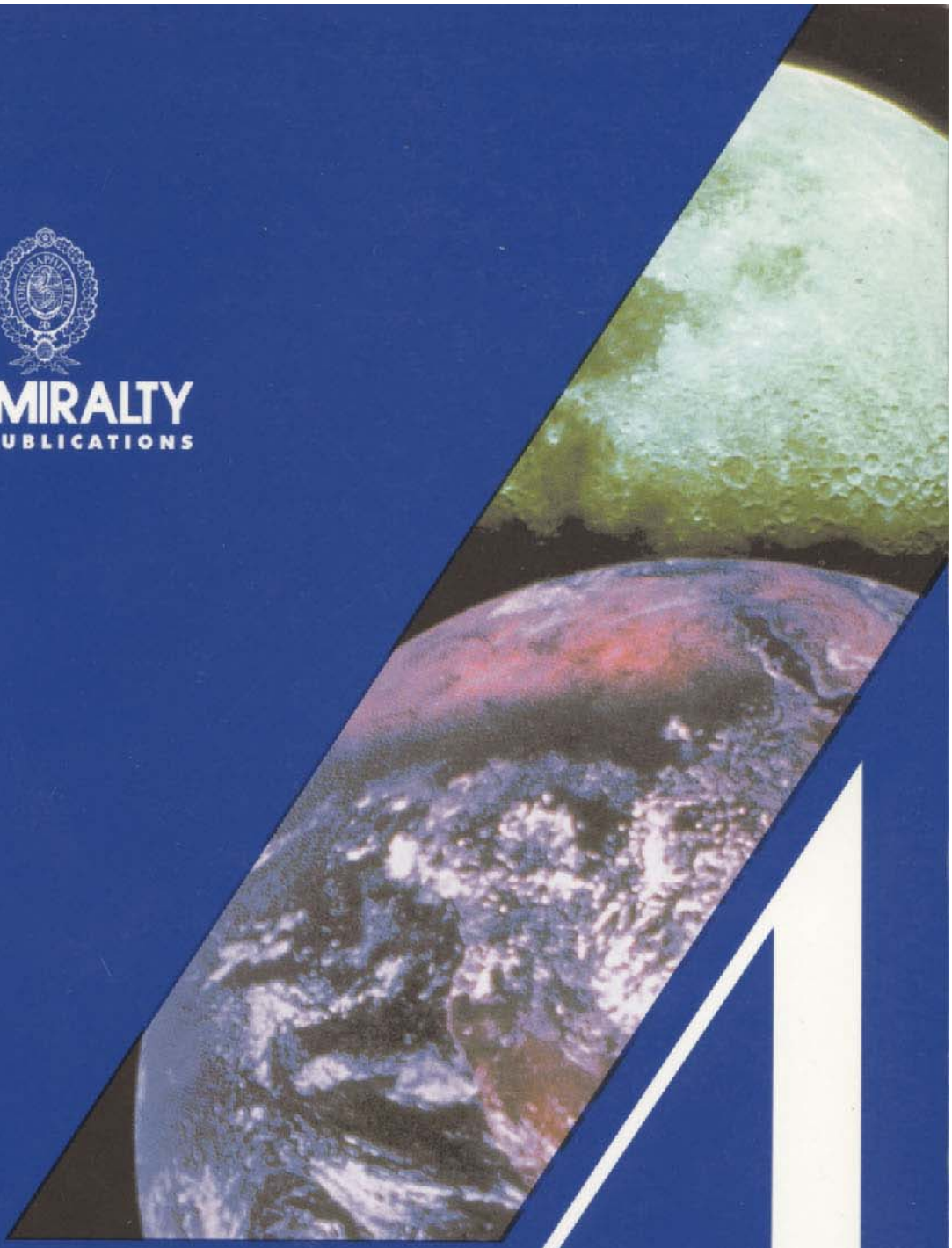
ADMIRALTY
CHARTS AND PUBLICATIONS



ADMIRALTY TIDE TABLES

EUROPE (excluding United Kingdom and Ireland), MEDITERRANEAN SEA AND ATLANTIC OCEAN

VOL 2

NP 202-00

INTRODUCTION

Methods of Prediction

(1) *Standard Ports where UK holds authority for tidal predictions.* Wherever possible predictions are based on continuous observation of the tide over a period of at least one year; in such cases the average changes in mean sea-level due to changes in meteorological conditions for the year in question are calculated and are included in the predictions. These changes do not, however, repeat themselves exactly from year to year; it has been found advisable, therefore, to observe and analyse changes in mean sea-level for a period of not less than three years and in the case of modern analyses this practice has been increasingly adopted.

As predictions are given for average meteorological conditions it follows that when conditions are not average the actual tides may differ from those predicted. Under extreme conditions these differences can be very large. The effects of varying meteorological conditions are discussed in subsequent paragraphs.

(2) *Standard Ports where UK is not the predicting authority.* Predictions for these ports are obtained by mutual international exchange from the national authorities responsible for the predictions. The method of prediction is not always known but is usually of a standard equal to that outlined above, and it can be assumed that, under average weather conditions, the predictions will be adequate for all normal navigational requirements. The legal authority for tidal predictions at these ports, including Secondary Port data, rests with the appropriate national authority concerned.

(3) *Choice of Standard Ports for use with Secondary Ports.* In order that the average time and height differences given in Part II may be as reliable as possible, it is necessary that the Standard Port chosen should have tidal characteristics which are similar to those of the Secondary Port. In some cases there is no local Standard Port with similar characteristics and it is necessary to choose a Standard Port which may be distant from the Secondary Port. In still other cases it is not possible to refer the tides to any published Standard Port, and in such cases prediction should only be carried out using harmonic constants and the Simplified Harmonic Method of Tidal Prediction.

(4) *Secondary Ports.* Predictions for Secondary Ports are made by applying time and height differences to predictions at a selected Standard Port or by using the harmonic constants and the Simplified Harmonic Method of Tidal Prediction.

The data on which the differences are based are extremely variable in quality. Modern revisions are usually based on observations over a period of a month or more; some data are based on foreign tide tables, and some other data are based on scattered observations of high and low water or a few hourly heights of tide, or again on estimates made at the time of the original survey. Harmonic constants are usually based on observations during a month or more but sometimes for 15 days only. Constants based on less data are annotated as approximate in the tide tables. The amplitudes of the constants are given to two decimal places of a metre except when they have been inferred: in these cases normally only one decimal place has been used.

Tidal Levels

A list of tidal levels for Standard Ports is given in Table V and the levels thus given are defined in the notes attached to that table. These levels are also used in Part II, and by application of the height differences similar levels can be obtained for the Secondary Ports.

Tidal levels are referred to Chart Datum of the largest scale Admiralty chart of the place.

Tidal levels for Standard Ports are subject to re-examination from time to time; due to changes in mean sea-level they do not necessarily remain constant.

Meteorological Effects on Tides

Meteorological conditions which differ from the average will cause corresponding differences between the predicted and the actual tide. Variations in tidal heights are mainly caused by strong or prolonged winds and by unusually high or low barometric pressure. Differences between predicted and actual times of high and low water are caused mainly by wind. The two effects are discussed separately below in the following paragraphs.

Barometric pressure. Tidal predictions are computed for average barometric pressure. A difference from the average of 34 millibars can cause a difference in height of about 0.3m. A low barometer will tend to raise sea level and a high barometer will tend to depress it. The water level does not, however, adjust itself immediately to a change of pressure and it responds moreover to the average change in pressure over a considerable area. The average barometric pressure for certain places is given in Sailing Directions and information is also given in some instances concerning the changes in level which can be expected under different conditions. Changes in level due to barometric pressure seldom exceed 0.3m but, when mean sea level is raised or lowered by strong winds or by storm surges, this effect can be important.

The effect of wind. The effect of wind on sea level – and therefore on tidal heights and times – is considerably variable and depends on the topography of the area in question. In general it can be said that wind will raise sea level in the direction towards which it is blowing. A strong wind blowing straight onshore will pile up the water and cause high waters to be higher than predicted, while winds blowing off the land will have the reverse effect. Winds blowing along a coast tend to set up long waves which travel along the coast, raising sea level where the crest of the wave appears and lowering sea level in the trough. These waves, are known as "storm surges".

Negative Surges

In a manner somewhat similar to the Storm Surges described above, the level of the sea can also be lower than the predicted level. Again the cause is usually meteorological. This effect is of great importance to very large vessels which may be navigating with small under-keel clearances.

Datums of Tidal Predictions

The datum for tidal predictions must be the same as the datum for soundings since the total depth of water is found by the addition of the charted depth to the height of the tide. The levels at which datums have been established at Standard Ports, however, vary widely and the datums do not conform to any uniform tidal level. Modern practice is to establish datum at or near the level of Lowest Astronomical Tide (LAT) but reference to Table V will show that many datums have been established considerably above this level and a few established below it. These datums are being gradually adjusted as opportunity offers so as to approximate to LAT. It should be emphasised that the level of LAT will be reached occasionally in the normal course of events and that lower levels than this may be reached with particular meteorological conditions.

For areas where the Hydrographer is the surveying authority details of the Bench Marks used, and the connections between them and Chart Datum, are available on application to the UK Hydrographic Office, Taunton.

Shallow Water Corrections

Shallow water effects can be included in the Simplified Harmonic Method of Tidal Prediction. At ports where the shallow water effect is noticeable and can reasonably be represented by corrections, data for use in the Simplified Harmonic Method of Tidal Prediction is included in Part III of the tables and in Table VI.

Seasonal Changes in Mean Level

The monthly variations in mean sea level do not necessarily repeat themselves exactly from year to year; hence the values given may be found to differ from observed values by as much as 0.1m, even where the values given are based on several years' observations. In consequence, where the maximum variation of mean sea level above and below the mean value is less than about 0.1m, the changes are listed as "negligible". In practice, mean sea level data are largely based on a relatively small number of observations for one year only and the figures for many places have been obtained by interpolation.

Variations in mean sea level over short periods may be considerably greater than the values given; mean sea level may remain as much as 0.3m above or below the average for as long as a month.

Seasonal Variations in Harmonic Constants

Variations have been detected in the harmonic constants of some ports. These can be included in the Simplified Harmonic Method of Tidal Prediction by the use of special values for the period of prediction. For those ports where the data is available and the variations are large enough, monthly values of the constants are given in the tables of Seasonal Changes in Part III.

Zone Time and Time Differences

Universal Time (UT) is the mean solar time of the prime meridian obtained from direct astronomical observation and corrected for the effects of small movements of the Earth relative to the axis of rotation. Greenwich Mean Time (GMT) is based on the hour angle of the mean sun and for all tidal predictions may be taken as the same as UT. The term UT(GMT) is used throughout this volume.

There are twenty four Time Zones in the world each of which covers 15° of longitude. The "zero" time zone, in which the time kept corresponds to Greenwich Mean Time, is centred on the prime meridian and extends from 7½°W. to 7½°E. The other zones, in which the time kept differs from GMT by an integral number of hours, are sequentially numbered and have either a negative prefix if east of Greenwich or a positive prefix if west of Greenwich. Within Zone 1200 a positive or negative prefix may be used, dependent on location relative to the International Date Line. Where Standard Time in the vicinity of the Date Line is described as – 1300, it signifies that the clock time is that of Zone +1100 but the date is the same as that of zones to the west of the Date Line.

To convert Zone Time to GMT, the number of hours as given by the zone number is added to, or subtracted from, the zone time, e.g. in Zone –0400 the time kept is 4 hours in advance of GMT and so at 2000 local time it is 1600 GMT, i.e. to obtain GMT apply the Zone number and its sign.

On land, a uniform time is adopted for convenience throughout a given country even though its boundaries may not wholly lie within a time zone. The Standard Time or Legal Time is in most cases that of the zone in which the country mainly lies. Countries having a longitudinal extent greater than one time zone may adopt more than one Standard Time, e.g. Eastern Standard Time, Pacific Standard Time in the United States.

Daylight Saving Time (Summer Time), introduced to prolong the hours of daylight in the evening, may in certain countries be the Legal Time for a part of the year. The Standard Time of the zone to the eastward is normally adopted during such periods, e.g. British Summer Time is Zone –0100. In certain countries this advanced time has been made Standard Time throughout the year. *In Admiralty Tide Tables no account is taken of Daylight Saving Time unless it has been adopted throughout the year.*

The times of Standard Port predictions are given in the normal Standard Time kept by the port. When using the tables it should be verified that this is the same as the time *which is actually being kept.* Changes in zone times are not always reported in sufficient time for inclusion in the latest edition of the tide tables. For the latest information consult Admiralty List of Radio Signals Vol.2 (NP 282) corrected by Section VI of the weekly edition of Admiralty Notices to Mariners.

Time Differences for Secondary Ports, when applied to the printed times of high and low water at Standard Ports, will give times of high and low water at the Secondary Port *in the zone time tabulated for the Secondary Port.* Any change in zone time at the Standard Port, or any difference between zone times at Standard and Secondary Ports has no significance; *the predicted values tabulated for the Standard Port must be used unaltered.* Only changes in zone time at the Secondary Port, where different from those tabulated, may be corrected for. It should be verified that the zone time tabulated for the Secondary Port is the same as that which is being kept.

Height Differences

For semi-diurnal ports, heights obtained by applying the height differences are those for the Mean Spring and Neap levels.

For the diurnal ports, heights obtained by applying the height differences are those for Mean Higher and Mean Lower, High and Low Waters.

Tidal Levels at Standard Ports

For the majority of Standard Ports tidal levels are calculated empirically from one or more year's predictions, adjusted to give average levels over a 19-yearly period. The remainder are calculated from formulae based on the four major harmonic constants.

Criteria for Diurnal and Semi-Diurnal Tides

All tides are composed of both semi-diurnal and diurnal components, the latter introducing inequality in successive heights of high or low water and also in the times. When this "diurnal inequality" reaches a certain limit it becomes more informative to list the average heights of the higher and lower high and low waters rather than the average spring and neap values. The division between diurnal and semi-diurnal tides is somewhat arbitrary and is determined by the following formulae:

(1) When π(H of S_2) is greater than 2 (H of K_1+H of O_1), the tide is considered to be "semi-diurnal".

(2) When π(H of S_2) is less than 2(H of K_1+H of O_1), the tide is considered to be "diurnal".

In some areas of the world those formulae are unsatisfactory and a more detailed study of the harmonic constants is necessary.

Seismic Sea Waves

Submarine earthquakes set up long waves which travel across the ocean at very great speeds, often reaching a speed of 400 knots in the Pacific. On entering shallow water these waves increase in height and often reach destructive proportions.

Tidal Streams and Currents

A distinction is drawn between tidal streams, which are astronomical in origin, and currents, which are not dependent on astronomical conditions and which are partly of meteorological origin; in practice, of course, the navigator experiences a combination of tidal stream and current.

Tidal streams can be predicted for any period in the future but currents must be assessed from information published on special charts and in the Admiralty Sailing Directions.

When the tidal streams are semi-diurnal in character they can be predicted by reference to a suitable Standard Port by tables printed on the published chart. In areas where the diurnal inequality of the tidal streams is large this procedure is not possible. In certain important parts of these areas daily predictions are given in Part Ia.

Harmonic Constants for tidal streams are included in Part IIIa and instructions for their use with the Simplified Harmonic Method of Tidal Prediction are on pages xi and 427.

Supplementary Tables

Table I.	- Conversion Table - metres to feet.
Table II.	- Multiplication table.
Table III	- is given only in ATT Volume 1.
Table IV	- is given only in ATT Volumes 1 and 2.
Table V.	- Standard Ports: Tidal Levels and Authorities for observations, analyses and predictions.
Table VI.	- Fortnightly Shallow Water Corrections.
Table VII.	- Table of Tidal Angles and Factors, which is the astronomical data for each day of the year (at 0000) used in the Simplified Harmonic Method of Tidal Prediction and in the short period analysis of 24-hourly heights or rates.
Table VIII.	- Table of weekly values of Orbital Elements required for use in the derivation of the Astronomical Arguments (E_o, u and f) for all constants.

INSTRUCTIONS FOR THE USE OF TABLES

TO FIND THE TIMES AND HEIGHTS OF HIGH AND LOW WATER

Standard Ports

The times and heights of high and low water are tabulated for every day of the year. The zone time used for the predicted times is usually the standard time for the area and is given at the top of each page. Care should be taken to ensure that this is the actual time zone in use on that date, the predicted time being corrected if necessary. Special care is needed for those ports whose time is changed during the year.

The heights are shown in metres referred to the chart datum of the port concerned.

Secondary Ports

The times of high and low water are obtained by applying the time differences tabulated in Part II to the daily prediction for the most suitable (not necessarily the closest) Standard Port. The Standard Port to be used is that which appears in **bold type** at the head of the subsection in Part II. Other Standard Ports may occur within a subsection in their correct geographical sequence but full data for these are not shown. The times obtained by applying these corrections are in the time zone shown next above the Secondary Port irrespective of the zone time used for the Standard Port predictions.

The heights of high and low water are obtained by applying the height differences tabulated in Part II to the daily predictions for the same Standard Port as is used for the times. For places where the tide is mainly semi-diurnal in character these differences are tabulated for the Mean Spring and Mean Neap levels at the Standard Port. Where the diurnal inequality is large, the tabulations are made for Mean Higher and Mean Lower, High and Low Water. In either case, unless there is a statement to the contrary in Part II it may be assumed that the variation is linear and differences for heights other than those tabulated may be obtained by interpolation or extrapolation. It MUST be noted that the predictions for Standard Ports include the Seasonal Variations for the Standard Port which may be different from those for the Secondary Port. The first step is therefore to SUBTRACT algebraically the seasonal variation for the Standard Port from the predicted height obtained from Part I. The next step is to apply the height difference corresponding to this corrected height at the Standard Port, interpolating or extrapolating as necessary. The final step is to ADD algebraically the seasonal variation for the Secondary Port. In both cases great care must be taken to ensure that the signs of the seasonal variations are correctly applied. Where no seasonal variations are given they are less than 0.1m and can be ignored. Allowance has been made in the preparation of the tables for any difference in the level of chart datum between the Standard and Secondary Port and the resulting heights are referred to chart datum at the Secondary Port concerned.

For certain ports the time differences are replaced by "*p*" indicating that no suitable Standard Port is available and predictions can only be made by using the Simplified Harmonic Method of Tidal Prediction. Height differences are included for these ports to enable tidal levels to be obtained but they should not be used for obtaining daily predictions.

TO FIND THE HEIGHT OF TIDE AT TIMES BETWEEN HIGH AND LOW WATER

The Standard Curves on page xvii show the factor of the range attained at a given time interval relative to that of HW for durations between 5 and 7 hours. They are based on the assumption that the tide approximates to a cosine curve.

These curves will give acceptable results, using interpolation between adjacent curves for the actual duration where necessary, provided that *both* the following criteria are satisfied:

(a) The duration of rise or fall must lie within the scope of the graphs i.e. between 5 and 7 hours.

(b) There must be no shallow water correction (f_4, F_4, f_6 and F_6) shown in Part III.

If either of these criteria is not met, intermediate heights must be predicted by the use of the Simplified Harmonic Method of Tidal Prediction.

Owing to the relatively small number of constituents used, the Simplified Harmonic Method of Tidal Prediction may produce predictions, for a Standard Port, which differ from those obtained in Part I. Times and heights from Part I should also be plotted on a graph of the results of calculations by the Simplified Harmonic Method of Tidal Prediction and this curve then adjusted to pass through the Part I predictions.

See page xviii for instructions on the use of calculators and the Simplified Harmonic Method of Tidal Predictions and forms A and B at the back of the book.

MEAN LEVELS

Table V gives the values of LAT, MSL, and HAT for the Standard Ports. In addition values of MLWS, MLWN, MHWN amd MHWS are shown for those ports where the tide is mainly semi-diurnal. Where there is large diurnal inequality the values of MLLW, MHLW, MLHW and MHHW are shown. The equivalent levels may be found for Secondary Ports by the direct application of the height differences tabulated in Part II while values for LAT and HAT may be found by linear extrapolation.

OFFSHORE AREAS AND PLACES BETWEEN SECONDARY PORTS

Tidal predictions for offshore areas and stretches of coastline between Secondary Ports should be obtained by the use of Co-Tidal Charts. For details of Co-Tidal Charts available see page 456 and the Catalogue of Admiralty Charts. Full instructions for their use are contained on the body of the charts.

DETAILED INSTRUCTIONS AND EXAMPLES

The Tidal Prediction Form is a convenient form for the majority of time and height calculations. The examples have been carried out on these forms and the instructions refer to the boxes. Copies of the form are found in the back of Admiralty Tide Tables.

THE SIMPLIFIED HARMONIC METHOD OF TIDAL PREDICTION

This method of prediction uses the Harmonic Constants published in Part III of these Tables and the Tidal Angles and Factors from Table VII. The application of Table VII to the four main constituents revises them for the date concerned and modifies them to allow for the effects of a number of related constituents. When the Shallow Water Corrections, Seasonal Corrections and Table VI are also used the prediction obtained is equivalent to one using 36 harmonic constituents. Of course, for many ports not all the above corrections are needed and for them only the necessary data are published. Instructions for use with programmable computers or calculators, with a worked example, are included on pages xviii to xx.

This method may also be used in the prediction of tidal streams, and harmonic constants are included in Part IIIa for this purpose. The constants are used in exactly the same way as for tidal predictions with the values of "H" given in knots instead of metres. For those positions where appropriate the tidal stream is assumed to run in two opposing directions, and the results obtained from the Simplified Harmonic Method give hourly rates in the positive or negative direction. The compass courses given for each direction in Part IIIa give the directions *towards which* the stream is predicted to run. For those positions where the stream is rotary, constants are given for both the north and east components. When hourly values of the stream for each component have been found, it is necessary to combine them to obtain the rates and directions towards which the stream is running at each time.

Example I: To find the times and heights of high and low waters at "Secondary Port" (semi-diurnal tides) on 16th January, using the following extracts.

Extract from ATT Part II.

PLACE	POSITION		TIME DIFFERENCES		HEIGHT DIFFERENCES (IN METRES)			
STANDARD PORT	Lat.	Long.			MHWS	MHWN	MLWN	MLWS
STANDARD PORT	see extract		MHW	MLW	**2·5**	**1·8**	**1·2**	**0·4**
SECONDARY PORT	**S.**	**E.**						
Secondary Port	0°20′	42°35′	–0015	–0025	–1·2	–0·8	–0·4	+0·1

SEASONAL CHANGES IN MEAN LEVEL

No.	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sep. 1	Oct. 1	Nov. 1
STANDARD PORT ...	–0.1	0.0	0.0	+0.1	+0.2	+0.2	+0.1	0.0	–0.1	–0.1	–0.1
Secondary port	0.0	+0.2	+0.1	+0.2	+0.2	+0.1	0.0	–0.1	–0.2	–0.1	–0.1

Notes: (i) The data used in this example do not refer to the year of these tables.

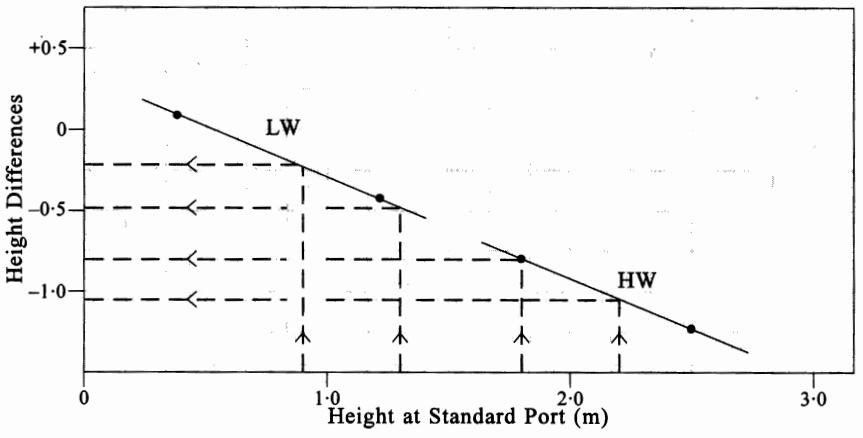
(ii) Computation of HW height differences is done by interpolation or extrapolation, using the two values tabulated for HW and the height of HW at the Standard Port. Similarly, LW height differences are computed from the data given for LW. In most cases, this can be carried out by eye. However, the use of a pocket calculator may be preferred. Alternatively, it may be carried out graphically, as shown below.
Plot A (MHWS 2.5, difference –1.2) and B (MHWN 1.8, difference –0.8).
Draw a line through A and B. Read off the height differences for Secondary Port corresponding to the corrected heights at Standard Port of 1.8 and 2.2 – i.e. –0.8 and –1.0.
Similarly, plot the LW height differences to get Secondary Port differences corresponding to the corrected heights at Standard Port of 0.9 and 1.3 – i.e. –0.2 and –0.5.

Extract from Part I

STANDARD PORT

JANUARY

	TIME	Ht. m
16	0324	0.8
	1014	1.7
F	1514	1.2
	2127	2.1



STANDARD PORT.....**Standard**..... TIME/HEIGHT REQUIRED.**H & LW**.....

SECONDARY PORT...**Secondary**..... DATE..**16 Jan**.TIME ZONE..**–0700**.....

	TIME		HEIGHT		
STANDARD PORT	HW	LW	HW	LW	RANGE
	1 **1014** **2127**	2 **0324** **1514**	3 **1.7** **2.1**	4 **0.8** **1.2**	5 **—**
Seasonal change	Standard Port		6 **+0.1**	6 **+0.1**	
DIFFERENCES	7* **–0015**	8* **–0025**	9* **–0.8** **–1.0**	10* **–0.2** **–0.5**	
Seasonal change	Secondary Port		11 **0.0**	11 **0.0**	
SECONDARY PORT	12 **0959** **2112**	13 **0259** **1449**	14 **1.0** **1.2**	15 **0.7** **0.8**	
Duration	16 **—**				

Example II: To find the times and heights of high and low waters at "Secondary Haven" (tides with large diurnal inequality) on 16th January, using the following extracts.

Extract from ATT Part II.

PLACE	POSITION		TIME DIFFERENCES		HEIGHT DIFFERENCES (IN METRES)			
STANDARD PORT	Lat.	Long.			MHHW	MLHW	MHLW	MLLW
STANDARD PORT	see extract		HHW	LLW	**2·5**	**2·2**	**1·9**	**0·4**
SECONDARY PORT	**N.**	**E.**						
Secondary Haven	4°40′	103°25′	–0015	–0025	–1·2	–1·1	–0·9	–0·1

SEASONAL CHANGES IN MEAN LEVEL

No.	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sep. 1	Oct. 1	Nov. 1
STANDARD PORT ...	–0.1	0.0	0.0	+0.1	+0.2	+0.2	+0.1	0.0	–0.1	–0.1	–0.1
Standard Haven	0.0	+0.1	+0.1	+0.2	+0.2	+0.1	0.0	–0.1	–0.2	–0.1	–0.1

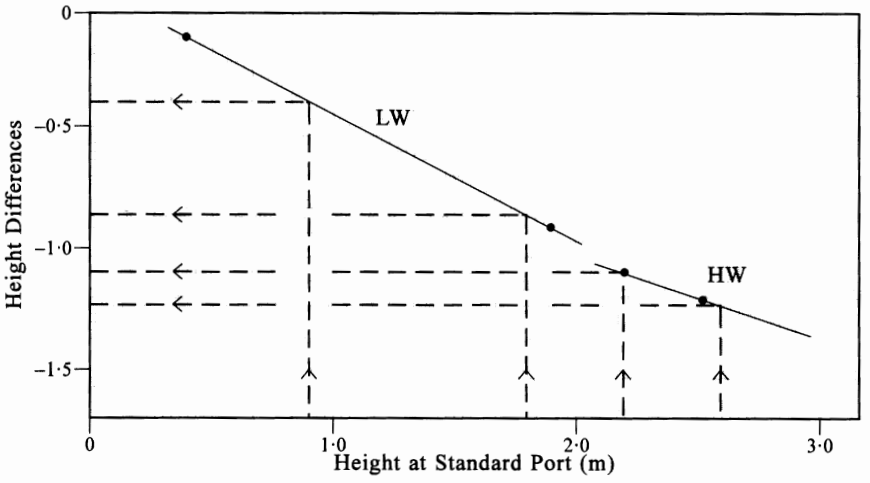
Notes: (i) The data used in this example do not refer to the year of these tables.
(ii) Computation of HW height differences is done by interpolation or extrapolation, using the two values tabulated for HW and the height of HW at the Standard Port. Similarly, LW height differences are computed from the data given for LW.
(iii) For instructions on graphical interpolation of differences, see Example I on page xii.

Extract from Part I

STANDARD PORT

JANUARY

	TIME	Ht. m
16	0254	0.8
	1144	2.5
F	1618	1.7
	2025	2.1



STANDARD PORT.....**Standard**..... TIME/HEIGHT REQUIRED.**H & LW**.....

SECONDARY PORT...**Secondary**..... DATE..**16 Jan**.TIME ZONE..**–0700**.....

	TIME		HEIGHT		
STANDARD PORT	HW	LW	HW	LW	RANGE
	1 **1144** **2025**	2 **0254** **1618**	3 **2.5** **2.1**	4 **0.8** **1.7**	5 —
Seasonal change	Standard Port		6 **+0.1**	6 **+0.1**	
DIFFERENCES	7* **–0015**	8* **–0025**	9* **–1.2** **–1.1**	10* **–0.4** **–0.9**	
Seasonal change	Secondary Port		11 **0.0**	11 **0.0**	
SECONDARY PORT	12 **1129** **2010**	13 **0229** **1553**	14 **1.4** **1.1**	15 **0.5** **0.9**	
Duration	16 —				

Example III: To find the times and heights of high and low waters at "Secondary Harbour" (diurnal tides) on 10th February, using the following extracts.

Extract from ATT Part II.

PLACE	POSITION		TIME DIFFERENCES		HEIGHT DIFFERENCES (IN METRES)			
STANDARD PORT	Lat.	Long.			MHHW	MLHW	MHLW	MLLW
STANDARD HARBOUR	see extract		HHW	LLW	1·6	Δ	Δ	0·4
SECONDARY PORT	N.	E.						
Secondary Harbour	2°30′	90°30′	+0106	+0146	+0·5	Δ	Δ	+0·1

SEASONAL CHANGES IN MEAN LEVEL

No.	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sep. 1	Oct. 1	Nov. 1
STANDARD HARBOUR	0.0	0.0	–0.1	0.0	0.0	+0.1	+0.1	–0.1	–0.2	–0.2	–0.1
Standard Harbour	0.0	+0.1	+0.1	+0.1	+0.1	+0.1	0.0	0.0	0.0	0.0	0.0

Notes: (i) The data used in this example do not refer to the year of these tables.

(ii) Where only one HW and one LW height differences is tabulated in Part II, both HW and LW differences must be obtained by interpolation or extrapolation, using these values and the heights at the Standard Port.

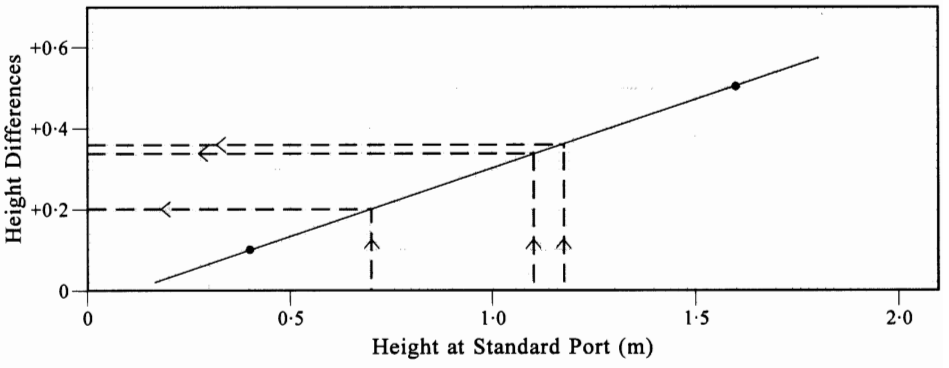
(iii) For instructions on graphical interpolation of differences, see Example I on page xii.

Extract from Part I

STANDARD HARBOUR

FEBRUARY

	TIME	Ht. m
10	0438	1.2
	0631	1.2
Tu	1057	1.2
	1928	0.7



STANDARD PORT.....**Standard**..... TIME/HEIGHT REQUIRED.**H & LW**.....

SECONDARY PORT...**Secondary**..... DATE..**10 Feb** TIME ZONE.**–0600**.....

	TIME		HEIGHT		
	HW	LW	HW	LW	RANGE
STANDARD PORT	1 **0438** **1057**	2 **0631** **1928**	3 **1.2** **1.2**	4 **1.1** **0.7**	5 —
Seasonal change	Standard Port		6 **0.0**	6 **0.0**	
DIFFERENCES	7* **+0106**	8* **+0146**	9* **+0.4** **+0.4**	10* **+0.3** **+0.2**	
Seasonal change	Secondary Port		11 **+0.1**	11 **+0.1**	
SECONDARY PORT	12 **0544** **1203**	13 **0817** **2114**	14 **1.7** **1.7**	15 **1.5** **1.0**	
Duration	16 —				

Example IV: To find the height of the tide at 1200 on 8th November at "Standard Port".

Extract from Part I

NOVEMBER

8	0132	1.5
	0823	3.2
F	1440	1.4
	2115	3.0

STANDARD PORT...**Standard**..... TIME/~~HEIGHT~~ REQUIRED..**1200**.....

SECONDARY PORT.....**—**..... DATE..**8 Nov**...TIME ZONE..**-0700**.....

	TIME		HEIGHT		
STANDARD PORT	HW	LW	HW	LW	RANGE
	1 **0823**	2 **1440**	3 **3.2**	4 **1.4**	5 **1.8**
Seasonal change	Standard Port		6 —	6 —	
DIFFERENCES	7* —	8* —	9* —	10* —	
Seasonal change	Secondary Port		11 —	11 —	
SECONDARY PORT	12 —	13 —	14 —	15 —	
Duration	16 **0617**				

Notes: (i) This method is only suitable when the duration of rise or fall is between 5 and 7 hours and when there is no Shallow Water Correction (see page xi).

(ii) For Secondary Ports, first obtain the times and heights of high and low waters as in examples I and II and then proceed as below.

(iii) The data used in this example do not refer to the year of these tables.

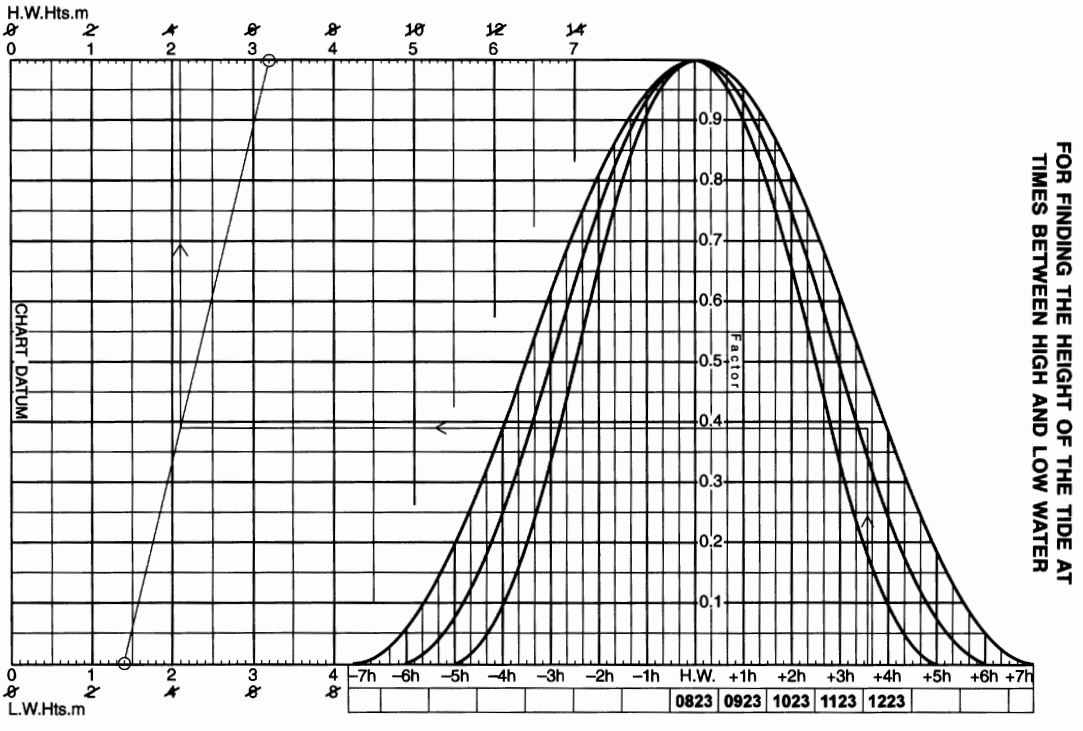
I On diagram on page xvii, plot heights of HW and LW occurring either side of required time and join by sloping line.

II Enter HW time and sufficient others to embrace required time.

III From required time, proceed vertically to curve for duration, interpolating as necessary between curves on diagram.

IV Proceed horizontally to sloping line, thence vertically to height scale. Read off height.

Extract from Part I



Height 2.1m

Example V: To find the time at which the midday tide falls to 2.1m on 8th November at "Standard Port".

Extract from Part I

NOVEMBER

8	0132	1.5
	0823	3.2
F	1440	1.4
	2115	3.0

STANDARD PORT...**Standard**..... ~~TIME~~/HEIGHT REQUIRED.**2.1** (**Midday-falling**)

SECONDARY PORT..—..... DATE..**8 Nov**...TIME ZONE..**-0700**.....

	TIME		HEIGHT		
STANDARD PORT	HW	LW	HW	LW	RANGE
	1 **0823**	2 **1440**	3 **3.2**	4 **1.4**	5 **1.8**
Seasonal change	Standard Port		6 —	6 —	
DIFFERENCES	7* —	8* —	9* —	10* —	
Seasonal change	Secondary Port		11 —	11 —	
SECONDARY PORT	12 —	13 —	14 —	15 —	
Duration	16 **0617**				

Notes: (i) This method is only suitable when the duration of rise or fall is between 5 and 7 hours and when there is no Shallow Water Correction (see page xi).

(ii) For Secondary Ports, first obtain the times and heights of high and low waters as in examples I and II and then proceed as below.

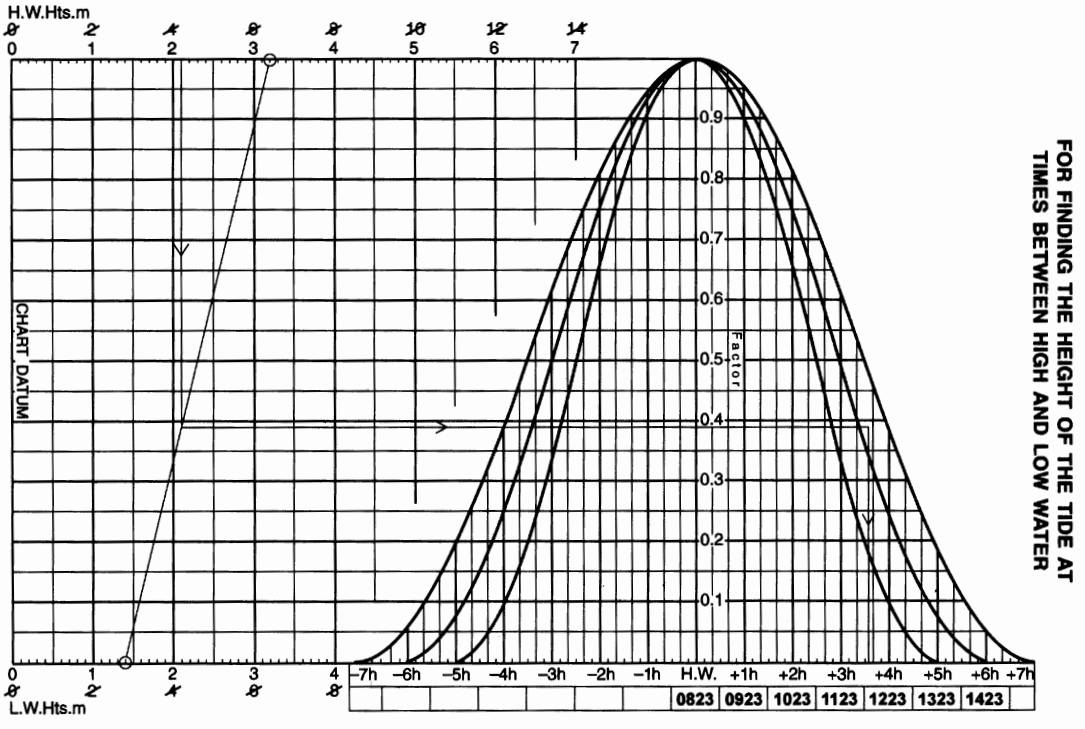
(iii) The data used in this example do not refer to the year of these tables.

I On diagram on page xvii, plot heights of HW and LW occurring either side of required event and join by sloping line.

II Enter HW time and those for half-tidal cycle covering required event.

III From required height, proceed vertically to sloping line, thence horizontal to curve for duration, interpolating as necessary between curves on diagram.

IV Proceed vertically to time scale. Read off time.



Time 1200

FOR FINDING THE HEIGHT OF THE TIDE AT TIMES BETWEEN HIGH AND LOW WATER

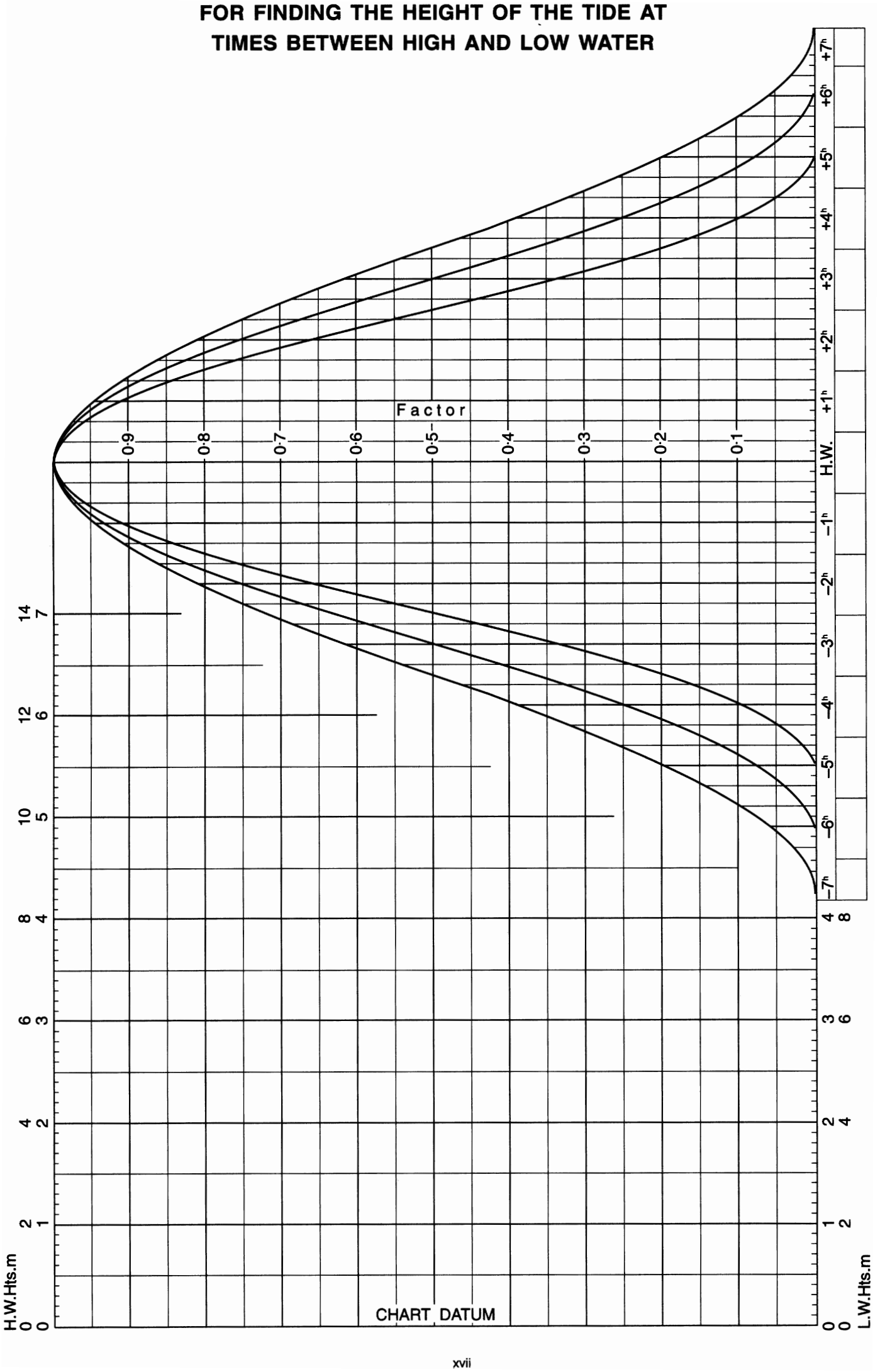


TABLE VII TIDAL ANGLES AND FACTORS

JANUARY

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	239	0.94	001	0.83	000	1.25	233	0.78
2	261	0.91	002	0.83	000	1.23	256	0.76
3	283	0.89	002	0.83	000	1.23	278	0.75
4	305	0.88	003	0.83	000	1.22	302	0.75
5	326	0.88	004	0.83	000	1.22	325	0.75
6	348	0.89	004	0.84	000	1.22	348	0.76
7	010	0.89	005	0.84	000	1.22	012	0.76
8	032	0.90	005	0.84	000	1.22	036	0.77
9	055	0.90	006	0.84	000	1.23	059	0.79
10	077	0.91	006	0.85	000	1.24	083	0.80
11	099	0.93	007	0.85	000	1.24	106	0.83
12	121	0.95	007	0.86	359	1.25	131	0.87
13	144	0.98	008	0.86	358	1.26	155	0.91
14	168	1.02	008	0.87	358	1.26	181	0.96
15	192	1.07	009	0.87	357	1.27	207	1.01
16	218	1.11	009	0.88	356	1.27	234	1.05
17	244	1.15	010	0.88	355	1.27	262	1.09
18	271	1.19	010	0.89	354	1.26	290	1.12
19	298	1.22	011	0.89	353	1.25	318	1.14
20	326	1.24	011	0.90	352	1.24	346	1.14
21	354	1.24	011	0.91	351	1.23	015	1.13
22	021	1.23	012	0.91	350	1.21	043	1.11
23	049	1.21	012	0.92	349	1.20	071	1.07
24	076	1.18	012	0.93	348	1.18	098	1.02
25	103	1.14	013	0.93	348	1.16	125	0.97
26	129	1.09	013	0.94	347	1.14	150	0.92
27	154	1.04	013	0.95	347	1.12	175	0.87
28	178	0.99	013	0.95	347	1.10	199	0.83
29	201	0.95	014	0.96	346	1.08	223	0.79
30	224	0.91	014	0.97	346	1.07	245	0.77
31	245	0.89	014	0.98	346	1.05	268	0.76

FEBRUARY

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	267	0.88	014	0.99	346	1.05	291	0.76
2	288	0.88	014	0.99	347	1.04	314	0.76
3	310	0.89	014	1.00	346	1.03	338	0.77
4	332	0.90	015	1.01	346	1.03	001	0.79
5	354	0.91	015	1.02	346	1.03	025	0.80
6	017	0.93	015	1.02	345	1.03	049	0.82
7	040	0.94	015	1.03	345	1.04	074	0.84
8	062	0.96	015	1.04	344	1.04	098	0.86
9	086	0.98	015	1.05	343	1.04	123	0.89
10	109	1.01	015	1.05	342	1.04	148	0.93
11	133	1.03	015	1.06	341	1.03	174	0.96
12	158	1.07	015	1.07	339	1.03	200	1.00
13	183	1.10	015	1.08	338	1.02	226	1.04
14	209	1.13	015	1.08	336	1.01	254	1.07
15	235	1.16	015	1.09	335	1.00	281	1.09
16	262	1.18	014	1.10	333	0.98	309	1.10
17	289	1.19	014	1.11	332	0.96	337	1.10
18	317	1.19	014	1.11	330	0.94	004	1.09
19	344	1.19	014	1.12	329	0.92	032	1.07
20	011	1.17	014	1.13	327	0.90	060	1.04
21	038	1.15	014	1.13	326	0.87	087	1.00
22	064	1.11	014	1.14	325	0.85	113	0.96
23	090	1.07	014	1.15	324	0.83	139	0.92
24	115	1.03	013	1.15	323	0.81	164	0.87
25	139	0.99	013	1.16	323	0.79	188	0.83
26	162	0.95	013	1.16	322	0.77	212	0.80
27	185	0.92	013	1.17	322	0.76	235	0.78
28	206	0.90	013	1.18	321	0.74	257	0.77
29	228	0.88	012	1.18	321	0.73	280	0.77

MARCH

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	250	0.88	012	1.19	320	0.73	303	0.78
2	271	0.89	012	1.19	320	0.72	326	0.79
3	293	0.90	012	1.20	319	0.72	350	0.81
4	315	0.92	011	1.20	318	0.72	014	0.83
5	338	0.95	011	1.20	317	0.72	039	0.86
6	001	0.97	011	1.21	315	0.73	064	0.89
7	025	1.00	010	1.21	314	0.73	089	0.91
8	049	1.02	010	1.22	312	0.73	115	0.94
9	074	1.05	010	1.22	309	0.73	140	0.97
10	099	1.07	010	1.22	307	0.73	167	1.00
11	124	1.09	009	1.23	305	0.73	193	1.02
12	150	1.11	009	1.23	302	0.73	220	1.04
13	176	1.13	009	1.23	299	0.72	247	1.05
14	202	1.14	008	1.24	296	0.71	274	1.06
15	228	1.15	008	1.24	294	0.71	301	1.06
16	255	1.15	008	1.24	291	0.70	328	1.06
17	282	1.15	007	1.24	288	0.68	356	1.04
18	308	1.13	007	1.24	286	0.67	023	1.02
19	334	1.12	007	1.24	283	0.66	049	1.00
20	000	1.10	006	1.25	281	0.65	076	0.97
21	026	1.07	006	1.25	278	0.63	101	0.93
22	051	1.04	006	1.25	276	0.62	127	0.90
23	075	1.01	005	1.25	275	0.61	152	0.86
24	099	0.97	005	1.25	273	0.60	176	0.83
25	122	0.94	005	1.25	272	0.59	200	0.81
26	145	0.92	004	1.25	270	0.59	223	0.79
27	167	0.90	004	1.25	269	0.58	246	0.78
28	189	0.89	004	1.25	268	0.58	269	0.78
29	210	0.88	003	1.25	267	0.59	292	0.78
30	232	0.89	003	1.24	266	0.59	315	0.80
31	253	0.91	002	1.24	265	0.60	338	0.83

APRIL

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	276	0.93	002	1.24	264	0.61	003	0.86
2	299	0.96	002	1.24	263	0.63	027	0.89
3	322	0.99	001	1.24	261	0.64	053	0.93
4	346	1.03	001	1.24	259	0.66	079	0.97
5	011	1.06	001	1.23	258	0.68	105	1.00
6	036	1.10	000	1.23	256	0.70	132	1.03
7	062	1.12	000	1.23	253	0.71	159	1.05
8	089	1.14	359	1.22	251	0.73	186	1.07
9	115	1.15	359	1.22	249	0.74	213	1.08
10	142	1.16	359	1.22	246	0.76	241	1.07
11	169	1.16	358	1.21	244	0.77	268	1.07
12	195	1.15	358	1.21	241	0.78	295	1.05
13	222	1.13	358	1.21	239	0.79	322	1.03
14	248	1.12	357	1.20	237	0.79	348	1.00
15	274	1.09	357	1.20	235	0.80	014	0.98
16	299	1.07	357	1.19	233	0.80	040	0.95
17	324	1.05	356	1.19	231	0.80	066	0.92
18	349	1.02	356	1.18	229	0.80	091	0.89
19	013	1.00	355	1.18	228	0.80	116	0.87
20	037	0.97	355	1.17	227	0.80	140	0.84
21	060	0.95	355	1.16	226	0.80	164	0.82
22	083	0.93	354	1.16	225	0.80	188	0.80
23	105	0.91	354	1.15	224	0.80	212	0.79
24	128	0.90	354	1.15	224	0.80	235	0.78
25	149	0.88	353	1.14	224	0.81	258	0.78
26	171	0.88	353	1.13	223	0.82	280	0.78
27	192	0.89	353	1.13	223	0.83	303	0.80
28	214	0.90	353	1.12	223	0.84	327	0.83
29	236	0.93	352	1.11	223	0.86	351	0.87
30	259	0.96	352	1.10	222	0.88	015	0.92

TABLE VII TIDAL ANGLES AND FACTORS

MAY

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	282	1.01	352	1.10	222	0.90	041	0.96
2	307	1.05	351	1.09	221	0.92	067	1.01
3	332	1.10	351	1.08	220	0.95	094	1.05
4	358	1.14	351	1.07	219	0.97	122	1.09
5	025	1.17	351	1.07	218	0.99	149	1.11
6	052	1.19	350	1.06	216	1.01	177	1.13
7	079	1.20	350	1.05	215	1.03	205	1.13
8	106	1.21	350	1.04	214	1.04	233	1.12
9	134	1.20	350	1.03	212	1.06	261	1.10
10	161	1.18	349	1.03	211	1.07	288	1.07
11	188	1.15	349	1.02	209	1.07	315	1.03
12	214	1.12	349	1.01	208	1.08	341	0.99
13	240	1.08	349	1.00	207	1.08	007	0.95
14	265	1.04	349	0.99	206	1.08	032	0.91
15	289	1.01	349	0.98	205	1.08	057	0.88
16	313	0.98	348	0.97	204	1.08	081	0.85
17	336	0.96	348	0.97	203	1.07	105	0.83
18	359	0.94	348	0.96	203	1.07	129	0.82
19	022	0.92	348	0.95	202	1.07	153	0.80
20	044	0.91	348	0.94	202	1.07	177	0.79
21	067	0.90	348	0.93	202	1.07	201	0.78
22	089	0.89	348	0.92	202	1.07	224	0.78
23	111	0.88	348	0.91	202	1.07	247	0.77
24	132	0.88	348	0.90	202	1.08	270	0.78
25	154	0.88	348	0.90	202	1.09	293	0.80
26	175	0.90	348	0.89	202	1.11	316	0.83
27	197	0.92	348	0.88	202	1.12	339	0.87
28	220	0.96	348	0.87	202	1.14	004	0.92
29	243	1.00	348	0.86	201	1.16	029	0.98
30	267	1.06	348	0.85	201	1.18	056	1.03
31	293	1.11	348	0.84	200	1.20	083	1.08

JUNE

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	319	1.15	348	0.84	199	1.21	111	1.13
2	346	1.19	348	0.83	198	1.23	139	1.16
3	013	1.22	349	0.82	197	1.24	167	1.18
4	041	1.24	349	0.81	196	1.25	196	1.18
5	069	1.25	349	0.80	195	1.26	224	1.17
6	097	1.24	349	0.80	194	1.27	252	1.14
7	125	1.21	349	0.79	193	1.27	280	1.10
8	152	1.18	350	0.78	192	1.27	307	1.05
9	179	1.14	350	0.78	191	1.26	334	1.00
10	205	1.09	350	0.77	190	1.26	000	0.95
11	230	1.05	351	0.76	190	1.25	025	0.90
12	254	1.00	351	0.76	189	1.24	049	0.86
13	278	0.96	351	0.75	188	1.23	073	0.83
14	300	0.93	352	0.75	188	1.22	096	0.81
15	323	0.91	352	0.74	188	1.21	120	0.80
16	345	0.90	353	0.73	188	1.21	143	0.79
17	007	0.89	353	0.73	188	1.20	167	0.78
18	029	0.89	354	0.73	188	1.20	190	0.78
19	051	0.89	354	0.72	188	1.20	214	0.78
20	073	0.88	355	0.72	188	1.20	237	0.78
21	095	0.88	355	0.71	188	1.21	260	0.78
22	116	0.88	356	0.71	188	1.22	283	0.80
23	138	0.89	356	0.71	188	1.23	306	0.83
24	160	0.92	357	0.71	188	1.24	329	0.87
25	182	0.95	357	0.70	187	1.26	354	0.92
26	205	0.99	358	0.70	187	1.27	019	0.97
27	229	1.04	359	0.70	186	1.28	045	1.03
28	254	1.10	359	0.70	185	1.29	072	1.09
29	280	1.15	000	0.70	185	1.30	100	1.14
30	307	1.19	000	0.70	184	1.31	128	1.17

JULY

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	335	1.23	001	0.70	183	1.31	156	1.20
2	003	1.25	002	0.70	182	1.31	185	1.21
3	031	1.26	002	0.70	181	1.31	214	1.20
4	059	1.26	003	0.70	180	1.30	242	1.17
5	088	1.24	003	0.70	179	1.29	270	1.13
6	115	1.21	004	0.70	178	1.28	298	1.08
7	142	1.16	005	0.71	177	1.27	325	1.03
8	169	1.11	005	0.71	176	1.26	351	0.97
9	194	1.06	006	0.71	176	1.24	016	0.91
10	218	1.01	006	0.72	175	1.23	040	0.87
11	242	0.96	007	0.72	175	1.21	064	0.83
12	264	0.93	007	0.72	175	1.20	087	0.80
13	286	0.90	008	0.73	174	1.18	110	0.79
14	308	0.89	008	0.73	174	1.17	133	0.78
15	329	0.88	009	0.74	175	1.17	156	0.78
16	351	0.88	009	0.74	175	1.16	180	0.78
17	013	0.88	009	0.75	175	1.16	203	0.78
18	035	0.89	010	0.76	175	1.16	227	0.79
19	057	0.89	010	0.76	175	1.17	250	0.80
20	079	0.89	011	0.77	174	1.17	274	0.81
21	101	0.90	011	0.77	174	1.18	297	0.83
22	123	0.92	011	0.78	173	1.19	320	0.87
23	146	0.95	011	0.79	173	1.19	345	0.91
24	169	0.99	012	0.80	172	1.20	010	0.96
25	193	1.03	012	0.80	171	1.20	036	1.02
26	217	1.08	012	0.81	170	1.20	062	1.07
27	243	1.13	012	0.82	169	1.20	090	1.12
28	270	1.17	012	0.83	168	1.20	118	1.16
29	297	1.21	013	0.83	167	1.19	146	1.19
30	325	1.23	013	0.84	165	1.18	174	1.20
31	353	1.25	013	0.85	164	1.17	203	1.20

AUGUST

	M2		S2		K1		O1	
DAY	A	F	A	F	A	F	A	F
1	021	1.25	013	0.86	163	1.16	231	1.18
2	049	1.23	013	0.87	162	1.14	260	1.14
3	077	1.21	013	0.88	161	1.12	287	1.10
4	104	1.17	013	0.88	160	1.10	314	1.04
5	130	1.12	013	0.89	159	1.08	341	0.99
6	156	1.07	013	0.90	158	1.06	006	0.93
7	181	1.02	013	0.91	158	1.04	031	0.88
8	204	0.97	013	0.92	158	1.02	054	0.84
9	227	0.93	013	0.93	157	1.00	077	0.81
10	249	0.90	013	0.94	157	0.99	100	0.79
11	270	0.88	013	0.95	157	0.98	123	0.79
12	292	0.88	013	0.95	157	0.97	146	0.79
13	313	0.88	013	0.96	157	0.96	169	0.79
14	335	0.88	012	0.97	157	0.96	193	0.80
15	357	0.89	012	0.98	157	0.96	217	0.81
16	020	0.90	012	0.99	156	0.96	241	0.82
17	042	0.91	012	1.00	155	0.96	264	0.84
18	065	0.92	012	1.01	155	0.96	288	0.86
19	087	0.94	012	1.02	154	0.97	312	0.89
20	110	0.96	011	1.02	152	0.97	337	0.92
21	134	0.99	011	1.03	151	0.97	002	0.97
22	158	1.03	011	1.04	150	0.96	028	1.01
23	183	1.07	011	1.05	148	0.96	054	1.05
24	208	1.10	010	1.06	146	0.95	081	1.10
25	234	1.14	010	1.06	145	0.94	109	1.13
26	261	1.17	010	1.07	143	0.93	136	1.15
27	288	1.19	010	1.08	141	0.92	165	1.17
28	316	1.21	009	1.09	139	0.90	193	1.17
29	343	1.21	009	1.10	137	0.88	221	1.15
30	011	1.20	009	1.10	136	0.86	249	1.12
31	038	1.18	008	1.11	134	0.84	276	1.09

TABLE VII TIDAL ANGLES AND FACTORS

SEPTEMBER

DAY	M2 A	M2 F	S2 A	S2 F	K1 A	K1 F	O1 A	O1 F
1	065	1.15	008	1.12	133	0.82	303	1.04
2	091	1.11	008	1.12	131	0.80	329	0.99
3	117	1.07	007	1.13	130	0.78	355	0.94
4	141	1.02	007	1.14	129	0.76	020	0.89
5	165	0.97	007	1.15	128	0.74	044	0.85
6	188	0.94	006	1.15	128	0.72	067	0.82
7	210	0.91	006	1.16	127	0.71	090	0.80
8	232	0.89	006	1.16	127	0.70	112	0.79
9	253	0.88	005	1.17	126	0.69	135	0.80
10	275	0.88	005	1.18	125	0.69	159	0.80
11	297	0.89	005	1.18	125	0.68	182	0.82
12	319	0.90	004	1.19	124	0.69	206	0.84
13	341	0.92	004	1.19	123	0.69	230	0.86
14	004	0.93	003	1.20	121	0.69	254	0.88
15	027	0.95	003	1.20	120	0.70	279	0.91
16	051	0.98	003	1.21	118	0.70	304	0.93
17	074	1.00	002	1.21	116	0.71	329	0.96
18	099	1.02	002	1.21	113	0.71	355	0.99
19	123	1.05	001	1.22	111	0.72	021	1.03
20	149	1.07	001	1.22	108	0.72	047	1.06
21	174	1.10	001	1.23	106	0.72	074	1.08
22	200	1.12	000	1.23	103	0.72	101	1.10
23	227	1.14	000	1.23	100	0.72	129	1.12
24	253	1.16	359	1.23	097	0.71	156	1.12
25	280	1.16	359	1.24	094	0.71	184	1.12
26	307	1.16	359	1.24	091	0.70	211	1.10
27	334	1.15	358	1.24	089	0.69	238	1.08
28	000	1.13	358	1.24	086	0.68	265	1.05
29	027	1.11	357	1.25	084	0.67	292	1.01
30	052	1.08	357	1.25	081	0.66	318	0.97

OCTOBER

DAY	M2 A	M2 F	S2 A	S2 F	K1 A	K1 F	O1 A	O1 F
1	077	1.04	357	1.25	079	0.65	343	0.93
2	102	1.01	356	1.25	078	0.64	008	0.89
3	126	0.97	356	1.25	076	0.64	032	0.86
4	149	0.94	356	1.25	075	0.63	056	0.83
5	171	0.91	355	1.25	074	0.63	079	0.81
6	193	0.89	355	1.25	073	0.63	101	0.80
7	214	0.88	354	1.25	072	0.63	124	0.81
8	236	0.88	354	1.25	071	0.63	147	0.82
9	257	0.89	354	1.25	070	0.64	171	0.84
10	279	0.90	353	1.25	069	0.65	194	0.86
11	302	0.93	353	1.25	068	0.67	219	0.89
12	325	0.95	353	1.25	067	0.68	244	0.92
13	349	0.98	352	1.24	066	0.70	269	0.96
14	013	1.01	352	1.24	064	0.72	295	0.99
15	037	1.04	351	1.24	063	0.74	321	1.02
16	063	1.07	351	1.24	061	0.76	347	1.05
17	088	1.09	351	1.24	059	0.78	014	1.07
18	114	1.11	350	1.23	057	0.80	041	1.09
19	141	1.13	350	1.23	055	0.82	068	1.10
20	167	1.14	350	1.23	053	0.84	095	1.10
21	193	1.14	349	1.22	051	0.85	122	1.10
22	220	1.14	349	1.22	049	0.86	149	1.09
23	246	1.13	349	1.22	046	0.87	176	1.07
24	273	1.12	348	1.21	044	0.88	203	1.05
25	299	1.10	348	1.21	043	0.88	229	1.03
26	324	1.08	348	1.20	041	0.89	255	1.00
27	349	1.06	348	1.20	039	0.89	281	0.97
28	014	1.03	347	1.19	038	0.89	307	0.94
29	039	1.01	347	1.19	037	0.89	332	0.91
30	062	0.98	347	1.18	036	0.89	356	0.88
31	086	0.95	347	1.18	035	0.89	020	0.85

NOVEMBER

DAY	M2 A	M2 F	S2 A	S2 F	K1 A	K1 F	O1 A	O1 F
1	109	0.93	346	1.17	034	0.89	044	0.83
2	131	0.90	346	1.16	034	0.89	067	0.81
3	153	0.89	346	1.16	033	0.89	090	0.81
4	175	0.88	346	1.15	033	0.90	113	0.81
5	196	0.88	345	1.15	033	0.91	136	0.82
6	218	0.88	345	1.14	033	0.92	159	0.84
7	240	0.90	345	1.13	033	0.94	183	0.88
8	262	0.93	345	1.13	033	0.96	207	0.91
9	285	0.97	345	1.12	032	0.98	232	0.96
10	309	1.00	345	1.11	032	1.00	258	1.00
11	334	1.04	344	1.10	031	1.02	284	1.05
12	359	1.08	344	1.10	030	1.05	311	1.08
13	025	1.12	344	1.09	029	1.07	338	1.11
14	052	1.14	344	1.08	028	1.09	006	1.13
15	078	1.16	344	1.07	027	1.11	033	1.14
16	106	1.17	344	1.07	026	1.13	061	1.14
17	133	1.17	344	1.06	025	1.15	088	1.13
18	160	1.17	344	1.05	024	1.16	116	1.11
19	187	1.15	344	1.04	022	1.17	143	1.09
20	213	1.13	344	1.03	021	1.18	169	1.06
21	239	1.10	344	1.03	020	1.18	196	1.02
22	264	1.07	344	1.02	019	1.18	221	0.99
23	289	1.04	344	1.01	018	1.18	247	0.95
24	314	1.01	344	1.00	017	1.18	272	0.92
25	338	0.99	344	0.99	016	1.18	296	0.90
26	001	0.96	344	0.98	016	1.17	321	0.87
27	024	0.94	344	0.98	015	1.17	345	0.85
28	047	0.93	344	0.97	015	1.17	009	0.84
29	070	0.91	345	0.96	015	1.16	033	0.82
30	092	0.90	345	0.95	015	1.16	056	0.81

DECEMBER

DAY	M2 A	M2 F	S2 A	S2 F	K1 A	K1 F	O1 A	O1 F
1	114	0.88	345	0.94	015	1.17	079	0.81
2	136	0.88	345	0.94	015	1.17	102	0.81
3	157	0.87	345	0.93	015	1.18	125	0.82
4	179	0.88	346	0.92	015	1.19	148	0.84
5	201	0.90	346	0.91	015	1.21	171	0.88
6	223	0.93	346	0.90	015	1.22	195	0.92
7	246	0.97	347	0.90	015	1.24	220	0.97
8	269	1.01	347	0.89	015	1.26	246	1.03
9	294	1.06	347	0.88	014	1.28	273	1.08
10	320	1.11	348	0.88	014	1.30	300	1.13
11	346	1.15	348	0.87	013	1.31	328	1.17
12	013	1.18	349	0.86	012	1.33	356	1.19
13	041	1.21	349	0.86	011	1.34	024	1.20
14	069	1.22	350	0.85	010	1.35	052	1.20
15	097	1.22	350	0.85	009	1.35	080	1.18
16	124	1.21	351	0.84	008	1.35	108	1.15
17	152	1.18	351	0.84	007	1.35	136	1.11
18	179	1.15	352	0.83	006	1.35	163	1.07
19	205	1.11	352	0.83	005	1.34	189	1.02
20	230	1.07	353	0.82	005	1.33	214	0.97
21	255	1.03	354	0.82	004	1.32	239	0.93
22	279	0.99	354	0.82	004	1.31	263	0.89
23	302	0.96	355	0.81	003	1.30	287	0.86
24	325	0.93	356	0.81	003	1.29	311	0.85
25	347	0.91	356	0.81	003	1.28	335	0.83
26	009	0.90	357	0.81	003	1.27	358	0.82
27	032	0.89	358	0.80	003	1.27	022	0.81
28	054	0.89	358	0.80	003	1.26	045	0.81
29	076	0.88	359	0.80	003	1.26	069	0.80
30	098	0.87	000	0.80	004	1.27	092	0.81
31	119	0.87	000	0.80	004	1.27	115	0.82
JAN 1	141	0.88	001	0.80	004	1.28	137	0.84

PART I

TIDAL PREDICTIONS

FOR

STANDARD PORTS

CANADA – SAINT JOHN, N.B.

LAT 45°16′N LONG 66°04′W

TIME ZONE **+0400** TIMES AND HEIGHTS OF HIGH AND LOW WATERS

JANUARY

	Time	m		Time	m
1	0135	1.7	**16**	0025	1.3
	0750	7.2		0640	7.5
SA	1410	1.6	SU	1300	1.2
	2020	7.0		1910	7.3
2	0230	1.7	**17**	0125	1.3
	0845	7.3		0740	7.7
SU	1505	1.5	M	1405	1.0
	2115	7.0		2010	7.4
3	0325	1.7	**18**	0230	1.1
	0930	7.4		0840	8.0
M	1550	1.4	TU	1505	0.7
	2200	7.1		2115	7.7
4	0410	1.6	**19**	0330	0.9
	1015	7.5		0940	8.3
TU	1635	1.3	W	1605	0.4
	2245	7.1		2210	7.9
5	0450	1.6	**20**	0425	0.7
	1100	7.6		1035	8.5
W	1715	1.2	TH	1700	0.2
	2325	7.2		2305	8.0
6	0530	1.5	**21**	0520	0.5
	1135	7.6		1130	8.6
TH	1755	1.1	F	1750	0.1
●			O		
7	0000	7.3	**22**	0000	8.1
	0605	1.5		0615	0.4
F	1210	7.7	SA	1220	8.6
	1830	1.1		1845	0.1
8	0035	7.3	**23**	0050	8.1
	0640	1.5		0705	0.5
SA	1245	7.7	SU	1310	8.5
	1905	1.1		1935	0.2
9	0110	7.3	**24**	0140	8.0
	0720	1.4		0755	0.6
SU	1325	7.7	M	1405	8.2
	1940	1.1		2025	0.5
10	0145	7.3	**25**	0230	7.9
	0755	1.4		0845	0.9
M	1400	7.6	TU	1455	7.9
	2020	1.1		2115	0.8
11	0225	7.3	**26**	0325	7.6
	0835	1.5		0940	1.1
TU	1440	7.5	W	1545	7.6
	2100	1.2		2205	1.1
12	0305	7.3	**27**	0415	7.4
	0920	1.5		1035	1.4
W	1525	7.4	TH	1640	7.2
	2145	1.2		2300	1.5
13	0350	7.3	**28**	0510	7.2
	1005	1.5		1130	1.6
TH	1615	7.3	F	1740	6.9
	2235	1.3		2355	1.7
14	0440	7.3	**29**	0610	7.0
	1100	1.5		1230	1.8
F	1705	7.3	SA	1840	6.7
	2325	1.4			
15	0540	7.4	**30**	0055	1.9
	1200	1.4		0710	7.0
SA	1805	7.2	SU	1330	1.8
				1940	6.7
			31	0155	2.0
				0805	7.0
			M	1425	1.8
				2040	6.7

FEBRUARY

	Time	m		Time	m
1	0250	2.0	**16**	0210	1.3
	0900	7.1		0825	7.8
TU	1520	1.7	W	1450	0.9
	2130	6.8		2100	7.5
2	0340	1.8	**17**	0315	1.1
	0950	7.3		0925	8.0
W	1605	1.5	TH	1550	0.6
	2215	6.9		2200	7.7
3	0425	1.7	**18**	0415	0.8
	1030	7.4		1025	8.3
TH	1650	1.3	F	1645	0.4
	2255	7.1		2255	7.9
4	0505	1.5	**19**	0505	0.6
	1110	7.6		1115	8.4
F	1725	1.1	SA	1735	0.2
	2335	7.3	O	2345	8.1
5	0540	1.4	**20**	0600	0.5
	1150	7.7		1205	8.4
SA	1805	1.0	SU	1825	0.2
●					
6	0010	7.4	**21**	0035	8.1
	0615	1.2		0645	0.5
SU	1225	7.8	M	1255	8.3
	1840	0.9		1910	0.3
7	0045	7.5	**22**	0120	8.0
	0655	1.1		0735	0.6
M	1300	7.8	TU	1340	8.1
	1915	0.8		2000	0.6
8	0120	7.6	**23**	0205	7.9
	0730	1.0		0820	0.8
TU	1335	7.8	W	1425	7.8
	1950	0.8		2045	0.9
9	0155	7.7	**24**	0250	7.7
	0810	1.0		0905	1.0
W	1415	7.8	TH	1515	7.5
	2030	0.9		2130	1.2
10	0240	7.7	**25**	0335	7.5
	0855	1.0		0955	1.3
TH	1500	7.7	F	1605	7.2
	2115	1.0		2220	1.6
11	0325	7.6	**26**	0430	7.2
	0940	1.1		1050	1.6
F	1545	7.5	SA	1655	6.9
	2205	1.1		2310	1.9
12	0415	7.6	**27**	0525	7.0
	1035	1.2		1145	1.9
SA	1640	7.3	SU	1755	6.6
	2300	1.3			
13	0510	7.5	**28**	0010	2.1
	1130	1.3		0620	6.8
SU	1740	7.2	M	1245	2.0
				1855	6.5
14	0000	1.4	**29**	0110	2.2
	0610	7.5		0725	6.8
M	1235	1.2	TU	1345	2.0
	1845	7.2		2000	6.5
15	0105	1.4			
	0715	7.6			
TU	1345	1.1			
	1955	7.3			

MARCH

	Time	m		Time	m
1	0210	2.2	**16**	0200	1.4
	0820	6.9		0810	7.7
W	1440	1.9	TH	1435	1.0
	2055	6.7		2050	7.4
2	0305	2.0	**17**	0305	1.2
	0915	7.1		0915	7.9
TH	1530	1.7	F	1535	0.8
	2140	6.9		2145	7.7
3	0350	1.8	**18**	0400	0.9
	1000	7.3		1010	8.0
F	1615	1.4	SA	1630	0.6
	2225	7.1		2240	7.9
4	0435	1.5	**19**	0455	0.7
	1040	7.5		1100	8.2
SA	1655	1.2	SU	1720	0.5
	2305	7.4		2325	8.0
5	0510	1.3	**20**	0540	0.6
	1120	7.7		1150	8.2
SU	1735	0.9	M	1805	0.5
	2340	7.6	O		
6	0550	1.0	**21**	0010	8.1
	1155	7.9		0625	0.5
M	1810	0.8	TU	1235	8.1
●				1850	0.6
7	0015	7.8	**22**	0055	8.1
	0625	0.8		0710	0.6
TU	1235	8.0	W	1315	8.0
	1845	0.7		1930	0.8
8	0050	7.9	**23**	0135	8.0
	0705	0.7		0755	0.8
W	1310	8.0	TH	1400	7.7
	1925	0.6		2015	1.1
9	0130	8.0	**24**	0220	7.8
	0745	0.6		0835	1.0
TH	1350	8.0	F	1445	7.5
	2005	0.7		2055	1.4
10	0215	8.0	**25**	0300	7.5
	0830	0.7		0920	1.3
F	1435	7.8	SA	1530	7.2
	2055	0.9		2140	1.7
11	0300	7.9	**26**	0350	7.3
	0920	0.8		1010	1.6
SA	1525	7.6	SU	1620	6.9
	2145	1.1		2230	2.0
12	0350	7.8	**27**	0440	7.0
	1015	1.0		1100	1.9
SU	1620	7.4	M	1715	6.7
	2240	1.3		2325	2.3
13	0450	7.6	**28**	0535	6.8
	1115	1.2		1200	2.1
M	1725	7.2	TU	1810	6.5
	2340	1.5			
14	0555	7.5	**29**	0025	2.4
	1220	1.3		0635	6.8
TU	1835	7.2	W	1300	2.1
				1915	6.5
15	0050	1.5	**30**	0125	2.4
	0705	7.5		0735	6.8
W	1330	1.2	TH	1355	2.0
	1940	7.2		2010	6.7
			31	0220	2.2
				0835	7.0
			F	1450	1.8
				2100	6.9

APRIL

	Time	m		Time	m
1	0310	1.9	**16**	0345	1.0
	0920	7.3		0955	7.9
SA	1535	1.5	SU	1615	0.9
	2145	7.2		2220	7.9
2	0355	1.5	**17**	0440	0.9
	1005	7.5		1045	7.9
SU	1620	1.2	M	1700	0.8
	2225	7.6		2305	8.0
3	0440	1.2	**18**	0525	0.7
	1045	7.8		1130	7.9
M	1700	0.9	TU	1745	0.9
	2305	7.9	O	2350	8.1
4	0520	0.8	**19**	0605	0.7
	1125	8.0		1215	7.9
TU	1740	0.7	W	1825	1.0
●	2345	8.1			
5	0600	0.6	**20**	0030	8.0
	1205	8.1		0650	0.8
W	1820	0.6	TH	1255	7.8
				1905	1.1
6	0025	8.3	**21**	0110	7.9
	0640	0.4		0730	0.9
TH	1250	8.2	F	1335	7.6
	1900	0.6		1945	1.3
7	0105	8.4	**22**	0150	7.8
	0725	0.4		0810	1.1
F	1330	8.1	SA	1415	7.4
	1945	0.7		2025	1.6
8	0150	8.3	**23**	0230	7.6
	0810	0.5		0850	1.3
SA	1420	8.0	SU	1500	7.2
	2035	0.9		2110	1.8
9	0240	8.2	**24**	0315	7.4
	0905	0.7		0935	1.6
SU	1510	7.7	M	1545	7.0
	2125	1.1		2155	2.1
10	0335	8.0	**25**	0400	7.1
	1000	0.9		1020	1.8
M	1610	7.5	TU	1635	6.8
	2225	1.4		2245	2.3
11	0435	7.7	**26**	0455	7.0
	1100	1.1		1115	2.0
TU	1715	7.3	W	1730	6.7
	2330	1.6		2340	2.4
12	0545	7.6	**27**	0550	6.9
	1210	1.3		1210	2.0
W	1825	7.3	TH	1825	6.7
13	0040	1.6	**28**	0040	2.3
	0650	7.5		0650	6.9
TH	1315	1.3	F	1310	2.0
	1930	7.3		1925	6.8
14	0150	1.5	**29**	0135	2.1
	0800	7.6		0745	7.0
F	1420	1.2	SA	1405	1.8
	2035	7.5		2015	7.1
15	0250	1.3	**30**	0230	1.8
	0900	7.7		0840	7.3
SA	1520	1.0	SU	1455	1.5
	2130	7.7		2105	7.4

CANADA – SAINT JOHN, N.B.

LAT 45°16'N LONG 66°04'W

TIME ZONE **+0400** TIMES AND HEIGHTS OF HIGH AND LOW WATERS

MAY

	Time	m		Time	m
1	0320	1.5	**16**	0420	1.0
	0925	7.5		1030	7.7
M	1540	1.2	TU	1640	1.1
	2150	7.8		2245	7.9
2	0405	1.1	**17**	0505	0.9
	1010	7.8		1110	7.7
TU	1625	1.0	W	1720	1.2
	2230	8.1		2330	7.9
3	0450	0.7	**18**	0545	0.9
	1055	8.0		1155	7.6
W	1710	0.8	TH	1805	1.3
	2315	8.4	O		
4	0535	0.4	**19**	0010	7.9
	1140	8.2		0625	0.9
TH	1755	0.6	F	1235	7.6
●				1840	1.4
5	0000	8.5	**20**	0045	7.8
	0620	0.2		0705	1.0
F	1225	8.2	SA	1315	7.5
	1840	0.6		1920	1.5
6	0045	8.6	**21**	0125	7.7
	0705	0.2		0745	1.2
SA	1315	8.2	SU	1350	7.3
	1930	0.7		2000	1.7
7	0135	8.5	**22**	0205	7.6
	0755	0.3		0825	1.3
SU	1405	8.0	M	1430	7.2
	2020	0.9		2040	1.9
8	0225	8.3	**23**	0245	7.4
	0850	0.5		0905	1.5
M	1500	7.8	TU	1515	7.1
	2115	1.1		2125	2.0
9	0325	8.1	**24**	0330	7.3
	0950	0.8		0950	1.7
TU	1600	7.6	W	1600	7.0
	2215	1.4		2210	2.1
10	0425	7.8	**25**	0415	7.1
	1050	1.0		1035	1.8
W	1705	7.5	TH	1650	6.9
	2320	1.5		2300	2.2
11	0530	7.6	**26**	0510	7.0
	1155	1.2		1130	1.8
TH	1815	7.4	F	1745	6.9
				2355	2.1
12	0030	1.5	**27**	0605	7.0
	0640	7.5		1220	1.8
F	1300	1.3	SA	1835	7.1
	1915	7.5			
13	0135	1.5	**28**	0050	2.0
	0745	7.5		0700	7.1
SA	1405	1.2	SU	1315	1.7
	2015	7.6		1930	7.3
14	0235	1.3	**29**	0145	1.7
	0845	7.6		0755	7.3
SU	1500	1.2	M	1410	1.5
	2110	7.7		2020	7.6
15	0330	1.1	**30**	0240	1.3
	0940	7.6		0845	7.5
M	1550	1.1	TU	1500	1.2
	2200	7.9		2110	7.9
			31	0330	0.9
				0940	7.8
			W	1550	1.0
				2200	8.2

JUNE

	Time	m		Time	m
1	0420	0.6	**16**	0525	1.1
	1025	8.0		1135	7.4
TH	1640	0.8	F	1740	1.5
	2245	8.5	O	2345	7.8
2	0510	0.3	**17**	0605	1.1
	1115	8.1		1215	7.4
F	1730	0.7	SA	1820	1.5
●	2335	8.6			
3	0600	0.2	**18**	0025	7.7
	1210	8.2		0645	1.1
SA	1820	0.6	SU	1250	7.3
				1900	1.6
4	0025	8.7	**19**	0105	7.7
	0650	0.1		0720	1.2
SU	1300	8.2	M	1330	7.3
	1915	0.7		1935	1.7
5	0120	8.6	**20**	0140	7.6
	0745	0.2		0800	1.3
M	1355	8.1	TU	1410	7.2
	2005	0.8		2015	1.7
6	0215	8.4	**21**	0220	7.5
	0840	0.4		0835	1.3
TU	1450	7.9	W	1445	7.2
	2105	1.0		2055	1.8
7	0315	8.2	**22**	0300	7.4
	0935	0.6		0920	1.4
W	1550	7.8	TH	1530	7.1
	2205	1.2		2140	1.8
8	0415	7.9	**23**	0345	7.3
	1035	0.9		1000	1.5
TH	1650	7.7	F	1615	7.1
	2305	1.3		2225	1.9
9	0515	7.7	**24**	0430	7.2
	1140	1.1		1050	1.6
F	1755	7.6	SA	1700	7.1
				2315	1.8
10	0010	1.4	**25**	0525	7.1
	0620	7.5		1140	1.6
SA	1240	1.2	SU	1755	7.2
	1855	7.6			
11	0115	1.4	**26**	0010	1.7
	0725	7.4		0620	7.2
SU	1340	1.3	M	1235	1.5
	1955	7.6		1845	7.4
12	0210	1.3	**27**	0105	1.5
	0825	7.4		0715	7.3
M	1435	1.4	TU	1330	1.4
	2045	7.6		1940	7.7
13	0305	1.2	**28**	0205	1.2
	0915	7.4		0810	7.4
TU	1525	1.4	W	1425	1.2
	2135	7.7		2035	7.9
14	0355	1.1	**29**	0300	0.9
	1005	7.4		0910	7.6
W	1615	1.4	TH	1520	1.0
	2225	7.8		2130	8.2
15	0445	1.1	**30**	0355	0.5
	1050	7.4		1005	7.8
TH	1700	1.4	F	1615	0.8
	2305	7.8		2225	8.4

JULY

	Time	m		Time	m
1	0450	0.3	**16**	0545	1.1
	1055	8.0		1150	7.2
SA	1710	0.7	SU	1800	1.5
●	2320	8.6	O		
2	0540	0.1	**17**	0005	7.6
	1150	8.1		0620	1.1
SU	1805	0.6	M	1230	7.3
				1835	1.5
3	0010	8.7	**18**	0040	7.6
	0635	0.0		0700	1.1
M	1245	8.2	TU	1305	7.3
	1900	0.6		1910	1.5
4	0105	8.6	**19**	0120	7.6
	0730	0.1		0735	1.1
TU	1340	8.1	W	1340	7.3
	1955	0.6		1950	1.5
5	0200	8.4	**20**	0155	7.5
	0825	0.3		0810	1.1
W	1435	8.0	TH	1420	7.3
	2050	0.8		2025	1.5
6	0300	8.2	**21**	0230	7.5
	0920	0.5		0850	1.2
TH	1530	7.9	F	1455	7.3
	2145	0.9		2110	1.5
7	0355	7.9	**22**	0315	7.4
	1015	0.8		0930	1.2
F	1630	7.7	SA	1540	7.3
	2245	1.1		2155	1.5
8	0455	7.6	**23**	0400	7.3
	1115	1.0		1015	1.3
SA	1725	7.6	SU	1625	7.3
	2345	1.3		2240	1.5
9	0555	7.4	**24**	0450	7.2
	1210	1.3		1105	1.4
SU	1825	7.5	M	1715	7.4
				2335	1.4
10	0045	1.4	**25**	0545	7.2
	0655	7.2		1200	1.4
M	1310	1.4	TU	1810	7.5
	1925	7.4			
11	0145	1.4	**26**	0035	1.3
	0755	7.1		0640	7.2
TU	1405	1.5	W	1300	1.4
	2020	7.4		1910	7.6
12	0240	1.4	**27**	0135	1.1
	0850	7.1		0745	7.3
W	1500	1.6	TH	1400	1.3
	2110	7.5		2010	7.8
13	0330	1.3	**28**	0235	0.9
	0940	7.1		0845	7.5
TH	1550	1.6	F	1500	1.1
	2200	7.5		2110	8.1
14	0420	1.2	**29**	0335	0.6
	1030	7.1		0945	7.7
F	1635	1.6	SA	1600	0.8
	2245	7.6		2205	8.3
15	0505	1.2	**30**	0430	0.3
	1110	7.2		1040	7.9
SA	1720	1.5	SU	1655	0.6
	2325	7.6	●	2305	8.5
			31	0525	0.1
				1135	8.1
			M	1750	0.5

AUGUST

	Time	m		Time	m
1	0000	8.6	**16**	0015	7.6
	0620	0.0		0630	1.0
TU	1230	8.2	W	1235	7.4
	1845	0.4		1845	1.2
2	0050	8.5	**17**	0050	7.7
	0710	0.1		0705	0.9
W	1320	8.2	TH	1310	7.5
	1935	0.4		1920	1.2
3	0145	8.4	**18**	0125	7.6
	0805	0.2		0740	0.9
TH	1415	8.1	F	1345	7.5
	2030	0.6		2000	1.2
4	0235	8.1	**19**	0205	7.6
	0855	0.5		0820	1.0
F	1505	7.9	SA	1425	7.5
	2120	0.8		2040	1.2
5	0330	7.8	**20**	0245	7.5
	0950	0.8		0900	1.1
SA	1600	7.7	SU	1505	7.5
	2215	1.0		2125	1.2
6	0425	7.5	**21**	0330	7.3
	1040	1.1		0945	1.2
SU	1655	7.5	M	1555	7.5
	2315	1.3		2215	1.2
7	0525	7.2	**22**	0420	7.2
	1140	1.4		1035	1.3
M	1750	7.3	TU	1645	7.5
				2310	1.3
8	0010	1.4	**23**	0515	7.1
	0625	7.0		1130	1.4
TU	1235	1.6	W	1745	7.5
	1850	7.2			
9	0110	1.5	**24**	0010	1.3
	0725	6.8		0620	7.1
W	1335	1.8	TH	1235	1.5
	1945	7.2		1845	7.5
10	0210	1.6	**25**	0115	1.1
	0820	6.8		0725	7.2
TH	1430	1.8	F	1340	1.4
	2040	7.2		1950	7.7
11	0305	1.5	**26**	0220	0.9
	0915	6.9		0830	7.4
F	1525	1.8	SA	1445	1.1
	2135	7.3		2055	7.9
12	0355	1.4	**27**	0320	0.6
	1005	7.0		0930	7.6
SA	1610	1.7	SU	1545	0.9
	2220	7.4		2155	8.2
13	0440	1.3	**28**	0420	0.4
	1045	7.1		1025	7.9
SU	1655	1.6	M	1640	0.6
	2300	7.5		2250	8.4
14	0520	1.1	**29**	0510	0.2
	1125	7.2		1120	8.1
M	1735	1.4	TU	1735	0.4
	2340	7.6	●	2345	8.4
15	0555	1.0	**30**	0600	0.1
	1205	7.3		1210	8.2
TU	1810	1.3	W	1825	0.3
O					
			31	0035	8.4
				0650	0.2
			TH	1300	8.2
				1915	0.4

CANADA – SAINT JOHN, N.B.

LAT 45°16'N LONG 66°04'W

TIME ZONE **+0400** TIMES AND HEIGHTS OF HIGH AND LOW WATERS

SEPTEMBER

	Time	m		Time	m
1	0120	8.2	**16**	0100	7.7
F	0740	0.4	SA	0710	0.8
	1345	8.1		1315	7.8
	2005	0.5		1930	0.9
2	0210	8.0	**17**	0135	7.7
SA	0825	0.6	SU	0750	0.9
	1435	7.9		1355	7.8
	2050	0.8		2015	0.9
3	0300	7.7	**18**	0220	7.6
SU	0915	1.0	M	0830	1.1
	1525	7.7		1440	7.7
	2145	1.0		2100	1.0
4	0350	7.3	**19**	0305	7.4
M	1005	1.3	TU	0920	1.2
	1615	7.4		1525	7.6
	2235	1.3		2150	1.1
5	0445	7.0	**20**	0355	7.2
TU	1100	1.7	W	1015	1.4
	1710	7.2		1620	7.5
	2335	1.6		2245	1.2
6	0545	6.8	**21**	0455	7.1
W	1200	1.9	TH	1115	1.6
	1810	7.0		1725	7.5
				2350	1.3
7	0035	1.8	**22**	0605	7.1
TH	0645	6.6	F	1220	1.6
	1300	2.1		1830	7.5
	1910	7.0			
8	0135	1.8	**23**	0100	1.2
F	0745	6.6	SA	0710	7.2
	1400	2.1		1330	1.5
	2010	7.0		1940	7.6
9	0230	1.7	**24**	0205	1.0
SA	0840	6.7	SU	0815	7.4
	1450	1.9		1435	1.2
	2100	7.1		2045	7.8
10	0320	1.6	**25**	0305	0.8
SU	0930	6.9	M	0920	7.7
	1540	1.8		1535	0.9
	2150	7.3		2140	8.1
11	0405	1.4	**26**	0405	0.5
M	1015	7.1	TU	1010	7.9
	1625	1.6		1625	0.6
	2230	7.5		2235	8.2
12	0445	1.2	**27**	0455	0.4
TU	1055	7.3	W	1105	8.1
	1705	1.3		1720	0.4
	2310	7.6	●	2325	8.3
13	0525	1.0	**28**	0545	0.3
W	1130	7.5	TH	1150	8.2
	1740	1.2		1805	0.4
O	2345	7.7			
14	0600	0.9	**29**	0015	8.2
TH	1205	7.6	F	0630	0.4
	1815	1.0		1235	8.2
				1850	0.4
15	0020	7.8	**30**	0100	8.0
F	0635	0.8	SA	0715	0.6
	1240	7.7		1320	8.1
	1855	0.9		1935	0.6

OCTOBER

	Time	m		Time	m
1	0145	7.8	**16**	0110	7.8
SU	0800	0.9	M	0725	0.9
	1405	7.9		1330	8.1
	2020	0.8		1950	0.7
2	0230	7.5	**17**	0155	7.7
M	0845	1.2	TU	0810	1.1
	1450	7.6		1415	8.0
	2110	1.1		2040	0.8
3	0320	7.2	**18**	0245	7.5
TU	0930	1.6	W	0900	1.3
	1540	7.4		1505	7.8
	2200	1.5		2130	1.0
4	0410	6.9	**19**	0340	7.3
W	1020	1.9	TH	0955	1.5
	1630	7.1		1605	7.6
	2255	1.7		2230	1.2
5	0505	6.7	**20**	0445	7.2
TH	1120	2.2	F	1100	1.6
	1730	6.9		1710	7.5
	2350	1.9		2340	1.3
6	0605	6.6	**21**	0550	7.2
F	1220	2.3	SA	1210	1.6
	1830	6.8		1820	7.5
7	0050	2.0	**22**	0045	1.2
SA	0705	6.6	SU	0700	7.3
	1320	2.3		1315	1.5
	1930	6.8		1930	7.6
8	0150	1.9	**23**	0150	1.1
SU	0805	6.7	M	0805	7.5
	1415	2.1		1420	1.3
	2025	7.0		2030	7.7
9	0240	1.8	**24**	0250	0.9
M	0855	6.9	TU	0905	7.7
	1505	1.9		1520	1.0
	2115	7.2		2130	7.9
10	0330	1.5	**25**	0345	0.8
TU	0935	7.2	W	0955	7.9
	1550	1.6		1610	0.7
	2155	7.4		2220	8.0
11	0410	1.3	**26**	0435	0.7
W	1015	7.4	TH	1045	8.1
	1630	1.3		1700	0.6
	2235	7.6		2310	8.0
12	0450	1.1	**27**	0520	0.7
TH	1055	7.7	F	1130	8.1
	1705	1.0		1745	0.5
	2315	7.8	●	2355	7.9
13	0525	0.9	**28**	0605	0.8
F	1130	7.9	SA	1210	8.1
	1745	0.8		1830	0.6
O	2350	7.8			
14	0605	0.8	**29**	0035	7.8
SA	1210	8.0	SU	0650	1.0
	1825	0.6		1250	8.0
				1910	0.8
15	0030	7.9	**30**	0120	7.6
SU	0640	0.8	M	0730	1.2
	1245	8.1		1335	7.8
	1905	0.6		1955	1.0
			31	0200	7.4
			TU	0810	1.5
				1415	7.6
				2035	1.2

NOVEMBER

	Time	m		Time	m
1	0245	7.2	**16**	0230	7.7
W	0855	1.8	TH	0845	1.2
	1500	7.4		1450	8.0
	2120	1.5		2115	0.8
2	0335	6.9	**17**	0330	7.5
TH	0945	2.0	F	0945	1.4
	1550	7.1		1550	7.8
	2210	1.8		2220	1.0
3	0425	6.7	**18**	0430	7.4
F	1035	2.3	SA	1045	1.5
	1645	6.9		1700	7.6
	2305	2.0		2325	1.2
4	0520	6.6	**19**	0540	7.3
SA	1130	2.4	SU	1155	1.6
	1740	6.8		1805	7.5
5	0005	2.1	**20**	0030	1.2
SU	0620	6.6	M	0645	7.4
	1230	2.4		1300	1.5
	1840	6.8		1915	7.5
6	0100	2.0	**21**	0135	1.2
M	0715	6.7	TU	0745	7.5
	1325	2.2		1405	1.3
	1935	6.9		2015	7.5
7	0155	1.9	**22**	0230	1.1
TU	0805	6.9	W	0845	7.7
	1420	2.0		1500	1.1
	2030	7.1		2115	7.6
8	0240	1.7	**23**	0325	1.0
W	0850	7.2	TH	0935	7.9
	1505	1.6		1555	0.9
	2115	7.3		2205	7.7
9	0325	1.4	**24**	0415	1.0
TH	0935	7.5	F	1025	8.0
	1550	1.3		1640	0.8
	2200	7.5		2250	7.7
10	0410	1.2	**25**	0500	1.0
F	1015	7.8	SA	1105	8.0
	1635	0.9		1725	0.8
	2240	7.7	●	2335	7.7
11	0450	1.0	**26**	0545	1.1
SA	1055	8.1	SU	1150	8.0
	1715	0.6		1810	0.8
O	2320	7.9			
12	0535	0.8	**27**	0015	7.6
SU	1140	8.3	M	0625	1.3
	1800	0.5		1230	7.9
				1850	0.9
13	0005	8.0	**28**	0055	7.5
M	0615	0.8	TU	0705	1.4
	1220	8.3		1310	7.8
	1845	0.4		1930	1.1
14	0050	7.9	**29**	0135	7.3
TU	0700	0.9	W	0745	1.6
	1310	8.3		1350	7.6
	1930	0.5		2010	1.3
15	0140	7.8	**30**	0215	7.2
W	0750	1.0	TH	0825	1.8
	1400	8.2		1430	7.4
	2020	0.6		2050	1.5

DECEMBER

	Time	m		Time	m
1	0300	7.0	**16**	0315	7.7
F	0905	2.0	SA	0930	1.1
	1515	7.2		1540	7.9
	2135	1.7		2200	0.8
2	0345	6.9	**17**	0415	7.6
SA	0955	2.1	SU	1030	1.3
	1600	7.0		1640	7.7
	2220	1.8		2305	1.0
3	0435	6.8	**18**	0515	7.5
SU	1045	2.3	M	1135	1.4
	1650	6.9		1745	7.5
	2310	1.9			
4	0525	6.7	**19**	0005	1.2
M	1140	2.3	TU	0620	7.4
	1745	6.8		1240	1.4
				1850	7.3
5	0005	2.0	**20**	0110	1.3
TU	0620	6.8	W	0725	7.5
	1235	2.2		1340	1.3
	1845	6.8		1955	7.3
6	0100	1.9	**21**	0205	1.3
W	0715	7.0	TH	0820	7.6
	1330	1.9		1440	1.2
	1940	7.0		2050	7.3
7	0150	1.7	**22**	0305	1.3
TH	0805	7.2	F	0915	7.6
	1420	1.6		1535	1.1
	2030	7.2		2145	7.3
8	0245	1.5	**23**	0355	1.3
F	0850	7.6	SA	1000	7.7
	1510	1.2		1620	1.0
	2120	7.4		2230	7.4
9	0330	1.3	**24**	0440	1.3
SA	0940	7.9	SU	1045	7.8
	1600	0.9		1705	1.0
	2205	7.6		2315	7.4
10	0420	1.0	**25**	0525	1.4
SU	1025	8.2	M	1130	7.8
	1645	0.6		1750	1.0
	2255	7.8	●	2355	7.4
11	0505	0.8	**26**	0605	1.4
M	1115	8.4	TU	1210	7.8
	1735	0.3		1825	1.0
O	2340	8.0			
12	0555	0.7	**27**	0035	7.3
TU	1200	8.5	W	0640	1.5
	1825	0.2		1245	7.7
				1905	1.1
13	0030	8.0	**28**	0110	7.3
W	0645	0.7	TH	0720	1.6
	1250	8.5		1325	7.6
	1915	0.2		1940	1.2
14	0125	8.0	**29**	0150	7.2
TH	0735	0.8	F	0755	1.6
	1345	8.4		1400	7.5
	2005	0.4		2020	1.3
15	0215	7.9	**30**	0225	7.1
F	0830	0.9	SA	0835	1.7
	1440	8.2		1440	7.3
	2105	0.6		2100	1.4
			31	0305	7.1
			SU	0915	1.8
				1520	7.2
				2140	1.6

PART II

TIME AND HEIGHT DIFFERENCES

FOR PREDICTING THE TIDE AT

SECONDARY PORTS

For use of Part II see pages x–xxi

UNITED STATES; CANADA, BAY OF FUNDY

No.	PLACE	Lat. N.	Long. W.	TIME DIFFERENCES MHW	TIME DIFFERENCES MLW	HEIGHT DIFFERENCES (IN METRES) MHWS	MHWN	MLWN	MLWS	M.L. Z_0 m.	
				Zone +0500							
2809	**BOSTON**	(see page 176)				**3.1**	**2.7**	**0.4**	**0.0**		
	Kennebec River										
2819	Fort Popham	43 45	69 47	−0002	−0005	−0.3	−0.2	−0.1	−0.1	1.37	
2820	Bath	43 55	69 49	+0050	+0108	−1.0	−0.9	−0.1	0.0	1.04	
2821	Richmond	44 05	69 48	+0237	+0250	−1.3	−1.2	−0.2	0.0	0.85	
2824	Monhegan Island	43 46	69 19	−0025	−0018	−0.2	−0.1	0.0	−0.1	1.43	
2825	Tenants Harbour	43 58	69 12	−0022	−0020	0.0	0.0	0.0	−0.1	1.52	
	Penobscot Bay										
2827	Matinicus Harbour	43 52	68 53	−0028	−0021	−0.1	0.0	0.0	−0.1	1.46	
2828	Vinalhaven	44 03	68 50	−0024	−0015	0.0	0.0	0.0	−0.1	1.52	
2829	Pulpit Harbour	44 09	68 53	−0025	−0025	+0.2	+0.2	0.0	−0.1	1.62	
2831	Rockland	44 06	69 06	−0025	−0025	+0.2	+0.1	0.0	−0.1	1.58	
2832	Belfast	44 25	69 00	−0020	−0020	+0.2	+0.2	0.0	−0.1	1.65	
2833	Bangor	44 48	68 46	−0040	−0015	+1.4	+1.1	+0.2	−0.1	2.19	
2835	Centre Harbour	44 16	68 35	−0024	−0016	+0.3	+0.2	0.0	−0.1	1.65	
2864	**SAINT JOHN, N.B.**	(see page 179)				**8.0**	**6.9**	**1.7**	**0.6**		
2837	Blue Hill Harbour	44 24	68 34	−0055	−0055	−4.6	−4.0	−1.3	−0.7	1.65	
2838	Bar Harbour	44 23	68 12	−0110	−0110	−4.5	−3.9	−1.3	−0.7	1.74	
2840	Prospect Harbour	44 24	68 01	−0105	−0108	−4.5	−3.9	−1.3	−0.6	1.74	
2842	Jonesport	44 32	67 36	−0105	−0105	−4.2	−3.6	−1.2	−0.7	1.89	
2843	Cutler, Little River	44 39	67 13	−0110	−0115	−3.5	−3.1	−1.2	−0.7	2.16	
2845	West Quoddy Head	44 49	66 59	−0052	−0040	−2.0	−1.7	−0.3	0.0	3.40	*
2846	Eastport ..... **U**	44 54	66 59	−0102	−0054	−1.1	−0.9	−0.1	+0.1	3.85	*
	Canada			Zone +0400							
	BAY OF FUNDY										
	Grand Manan Island										
2847	Outer Wood Island	44 36	66 48	−0027	−0029	−2.5	−2.2	−0.2	+0.1	3.09	d
2849	North Head	44 46	66 45	−0004	−0007	−1.5	−1.3	−0.2	0.0	3.56	d
2853	Welshpool	44 53	66 57	+0003	+0008	−1.3	−1.0	−0.2	+0.1	3.70	d
	Passamaquoddy Bay										
2858	St. Andrews	45 04	67 03	+0011	+0018	−0.9	−0.7	−0.1	+0.1	3.90	d
2860	Back Bay	45 03	66 52	−0003	−0007	−1.2	−1.0	+0.1	+0.3	3.85	d
2862	Lepreau Bay	45 07	66 29	−0001	+0003	−0.8	−0.5	−0.2	+0.2	4.0	dx
2864	SAINT JOHN, N.B.	45 16	66 04	STANDARD PORT			See Table V			4.42	
2866	St. Martins	45 21	65 32	+0011	+0007	+1.5	+1.5	+0.5	+0.4	5.28	
	CHIGNECTO BAY										
2869	Herring Cove	45 34	64 58	+0013	+0016	+2.4	+2.4	+0.6	+0.4	5.81	d
2871	Grindstone Island	45 43	64 37	+0016	+0025	+3.9	+3.6	+0.8	+0.4	6.56	d
	River Petitcodiac										
2872	Hopewell Cape	45 51	64 35	+0010	+0029	+4.7	+4.2	+1.1	+0.5	6.94	*
2874	Moncton	46 05	64 46	+0045	⊙	⊙	⊙	⊙	⊙	⊙	*
2875	Salisbury	45 59	65 05	+0130	⊙	⊙	⊙	⊙	⊙	⊙	*
	Cumberland Basin										
2877	Amherst Harbour	45 50	64 17	+0035	+0045	+5.6	+5.0	+0.9	+0.6	7.4	dx
2878	Joggins Wharf	45 41	64 28	+0019	+0025	+4.2	+3.9	+0.7	+0.4	6.61	
2880	Cape Capstan	45 28	64 51	+0011	+0013	+2.5	+2.3	+0.6	+0.4	5.75	d
	MINAS BASIN AND CHANNEL										
2881	Ile Haute	45 15	65 00	+0011	+0006	+2.5	+2.2	+0.3	+0.3	6.0	dx
2883	West Advocate	45 21	64 49	0000	0000	+2.5	+2.3	+0.6	+0.4	5.76	d
2884	Port Greville	45 24	64 33	+0029	+0031	+3.5	+3.3	+0.8	+0.5	6.35	
2885	Parrsboro	45 22	64 20	+0050	+0043	+4.5	+4.1	+0.7	+0.3	6.70	
2886	Five Islands	45 23	64 04	+0057	+0057	+5.6	+5.1	+1.0	+0.5	7.38	
2888	Truro	45 22	63 20	+0135	⊙	+0.1	−0.5	⊙	⊙	⊙	
2891	Burntcoat Head	45 18	63 49	+0105	+0110	+6.0	+5.4	+1.0	+0.5	7.53	

SEASONAL CHANGES IN MEAN LEVEL

No.	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sep. 1	Oct. 1	Nov. 1	Dec. 1	Jan. 1
2740	−0.1	−0.1	−0.1	0.0	0.0	0.0	0.0	0.0	+0.1	+0.1	0.0	0.0	−0.1
2762 – 2777	−0.1	−0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+0.1	0.0	0.0	−0.1
2779 – 2891	Negligible												

CANADA: NOVA SCOTIA, CAPE BRETON ISLAND

No.	PLACE	Lat. N.	Long. W.	TIME DIFFERENCES MHW (Zone +0400)	TIME DIFFERENCES MLW (Zone +0400)	HEIGHT DIFFERENCES (IN METRES) MHWS	MHWN	MLWN	MLWS	M.L. Z_0 m.	
2864	**SAINT JOHN, N.B.**	(see page 179)				**8.0**	**6.9**	**1.7**	**0.6**		
	Avon River										
2893	Hantsport	45 04	64 10	+0105	+0118	+5.4	+4.9	+0.1	+0.1	7.07	
2894	Windsor	45 00	64 08	+0103	○	○	○	○	○	○	
2897	Scotsmans Bay	45 19	64 26	+0016	+0014	+3.6	+3.4	+0.6	+0.3	6.36	
	BAY OF FUNDY										
2899	Margaretsville	45 03	65 04	−0009	−0009	+1.7	+2.0	+0.3	+0.5	5.41	
	Annapolis Basin										
2901	Digby Pier	44 38	65 45	−0017	−0018	+0.2	+0.3	+0.2	+0.2	4.54	
2902	Annapolis Royal	44 45	65 30	+0006	+0010	+0.7	+0.9	+0.1	+0.3	4.8	dx
	St.Mary Bay										
2904	Tiverton	44 23	66 13	−0044	−0045	−2.5	−2.1	−0.4	+0.1	3.06	
2905	Westport	44 16	66 21	−0039	−0042	−2.5	−2.1	−0.5	0.0	3.02	
2906	Meteghan	44 12	66 10	−0051	−0054	−2.6	−2.2	−0.4	+0.1	3.01	
2907	Weymouth	44 25	66 00	−0023	−0017	−2.2	−1.6	−0.3	0.0	3.2	dx
2910	Yarmouth ..... **C**	43 50	66 07	−0108	−0117	−3.6	−3.0	−0.6	−0.1	2.47	
2912	Woods Harbour	43 32	65 44	−0206	−0238	−4.8	−4.1	−0.8	0.0	1.85	
2913	Flat Island	43 30	66 00	−0131	−0150	−4.4	−3.7	−0.7	0.0	2.05	
2935	**HALIFAX**	(see page 182)				**1.8**	**1.5**	**0.5**	**0.3**		
	ATLANTIC OCEAN										
2914	Clark's Harbour	43 27	65 38	+0137	+0056	+1.1	+1.0	+0.2	0.0	1.58	
2915	Barrington Passage	43 32	65 37	+0052	+0029	+0.4	+0.5	+0.1	+0.1	1.33	
2917	Shelburne	43 45	65 19	+0041	+0019	+0.4	+0.4	+0.4	+0.3	1.40	
2919	Lockeport	43 42	65 07	+0025	+0010	+0.2	+0.3	+0.1	+0.1	1.20	
2922	Port Mouton	43 56	64 51	+0020	+0005	+0.1	+0.1	+0.2	+0.1	1.15	
2923	Liverpool	44 03	64 43	+0002	+0008	+0.1	+0.1	+0.1	0.0	1.10	
	Lahave River										
2926	Krout Point	44 17	64 21	+0004	+0001	+0.2	+0.2	+0.1	0.0	1.2	dx
2927	Bridgewater	44 23	64 31	+0009	+0006	+0.3	+0.1	+0.2	+0.1	1.2	dx
2928	Lunenburg	44 22	64 19	0000	−0002	+0.3	+0.3	+0.3	+0.2	1.29	
	Mahone Bay										
2929	Mahone Harbour	44 27	64 22	+0003	−0001	+0.3	+0.3	+0.3	+0.2	1.3	dx
2930	Chester	44 33	64 15	+0001	−0004	+0.2	+0.2	0.0	−0.1	1.16	d
2932	Indian Harbour	44 31	63 57	+0006	+0003	+0.2	+0.2	+0.2	+0.1	1.19	
2935	HALIFAX	44 40	63 35	STANDARD PORT			See Table V			1.02	
2939	Jeddore Harbour	44 46	63 03	+0003	+0019	+0.3	+0.2	+0.2	+0.1	1.22	d
2940	Murphy Cove	44 47	62 46	−0016	−0013	+0.1	+0.2	+0.2	+0.2	1.18	
2942	Sheet Harbour	44 55	62 32	−0005	−0003	+0.1	+0.2	+0.2	+0.1	1.16	
2946	Sonora	45 03	61 55	−0008	+0002	+0.1	+0.1	+0.1	+0.1	1.10	
2948	Isaac's Harbour	45 11	61 40	−0016	−0009	+0.2	+0.1	+0.3	+0.1	1.21	
3159	**ARGENTIA**	(see page 200)				**2.2**	**1.7**	**0.7**	**0.3**		
2950	Larry's River	45 13	61 23	−0037	+0014	−0.3	−0.1	0.0	+0.1	1.14	
2952	Sable Island	43 56	59 54	−0008	+0030	−0.6	−0.3	−0.1	+0.1	1.01	
2954	Canso Harbour	45 20	61 00	−0035	+0020	−0.4	−0.2	−0.1	0.0	1.07	t
2956	Guysborough	45 23	61 30	−0020	+0050	−0.8	−0.6	−0.3	−0.2	0.8	dx
	CAPE BRETON ISLAND										
	Gut of Canso										
2958	Port Hastings	45 39	61 24	−0041	+0017	−0.5	−0.3	−0.2	−0.1	0.91	
2959	Point Tupper ..... **C**	45 36	61 22	−0040	+0015	−0.6	−0.4	−0.3	−0.1	0.88	
2960	Arichat	45 31	61 02	−0049	+0010	−0.6	−0.4	−0.3	−0.1	0.85	
2961	Cannes	45 38	60 58	−0032	+0034	−0.8	−0.5	−0.4	−0.2	0.73	
2964	Gabarus	45 50	60 09	0000	0000	−0.7	−0.5	−0.2	−0.1	0.9	dx
2965	Louisburg	45 55	59 58	−0015	0000	−0.7	−0.4	−0.2	0.0	0.91	t

○ No data.
△ Tide is usually diurnal.
C Tides predicted in Canadian Tide Tables.
d Differences approximate.
p For predictions use harmonic constants (see Part III).
t Time differences approximate.
x M.L. inferred.

PART III

HARMONIC CONSTANTS

These data are intended for use with the Simplified Harmonic Method of Tidal Prediction. This may be carried out either by calculator or computer using NP 159A (the PC version of the Simplified Harmonic Method) or other program based on the Simplified Harmonic Method or Forms A and B at the back of this book as described on pages xxii to xxiv.

Whichever method is used the results will not be exactly the same as those in Part I, which use many more harmonic constituents—sometimes in excess of 100—and thus can be expected to be of greater accuracy.

Except where indicated to the contrary, harmonic constant values are based on observations lasting for at least one month.

CANADA

No.	PLACE	M.L. Z_0 m.	HARMONIC CONSTANTS M_2 g°	M_2 H.m	S_2 g°	S_2 H.m	Zone +0400 K_1 g°	K_1 H.m	O_1 g°	O_1 H.m	S.W. CORRECTIONS 1/4 diurnal f_4	1/4 diurnal F_4	1/6 diurnal f_6	1/6 diurnal F_6
2866	St. Martins	5.28	346	3.69	028	0.58	135	0.16	120	0.12	⊙	⊙	⊙	⊙
2869	Herring Cove	5.81	348	4.06	029	0.59	138	0.23	135	0.11	230	0.005	035	0.001
2871	Grindstone Island	6.56	351	4.72	035	0.74	139	0.18	121	0.15	233	0.007	⊙	⊙
2872	Hopewell Cape	6.94	351	4.96	035	0.81	140	0.18	125	0.14	260	0.010	⊙	⊙
2878	Joggins Wharf	6.61	351	4.88	031	0.72	134	0.16	119	0.13	230	0.008	⊙	⊙
2880	Cape Capstan	5.75	347	4.13	022	0.66	134	0.19	125	0.10	218	0.005	⊙	⊙
2883	West Advocate	5.76	342	4.09	026	0.68	122	0.18	105	0.10	198	0.004	⊙	⊙
2884	Port Greville	6.35	356	4.61	037	0.69	136	0.17	132	0.16	212	0.004	⊙	⊙
2885	Parrsboro	6.70	005	5.05	049	0.75	143	0.19	137	0.13	330	0.004	⊙	⊙
2886	Five Islands	7.38	009	5.42	054	0.78	148	0.17	135	0.13	247	0.001	⊙	⊙
2891	Burntcoat Head	7.53	014	5.64	059	0.83	154	0.14	140	0.12	279	0.003	⊙	⊙
2897	Scotsmans Bay	6.36	349	4.67	032	0.67	138	0.16	107	0.12	198	0.003	⊙	⊙
2899	Margaretsville	5.41	337	3.86	023	0.42	128	0.16	115	0.13	297	0.003	⊙	⊙
2901	Digby Pier	4.54	334	3.15	010	0.50	132	0.15	119	0.12	224	0.002	311	0.002
2904	Tiverton	3.06	320	2.09	349	0.34	126	0.13	116	0.11	345	0.011	⊙	⊙
2905	Westport	3.02	322	2.14	355	0.32	122	0.14	113	0.11	⊙	⊙	⊙	⊙
2906	Meteghan	3.01	316	2.03	340	0.32	122	0.15	113	0.12	⊙	⊙	⊙	⊙
2910	Yarmouth	2.47	306	1.67	337	0.28	124	0.14	108	0.10	⊙	⊙	⊙	⊙
2912	Woods Harbour	1.85	273	1.13	300	0.18	111	0.14	098	0.09	081	0.052	⊙	⊙
2913	Flat Island	2.05	293	1.31	326	0.19	114	0.14	101	0.10	044	0.035	⊙	⊙
2914	Clark's Harbour	1.58	272	1.09	302	0.17	106	0.15	090	0.10	084	0.036	⊙	⊙
2915	Barrington Passage	1.33	254	0.80	284	0.12	094	0.13	072	0.07	⊙	⊙	⊙	⊙
2917	Shelburne	1.40	249	0.66	246	0.12	095	0.12	074	0.07	⊙	⊙	⊙	⊙
2919	Lockeport	1.20	243	0.70	269	0.14	087	0.13	060	0.08	⊙	⊙	⊙	⊙
2922	Port Mouton	1.15	241	0.60	270	0.11	081	0.12	051	0.07	311	0.029	⊙	⊙
2923	Liverpool	1.10	237	0.65	267	0.12	077	0.14	077	0.08	313	0.069	⊙	⊙
2928	Lunenburg	1.29	234	0.63	257	0.14	068	0.11	058	0.06	298	0.077	⊙	⊙
2932	Indian Harbour	1.19	237	0.64	263	0.13	069	0.12	042	0.06	294	0.063	⊙	⊙
2935	**HALIFAX**	1.02	234	0.63	263	0.14	063	0.11	039	0.04	293	0.074	108	0.008
2939	Jeddore Harbour	1.22	240	0.65	273	0.14	065	0.09	023	0.04	302	0.142	⊙	⊙
2940	Murphy Cove	1.18	228	0.61	259	0.13	045	0.10	014	0.04	297	0.094	⊙	⊙
2942	Sheet Harbour	1.16	233	0.62	261	0.13	043	0.10	010	0.03	297	0.086	⊙	⊙
2946	Sonora	1.10	233	0.60	262	0.13	030	0.08	338	0.04	307	0.133	⊙	⊙
2948	Isaac's Harbour	1.21	229	0.59	265	0.17	015	0.09	324	0.04	280	0.101	⊙	⊙
2950	Larry's River	1.14	229	0.59	260	0.13	024	0.06	305	0.04	295	0.106	⊙	⊙
2952	Sable Island	1.01	240	0.51	271	0.13	127	0.03	106	0.03	257	0.053	⊙	⊙
2954	Canso Harbour	1.07	231	0.59	260	0.14	348	0.06	279	0.03	⊙	⊙	⊙	⊙
2958	Port Hastings	0.91	229	0.60	266	0.15	351	0.06	275	0.04	293	0.086	⊙	⊙
2959	Point Tupper	0.88	228	0.59	262	0.15	352	0.07	284	0.05	286	0.106	⊙	⊙
2960	Arichat	0.85	225	0.57	273	0.13	352	0.07	274	0.04	285	0.105	⊙	⊙
2961	Cannes	0.73	235	0.56	277	0.12	348	0.05	268	0.04	288	0.152	⊙	⊙
2965	Louisburg	0.91	228	0.50	264	0.12	324	0.06	265	0.06	⊙	⊙	⊙	⊙
2969	North Sydney	0.70	236	0.37	275	0.11	263	0.07	225	0.08	⊙	⊙	⊙	⊙
2974	Ingonish Island	0.82	243	0.37	287	0.10	258	0.07	228	0.09	⊙	⊙	⊙	⊙
2976	Dingwall	0.79	241	0.28	291	0.09	259	0.08	220	0.09	⊙	⊙	⊙	⊙
2977	St. Paul Island	0.72	249	0.31	287	0.10	235	0.08	210	0.09	⊙	⊙	⊙	⊙
2980	Grande Entree	0.56	275	0.19	320	0.07	253	0.12	226	0.11	⊙	⊙	⊙	⊙
2983	Cap-aux-Meules	0.65	280	0.21	319	0.08	248	0.12	222	0.13	⊙	⊙	⊙	⊙
2986	Cheticamp	0.72	250	0.19	294	0.06	262	0.14	235	0.15	⊙	⊙	⊙	⊙
2988	Broad Cove Marsh	0.81	254	0.21	294	0.06	267	0.16	239	0.17	⊙	⊙	⊙	⊙
2990	Port Hood	0.65	267	0.27	305	0.08	268	0.16	239	0.16	⊙	⊙	⊙	⊙
2992	Auld Cove	0.74	275	0.29	330	0.09	282	0.16	238	0.16	⊙	⊙	⊙	⊙
2994	Antigonish	0.85	274	0.27	340	0.09	273	0.15	242	0.18	⊙	⊙	⊙	⊙
2997	**PICTOU**	1.19	282	0.42	331	0.11	267	0.21	235	0.18	⊙	⊙	⊙	⊙
3001	Pugwash Harbour	1.47	319	0.71	030	0.17	268	0.24	239	0.23	⊙	⊙	⊙	⊙
3003	Cape Tormentine	1.61	326	0.45	032	0.12	279	0.22	250	0.22	⊙	⊙	⊙	⊙
3005	Shediac Bay	1.05	300	0.15	060	0.04	255	0.26	230	0.24	⊙	⊙	⊙	⊙

SEASONAL CHANGES IN MEAN LEVEL

No.	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sep. 1	Oct. 1	Nov. 1	Dec. 1	Jan. 1
2710 – 2717	–0.1	–0.1	–0.1	0.0	0.0	0.0	0.0	0.0	+0.1	+0.1	0.0	0.0	–0.1
2719 – 2721	–0.2	–0.1	0.0	+0.1	+0.1	+0.1	0.0	0.0	+0.1	0.0	0.0	–0.1	–0.2
2723 – 2728a	–0.1	–0.1	–0.1	0.0	0.0	0.0	0.0	0.0	+0.1	+0.1	0.0	0.0	–0.1
2730 – 2732	–0.2	–0.1	0.0	0.0	0.0	0.0	0.0	0.0	+0.1	+0.1	0.0	–0.1	–0.2
2734 – 2756	–0.1	–0.1	–0.1	0.0	0.0	0.0	0.0	0.0	+0.1	+0.1	0.0	0.0	–0.1
2762 – 2776	–0.1	–0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+0.1	0.0	0.0	–0.1
2781 – 3005							Negligible						