

JOINT PRODUCTION OF COMMON DATUM CHARTS OF THE STRAITS OF MALACCA AND SINGAPORE

PHASE I

Prepared by a Joint Team from
Indonesia, Japan, Malaysia, Singapore

INTRODUCTION

The Malacca and Singapore Straits are important waterways which constitute critical portions of the major oil transport route from the Middle East to the Far East. Increases in the density of shipping and the size of oil tankers have necessitated a reappraisal of the existing nautical charts of the Straits.

At the 4th Session of the IMCO Sub-Committee on Safety of Navigation in 1967, Japan submitted a proposal to establish a routeing scheme in the Malacca and Singapore Straits. However, it was recognized that before establishing a routeing scheme in the Straits it would be essential to carry out a detailed hydrographic survey and to install the required aids to navigation.

Accordingly, in 1968, the Government of Japan proposed a detailed hydrographic survey of the Malacca and Singapore Straits, to be carried out jointly with the bordering States of Indonesia, Malaysia and Singapore. In 1969, a preliminary hydrographic survey was thus carried out. This was subsequently followed by additional joint hydrographic surveys which were finally completed in 1975. The data obtained were utilized in updating the pertinent nautical charts.

The coastlines, topographic features and other prominent objects appearing on existing charts of the Straits had been based on different geodetic datums, viz. the Revised Kertau Datum in the case of Malaysia-Singapore and the Bangka Datum on the Indonesian side. This gave rise to discrepancies in position-fixing by vessels when they took their bearings off objects located on opposite sides of the Straits. In order to eliminate such discrepancies, charts based on a common geodetic datum would have to be produced. In 1977, Japan and the three other States agreed to produce such charts.

Fortunately, there already existed at Pulau Pisang in the western approach to the Singapore Strait a fundamental point fixed with refe-

rence to WGS-72. This was also the point that had been connected during earlier joint hydrographic surveys when the geographical coordinates on the Revised Kertau Datum used on the Malaysian side and those on the Bangka Datum used on the Indonesian side had been determined. These geodetic data were utilized for the production of the Common Datum Charts. The geographical coordinates of existing smooth sheets were suitably modified by allowing for the differences between the Revised Kertau and/or Bangka Datums and the WGS-72.

These Common Datum Charts are the master sheets to be used for the production of nautical charts. They will require only minimum modifications (e.g. to title, number, notes, etc.) to bring them into line with the standard charts produced by each State.

This report describes Phase I of the work on the Common Datum Charts.

OVERALL PLANNING

Phase I comprised the following :

- (a) Collection and investigation of source materials necessary for the production of the Common Datum Charts.
- (b) Production of Sheets 1, 2 and 3 of the Common Datum Charts.
- (c) Preparation for the execution of subsequent phases.

COMMON DATUM POINT, SPHEROID USED AND PRINCIPAL CHART SPECIFICATIONS

1. Common datum point.

The common datum point was the fundamental point at Pulau Pisang whose Doppler Satellite-derived geodetic coordinates are : $01^{\circ}28'08.1158''$ N, $103^{\circ}15'22.6890''$ E.

2. Spheroid.

The spheroid used was the World Geodetic System 1972 (WGS-72), with $a = 6\,378\,135.00$ metres and $f = 1/298.26$.

3. Principal chart specifications.

- (a) Coverage and scale (see fig. 1) :
 - (i) Sheet 1 : Scale 1:50 000; limits : $00^{\circ}57.8' N - 01^{\circ}16.5' N$, $103^{\circ}21.0' E - 103^{\circ}47.0' E$.
 - (ii) Sheet 2 : Scale 1:50 000; limits : $01^{\circ}02.0' N - 01^{\circ}20.0' N$, $103^{\circ}36.0' E - 104^{\circ}03.0' E$.
 - (iii) Sheet 3 : Scale 1:75 000; limits : $01^{\circ}04.0' N - 01^{\circ}32.0' N$, $103^{\circ}58.0' E - 104^{\circ}37.0' E$.
- (b) Standard parallel : $01^{\circ}15' N$.
- (c) Language : English.

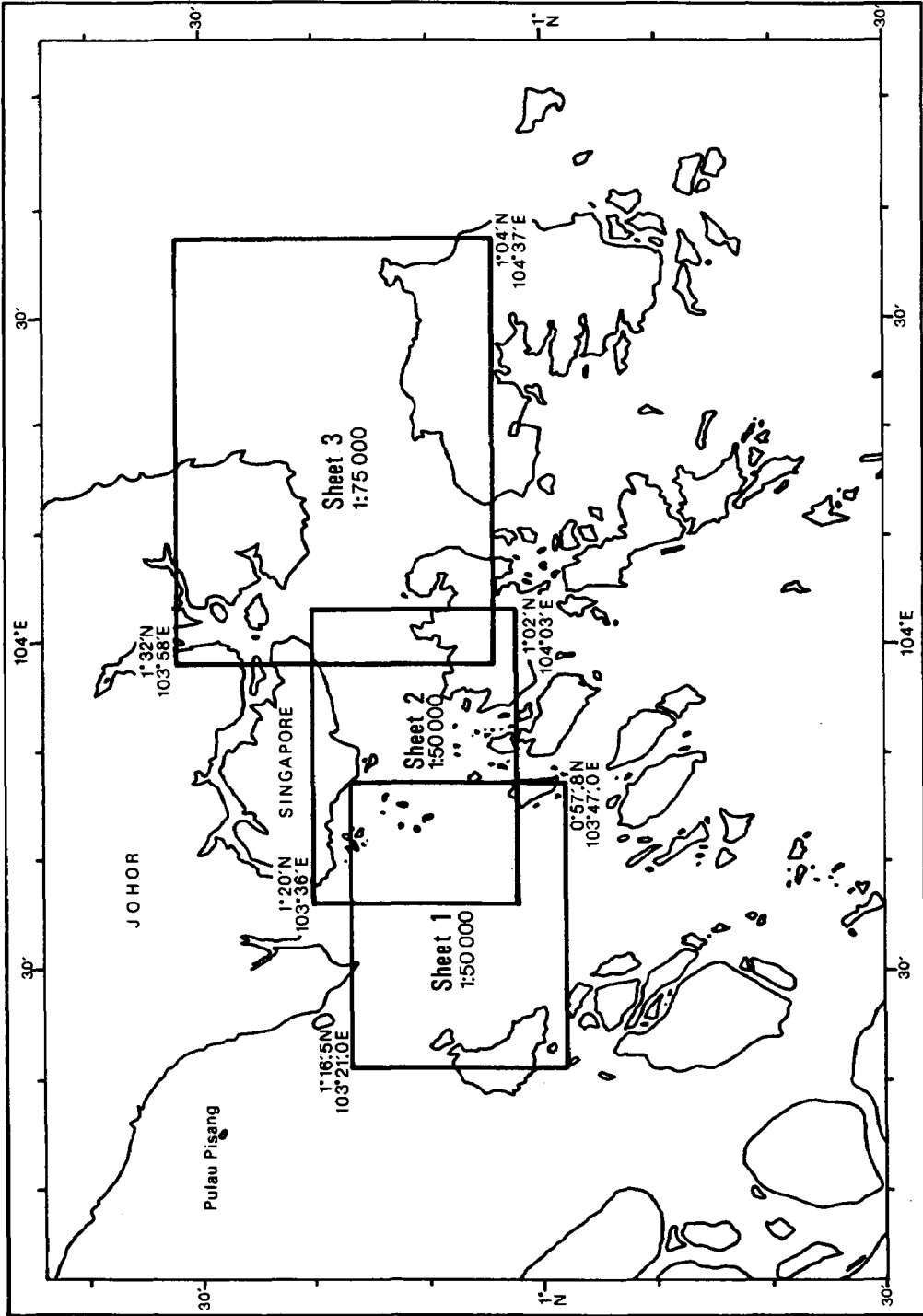


FIG. — Common Datum Chart Coverage — Phase I.

- (d) Unit of measurement : Metre.
- (e) Projection : Mercator.
- (f) Symbols and abbreviations :
 - (i) The Standard Symbols and Abbreviations adopted by the International Hydrographic Organization (IHO).
 - (ii) For Symbols and abbreviations not in the IHO Standard List, those appearing in the Japanese List of Symbols (Chart No. 6011) were used.
- (g) Colour : In four colours.

PRODUCTION OF COMMON DATUM CHARTS

1. Collection of source material.

Each participating country examined all its source material, both national and foreign, collected these together, and sent them to the Hydrographic Department of Japan.

2. Verification of source material and preparation of the specifications.

A joint team from the four participating countries met in Tokyo (10-30 March 1978) to carry out a verification of the assembled source material and to prepare technical specifications for the production of the Common Datum Charts. The joint team also decided upon the methods and the work schedule which included reconnaissance for the subsequent phases.

The joint team arrived at the following conclusions :

(a) For verification of the source material, the basis was the data's reliability for present day navigational requirements, detailed information on each survey and its overall accuracy being taken into account. All data supplied by the four participating countries for compilation were thus verified and graded according to their reliability. It was decided that although the source data supplied were adequate for this purpose, participating countries would be asked to continue to provide additional data as soon as this became available.

(b) The Transit satellite-derived coordinates and the Revised Kertau coordinates of the fundamental point at Pulau Pisang are as follows :

WGS-72	1°28'08.1158" N	103°15'22.6890" E
Revised Kertau	1°28'08.5040" N	103°15'29.1020" E
	- 0.39"	- 6.41"
Difference		

Geographical coordinates on the Revised Kertau Datum and the Bangka Datum for Pulau Pisang as confirmed by the various joint hydrographic surveys are as follows :

Revised Kertau	1°28'08.51" N	103°15'29.15" E
Bangka	1°28'10.32" N	103°15'15.98" E
	- 1.81"	+ 13.17"
Difference		

The difference between the WGS-72 coordinates and those of the Bangka Datum is therefore $- 2.20''$ and $+ 6.76''$.

Accordingly, the smooth sheets that were based on the Revised Kertau Datum had to be adjusted by $- 0.39''$ in latitude and $- 6.41''$ in longitude, and those based on the Bangka Datum by $- 2.20''$ in latitude and $+ 6.76''$ in longitude.

Transformation of the geographical coordinates of individual points based on the Revised Kertau (or the Bangka) Datum to WGS-72 is theoretically possible. However, a convenient and practical alternative method is to adjust for the difference between the WGS-72 and the Revised Kertau (or the Bangka) Datum at Pulau Pisang by parallel shifting. As the resultant difference between the theoretical solution and the more convenient practical method was found to be marginal and well within the limits of allowable cartographic accuracy, it was agreed that the practical method would be used.

(c) A "Manual for the Joint Production of Common Datum Charts of the Straits of Malacca and Singapore" was drawn up. A list of the symbols and abbreviations and the rules for their application on the Common Datum Charts was also examined and adopted.

CHART COMPILATION

The joint team from the four participating countries carried out the compilation of the Common Datum Charts in Tokyo between 4 July and 29 November 1978.

The objective of the compilation was to prepare a drafting guide for the Common Datum Charts.

1. Compilation work consisted of the following :
 - (a) Examination of additional source material.
 - (b) Checking of computations.
 - (c) Plotting of coordinates.
 - (d) Preparation of block copies.
 - (e) Preparation of the geographical names sheets.
 - (f) Checking of Notices to Mariners.
 - (g) Preparation and checking of drafting guide.
2. Compilation of the Common Datum Charts was completed smoothly and as scheduled, after the joint solution of a few technical problems encountered during the course of compilation.

INVESTIGATION OF LANDMARKS

Between 8 and 21 January 1979 the joint team inspected the landmarks to be charted, the Indonesian survey vessel KRI *Jalanidhi* being used for this purpose. The team then met in the Hydrographic Department, Port of Singapore Authority, (22-28 January 1979) to finalize the drafting guides.

1. Earlier, guidelines for the inspection of the landmarks had been discussed and adopted. The investigation was to include :
 - (a) Checking of doubtful matters.
 - (b) Confirmation of the topographic features.
 - (c) Fixing the positions of new conspicuous objects.
 - (d) Taking photographs of land views.
 - (e) Investigation of certain dubious geographical names, etc.
2. Based on the findings of the field investigation of landmarks, the necessary action was taken and the drafting guides were amended accordingly.
3. A comparison was made between the drafting guides and the new charts published by Singapore and the drafting guides were further amended.
4. The dubious geographical names in Indonesian territory appearing on the drafting guides were checked with the local authority and corrected where necessary.

PREPARATION AND PROOF-READING OF REPROMATS

The joint team met in Tokyo from 10 April-10 August 1979 to prepare the repromats for the Common Datum Charts and to proof-read the charts.

1. Repromats of each sheet were prepared as follows :
 - (a) For the black plate, a line-work sheet and a "stick-on" sheet were separately prepared; on completion these were combined onto one sheet.
 - (b) The magenta plate was similarly prepared.
 - (c) The blue-tint and the land-tint plates were made photo-mechanically after completion of the black plate.
2. Work on the repromats was prepared as follows :
 - (a) Amendment of the drafting guides.
 - (b) Checking of Notices to Mariners.
 - (c) Preparation of photo-typeset letters and symbols.
 - (d) Drawing of coastlines, harbour limits, depth contours, danger lines, and topography.
 - (e) Sticking on of topographic and hydrographic information.
 - (f) Preparation of the magenta plate.
3. The master sheets were jointly checked and proof-read.
4. The work of preparation and proof-reading of the repromats was completed on schedule. Some technical problems encountered during this phase were jointly solved.

FINALIZATION OF THE REPROMATS AND THE REPORT

The representatives of the four participating countries met in Tokyo from 19-21 September 1979 to finalize the repromats for Sheets 1, 2 and 3 of the Common Datum Charts scheduled under Phase I, and to adopt their Report outlining the cartographic work entailed.