

### 3.4 Notices to Mariners

During field works of the hydrographic survey, some dangerous shoals were detected. The informations were promulgated to all vessels by radio broadcast as soon as possible and subsequently by Notices to Mariners through responsible authorities of the three Littoral States.

The informations promulgated as Notices to Mariners under the name of "The Four-Nation Joint Survey Team in Malacca and Singapore Straits" were as follows :

Table 3-12 Notices to Mariners

Date	Location		Least Depth	Remarks
	Area/Point	Position(WGS-84)		
Nov. 28, 1996	Point f	2° 27.2' N 101° 36.2' E	15.1 m* (16.1 m)	Wreck
Dec. 26, 1996	Point g	2° 16.0' N 101° 47.6' E	17.9 m	Shoal
	Sub-Area J	2° 18.2' N 101° 48.6' E	17.9 m	Shoal
		2° 17.4' N 101° 49.2' E	15.4 m	Shoal
		2° 16.5' N 101° 49.3' E	16.3 m* (16.1 m)	Shoal
Dec. 6, 1997	Point a	2° 10.3' N 101° 52.3' E	20.0 m	Shoal
		2° 10.9' N 101° 51.6' E	18.6 m	Shoal
		2° 09.8' N 101° 50.7' E	20.4 m	Shoal
		2° 08.9' N 101° 50.6' E	17.5 m	Shoal

[Note] 15.1 m\* : Reported Water Depth  
(16.1 m) : Final Water Depth after tidal correction

### 3.5 Bottom Materials Sampling

At principal points in each survey area, sea bottom materials were collected using cylindrical dredge during the hydrographic survey. A lead coated with grease was used to collect samples at supplementary points.

The number of samples collected at each of the survey area is tabulated in Table 3-13. There were 194 samples at 45 principal points and 149 supplementary points at shoals and around wreck positions.

Table 3-14 shows the observed records of sea bottom materials sampled from 194 points. The nature of seabed was determined by visual inspection using the standards shown in Table 3-15.

Table 3-15 Grain Size Standards for Bottom Materials Classification

Quality of the Bottom (Symbol)		Grain Size (mm)	$\phi$ Scale
Mud	Clay (Cy)	< 0.0039	> 8
	Mud (M)	0.0039 - 0.0625	8 - 4
Sand	Fine Sand (fS)	0.0625 - 0.25	4 - 2
	Sand (S)	0.25 - 0.50	2 - 1
	Coarse Sand (cS)	0.50 - 2.0	1 - -1
Gravel	Granule (Gr)	2.0 - 4.0	-1 - -2
	Gravel (G)	4.0 - 64	-2 - -6
	Shingle (Sn)	64 - 256	-6 - -8
	Stones (St)	256 <	-8 >

Table 3-13 Number of Bottom Material Samples

Group Area	Sub-Area or Point	Number of Samples		
		Total	Principal Point	Supplementary Point
1	Point j	5 samples	1 sample	4 samples
	Point k	5 samples	1 sample	4 samples
	Point l	5 samples	1 sample	4 samples
	Sub-Area A	20 samples	4 samples	16 samples
2	Sub-Area B	25 samples	5 samples	20 samples
	Point f	1 sample	1 sample	—
	Sub-Area C	6 samples	2 samples	4 samples
	Point g	1 sample	1 sample	—
	Sub-Area J	5 samples	3 samples	2 samples
	Sub-Area K	6 samples	1 sample	5 samples
3	Point a	5 samples	1 sample	4 samples
	Point m	5 samples	1 sample	4 samples
	Sub-Area D	10 samples	2 samples	8 samples
4	Point b	4 samples	1 sample	3 samples
	Sub-Area L	11 samples	2 samples	9 samples
	Point c	10 samples	2 samples	8 samples
5	Point h	10 samples	2 samples	8 samples
	Sub-Area E	10 samples	2 samples	8 samples
	Point d	15 samples	3 samples	12 samples
	Point i	10 samples	2 samples	8 samples
	Sub-Area F	10 samples	2 samples	8 samples
	Point e	12 samples	4 samples	8 samples
	Sub-Area G	10 samples	2 samples	8 samples
Sub-Area H	10 samples	2 samples	8 samples	
6	Sub-Area I	3 samples	1 sample	2 samples
Total		194 samples	45 samples	149 samples

The characteristics of the quality of sea bottom materials in each survey area were as follows (see table 3-14).

#### Group Area 1

The nature of seabed in Points j, k, l and Sub-Area A, located near the One Fathom Bank in the northwestern part of the Strait of Malacca, comprised mainly fine sand and muddy sand. Sand containing gravels existed at the bank of the northeast part in Sub-Area A.

#### Group Area 2

In Group Area 2 located at the northwest part in the Strait of Malacca, the nature of seabed in Sub-Area B, Point f, Sub-Area J and Sub-Area K comprised coarse sand and partly contained a great amount of granules.

The quality of bottom materials consisted of sand and gravel in Sub-Area C and Point g, respectively.

The bottom materials in the southeast part of this group area ; Sub-Area c, Point g, Sub-Area J and Sub-Area K, contained shells.

#### Group Area 3

The nature of seabed in Points a, m and Sub-Area D, located near Pulau Undan, comprised mainly sand, muddy sand and partly gravels in Sub-Area D.

#### Group Area 4

In Group Area 4 located at the offshore area of Tanjung Segenting, the nature of seabed was characterized with mud and sandy mud partly containing shells.

### Group Area 5

The nature of seabed in Group Area 5, located in the Strait of Singapore, is quite different by the area.

In the western part of the Strait of Singapore, coarse sand and clay were comprised in Point h, and it comprised mainly rock outcrops and partly coarse sand containing shells in Sub-Area E. Sea bottom materials in Points d and e comprised mainly sandy mud and clay at the south, and muddy sand and clay with a substantial amount of shells at the north.

In the offshore area of Singapore, the nature of seabed comprised sand and gravels containing shells in almost the entire area in Sub-Area F. It comprised mainly a mixture of sand and gravel at the west and coral reefs at the east in Sub-Area G and Point e.

In Sub-Area H, coral reefs and rock outcrops were found in almost the entire area. Broken corals containing shells existed at abundance at the northeast and rock outcrops were found at the southwest.

### Group Area 6

In Sub-Area I of Group Area 6 at the eastern part of the Strait of Singapore, the nature of seabed comprised mainly coarse sand, and partly broken corals and gravels.

Table 3-14 Records of Bottom Materials Sampling

Sampling Point					Sampling Date	Bottom Characteristics	
Sub-Area Point	Sample No.	Location (Latitude)	(Longitude)	Water Depth		Quality (Symbol)	Others
Point j	No. 1	2° 58.19' N	100° 49.37' E	28.5 m	Nov. 2, 1997	SM	
	1-1	2° 58.46'	100° 49.42'	23.7 m		SM	
	1-2	2° 58.17'	100° 49.63'	25.1 m		fS	
	1-3	2° 57.91'	100° 49.19'	30.5 m		fS	
	1-4	2° 58.25'	100° 48.90'	30.6 m		fS	
Point k	No. 1	2° 54.03' N	100° 51.72' E	17.0 m	Oct. 31, 1997	S	Shells (Broken)
	1-1	2° 54.22'	100° 51.80'	21.8 m		SM	
	1-2	2° 53.97'	100° 52.02'	18.1 m		fS	
	1-3	2° 53.74'	100° 51.69'	28.2 m		SM	
	1-4	2° 54.05'	100° 51.27'	31.4 m		SM	
Point l	No. 1	2° 51.23' N	100° 59.77' E	16.5 m	Nov. 12, 1997	fS	
	1-1	2° 51.25'	100° 59.56'	24.6 m		fS	
	1-2	2° 51.82'	100° 59.82'	19.0 m		fS	
	1-3	2° 51.15'	100° 00.12'	18.5 m		fS	
	1-4	2° 51.00'	100° 59.79'	27.8 m		fS	
Sub-Area A	No. 1	2° 48.01' N	101° 01.06' E	36.4 m	Nov. 15, 1997	cS	
	1-1	2° 47.96'	101° 01.36'	34.8 m		S	
	1-2	2° 47.71'	101° 01.67'	31.5 m		SG	
	1-3	2° 48.01'	101° 01.95'	34.0 m		SG	
	1-4	2° 48.29'	101° 01.64'	37.7 m		M	
	No. 2	2° 49.97' N	100° 58.51' E	43.0 m	Nov. 16, 1997	S	Shells
	2-1	2° 50.25'	100° 58.48'	41.0 m		fS	
	2-2	2° 49.91'	100° 58.79'	40.1 m		fS	
	2-3	2° 49.71'	100° 58.44'	39.7 m		fS	
	2-4	2° 49.98'	100° 58.18'	41.9 m		fS	
	No. 3	2° 48.42' N	100° 56.85' E	25.0 m	Nov. 16, 1997	S	
	3-1	2° 48.24'	100° 56.81'	25.6 m		fS	
	3-2	2° 48.46'	100° 56.60'	27.8 m		fS	
3-3	2° 48.67'	100° 56.86'	29.4 m	SM			
3-4	2° 48.43'	100° 57.08'	26.8 m	fS			

(to be continued)

Sampling Point				Sampling Date	Bottom Characteristics		
Sub-Area Point	Sample No.	Location (Latitude)	(Longitude)		Water Depth	Quality (Symbol)	Others
Sub-Area A	No. 4	2° 47.32' N	101° 00.06' E	37.2 m	Nov. 16, 1997	S	
	4-1	2° 47.26'	100° 59.73'	39.2 m		S	
	4-2	2° 47.03'	101° 00.03'	35.8 m		SM	
	4-3	2° 47.33'	101° 00.29'	37.9 m		fS	
	4-4	2° 47.54'	100° 59.97'	35.0 m		S	
Sub-Area B	No. 1	2° 34.01' N	101° 25.53' E	—	Nov. 23, 1996	SG	
	1-1	2° 34.01'	101° 25.60'	—		SG	
	1-2	2° 33.92'	101° 25.69'	—		SG	
	1-3	2° 33.86'	101° 25.57'	—		SG	
	1-4	2° 33.97'	101° 25.44'	50.5 m		SG	
	No. 2	2° 34.17' N	101° 25.53' E	—	Nov. 23, 1996	SG	
	2-1	2° 34.11'	101° 25.72'	41.2 m		SG	
	2-2	2° 34.05'	101° 25.56'	40.1 m		SG	
	2-3	2° 34.18'	101° 25.45'	—		SG	
	2-4	2° 34.30'	101° 25.63'	31.4 m		SG	
	No. 3	2° 34.53' N	101° 25.42' E	—	Nov. 23, 1996	cS	
	3-1	2° 34.50'	101° 25.52'	35.6 m		SG	
	3-2	2° 34.70'	101° 25.47'	48.8 m		SG	
	3-3	2° 34.56'	101° 25.26'	40.0 m		SG	
	3-4	2° 34.40'	101° 25.38'	36.7 m		SG	
	No. 4	2° 35.17' N	101° 25.37' E	31.3 m	Nov. 24, 1996	cS	
4-1	2° 35.28'	101° 25.33'	44.6 m	cS			
4-2	2° 35.12'	101° 25.22'	31.2 m	cS			
4-3	2° 35.03'	101° 25.42'	34.6 m	cS			
4-4	2° 35.19'	101° 25.45'	32.5 m	cS			
No. 5	2° 35.05' N	101° 25.75' E	29.4 m	Nov. 24, 1996	SG	Shells	
5-1	2° 35.09'	101° 25.73'	36.3 m		cS		
5-2	2° 35.02'	101° 25.56'	48.3 m		SG		
5-3	2° 34.96'	101° 25.72'	35.5 m		SG		
5-4	2° 35.04'	101° 25.92'	34.6 m		SG		
Point f	No. 1	2° 28.76' N	101° 35.75' E	45.4 m	Nov. 28,	SG	

(to be continued)

Sampling Point					Sampling Date	Bottom Characteristics	
Sub-Area Point	Sample No.	Location (Latitude) (Longitude)		Water Depth		Quality (Symbol)	Others
Sub-Area C	No. 1	2° 22.63' N	101° 40.02' E	31.0 m	Nov. 28, 1996	S	Shells
	1-1	2° 22.75'	101° 40.05'	34.4 m		S	
	No. 2	2° 22.56' N	101° 40.95' E	34.3 m	Dec. 06, 1996	S	Shells
	2-1	2° 22.63'	101° 41.10'	30.3 m		S	
	2-2	2° 22.98'	101° 42.05'	27.4 m		S	
	2-3	2° 23.25'	101° 41.18'	40.1 m		S	
Point g	No. 1	2° 15.98' N	101° 47.52' E	25.6 m	Dec. 18, 1996	G	Shells
Sub-Area J	No. 1	2° 17.28' N	101° 47.52' E	25.0 m		S	Shells
	No. 2	2° 17.40' N	101° 49.23' E	26.0 m	cS		
	No. 3	2° 16.49' N	101° 49.35' E	24.3 m	Dec. 20, 1996	SG	Shells
	3-1	2° 16.91'	101° 49.24'	31.8 m		cS	
	3-2	2° 15.86'	101° 49.48'	28.5 m		cS	
Sub-Area K	No. 1	2° 17.68' N	101° 54.09' E	20.2 m	Dec. 26, 1996	SG	Shells
	1-1	2° 18.27'	101° 53.67'	24.3 m		cS	
	1-2	2° 17.78'	101° 54.08'	22.6 m		SG	
	1-3	2° 17.62'	101° 54.25'	—		G	
	1-4	2° 17.67'	101° 53.95'	24.3 m		SG	
	1-5	2° 17.45'	101° 54.05'	27.0 m		cS	
Point a	No. 1	2° 10.88' N	101° 51.60' E	20.4 m	Nov. 28, 1997	S	
	1-1	1° 10.89'	101° 51.23'	33.1 m		S	
	1-2	1° 11.07'	101° 51.60'	27.3 m		S	
	1-3	1° 10.83'	101° 51.82'	34.5 m		S	
	1-4	1° 10.57'	101° 51.49'	30.2 m		S	
Point m	No. 1	1° 59.79' N	102° 12.45' E	49.7 m	Dec. 13, 1997	SM	
	1-1	1° 59.86'	102° 12.77'	49.2 m		SG	
	1-2	2° 00.08'	102° 12.42'	45.5 m		S	
	1-3	1° 59.78'	102° 12.14'	51.1 m		S	
	1-4	1° 59.48'	102° 12.44'	54.0 m		SM	



(to be continued)

Sampling Point					Sampling Date	Bottom Characteristics	
Sub-Area Point	Sample No.	Location (Latitude)	Location (Longitude)	Water Depth		Quality (Symbol)	Others
Sub-Area D	No. 1	1° 56.19' N	102° 15.12' E	42.5 m	Dec. 15, 1997	MS	
	1-1	1° 56.57'	102° 15.03'	54.8 m		R	
	1-2	1° 56.20'	102° 14.82'	50.6 m		MS	
	1-3	1° 56.92'	102° 15.09'	52.9 m		R	
	1-4	1° 56.23'	102° 15.30'	46.6 m		S	
	No. 2	1° 55.77' N	102° 16.28' E	49.4 m	Dec. 15, 1997	SG	Shells
	2-1	1° 55.91'	102° 16.52'	58.3 m		MS	
	2-2	1° 56.09'	102° 16.25'	47.8 m		S	
	2-3	1° 55.78'	102° 15.96'	53.0 m		MS	
	2-4	1° 55.52'	102° 16.26'	56.6 m		S	
Point b	No. 1	1° 47.62' N	102° 44.00' E	10.7 m	Jan. 5, 1997	MS	
	1-1	1° 47.65'	102° 43.60'	—		MS	
	1-2	1° 47.40'	102° 44.00'	28.2 m		MS	
	1-3	1° 45.50'	102° 44.30'	12.1 m		MS	
Sub-Area L	No. 1	1° 42.77' N	102° 48.78' E	18.6 m	Jan. 5, 1997	MS	
	1-1	1° 42.67'	102° 49.62'	29.1 m		M	
	1-2	1° 42.70'	102° 49.13'	19.5 m		MS	
	1-3	1° 42.52'	102° 48.67'	31.7 m		MS	
	1-4	1° 43.03'	102° 48.93'	29.6 m		MS	
	1-5	1° 42.83'	102° 48.52'	20.1 m	MS		
	No. 2	1° 44.16' N	102° 46.02' E	22.0 m	Jan. 5, 1997	MS	Shells
	2-1	1° 43.88'	102° 46.38'	29.1 m		MS	
	2-2	1° 43.82'	102° 46.13'	37.3 m		MS	Shells
	2-3	1° 44.25'	102° 46.33'	24.6 m		MS	
2-4	1° 44.48'	102° 45.92'	—	MS			
Point c	No. 1	1° 33.55' N	103° 05.29' E	27.8 m	Jan. 14, 1997	MS	
	1-1	1° 33.60'	103° 05.62'	19.6 m		MS	
	1-2	1° 33.77'	103° 05.38'	17.7 m		M	
	1-3	1° 33.32'	103° 05.32'	31.8 m		MS	
	1-4	1° 33.55'	103° 05.00'	34.3 m		M	

(to be continued)

Sampling Point					Sampling Date	Bottom Characteristics	
Sub-Area Point	Sample No.	Location (Latitude) (Longitude)		Water Depth		Quality (Symbol)	Others
Point c	No. 2	1° 34.32' N	103° 04.58' E	13.3 m	Jan. 14, 1997	fS	Shells
	2-1	1° 34.45'	103° 04.85'	25.2 m		MS	
	2-2	1° 34.60'	103° 04.55'	25.9 m		MS	
	2-3	1° 34.13'	103° 04.60'	—		MS	
	2-4	1° 34.33'	103° 04.28'	—		MS	
Point h	No. 1	1° 16.76' N	103° 21.12' E	32.4 m	Oct. 2, 1997	cS	
	1-1	1° 16.99'	103° 21.19'	33.2 m		cS	Shells
	1-2	1° 16.74'	103° 21.45'	33.3 m		cS	
	1-3	1° 16.57'	103° 21.08'	28.5 m		M	
	1-4	1° 16.77'	103° 20.73'	30.0 m		cS	Shells
	No. 2	1° 15.82' N	103° 19.48' E	31.3 m	Oct. 2, 1997	cS	
	2-1	1° 15.89'	103° 19.01'	31.4 m		Cy	
	2-2	1° 16.08'	103° 19.50'	33.0 m		Cy	
	2-3	1° 15.77'	103° 19.75'	30.8 m		Cy	
	2-4	1° 15.52'	103° 19.37'	35.7 m		cS	
Sub-Area E	No. 1	1° 12.87' N	103° 25.80' E	38.4 m	Oct. 4, 1997	R	
	1-1	1° 12.90'	103° 25.84'	39.6 m		R	
	1-2	1° 12.68'	103° 26.02'	39.2 m		R	
	1-3	1° 12.48'	103° 25.68'	41.0 m		R	
	1-4	1° 12.75'	103° 25.32'	32.4 m		R	
	No. 2	1° 10.98' N	103° 26.05' E	37.4 m	Oct. 5, 1997	cS	Shells
	2-1	1° 10.99'	103° 26.31'	43.4 m		R	
	2-2	1° 11.20'	103° 25.94'	41.9 m		R	
	2-3	1° 10.94'	103° 25.73'	47.2 m		R	
	2-4	1° 10.73'	103° 25.96'	50.8 m		cS	Shells
Point d Point i	No. 1	1° 10.41' N	103° 33.52' E	26.9 m	May 22, 1997	SM	
	1-1	1° 10.05'	103° 33.50'	24.8 m		SM	
	1-2	1° 10.45'	103° 33.24'	28.7 m		SM	
	1-3	1° 10.70'	103° 33.58'	31.2 m		SM	
	1-4	1° 10.45'	103° 33.86'	28.3 m		SM	

(to be continued)

Sampling Point					Sampling Date	Bottom Characteristics	
Sub-Area Point	Sample No.	Location (Latitude) (Longitude)		Water Depth		Quality (Symbol)	Others
Point d Point i	No. 2	1° 11.93' N	103° 33.66' E	35.9 m	May 23, 1997	MS	
	2-1	1° 12.16'	103° 33.59'	34.5 m		Cy	
	2-2	1° 11.88'	103° 33.29'	35.1 m		Cy	
	2-3	1° 11.63'	103° 33.59'	33.5 m		cS	
	2-4	1° 11.92'	103° 33.80'	33.0 m		S	
	No. 3	1° 13.61' N	103° 34.04' E	30.3 m	May 23, 1997	M	Shells
	3-1	1° 13.51'	103° 34.05'	25.5 m		MS	Shells
	3-2	1° 13.54'	103° 33.74'	28.9 m		Cy	
	3-3	1° 13.27'	103° 34.08'	31.6 m		fS	Shells
	3-4	1° 13.55'	103° 34.35'	28.2 m		MS	
Sub-Area F	No. 1	1° 03.97' N	103° 43.27' E	27.0 m	Sep. 15, 1997	SMG	Shells
	1-1	1° 04.03'	103° 43.40'	26.3 m		SG	Shells
	1-2	1° 03.71'	103° 43.21'	27.8 m		SG	
	1-3	1° 04.02'	103° 42.81'	29.1 m		SG	
	1-4	1° 04.36'	103° 43.08'	32.7 m		SG	Shells
	No. 2	1° 05.66' N	103° 41.47' E	20.1 m	Sep. 15, 1997	SG	Shells
	2-1	1° 05.53'	103° 41.34'	19.4 m		SG	
	2-2	1° 05.46'	103° 41.55'	21.0 m		SG	
	2-3	1° 05.67'	103° 41.75'	20.4 m		SG	
	2-4	1° 05.93'	103° 41.53'	22.8 m		SG	
Point e Sub-Area G	No. 1	1° 07.18' N	103° 43.76' E	24.1 m	Jun. 6, 1997	SG	
	1-1	1° 07.04'	103° 43.72'	28.0 m		SG	
	1-2	1° 07.23'	103° 43.45'	23.2 m		SG	
	1-3	1° 07.39'	103° 43.72'	34.6 m		SG	
	1-4	1° 07.20'	103° 43.91'	30.8 m		SM	
	No. 2	1° 08.57' N	103° 43.38' E	31.1 m		Co	
	No. 3	1° 08.68' N	103° 44.58' E	39.8 m	Jun. 12, 1997	Co	
	3-1	1° 08.52'	103° 44.84'	61.7 m		cS	
	3-2	1° 08.75'	103° 44.59'	38.1 m		Co	

(to be continued)

Sampling Point					Sampling Date	Bottom Characteristics	
Sub-Area Point	Sample No.	Location (Latitude)	(Longitude)	Water Depth		Quality (Symbol)	Others
Point e Sub-Area G	No. 4	1° 07.49' N	103° 45.53' E	30.3 m	Jun. 12, 1997	Co	
	4-1	1° 07.21'	103° 45.52'	30.8 m		St	Shells
	4-2	1° 07.86'	103° 45.63'	38.3 m		Co	
Sub-Area H	No. 1	1° 10.56' N	103° 47.80' E	29.6 m	Jun. 10, 1997	Co	Shells
	1-1	1° 10.49'	103° 47.58'	47.6 m		Co	Shells
	1-2	1° 10.33'	103° 47.73'	42.9 m		Co	Shells
	1-3	1° 10.60'	103° 47.98'	31.9 m		Co	Shells
	1-4	1° 10.74'	103° 47.72'	34.6 m		St	
	No. 2	1° 11.11' N	103° 49.22' E	24.5 m	Jun. 10, 1997	Co	
	2-1	1° 11.06'	103° 49.02'	42.5 m		St	
	2-2	1° 10.84'	103° 49.21'	43.3 m		St	
	2-3	1° 11.09'	103° 49.48'	28.4 m		St	
	2-4	1° 11.32'	103° 49.23'	28.7 m	St		
Sub-Area I	No. 1	1° 16.48' N	104° 14.57' E	44.4 m	Jun. 28, 1997	Co	
	1-1	1° 16.68'	104° 14.61'	46.0 m		G	
	1-2	1° 16.20'	104° 14.61'	44.8 m		cS	

[Note] 1) Symbol of Bottom Materials

Cy : Clay, M : Mud, fS : Fine Sand, S : Sand, cS : Coarse Sand  
 Gr : Granule, G : Gravel, Sn : Shingle, St : Stones  
 Co : Coral

2) No.1 - No.4 : Principal Points

1-1 - 4-2 : Supplementary Points

3) Water Depth : Raw Data (not reduced)

### 3.6 Smooth Sheets

The hydrographic survey results under the Study were plotted on sixteen (16) smooth sheets of scale 1:20,000.

The details of the smooth sheets are tabulated in Table 3-16. Figures 3-68 to 3-73 show the coverage of each of the smooth sheets.

One original set of smooth sheets was submitted to each Littoral State.

Table 3-16 Details of Smooth Sheets on the Study

Group Area	Sub-Area Point	Name of Smooth Sheet	Scale
1	j, k	One Fathom Bank - 1	1 / 20,000
	A, l	One Fathom Bank - 2	1 / 20,000
2	B	Off Cape Rachado - 1	1 / 20,000
	f	Off Cape Rachado - 2	1 / 20,000
	C	Off Cape Rachado - 3	1 / 20,000
	J, K, g	Off Cape Rachado - 4	1 / 20,000
3	a	South of Cape Rachado	1 / 20,000
	D, m	West of Malacca	1 / 20,000
4	L, b	Off Segenting - 1	1 / 20,000
	c	Off Segenting - 2	1 / 20,000
5	h	North of Iyu Kecil	1 / 20,000
	E	East of Iyu Kecil - 1	1 / 20,000
	F	Pulau Takong	1 / 20,000
	d, i	East of Iyu Kecil - 2	1 / 20,000
	G, H, e	Raffles Light	1 / 20,000
6	I	South of Tanjung Ayam	1 / 20,000

1/200000 ( Lat. 2-00-00N WGS-84 )

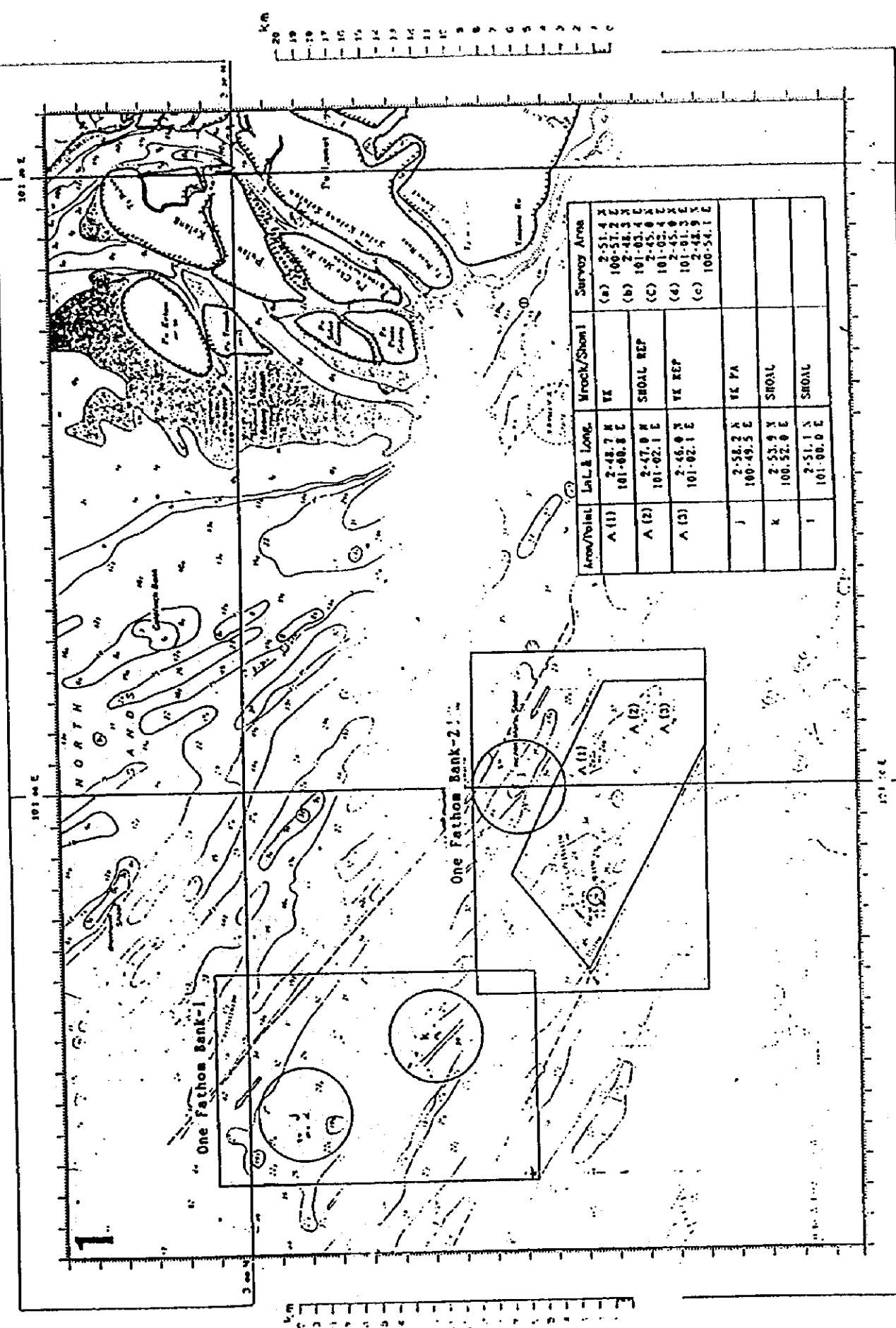
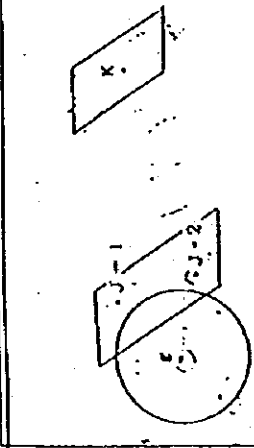
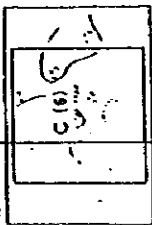
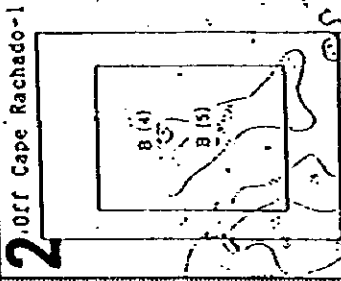
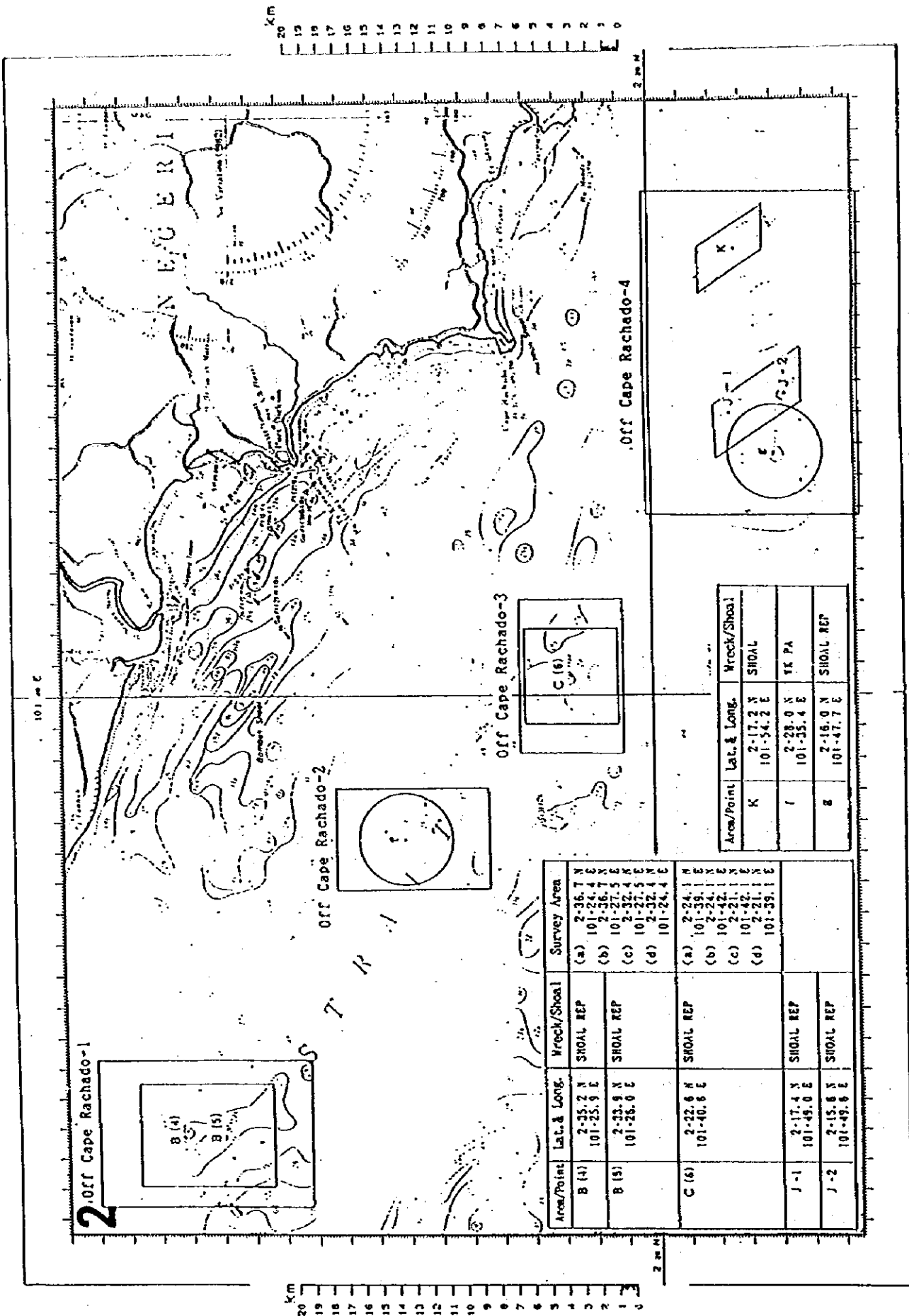


Fig. 3-68 Chart Sizes for Smooth Sheets (Group Area 1)

( Lat. 2-00-00N WGS-84 )



Area/Point	Lat. & Long.	Wreck/Shoal	Survey Area
B (4)	2-35.2 N	SHOAL REP	(a) 2-36.7 N
	101-25.9 E		(b) 101-24.4 E
B (5)	2-33.9 N	SHOAL REP	(c) 101-27.5 E
			(d) 101-27.5 E
			(e) 101-27.5 E
			(f) 101-24.4 E
C (6)	2-22.6 N	SHOAL REP	(a) 2-24.1 N
			(b) 101-39.1 E
			(c) 101-42.1 E
			(d) 101-42.1 E
J-1	2-17.4 N	SHOAL REP	
	101-49.0 E		
J-2	2-15.6 N	SHOAL REP	
	101-49.6 E		

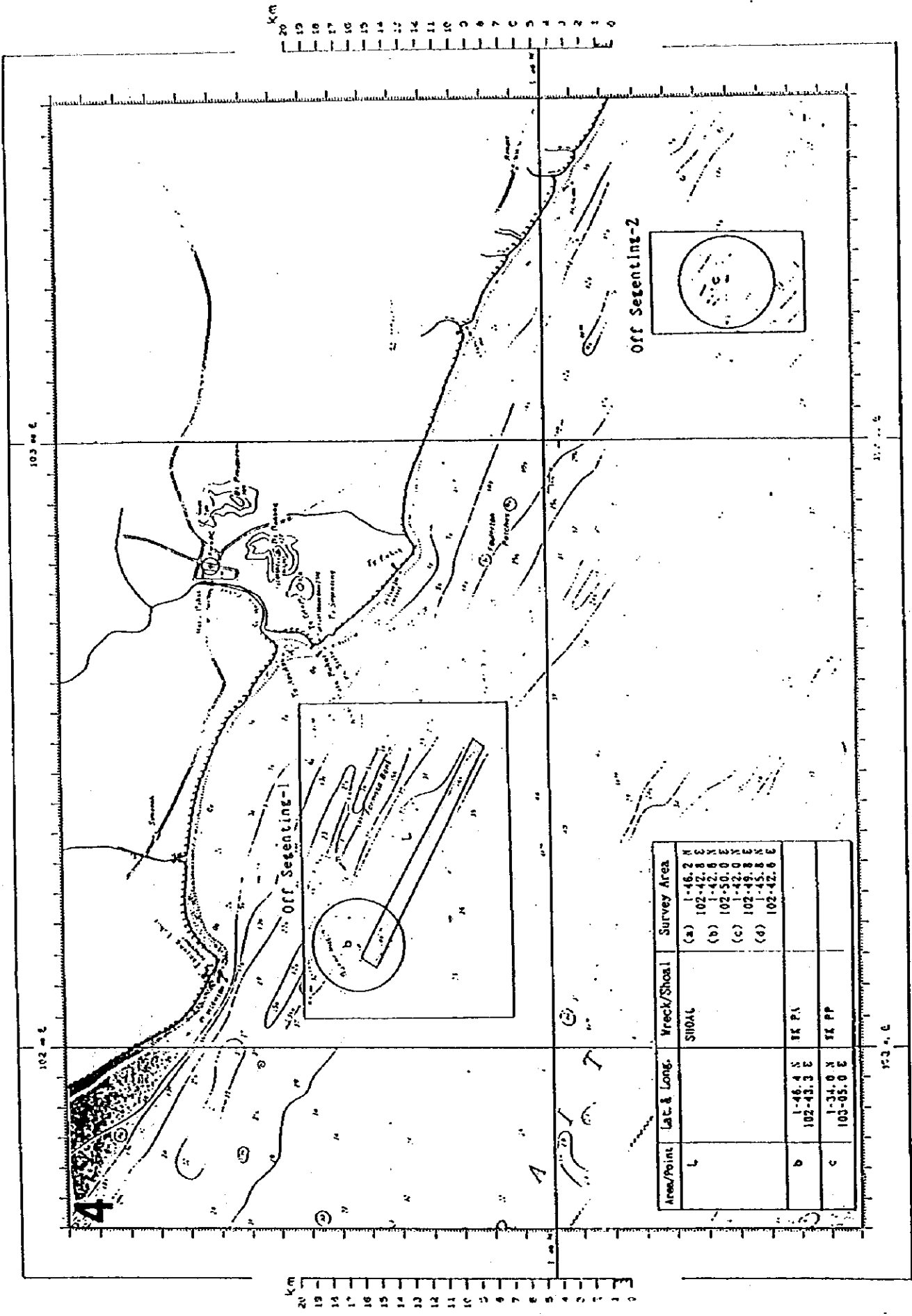
Area/Point	Lat. & Long.	Wreck/Shoal
K	2-17.2 N 101-54.2 E	SHOAL
J	2-28.0 N 101-35.4 E	TK PA
E	2-16.0 N 101-47.7 E	SHOAL REP

Fig. 3-69 Chart Sizes for Smooth Sheets (Group Area 2)





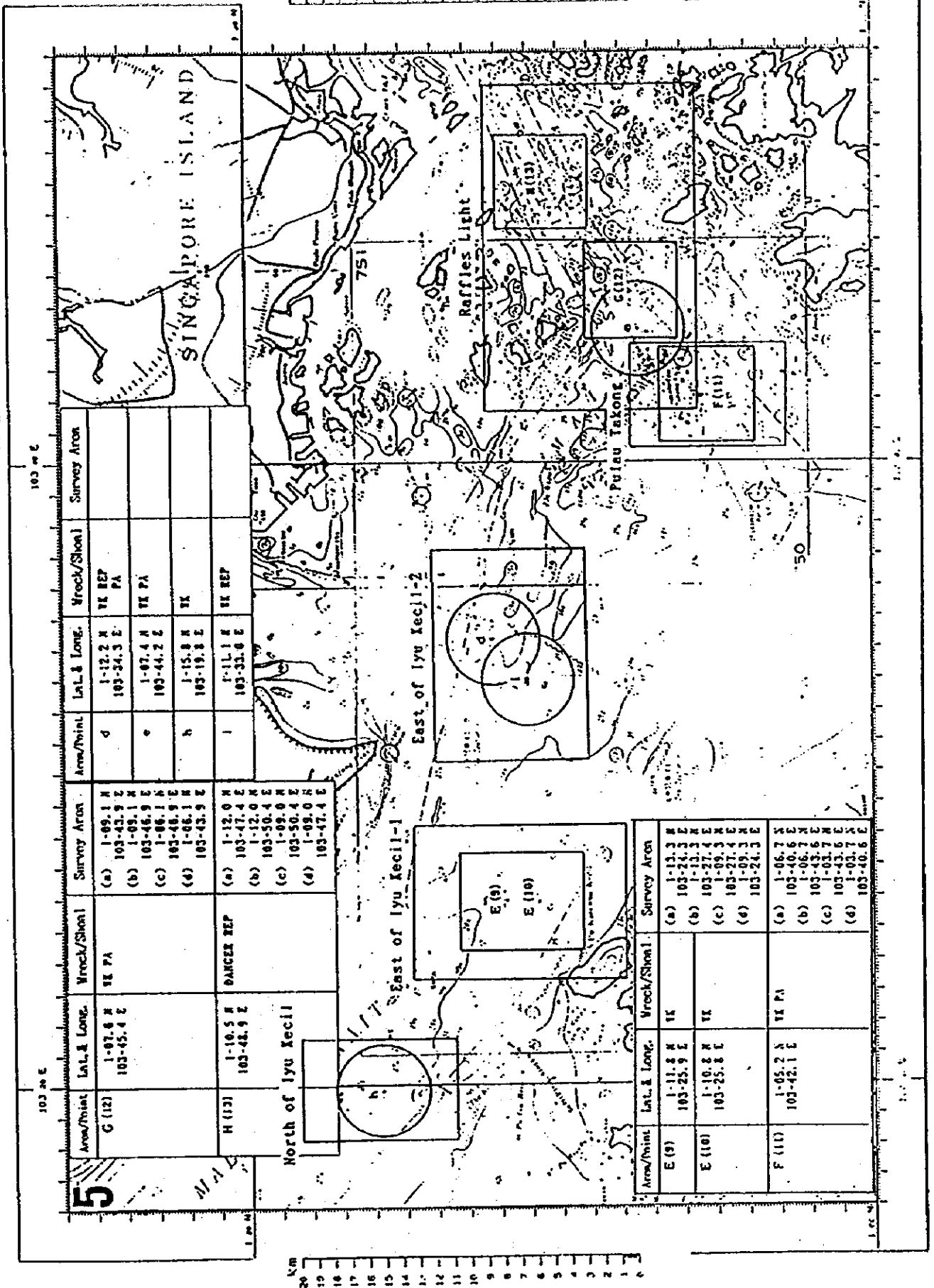
( Lat. 2-00-00N WGS-84 )



Area/Point	Lat. & Long.	Wreck/Shoal	Survey Area
L		S1104C	(a) 1-46.2 N 102-42.8 E
			(b) 1-42.6 N 102-50.0 E
			(c) 1-42.0 N 102-49.8 E
			(d) 1-45.8 N 102-42.6 E
b	1-46.4 N 102-43.3 E	TK PA	
c	1-34.0 N 103-05.0 E	TK PP	

Fig. 3-71 Chart Sizes for Smooth Sheets (Group Area 4)

1/200000 ( Lat. 2-00-00N WGS-84 )



Area/Point	Lat. & Long.	Wreck/Shoal	Survey Area	Area/Point	Lat. & Long.	Wreck/Shoal	Survey Area
G (12)	1-07.8 N 103-45.4 E	TK PA	(a) 1-09.1 N 103-43.9 E (b) 1-09.1 N 103-46.9 E (c) 1-06.1 N 103-46.9 E (d) 1-06.1 N 103-43.9 E	d	1-12.2 N 103-34.3 E	TK REP PA	
				e	1-07.4 N 103-44.2 E	TK PA	
				h	1-15.8 N 103-19.8 E	TK	
				i	1-11.1 N 103-31.6 E	TK REP	
H (13)	1-10.5 N 103-48.9 E	DANGER REP	(a) 1-12.0 N 103-47.4 E (b) 1-12.0 N 103-50.4 E (c) 1-09.0 N 103-50.4 E (d) 1-09.0 N 103-47.4 E				

Area/Point	Lat. & Long.	Wreck/Shoal	Survey Area	
E (9)	1-11.8 N 103-25.9 E	TK	(a) 1-12.3 N 103-23.3 E (b) 1-12.3 N 103-27.4 E (c) 1-09.3 N 103-27.4 E (d) 1-09.3 N 103-24.3 E	
	E (10)	1-10.8 N 103-25.8 E	TK	
F (11)	1-05.2 N 103-42.1 E	TK PA	(a) 1-06.7 N 103-40.6 E (b) 1-06.7 N 103-43.6 E (c) 1-03.7 N 103-43.6 E (d) 1-03.7 N 103-40.6 E	

Fig. 3-72 Chart Sizes for Smooth Sheets (Group Area 5)

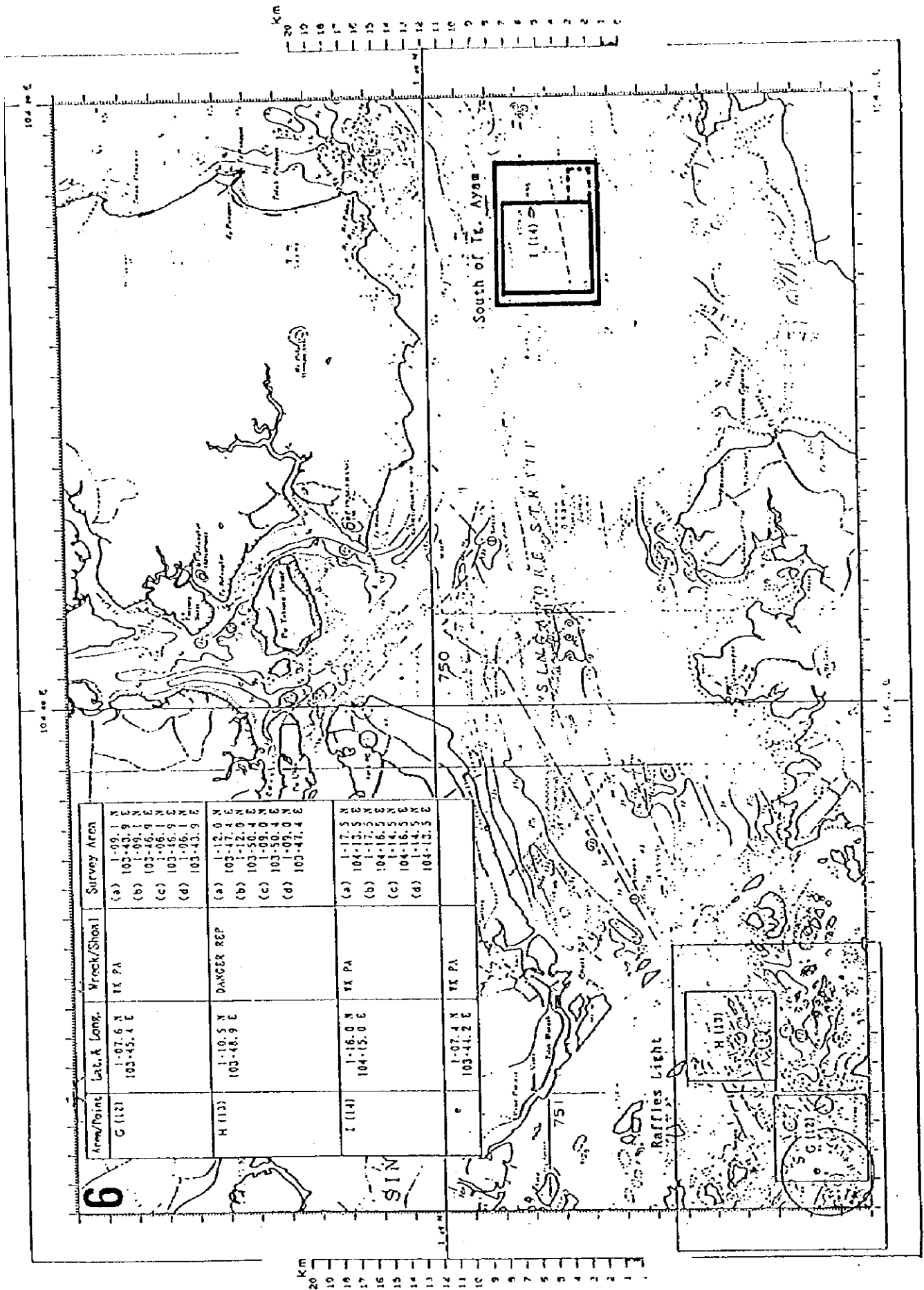


Fig. 3-73 Chart Sizes for Smooth Sheets (Group Area 6)

CHAPTER 4

ELECTRONIC NAVIGATIONAL  
CHARTS DATABASE

## CHAPTER 4 : ELECTRONIC NAVIGATIONAL CHARTS DATABASE

### 4.1 Electronic Navigational Charts Database

Electronic Navigational Charts (ENC) database covering six sheets of common datum charts of the Straits of Malacca and Singapore shown in Table 4-1 was prepared in Japan. This database makes use of this study results.

The ENC database conformed to the IHO Specifications S57 Edition 3.

One magnetic tape file of ENC database was submitted to each Littoral State together with this report.

Table 4-1 Nautical Charts Used for ENC Database

Chart No.*	Title of Chart	Scale	Size	Published
621	Singapore Strait	1:200,000	Full**	Sep. 1982
622A	Tanjung Keling to Western Entrance of Singapore Strait	1:200,000	Full	Sep. 1982
622B	One Fathom Bank to Tanjung Keling	1:200,000	Full	Sep. 1982
749	Singapore Strait Eastern Portion	1: 75,000	Full	Mar. 1981
750	Singapore Strait Central Portion	1: 50,000	Full	Feb. 1996
751	Singapore Strait Western Portion	1: 50,000	Full	Feb. 1996

[Note] Chart No.\* : Japanese Nautical Chart Number  
 Full\*\* : about 96cm x 63cm at the inner neat line

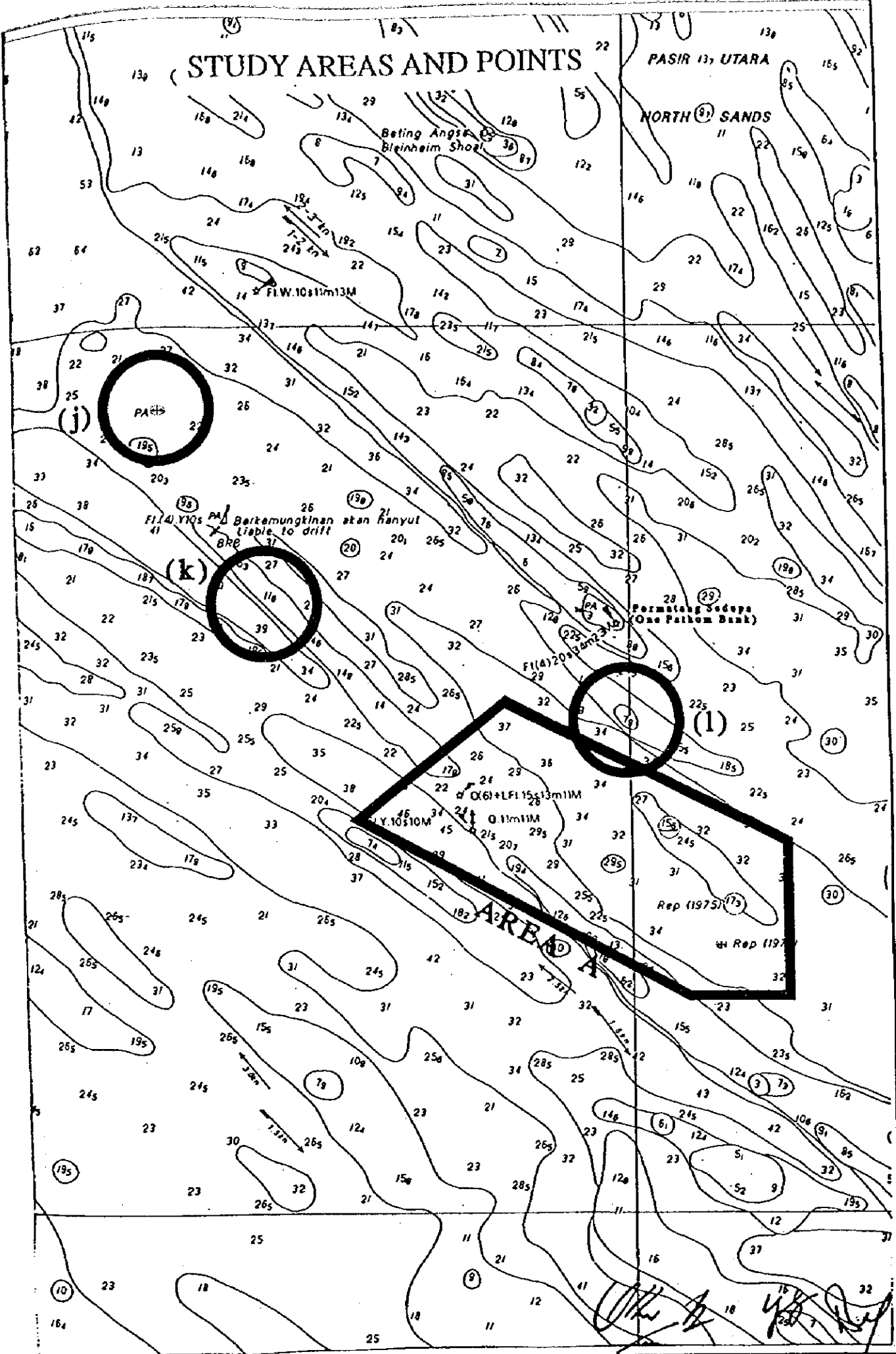
APPENDIX

Appendix 1

Map of Study Areas and Points

( Scale : 1/200,000 )

# STUDY AREAS AND POINTS



PASIR 13, UTARA  
NORTH SANDS

Beting Angsa  
Bleinheim Shoal

Permatang Sedapa  
(One Fathom Bank)

AREA A

(j)

(k)

(1)

Bertamungkinan akan hanyut  
(able to drift)

Y. 10510M  
0.11M  
1.13M

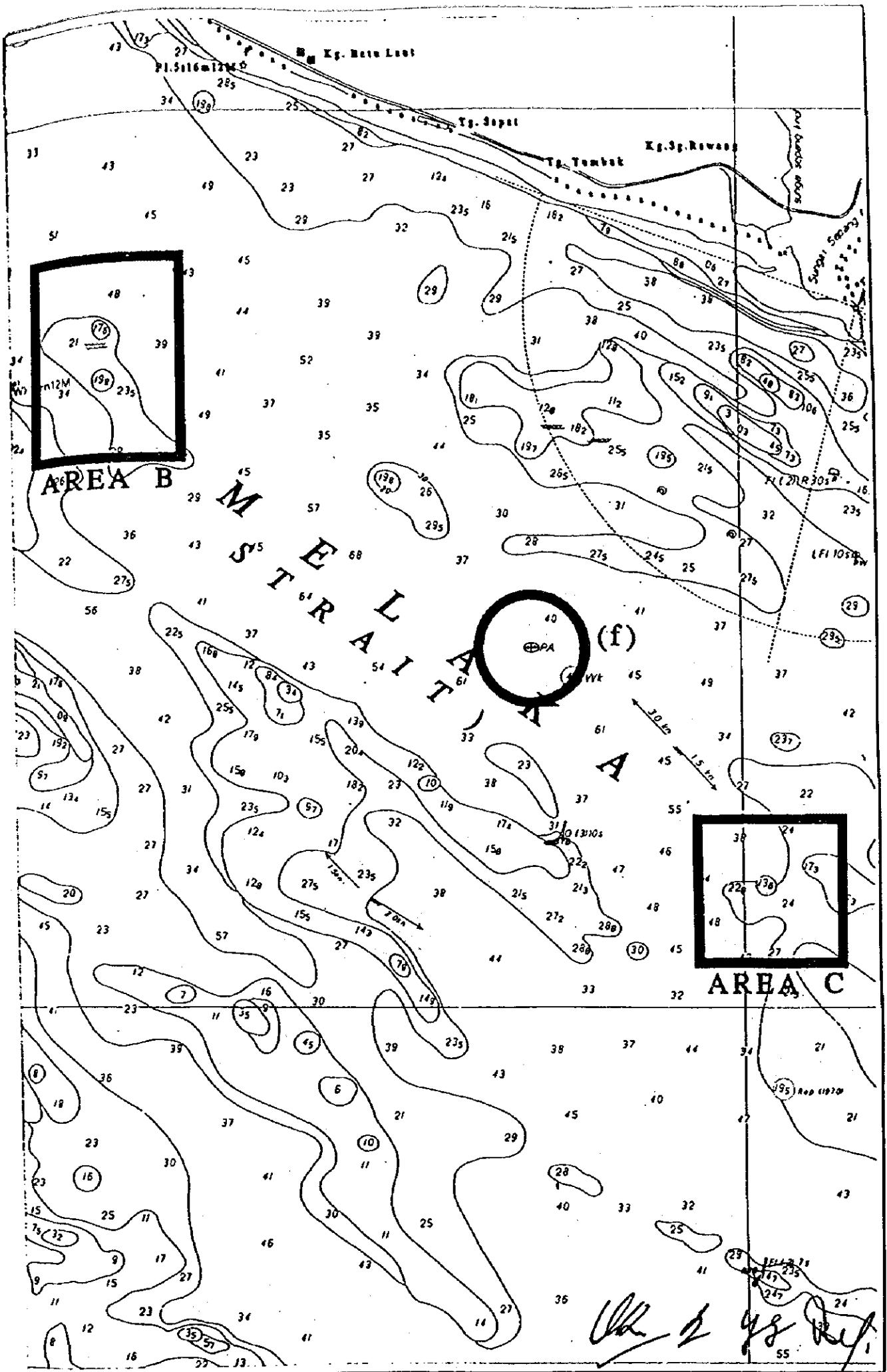
FI(4)2003

Rep (1975) (73)

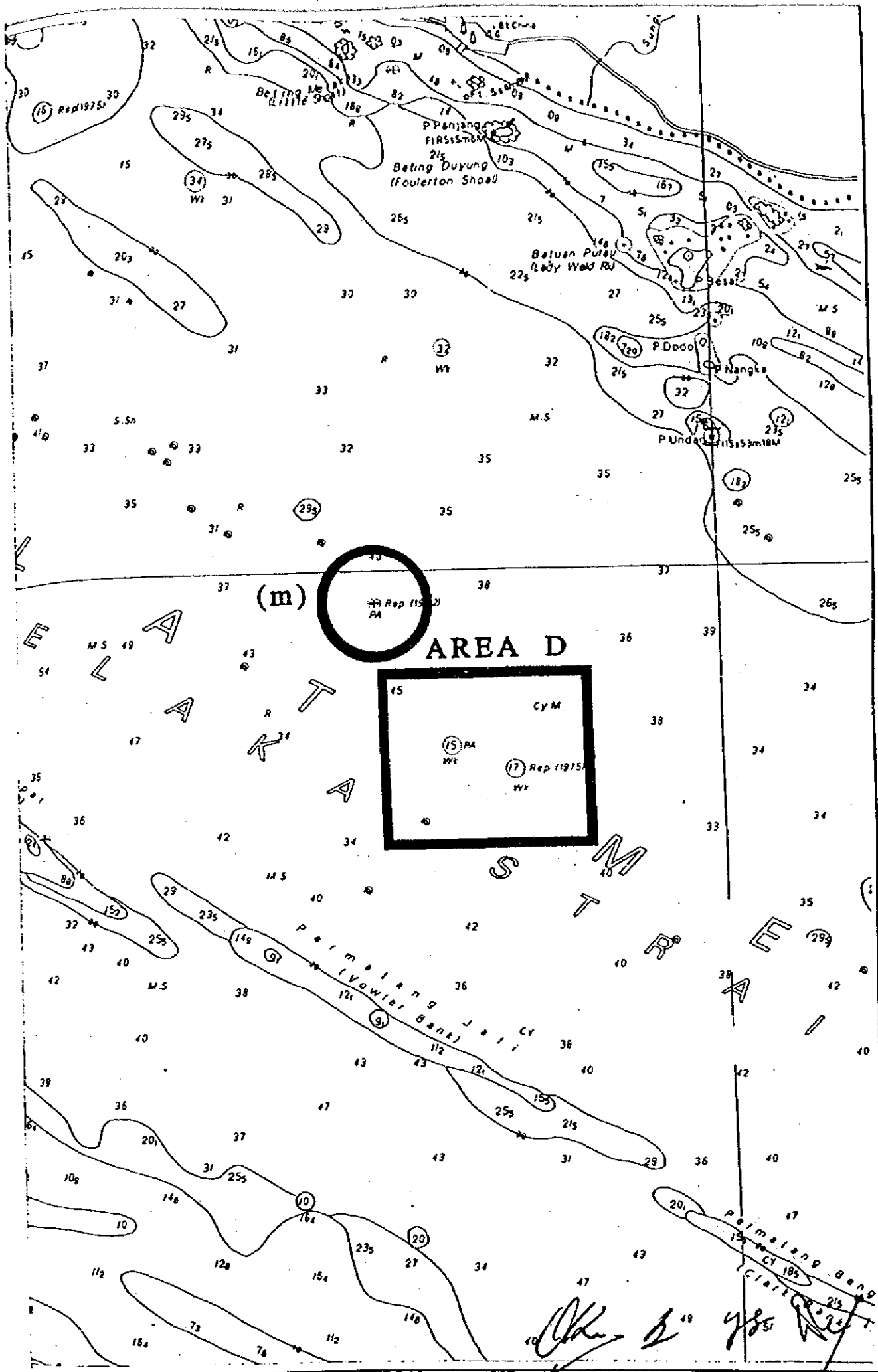
44 Rep (197

*Handwritten signatures and dates*

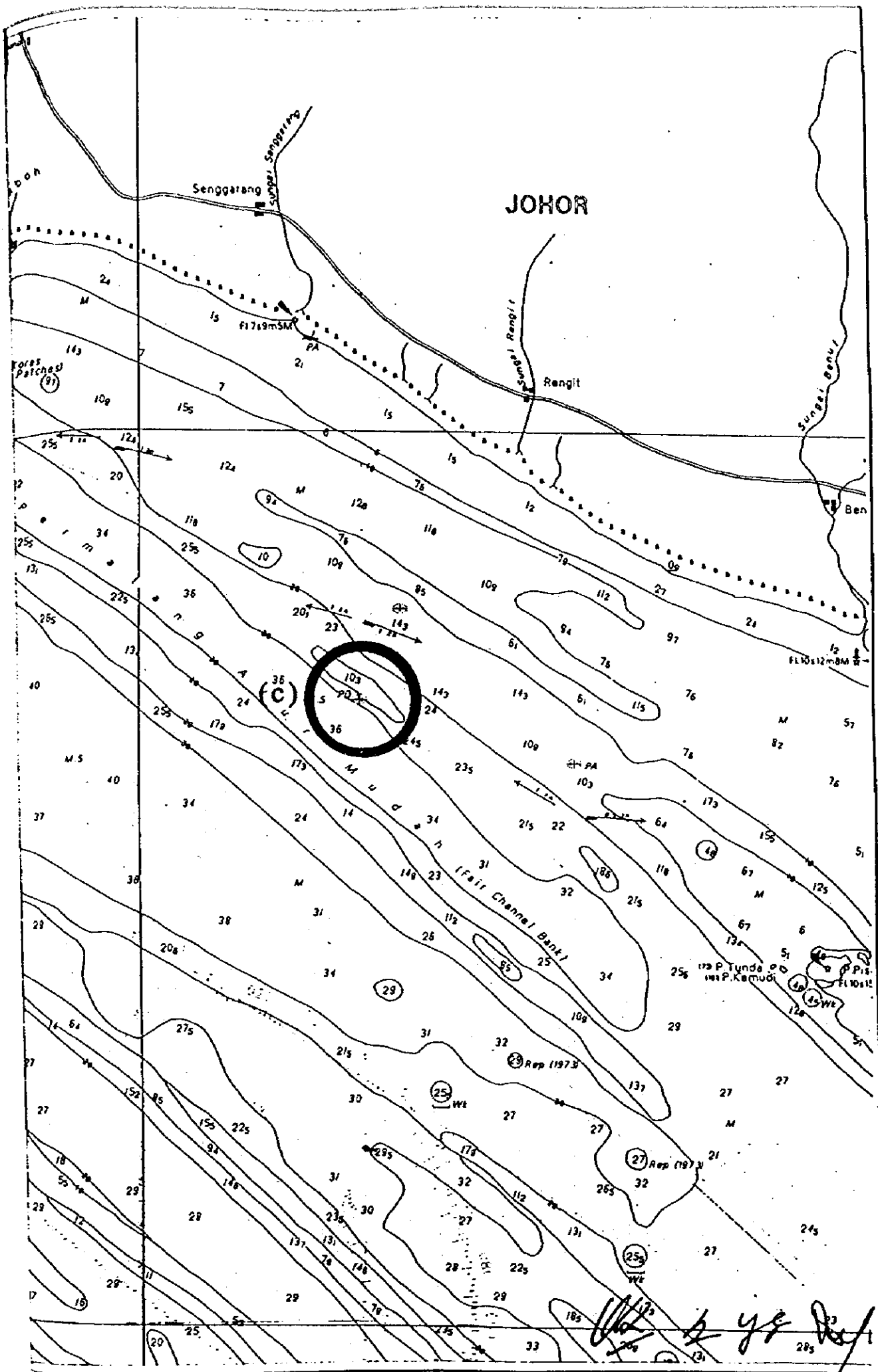






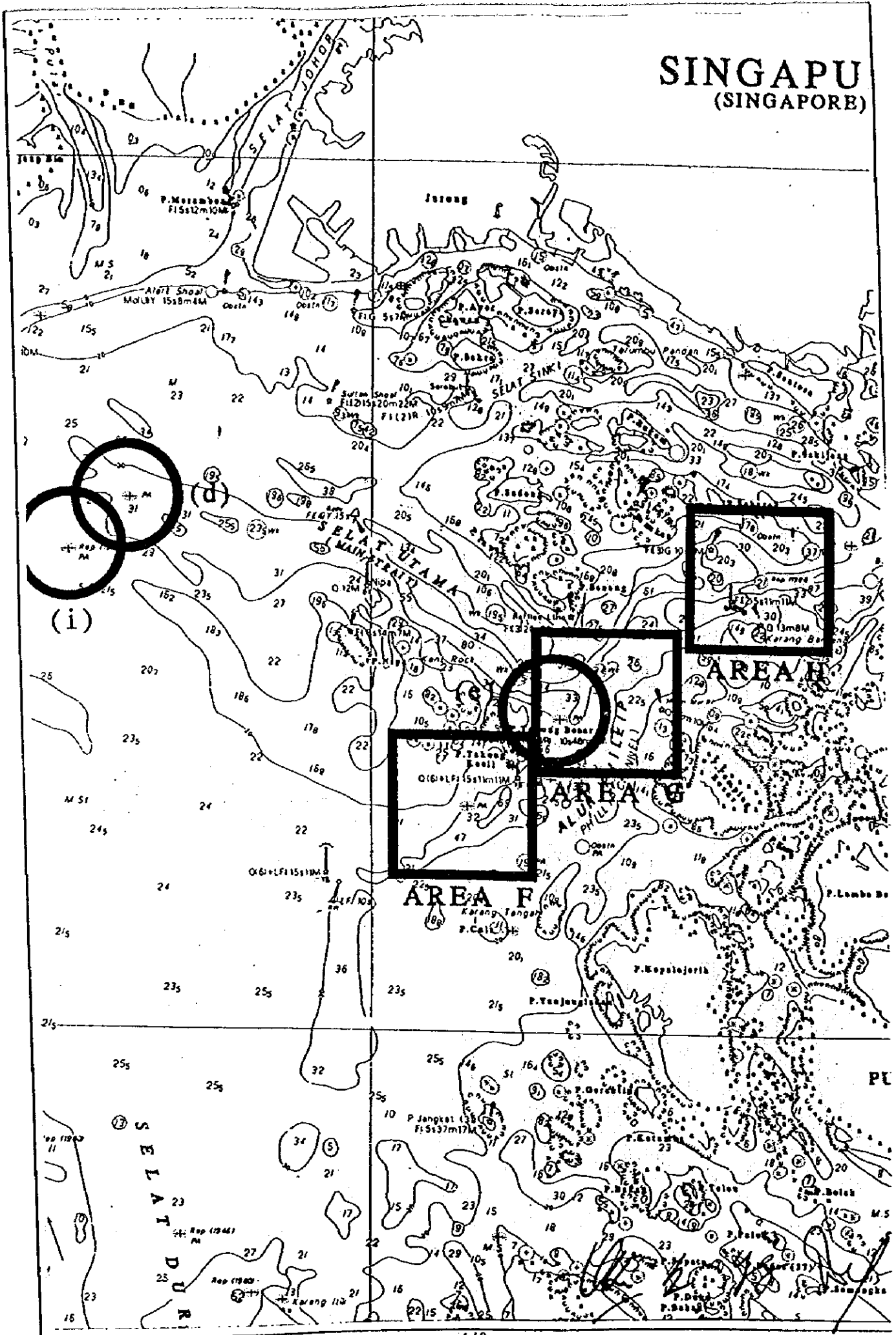




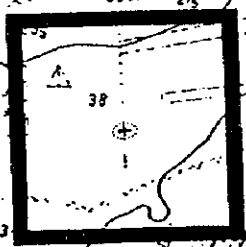
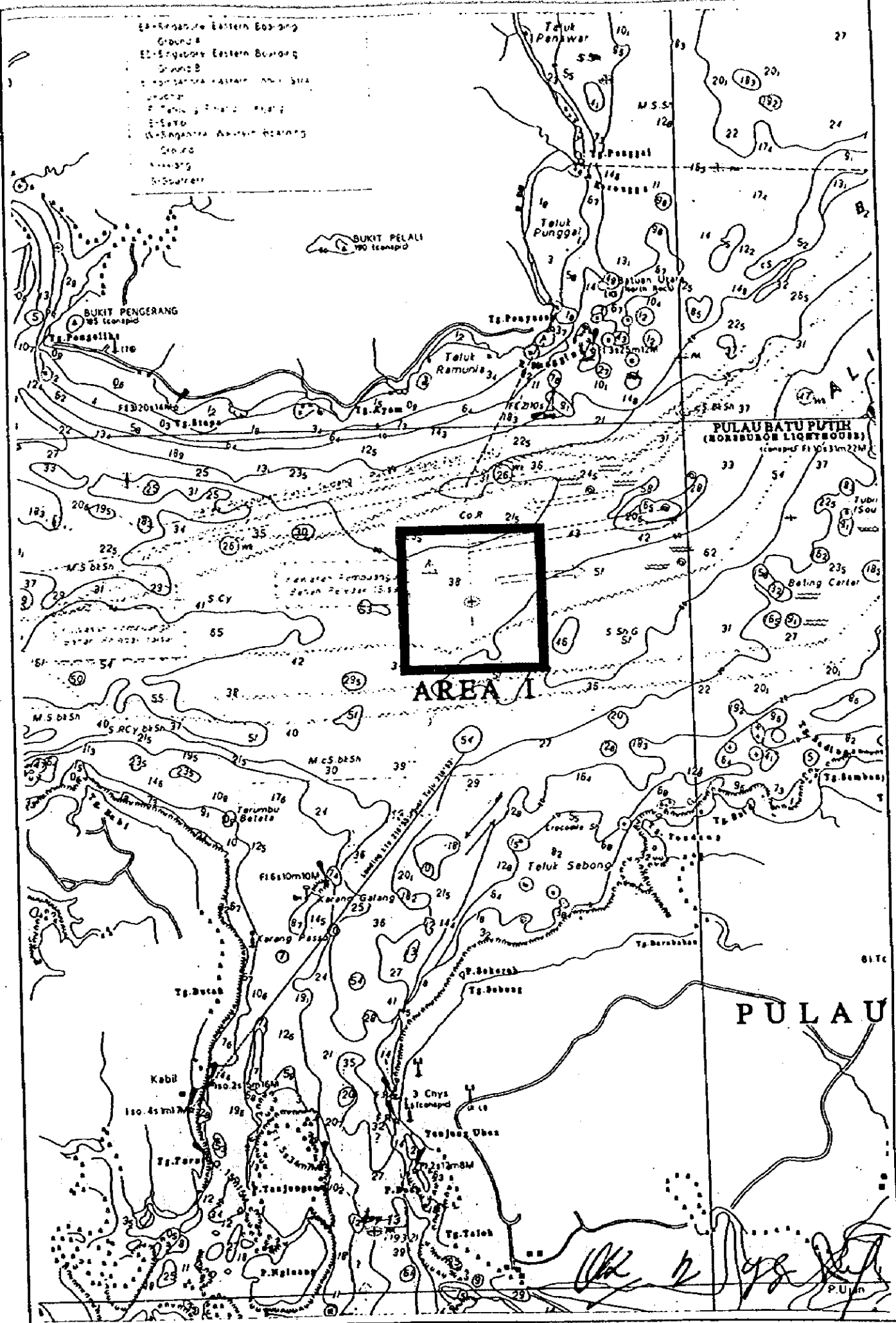




# SINGAPU (SINGAPORE)



- EA-Singapore Eastern Boating Ground
- EB-Singapore Eastern Boating Ground B
- ES-Singapore Eastern Boating Ground C
- ET-Singapore Eastern Boating Ground D
- EU-Singapore Eastern Boating Ground E
- EV-Singapore Eastern Boating Ground F
- EW-Singapore Eastern Boating Ground G
- EX-Singapore Eastern Boating Ground H
- EY-Singapore Eastern Boating Ground I
- EZ-Singapore Eastern Boating Ground J



AREA I

PULAU

*Handwritten signature and date: Ok 2 1988*



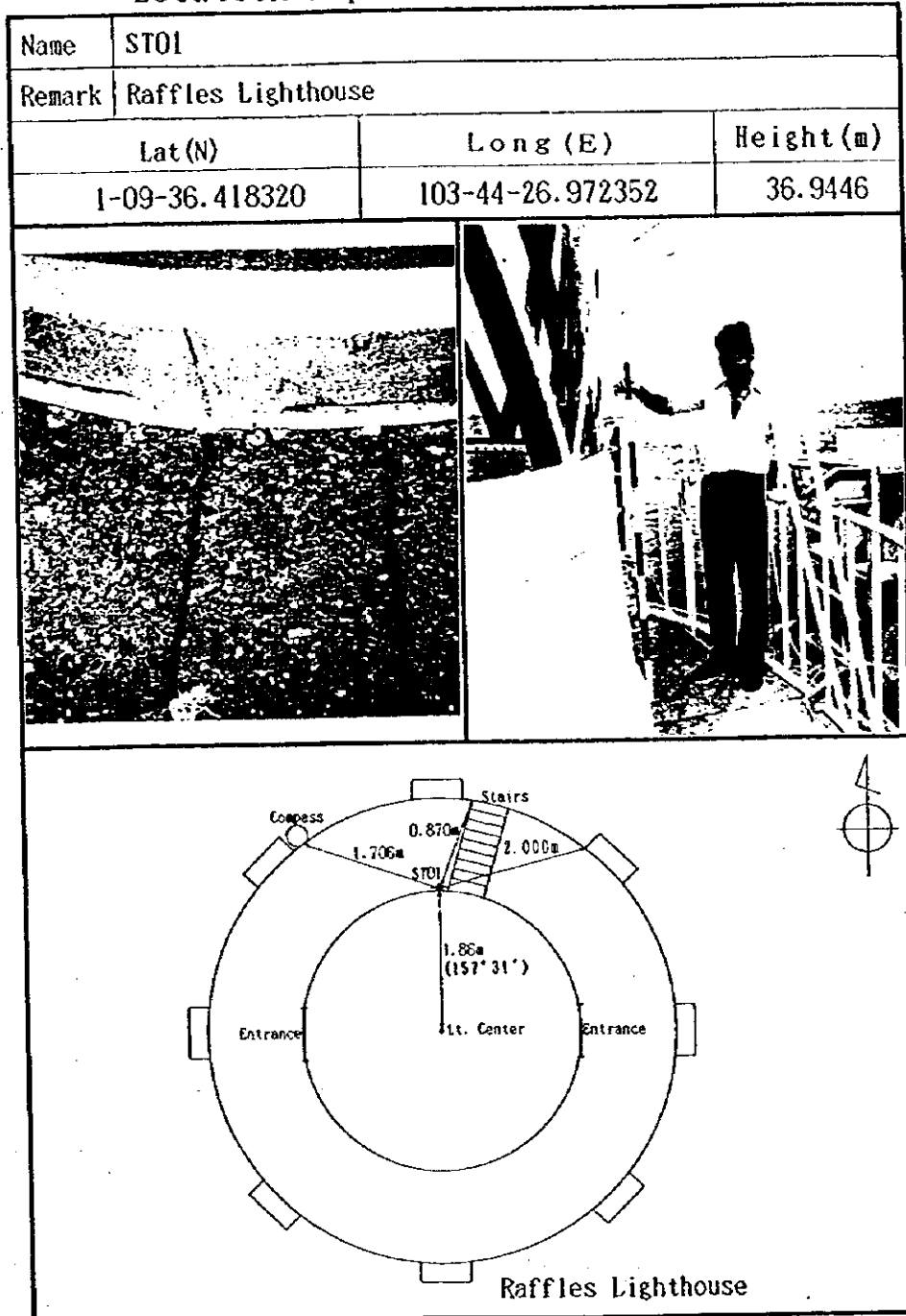
Appendix 2

Description of Control Points

DESCRIPTION OF CONTROL POINT

No. : ST 01  
 Name : Raffles Lighthouse  
 Geodetic coordinates : 1-09-36.418320 N 103-44-26.972352 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 36.9446 m  
 Date of Establishment : Oct. 1996  
 Locality : Pulau Satumu, Singapore  
 Description : The station is a brass mark on top of the lighthouse on the Northern Floor of the Parapet of the light centre.  
 Accessible by Boat.

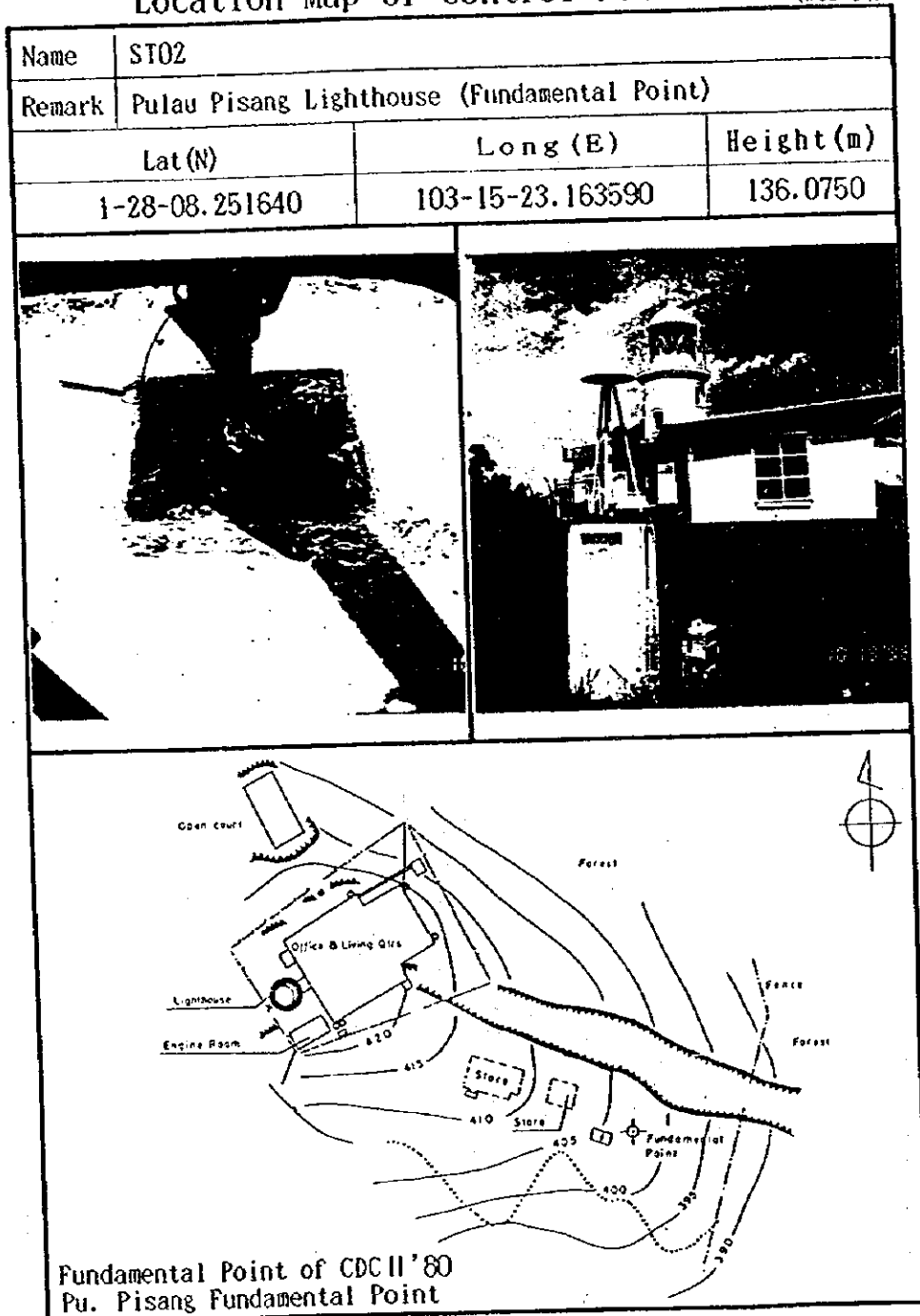
Location Map of Control Point (WGS-84)



DESCRIPTION OF CONTROL POINT

No. : ST 02  
 Name : Pulau Pisang Lighthouse  
 Geodetic coordinates : 1-28-08.251640 N 103-15-23.163590 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 136.0750 m  
 Date of Establishment : Oct. 1996  
 Locality : Pulau Pisang Lighthouse (Fundamental Point)  
 Description : The station is located on the open field southeast of the lighthouse along the slope.  
 The marker is a brass plate centred on the concrete pillar.  
 Accessible by Boat.

Location Map of Control Point (WGS-84)

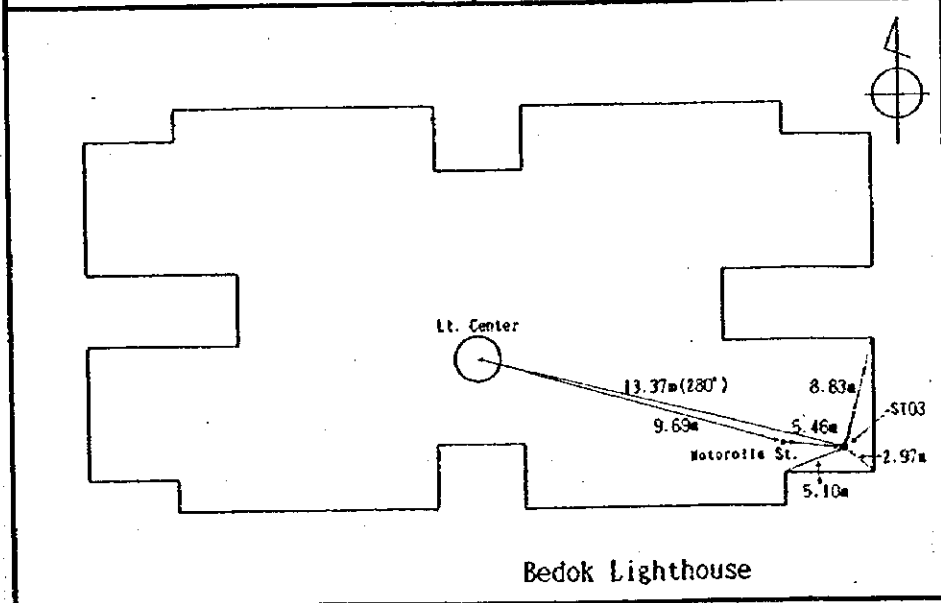
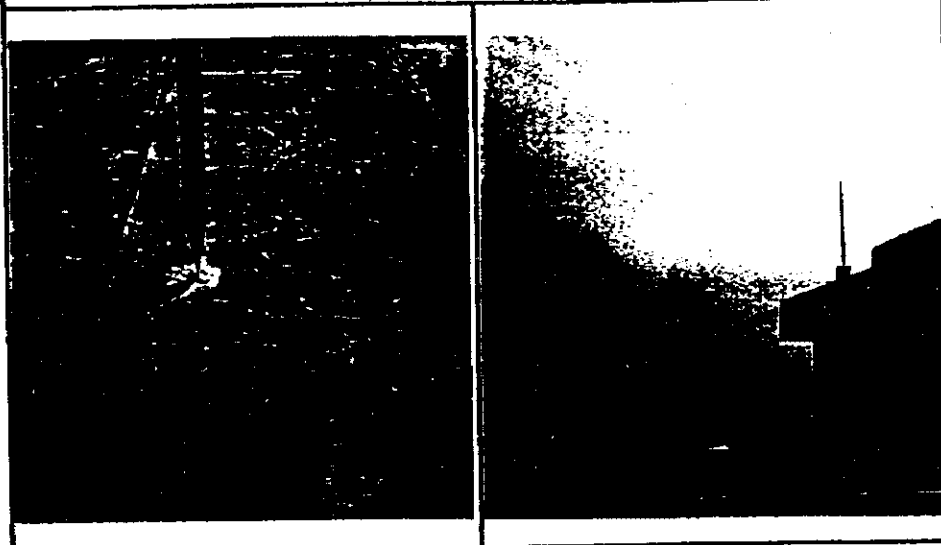


DESCRIPTION OF CONTROL POINT

No. :ST 03  
 Name :Bedok Lighthouse  
 Geodetic coordinates : 1-18-32.671883 N 103-55-58.319961 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 83.5214 m  
 Date of Establishment :Oct. 1996  
 Locality :Block 5000K, Neptune Court Marine Parade Road.  
 Description : The station is a brass mark situated on the roof top of block 5000K just below the lighthouse on the eastern corner of the parapet.  
 Accessible by Car.

Location Map of Control Point (WGS-84)

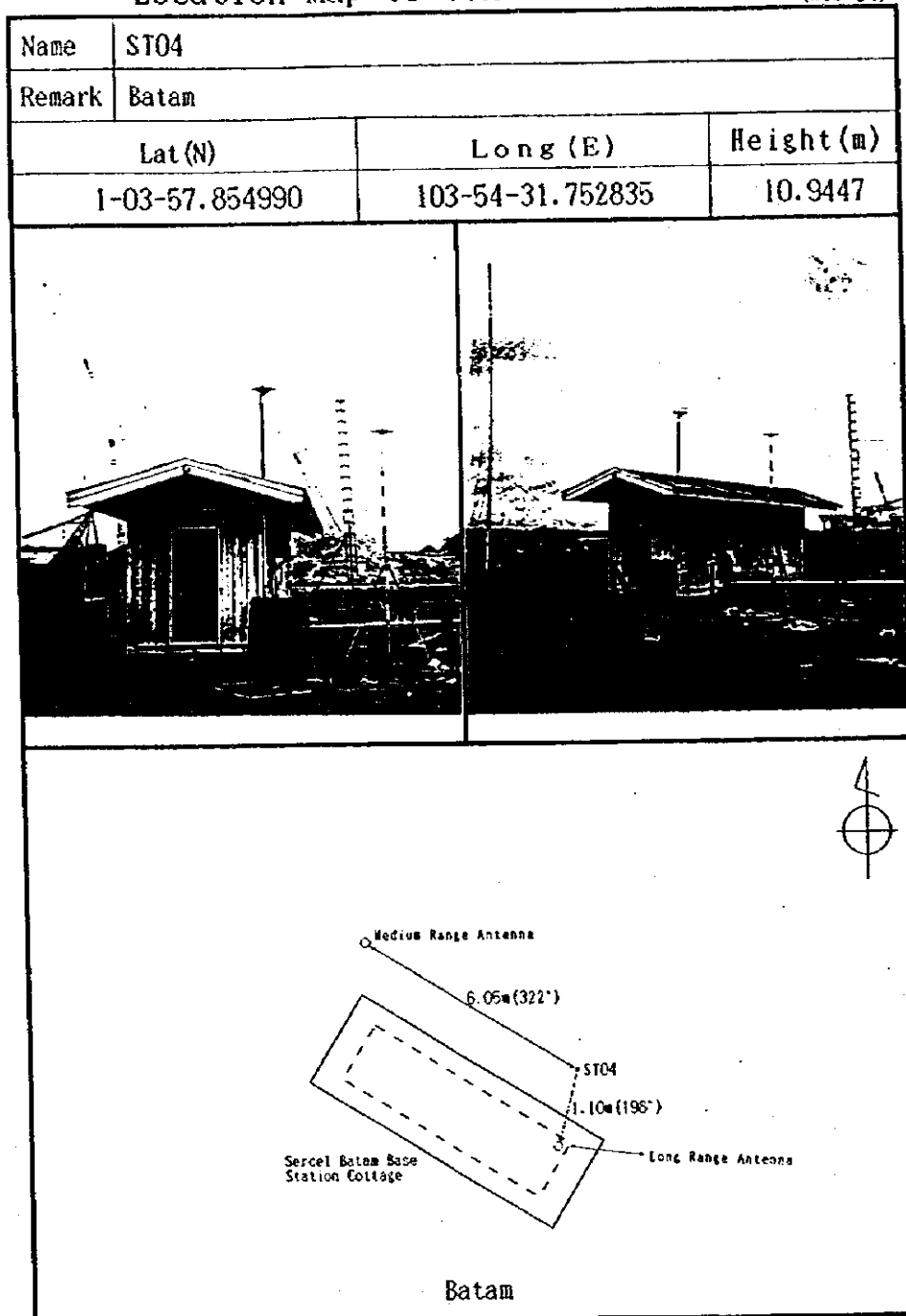
Name	ST03		
Remark	Bedok Lighthouse		
	Lat (N)	Long (E)	Height (m)
	1-18-32.671883	103-55-58.319961	83.5214



DESCRIPTION OF CONTROL POINT

No. : ST 04  
 Name : Batam DGPS Station (Sercel DGPS System)  
 Geodetic coordinates : 1-03-57.854990 N 103-54-31.752835 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 10.9447 m  
 Date of Establishment : Oct. 1996  
 Locality : Pt. Ballast, Tg. Uncang, Batam  
 Description : The station is a GPS antenna.  
 The location can be approached by car from Batuampar.

Location Map of Control Point (WGS-84)

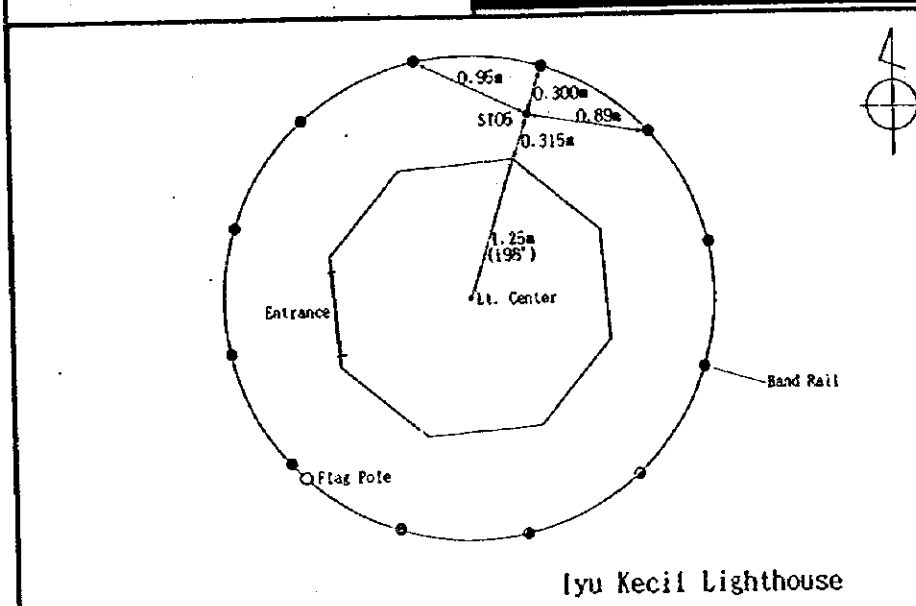
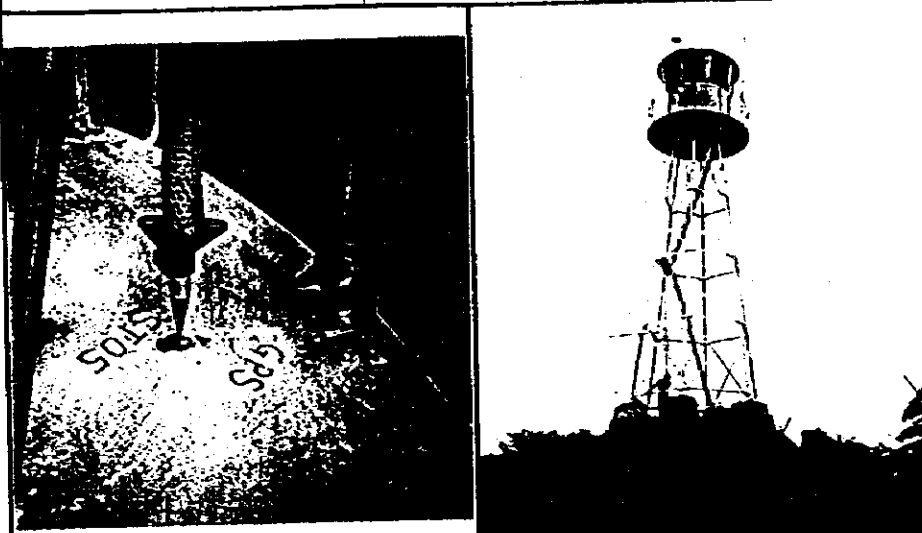


DESCRIPTION OF CONTROL POINT

No. :ST 05  
 Name :Iyu Kecil Lighthouse  
 Geodetic coordinates : 1-11-27.752264 N 103-21-07.805106 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid:48.7887 m  
 Date of Establishment :Oct. 1996  
 Locality :Pulau Iyu Kecil,Riau  
 Description : The station is a brass mark at the top of lighthouse.  
 The location can be approached by boat.

Location Map of Control Point (WGS-84)

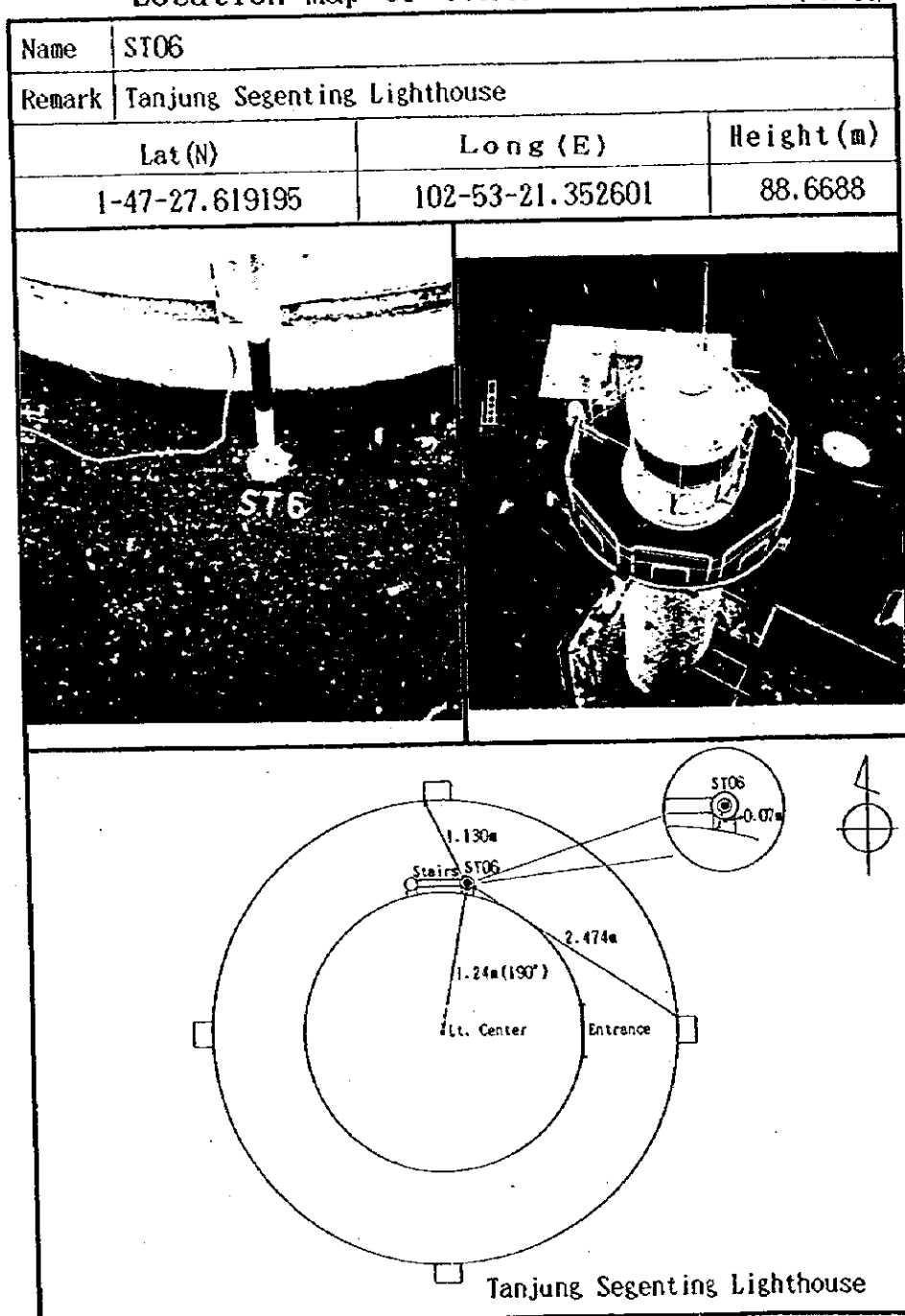
Name	ST05		
Remark	Iyu Kecil Lighthouse		
	Lat(N)	Long(E)	Height(m)
	1-11-27.752264	103-21-07.805106	48.7887



DESCRIPTION OF CONTROL POINT

No. :ST 06  
 Name :Tanjung Segenting Lighthouse  
 Geodetic coordinates : 1-47-27.619195 N 102-53-21.352601 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid:88.6688 m  
 Date of Establishment :Oct.1996  
 Locality :Tanjung Segenting ,Batu Pahat  
 Description : The station is a brass mark situated at the top of the lighthouse.  
 It is accessible by road.

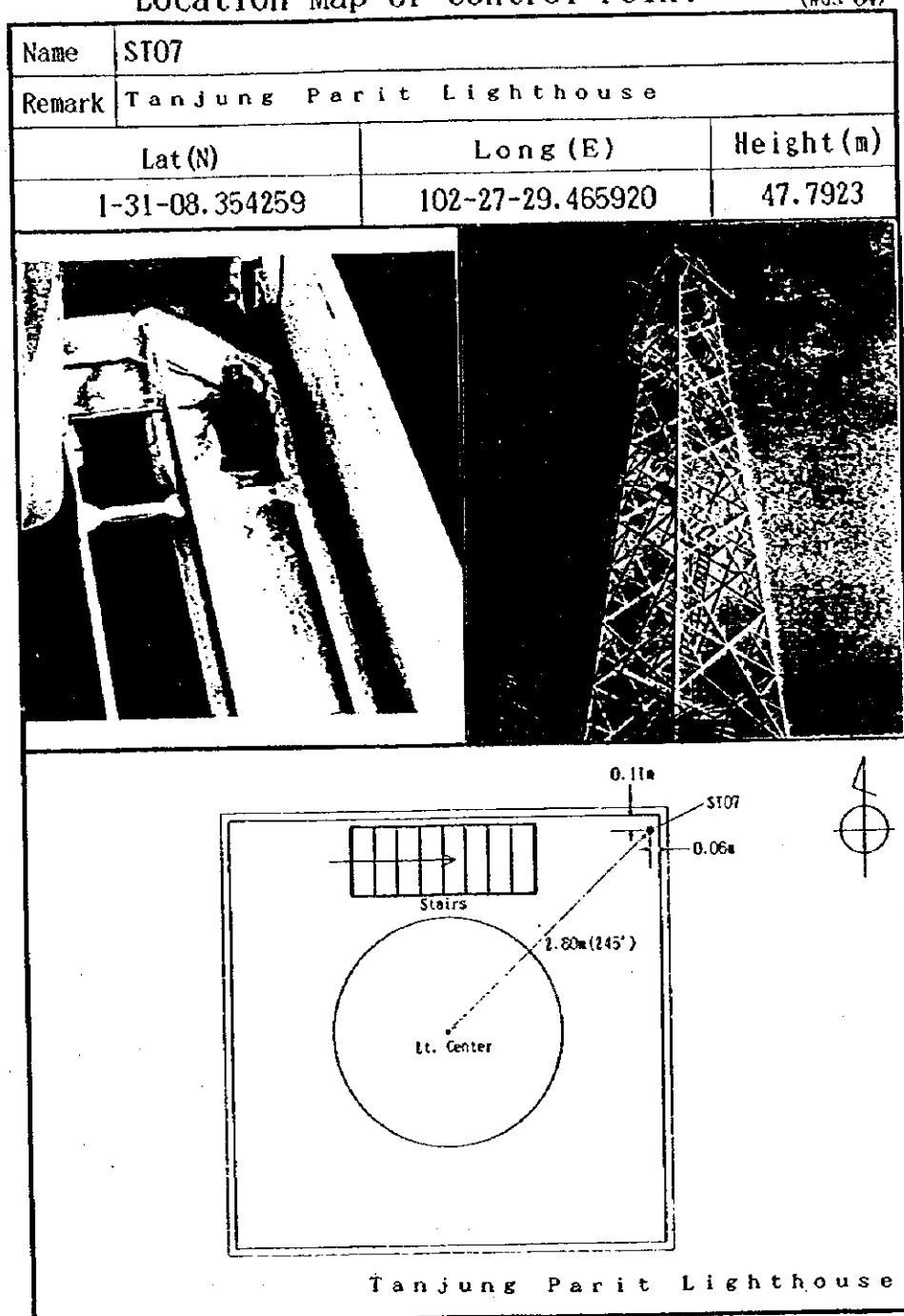
Location Map of Control Point (WGS-84)



DESCRIPTION OF CONTROL POINT

No. : ST 07  
 Name : Tanjung Parit Lighthouse  
 Geodetic coordinates : 1-31-08.354259 N 102-27-29.465920 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 47.7923 m  
 Date of Establishment : Oct. 1996  
 Locality : Tg. Parit, Riau  
 Description : The station is a brass mark at the corner of the top.  
 It is located 2.80 m North East Ward (65 ° ) of lighthouse.  
 The location can be approached by boat.

Location Map of Control Point (WGS-84)

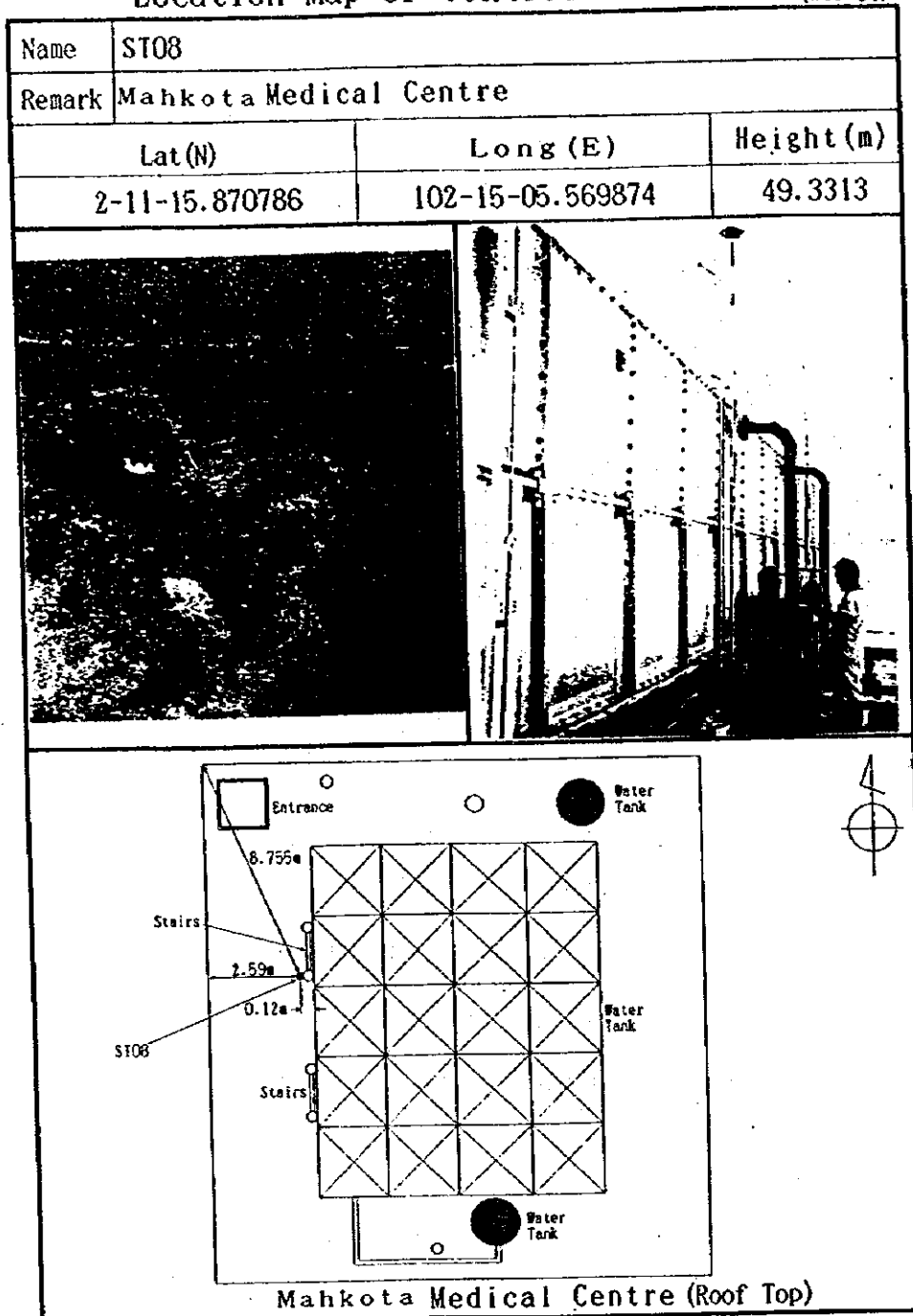




DESCRIPTION OF CONTROL POINT

No. : ST 08  
 Name : Mahkota Medical Centre  
 Geodetic coordinates : 2-11-15.870786 N 102-15-05.569874 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 49.3313 m  
 Date of Establishment : Oct. 1996  
 Locality : On top of Mahkota Medical Centre, Malacca  
 Description : The station is a brass mark at the top of Mahkota Medical Centre building and is accessible by road.

Location Map of Control Point (WGS-84)



DESCRIPTION OF CONTROL POINT

No. : ST 09

Name : Tanjung Medang Lighthouse

Geodetic coordinates : 2-07-27.395573 N 101-39-21.260730 E

Ellipsoid : WGS 84

Height on ellipsoid: 0.3058 m

Date of Establishment : Oct. 1996

Locality : Tanjung Medang, Riau

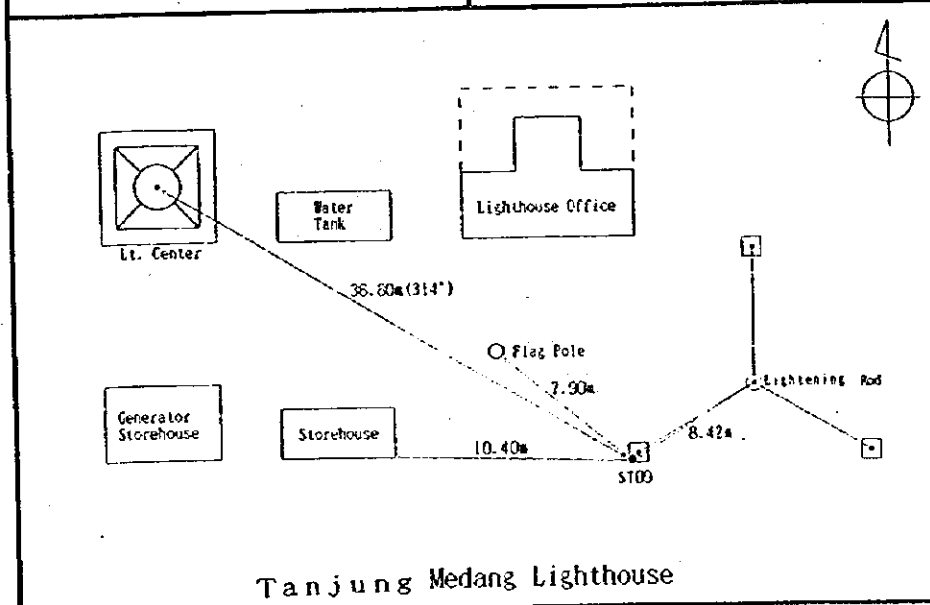
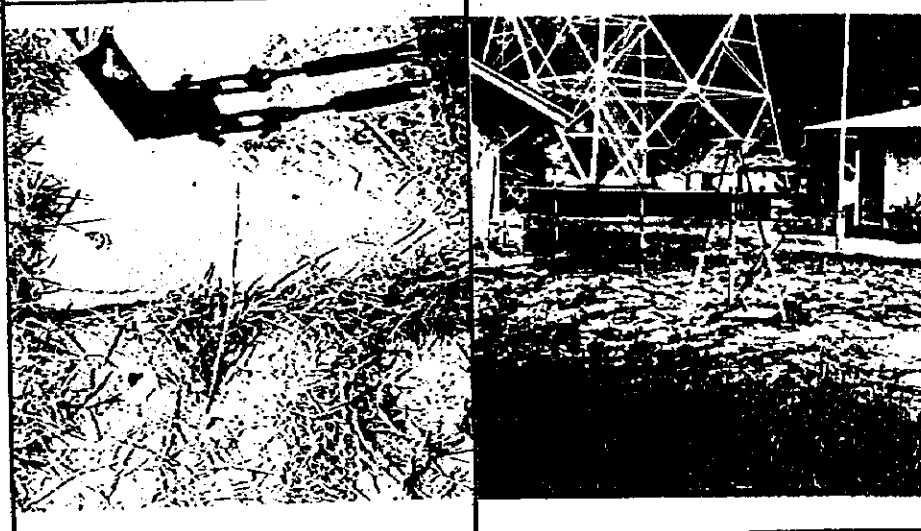
Description : The station is a brass mark at the anchor point of lightening Rod.

It is located 36.80 m South East Ward (314 ° )of lighthouse.  
The location can be approached by boat and helly.

Location Map of Control Point

(WGS-84)

Name	ST09		
Remark	Tanjung Medang Lighthouse		
	Lat(N)	Long (E)	Height (m)
	2-07-27.395573	101-39-21.260730	0.3058

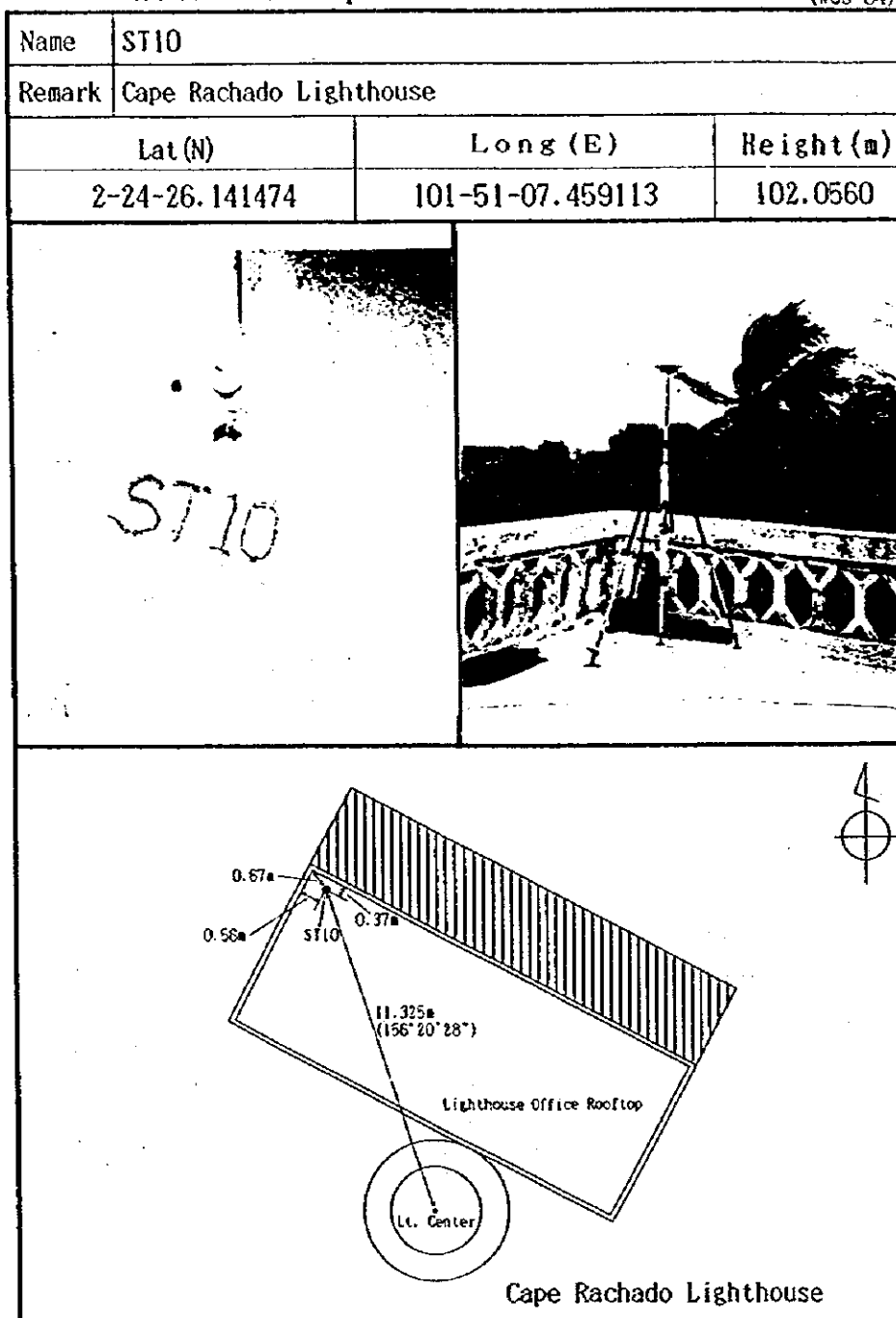


DESCRIPTION OF CONTROL POINT

No. : ST 10  
 Name : Cape Rachado Lighthouse (Rumah Api Tanjung Tuan)  
 Geodetic coordinates : 2-24-26.141474 N 101-51-07.459113 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 102.0560 m  
 Date of Establishment : Oct. 1996  
 Locality : Tanjung Tuan, Negeri Sembilan  
 Description : The station is a brass mark situated at the top of lighthouse.  
 it is accessible by road.

Location Map of Control Point

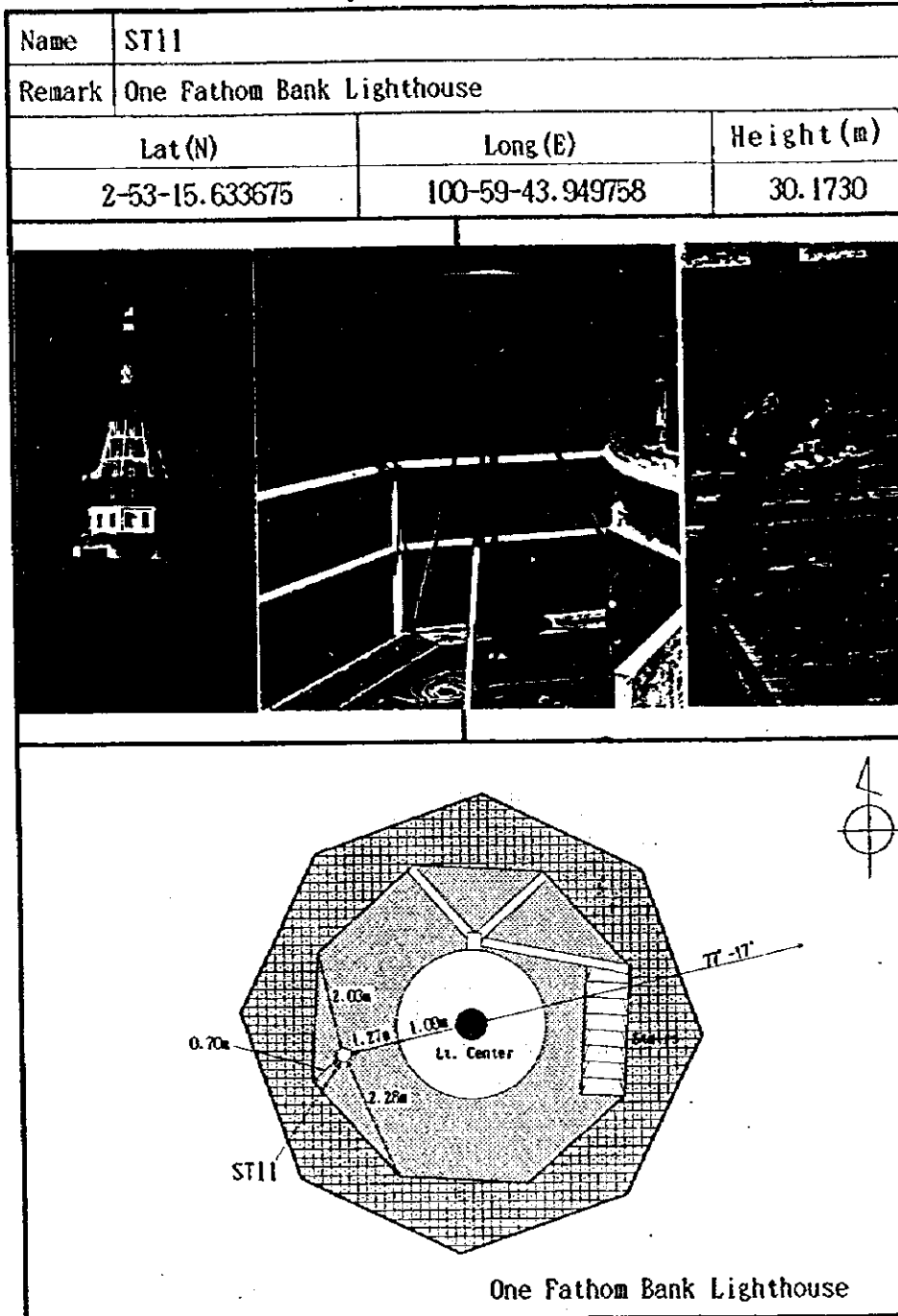
(WGS-84)



DESCRIPTION OF CONTROL POINT

No. : ST 11  
 Name : One Fathom Bank Lighthouse  
 Geodetic coordinates : 2-53-15.633675 N 100-59-43.949758 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid : 30.1730 m  
 Date of Establishment : Oct. 1997  
 Locality : Malacca Straits, State of Selangor, Malaysia  
 Description : the One Fathom Bank Lighthouse which lies about 30 nautical miles west of Port Klang, and is only approachable by small craft.

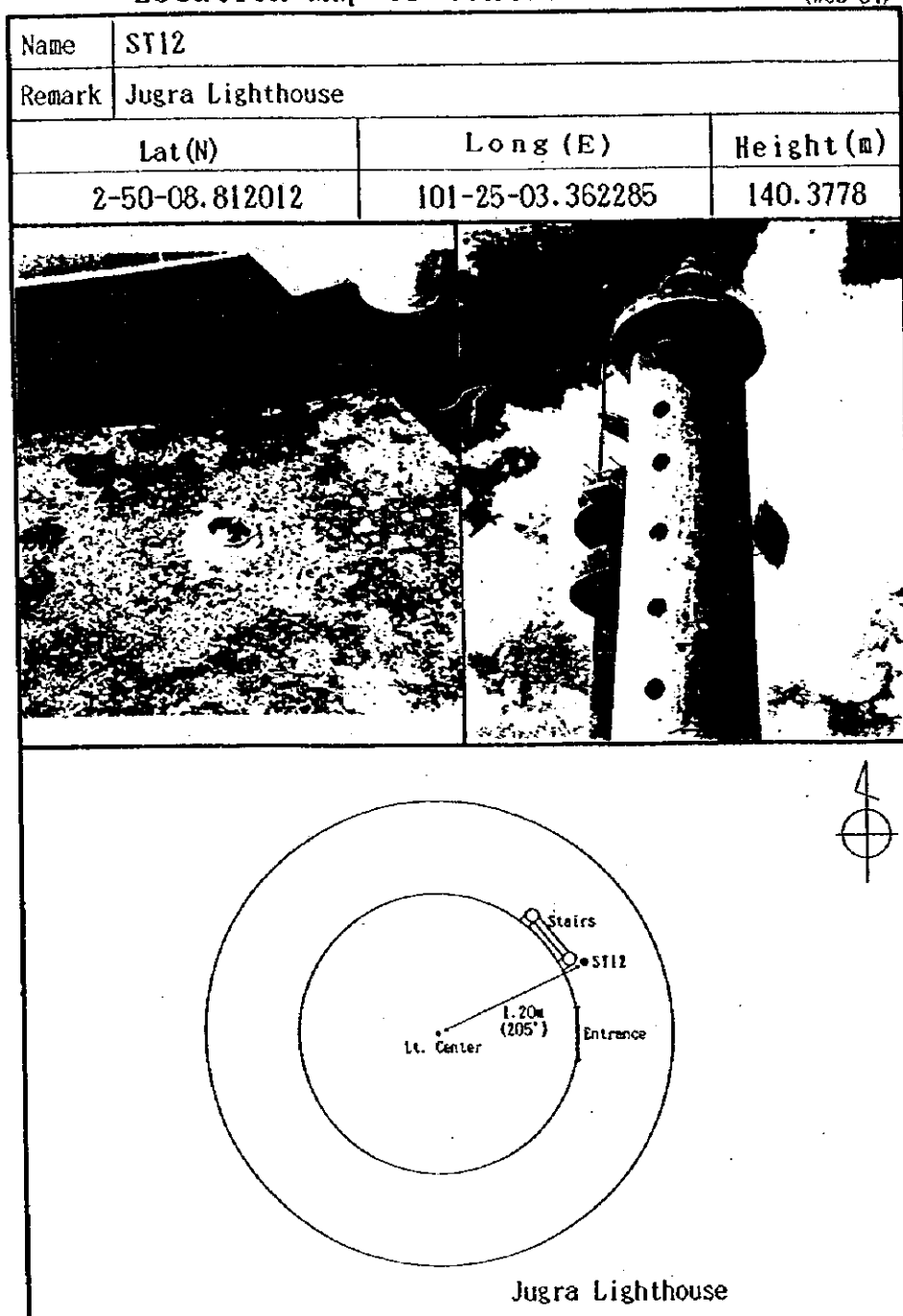
Location Map of Control Point (WGS-84)



DESCRIPTION OF CONTROL POINT

No. : ST 12  
 Name : Jugra Lighthouse  
 Geodetic coordinates : 2-50-08.812012 N 101-25-03.362285 E  
 Ellipsoid : WGS 84  
 Height on ellipsoid: 140.3778 m  
 Date of Establishment : Oct. 1996  
 Locality : Jugra, Selangor  
 Description : The station is a brass mark situated at the top of lighthouse.  
 it is accessible by road.

Location Map of Control Point (WGS-84)



DESCRIPTION OF CONTROL POINT

No. : GP 09

Name : GPS 09 Labu

Geodetic coordinates : 2-44-26.33575 N 101-51-39.82981 E

Ellipsoid : WGS 84

Height on ellipsoid: 59.1140 m

Date of Establishment : 1989

Locality : Labu, Seremban

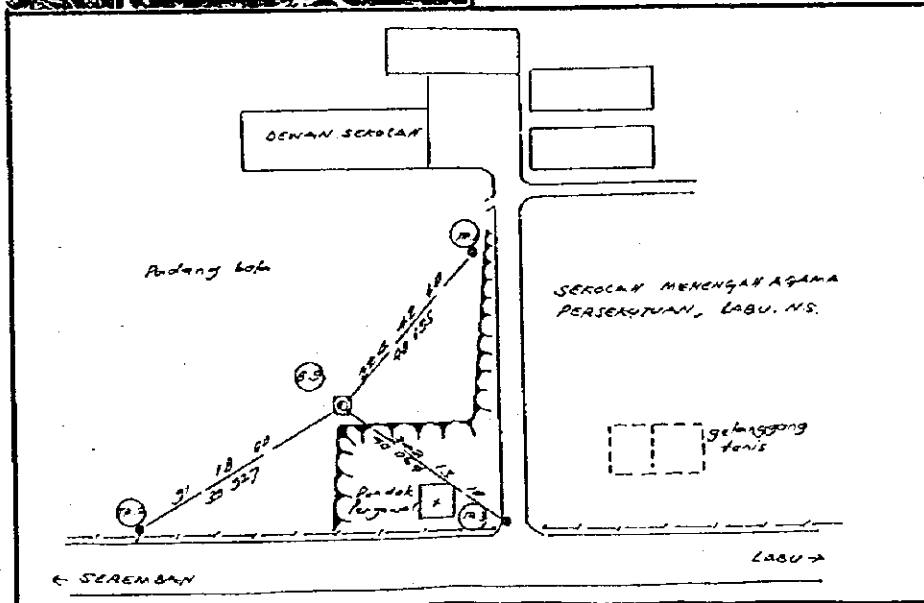
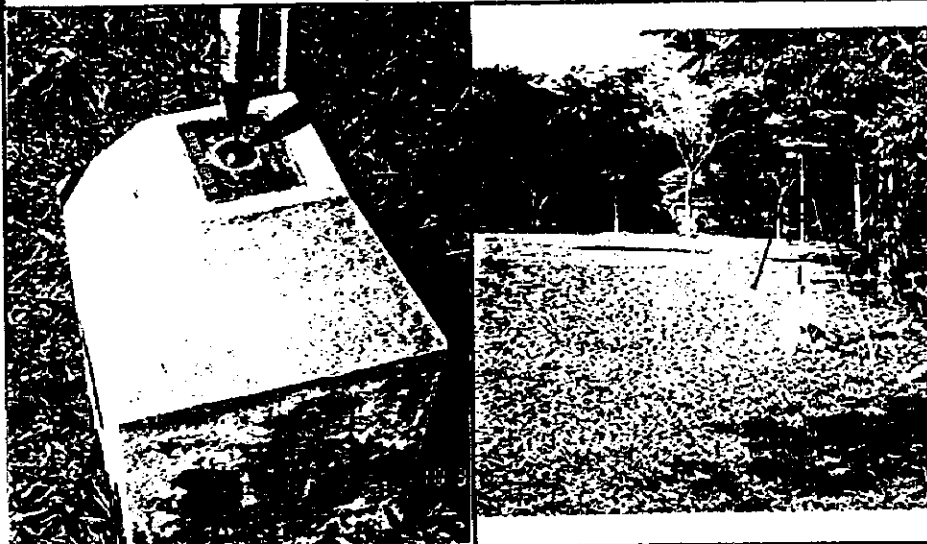
Description : The station is located behind the guard house of Islamic Secondary High School, Labu, Negeri Sembilan and it is accessible by road.

The marker is a brass bolt centred on the concrete pillar.

Location Map of Control Point

(WGS-84)

Name	GPO9		
Remark	Labu (Fundamental Point)		
	Lat (N)	Long (E)	Height (m)
	2-44-26.335750	101-51-39.829810	59.1140



DESCRIPTION OF CONTROL POINT

No. :GP 18

Name :GPS 18 Morib

Geodetic coordinates : 2-43-21.51227 N 101-27-22.58678 E

Ellipsoid : WGS 84

Height on ellipsoid:-0.1130

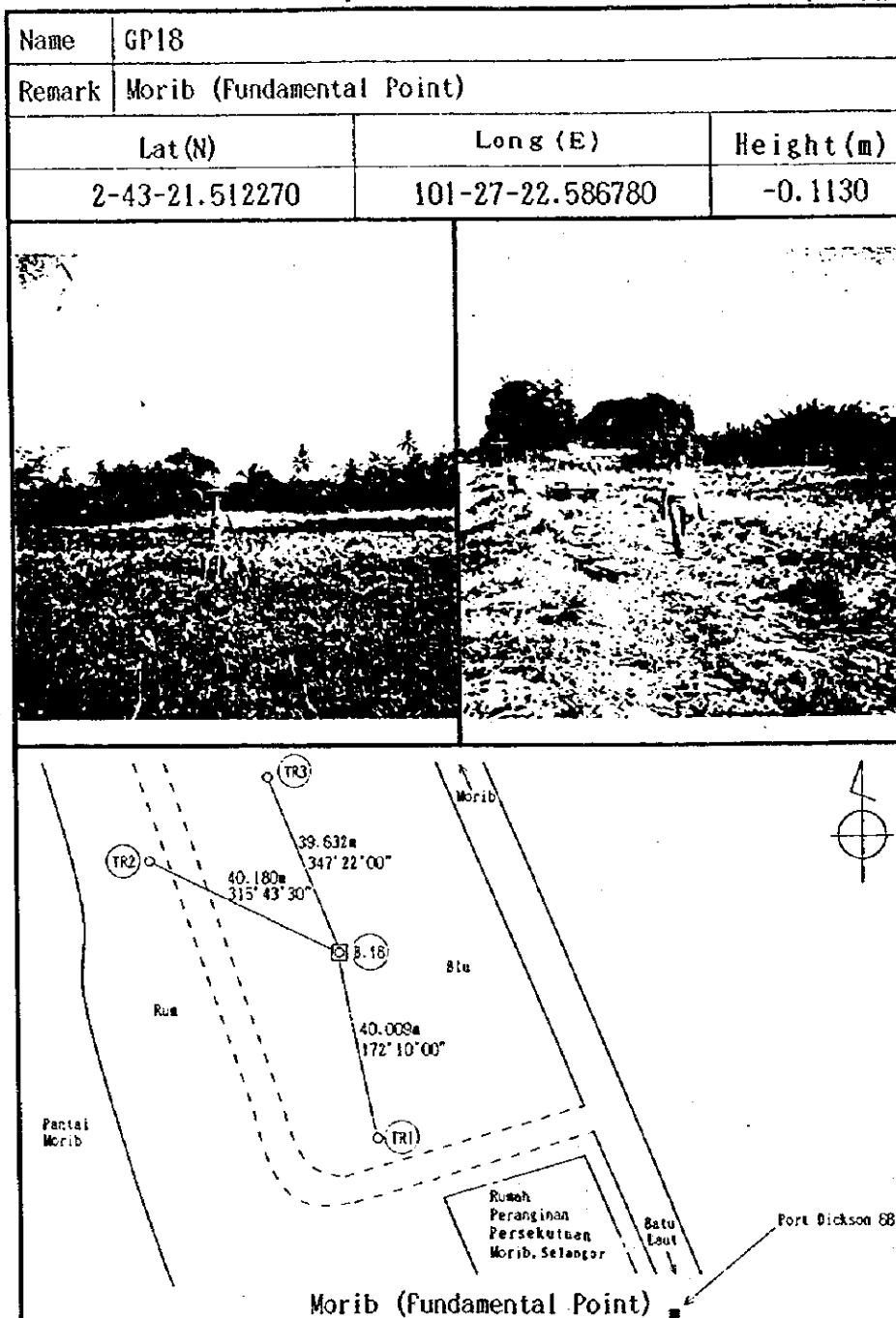
Date of construction :1989

Locality :Morib Selangor

Description : The station is located at the Reserved Land nearby Government's Rest House, Morib, Selangor. It is accessible by road and boat. The marker is a brass bolt centered on the concrete pillar.

Location Map of Control Point

(WGS-84)



## Appendix 3

### Results of Control Point Survey

Appendix 3-1 : Coordinates of Lighthouse's Center

Appendix 3-2 : Comparison of One-Point-Fixing and Three-Point-Fixing



Appendix 3-1 : Coordinates of Lighthouse's Center

Computed Coordinates of Lighthouse Center

(WGS-84)

Name	Lat (N)	Long (E)	Azimuth	Distance (m)
ST01	1 09 36.418320	103 44 26.972352	157 31 00	2.000
Raffles Lt.	1 09 36.358155	103 44 26.997091		
ST03	1 18 32.671883	103 55 58.319961	280 00 00	13.370
Bedok Lt.	1 18 32.747470	103 55 57.894042		
ST04	1 03 57.854990	103 54 31.752835	322 00 00	6.050
Batam Medium An.	1 03 58.010205	103 54 31.632358		
ST04	1 03 57.854990	103 54 31.752835	198 00 00	1.100
Batam Short An.	1 03 57.820930	103 54 31.741840		
ST05	1 11 27.752264	103 21 07.805106	198 00 00	1.565
Iyu Kecil Lt.	1 11 27.703806	103 21 07.789463		
ST06	1 47 27.619195	102 53 21.352601	190 00 00	1.240
Segenting Lt.	1 47 27.579438	102 53 21.345634		
ST07	1 31 08.354259	102 27 29.465920	245 00 00	2.800
Parit Lt.	1 31 08.315733	102 27 29.383825		
ST09	2 07 27.395573	101 39 21.260730	314 00 00	36.800
Medang Lt.	2 07 28.227838	101 39 20.404067		
ST10	2 24 26.141474	101 51 07.459113	156 20 28	11.325
Rachado Lt.	2 24 25.803758	101 51 07.606212		
ST11	2 53 15.633675	100 59 43.949758	77 17 00	2.360
One Fathom Bank Lt.	2 53 15.650613	100 59 44.024343		
ST12	2 50 08.812012	101 25 03.362285	205 00 00	1.200
Jugra Lt.	2 50 08.776605	101 25 03.345864		

Appendix 3-2 : Comparison of One-Point-Fixing and Three-Point-Fixing

THE RESULT OF THE DIFFERENCE BETWEEN FIXED ONE POINT AND THREE POINTS  
(WGS-84)

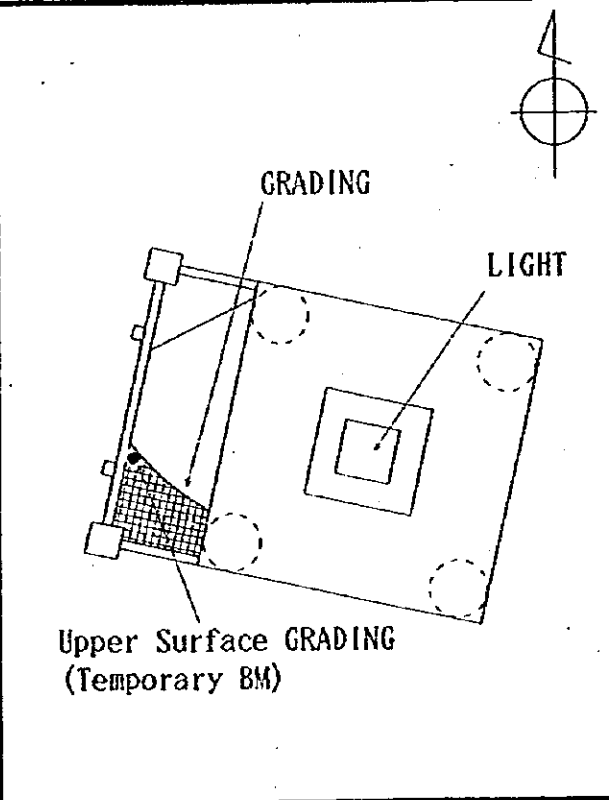
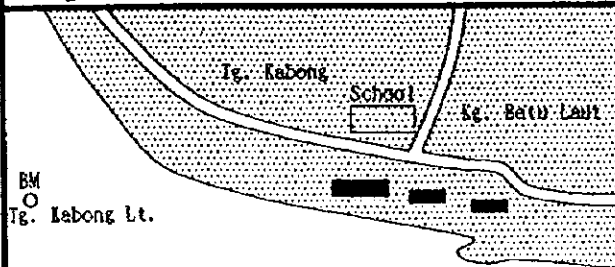
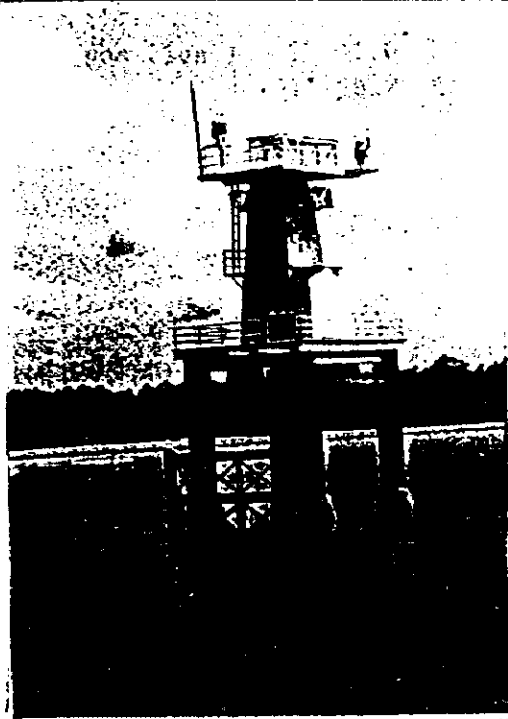
NAME	LAT.	LONG.	H (m)	NOTES
ST01 (Raffles Lt)	1-09-36.420035	103-44-26.972062	37.0051	1POINT FIX
	1-09-36.418320	103-44-26.972352	36.9446	3POINT FIX
	0.001715	-0.000290	0.0605	DIFF.
ST02 (Pu. Pisang Lt)	1-28-08.251640	103-15-23.163590	136.0750	1POINT FIX
	1-28-08.251640	103-15-23.163590	136.0750	3POINT FIX
	0.000000	0.000000	0.0000	DIFF.
ST03 (Bedok Lt)	1-18-32.674091	103-55-58.319054	83.5367	1POINT FIX
	1-18-32.671883	103-55-58.319961	83.5214	3POINT FIX
	0.002208	-0.000907	0.0153	DIFF.
ST04 (Batam St.)	1-03-57.857451	103-54-31.752696	11.0062	1POINT FIX
	1-03-57.854990	103-54-31.752835	10.9447	3POINT FIX
	0.002461	-0.000139	0.0615	DIFF.
ST05 (Iyu Kecil Lt)	1-11-27.752783	103-21-07.804984	48.8397	1POINT FIX
	1-11-27.752264	103-21-07.805106	48.7887	3POINT FIX
	0.000519	-0.000122	0.0510	DIFF.
ST06 (Tg. Segenting Lt)	1-47-27.617795	102-53-21.351216	88.6409	1POINT FIX
	1-47-27.619195	102-53-21.352601	88.6688	3POINT FIX
	-0.001400	-0.001385	-0.0279	DIFF.
ST07 (Tg. Parit Lt)	1-31-08.351704	102-27-29.468258	47.8326	1POINT FIX
	1-31-08.354259	102-27-29.465920	47.7923	3POINT FIX
	-0.002555	0.002338	0.0403	DIFF.
ST08 (Mahkota Medi- cal Center)	2-11-15.866656	102-15-05.569242	49.2631	1POINT FIX
	2-11-15.870786	102-15-05.569874	49.3313	3POINT FIX
	-0.004130	-0.000632	-0.0682	DIFF.
ST09 (Tg. Medang Lt)	2-07-27.389632	101-39-21.261658	0.2676	1POINT FIX
	2-07-27.395573	101-39-21.260730	0.3058	3POINT FIX
	-0.005941	0.000928	-0.0382	DIFF.
ST10 (Cape. Rachado Lt)	2-24-26.136138	101-51-07.460593	101.9631	1POINT FIX
	2-24-26.141474	101-51-07.459113	102.0560	3POINT FIX
	-0.005336	0.001480	-0.0929	DIFF.
ST12 (Jugra Lt)	2-50-08.804597	101-25-03.363009	40.2386	1POINT FIX
	2-50-08.812012	101-25-03.362285	40.3778	3POINT FIX
	-0.007415	0.000724	-0.1392	DIFF.
GP09 (Labu)	2-44-26.327931	101-51-39.831908	59.0947	1POINT FIX
	2-44-26.335750	101-51-39.829810	59.1140	3POINT FIX
	-0.007819	0.002098	-0.0193	DIFF.
GP18 (Morib)	2-43-21.505168	101-27-22.587797	-0.2345	1POINT FIX
	2-43-21.512270	101-27-22.586780	-0.1130	3POINT FIX
	-0.007102	-0.001017	0.1215	DIFF.

Appendix 4

Description of Temporary Tide Stations

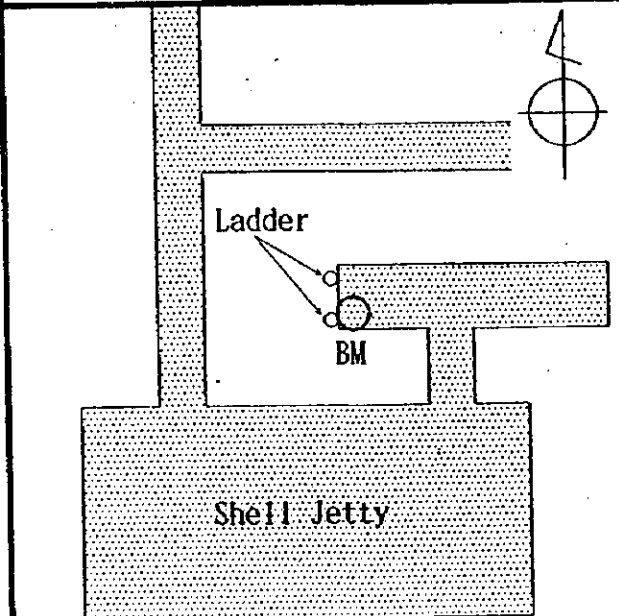
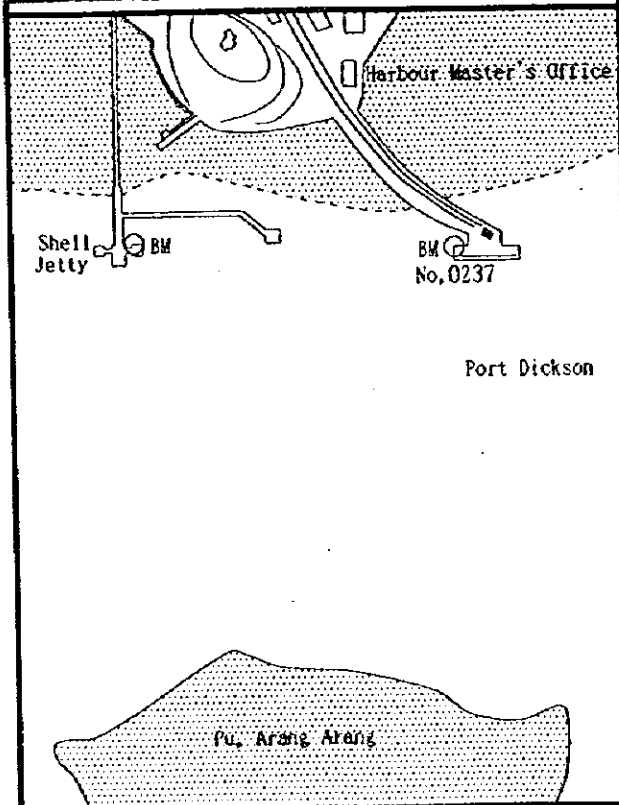
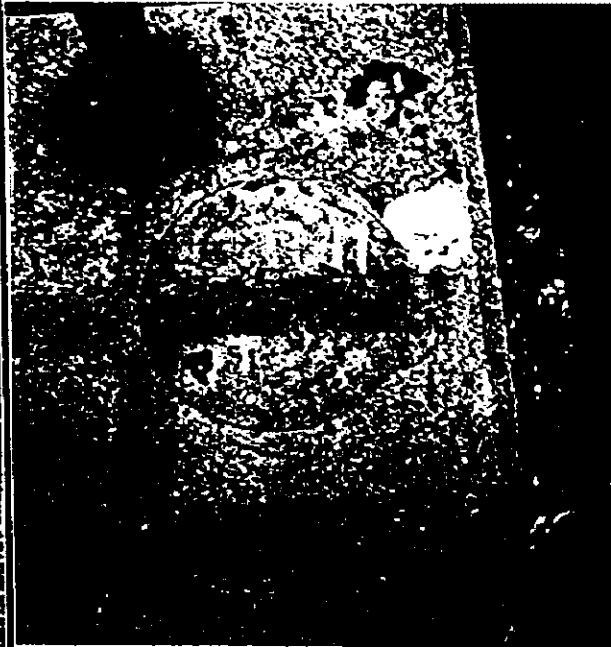
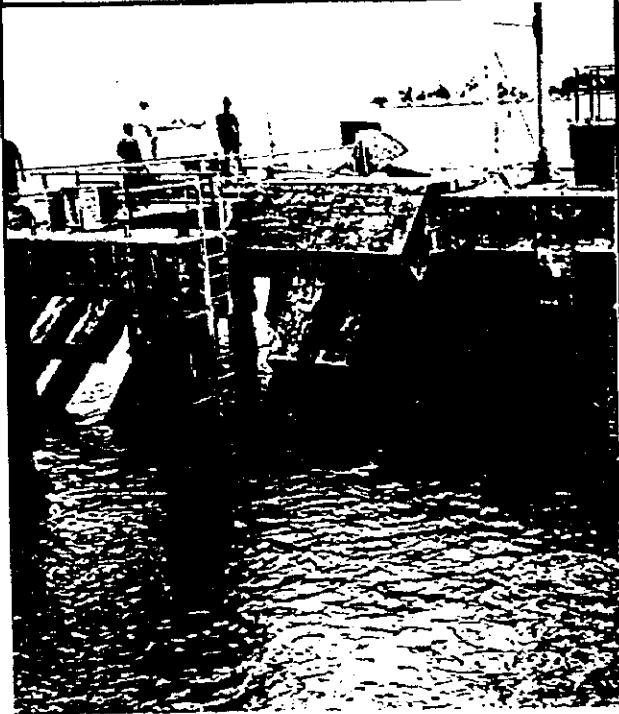
# Location Map of BM

Name	Tanjung Gabang Beacon		
Remark			
Lat (N)	Long (E)	DL (m)	
2-41.0	101-29.2	4.16 Below The Upper Plate OF GRADING On Middle Step	



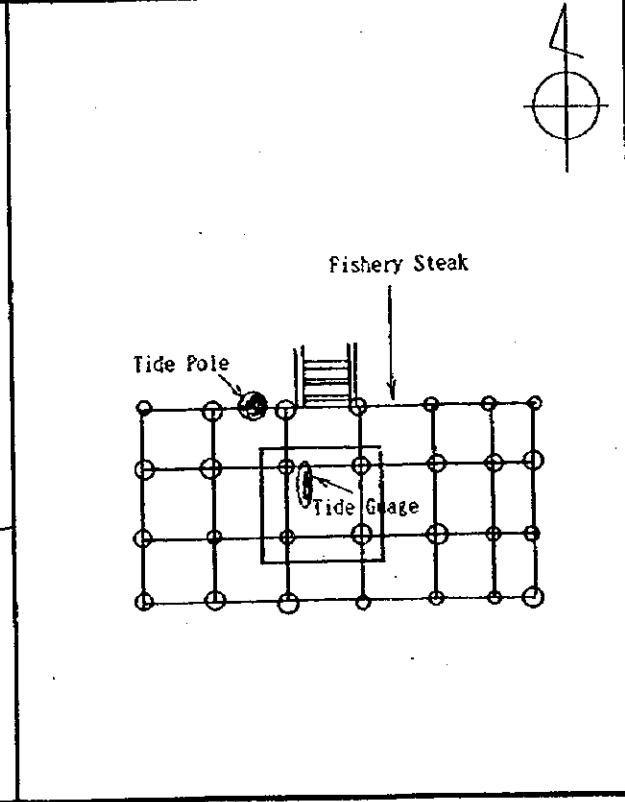
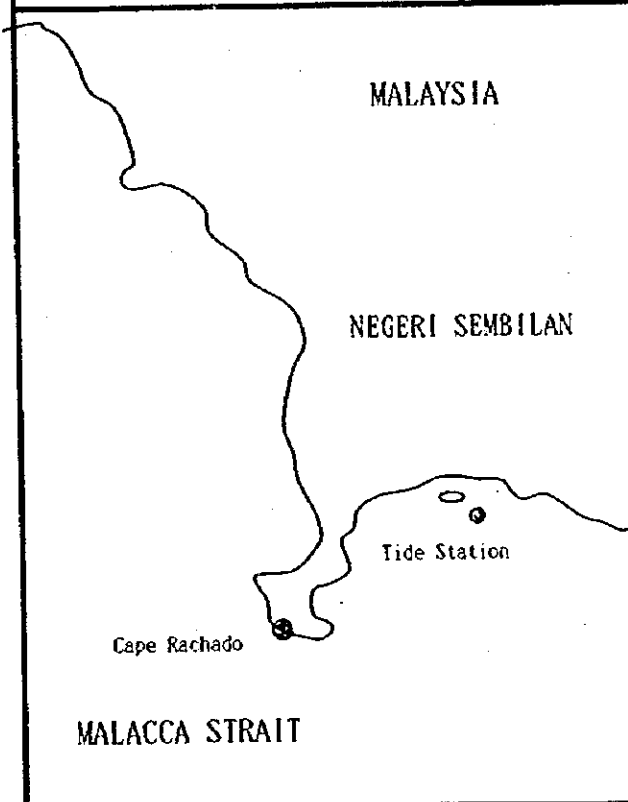
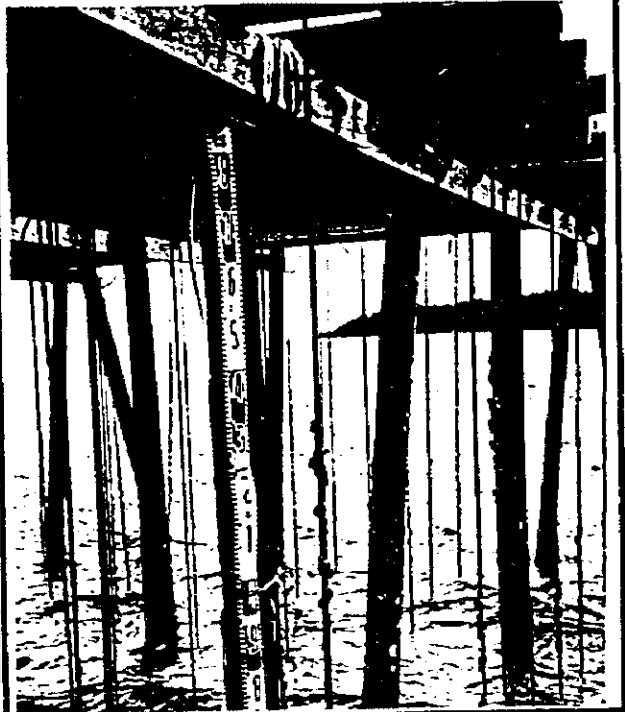
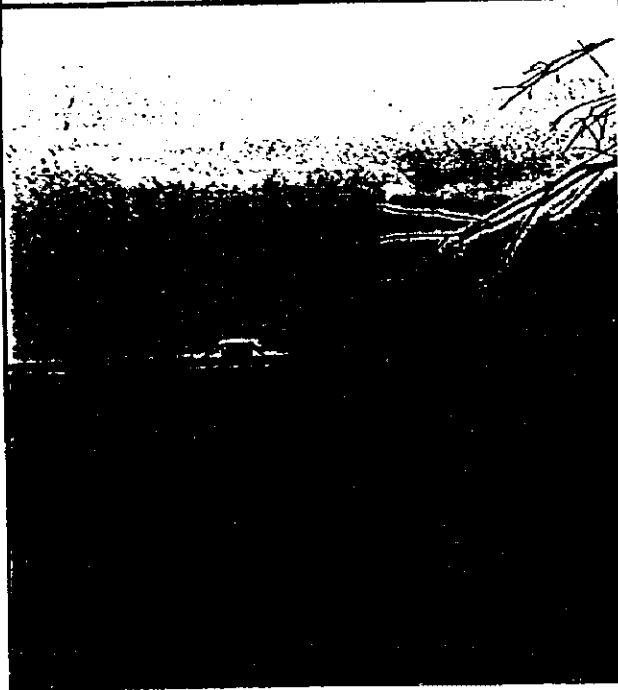
# Location Map of BM

Name	Shell Jetty	
Remark	Port Dickson	
Lat(N)	Long (E)	DL(m)
2-31.5	101-47.4	4.76 Below BM



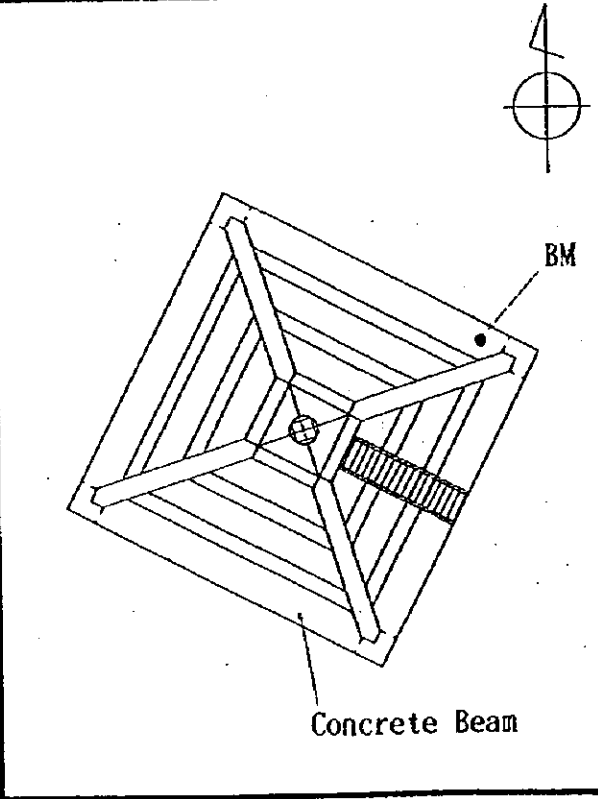
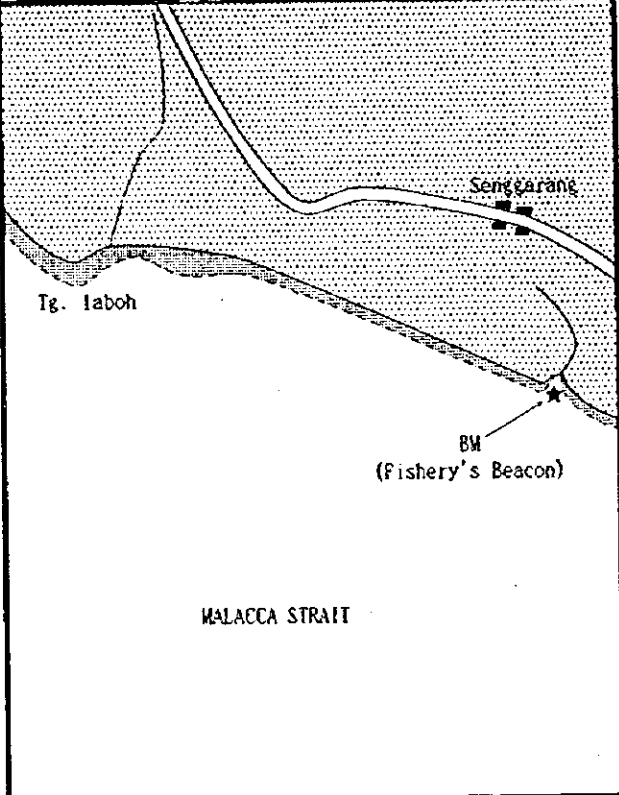
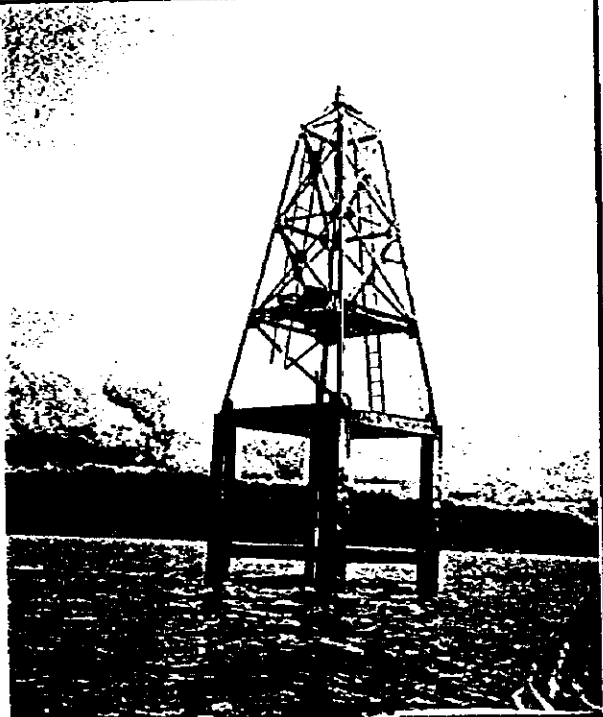
# Location Map of BM

Name	Cape Rachado	
Remark	Fishery steak is located about 4Km eastward of Cape Rachado	
Lat (N)	Long (E)	DL (m)
2-24.9	101-53.9	2.94m below the upper surface of fishery steak beam



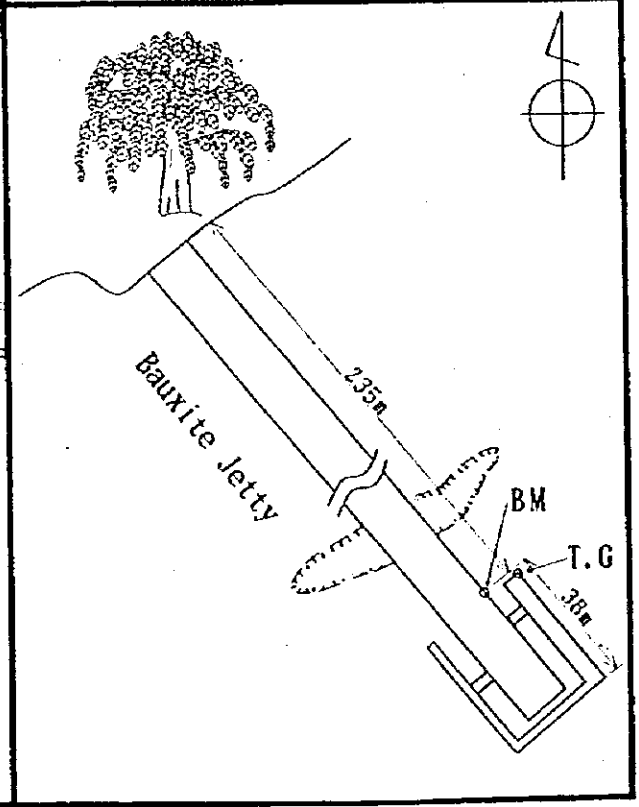
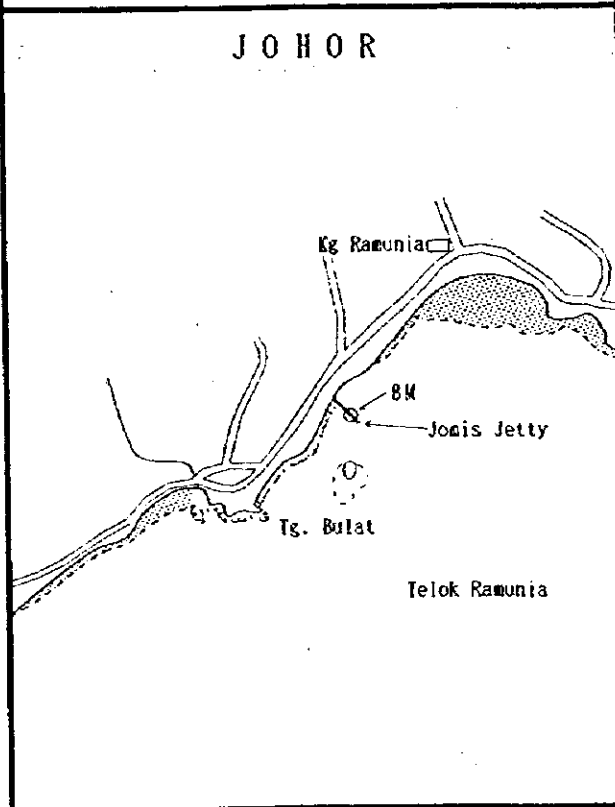
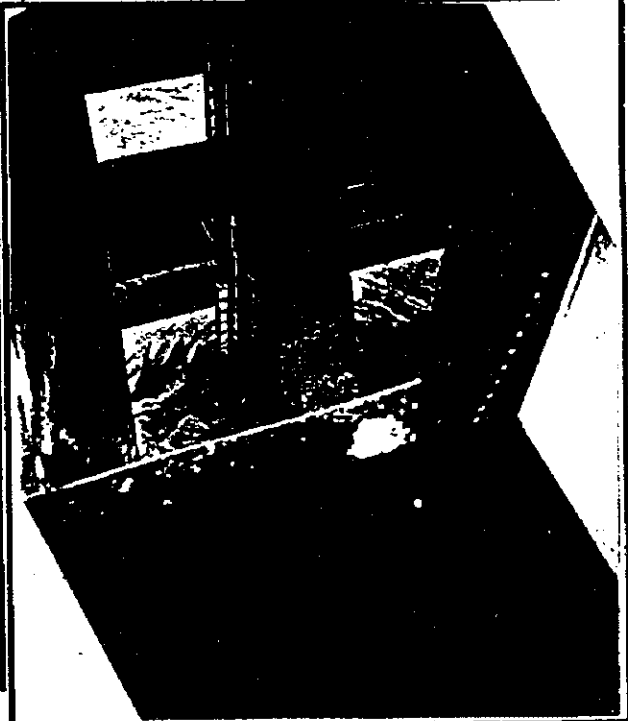
# Location Map of BM

Name	Segenting Fishery's Beacon		
Remark			
Lat (N)	Long (E)	DL (m)	
1-42.5	103-03.6	4.11 Below Segenting BM	



# Location Map of BM

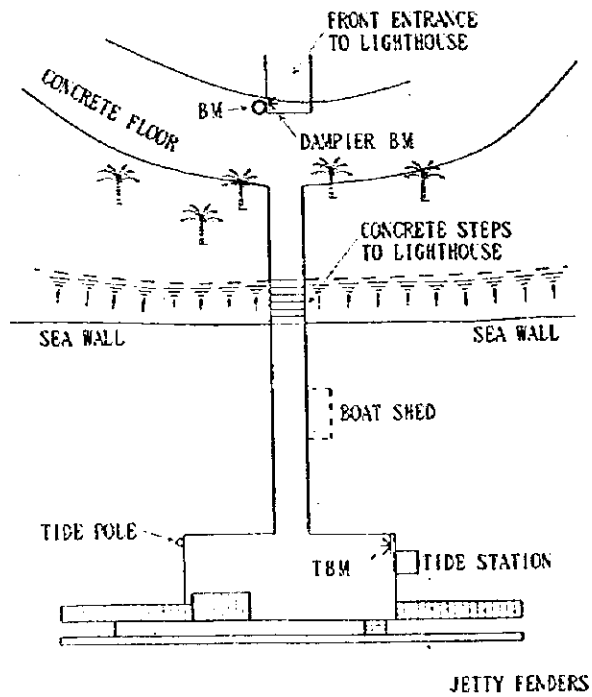
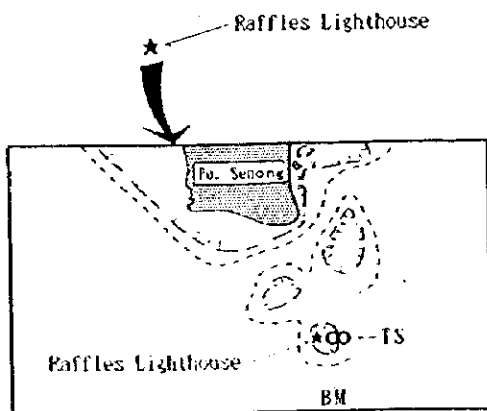
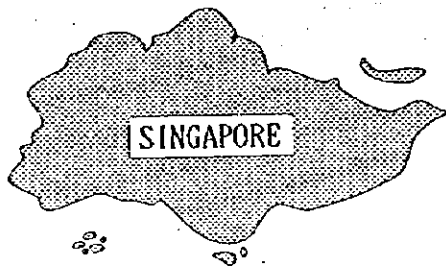
Name	Bauxite Jetty(Jomis Jetty) in Telok Ramunia		
Remark	Kg. Ramunia, Tg. Ayam, JOHOR		
Lat (N)	Long (E)	DL (m)	
1-21.4	104-14.0	5.247m below BM which is set on the eastern side of jetty about 300m from the shore	





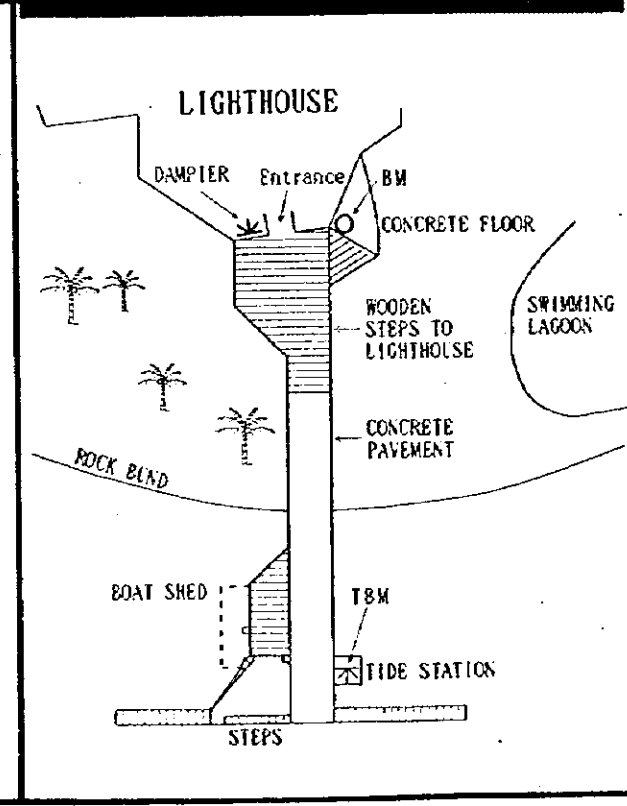
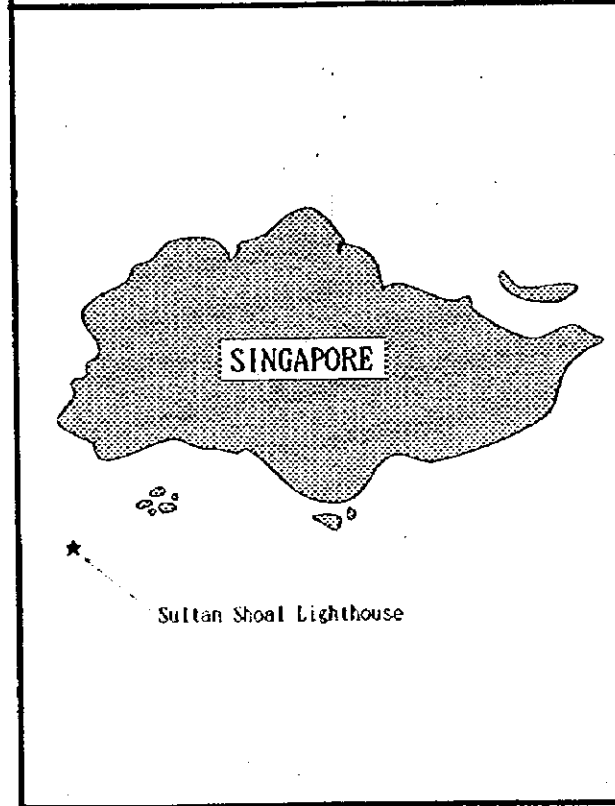
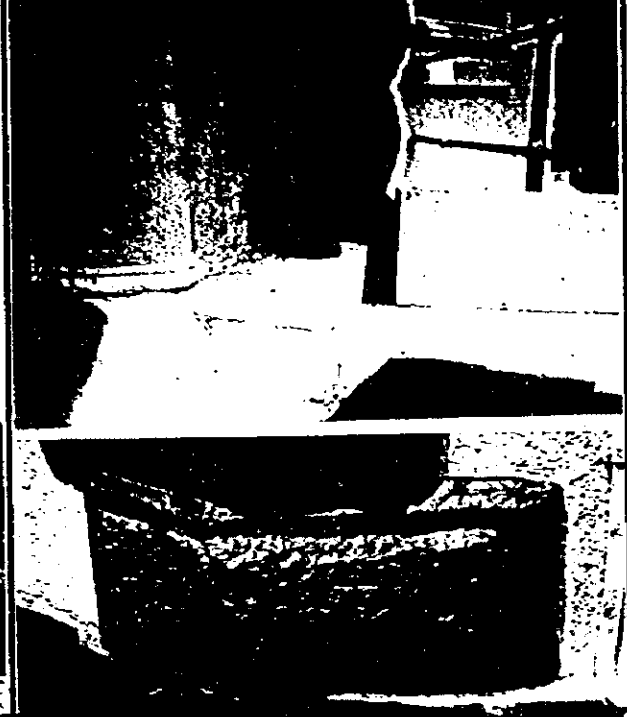
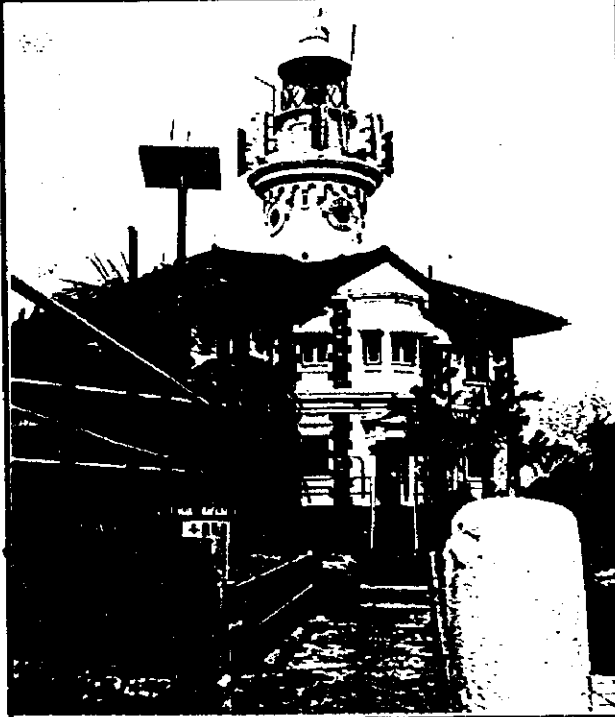
# Location Map of BM

Name	Raffles Lighthouse	
Remark		
Lat (N)	Long (E)	DL (m)
1-09.6	103-44.6	4.175m below cut mark on concrete jetty next to tide gauge and 8.194m below BM(brass bolt) at the front entrance to lighthouse



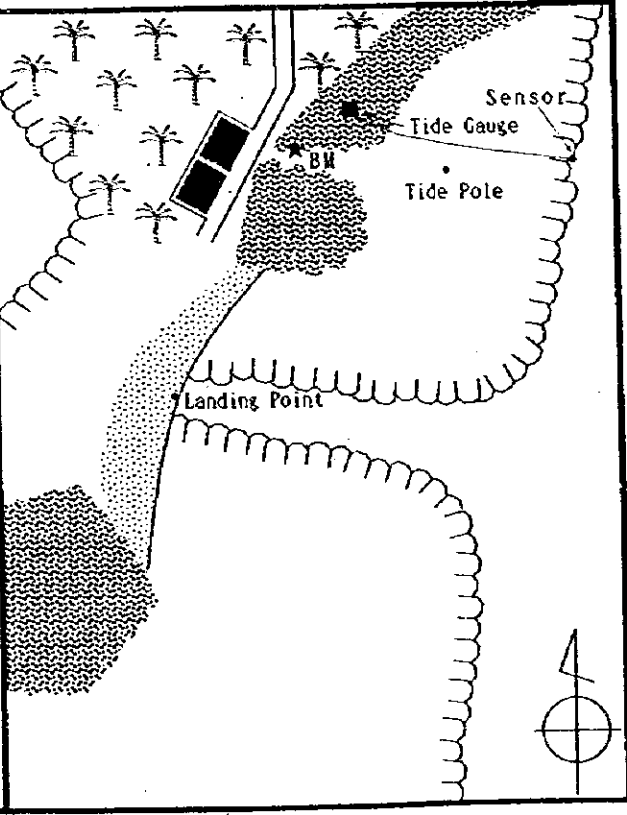
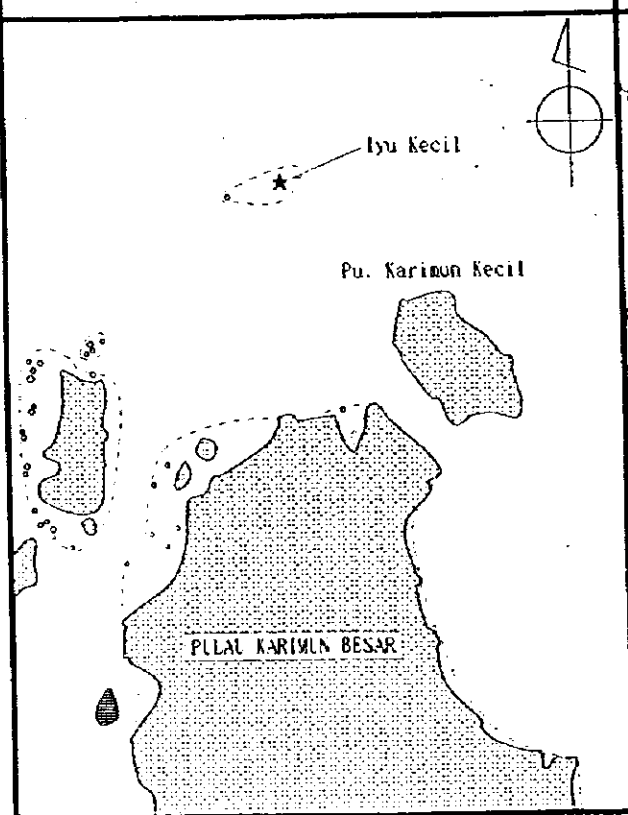
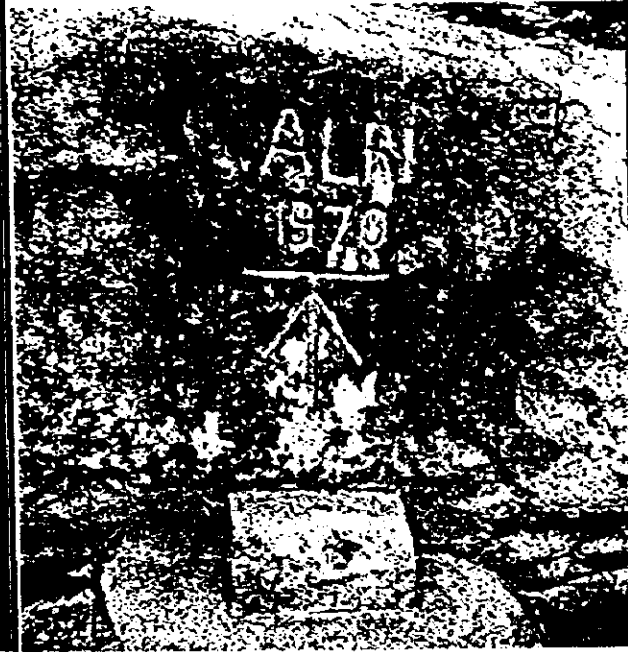
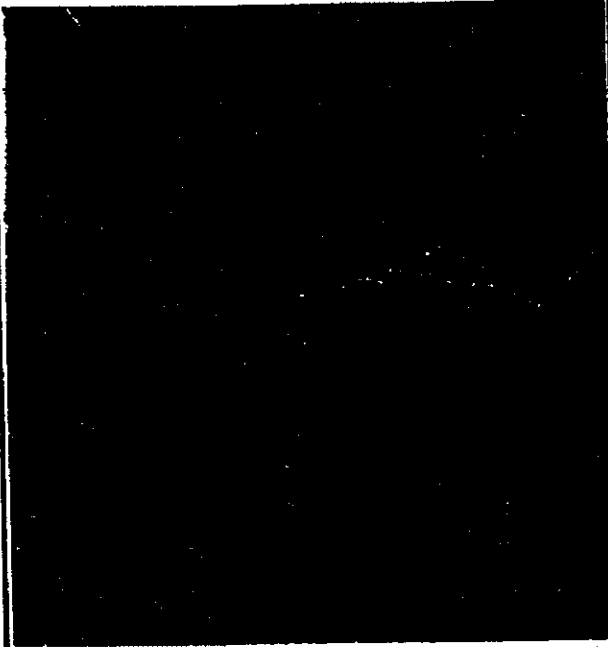
# Location Map of BM

Name	Sultan Shoal Lighthouse		
Remark			
Lat (N)	Long (E)	DL (m)	
1-14.4	103-39.0	4.922m below cut mark on concrete jetty next to tide gauge and 6.502m below BM (brass bolt) at right hand side of the entrance to lighthouse	



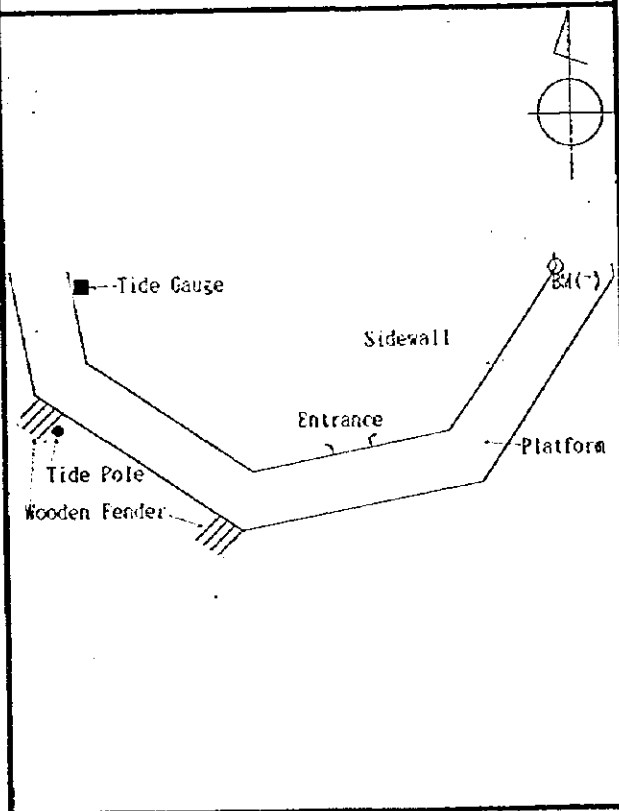
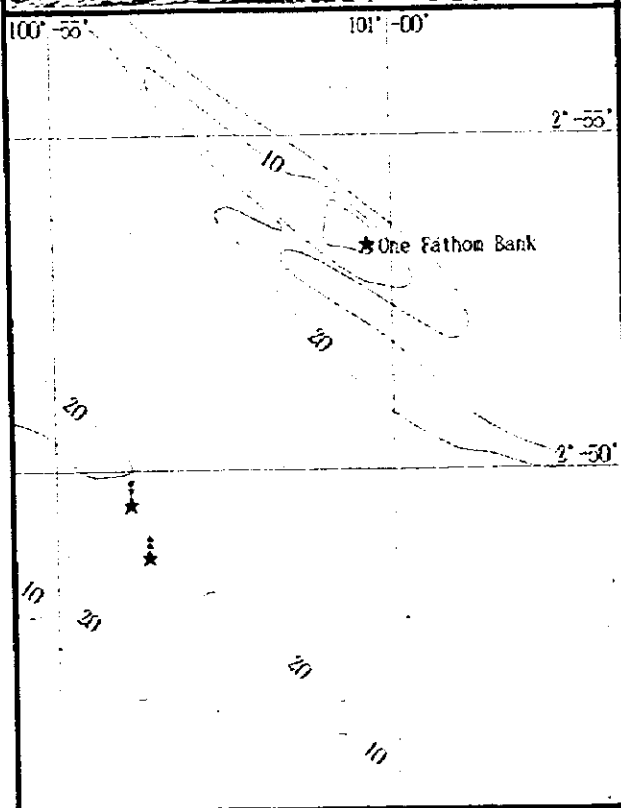
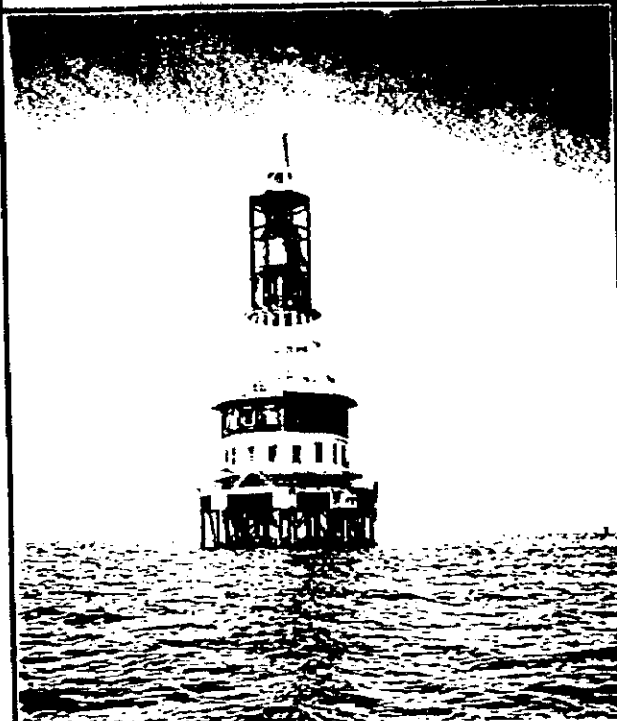
# Location Map of BM

Name	Iyu Kecil		
Remark			
Lat (N)	Long (E)	DL (m)	
1-11.5	103-21.1	4.37m below BM(丕) engraved on the side of a boulder lying at the beach of Pu. Iyu Kecil	



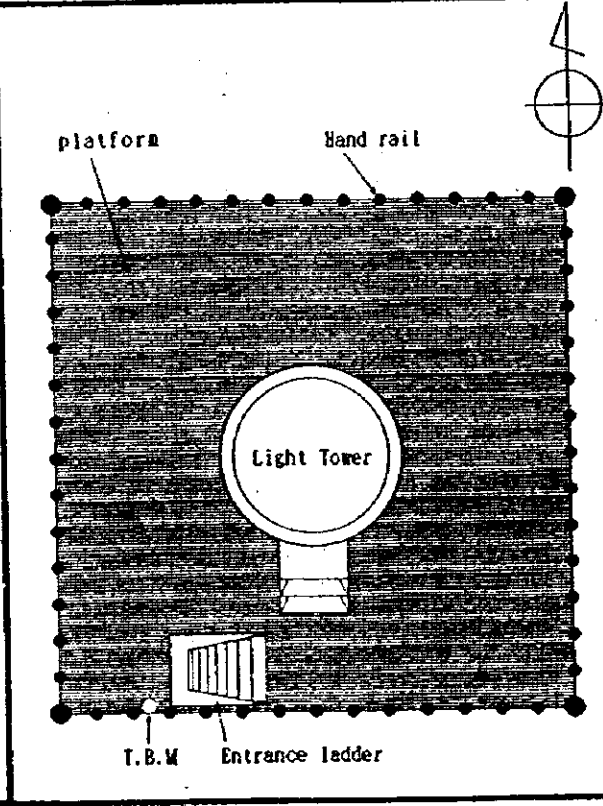
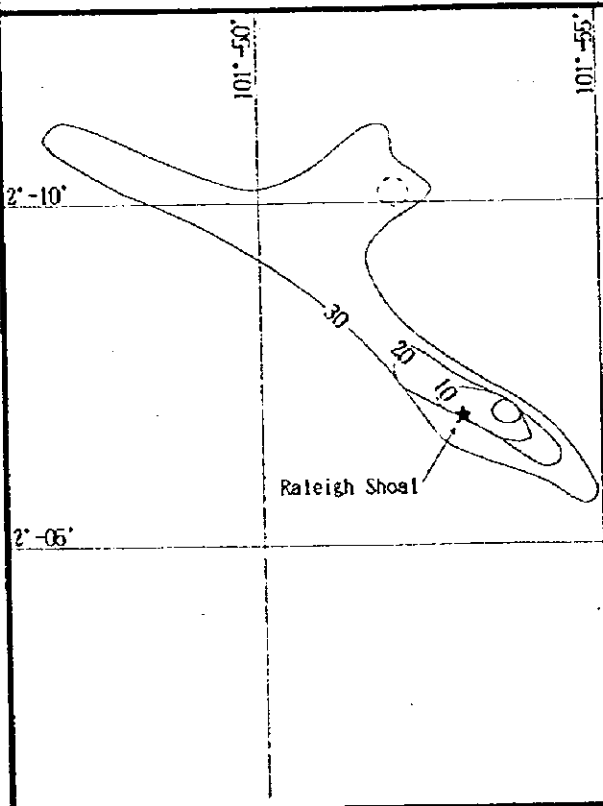
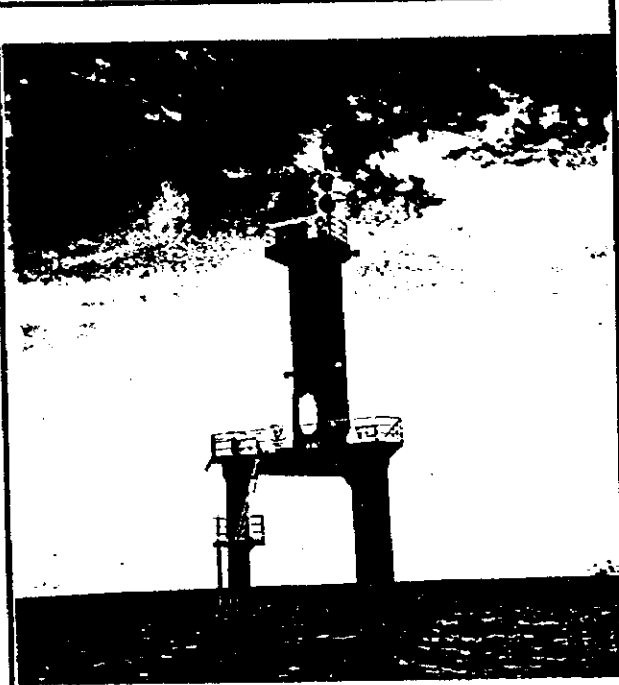
# Location Map of BM

Name	One Fathom Bank Lighthouse		
Remark			
Lat (N)	Long (E)	DL (m)	
2-53.3	100-59.7	10.34m below BM(丕) (H. M. S. Dampier. 1967) located on the south wall of the first story of One Fathom Bank Lighthouse	



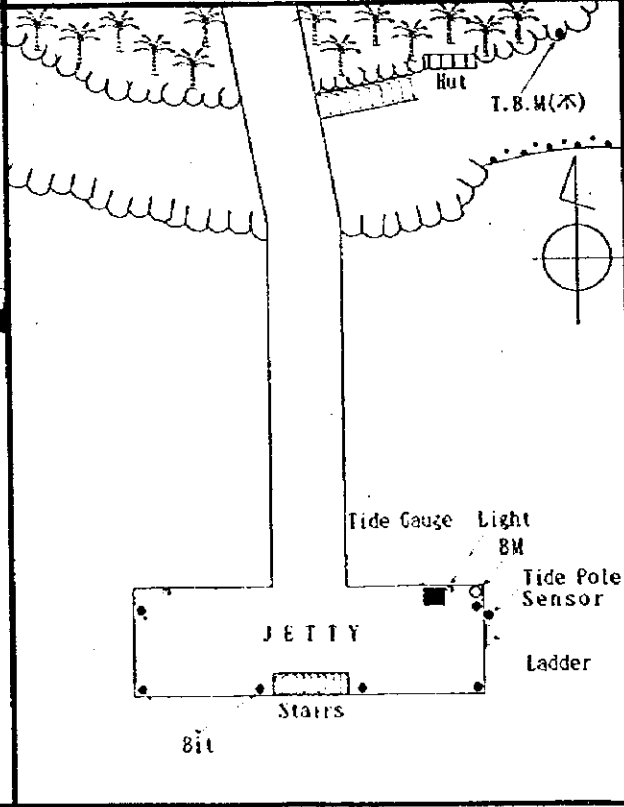
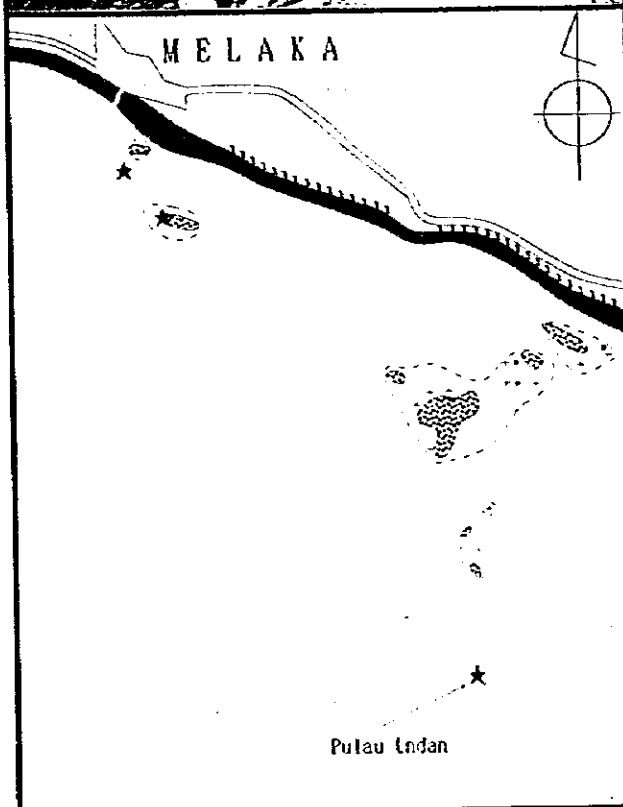
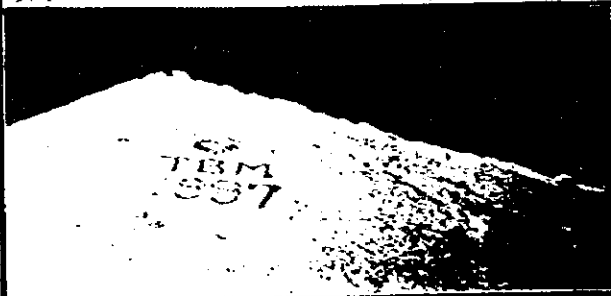
# Location Map of BM

Name	Raleigh Shoal Light Beacon		
Remark			
Lat (N)	Long (E)	DL (m)	
2-06.8	101-53.1	8.05m below the platform surface of the Light Beacon	



# Location Map of BM

Name	Pulau Undan		
Remark			
Lat (N)	Long (E)	DL (m)	
2-02.9	102-20.0	3.9m below T.B.M(丕) engraved on the side of a boulder at the end of jetty 4.6m below BM(brass bolt) which is set on the NE corner of jetty	



Appendix 5

Hourly Heights of Tides

TC. CABANG 1996/11/9-11/26

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	mean	st. kl	sk	skl	pk	sl	
9	3.19	3.61	4.32	5.00	5.37	5.48	5.36	4.85	4.25	3.61	3.04	2.77	2.87	3.10	3.69	4.43	5.06	5.24	5.16	4.76	4.25	3.62	3.07	2.78	4.12	3.95	3.03	0.07	0.12	0.03	
10	2.79	3.24	3.97	4.60	5.26	5.63	5.54	5.23	4.65	3.98	3.32	2.80	2.72	2.87	3.28	4.07	4.63	5.32	5.40	5.10	4.70	3.92	3.25	2.78	4.14	3.97	3.04	0.09	0.14	0.04	
11	2.84	2.78	3.25	4.15	5.01	5.61	5.76	5.64	5.14	4.44	3.68	3.07	2.70	2.64	2.86	3.46	4.37	5.16	5.60	5.39	5.04	4.46	3.61	2.90	4.13	3.97	3.02	0.08	0.14	0.02	
12	2.51	2.63	2.80	3.52	4.47	5.33	5.75	5.76	5.53	4.91	4.00	3.28	2.77	2.82	2.87	2.98	3.80	4.79	5.43	5.60	5.26	4.54	3.61	3.42	4.11	3.97	3.04	0.08	0.11	0.04	
13	2.79	2.85	2.67	3.08	3.21	4.89	5.62	5.85	5.76	5.31	4.60	3.75	3.07	2.70	2.59	2.73	3.30	4.17	5.06	5.50	5.49	5.19	4.68	3.87	4.13	3.94	3.04	0.08	0.11	0.01	
14	3.17	2.99	2.54	2.74	3.73	4.14	5.05	5.69	5.65	5.48	4.96	4.12	3.37	2.87	2.60	2.64	2.89	3.57	4.50	5.19	5.52	5.35	4.94	4.34	4.05	3.92	3.01	0.00	-0.01	0.01	
15	3.69	2.97	2.68	2.68	2.88	3.53	4.41	5.11	5.44	5.29	5.11	4.54	3.80	3.06	2.82	2.69	2.79	3.19	3.93	4.71	5.73	5.37	5.13	4.73	3.92	3.76	2.97	-0.06	-0.07	-0.04	
16	4.14	3.80	2.98	2.79	2.81	3.15	3.81	4.51	5.06	5.24	5.18	4.84	4.25	3.59	3.14	2.89	2.87	3.04	3.50	4.18	4.80	5.17	5.19	4.99	3.98	3.76	2.96	-0.07	-0.07	-0.04	
17	4.61	4.05	3.52	3.15	3.02	3.06	3.40	3.93	4.48	4.89	5.04	4.96	4.72	4.60	4.17	3.74	3.47	3.29	3.29	3.43	3.75	4.22	4.59	4.92	4.07	3.78	3.02	-0.03	-0.05	0.02	
18	4.90	4.56	4.17	3.76	3.43	3.23	3.28	3.51	3.86	4.28	4.61	4.81	4.50	4.60	4.17	3.74	3.47	3.29	3.29	3.30	3.38	3.64	4.05	4.46	3.99	3.74	2.99	-0.06	-0.09	-0.01	
19	5.00	4.92	4.69	4.34	3.93	3.33	3.34	3.36	3.36	3.57	3.96	4.30	4.09	4.45	4.45	4.21	3.85	3.68	3.68	3.68	3.75	3.42	3.27	3.45	3.82	4.00	3.74	2.99	-0.08	-0.09	-0.01
20	4.82	5.02	5.02	4.84	4.43	4.03	3.64	3.34	3.14	3.18	3.24	3.66	4.09	4.45	4.63	4.63	4.46	4.14	3.75	3.42	3.27	3.27	3.45	3.82	4.00	3.74	2.97	-0.05	-0.10	-0.03	
21	4.36	4.89	5.23	5.22	5.08	4.72	4.23	3.66	3.26	3.03	2.96	3.08	3.42	3.96	4.32	4.73	4.74	4.52	4.18	3.68	3.26	3.04	3.04	3.26	3.00	3.73	2.97	-0.05	-0.10	-0.03	
22	3.71	4.37	4.98	5.38	5.43	5.28	4.86	4.22	3.65	3.13	2.89	2.82	2.98	3.46	4.10	4.69	4.97	4.82	4.68	4.28	3.81	3.16	2.91	2.89	4.05	3.81	3.01	0.00	-0.07	0.01	
23	3.17	3.70	4.52	5.19	5.28	4.86	4.22	3.65	3.13	2.89	2.82	2.98	2.98	2.76	2.97	3.57	4.33	4.93	5.18	5.08	4.71	4.14	3.51	2.96	2.68	4.09	3.85	3.01	0.04	0.02	0.01
24	2.81	3.15	3.83	4.65	5.36	5.63	5.61	5.26	4.59	3.84	3.13	2.78	2.60	2.66	2.16	3.92	4.72	5.24	5.32	5.09	4.63	3.96	3.31	2.85	4.09	3.85	3.01	0.04	0.02	0.01	
25	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
26	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
27	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
28	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
29	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
30	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
31	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
32	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
33	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
34	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
35	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
36	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
37	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
38	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
39	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
40	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
41	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
42	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
43	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
44	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
45	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
46	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
47	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
48	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
49	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.05	3.81	2.99	0.00	-0.02	-0.01
50	2.63	2.78	3.22	4.07	4.89	5.67	5.47	5.05	4.33	3.55	2.97	2.67	2.61	2.67	2.61	2.16	3.28	4.16	5.00	5.35	5.27	4.94	4.41	3.65	2.99	4.					



PORT DICKSON TABLE 1996/11/26-12/25

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN	PK	TKL	PK	PK	TKL	
26	2.63	2.33	2.37	2.67	4.83	4.43	3.81	3.19	2.78	2.53	2.46	2.87	2.88	3.22	3.52	4.40	4.39	4.28	4.61	4.59	4.40	3.93	3.22	3.54	3.75	2.96	-0.02	-0.02	-0.01		
27	2.76	2.54	2.32	2.45	2.92	3.68	4.39	4.72	4.70	4.11	3.81	3.27	2.93	2.63	2.52	2.92	2.75	3.22	3.95	4.49	4.48	4.17	3.59	3.52	3.73	2.94	-0.04	-0.04	0.00		
28	3.00	2.62	2.41	2.37	2.63	3.23	3.99	4.52	4.79	4.60	4.38	3.81	3.27	2.74	2.66	2.86	2.74	3.06	3.53	4.25	4.56	4.55	4.37	3.54	3.73	2.97	-0.02	-0.02	0.03		
29	3.33	2.85	2.57	2.46	2.97	3.66	4.52	5.09	5.24	4.66	4.52	4.09	3.57	3.09	2.85	2.74	2.79	3.00	3.44	4.04	4.49	4.60	4.47	3.67	3.79	3.00	0.01	0.02	0.07		
30	3.70	3.27	2.90	2.67	2.86	3.54	4.12	4.56	4.66	4.63	4.23	3.66	3.16	2.86	2.81	2.94	2.91	2.94	3.10	3.49	3.87	4.21	4.30	4.28	3.64	3.90	0.08	0.13	0.07		
1	3.79	3.40	3.02	2.77	2.90	3.58	4.16	4.29	4.17	3.88	3.46	3.12	2.94	2.91	2.94	2.91	2.94	3.10	3.49	3.87	4.21	4.30	4.28	3.64	3.90	3.75	2.96	-0.07	-0.02	-0.02	
2	3.99	3.60	3.29	3.04	2.90	3.58	4.16	4.29	4.17	3.88	3.46	3.12	2.94	2.91	2.94	2.91	2.94	3.10	3.49	3.87	4.21	4.30	4.28	3.64	3.90	3.75	2.96	-0.07	-0.02	-0.02	
3	4.18	3.98	3.68	3.41	3.14	3.03	2.99	3.05	3.29	3.65	3.52	4.10	4.13	4.00	3.70	3.44	3.17	2.95	2.98	3.10	3.31	3.41	3.67	3.95	4.13	3.49	3.73	2.93	-0.07	-0.04	-0.04
4	4.17	4.10	3.94	3.72	3.47	3.27	3.11	3.03	3.10	3.24	3.43	3.62	3.73	3.77	3.74	3.61	3.49	3.33	3.18	3.22	3.28	3.34	3.57	3.87	4.13	3.49	3.76	2.96	-0.05	-0.01	-0.01
5	4.07	4.20	4.18	4.04	3.93	3.62	3.46	3.20	3.06	3.07	3.07	3.33	3.60	3.60	3.75	3.71	3.65	3.50	3.27	3.13	3.10	3.09	3.18	3.40	3.50	3.74	2.94	-0.06	-0.03	-0.03	
6	3.72	4.04	4.22	4.29	4.21	4.04	3.77	3.39	3.16	2.93	2.92	2.97	3.11	3.38	3.64	3.80	3.87	3.70	3.46	3.20	2.98	2.83	2.77	2.92	3.47	3.67	2.92	-0.09	-0.10	-0.06	
7	3.18	3.61	4.05	4.31	4.42	4.34	4.08	3.69	3.30	3.04	2.85	2.76	2.83	3.09	3.40	3.74	3.94	3.97	3.83	3.54	3.15	2.81	2.63	2.48	3.51	3.67	2.96	-0.05	-0.10	-0.01	
8	2.73	3.11	3.68	4.22	4.52	4.60	4.50	4.14	3.62	3.19	2.92	2.73	2.72	2.85	3.15	3.61	4.07	4.23	4.17	3.94	3.48	2.98	2.64	2.48	3.51	3.67	2.96	-0.02	-0.03	-0.01	
9	2.45	2.87	3.20	3.52	3.47	3.73	4.14	4.53	4.74	4.53	4.32	3.89	2.89	2.66	2.54	2.64	2.94	3.52	4.21	4.65	4.51	4.33	3.85	3.21	2.69	3.98	3.75	2.98	0.02	0.00	0.03
10	2.40	2.43	2.75	3.41	4.19	4.69	4.87	4.84	4.50	4.14	3.62	3.19	2.92	2.73	2.82	2.96	3.24	3.87	4.64	4.74	4.65	4.38	3.77	3.11	3.61	3.77	3.00	0.05	0.00	0.04	
11	2.19	2.26	2.36	2.81	3.64	4.45	4.85	4.96	4.83	4.37	3.73	3.13	2.78	2.62	2.56	2.73	3.14	3.87	4.64	4.71	4.65	4.38	3.77	3.11	3.61	3.78	3.01	0.04	0.01	0.04	
12	2.62	2.37	2.28	2.45	3.02	3.91	4.63	4.94	4.98	4.78	4.29	3.49	3.06	2.71	2.54	2.56	2.79	3.30	4.10	4.65	4.71	4.60	4.24	3.58	3.60	3.78	3.01	0.04	0.01	0.03	
13	2.94	2.51	2.28	2.22	2.52	3.20	4.11	4.74	4.94	4.95	4.62	4.01	3.33	2.68	2.63	2.53	2.61	2.92	3.50	4.15	4.75	4.60	4.15	3.59	3.81	3.00	0.03	0.04	0.03	0.07	
14	3.53	3.56	2.58	2.40	2.41	2.80	3.57	4.39	4.97	4.89	4.47	3.83	3.20	2.91	2.80	2.87	2.73	2.94	3.64	4.09	4.53	4.74	4.53	3.63	3.89	3.04	0.02	0.12	0.14	0.08	
15	4.06	3.49	2.92	2.67	2.81	2.83	2.77	2.93	3.31	3.66	4.25	4.72	4.25	3.70	3.20	2.87	2.85	2.95	3.17	3.52	3.52	3.24	3.57	3.96	3.52	3.74	2.97	-0.04	-0.03	0.00	
16	4.38	3.89	3.34	2.92	2.83	2.83	2.77	2.93	3.31	3.66	4.25	4.72	4.25	3.70	3.20	2.87	2.85	2.95	3.17	3.52	3.52	3.24	3.57	3.96	3.52	3.74	2.97	-0.04	-0.03	0.00	
17	4.84	4.23	3.65	3.40	3.02	2.83	2.77	2.93	3.31	3.66	4.25	4.72	4.25	3.70	3.20	2.87	2.85	2.95	3.17	3.52	3.52	3.24	3.57	3.96	3.52	3.74	2.97	-0.04	-0.03	0.00	
18	4.23	4.34	4.31	4.11	3.78	3.45	3.12	2.87	2.79	2.76	2.94	3.22	3.48	3.71	3.82	3.78	3.68	3.44	3.22	3.05	2.96	2.98	3.14	3.30	3.44	3.68	2.89	-0.12	-0.09	-0.09	
19	3.83	4.17	4.35	4.33	4.25	3.99	3.64	3.29	3.07	2.87	2.93	2.92	3.11	3.43	3.66	3.92	3.85	3.77	3.43	3.17	3.00	2.81	2.80	2.95	3.48	3.70	2.91	-0.07	-0.03	-0.06	
20	3.26	3.70	4.08	4.35	4.42	4.32	4.07	3.67	3.31	3.05	2.85	2.78	2.86	3.03	3.40	3.84	3.97	3.99	3.84	3.53	3.18	2.92	2.78	2.65	3.49	3.74	2.91	-0.07	-0.03	-0.06	
21	2.80	3.18	3.78	4.20	4.40	4.55	4.42	4.13	3.69	3.26	3.03	2.75	2.65	2.74	3.03	3.61	4.01	4.01	4.10	3.88	3.56	3.15	2.79	2.62	3.51	3.78	2.91	0.00	0.05	-0.02	
22	2.57	2.73	3.28	3.82	4.33	4.60	4.59	4.43	4.12	3.62	3.15	2.81	2.68	2.64	2.90	3.19	3.79	4.22	4.37	4.29	4.03	3.56	3.09	2.77	3.56	3.82	2.95	0.00	0.05	-0.02	
23	2.52	2.56	2.71	3.30	4.00	4.50	4.74	4.77	4.55	4.01	3.48	3.08	2.81	2.71	2.74	2.98	3.47	4.08	4.45	4.48	4.34	3.96	3.40	2.93	3.84	3.01	0.05	0.07	0.04	0.06	
24	2.52	2.49	2.52	2.98	3.67	4.34	4.74	4.86	4.74	4.35	3.78	3.27	2.94	2.72	2.69	2.78	3.14	3.77	4.37	4.55	4.51	4.26	3.74	3.17	3.62	3.85	3.03	0.06	0.08	0.06	
25	2.62	2.49	2.52	2.98	3.67	4.34	4.74	4.86	4.74	4.35	3.78	3.27	2.94	2.72	2.69	2.78	3.14	3.77	4.37	4.55	4.51	4.26	3.74	3.17	3.62	3.85	3.03	0.06	0.08	0.06	

PORT M. (30DAYS) =	3.77	3.62
TC. KL (30DAYS) =	2.97	2.85
PT. DR. (30DAYS) = P. A.	3.55	3.40
= TC. KL.	3.55	3.43
MEAN MSJ =		
MSJ	3.56	3.77



SEGMENTING TABLE 1996/12/9-1996/12/22

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN	TC_KUKUP	SEKSI	TC_KUKUP	SEKSI	TC_KUKUP	SEKSI
12/9	1.23	0.83	0.52	0.36	0.44	0.83	1.60	2.70	2.66	2.82	2.68	2.34	1.72	1.23	0.77	0.40	0.17	0.21	0.53	1.20	1.80	2.16	2.16	1.95	1.31	2.96	4.08	-0.04	-0.02	-0.06	
	1.57	1.11	0.69	0.42	0.28	0.38	1.01	1.77	2.42	2.83	2.94	2.71	2.27	1.68	1.10	0.64	0.31	0.11	0.20	0.72	1.41	1.92	2.27	2.23	1.38	2.98	4.09	-0.03	0.00	-0.05	
10	1.88	1.44	0.96	0.51	0.27	0.18	0.45	1.28	2.08	2.75	3.03	3.06	2.72	2.17	1.58	0.97	0.54	0.20	0.08	0.28	0.92	1.67	2.23	2.38	1.40	3.00	4.13	-0.01	0.02	-0.01	
11	2.22	1.83	1.35	0.98	0.45	0.24	0.21	0.68	1.59	2.30	2.95	3.12	3.03	2.63	2.04	1.34	0.87	0.46	0.15	0.10	0.48	1.22	1.84	2.28	1.43	3.01	4.16	0.02	0.03	0.02	
12	2.31	2.08	1.66	1.21	0.71	0.31	0.15	0.24	0.85	1.73	2.51	3.00	3.09	2.92	2.50	1.85	1.22	0.74	0.34	0.08	0.14	0.67	1.42	2.01	1.41	3.00	4.15	-0.00	0.02	0.01	
13	2.35	2.34	2.07	1.74	1.15	0.71	0.47	0.28	0.49	1.26	2.01	2.68	3.17	3.10	2.86	2.33	1.64	0.98	0.59	0.25	0.10	0.33	0.91	1.57	1.47	3.04	4.22	0.06	0.06	0.08	
14	2.15	2.40	2.29	1.99	1.68	1.09	0.65	0.40	0.36	0.70	1.44	2.17	2.72	2.99	2.93	2.63	2.08	1.52	0.91	0.52	0.27	0.18	0.52	1.22	1.49	3.05	4.23	0.09	0.07	0.09	
15	1.80	2.20	2.31	2.18	1.90	1.53	1.04	0.70	0.49	0.49	0.88	1.52	2.12	2.63	2.79	2.71	2.32	1.97	1.43	0.92	0.57	0.38	0.38	0.38	0.68	1.50	3.05	4.23	0.09	0.05	0.08
16	1.30	1.95	2.17	2.26	2.15	1.88	1.52	1.12	0.78	0.87	0.65	0.95	1.49	2.01	2.42	2.54	2.48	2.17	1.72	1.31	0.91	0.61	0.43	0.48	1.50	3.03	4.22	0.09	0.01	0.03	
17	0.78	1.27	1.70	1.96	2.10	2.01	1.82	1.51	1.15	0.91	0.75	0.66	0.89	1.29	1.71	2.03	2.18	2.17	1.99	1.65	1.31	0.99	0.74	0.58	1.42	2.97	4.17	0.01	-0.01	0.03	
18	0.63	0.93	1.30	1.84	1.92	2.06	1.99	1.82	1.53	1.20	0.87	0.68	0.58	0.59	0.86	1.22	1.60	1.84	1.91	1.80	1.71	1.41	0.99	0.78	1.33	2.88	4.06	-0.08	-0.10	-0.08	
19	0.76	1.07	1.43	1.85	2.13	2.24	2.27	2.06	1.75	1.38	1.08	0.72	0.53	0.53	0.59	0.59	0.92	1.33	1.71	1.89	1.84	1.76	1.40	1.01	1.38	2.91	4.09	-0.03	-0.07	-0.05	
20	0.76	0.65	0.60	0.80	1.25	1.78	2.12	2.34	2.33	2.17	1.81	1.51	0.95	0.69	0.44	0.36	0.48	0.72	1.19	1.77	1.85	1.84	1.62	1.47	1.31	2.91	4.08	-0.10	-0.07	-0.06	
21	1.10	0.86	0.64	0.59	0.94	1.37	2.04	2.14	2.65	2.54	2.29	1.92	1.50	1.05	0.84	0.30	0.20	0.35	0.87	1.47	1.59	2.02	1.89	1.64	1.36	2.91	4.07	-0.05	-0.07	-0.07	
22	1.10	0.86	0.64	0.59	0.94	1.37	2.04	2.14	2.65	2.54	2.29	1.92	1.50	1.05	0.84	0.30	0.20	0.35	0.87	1.47	1.59	2.02	1.89	1.64	1.36	2.91	4.07	-0.05	-0.07	-0.07	
																								MEAN	1.41	2.98	4.14				

TC_KUKUP(14DAYS) =	2.98	2.85
KUKUP(14DAYS) =	4.14	3.99
SEGMENTING(14DAYS)=TC_KUKUP	1.41	1.28
MEAN MS1 =	1.41	1.28

Tide Station : Tanjung Ayam (coeff.: 0.9785, const.: 0.12)  
 Observation Period : May 31 to June 29, 1997

	11	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN	
31	2.10	2.20	2.39	2.59	2.86	3.03	3.08	2.97	2.73	2.41	2.10	1.87	1.80	1.88	2.13	2.42	2.71	2.99	3.18	3.26	3.21	3.04	2.71	2.45	2.588	
1	2.21	2.11	2.11	2.27	2.52	2.79	2.99	3.14	3.13	2.93	2.67	2.35	2.07	1.97	1.98	2.16	2.40	2.67	2.95	3.19	3.25	3.17	2.93	2.60	2.607	
2	2.22	1.96	1.82	1.84	2.08	2.39	2.73	3.01	3.22	3.23	3.07	2.86	2.52	2.19	2.02	2.06	2.20	2.44	2.74	3.05	3.30	3.35	3.16	2.87	2.597	
3	2.46	2.06	1.73	1.59	1.67	1.95	2.38	2.71	2.99	3.27	3.30	3.18	2.96	2.61	2.27	2.11	2.06	2.20	2.46	2.81	3.12	3.30	3.28	3.04	2.563	
4	2.67	2.16	1.69	1.38	1.31	1.45	1.88	2.37	2.70	3.01	3.33	3.34	3.23	3.00	2.63	2.25	2.11	2.11	2.28	2.54	2.86	3.17	3.36	3.19	2.501	
5	2.90	2.47	1.97	1.48	1.21	1.25	1.50	1.94	2.46	2.85	3.19	3.42	3.42	3.30	3.06	2.65	2.31	2.20	2.23	2.40	2.79	3.07	3.32	3.38	2.532	
6	3.17	2.80	2.32	1.75	1.32	1.14	1.25	1.58	2.07	2.52	2.91	3.31	3.50	3.52	3.36	3.04	2.67	2.34	2.28	2.36	2.61	2.91	3.22	3.41	2.557	
7	3.38	3.10	2.64	2.12	1.57	1.21	1.14	1.29	1.67	2.16	2.62	3.03	3.36	3.46	3.40	3.24	2.94	2.56	2.31	2.30	2.46	2.71	3.06	3.32	2.544	
8	3.42	3.29	2.95	2.47	1.94	1.40	1.15	1.16	1.40	1.79	2.30	2.72	3.15	3.40	3.42	3.33	3.11	2.73	2.47	2.31	2.36	2.53	2.80	3.09	2.529	
9	3.34	3.36	3.18	2.79	2.32	1.81	1.40	1.23	1.32	1.61	2.05	2.51	2.87	3.23	3.38	3.38	3.26	3.00	2.63	2.35	2.32	2.40	2.63	2.88	2.552	
10	3.13	3.30	3.28	3.03	2.62	2.13	1.67	1.36	1.32	1.46	1.81	2.22	2.57	2.95	3.18	3.29	3.25	3.07	2.75	2.46	2.29	2.30	2.42	2.67	2.522	
11	2.95	3.16	3.25	3.12	2.66	2.50	2.05	1.64	1.47	1.47	1.70	2.02	2.39	2.76	3.05	3.18	3.22	3.13	2.93	2.64	2.41	2.32	2.35	2.49	2.544	
12	2.70	2.93	3.11	3.15	3.00	2.74	2.39	2.01	1.72	1.63	1.69	1.90	2.22	2.54	2.85	3.06	3.15	3.17	3.04	2.80	2.56	2.36	2.32	2.35	2.558	
13	2.51	2.71	2.90	3.01	3.04	2.91	2.67	2.37	2.02	1.82	1.80	1.90	2.11	2.36	2.61	2.85	3.05	3.14	3.13	2.96	2.71	2.48	2.33	2.30	2.570	
14	2.38	2.49	2.65	2.84	2.96	2.95	2.86	2.64	2.39	2.15	2.01	2.00	2.07	2.24	2.47	2.69	2.90	3.07	3.14	3.08	2.92	2.68	2.48	2.34	2.600	
15	2.31	2.33	2.44	2.58	2.75	2.87	2.91	2.89	2.75	2.58	2.37	2.26	2.24	2.24	2.39	2.54	2.75	2.94	3.12	3.15	3.08	2.88	2.62	2.40	2.641	
16	2.23	2.16	2.17	2.26	2.45	2.67	2.83	2.95	2.94	2.88	2.71	2.54	2.41	2.32	2.40	2.47	2.60	2.84	3.02	3.13	3.10	3.05	2.79	2.50	2.843	
17	2.24	2.03	1.93	1.95	2.09	2.41	2.62	2.85	3.00	3.04	2.95	2.83	2.64	2.42	2.35	2.35	2.46	2.66	2.89	3.12	3.25	3.19	3.02	2.76	2.627	
18	2.42	2.06	1.84	1.74	1.82	2.08	2.40	2.71	2.93	3.11	3.16	3.08	2.93	2.69	2.42	2.33	2.33	2.49	2.73	2.95	3.16	3.25	3.13	2.93	2.612	
19	2.56	2.15	1.76	1.53	1.52	1.71	2.05	2.43	2.76	3.07	3.25	3.24	3.14	2.93	2.63	2.34	2.28	2.35	2.56	2.81	3.04	3.27	3.31	3.15	2.577	
20	2.82	2.38	1.92	1.52	1.35	1.41	1.66	2.12	2.54	2.88	3.19	3.35	3.32	3.21	2.89	2.56	2.29	2.31	2.41	2.64	2.87	3.19	3.35	3.31	2.582	
21	3.03	2.63	2.15	1.63	1.28	1.23	1.38	1.74	2.26	2.67	3.04	3.35	3.45	3.37	3.18	2.83	2.49	2.28	2.32	2.49	2.75	3.03	3.31	3.42	2.555	
22	3.30	2.93	2.48	1.93	1.42	1.10	1.08	1.31	1.77	2.30	2.75	3.17	3.46	3.51	3.37	3.17	2.75	2.42	2.32	2.36	2.62	2.91	3.20	3.44	2.545	
23	3.51	3.29	2.88	2.36	1.80	1.29	1.06	1.15	1.46	1.93	2.42	2.85	3.31	3.52	3.50	3.35	3.07	2.66	2.29	2.27	2.41	2.70	2.97	3.27	2.555	
24	3.51	3.52	3.24	2.76	2.24	1.69	1.25	1.12	1.23	1.62	2.13	2.61	3.04	3.41	3.54	3.51	3.34	3.05	2.60	2.39	2.36	2.47	2.80	3.13	2.607	
25	3.34	3.54	3.48	3.16	2.68	2.09	1.57	1.23	1.14	1.30	1.71	2.25	2.71	3.09	3.38	3.49	3.37	3.16	2.79	2.37	2.17	2.25	2.36	2.68	2.557	
26	3.05	3.25	3.42	3.26	3.01	2.58	2.11	1.58	1.31	1.29	1.51	1.94	2.37	2.81	3.24	3.41	3.49	3.41	3.07	2.76	2.30	2.22	2.18	2.46	2.585	
27	2.66	2.99	3.33	3.49	3.36	3.08	2.70	2.22	1.80	1.56	1.59	1.77	2.15	2.52	2.86	3.16	3.31	3.28	3.70	2.86	2.54	2.24	2.03	2.12	2.618	
28	2.77	2.45	2.73	3.00	3.14	3.11	2.95	2.60	2.33	1.31	1.77	1.85	1.99	2.34	2.64	2.92	3.24	3.41	3.29	3.13	2.79	2.48	2.18	2.03	2.606	
29	2.77	2.25	2.44	2.67	2.95	3.08	3.12	3.00	2.83	2.52	2.23	2.10	2.23	2.31	2.48	2.75	3.03	3.22	3.38	3.29	3.15	2.73	2.36	2.20	2.585	
																									MEAN	2.578
																									SEASONAL CHANGE	0.100
																									MEAN SEA LEVEL	2.678
																									Z0	1.900
																									Q	0.778

One Fathom Bank (hourly table)

AREA: One Fathom Bank (standard:Port Kelang .Tg.Kling)  
 DATE: Oct-87

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	OFBmean	PKmean	
10	484	449	412	377	359	358	375	407	445	472	496	498	492	467	431	402	377	366	366	385	410	450	481	504	427.6	340.1	
11	510	498	474	439	408	383	361	364	381	407	440	470	489	497	483	461	430	397	370	348	363	380	415	459	426.1	341.6	
12	499	527	530	513	479	436	387	351	331	334	364	408	455	498	522	523	499	456	403	356	326	319	339	388	426.8	341.4	
13	454	516	556	567	552	509	445	381	330	293	292	327	390	463	518	554	556	521	462	392	332	289	282	308	428.7	344.0	
14	379	468	545	600	620	598	532	450	373	303	260	260	309	397	483	550	589	585	535	455	376	303	255	251	436.5	353.3	
15	298	393	498	584	644	653	616	534	437	346	271	230	246	314	420	521	591	622	605	537	441	351	275	226	443.9	360.4	
16	232	305	413	527	614	663	667	609	511	407	314	240	209	243	333	452	551	613	635	600	517	416	325	250	443.6	358.1	
17	215	240	331	454	567	644	679	658	582	477	372	280	217	204	260	371	488	580	632	633	586	491	390	305	444.0	357.4	
18	234	220	269	370	491	590	652	667	629	538	431	333	250	208	220	295	408	518	594	632	616	551	455	363	438.9	351.8	
19	288	240	245	316	419	524	598	640	638	580	484	388	303	239	221	260	342	449	541	597	614	582	509	424	435.0	347.2	
																									448.0	362.4	
																										MSL(10days)	

Raleigh Shoal (hourly table)

AREA: Raleigh Shoal (standard: Tg. Kline)

date: 1997/11

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	sum	mean	Raleigh Tg. Kline	mean
19	357	316	278	249	235	236	260	309	363	397	412	406	379	343	306	281	267	265	270	288	330	366	389	391	7693	320.5	267.0	
20	370	336	298	268	246	238	246	275	321	360	384	392	382	354	323	299	281	274	280	287	307	331	357	370	7579	315.8	262.9	
21	364	343	313	284	259	246	246	256	285	321	347	365	367	353	335	314	297	287	284	287	300	314	336	350	7453	310.5	258.0	
22	355	344	325	306	284	268	260	259	269	291	318	333	346	350	348	333	318	309	297	293	294	301	317	327	7445	310.2	257.1	
23	341	347	340	335	316	304	285	275	269	271	281	297	312	327	337	340	334	325	315	304	298	297	301	314	7466	311.1	257.8	
24	327	341	353	354	353	336	317	298	281	272	270	272	286	298	320	337	347	344	334	318	302	291	285	287	7523	313.5	259.0	
25	297	316	339	361	368	368	353	333	309	285	272	264	270	277	297	327	346	353	347	325	301	283	267	263	7521	313.4	259.5	
26	271	291	325	359	385	394	389	368	339	307	279	264	258	260	278	306	340	361	367	353	329	299	276	262	7660	319.2	265.0	
27	258	271	297	339	380	403	409	396	370	335	300	276	263	258	267	289	329	356	374	372	344	310	280	257	7733	322.2	267.8	
																									mean	315.2	261.6	
																									MSL	338.6	285.0	

Pulau Undan (hourly table)

AREA: Pulau Undan (standard: Ig. kling)  
date 1997/11

date	Undan Tg. Kling																										
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
20	350	336	311	277	242	224	217	227	255	298	336	361	370	364	342	311	290	275	263	254	253	266	294	322	7038	293.3	262.9
21	332	325	309	286	258	234	219	221	236	284	299	326	344	349	341	321	301	285	273	266	262	278	297	297	6890	287.1	258.0
22	312	316	310	297	279	258	242	236	237	247	269	292	314	329	334	330	318	303	290	279	269	266	267	275	6869	286.2	257.1
23	289	304	311	311	304	292	275	259	248	245	249	257	272	291	309	320	320	316	306	294	281	274	271	272	6870	286.3	257.8
24	279	292	308	319	323	320	305	287	271	256	246	242	247	257	278	298	316	325	322	311	294	276	266	258	6895	287.3	259.0
25	258	266	285	308	330	338	339	327	309	281	284	253	242	242	253	274	299	319	325	317	300	279	260	245	6913	288.0	259.5
26	242	244	266	297	331	353	364	362	344	316	285	259	243	232	230	244	276	311	333	336	328	281	257	257	7043	293.5	265.0
27	242	237	244	270	311	349	372	378	372	350	315	280	258	241	230	232	256	296	330	342	338	321	290	259	7113	296.4	267.8
28	233	220	224	241	284	336	375	391	394	381	345	307	279	257	238	226	231	269	314	341	343	310	274	274	7146	297.8	268.8
29	240	218	207	216	246	301	354	386	396	394	370	326	298	262	242	226	221	243	294	335	351	345	329	297	7087	295.3	266.8
30	256	224	210	207	223	273	335	381	402	407	395	357	314	279	255	235	222	229	264	319	353	352	344	320	7156	298.2	269.0
1	281	241	213	204	207	237	299	357	334	407	406	384	336	297	269	249	230	222	240	292	341	362	354	341	7163	298.5	269.2
2	311	263	228	208	203	212	253	321	376	402	407	398	366	320	287	266	246	230	231	265	321	362	365	354	7195	299.8	269.8
3	330	291	247	219	204	204	225	280	344	388	404	403	386	346	309	282	263	247	239	248	293	343	368	362	7225	301.0	270.5
4	347	322	279	241	215	209	216	247	307	361	394	403	398	371	328	299	280	261	245	241	258	304	346	360	7232	301.3	271.0
5	354	337	309	268	236	219	218	227	264	318	364	387	392	381	352	316	294	274	260	248	251	274	313	345	7201	300.0	269.4
6	353	345	327	297	265	237	223	224	238	278	324	361	379	382	371	339	312	291	274	263	256	280	280	313	7191	299.6	269.0
7	339	345	341	325	302	272	248	237	238	251	278	314	346	365	368	357	332	309	290	277	266	262	268	285	7215	300.6	269.9
8	315	341	351	348	335	315	287	263	249	243	248	264	290	321	344	353	350	335	314	294	281	268	262	263	7234	301.4	271.4
9	276	306	336	351	355	348	331	304	277	256	246	242	246	264	295	323	338	342	329	313	292	274	264	260	7168	298.7	269.1
10	264	279	312	347	372	379	375	356	324	292	269	253	244	239	248	274	311	334	337	329	308	284	262	248	mean	295.8	266.3
																									MSL	314.5	285.0

Iyu Kecil (hourly table)

AREA: Iyu Kecil (standard:Sultan Shoal,Raffles)  
date: 1997/9

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	sun	mean	sultan	raffles
8	286	328	343	335	303	249	199	163	146	144	166	221	290	339	358	354	324	274	221	178	149	137	143	180	5830	242.9	167.4	159.8
9	234	286	318	319	300	264	217	179	161	153	167	201	262	317	350	361	346	309	256	217	177	160	151	160	5865	244.4	168.3	161.0
10	194	237	274	293	291	271	239	209	187	175	171	189	220	268	308	336	341	329	294	257	219	194	175	166	5837	243.2	166.4	159.6
11	174	194	224	248	268	265	251	231	209	187	180	185	197	220	261	297	324	335	329	307	278	244	215	191	5814	242.3	165.5	159.1
12	174	169	175	188	209	229	246	245	237	218	202	192	189	198	216	244	281	318	341	348	337	308	271	232	5767	240.3	163.5	157.3
13	200	175	160	155	169	193	230	255	272	272	259	233	206	188	181	187	209	248	298	339	360	356	332	289	5766	240.3	164.1	157.5
14	239	198	166	144	136	153	196	246	284	306	302	281	242	202	172	157	162	181	239	306	361	389	384	354	5800	241.7	165.8	158.5
15	300	238	188	148	131	123	145	212	276	317	331	327	296	244	192	156	139	144	171	242	326	386	410	397	5839	243.3	166.5	158.7
16	358	293	225	173	138	113	114	153	239	309	344	352	340	300	236	181	141	125	125	168	262	352	406	422	5869	244.5	168.2	160.0
																									mean	242.5	166.2	159.1
																									MSL	246.0	167.0	163.0