JOINT PRELIMINARY HYDROGRAPHIC SURVEY OF THE MALACCA STRAIT

by Kiyoshi KAWAKAMI, D. Sc.,
Hydrographic Office of Japan

1. — INTRODUCTION

Japan, as one of the nations that are greatly dependent upon the petroleum being produced in the Middle and the Near East, is deeply concerned about safe navigation through the Malacca Strait where an important route for oil transportation exists.

The growth in size of oil tankers and their increased transits via this route in recent years have particularly called our attention to the necessity of establishing a traffic separation scheme in the Malacca Strait as well as the need for reviewing the appropriateness of the existing charts, mostly compiled on the basis of the 1936 surveys of this region. Consequently, the Hydrographic Office of Japan has been striving to collect various data and information concerning the status of the Strait since the autumn of 1965.

In August 1966, the U.K. Hydrographic Department contacted the Hydrographic Office of Japan about a plan for the survey of the Malacca Strait, seeking information useful for their plan. In November of the same year, the Shell Oil Company expressed the hope that the Hydrographic Office of Japan would also participate in the Malacca Strait survey.

Meanwhile, Japan and Singapore jointly worked on a proposal that was submitted to the Fourth Session of the IMCO Sub-Committee on Safety of Navigation in December 1967, to adopt a traffic separation scheme in the Malacca Strait to provide navigational safety for large-sized vessels. This proposal, however, was not adopted by the Sub-Committee because it was considered that a detailed hydrographic survey and sufficient navigational aids to be provided by neighbouring and interested countries would be a prerequisite to establishing such a scheme in the Strait.

In view of the above-mentioned circumstances, the Government of Japan has begun to deal actively with the problem. To begin with, in November 1968, it proposed to the three nations neighbouring the Malacca Strait that they carry out a joint preliminary hydrographic survey before making a full-scale and detailed hydrographic survey and instituting navigational aids.

As representative of the Government of Japan, the writer visited Indonesia, Malaysia, and Singapore to negotiate directly with the Governments of these countries about this project, and succeeded in obtaining the agreement of these Governments for the conduct of a four-nation joint preliminary survey on the following understanding :

(1) The preliminary survey, including bottom sampling for charting purposes, will be conducted, using the Japanese survey ship *Koyo Maru*, by a team of officials provided by the Japanese Ministry of Transport. The Government of ..... will provide an agreed number of officials from its ..... to participate in the preliminary survey including the operations aboard the *Koyo Maru*.

(2) The Government of Japan will seek from the Governments of ..... and of ..... such co-operation as is necessary for a satisfactory implementation of the preliminary survey.

(3) The data obtained from the preliminary survey will be processed by the Japanese Ministry of Transport and will subsequently be released jointly by the participating Governments.

(4) The expenses necessary for the preliminary survey will be borne by Japan.

(5) With a view to ensuring a successful implementation of the preliminary survey, the Government of ..... will authorize the repeated entry of the *Koyo Maru* into the ..... territorial waters and ports as well as the establishment by the survey team of the necessary markings for survey purposes in ..... territory. It will also issue to the Japanese ..... and ..... officials participating in the preliminary survey multiple entry visas to the ..... strait, which shall remain effective during the period of the preliminary survey.

2. — OUTLINE OF THE PLAN OF THE PRELIMINARY SURVEY

The purpose of the preliminary survey is to define the areas between Eastern Bank and One Fathom Bank in the Malacca Strait in which re-surveying or precise surveying will be required for present nautical charts on the route for large-sized vessels through the Strait, as well as to study technical problems, such as the effects on performance of electronic position-fixing equipments, which would be used in carrying out the full-scale hydrographic survey.

The hydrographic survey will be carried out with a survey ship making two return trips over the route presently frequented by large-sized vessels, thus running four parallel sounding lines each 0.5 mile apart. (See figure : Centreline of planned survey area).

In addition, with the motor boats which are carried aboard the survey ship, more detailed surveys will be conducted in four specified areas : (1) in the Phillip Channel, (2) northwestward of Buffalo Rock, (3) west-southwestward of Cape Rachado and (4) northeastward of The Brothers.

(See figure.) The interval between sounding lines for the survey of the specified areas is 100 metres.

In the case of the survey ship, fixes are to be made by Radar, Loran C, and landmarks, and, in order to increase Radar effectiveness, Radar reflectors are to be established at Sungei Muar, Tg. Telaga, Cape Rachado Lighthouse, Tg. Said, and Tg. Serakit (See figure). In the case of the surveying boats in the specified areas, a microwave range meter (precise electronic distance measuring equipment) will be employed for position fixing.

For sounding, the survey ship carries a precision echo-sounder for shallow waters, while the motor boat is equipped with a four-beam echo-sounder. The sounding datum used by the U.K. in their 1967 survey will again be employed.

During the survey period, tide gauges for tidal observations are to be established at Cape Rachado, Iyu Kl., Batu Pahat, and Pu. Satumu (See figure). A self-recording current meter is to be moored to the Raleigh Shoal Light Buoy for tidal current observation.

The results of the survey obtained by the survey ship on the four tracks traversing the Strait are to be compiled on a smooth sheet at a scale of 1/150 000 and those obtained by the motor boat in the specified areas, on smooth sheets at 1/50 000.

The particulars and performance of the survey ship and the main equipments used are as follows :

A) *Survey Ship* Koyo Maru (chartered)

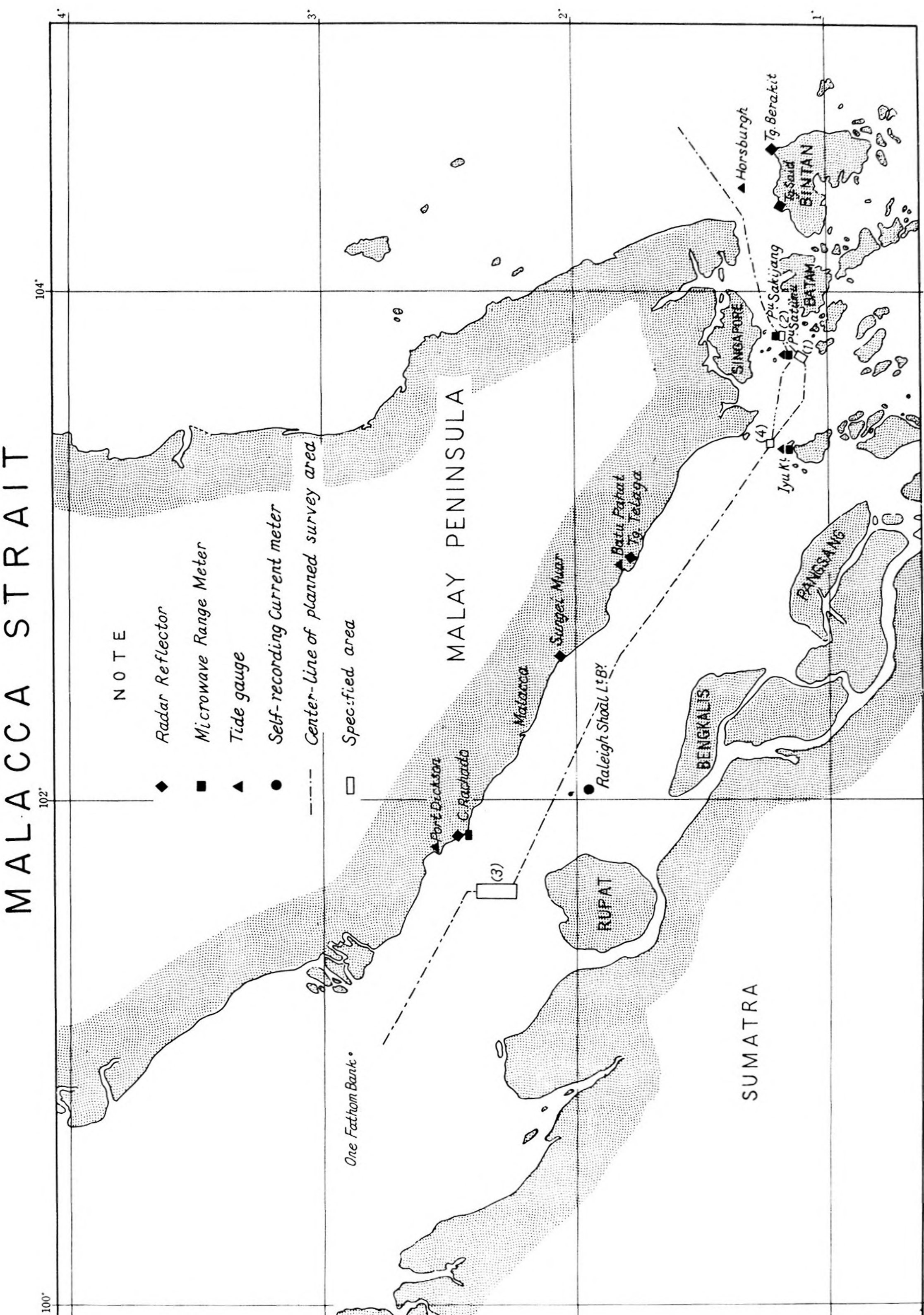
Ship's shape : Long forecastle
Classification : NK, NS*, MNS*
Completed on : 6 September 1968
Length overall : 85.54 metres
Breadth : 14.00 metres
Depth : 7.00 metres
Gross tonnage : 2 061.98 tons
Maximum speed : 19.6 knots
Cruising range : 18 000 miles
Accommodation : 74 men (inclusive of crew)
Air-conditioning : Entire ship
Motor boats for operations : 2

B) *Precision Echo-sounder for Shallow Waters*

Sounding range : 0-100 m
Recording range : 0-40 m, 30-70 m, 60-100 m
Minimum calibration : 0.2 m

$$\text{Accuracy} : \pm \left(0.1 + D \times \frac{1}{1000}\right) m \quad (D = \text{Depth})$$

Frequency of synchronous generator : 75 Hz
Paper width and length : 300 mm $\times$ 20 m


MALACCA STRAIT
NOTE
Radar Reflector
Microwave Range Meter
Tide gauge
Self-recording Current meter
Center-line of planned survey area
Specified area
MALAY PENINSULA
SUMATRA
RUPAT
BENGKALIS
SINGAPORE
BATAM
BINTAN
Tg. Berakit
Horsburgh
Tg. Said
Pu. Sakijang
Pu. Satumu
Iyu K!
Batu Pahat
Tg. Telaga
Sungei Muar
Malacca
Port Dickson
C. Rachado
Raleigh Shoal Lt By
One Fathom Bank
(1)
(2)
(3)
(4)
4°
3°
2°
1°
100°
102°
104°
10000m 0 50 100 150km

Paper speed : 40 mm/min
Recording system : Linear recording, marked by electric sparks on dry paper
Transmitter frequency : About 100 kHz
Transmitter : Condenser discharge transmission controlled by vacuum tubes
Receiver : Straight envelope detector.
Power : AC 100 V, 60 Hz.

C) *Four-Beam Echo-Sounder*

Maximum sounding range : 100 m
Sounding range :

	Shallow	Deep
Range 1	0-20 m	0-40 m
Range 2	10-30 m	20-60 m
Range 3	20-40 m	40-80 m
Range 4	30-50 m	60-100 m

Minimum calibration : Shallow : 0.2 m; Deep : 0.4 m

$$\text{Accuracy} : \pm \left(0.1 + D \times \frac{1}{1000}\right)\text{m} \quad (D = \text{Depth})$$

Frequency of synchronous generator : 300 Hz
Paper width and length : 150 mm $\times$ 20 m
Paper speed : 40 mm/min
Recording system : Linear recording, marked by electric sparks on dry paper
Transmitter frequency : Vertical sounding : 100 kHz $\pm$ 5 kHz
Oblique sounding : 200 kHz $\pm$ 5 kHz
Transmitter : Condenser discharge transmission controlled by photo-transistors
Receiver : Super-heterodyne system
Transducer : Electrostrictive element with $BaTiO_3$
Power : DC 24 V

D) *Microwave Range Meter*

Maximum measuring range : 50 km
Display : 5 digits display tubes $\times$ 2

$$\text{Accuracy} : 0.5\text{ m} \pm \frac{1}{10\,000} \times D \quad (D = \text{Distance})$$

Frequency : 2.9 - 3.1 GHz (3 waves)
Output power : 0.25 W
Antenna directional angle : Interrogator : Vertical ..... 10°
Horizontal ..... 360°
Responder : Vertical ..... 10°
Horizontal ..... 60°

E) *Tide Gauge*

Sensitivity : ± 0.2 mm
Range : Wide : 5 m, 10 m
Narrow : 0.5 m, 1 m
} Recorded simultaneously
Tracing speed : 0.55 m/min
Detector : Needle touching (30 mm in diameter, 200 mm in length)
Recording : Self-recording
Paper width and length : 200 mm × 15 m
Paper speed : 6 mm/hr, or 18 mm/hr
Power source : AC 100 V, 50-60 Hz

3. — CONDUCT OF THE PRELIMINARY SURVEY

The preliminary survey was carried out from 28 January to 14 March 1969. The survey team consisted of 18 Japanese, 2 Indonesian, 2 Malaysian, and 3 Singaporean officers, totalling 25 members. The team's chief was Mr. Bunzaburo KAWAMURA of Japan.

The results of the survey are being processed and will be released by the end of May 1969.

In the meantime, a total of 15 uncharted shoal waters that were revealed during the survey were notified by Japanese Notices to Mariners.

4. — ACKNOWLEDGEMENTS

The writer wishes to thank the officials of the Governments of Indonesia, Malaysia, and Singapore for their warm support of the project. The members of the survey team deserve special thanks and praise for their excellent performance of the survey. I also wish to acknowledge the assistance of Mr. Yasuhiro OYAMADA in the preparation of this article.