

Appendix 6

Long-Term Mean Sea Levels
at Temporary Tide Stations

Long-Term Mean Sea Level at Temporary Station

Name of Station	Short-Term M. S. L.		Long-Term M. S. L.			Standard Station
	Tempora. Station (T ₁)	Standard Station (S ₁)	Standard Station (S ₀)	Temporary Station (T ₀) (Average)		
Tg. Gabang (Nov. 9 - Nov. 26)	4.05 m	3.83 m 3.00 m	3.62 m 2.85 m	3.84 m 3.90 m	3.87 m	Port Klang Tg. Kling
Port Dickson (Nov. 26 - Dec. 25)	3.55 m	3.77 m 2.97 m	3.62 m 2.85 m	3.40 m 3.43 m	3.42 m	Port Klang Tg. Kling
Cape Rachado (Nov. 25 - Dec. 24)	3.71 m	3.77 m 2.97 m	3.62 m 2.85 m	3.56 m 3.59 m	3.58 m	Port Klang Tg. Kling
Segenting (Dec. 9 - Dec. 22)	1.41 m	2.98 m 4.14 m	2.85 m 3.99 m	1.28 m 1.26 m	1.27 m	Tg. Kling Kukup

[Note] $T_0 = T_1 + (S_0 - S_1)$
 $= 4.05 + (3.62 - 3.83) = 3.84 \text{ m}$

Here, T₀ : Long-Term Mean Sea Level at Temporary Station
T₁ : Short-Term Mean Sea Level at Temporary Station
S₀ : Long-Term Mean Sea Level at Standard Station
S₁ : Short-Term Mean Sea Level at Standard Station

Long-Term Mean Sea Level at Tanjung Ayam

Name of Station	Short-Term M. S. L.		Long-Term M. S. L.		Standard Station
	Tg. Ayam Station (T ₁)	Standard Station (S ₁)	Standard Station (S ₀)	Tanjung Ayam Station (T ₀) (Final Value)	
Tanjung Ayam	2.578m	1.590m 2.591m	1.695m 2.703m	2.683m 2.690m	Angler Bank Changi (reference)
				2.68 m	

[Note]

1) Period of Tidal Observation at Each Station

Tg. Ayam Station : May 31, 1997 -- June 29, 1997

Angler Bank Station : January 1992 -- December 1995

Changi Station : October 1996 -- June 1997

2) Calculation of Long-Term Mean Sea Level at Tg. Ayam Station

$$T_0 = T_1 + (S_0 - S_1)$$

$$= 2.578 + (1.695 - 1.590) = 2.683 \text{ m} \quad \langle \text{S. Station: Angler Bank} \rangle$$

$$= 2.578 + (2.703 - 2.591) = 2.690 \text{ m} \quad \langle \text{S. Station: Changi} \rangle$$

Here, T₀ : Long-Term Mean Sea Level at Tg. Ayam Station

T₁ : Short-Term Mean Sea Level at Tg. Ayam Station

S₀ : Long-Term Mean Sea Level at Standard Station

S₁ : Short-Term Mean Sea Level at Standard Station

3) Changi tide station had only 9 months of available historical records.

The difference of Long-Term Mean Sea Levels at Tg. Ayam Station using Angler Bank and Changi station values was 0.7 cm. Finally, 2.68 m was adopted as Long-Term Mean Sea Level at Tg. Ayam Station.

Long-Term Mean Sea Level at Temporary Station

Name of Station	Short-Term M. S. L.		Long-Term M. S. L.			Standard Station
	Tempora. Station (T ₁)	Standard Station (S ₁)	Standard Station (S ₀)	Temporary Station (T ₀) (Final)		
Iyu Kecil	2.425m	1.591m 1.662m (9 days)	1.630m 1.670m	2.46 m 2.43 m	2.47 ^m m	Raffles L.H. Sultan Shoal
One Fathom Bank	4.351m	3.495m (10 days)	3.624m	4.48 m	4.46 ^m m	Port Klang
Raleigh Shoal	3.152m	2.616m (9 days)	2.850m	3.38 m		Tg. Kling
Pulau Undan	2.958m	2.663m (21 days)	2.850m	3.14 m		Tg. Kling

[Note] 1) Calculation of Long-Term M. S. L.

$$\begin{aligned}
 T_0 &= T_1 + (S_0 - S_1) \\
 &= 2.425 + (1.630 - 1.591) = 2.464 \text{ m} \quad (\text{Iyu Kecil}) \\
 &= 4.351 + (3.624 - 3.495) = 4.480 \text{ m} \quad (\text{One Fathom Bank}) \\
 &= 3.152 + (2.850 - 2.616) = 3.386 \text{ m} \quad (\text{Raleigh Shoal}) \\
 &= 2.958 + (2.850 - 2.663) = 3.145 \text{ m} \quad (\text{Pulau Undan})
 \end{aligned}$$

Here, T₀ : Long-Term Mean Sea Level at Temporary Station
T₁ : Short-Term Mean Sea Level at Temporary Station
S₀ : Long-Term Mean Sea Level at Standard Station
S₁ : Short-Term Mean Sea Level at Standard Station

2) Final values of Long-Term M. S. L. at Iyu Kecil and O. F. B., 2.47^mm and 4.46^mm were obtained by leveling from existing Bench Marks.

Appendix 7

Tidal Harmonic Constants
Used for Tidal Prediction

TIDAL HARMONIC CONSTANTS

ONE FATHOM BANK

(1) Position

Latitude : 2°53'18"N.
 Longitude : 100°59'48"E.
 Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978
 Duration : Mar. 1 1978 ~ Mar. 5 1979
 Method of observation : LFT-V, 1:20
 Observed by : MALAYSIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_a	11.55	135.08	135.39	a_1	1.85	251.91	247.87	SK_1	0.69	42.40	77.22
S_{sa}	6.64	109.49	110.10	$2Q_1$	0.36	238.76	234.17	MK_1	1.42	9.26	36.46
M_m	1.05	344.93	349.02					SO_1	0.49	21.86	48.45
MS_f	0.76	300.06	307.68	S_2	61.80	166.16	189.16	M_2	0.19	320.02	343.10
M_f	4.39	37.10	45.34	T_1	2.78	156.89	179.59	MO_1	0.64	3.08	22.04
				R_2	0.55	315.89	339.20				
S_1	3.25	176.09	187.60	K_2	17.71	163.96	187.59	S_1	0.53	227.75	273.77
K_1	17.20	7.61	19.43	L_2	4.88	123.95	143.42	SK_1	0.20	182.65	229.28
P_1	6.21	5.25	16.45	λ_2	2.34	98.20	117.12	MS_1	2.06	168.95	207.35
π_1	0.62	44.96	55.84	MSN_2	1.10	319.62	346.71	MK_1	0.69	157.45	196.46
ϕ_1	0.44	108.75	120.87	KJ_2	1.04	358.37	26.08	SN_1	0.56	179.94	214.25
ϕ_1	0.93	85.57	98.00	M_2	124.58	124.50	139.89	M_1	1.82	134.62	165.40
M_1	0.59	120.15	127.85	$2SM_2$	2.46	350.04	20.67	MN_1	0.73	129.21	155.90
θ_1	0.12	156.60	171.95	OP_1	0.48	261.12	275.89				
J_1	3.20	40.25	56.14	MKS_2	0.74	310.98	326.99	$2SM_1$	0.48	198.53	259.93
χ_1	0.23	184.74	193.01	N_2	23.26	118.18	129.48	MSK_1	0.31	170.25	232.27
O_1	4.61	149.96	153.54	ν_2	4.49	107.93	119.79	$2MS_1$	1.34	134.46	188.24
MP_1	1.64	3.77	7.97	μ_2	5.32	155.70	163.47	$2MK_1$	0.31	122.77	177.17
SO_1	2.34	110.31	129.74	$2N_2$	3.36	100.72	107.94	MSN_1	0.31	147.38	197.07
OO_1	1.80	34.45	54.49	MNS_2	1.02	150.86	154.55	M_1	0.84	91.36	137.52
P_1	0.39	135.18	135.22	OQ_2	0.69	43.02	46.09	$2MN_1$	0.32	95.95	138.03
Q_1	0.42	212.56	212.06								

TIDAL HARMONIC CONSTANTS

TG. GABANG

(1) Position

Latitude : 2°40'42"N.

Longitude : 101°29'51"E.

Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978

Duration : Mar. 1 1978 ~ Mar. 5 1979

Method of observation : LFT-V, 1:20

Observed by : MALAYSIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_0	9.21	147.35	147.66	σ_1	3.21	250.07	245.53	SK_3	0.75	126.30	159.62
S_{1a}	6.59	105.66	106.28	$2Q_1$	0.81	165.54	160.45	MK_3	1.16	106.02	131.71
M_{1a}	1.25	16.08	20.17	S_2	50.68	188.91	210.92	SO_3	1.16	147.33	172.41
MSf	1.27	17.65	25.27	T_2	2.88	191.91	213.61	M_3	0.33	332.41	353.99
Mf	2.68	25.49	33.73	R_2	0.48	185.13	207.45	MO_3	1.23	129.33	146.79
S_1	3.54	202.13	213.14	K_2	15.06	185.54	208.16	S_4	0.74	317.78	1.79
K_1	8.14	28.92	40.23	L_1	3.98	145.80	164.26	SK_4	0.41	310.02	354.65
P_1	3.52	29.59	40.29	λ_2	2.53	132.37	150.29	MS_4	3.39	277.43	313.82
ϵ_1	0.70	130.63	141.02	MSN_2	1.59	348.06	14.14	MK_4	1.00	270.20	307.21
ψ_1	0.91	152.74	164.36	KJ_2	0.51	29.76	56.46	SN_4	0.61	277.10	309.40
ϕ_1	0.32	62.39	74.32	M_2	101.30	146.90	161.29	M_4	3.51	240.76	269.53
M_1	0.28	158.17	165.36	$2SM_2$	2.75	17.62	47.24	MN_4	1.37	231.55	256.24
θ_1	0.17	113.18	128.02	OP_2	0.18	289.31	303.08				
J_1	2.58	54.72	70.11	MKS_2	0.75	179.55	194.55	$2SM_4$	0.99	7.99	66.38
I_1	0.43	177.06	184.84	N_2	18.94	139.99	150.29	MSK_4	0.74	3.11	62.33
O_1	12.92	139.82	142.89	ν_2	3.56	130.87	141.72	$2MS_4$	2.52	320.50	11.28
MP_1	1.50	3.77	7.47	μ_2	3.80	187.12	193.89	$2MK_4$	1.03	321.62	13.01
SO_1	1.81	117.08	136.01	$2N_2$	3.21	124.85	131.07	MSN_4	0.78	322.15	8.84
OO_1	1.35	54.67	74.22	MNS_2	0.86	191.13	193.82	M_4	1.67	284.94	328.10
P_2	0.55	112.61	112.15	OQ_2	0.68	41.33	43.40	$2MN_4$	0.97	273.95	313.02
Q_2	1.12	128.28	127.27								

TIDAL HARMONIC CONSTANTS

PORT DICKSON

(1) Position

Latitude : 2°31'13"N.
 Longitude : 101°47'51"E.
 Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978
 Duration : Mar. 1 1978 ~ Mar. 5 1979
 Method of observation : LFT-V, 1:20
 Observed by : MALAYSIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
<i>Sa</i>	9.60	156.32	156.63	<i>a₁</i>	3.23	249.11	244.27	<i>SK₁</i>	0.61	189.18	221.60
<i>Ssa</i>	5.95	115.86	116.47	<i>2Q₁</i>	1.03	166.88	161.49	<i>MK₁</i>	1.59	174.26	199.05
<i>Mm</i>	1.90	10.03	14.11					<i>SO₁</i>	1.87	189.12	213.30
<i>MSf</i>	2.54	25.67	33.29	<i>S₂</i>	41.52	204.91	226.32	<i>M₂</i>	0.35	354.87	15.55
<i>Mf</i>	2.07	28.31	36.54	<i>T₂</i>	2.38	204.17	225.27	<i>MO₁</i>	2.25	158.48	175.05
				<i>R₂</i>	0.37	188.10	209.81				
<i>S₁</i>	3.60	208.50	219.20	<i>K₂</i>	11.97	200.39	222.42	<i>S₁</i>	0.73	6.04	48.85
<i>K₁</i>	4.68	75.80	86.81	<i>L₂</i>	3.33	165.90	183.77	<i>SK₁</i>	0.47	350.75	34.17
<i>P₁</i>	2.25	55.98	66.37	<i>λ_2</i>	1.92	148.36	165.68	<i>MS₁</i>	3.81	322.80	357.99
<i>π_1</i>	0.70	127.27	137.35	<i>MSN₁</i>	1.13	3.46	28.95	<i>MK₁</i>	1.00	312.66	348.46
<i>ψ_1</i>	0.91	166.82	178.14	<i>KJ₁</i>	0.31	72.83	98.93	<i>SN₁</i>	0.68	320.21	351.32
<i>ϕ_1</i>	0.37	79.76	91.38	<i>M₁</i>	82.78	163.64	177.43	<i>M₁</i>	3.87	283.42	311.00
<i>M₁</i>	0.09	120.45	127.34	<i>2SM₁</i>	2.34	36.18	65.20	<i>MN₁</i>	1.47	271.80	295.28
<i>θ_1</i>	0.10	82.88	97.42	<i>OP₁</i>	0.40	260.09	273.26				
<i>J₁</i>	2.34	61.06	76.16	<i>MKS₁</i>	0.40	210.15	224.55	<i>2SM₁</i>	1.17	38.49	95.09
<i>χ_1</i>	0.46	193.83	201.31	<i>N₂</i>	15.47	156.11	165.81	<i>MSK₁</i>	0.75	31.40	88.61
<i>O₁</i>	17.22	139.24	142.01	<i>ν_1</i>	2.97	153.49	163.74	<i>2MS₁</i>	2.85	346.02	35.00
<i>MP₁</i>	1.14	358.93	2.32	<i>μ_1</i>	2.41	203.60	209.77	<i>2MK₁</i>	0.93	343.13	32.73
<i>SO₁</i>	1.15	116.70	135.33	<i>2N₁</i>	2.26	144.41	150.03	<i>MSN₁</i>	0.85	353.43	38.33
<i>OO₁</i>	1.25	65.09	84.33	<i>MNS₁</i>	0.67	220.90	222.98	<i>M₁</i>	1.74	311.84	353.19
<i>ρ_1</i>	0.80	116.51	115.75	<i>OQ₁</i>	0.60	65.71	67.17	<i>2MN₁</i>	1.01	300.14	337.41
<i>Q₁</i>	1.89	118.54	117.23								

TIDAL HARMONIC CONSTANTS

MALACCA (TG. KLING)

(1) Position

Latitude : 2°13' 0"N.

Longitude : 102° 9'18"E.

Time kept at the place : -0730

(2) Time & duration of observation

Central day : Oct. 8 1978

Duration : Apr. 6 1978 ~ Apr. 10 1979

Method of observation : LFT-V, 1:20

Observed by : MALAYSIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_a	7.15	158.79	159.09	σ_1	3.64	248.41	243.21	SK_3	0.92	252.58	283.92
S_{sa}	5.94	102.40	103.01	$2Q_1$	0.68	176.07	170.32	MK_3	2.44	215.42	239.14
Mm	1.70	20.24	24.33					SO_3	2.55	222.55	245.66
MSf	1.91	30.39	38.01	S_2	29.10	239.74	260.43	M_3	0.36	10.55	30.15
Mf	1.26	349.00	357.23	T_2	2.04	232.39	252.77	MO_3	2.88	182.16	197.65
				R_2	0.44	201.25	222.25				
S_1	3.94	220.52	230.87	K_2	8.23	234.86	256.17	S_4	0.58	55.05	96.43
K_1	8.98	139.62	150.28	L_2	2.22	212.62	229.77	SK_4	0.36	28.40	70.40
P_1	2.52	124.34	134.37	λ_1	1.77	202.91	219.52	MS_4	2.80	16.51	50.27
π_1	0.90	148.82	158.55	MSN_2	0.87	49.65	74.43	MK_4	0.99	357.87	32.25
ψ_1	0.85	165.28	176.24	KJ_2	0.31	46.38	71.77	SN_4	0.49	6.80	36.48
ϕ_1	0.22	124.05	135.32	M_2	60.33	200.59	213.66	M_4	2.79	339.77	5.91
M_1	0.22	280.41	286.95	$2SM_2$	1.63	77.11	105.42	MN_4	1.11	328.14	350.20
θ_1	0.48	89.73	103.92	OP_2	0.90	248.18	260.64				
J_1	2.03	73.51	88.25	MKS_2	0.72	111.75	125.44	$2SM_4$	0.65	154.89	209.34
χ_1	0.54	174.16	181.27	N_2	10.72	191.85	200.84	MSK_4	0.49	164.01	219.08
O_1	22.12	136.16	138.58	ν_2	2.69	189.69	199.22	$2MS_4$	1.66	113.39	160.23
MP_1	0.94	315.08	318.11	μ_2	1.39	299.29	304.74	$2MK_4$	0.67	117.48	164.92
SO_1	0.67	95.01	113.28	$2N_2$	1.82	192.03	196.93	MSN_4	0.51	114.28	157.02
OO_1	0.62	86.88	105.77	MNS_2	0.41	291.40	292.77	M_4	1.25	78.02	117.24
ρ_1	1.22	106.40	105.29	OQ_2	0.53	155.14	155.90	$2MN_4$	0.74	65.97	101.10
Q_1	2.18	101.60	99.93								

TIDAL HARMONIC CONSTANTS

TG. SEGENTING

(1) Position

Latitude : 1°46'24"N.

Longitude : 102°52'48"E.

Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978

Duration : Mar. 1 1978 ~ Mar. 5 1979

Method of observation : LFT-V, 1:20

Observed by : MALAYSIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_a	6.58	163.71	164.02	σ_1	3.76	249.12	243.19	SK_1	0.97	321.53	350.70
S_{1a}	5.64	107.25	107.86	$2Q_1$	0.59	156.69	150.22	MK_1	1.95	280.52	302.07
Mm	1.77	20.62	24.71					SO_1	2.05	289.10	310.04
MSf	2.84	38.82	46.44	S_2	35.88	307.25	326.49	M_1	0.24	132.73	150.17
Mf	0.81	8.09	16.33	T_1	2.39	299.53	318.46	MO_1	2.20	254.72	268.03
				R_2	0.29	317.10	336.65				
S_1	4.03	231.28	240.90	K_2	10.59	307.28	327.14	S_1	0.56	171.46	209.94
K_1	18.91	147.78	157.71	L_2	3.40	272.35	288.05	SK_1	0.32	172.25	211.35
P_1	5.47	141.20	150.52	λ_2	2.57	269.19	284.35	MS_1	3.95	128.51	159.37
κ_1	1.12	148.51	157.51	MSN_2	1.21	120.94	144.27	MK_1	1.15	115.74	147.22
ϕ_1	0.63	182.33	192.57	KJ_1	0.26	177.13	201.07	SN_1	0.52	130.51	157.29
ϕ_1	0.18	154.88	165.43	M_2	79.74	264.71	276.33	M_1	4.21	86.18	109.43
M_1	0.55	295.67	301.48	$2SM_2$	2.31	156.67	183.53	MN_1	1.50	74.27	93.43
θ_1	0.39	89.21	102.67	OP_2	0.26	203.61	214.62				
J_1	1.92	84.30	98.31	MKS_2	1.31	71.19	83.43	$2SM_1$	0.72	269.23	319.33
χ_1	0.58	154.07	160.46	N_2	14.21	256.87	264.40	MSK_1	0.45	262.07	312.78
O_1	25.75	127.25	128.94	ν_2	3.59	245.46	253.54	$2MS_1$	1.91	217.24	259.72
MP_1	0.91	293.08	295.39	μ_2	3.31	1.49	5.49	$2MK_1$	0.60	221.74	264.84
SO_1	0.83	4.74	22.29	$2N_2$	2.91	247.06	250.52	MSN_1	0.50	222.83	261.23
OO_1	0.59	155.38	173.54	MNS_2	0.75	358.01	357.93	M_2	1.19	180.16	215.03
p_1	1.17	107.69	105.84	OQ_2	1.02	175.53	174.84	$2MN_1$	0.67	170.90	201.67
Q_1	3.14	89.52	87.13								

TIDAL HARMONIC CONSTANTS

PU. PISANG

(1) Position

Latitude : 1°28'12"N.

Longitude : 103°15'18"E.

Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978

Duration : Mar. 1 1978 ~ Mar. 5 1979

Method of observation : OTT, 1:20

Observed by : SINGAPORE

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_a	2.86	176.05	176.36	σ_1	3.22	251.66	245.36	SK_3	1.01	31.00	59.04
S_{sa}	5.57	105.44	106.06	$2Q_1$	0.44	160.30	153.45	MK_3	2.55	351.65	12.07
M_m	1.85	18.51	22.59	S_1	42.17	332.91	351.40	SO_3	2.51	351.77	11.58
MS_f	3.31	44.03	51.65	T_2	3.01	333.63	351.81	M_3	0.54	170.06	186.37
M_f	0.74	358.70	6.93	R_2	1.00	319.80	338.59	MO_3	3.01	319.77	331.96
S_1	3.61	238.22	247.46	K_1	13.31	330.92	350.02	S_3	0.92	214.72	251.70
K_1	23.83	148.48	158.04	L_2	3.89	295.71	310.67	SK_4	0.59	206.38	243.97
P_1	7.18	142.46	151.40	λ_2	3.21	296.06	310.47	MS_4	5.77	171.09	200.45
π_1	1.05	145.44	154.07	MSN_2	1.58	149.75	172.33	MK_4	1.63	167.31	197.29
ψ_1	0.34	222.61	232.47	KJ_2	0.32	230.88	254.06	SN_4	0.75	173.10	198.38
ϕ_1	0.29	162.14	172.30	M_2	93.24	288.49	299.36	M_4	5.89	128.52	150.26
M_1	0.63	312.52	317.95	$2SM_2$	2.97	183.28	209.39	MN_4	2.13	118.60	136.26
θ_1	0.43	98.28	111.37	OP_1	0.56	259.97	270.22	$2SM_4$	0.99	31.17	79.02
J_1	1.60	91.45	105.08	MKS_2	0.82	51.89	63.38	MSK_4	0.83	28.65	77.12
χ_1	0.64	136.03	142.05	N_2	16.70	279.00	285.79	$2MS_4$	2.91	343.24	23.48
O_1	26.27	119.01	120.33	ν_2	4.34	266.76	274.09	$2MK_4$	1.24	342.91	23.76
MP_1	1.24	274.27	276.21	μ_2	3.75	19.36	22.61	MSN_4	0.80	343.70	19.85
SO_1	1.40	351.73	8.90	$2N_2$	3.42	267.36	270.06	M_4	2.13	302.94	335.55
OO_1	0.92	170.67	188.46	MNS_2	0.87	24.99	24.16	$2MN_4$	1.19	289.59	318.12
ρ_1	1.26	103.70	101.48	OQ_2	0.89	193.19	191.75				
Q_1	3.57	79.56	76.79								

TIDAL HARMONIC CONSTANTS

IYU KECIL (PASIR PANJANG)

(1) Position

Latitude : 1° 7'33"N.

Longitude : 103°20'42"E.

Time kept at the place : -0700

(2) Time & duration of observation

Central day : June 4 1978

Duration : Dec. 1 1977 ~ Dec. 5 1978

Method of observation : LFT-V, 1:20

Observed by : INDONESIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_a	4.57	177.66	177.95	σ_1	2.60	252.15	239.29	SK_1	0.93	76.19	81.44
S_{sa}	5.31	93.47	94.05	$2Q_1$	0.43	205.94	192.58	MK_1	2.87	25.45	23.59
Mm	1.44	5.24	9.05					SO_1	2.83	25.72	23.28
MSf	3.76	43.15	50.27	S_1	43.31	347.78	351.09	M_1	0.60	203.36	197.66
Mf	1.50	268.36	276.04	T_2	3.01	341.27	344.29	MO_1	3.30	353.44	343.90
				R_2	0.69	304.44	303.04				
S_1	3.89	236.69	238.34	K_2	13.45	344.99	348.87	S_1	0.88	260.07	266.69
K_1	26.49	147.97	149.91	L_2	4.61	303.25	303.26	SK_1	0.57	218.90	226.10
P_1	8.14	142.02	143.39	λ_1	2.65	298.65	298.15	MS_1	5.57	212.65	212.16
κ_1	1.12	116.31	117.39	MSN_1	2.02	158.18	165.30	MK_1	1.63	210.59	210.67
ψ_1	0.30	105.60	107.83	KJ_1	0.52	244.47	252.17	SN_1	0.87	218.50	214.20
ϕ_1	0.32	236.39	238.90	M_2	94.41	301.99	298.19	M_1	5.56	169.73	162.12
M_1	1.17	297.23	295.33	$2SM_1$	3.20	193.19	203.61	MN_1	2.08	156.66	145.25
θ_1	0.25	151.17	156.42	OP_2	0.80	171.36	166.98				
J_1	1.35	98.85	104.60	MKS_2	1.84	76.87	73.64	$2SM_1$	1.01	91.50	94.32
α_1	0.19	103.04	101.68	N_2	17.37	292.92	285.31	MSK_1	0.71	78.17	81.57
O_1	25.92	112.86	107.11	ν_2	3.77	281.70	274.60	$2MS_1$	2.78	34.52	30.23
MP_1	1.75	269.33	264.16	μ_1	3.89	33.58	22.67	$2MK_1$	0.96	29.86	26.14
SO_1	1.98	348.24	357.29	$2N_1$	3.10	276.59	265.16	MSN_1	0.85	36.68	28.58
OO_1	0.68	160.48	170.11	MNS_2	0.99	19.18	4.46	M_1	1.81	349.14	337.73
ρ_1	1.12	112.40	103.36	OQ_2	0.62	213.59	198.29	$2MN_1$	1.00	335.53	320.31
Q_1	3.98	71.08	61.52								

TIDAL HARMONIC CONSTANTS

RAFFLES LIGHTHOUSE

(1) Position

Latitude : 1° 9'36"N.
 Longitude : 103°44'30"E.
 Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978
 Duration : Mar. 1 1978 ~ Mar. 5 1979
 Method of observation : OTT, 1:20
 Observed by : SINGAPORE

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
<i>Sa</i>	4.78	239.72	240.03	<i>a₁</i>	1.64	245.11	238.32	<i>SK₁</i>	0.89	81.69	108.27
<i>Sra</i>	4.41	114.14	114.76	<i>2Q₁</i>	0.19	354.02	346.69	<i>MK₁</i>	3.07	33.43	52.39
<i>Mm</i>	1.32	32.50	36.59					<i>SO₁</i>	2.77	38.64	56.98
<i>MSf</i>	2.94	59.31	66.93	<i>S₂</i>	36.85	355.56	13.08	<i>M₁</i>	0.37	177.29	192.14
<i>Mf</i>	1.06	76.31	84.55	<i>T₂</i>	2.16	359.98	17.19	<i>MO₁</i>	2.54	356.19	6.92
				<i>R₂</i>	1.06	336.53	354.36				
<i>S₁</i>	2.09	238.72	247.48	<i>K₂</i>	11.03	352.71	10.84	<i>S₁</i>	0.62	288.46	323.49
<i>K₁</i>	27.03	130.03	139.10	<i>L₂</i>	3.50	316.36	330.34	<i>SK₁</i>	0.16	281.71	317.36
<i>P₁</i>	8.08	125.00	133.45	<i>i₂</i>	2.37	313.55	326.99	<i>MS₁</i>	3.20	259.43	286.85
<i>r₁</i>	0.73	130.43	138.57	<i>MSN₁</i>	1.37	175.07	196.67	<i>MK₁</i>	1.19	263.82	291.85
<i>s₁</i>	0.30	270.22	279.59	<i>KJ₂</i>	0.28	216.76	238.98	<i>SN₁</i>	0.45	248.98	272.31
<i>s₂</i>	0.02	60.77	70.46	<i>M₂</i>	82.97	309.07	318.97	<i>M₁</i>	3.37	218.57	238.37
<i>M₁</i>	0.71	355.44	0.39	<i>2SM₁</i>	2.44	204.77	229.90	<i>MN₁</i>	1.21	205.81	221.52
<i>h₁</i>	0.30	135.88	148.48	<i>OP₁</i>	0.83	73.68	82.96				
<i>J₁</i>	1.13	99.94	113.09	<i>MKS₂</i>	0.50	76.32	86.84	<i>2SM₁</i>	0.80	143.76	188.69
<i>z₁</i>	0.42	94.65	100.18	<i>N₂</i>	15.25	296.30	302.11	<i>MSK₁</i>	0.40	135.33	180.88
<i>O₁</i>	25.20	83.00	83.83	<i>v₁</i>	3.26	294.48	300.84	<i>2MS₁</i>	1.99	78.78	116.09
<i>MP₁</i>	1.28	265.34	266.79	<i>h₂</i>	2.35	48.46	50.74	<i>2MK₁</i>	0.58	79.50	117.42
<i>SO₁</i>	1.74	6.68	23.36	<i>2N₂</i>	2.80	279.31	281.04	<i>MSN₁</i>	0.52	91.61	124.84
<i>OO₁</i>	1.24	173.79	191.09	<i>MNS₂</i>	0.68	53.81	52.00	<i>M₁</i>	1.18	34.26	63.95
<i>p₁</i>	1.05	70.70	68.00	<i>OQ₂</i>	0.62	198.08	195.66	<i>2MN₁</i>	0.60	24.56	50.17
<i>Q₁</i>	4.44	44.85	41.60								

TIDAL HARMONIC CONSTANTS

ANGLER BANK

(1) Position

Latitude : 1°20'42"N.
 Longitude : 104° 1'54"E.
 Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978
 Duration : Mar. 1 1978 ~ Mar. 5 1979
 Method of observation : OTT, 1:20
 Observed by : SINGAPORE

Constituents	H	κ	g	Constituents	H	κ	g	Constituents	H	κ	g
<i>Sa</i>	9.71	253.82	254.13	<i>σ₁</i>	0.42	196.06	188.99	<i>SK₁</i>	0.34	121.72	147.43
<i>Ssa</i>	4.93	92.26	92.88	<i>2Q₁</i>	1.40	0.88	353.26	<i>MK₁</i>	1.75	52.02	70.11
<i>Mm</i>	0.89	18.33	22.42					<i>SO₁</i>	1.44	54.99	72.47
<i>MSf</i>	1.42	85.12	92.74	<i>S₂</i>	29.40	346.23	3.16	<i>M₁</i>	0.11	125.27	139.24
<i>Mf</i>	1.34	133.77	142.01	<i>T₂</i>	1.47	316.71	333.34	<i>MO₁</i>	1.07	6.96	16.81
				<i>R₂</i>	0.28	349.27	6.52				
<i>S₁</i>	1.12	194.62	203.09	<i>K₂</i>	8.50	343.19	0.75	<i>S₁</i>	0.14	0.33	34.21
<i>K₁</i>	28.07	88.47	97.24	<i>L₂</i>	2.84	325.78	339.18	<i>SK₁</i>	0.07	147.43	181.92
<i>P₁</i>	8.98	81.40	89.56	<i>λ₂</i>	1.66	321.20	334.05	<i>MS₁</i>	1.93	344.39	10.65
<i>π₁</i>	0.81	70.29	78.14	<i>MSN₁</i>	0.93	194.92	215.94	<i>MK₁</i>	1.11	288.49	315.36
<i>φ₁</i>	0.40	8.54	17.62	<i>KJ₁</i>	0.28	127.35	148.99	<i>SN₁</i>	0.13	317.68	339.85
<i>φ₁</i>	0.42	326.79	336.18	<i>M₂</i>	75.14	297.35	306.67	<i>M₁</i>	1.79	304.67	323.31
<i>M₁</i>	1.07	33.62	38.28	<i>2SM₂</i>	1.66	209.20	233.75	<i>MN₁</i>	0.60	285.18	299.73
<i>θ₁</i>	0.25	150.83	163.14	<i>OP₁</i>	0.58	135.18	143.89				
<i>J₁</i>	1.25	89.25	102.11	<i>MKS₁</i>	1.39	47.62	57.55	<i>2SM₁</i>	0.46	200.56	243.75
<i>λ₁</i>	0.11	97.12	102.36	<i>N₂</i>	14.70	277.55	282.78	<i>MSK₁</i>	0.31	176.99	229.80
<i>O₁</i>	29.12	43.91	44.45	<i>ν₂</i>	2.90	282.90	288.68	<i>2MS₁</i>	1.18	129.69	165.26
<i>MP₁</i>	0.27	298.25	299.40	<i>μ₂</i>	0.52	89.04	90.74	<i>2MK₁</i>	0.45	121.96	158.15
<i>SO₁</i>	0.45	340.65	357.04	<i>2N₂</i>	2.17	264.15	265.30	<i>MSN₁</i>	0.30	145.49	176.98
<i>OO₁</i>	0.72	246.11	263.12	<i>MNS₂</i>	0.47	73.55	71.16	<i>M₁</i>	0.62	81.71	109.66
<i>ρ₁</i>	1.24	26.82	23.82	<i>OQ₂</i>	0.48	191.79	188.79	<i>2MN₁</i>	0.30	67.23	91.09
<i>Q₁</i>	5.67	13.22	9.68								

TIDAL HARMONIC CONSTANTS

TG. AYAM

(1) Position

Latitude : 1°20'24"N.

Longitude : 104°13' 4"E.

Time kept at the place : -0730

(2) Time & duration of observation

Central day : June 4 1978

Duration : Dec. 1 1977 ~ Dec. 5 1978

Method of observation : LFT-V, 1:20

Observed by : MALAYSIA

Constituents	H	ε		Constituents	H	ε		Constituents	H	ε	
		cm	deg.			deg.	cm			deg.	deg.
<i>Sa</i>	12.38	278.06	278.37	<i>a₁</i>	0.13	270.44	263.18	<i>SK₁</i>	0.66	121.54	146.69
<i>Ssa</i>	4.24	105.74	106.36	<i>2Q₁</i>	1.19	340.48	332.67	<i>MK₁</i>	2.31	73.47	91.00
<i>Mm</i>	1.24	285.93	290.01	<i>S₂</i>	23.66	342.29	358.85	<i>SO₁</i>	1.79	73.16	90.08
<i>MSf</i>	1.07	22.30	29.92	<i>T₂</i>	0.89	321.43	337.69	<i>M₁</i>	0.19	204.85	218.27
<i>Mf</i>	1.46	195.83	204.06	<i>R₂</i>	0.24	61.85	78.72	<i>MO₁</i>	1.63	31.23	40.53
<i>S₁</i>	0.79	198.98	207.26	<i>K₂</i>	7.23	343.64	0.82	<i>S₁</i>	0.18	16.20	49.33
<i>K₁</i>	28.13	75.29	83.88	<i>L₂</i>	2.50	308.45	321.48	<i>SK₁</i>	0.08	272.63	306.37
<i>P₁</i>	9.31	67.25	75.23	<i>λ₂</i>	1.40	323.12	335.60	<i>MS₁</i>	1.71	0.44	25.95
<i>κ₁</i>	0.76	59.81	67.48	<i>MSN₁</i>	1.03	195.21	215.86	<i>MK₁</i>	1.13	306.42	332.55
<i>ψ₁</i>	0.63	28.07	36.96	<i>KJ₂</i>	0.56	149.08	170.35	<i>SN₁</i>	0.20	0.54	21.96
<i>φ₁</i>	0.55	326.33	335.54	<i>M₂</i>	64.95	291.66	300.61	<i>M₁</i>	1.71	329.20	347.09
<i>M₁</i>	0.90	35.91	40.38	<i>2SM₂</i>	1.23	218.73	242.92	<i>MN₁</i>	0.76	313.01	326.81
<i>θ₁</i>	0.21	71.79	83.92	<i>OP₂</i>	0.82	93.03	101.35				
<i>J₁</i>	1.45	78.55	91.23	<i>MKS₂</i>	0.58	9.25	18.81	<i>2SM₁</i>	0.49	202.53	244.61
<i>χ₁</i>	0.29	115.57	120.62	<i>N₂</i>	12.85	268.67	273.53	<i>MSK₁</i>	0.36	190.36	233.05
<i>O₁</i>	29.64	31.74	32.10	<i>ν₂</i>	2.29	280.45	285.86	<i>2MS₁</i>	1.11	141.16	175.61
<i>MP₁</i>	0.26	30.05	31.02	<i>ρ₂</i>	0.96	149.67	151.00	<i>2MK₁</i>	0.48	128.35	163.43
<i>SO₁</i>	0.43	34.28	50.49	<i>2N₁</i>	1.63	249.50	250.28	<i>MSN₁</i>	0.33	147.73	178.10
<i>OO₁</i>	0.26	51.55	68.38	<i>MNS₂</i>	0.49	74.70	71.94	<i>M₁</i>	0.54	100.14	126.98
<i>ρ₁</i>	1.19	16.96	13.78	<i>OQ₂</i>	0.43	207.43	204.06	<i>2MN₁</i>	0.27	79.24	102.00
<i>Q₁</i>	6.27	3.21	359.48								

TIDAL HARMONIC CONSTANTS

HORSBURGH LIGHTHOUSE

(1) Position

Latitude : 1°19'48"N.
 Longitude : 104°24'18"E.
 Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978
 Duration : Mar. 1 1978 ~ Mar. 5 1979
 Method of observation : OTT, 1:20 & TG-4
 Observed by : SINGAPORE

Constituents	H	ε		g	Constituents	H	ε		g	Constituents	H	ε		g
		cm	deg.				deg.	cm				deg.	deg.	
<i>S_a</i>	14.91	273.75	274.06		<i>a₁</i>	0.42	29.50	22.05		<i>SK₁</i>	0.37	138.52	163.11	
<i>S_{sa}</i>	5.34	111.90	112.52		<i>2Q₁</i>	1.56	352.78	344.78		<i>MK₁</i>	1.28	67.89	84.87	
<i>M_m</i>	0.45	38.14	42.22							<i>SO₁</i>	0.80	69.38	85.74	
<i>MS_f</i>	1.27	88.35	95.97		<i>S₂</i>	19.06	335.49	351.68		<i>M₂</i>	0.07	8.99	21.84	
<i>M_f</i>	2.25	100.42	108.65		<i>T₂</i>	1.13	297.22	313.10		<i>MO₁</i>	0.64	21.41	30.15	
					<i>R₂</i>	0.37	56.53	73.03						
<i>S₁</i>	0.64	210.30	218.39		<i>K₂</i>	6.28	329.34	346.15		<i>S₁</i>	0.17	74.07	106.45	
<i>K₁</i>	26.65	60.74	69.14		<i>L₂</i>	1.80	314.95	327.61		<i>SK₁</i>	0.04	23.07	56.07	
<i>P₁</i>	9.01	57.97	65.75		<i>λ₂</i>	1.00	320.53	332.64		<i>MS₁</i>	1.29	34.30	59.06	
<i>π₁</i>	0.87	63.29	70.77		<i>MSN₁</i>	0.61	208.47	228.74		<i>MK₁</i>	0.74	320.21	345.59	
<i>φ₁</i>	0.27	51.91	60.62		<i>KJ₂</i>	0.39	137.68	158.57		<i>SN₁</i>	0.16	28.06	48.74	
<i>φ₁</i>	0.60	326.30	335.32		<i>M₂</i>	56.46	283.65	292.22		<i>M₁</i>	1.42	2.71	19.86	
<i>M₁</i>	1.24	45.46	49.74		<i>2SM₂</i>	0.99	224.40	248.21		<i>MN₁</i>	0.53	352.18	5.24	
<i>θ₁</i>	0.41	130.32	142.26		<i>OP₁</i>	1.54	37.74	45.70						
<i>J₁</i>	1.29	75.92	88.41		<i>MKS₂</i>	0.99	318.15	327.34		<i>2SM₁</i>	0.28	217.60	258.55	
<i>χ₁</i>	0.26	44.95	49.82		<i>N₂</i>	11.39	260.01	264.49		<i>MSK₁</i>	0.29	187.82	229.39	
<i>O₁</i>	27.92	21.60	21.77		<i>ν₂</i>	1.90	280.77	285.80		<i>2MS₁</i>	0.69	145.45	178.78	
<i>MP₁</i>	0.53	4.18	4.96		<i>μ₂</i>	1.03	169.48	170.43		<i>2MK₁</i>	0.36	138.72	172.67	
<i>SO₁</i>	0.14	146.94	162.96		<i>2N₁</i>	1.26	255.09	255.50		<i>MSN₁</i>	0.23	155.56	184.81	
<i>OO₁</i>	0.47	339.43	356.07		<i>MNS₂</i>	0.21	86.32	83.19		<i>M₁</i>	0.37	107.91	133.63	
<i>ρ₁</i>	1.21	1.52	358.15		<i>OQ₂</i>	0.25	262.92	259.18		<i>2MN₁</i>	0.13	102.31	123.94	
<i>Q₁</i>	5.69	356.23	352.31											

TIDAL HARMONIC CONSTANTS

BATU AMPAR

(1) Position

Latitude : 1° 9'59"N.
 Longitude : 103°59'49"E.
 Time kept at the place : -0700

(2) Time & duration of observation

Central day : June 4 1978
 Duration : Dec. 1 1977 ~ Dec. 5 1978
 Method of observation : LFT-V, 1:20
 Observed by : INDONESIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
<i>Sa</i>	12.43	278.37	278.66	σ_1	0.41	218.28	204.77	<i>SK₁</i>	0.49	113.12	116.42
<i>Ssa</i>	3.83	133.22	133.80	<i>2Q₁</i>	1.26	356.25	342.24	<i>MK₁</i>	2.07	64.46	60.65
<i>Mm</i>	1.07	308.06	311.87					<i>SO₁</i>	1.55	68.07	63.68
<i>MSf</i>	1.52	32.53	39.64	<i>S₂</i>	30.52	353.63	355.63	<i>M₂</i>	0.04	170.58	162.92
<i>Mf</i>	1.79	208.89	216.57	<i>T₂</i>	1.58	16.54	18.26	<i>MO₁</i>	1.58	15.92	4.42
				<i>R₂</i>	1.01	309.51	311.80				
<i>S₁</i>	1.40	213.56	214.56	<i>K₂</i>	8.59	349.58	352.16	<i>S₁</i>	0.21	340.59	344.61
<i>K₁</i>	28.82	98.90	100.19	<i>L₂</i>	2.42	311.15	309.85	<i>SK₂</i>	0.26	247.70	252.29
<i>P₁</i>	8.73	89.86	90.57	λ_2	2.17	309.46	307.65	<i>MS₁</i>	2.15	334.59	331.49
κ_1	0.59	86.51	86.94	<i>MSN₁</i>	0.76	172.67	178.48	<i>MK₂</i>	0.97	285.48	282.96
ψ_1	0.44	63.36	64.94	<i>KJ₂</i>	0.48	212.65	219.05	<i>SN₁</i>	0.13	330.20	323.29
ϕ_1	0.84	278.10	279.96	<i>M₂</i>	76.08	303.88	298.78	<i>M₁</i>	2.07	299.31	289.10
<i>M₁</i>	0.66	39.46	36.91	<i>2SM₁</i>	1.86	211.96	221.08	<i>MN₁</i>	0.43	289.27	275.25
θ_1	0.34	94.07	98.66	<i>OP₂</i>	3.04	151.50	145.81				
<i>J₁</i>	1.62	82.20	87.30	<i>MKS₂</i>	2.79	100.53	96.00	<i>2SM₂</i>	0.67	202.07	200.98
<i>z₁</i>	0.27	91.13	89.12	<i>N₂</i>	14.41	282.21	273.30	<i>MSK₂</i>	0.45	183.08	182.57
<i>O₁</i>	29.48	52.81	46.42	ν_2	2.52	279.87	271.46	<i>2MS₂</i>	1.63	135.44	127.23
<i>MP₁</i>	0.10	303.83	298.01	μ_2	0.72	80.81	68.59	<i>2MK₂</i>	0.57	135.74	128.11
<i>SO₁</i>	0.54	350.16	358.56	<i>2N₁</i>	2.32	269.61	256.89	<i>MSN₂</i>	0.48	141.26	129.24
<i>OO₁</i>	0.49	232.72	241.69	<i>MNS₂</i>	0.69	50.13	34.10	<i>M₂</i>	1.00	84.07	68.76
<i>P₁</i>	1.15	42.84	33.14	<i>OQ₂</i>	0.67	234.58	217.97	<i>2MN₂</i>	0.49	71.13	52.01
<i>Q₁</i>	5.49	18.09	7.88								

TIDAL HARMONIC CONSTANTS

TG. MEDANG

(1) Position

Latitude : 2° 7'24"N.

Longitude : 101°40' 0"E.

Time kept at the place : -0700

(2) Time & duration of observation

Central day : Sept. 2 1978

Duration : Mar. 1 1978 ~ Mar. 5 1979

Method of observation : LFT-V, 1:20

Observed by : INDONESIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
Sa	8.85	158.98	159.27	σ_1	3.58	247.87	236.69	SK ₁	0.69	200.97	211.26
Ssa	6.15	113.55	114.12	2Q ₁	0.75	156.19	144.51	MK ₁	1.79	181.35	184.52
Mm	1.61	17.12	20.93	S ₂	37.16	211.66	218.33	SO ₁	2.03	193.30	195.90
MSf	1.76	32.45	39.56	T ₂	2.57	210.81	217.19	M ₁	0.39	357.33	356.67
Mf	1.98	15.48	23.17	R ₂	0.50	195.26	202.22	MO ₁	2.45	160.97	156.46
S ₁	3.92	213.99	217.32	K ₂	10.73	207.65	214.89	S ₁	0.71	9.18	22.52
K ₁	5.20	104.24	107.86	L ₂	2.85	172.61	175.97	SK ₁	0.42	358.37	12.28
P ₁	1.95	77.89	80.94	λ_2	2.01	162.64	165.50	MS ₁	3.33	324.22	330.45
π_1	0.84	142.07	144.82	MSN ₁	1.22	16.08	26.56	MK ₁	1.06	313.43	320.23
ψ_1	0.91	157.82	161.73	KJ ₁	0.24	75.96	87.01	SN ₁	0.66	328.02	330.44
ϕ_1	0.20	89.12	93.32	M ₂	74.83	170.92	170.47	M ₁	3.38	285.54	284.65
M ₁	0.19	242.97	242.75	2SM ₂	2.19	42.75	56.53	MN ₁	1.27	275.64	270.94
θ_1	0.28	97.28	104.21	OP ₂	0.36	260.13	259.11	2SM ₁	1.01	51.53	64.42
J ₁	2.27	65.33	72.76	MKS ₂	0.10	213.37	213.50	MSK ₁	0.64	47.41	60.87
χ_1	0.53	174.05	174.37	N ₂	13.65	163.08	158.82	2MS ₁	2.47	2.38	8.16
O ₁	18.79	138.29	134.22	ν_2	2.83	158.97	155.23	2MK ₁	0.87	3.31	9.66
MP ₁	1.03	351.36	347.87	μ_2	1.86	228.47	220.91	MSN ₁	0.72	6.86	8.83
SO ₁	1.03	115.57	126.30	2N ₂	2.27	152.78	144.72	M ₁	1.54	327.77	326.44
OO ₁	0.78	67.00	78.31	MNS ₁	0.48	230.45	219.09	2MN ₁	0.87	319.29	314.15
ρ_1	0.81	111.14	103.78	OQ ₂	0.54	88.03	76.09				
Q ₁	1.94	113.38	105.50								

TIDAL HARMONIC CONSTANTS

TG. PARIT

(1) Position

Latitude : 1°32'24"N.
 Longitude : 102°26'33"E.
 Time kept at the place : -0700

(2) Time & duration of observation

Central day : Sept. 2 1978
 Duration : Mar. 1 1978 ~ Mar. 5 1979
 Method of observation : LFT-V, 1:20
 Observed by : INDONESIA

Constituents	H	κ	g	Constituents	H	κ	g	Constituents	H	κ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_0	6.77	159.97	160.26	σ_1	3.86	248.20	236.25	SK_3	1.04	301.30	309.26
S_{20}	6.88	109.98	110.55	$2Q_1$	0.65	157.29	144.83	MK_3	2.20	257.40	258.25
Mm	1.82	13.05	16.86	S_2	32.59	291.44	296.56	SO_3	2.21	266.13	266.40
MSf	2.55	38.15	45.26	T_2	2.56	281.02	285.84	M_3	0.15	93.80	90.80
Mf	1.07	9.09	16.78	R_2	0.24	298.46	303.86	MO_3	2.44	225.29	218.45
S_1	4.31	227.30	229.86	K_2	9.41	291.05	296.74	S_3	0.47	133.11	143.34
K_1	16.43	146.31	149.15	L_2	3.38	261.61	263.43	SK_2	0.13	114.51	125.31
P_1	4.49	138.70	140.97	λ_2	1.98	249.87	251.18	MS_2	2.86	103.82	106.94
π_1	1.03	143.60	145.59	MSN_2	1.19	111.52	120.45	MK_2	0.88	83.70	87.39
ϕ_1	0.71	165.53	168.67	KJ_2	0.07	287.16	296.67	SN_2	0.44	94.80	94.11
ϕ_2	0.26	147.17	150.59	M_2	72.07	250.48	248.49	M_2	3.22	64.82	60.82
M_1	0.53	298.83	297.83	$2SM_1$	1.87	140.51	152.74	MN_2	1.23	49.98	42.18
θ_1	0.42	84.50	90.65	OP_2	0.57	282.31	279.73				
J_1	2.02	80.17	86.82	MKS_2	0.98	93.59	92.17	$2SM_2$	1.02	230.62	238.85
χ_1	0.56	166.16	165.70	N_2	13.07	242.39	236.59	MSK_2	0.72	224.00	232.81
O_1	25.08	130.87	126.02	ν_2	3.12	234.94	229.64	$2MS_2$	2.90	180.77	181.89
MP_1	0.89	295.25	290.99	μ_2	2.92	351.34	342.23	$2MK_2$	1.03	178.95	180.64
SO_1	0.63	22.89	32.85	$2N_2$	2.74	231.76	222.14	MSN_2	0.81	179.43	176.74
OO_1	0.49	140.07	150.60	MNS_2	0.64	351.53	338.61	M_2	1.92	141.72	135.73
P_2	1.08	110.78	102.64	OQ_2	0.73	169.16	155.67	$2MN_2$	1.10	130.25	120.45
Q_1	3.01	96.39	87.74								

TIDAL HARMONIC CONSTANTS

TG. SENE BUI

(1) Position

Latitude : 2°17'45"N.

Longitude : 101° 2'48"E.

Time kept at the place : -0700

(2) Time & duration of observation

Central day : Sept. 2 1978

Duration : Mar. 1 1978 ~ Mar. 5 1979

Method of observation : LFT-V, 1:20

Observed by : INDONESIA

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_a	13.55	136.75	137.03	σ_1	2.78	248.74	238.18	SK_1	1.27	103.98	116.13
S_{sa}	7.47	104.57	105.15	$2Q_1$	0.70	167.94	156.87	MK_1	2.11	55.53	60.56
M_m	0.73	33.42	37.23					SO_1	1.33	93.67	98.13
MS_f	1.50	248.92	256.03	S_2	58.34	185.46	193.37	M_1	0.22	353.48	354.67
M_f	2.22	31.22	38.91	T_2	3.76	173.42	181.04	MO_1	0.92	76.25	73.60
				R_2	0.65	237.69	245.88				
S_1	3.71	193.82	197.77	K_2	16.95	180.20	188.68	S_2	1.14	294.16	309.97
K_1	11.48	22.00	26.24	L_2	5.30	137.14	141.74	SK_2	0.66	279.94	296.33
P_1	4.87	22.47	26.14	λ_2	3.54	115.58	119.67	MS_1	5.48	231.30	240.00
α_1	0.70	115.95	119.32	MSN_2	2.15	342.03	353.75	MK_2	2.01	220.12	229.39
ϕ_1	0.83	154.18	158.70	KJ_2	0.67	69.23	81.53	SN_1	1.03	251.23	256.12
ϕ_2	0.41	55.01	59.83	M_2	117.59	142.62	143.42	M_2	5.57	192.82	194.42
M_1	0.41	169.70	170.09	$2SM_2$	3.24	12.06	27.08	MN_1	2.18	185.43	184.21
θ_1	0.18	126.92	134.46	OP_1	0.88	185.80	186.02				
J_1	2.71	52.93	60.98	MKS_2	0.94	191.51	192.88	$2SM_1$	1.51	338.58	355.19
α_2	0.43	170.97	171.91	N_2	22.25	136.82	133.81	MSK_2	0.95	339.92	357.10
O_1	9.91	140.51	137.07	ν_2	4.14	134.51	132.00	$2MS_2$	4.00	294.06	303.55
MP_1	1.61	4.78	1.91	μ_2	5.14	188.81	182.49	$2MK_2$	1.39	300.05	310.12
SO_2	2.14	117.16	128.51	$2N_2$	3.48	121.31	114.49	MSN_2	1.27	296.59	302.27
OO_1	1.62	54.13	66.05	MNS_2	1.39	197.40	187.28	M_3	2.68	258.91	261.30
ρ_1	0.24	112.65	105.90	OQ_2	1.09	58.34	47.64	$2MN_2$	1.59	252.28	250.85
Q_1	0.66	143.98	136.72								

TIDAL HARMONIC CONSTANTS

SULTAN SHOAL LIGHTHOUSE

(1) Position

Latitude : 1°14'24"N.

Longitude : 103°39' 0"E.

Time kept at the place : -0730

(2) Time & duration of observation

Central day : Sept. 2 1978

Duration : Mar. 1 1978 ~ Mar. 5 1979

Method of observation : OTT. 1:20

Observed by : SINGAPORE

Constituents	H	ϵ	g	Constituents	H	ϵ	g	Constituents	H	ϵ	g
	cm	deg.	deg.		cm	deg.	deg.		cm	deg.	deg.
S_a	5.74	221.85	222.16	σ_1	2.00	256.37	249.67	SK_1	1.07	83.62	110.48
S_{sa}	5.87	106.16	106.78	$2Q_1$	0.31	194.80	187.56	MK_1	3.67	26.56	45.80
M_m	1.62	29.68	33.76	S_2	39.00	354.28	11.98	SO_1	3.26	31.52	50.14
MSf	3.12	53.42	61.04	T_2	2.52	353.16	10.55	M_1	0.49	170.69	185.81
Mf	0.28	57.43	65.66	R_2	0.78	358.73	16.74	MO_1	3.31	349.41	0.41
S_1	2.69	236.82	245.67	K_2	11.92	347.68	6.00	S_1	0.68	279.37	314.77
K_1	26.43	142.32	151.48	L_2	3.82	316.09	330.25	SK_2	0.28	247.27	283.28
P_1	8.08	136.53	145.07	λ_2	2.42	320.29	333.91	MS_1	4.06	237.62	265.40
π_1	0.74	129.01	137.24	MSN_1	1.60	173.28	195.07	MK_2	1.49	239.34	267.74
ψ_1	0.31	289.01	298.47	KJ_1	0.29	208.10	230.50	SN_1	0.59	229.59	253.29
ϕ_1	0.19	130.48	140.25	M_2	86.82	308.32	318.40	M_2	4.33	196.50	216.67
M_1	0.72	332.99	338.03	$2SM_2$	2.87	204.12	229.44	MN_1	1.66	184.59	200.67
θ_1	0.36	126.40	139.09	OP_2	1.15	36.23	45.69				
J_1	0.99	99.85	113.09	MKS_2	0.08	107.92	118.62	$2SM_3$	0.95	118.69	164.17
χ_1	0.50	97.68	103.30	N_2	15.99	297.03	303.03	MSK_2	0.56	107.31	153.41
O_1	24.41	98.32	99.24	ν_2	3.42	289.17	295.72	$2MS_3$	2.64	55.87	93.73
MP_1	1.64	255.79	257.33	μ_2	2.66	42.46	44.92	$2MK_3$	0.85	52.91	91.39
SO_2	2.02	358.66	15.44	$2N_2$	3.04	288.60	290.51	MSN_2	0.65	63.34	97.12
OO_1	1.34	164.84	182.24	MNS_2	0.76	50.69	49.06	M_3	1.69	11.23	41.47
P_2	1.03	88.52	85.91	OQ_2	0.65	218.27	216.04	$2MN_2$	0.91	1.39	27.55
Q_1	4.05	58.10	54.94								

TIDAL HARMONIC CONSTANTS

KEPALA JERNIH

Latitude : 1° 2'48"N.

Longitude : 103°47' 7"E.

Time kept at the place : -0700

Method of observation : LFT-V, 1:20

Observed by : INDONESIA

MONTH	DEC. 1977			JAN. 1978			FEB. 1978			MAR. 1978			APR. 1978		
Constituents	H	ϵ	g	H	ϵ	g	H	ϵ	g	H	ϵ	g	H	ϵ	g
	cm	deg.	deg.	cm	deg.	deg.	cm	deg.	deg.	cm	deg.	deg.	cm	deg.	deg.
<i>Mm</i>	6.8	327.2	331.0	2.8	32.3	36.1	3.1	259.7	263.5	1.4	324.2	328.0	4.0	79.2	83.0
<i>MSf</i>	1.5	152.7	159.8	7.5	1.2	8.3	2.1	5.4	12.5	3.9	78.7	85.8	2.2	82.6	89.7
<i>Q</i>	5.1	43.0	33.0	4.6	62.9	52.9	6.5	55.8	45.9	4.6	59.5	49.5	2.3	63.3	58.3
<i>O</i>	24.3	96.2	90.0	24.1	90.9	84.7	27.6	90.2	84.0	29.6	89.1	82.9	27.8	89.5	83.3
<i>M₁</i>	0.8	320.8	318.4	2.2	287.2	284.9	1.5	320.8	318.5	0.5	297.0	294.7	1.9	282.3	279.9
<i>K₁</i>	29.1	134.4	135.9	30.5	131.6	133.1	31.8	136.4	137.9	34.9	144.8	146.3	30.8	152.4	153.9
<i>J₁</i>	0.4	333.0	338.3	0.6	1.5	6.8	0.6	56.9	62.3	2.1	83.2	88.5	1.6	153.0	158.4
<i>OO₁</i>	7.0	146.2	155.3	3.4	220.2	229.4	1.3	323.5	332.7	2.7	359.3	8.5	3.7	95.0	104.2
<i>P₁</i>	9.6	134.4	135.3	10.1	131.6	132.5	10.5	136.4	137.3	11.5	144.8	145.8	10.2	152.4	153.3
<i>1/2</i>	1.9	14.0	2.2	1.7	47.4	35.6	2.5	28.0	16.2	3.0	37.0	25.2	3.0	47.4	35.6
<i>N₁</i>	15.0	298.3	289.8	14.1	298.3	289.8	15.0	300.7	292.2	14.6	302.2	293.7	15.6	308.5	300.0
<i>v₁</i>	2.9	298.3	290.3	2.7	298.3	290.3	2.9	300.7	292.7	2.8	302.2	294.2	3.0	308.5	300.5
<i>M₂</i>	81.6	314.0	309.3	79.9	313.0	308.3	78.4	314.6	309.9	81.2	315.6	310.9	82.0	315.6	310.9
<i>L₂</i>	5.2	314.5	313.6	5.6	333.6	332.7	3.8	326.3	325.4	1.8	344.8	343.9	1.8	265.4	264.5
<i>S₂</i>	36.2	0.6	3.1	36.8	3.8	6.2	37.1	5.3	7.7	38.5	3.2	5.6	36.9	2.1	4.5
<i>K₂</i>	9.8	0.6	3.6	10.0	3.8	6.8	10.1	5.3	8.3	10.5	3.2	6.2	10.0	2.1	5.1
<i>2SM₂</i>	4.8	203.5	213.0	2.9	198.2	207.8	2.0	195.8	205.4	2.2	225.5	235.0	2.5	240.5	250.1
<i>MO₂</i>	2.4	353.5	342.6	2.2	355.7	344.9	1.9	342.1	331.3	1.9	340.8	329.9	2.4	348.7	337.8
<i>M₁</i>	1.1	163.9	156.9	0.7	219.1	212.1	1.2	209.5	202.5	0.3	179.9	172.9	0.6	199.8	192.8
<i>MK₁</i>	3.5	37.7	34.5	3.2	48.0	44.9	3.1	58.9	55.7	2.2	60.0	56.8	2.8	3.5	0.4
<i>MN₁</i>	1.6	219.1	205.9	1.9	226.3	213.1	1.3	222.8	209.6	1.4	210.3	197.1	1.1	211.9	198.8
<i>M₁</i>	4.4	237.0	227.6	4.0	241.9	232.5	4.3	244.4	235.0	4.2	236.6	227.2	3.6	221.8	212.4
<i>SN₁</i>	0.4	108.6	102.6	0.7	292.5	286.4	0.8	351.6	345.5	0.7	273.5	267.5	0.8	223.6	217.5
<i>MS₁</i>	2.8	279.6	277.4	3.5	282.5	280.2	3.9	288.4	286.1	3.9	279.2	276.9	3.7	260.8	258.5
<i>2MN₁</i>	0.6	30.0	12.2	0.4	67.9	50.0	0.5	57.3	39.5	0.5	64.3	46.5	0.6	71.3	53.4
<i>M₁</i>	1.4	55.8	41.7	1.0	52.7	38.6	0.9	76.3	62.3	0.8	90.0	76.0	0.9	55.5	41.5
<i>MSN₁</i>	0.6	109.0	98.3	0.7	147.8	137.1	0.4	101.9	91.1	0.7	118.2	107.5	0.6	105.0	94.2
<i>2MS₁</i>	1.4	101.0	94.1	1.2	105.4	98.5	1.3	114.2	107.3	1.6	119.6	112.7	2.0	112.5	105.5
<i>2SM₁</i>	0.5	205.5	205.7	0.6	185.3	185.5	0.4	205.9	206.1	0.8	162.2	162.3	0.9	157.2	157.4

TIDAL HARMONIC CONSTANTS

KEPALA JERNIH

Latitude : 1° 2'48"N.
 Longitude : 103°47' 7"E.
 Time kept at the place : -0700
 Method of observation : LFT-V, 1:20
 Observed by : INDONESIA

MONTH	MAY 1978			FEB. 1979			MAR. 1979			APR. 1979			MEAN		
Constituents	H	ϵ	g	H	ϵ	g	H	ϵ	g	H	ϵ	g	H	ϵ	g
	cm	deg.	deg.	cm	deg.	deg.	cm	deg.	deg.	cm	deg.	deg.	cm	deg.	deg.
<i>Mm</i>	4.9	289.1	292.9	2.9	90.3	94.1	4.0	35.7	39.5	1.7	21.3	25.1	1.8	356.3	0.1
<i>MSf</i>	4.1	104.6	111.7	2.5	95.7	102.9	1.1	68.2	75.3	0.7	352.3	359.4	1.9	57.6	64.7
<i>Q₁</i>	3.3	41.3	31.3	4.5	68.1	58.1	6.3	52.8	42.8	5.2	32.1	22.1	4.6	53.0	43.0
<i>O₁</i>	23.7	91.3	85.1	27.4	93.5	87.3	29.2	91.4	85.2	28.1	90.5	84.3	26.8	91.3	85.1
<i>M₁</i>	2.1	283.7	281.3	1.2	90.5	88.1	1.1	52.9	50.5	1.3	64.1	61.7	0.7	316.4	314.1
<i>K₁</i>	28.6	149.3	150.8	31.0	136.8	138.3	33.9	143.3	144.8	31.6	150.6	152.1	31.1	142.2	143.7
<i>J₁</i>	0.9	8.1	13.5	1.6	126.3	131.6	2.6	178.0	183.3	1.7	241.2	246.6	0.5	136.0	141.3
<i>OO₁</i>	3.4	120.7	129.9	1.6	229.8	239.0	0.4	28.5	37.7	0.7	48.9	58.1	1.1	135.0	144.2
<i>P₁</i>	9.5	149.3	150.2	10.3	136.8	137.7	11.2	143.3	144.2	10.5	150.6	151.5	10.3	142.2	143.1
<i>μ</i>	2.5	40.1	28.3	2.6	25.7	14.9	2.4	41.4	29.6	2.5	40.8	29.0	2.4	36.3	24.5
<i>N₂</i>	17.5	302.1	293.7	16.6	300.3	291.8	14.2	298.4	289.9	15.0	298.9	290.4	15.2	300.9	292.4
<i>ν_2</i>	3.4	302.1	294.2	3.2	300.3	292.3	2.8	298.4	290.5	2.9	298.9	290.9	3.0	300.9	292.9
<i>M₂</i>	84.0	314.4	309.8	78.6	315.5	310.8	81.4	314.3	309.7	82.7	313.5	308.8	81.1	314.5	309.8
<i>L₂</i>	4.0	305.2	304.4	5.0	0.	358.6	5.2	4.1	3.2	1.8	3.6	2.7	3.4	334.3	333.4
<i>S₂</i>	35.4	1.8	4.2	38.0	3.8	6.2	38.4	0.3	2.7	37.3	358.2	0.7	37.2	2.1	4.6
<i>K₂</i>	9.6	1.8	4.8	10.3	3.8	6.8	10.4	0.3	3.3	10.1	358.2	1.3	10.1	2.1	5.1
<i>2SM₂</i>	3.3	226.5	236.1	1.6	220.2	229.8	2.1	220.5	230.0	2.5	224.8	234.4	2.6	216.0	225.6
<i>MO₃</i>	3.2	351.7	340.9	1.3	310.1	299.3	1.5	336.7	325.8	2.5	355.9	345.1	2.1	346.6	335.8
<i>M₃</i>	0.6	209.5	202.5	0.9	176.7	169.7	0.2	336.7	329.7	0.6	93.3	86.3	0.6	188.7	181.6
<i>MK₃</i>	3.2	21.5	18.3	2.8	57.8	54.6	1.9	46.8	43.6	3.3	2.2	359.0	2.7	36.2	33.0
<i>MN₃</i>	1.8	170.3	157.1	2.4	208.0	194.8	1.6	209.8	196.6	1.4	199.0	185.8	1.5	208.3	195.1
<i>M₄</i>	3.2	207.7	198.3	3.6	245.5	236.2	3.9	228.0	218.6	3.7	219.1	209.7	3.8	232.2	222.8
<i>SN₄</i>	2.1	183.9	177.8	0.1	120.7	114.6	0.8	286.5	280.4	0.3	228.2	222.1	0.4	236.8	230.7
<i>MS₄</i>	3.8	249.0	246.7	3.5	289.1	286.8	3.5	266.6	264.3	3.6	252.4	250.2	3.5	271.8	269.6
<i>2MN₄</i>	1.1	44.9	27.0	0.9	54.9	37.1	0.5	31.9	14.0	0.6	48.1	30.2	0.6	51.3	33.4
<i>M₄</i>	1.5	41.5	27.4	1.0	99.6	85.5	1.1	80.0	65.9	0.8	61.4	47.4	1.0	65.7	51.7
<i>MSN₄</i>	1.0	84.6	73.8	0.7	113.3	102.6	0.6	120.5	109.8	0.8	87.2	76.5	0.6	107.9	97.2
<i>2MS₄</i>	2.3	107.3	100.4	1.1	124.8	117.9	1.8	101.1	94.1	2.0	94.4	87.5	1.6	107.9	101.0
<i>2SM₄</i>	1.5	152.8	153.0	0.4	162.8	163.0	0.7	139.6	139.7	1.0	138.7	138.9	0.7	160.6	160.7

Appendix 8

Records of Sunken Wrecks

Records of Sunken Wrecks
(Confirmation of Wrecks)

Point i(1)

Point J(1) (Side Scan Sonar)

- 1) Date of Survey : 12/11/97
- 2) Time : 0924 hrs
- 3) Line No. : Y-820
- 4) Course : 180° (H-S)
- 5) Remarks : Range 200m



70-11-
 2011-2-03

27.83M

26.19M

29.49M

27.39M

27.59M

26.69M

27.59M

25.99M

2011-2-03

011-2-03

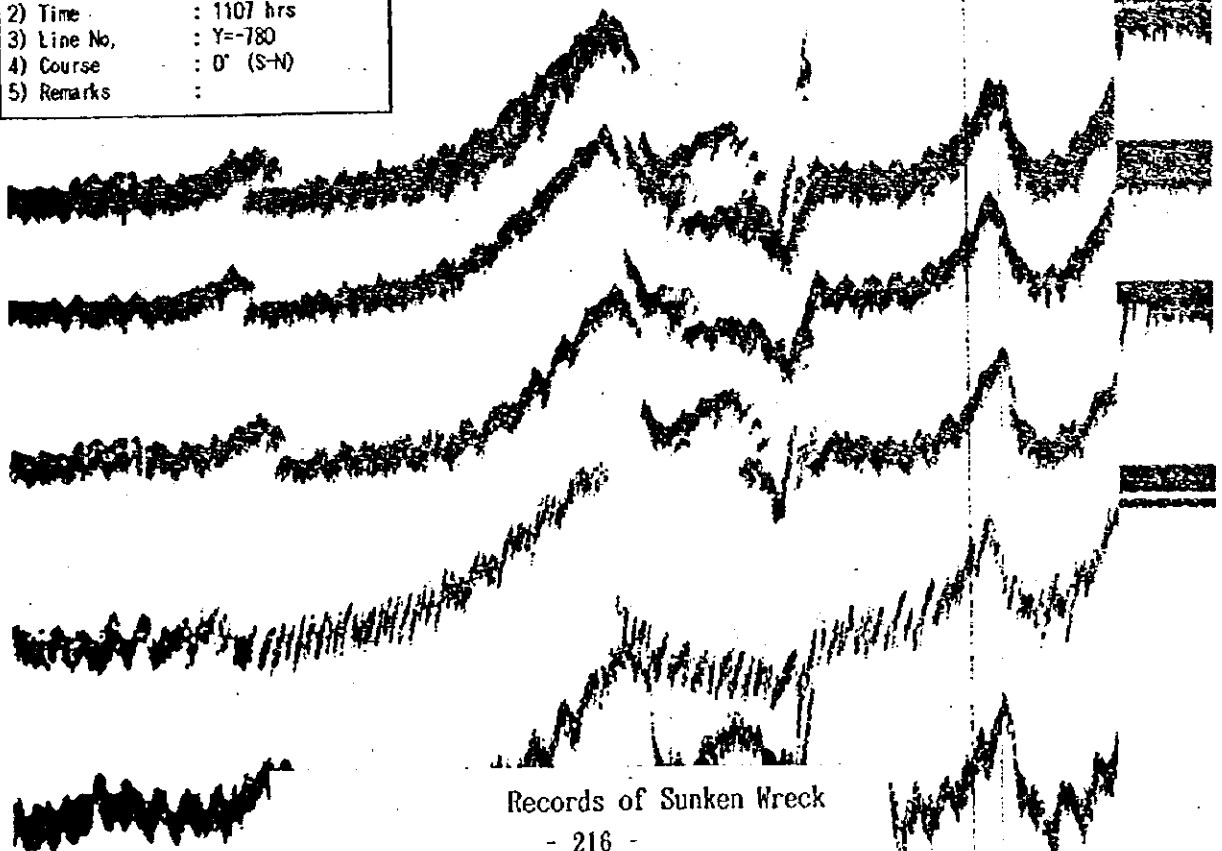
Position (WGS-84)

2° 58' 35" N

100° 49' 35" E

Point J(1) (Echo Sounder)

- 1) Date of Survey : 02/11/97
- 2) Time : 1107 hrs
- 3) Line No. : Y-780
- 4) Course : 0° (S-N)
- 5) Remarks :

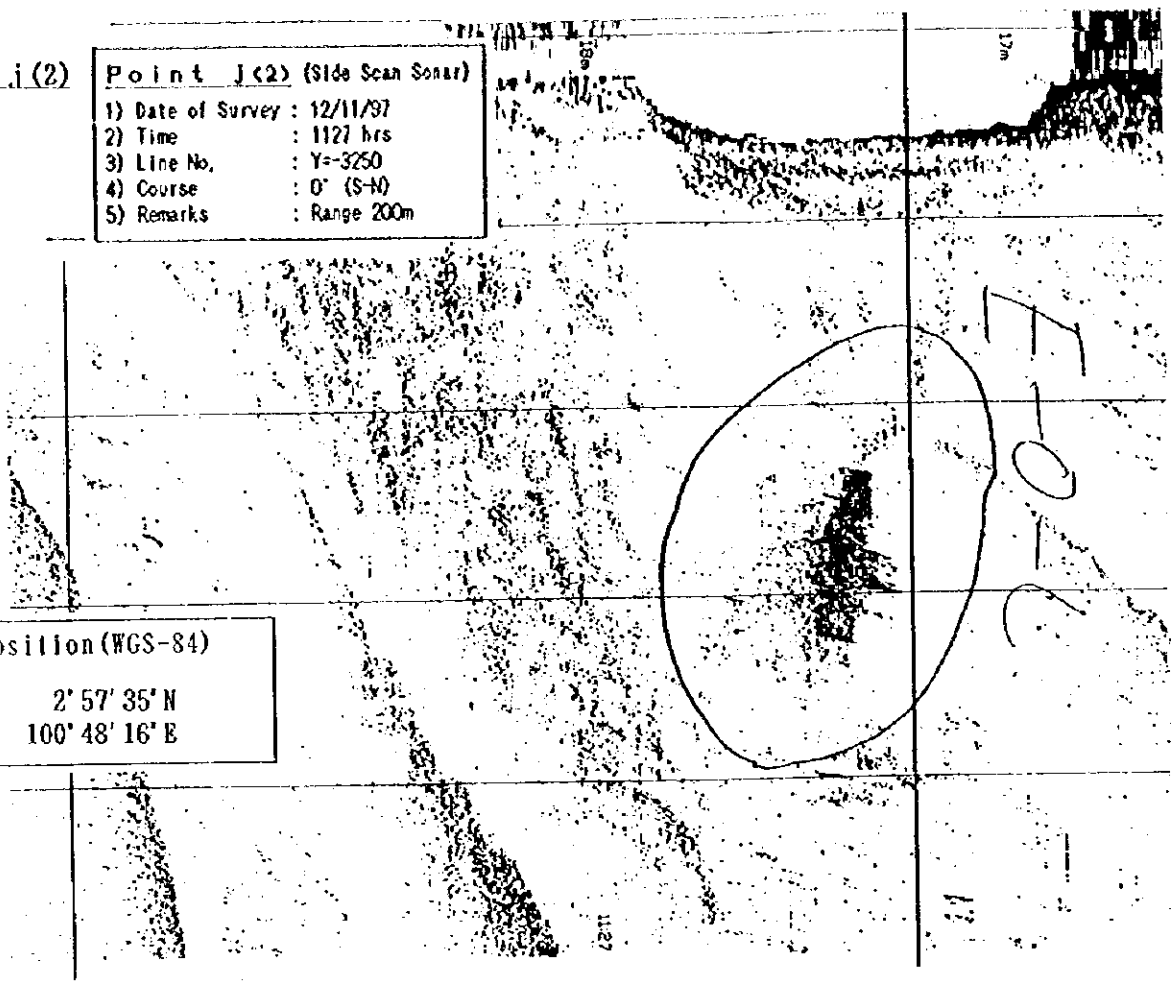


Records of Sunken Wreck

Point J(2)

Point J(2) (Side Scan Sonar)

- 1) Date of Survey : 12/11/97
- 2) Time : 1127 hrs
- 3) Line No. : Y-3250
- 4) Course : 0° (S-N)
- 5) Remarks : Range 200m

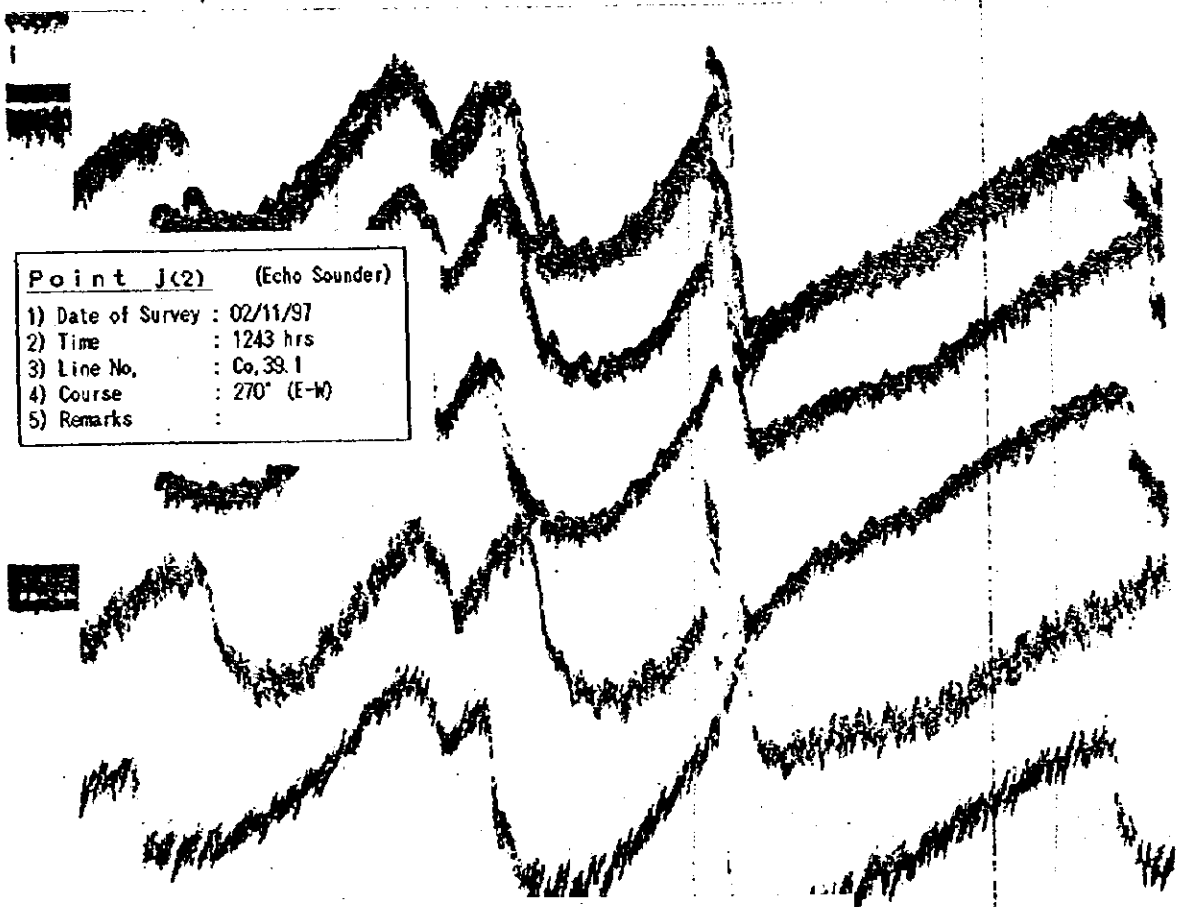


Position (WGS-84)

2° 57' 35" N
100° 48' 16" E

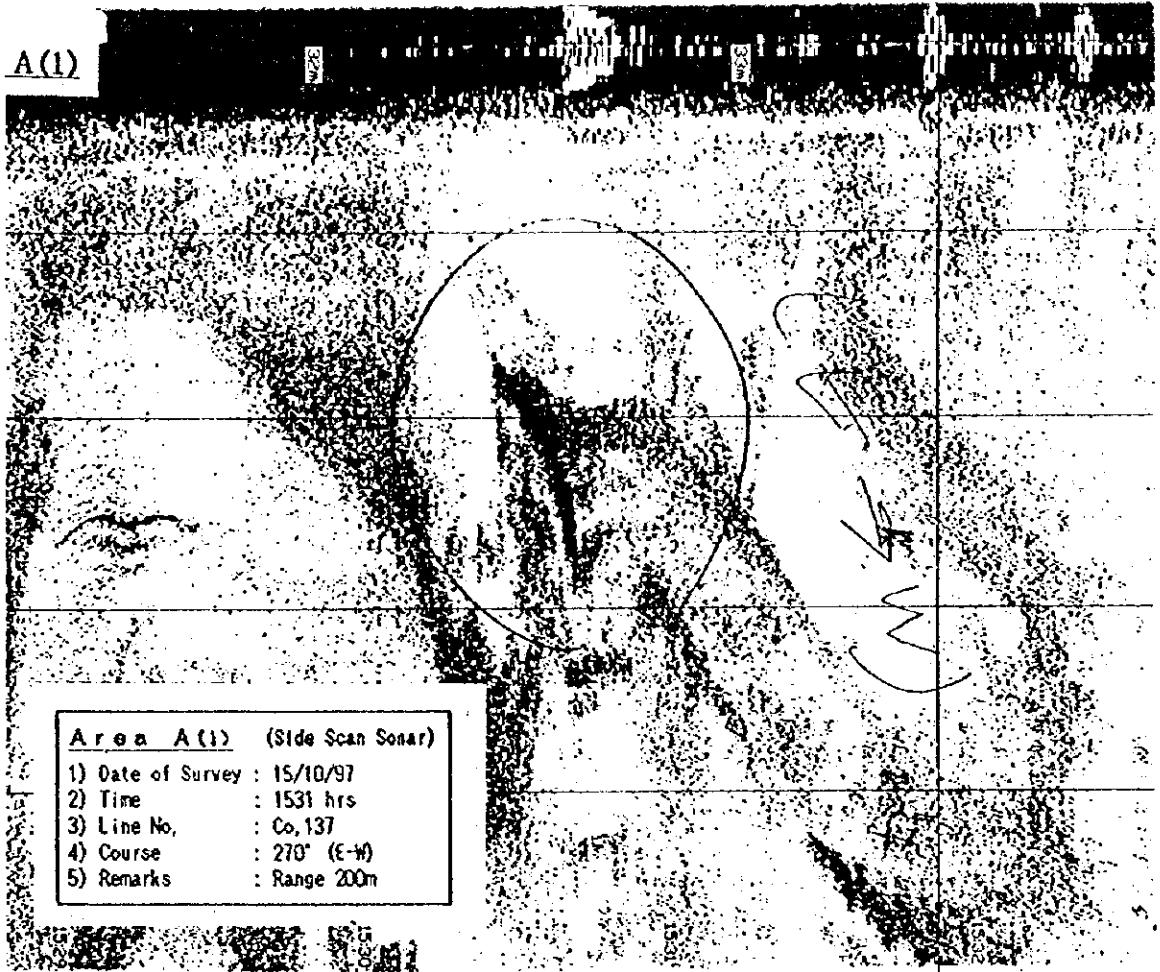
Point J(2) (Echo Sounder)

- 1) Date of Survey : 02/11/97
- 2) Time : 1243 hrs
- 3) Line No. : Co. 39.1
- 4) Course : 270° (E-W)
- 5) Remarks :



Records of Sunken Wreck

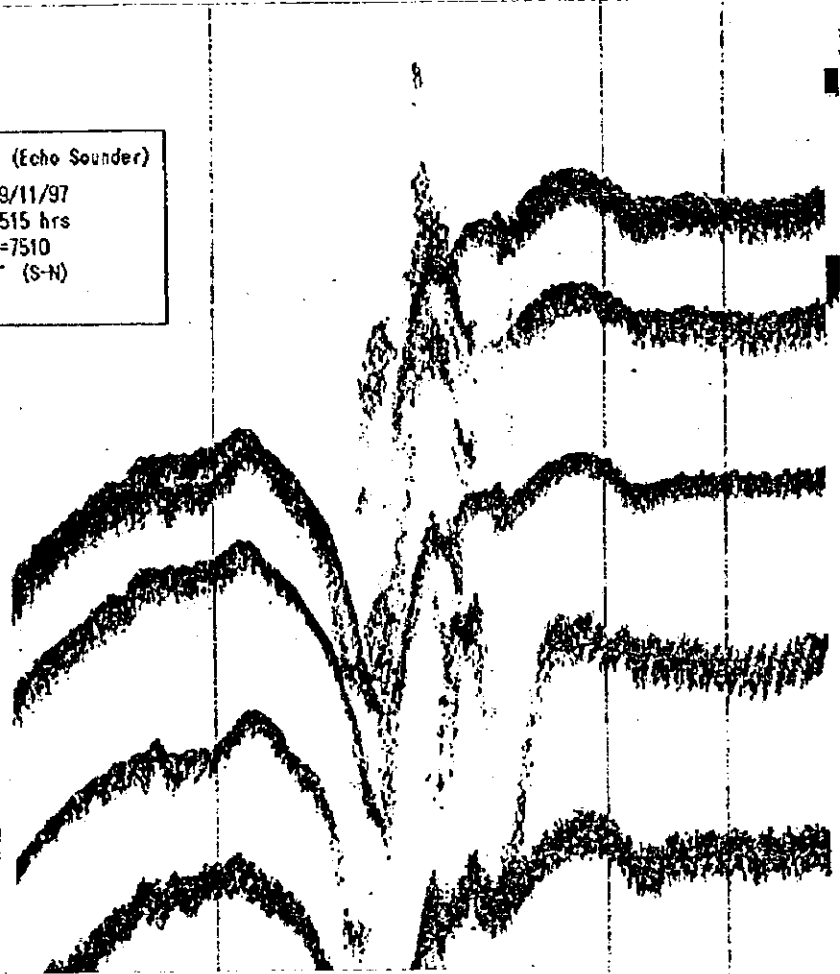
Sub-Area A(1)



Area A(1) (Side Scan Sonar)
1) Date of Survey : 15/10/97
2) Time : 1531 hrs
3) Line No. : Co, 137
4) Course : 270° (E-W)
5) Remarks : Range 200m

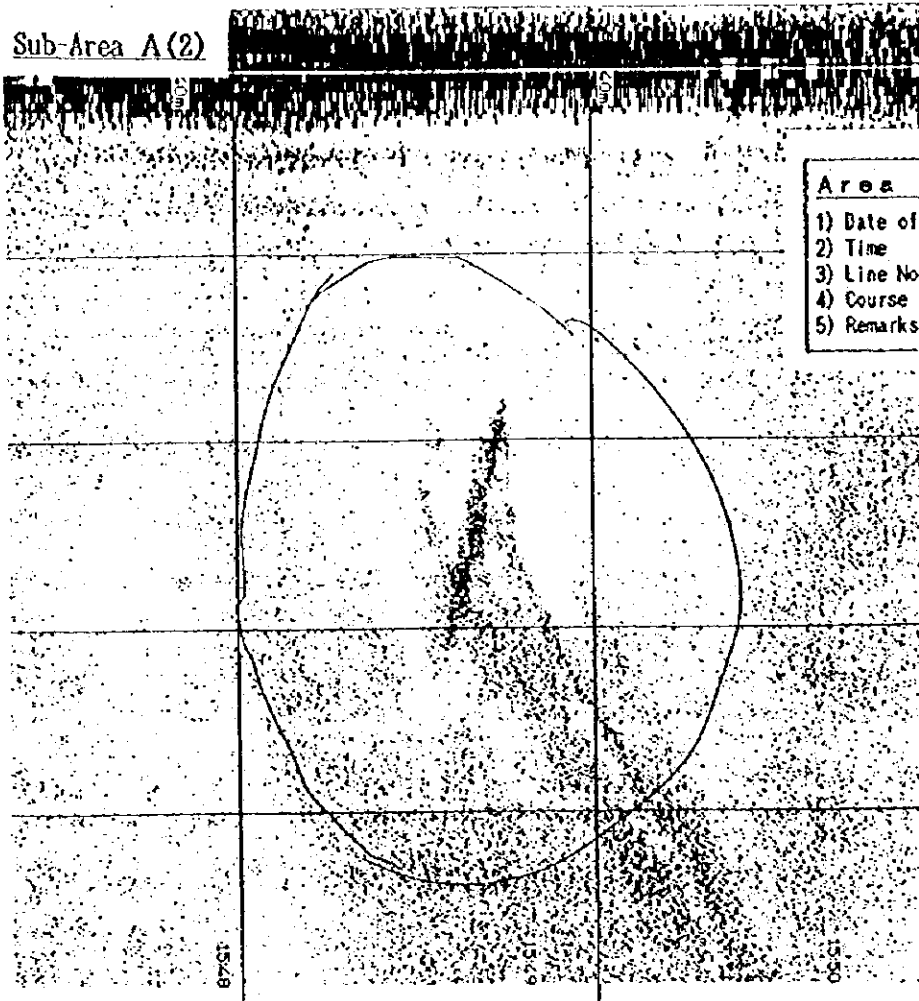
Area A(1) (Echo Sounder)
1) Date of Survey : 09/11/97
2) Time : 1515 hrs
3) Line No. : Y-7510
4) Course : 0° (S-N)
5) Remarks :

Position (WGS-84)
2° 48' 39" N
101° 03' 03" E



Records of Sunken Wreck

Sub-Area A(2)



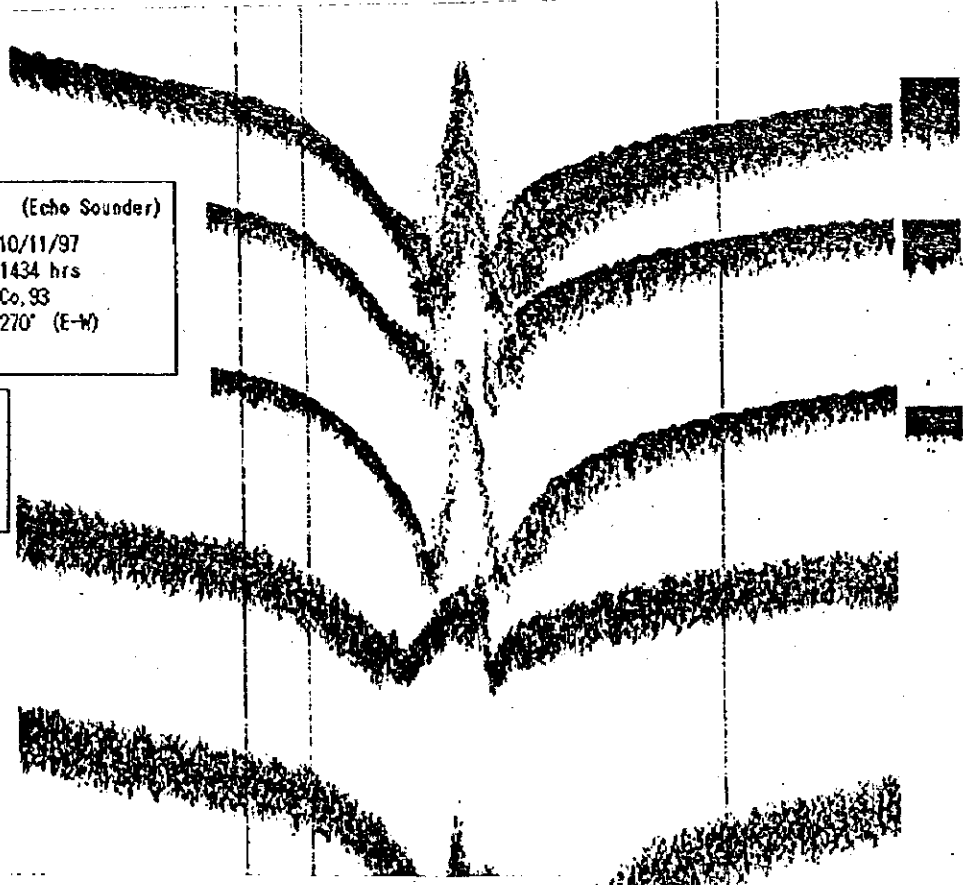
Area A(2) (Side Scan Sonar)
 1) Date of Survey : 26/10/97
 2) Time : 1547 hrs
 3) Line No. : Co. 91
 4) Course : 270° (E-W)
 5) Remarks : Range 200m

1435
 10/11
 AREA: A
 WK E
 CO. 93 (E-W)
 46.9 (Raw)

48.41M
49.11M
50.39M
48.79M
14:35
40M+20M+2.

Area A(2) (Echo Sounder)
 1) Date of Survey : 10/11/97
 2) Time : 1434 hrs
 3) Line No. : Co. 93
 4) Course : 270° (E-W)
 5) Remarks :

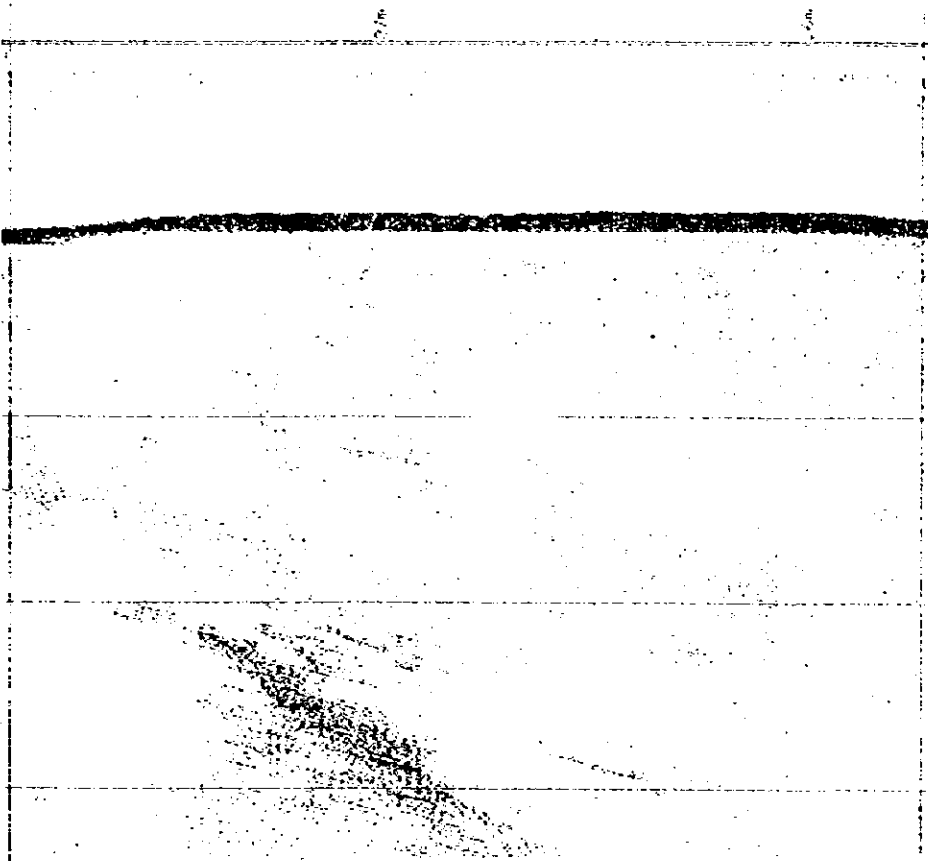
Position (WGS-84)
 2° 47' 27" N
 100° 57' 01" E



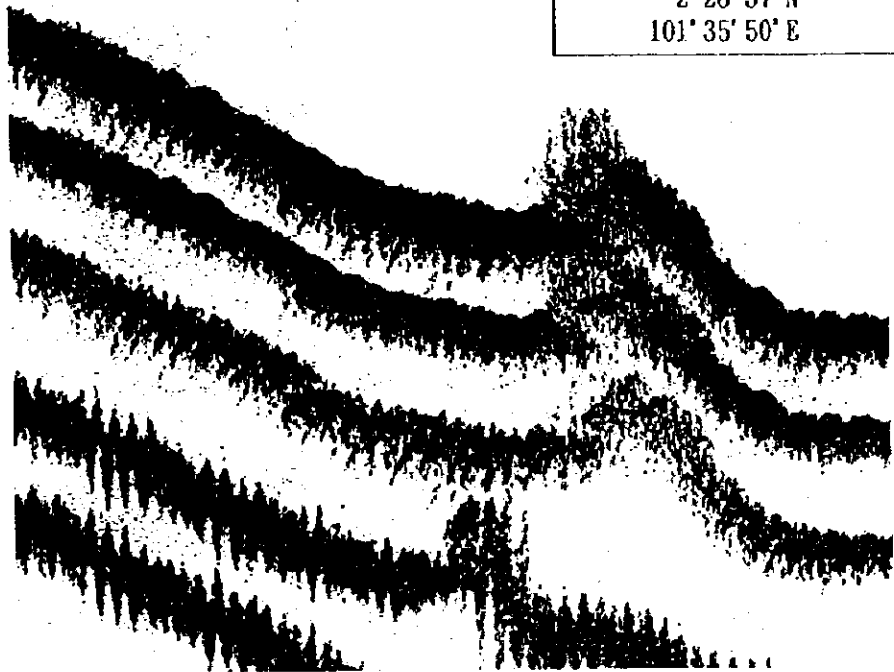
Records of Sunken Wreck

Point f

[Side Scan Sonar]



[Echo Sounder]



Position (WGS-84)

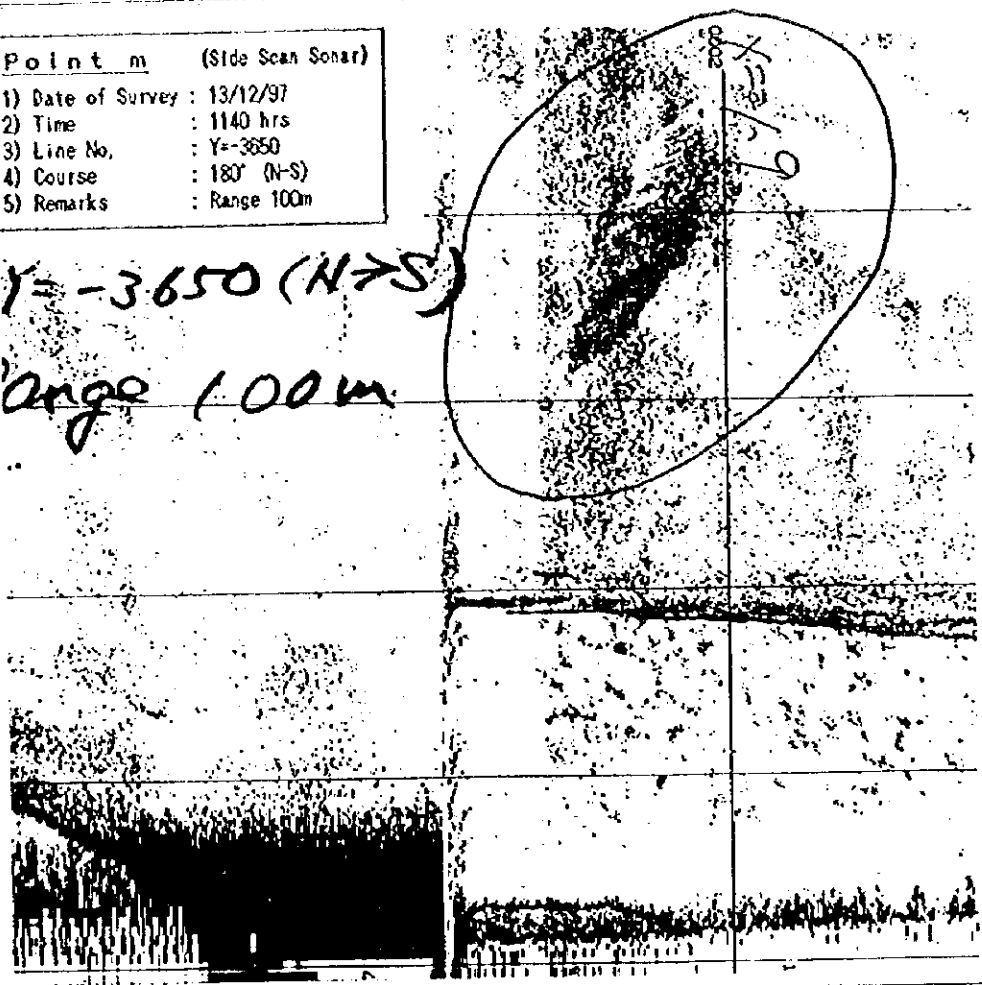
2° 28' 37" N
101° 35' 50" E

Records of Sunken Wrecks

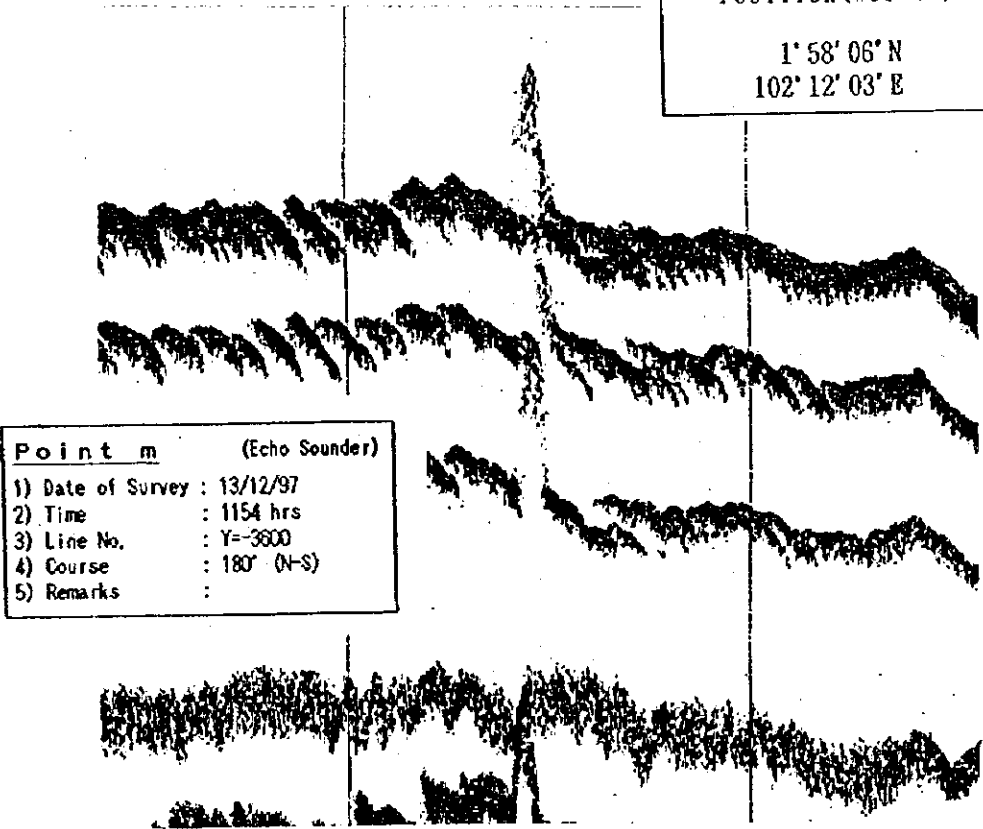
Point m

Point m	(Side Scan Sonar)
1) Date of Survey :	13/12/97
2) Time :	1140 hrs
3) Line No. :	Y=-3650
4) Course :	180° (N-S)
5) Remarks :	Range 100m

Y = -3650 (N→S)
 Range 100m



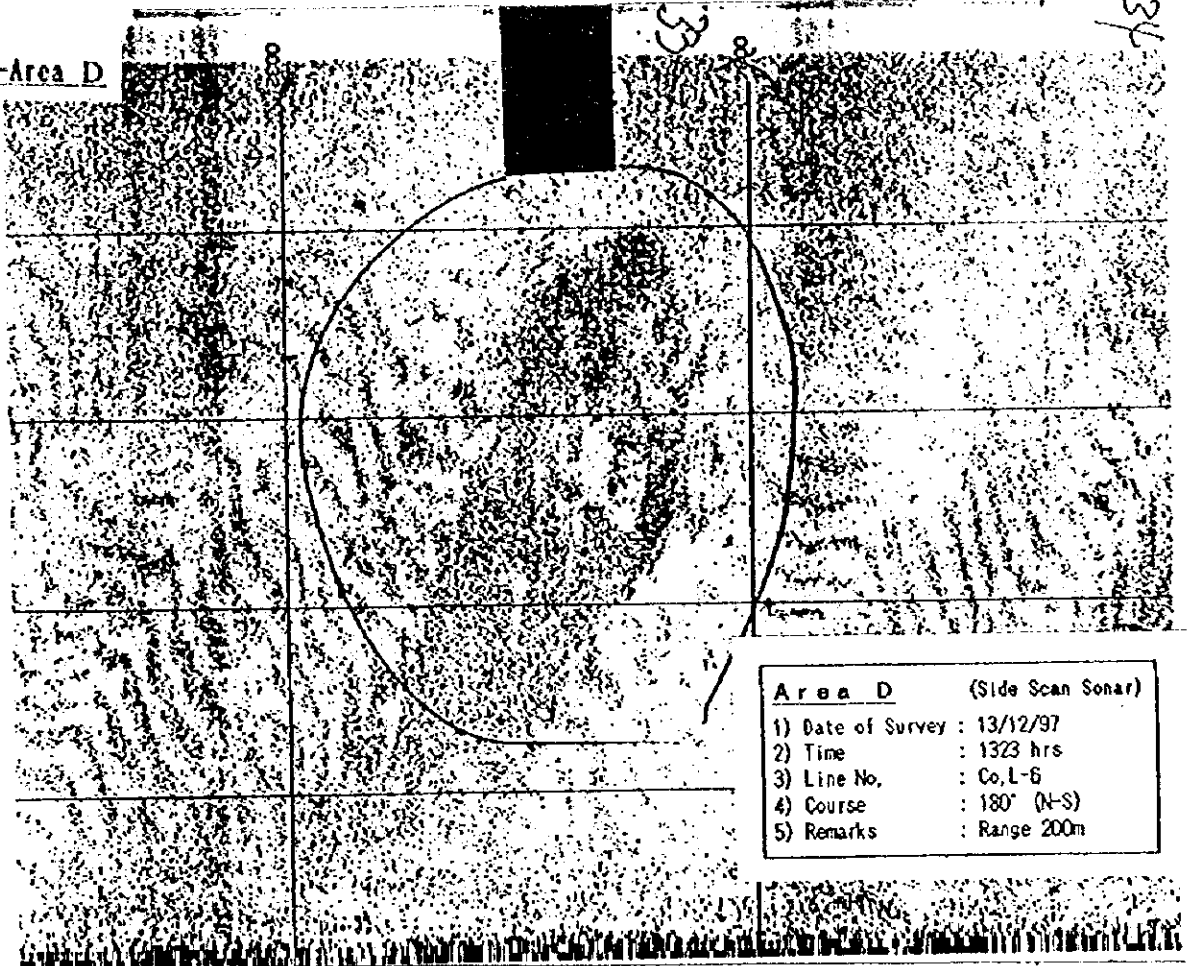
Position (WGS-84)
1° 58' 06" N
102° 12' 03" E



Point m	(Echo Sounder)
1) Date of Survey :	13/12/97
2) Time :	1154 hrs
3) Line No. :	Y=-3600
4) Course :	180° (N-S)
5) Remarks :	

Records of Sunken Wreck

Sub-Area D



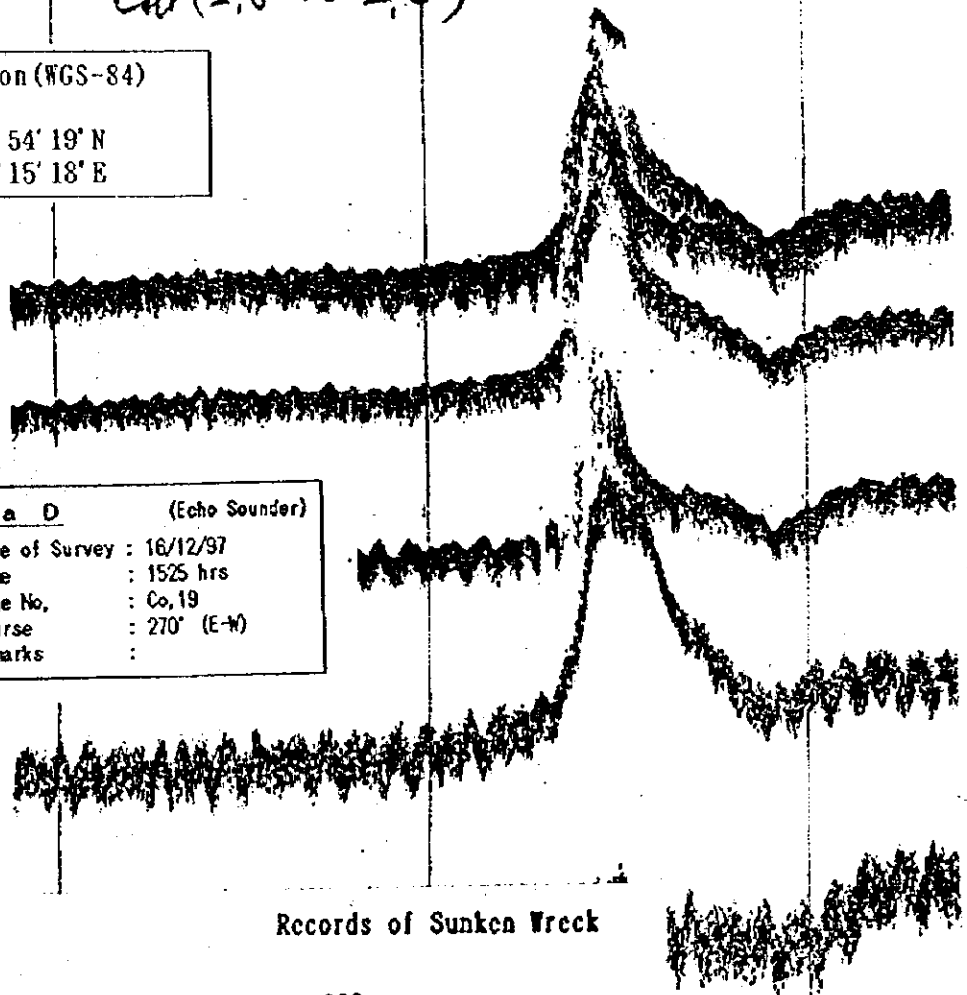
Cut (2.5 ~ 2.3)

Position (WGS-84)

1° 54' 19" N
102° 15' 18" E

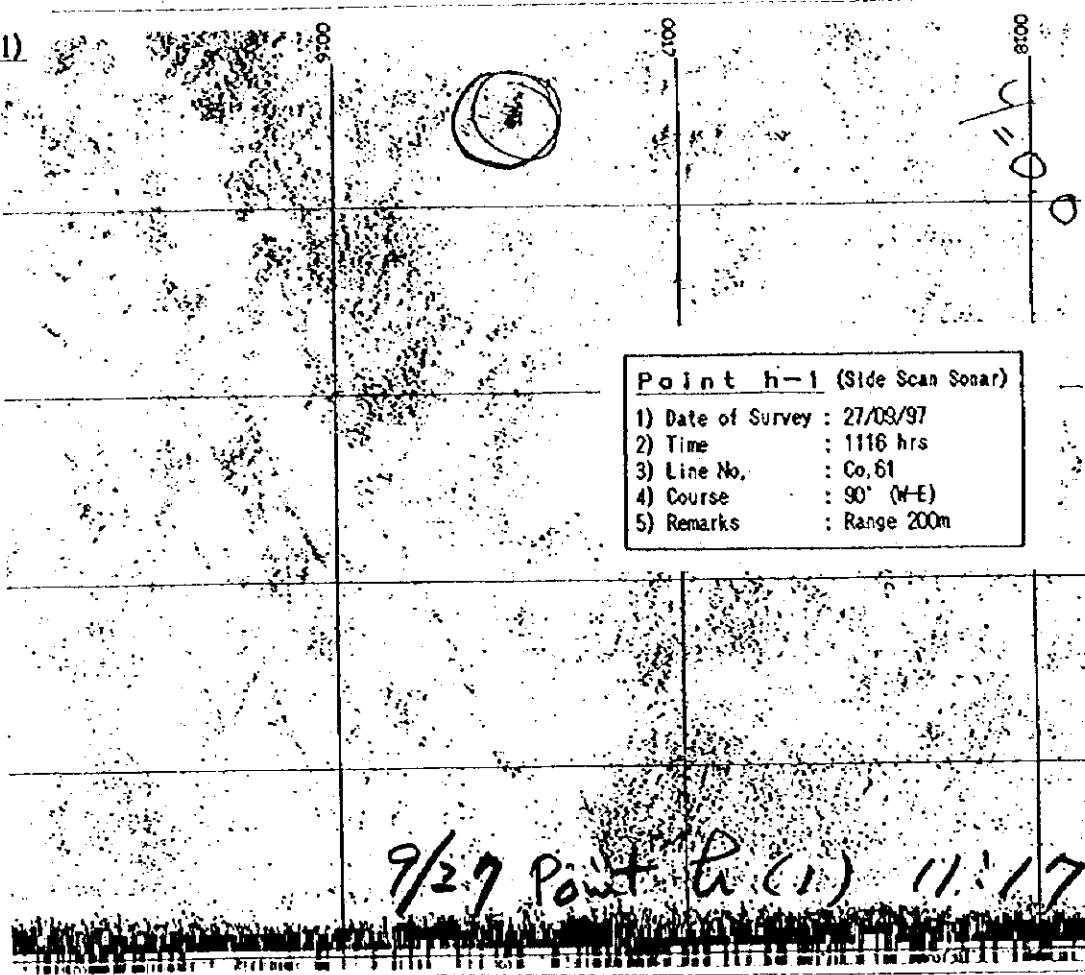
Area D (Echo Sounder)

1) Date of Survey : 16/12/97
2) Time : 1525 hrs
3) Line No. : Co, 19
4) Course : 270° (E-W)
5) Remarks :



Records of Sunken Wreck

Point h (1)



Point h-1 (Side Scan Sonar)

1) Date of Survey : 27/09/97
 2) Time : 1116 hrs
 3) Line No. : Co. 61
 4) Course : 90° (W-E)
 5) Remarks : Range 200m

9/27 Point h (1) 11:17

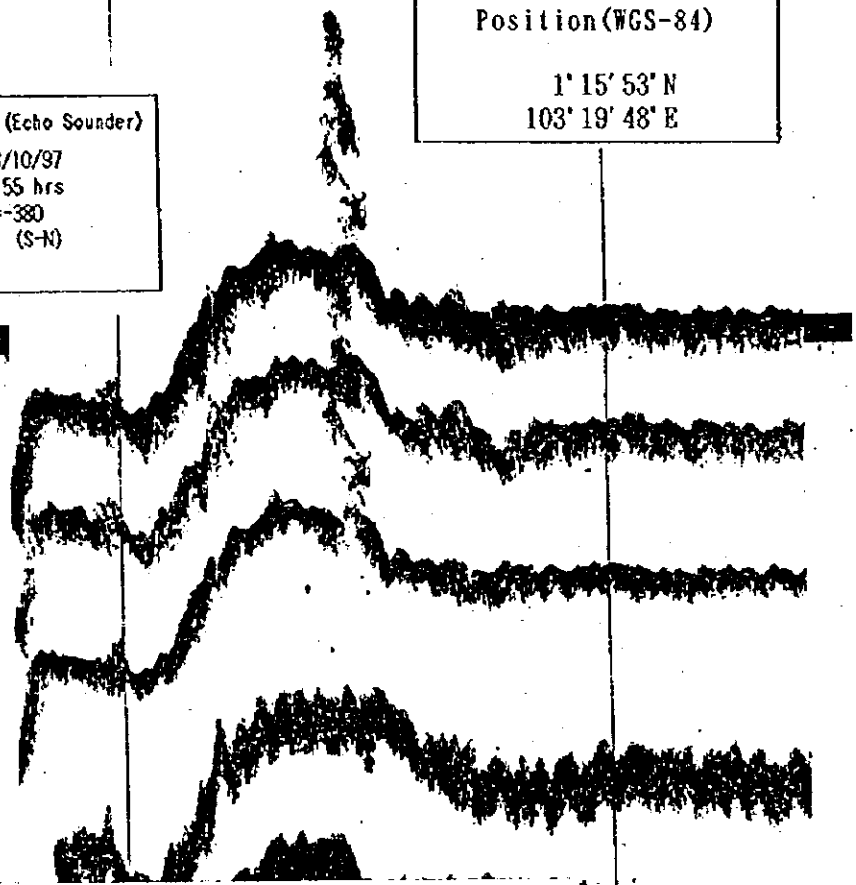
Position (WGS-84)

1° 15' 53" N
 103° 19' 48" E

Point h-1 (Echo Sounder)

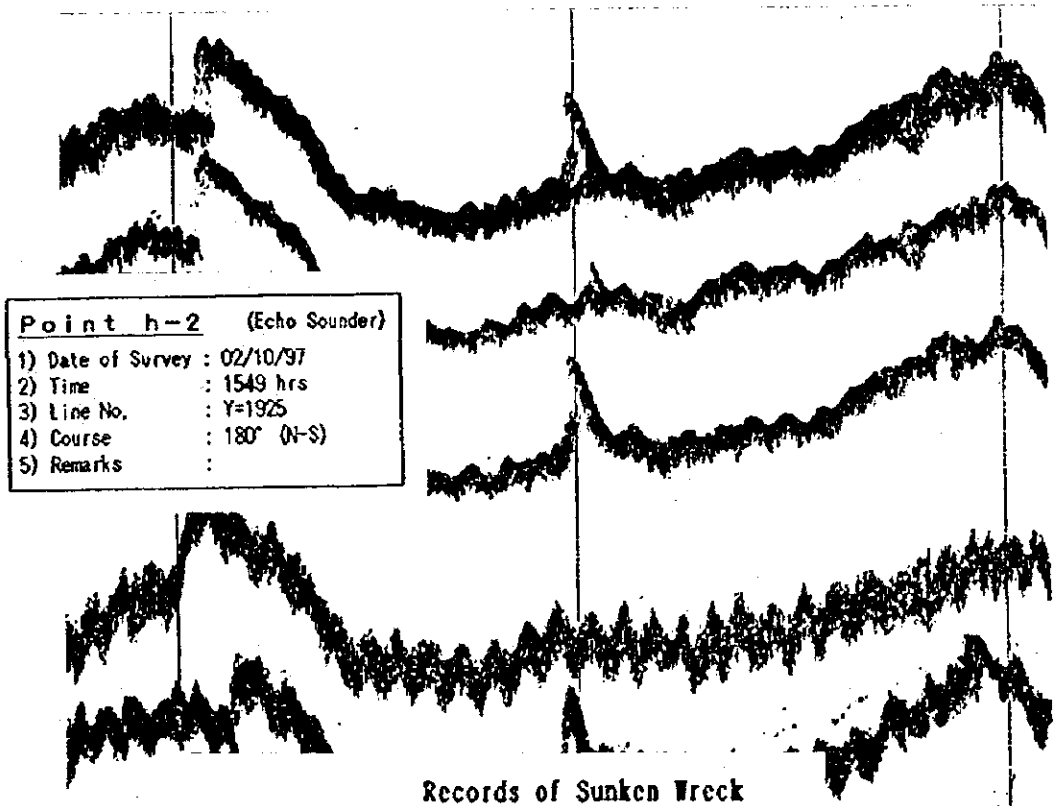
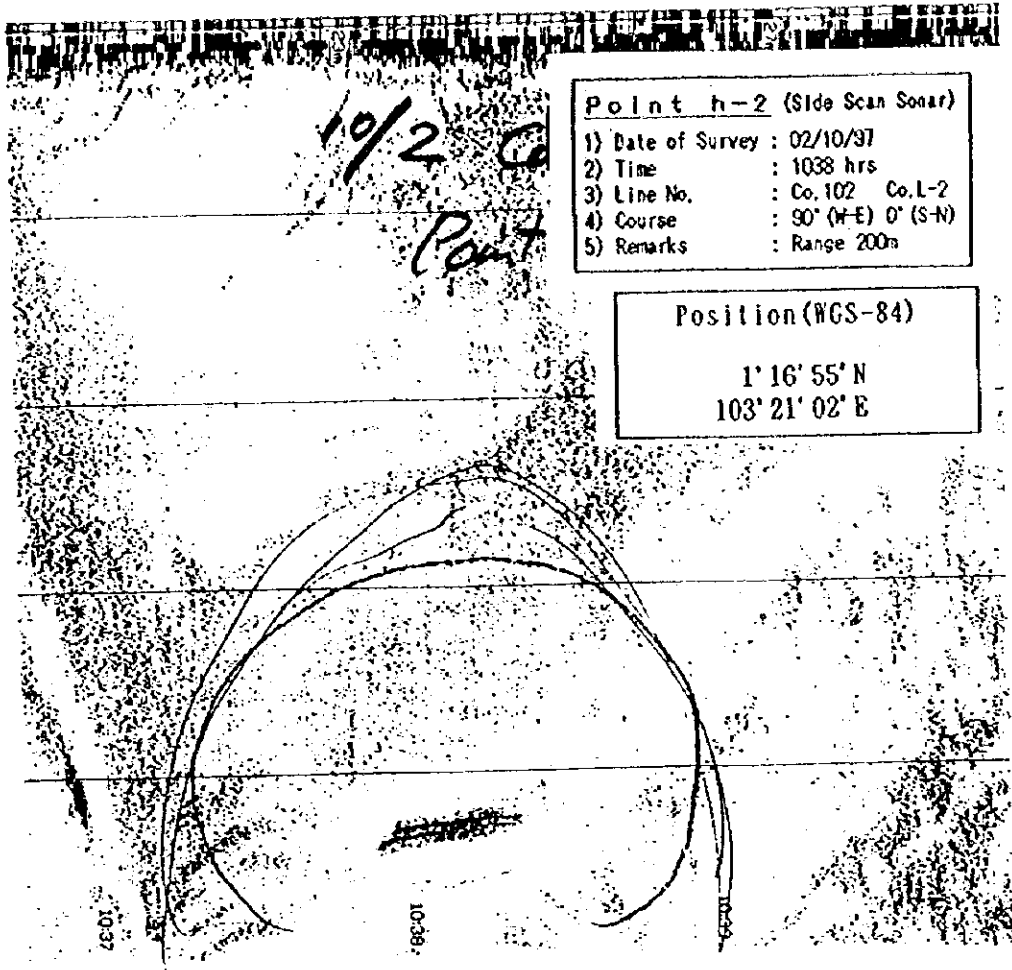
1) Date of Survey : 03/10/97
 2) Time : 1155 hrs
 3) Line No. : Y=-380
 4) Course : 0° (S-N)
 5) Remarks :

No. Y=-380 (S-N)

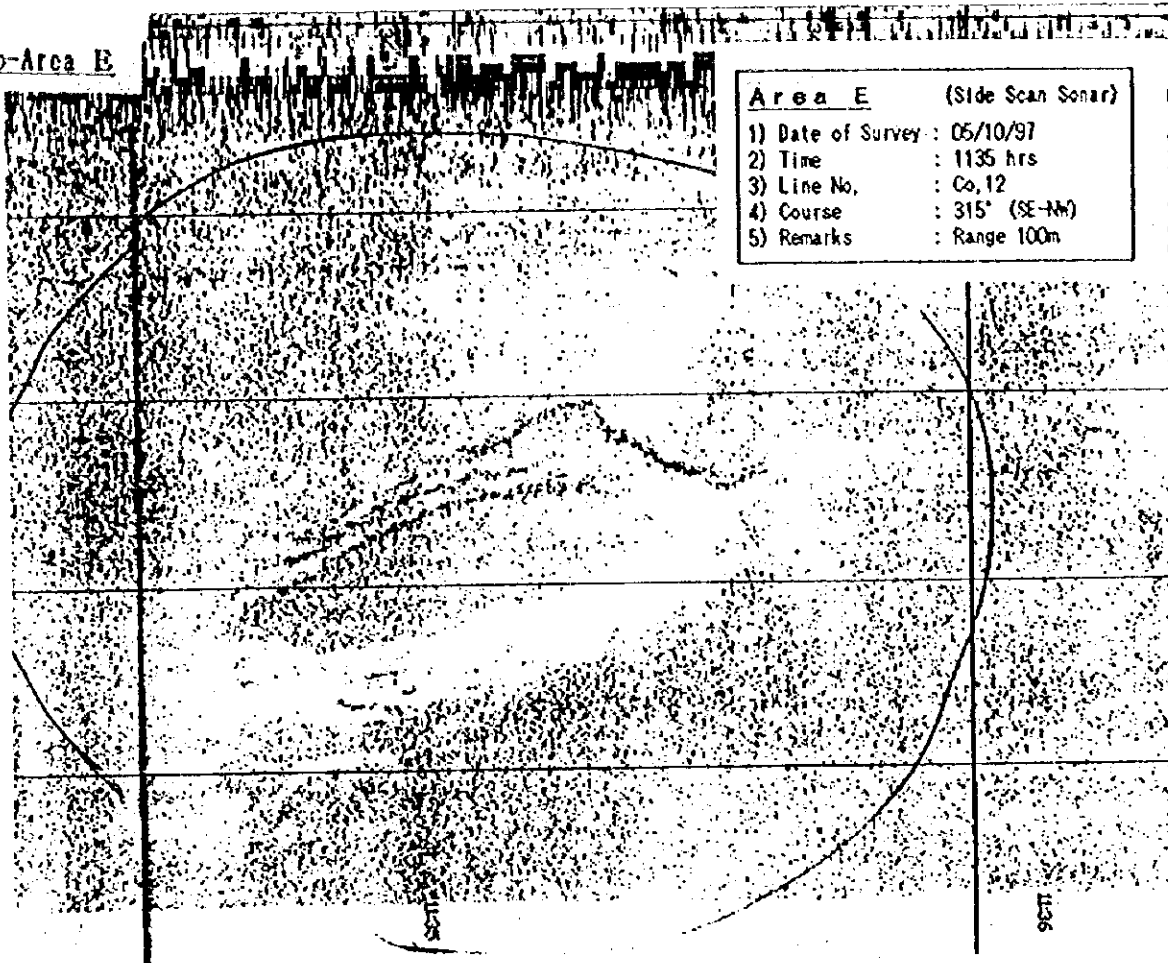


Records of Sunken Wreck

Point h (2)

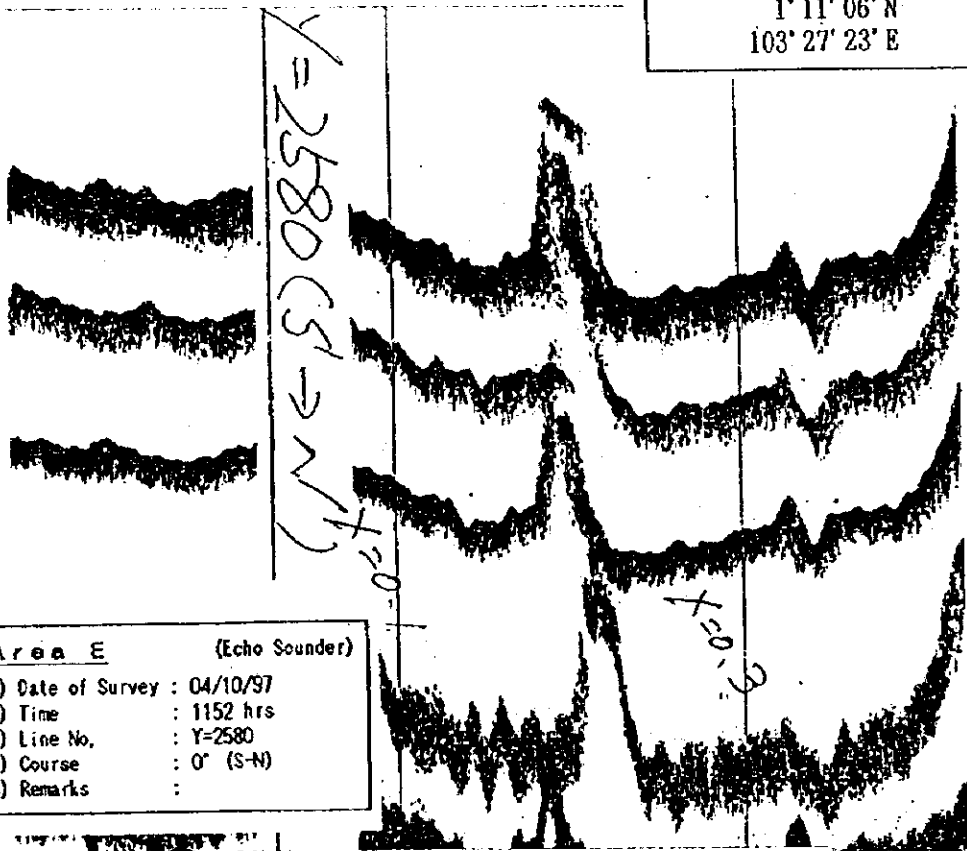


Sub-Area E



Position (WGS-84)

1° 11' 06" N
103° 27' 23" E



Area E (Echo Sounder)	
1) Date of Survey :	04/10/97
2) Time :	1152 hrs
3) Line No. :	Y=2580
4) Course :	0° (S-N)
5) Remarks :	

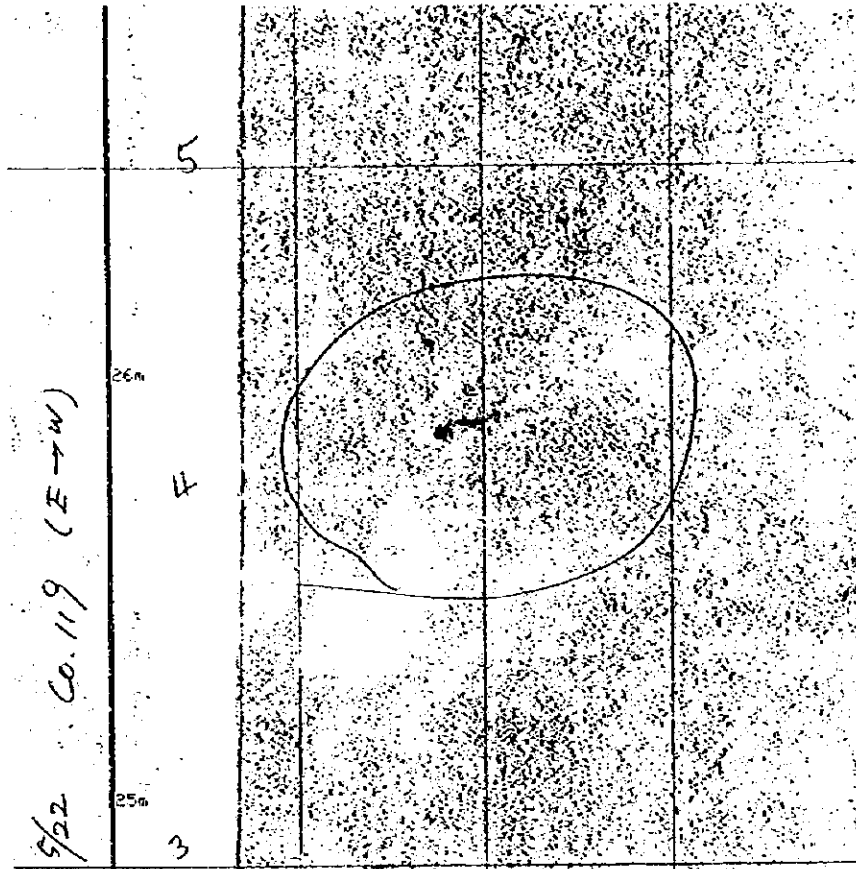
Records of Sunken Wreck

Point d

[Side Scan Sonar]

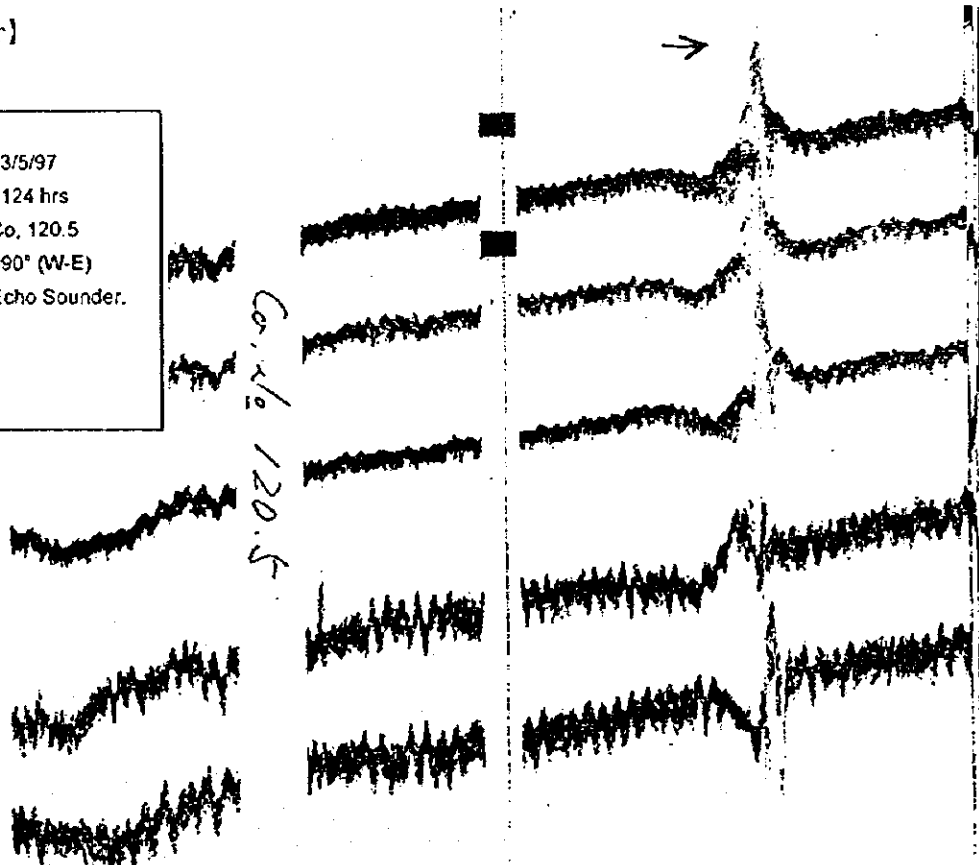
Point d
 1) Date of Survey : 22/5/97
 2) Time : 1337 hrs
 3) Line No : Co, 119
 4) Course : 270° (E-W)
 5) Remarks : Side Scan Sonar.

Position (WGS-84)
 1° 12' 45" N
 103° 35' 05" E



[Echo Sounder]

Point d
 1) Date of Survey : 23/5/97
 2) Time : 1124 hrs
 3) Line No : Co, 120.5
 4) Course : 090° (W-E)
 5) Remarks : Echo Sounder.



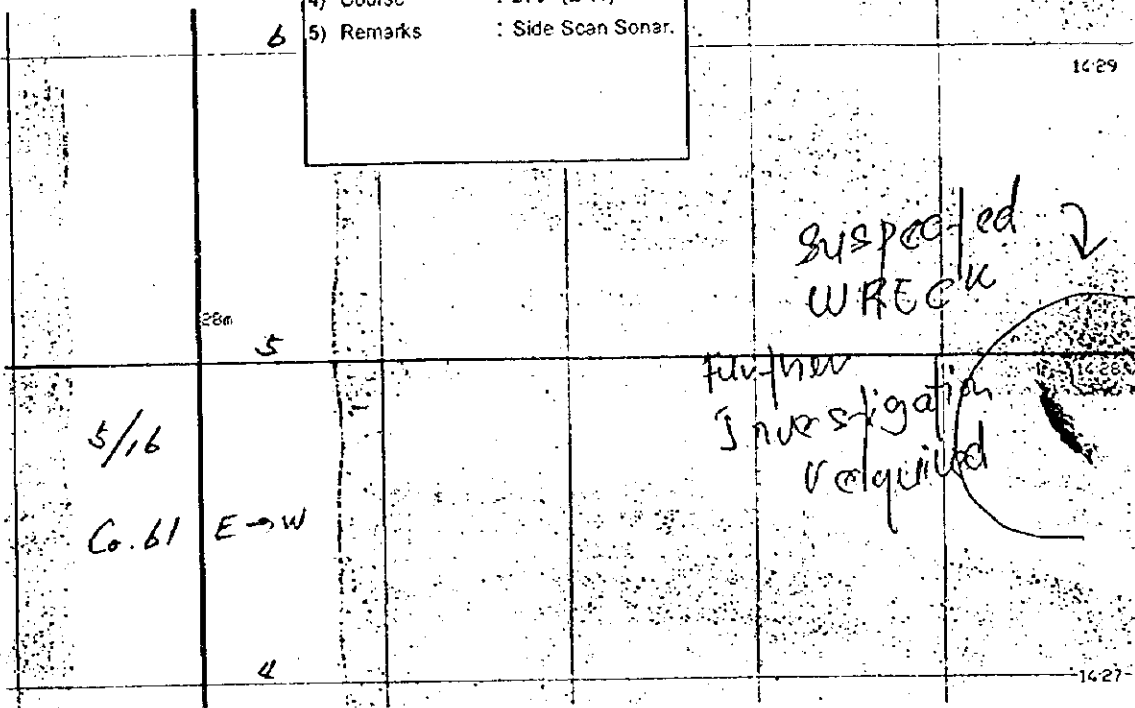
Records of Sunken Wreck

Point i

Point i
 1) Date of Survey : 16/5/97
 2) Time : 1428 hrs
 3) Line No : Co. 61
 4) Course : 270° (E-W)
 5) Remarks : Side Scan Sonar.

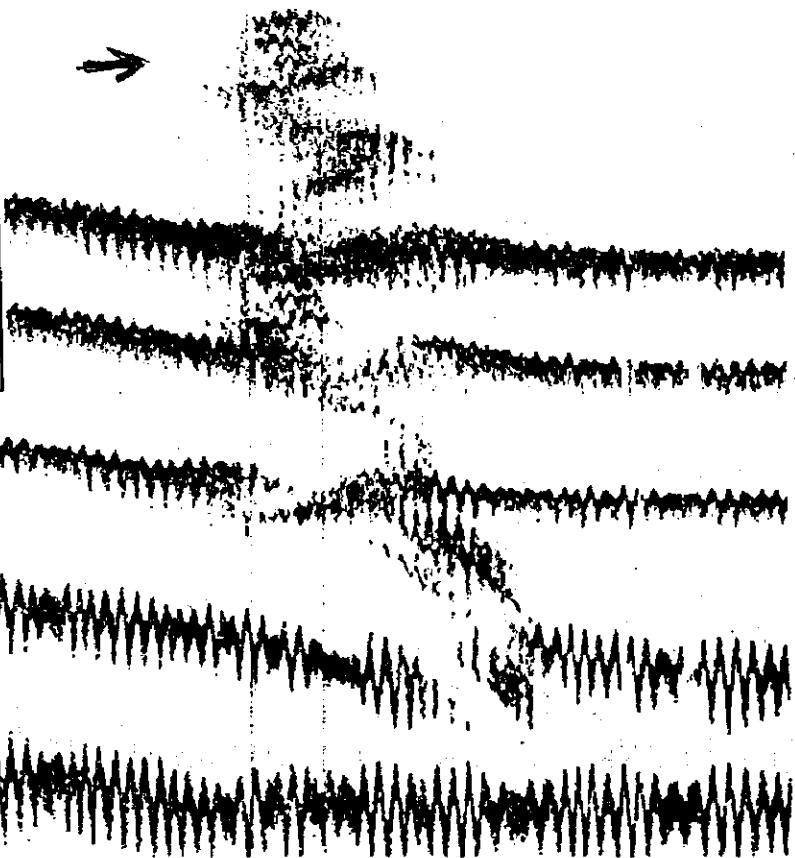
Position (WGS-84)
 1° 11' 14" N
 103° 35' 26" E

[Side Scan Sonar]



[Echo Sounder]

Point i
 1) Date of Survey : 23/5/97
 2) Time : 1545 hrs
 3) Line No : Co. 110
 4) Course : -
 5) Remarks : Echo Sounder.
 Craft stopped over
 wreck position for
 lead line measurement.

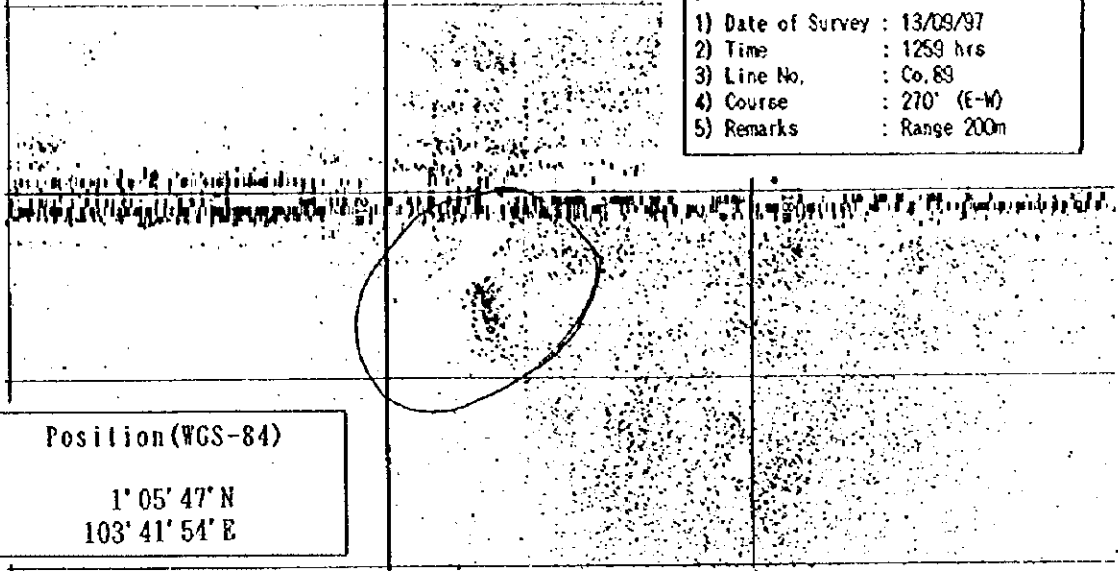


Records of Sunken Wreck

Sub-Area F

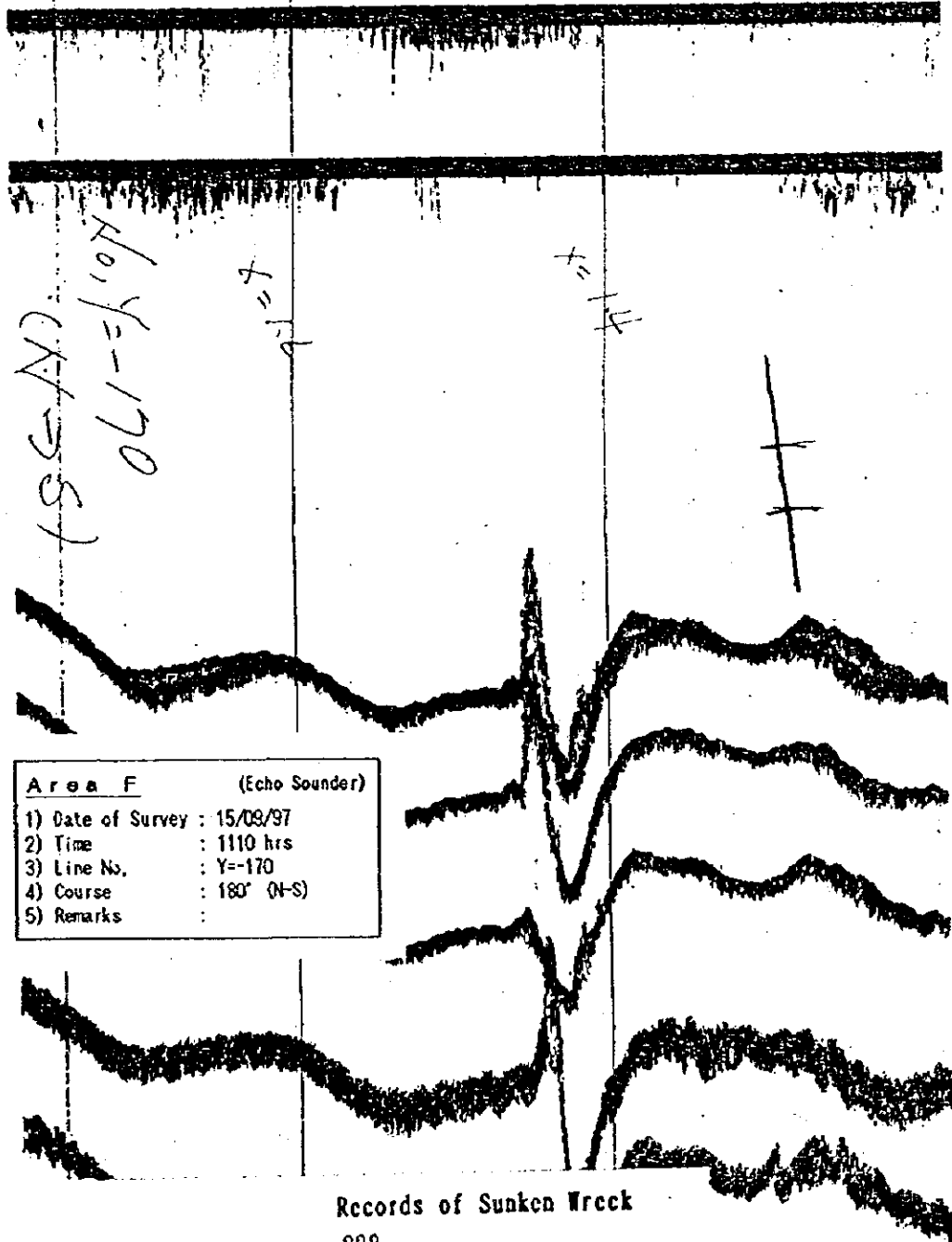
Area F (Side Scan Sonar)

- 1) Date of Survey : 13/09/97
- 2) Time : 1259 hrs
- 3) Line No. : Co. 83
- 4) Course : 270° (E-W)
- 5) Remarks : Range 200m



Position (WGS-84)

1° 05' 47" N
103° 41' 54" E



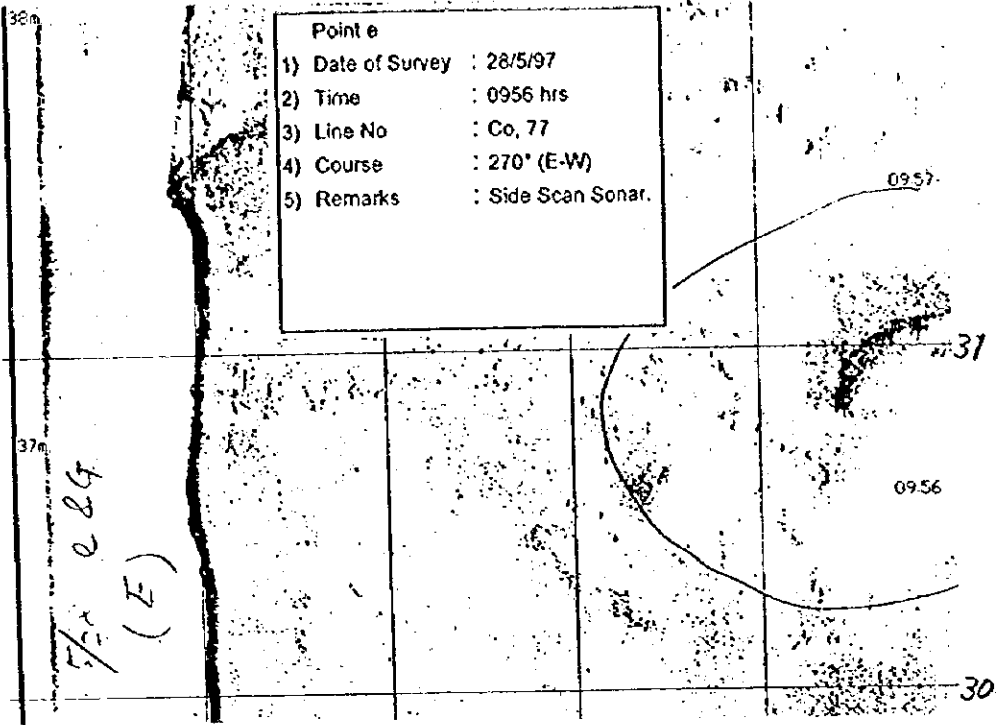
Area F (Echo Sounder)

- 1) Date of Survey : 15/09/97
- 2) Time : 1110 hrs
- 3) Line No. : Y-170
- 4) Course : 180° (N-S)
- 5) Remarks :

Records of Sunken Wreck

Point e

[Side Scan Sonar]



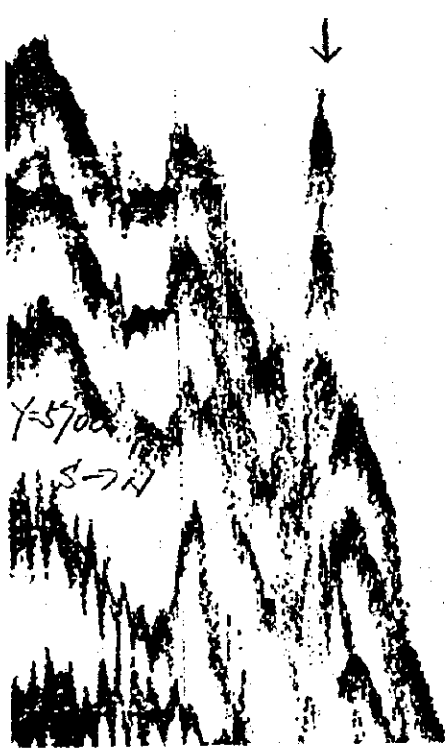
Point e

- 1) Date of Survey : 28/5/97
- 2) Time : 0956 hrs
- 3) Line No : Co, 77
- 4) Course : 270° (E-W)
- 5) Remarks : Side Scan Sonar.

Position (WGS-84)

1° 07' 48" N
103° 43' 56" E

[Echo Sounder]



Point e

- 1) Date of Survey : 11/6/97
- 2) Time : 1318, 1322 hrs
- 3) Line No : Y=5700
- 4) Course : 0° (S-N)
- 5) Remarks : Echo Sounder.
Craft stopped over
wreck position for
lead line measurement.



Lead
11. Jun. Co. No. Y = - 5700
(S → N)

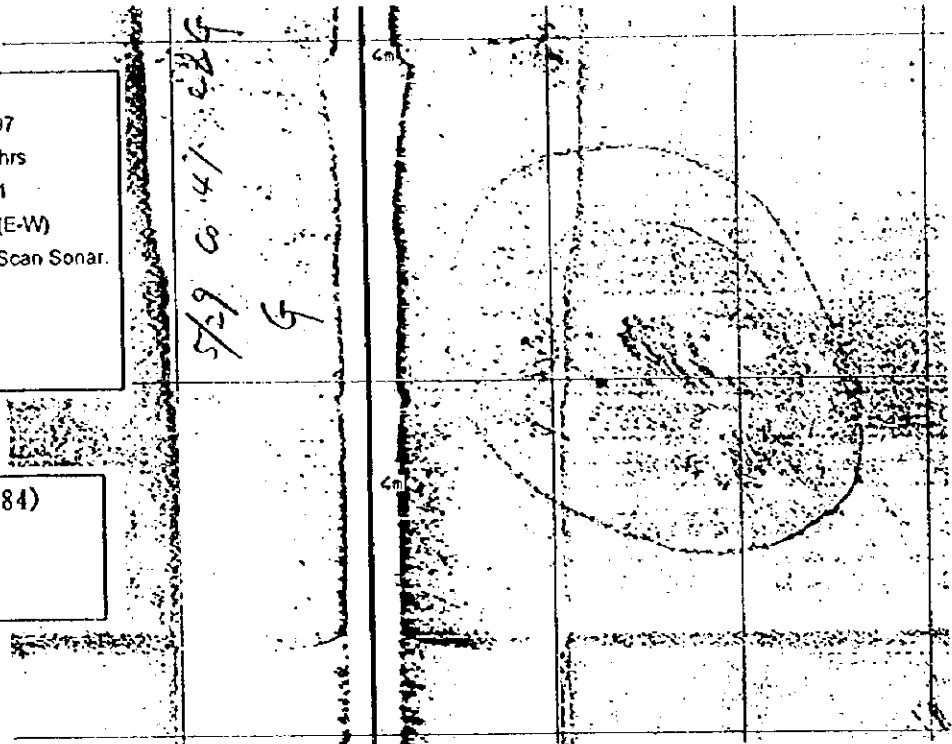
Records of Sunken Wreck

Area G

[Side Scan Sonar]

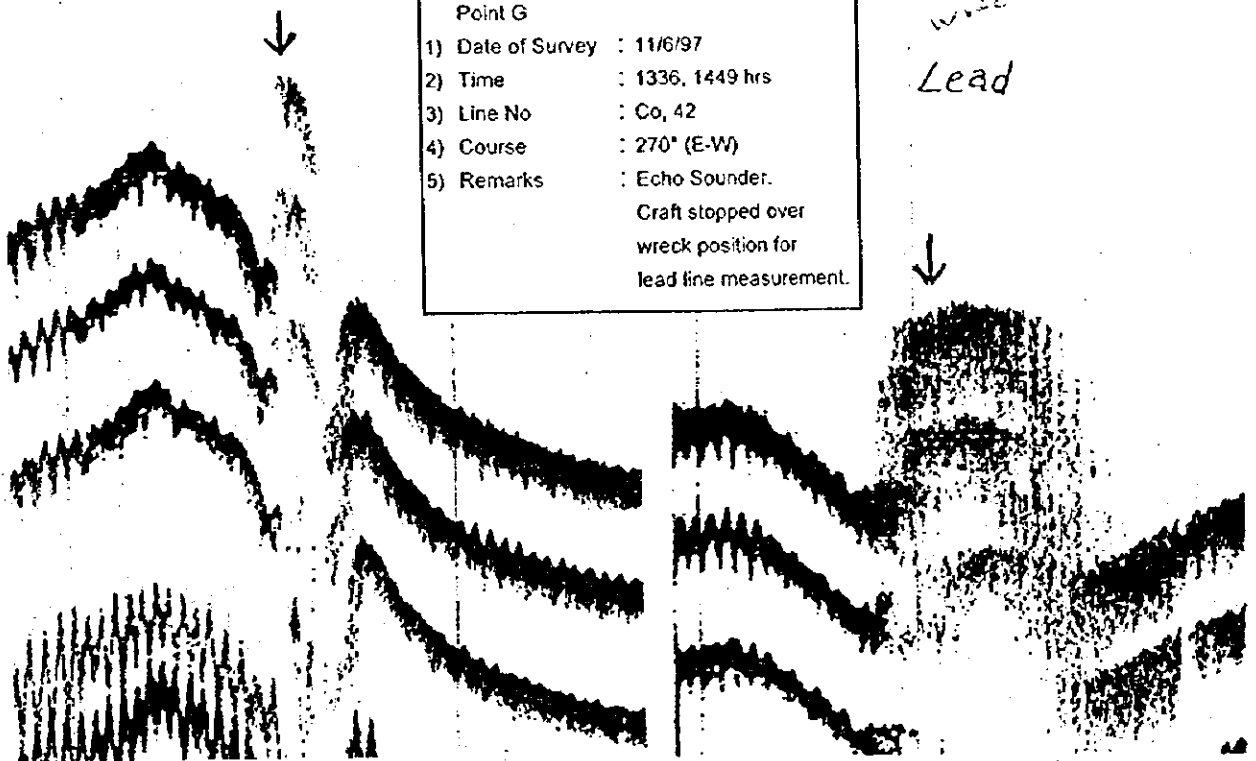
Point G
1) Date of Survey : 29/5/97
2) Time : 1008 hrs
3) Line No : Co, 41
4) Course : 270° (E-W)
5) Remarks : Side Scan Sonar.

Position (WGS-84)
1° 06' 45" N
103° 44' 31" E



[Echo Sounder]

Point G
1) Date of Survey : 11/6/97
2) Time : 1336, 1449 hrs
3) Line No : Co, 42
4) Course : 270° (E-W)
5) Remarks : Echo Sounder.
Craft stopped over
wreck position for
lead line measurement.



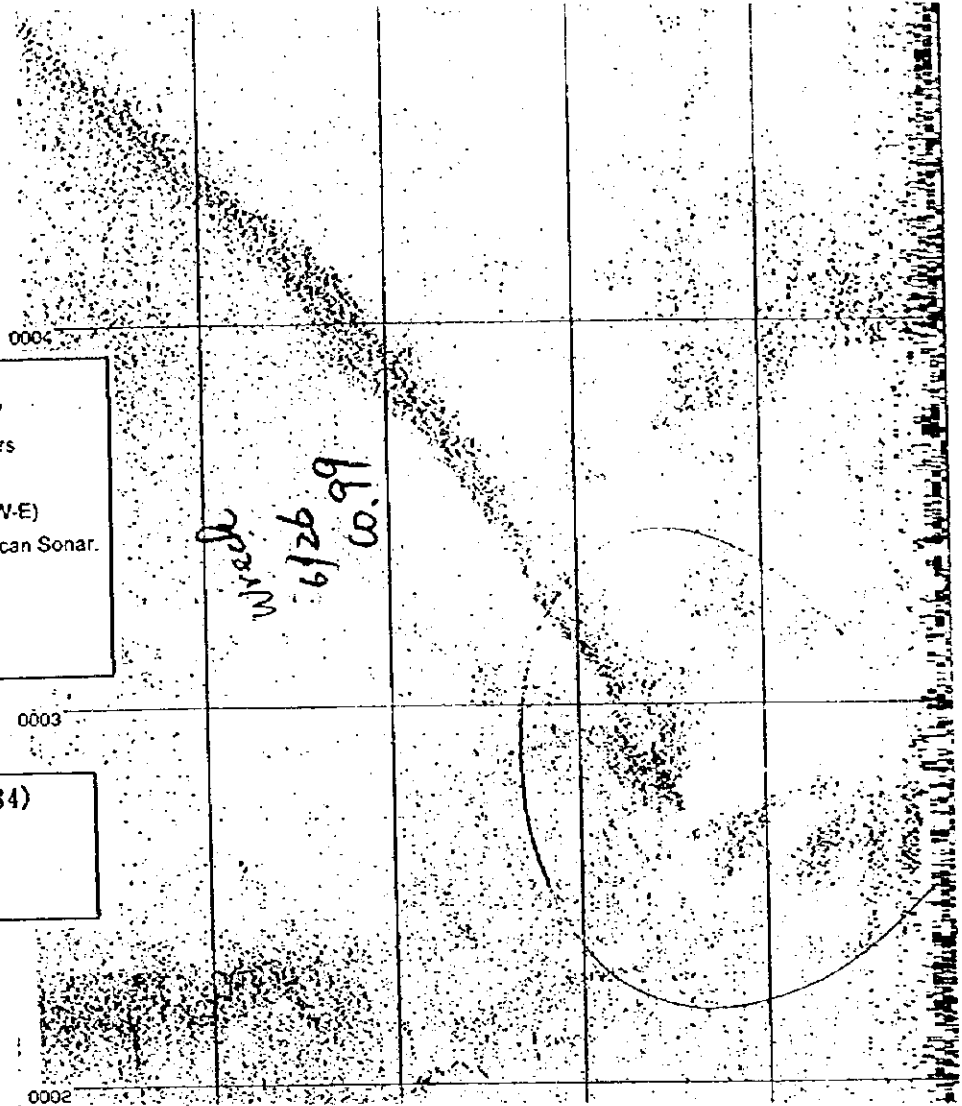
Records of Sunken Wreck

Area I (1)

[Side Scan Sonar]

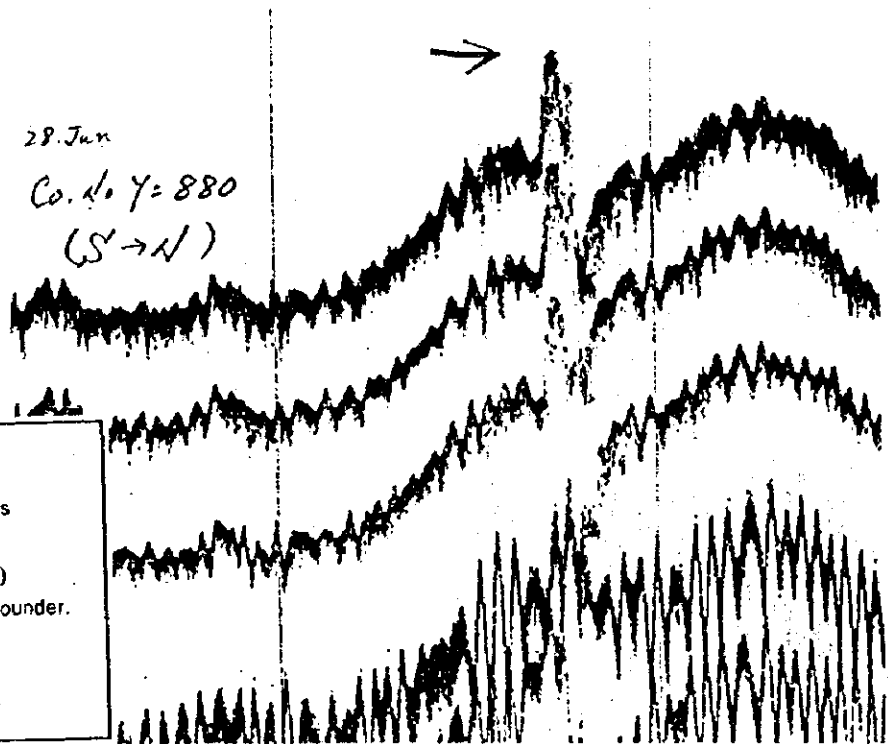
Area I (1)
1) Date of Survey : 26/6/97
2) Time : 1144 hrs
3) Line No : Co. 99
4) Course : 090° (W-E)
5) Remarks : Side Scan Sonar.

Position (WGS-84)
1° 17' 10" N
104° 15' 29" E



[Echo Sounder]

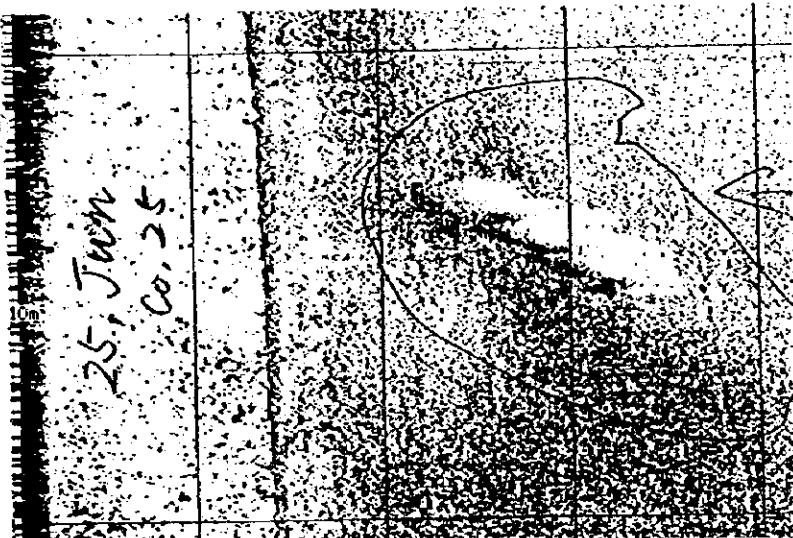
Area I (1)
1) Date of Survey : 28/6/97
2) Time : 1031 hrs
3) Line No : Y=880
4) Course : 0° (S-N)
5) Remarks : Echo Sounder.



Records of Sunken Wreck

Area I (2)

[Side Scan Sonar]



Area I (2)
 1) Date of Survey : 25/6/97
 2) Time : 1420 hrs
 3) Line No : Co, 25
 4) Course : 090° (W-E)
 5) Remarks : Side Scan Sonar.

[Echo Sounder]

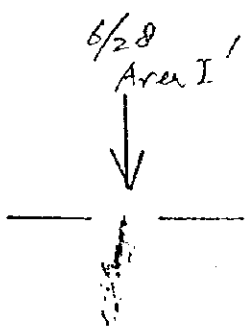
Position (WGS-84)
 1° 15' 25" N
 104° 18' 19" E

Area I (2)
 1) Date of Survey : 28/6/97
 2) Time : 1050 hrs
 3) Line No : Co, 23
 4) Course : 270° (E-W)
 5) Remarks : Echo Sounder.

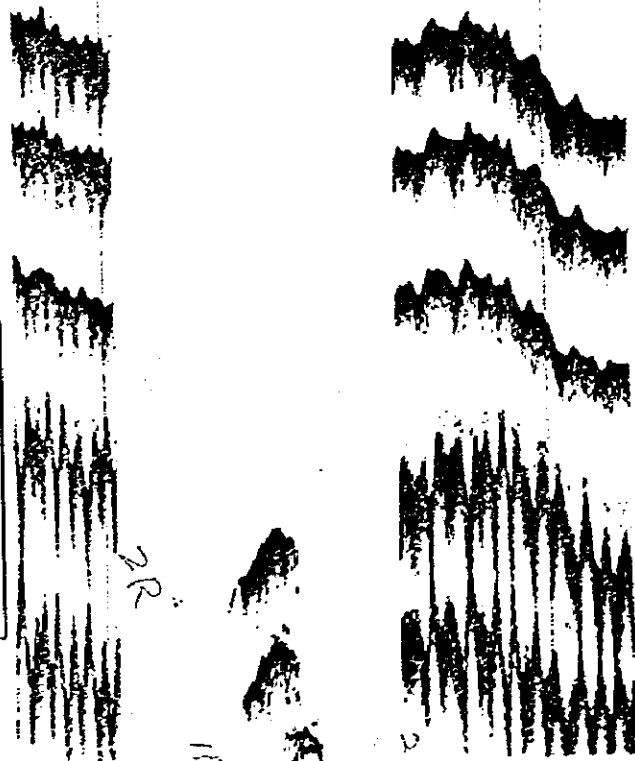
Records of Sunken Wreck

63.78M	64.00M
63.78M	64.65M
66.03M	65.91M
63.77M	64.22M
20M+2.5%	40M+2.5%

28 Jun. Co. No 23 (E-W) 1050



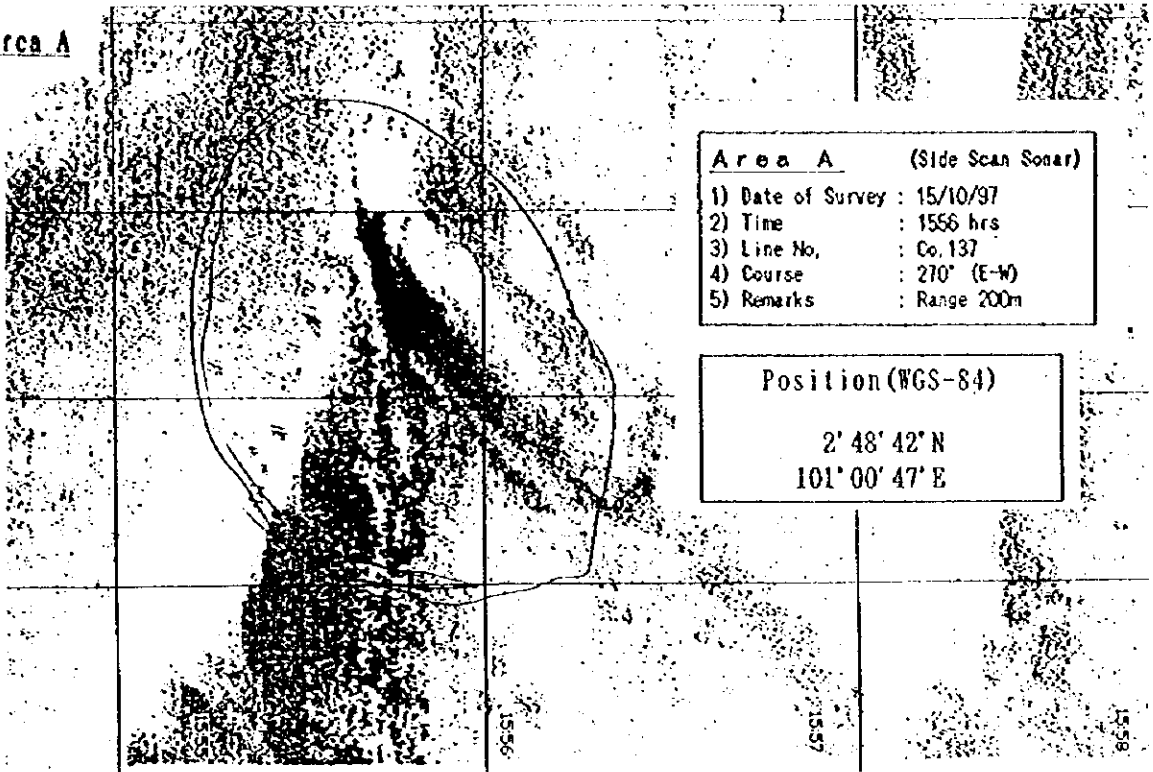
1050



2R

Records of Sunken Wrecks
(Verification of the Existence of Wrecks)

Sub-Area A

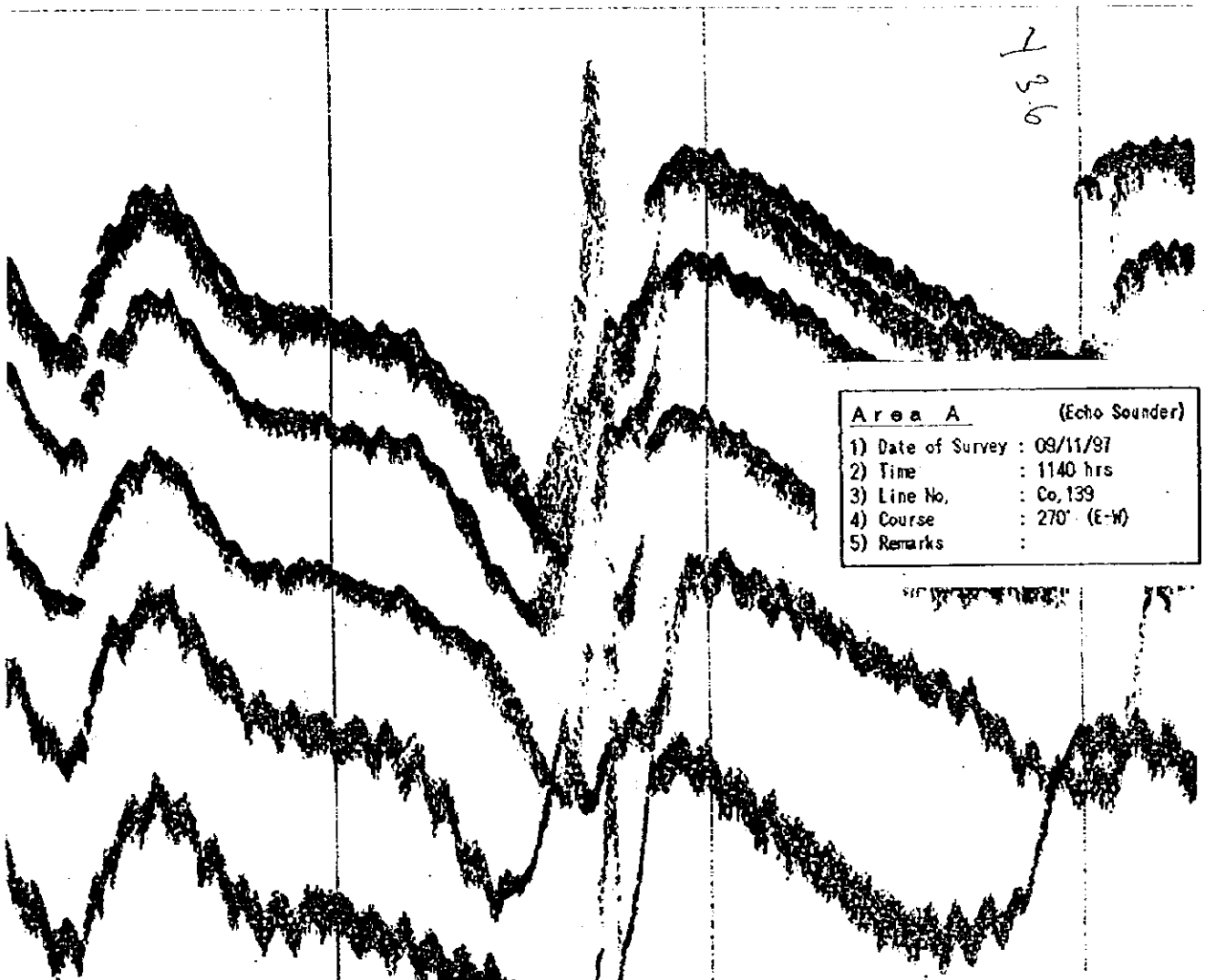


Area A (Side Scan Sonar)

- 1) Date of Survey : 15/10/97
- 2) Time : 1556 hrs
- 3) Line No. : Co. 137
- 4) Course : 270° (E-W)
- 5) Remarks : Range 200m

Position (WGS-84)

2° 48' 42" N
101° 00' 47" E



Area A (Echo Sounder)

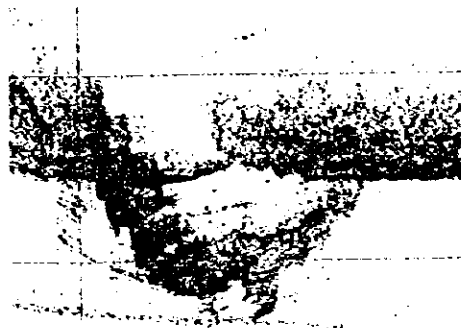
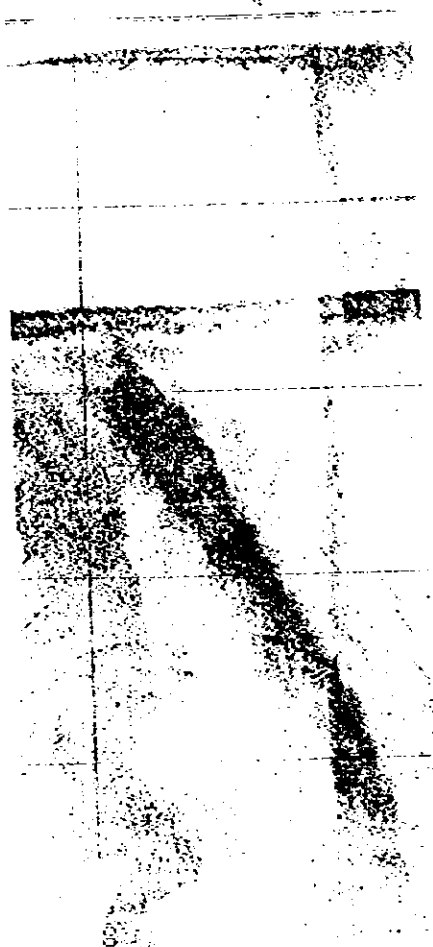
- 1) Date of Survey : 09/11/97
- 2) Time : 1140 hrs
- 3) Line No. : Co. 139
- 4) Course : 270° (E-W)
- 5) Remarks :

Records of Sunken Wreck

Point f

[Side Scan Sonar]

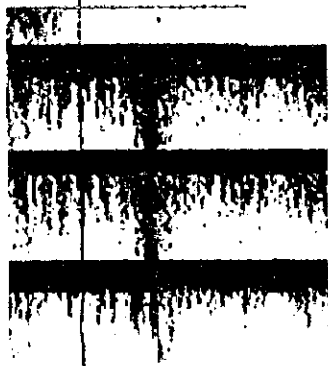
Position (WGS-84)
2° 27' 12" N
101° 36' 10" E



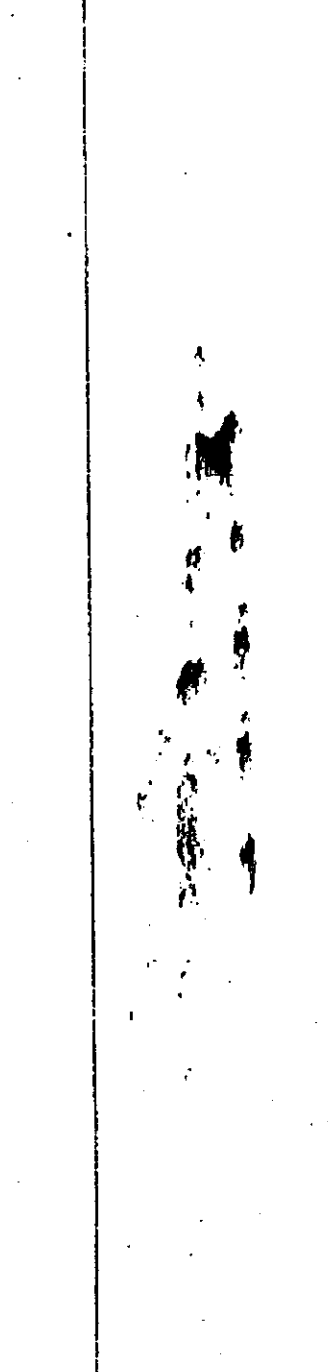
Records of Sunken Wrecks

Point f

[Echo Sounder]



12-15	74.09M
	74.64M
	56.91M
	74.38M
40M+2.0%	



Records of Sunken Wrecks



Point e

[Side Scan Sonar]



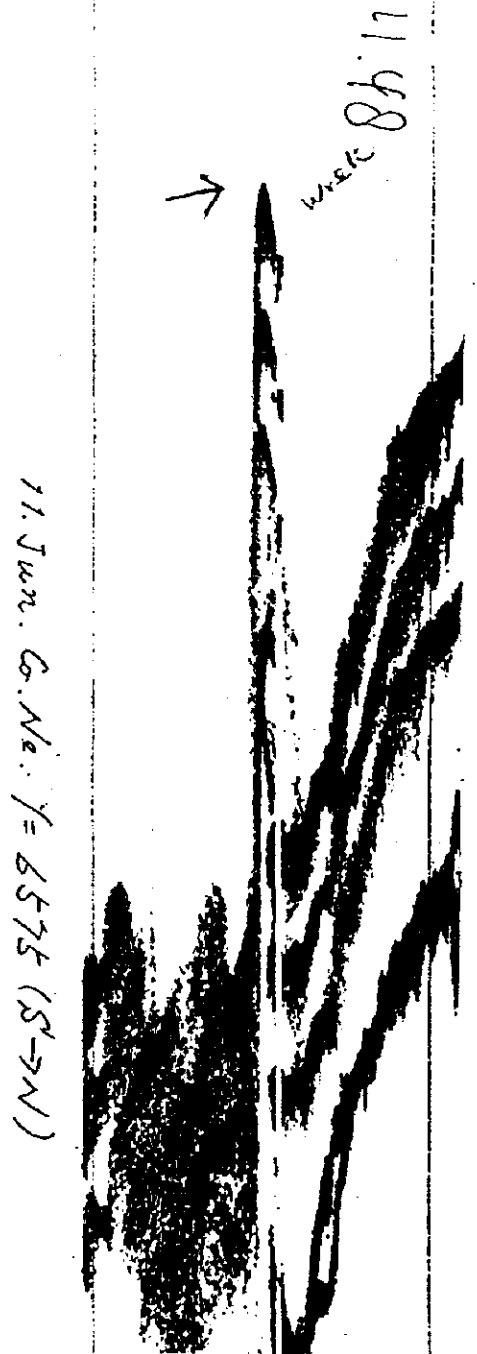
Point e
 1) Date of Survey : 12/6/97
 2) Time : 1156 hrs
 3) Line No : Co. 96
 4) Course : 090° (W-E)
 5) Remarks : Side Scan Sonar.

Position (WGS-84)
 1° 08' 11" N
 103° 43' 27" E

[Echo Sounder]

Point e
 1) Date of Survey : 11/6/97
 2) Time : 1148 hrs
 3) Line No : Y=6575
 4) Course : 0° (S-N)
 5) Remarks : Echo Sounder.

41.81M	(2/3)	0.9	28
46.04M	WRE		31
43.78M			28
41.53M			28
40M+20M+2.5%		(20M+2.5%	



11. Jun. Co. No. Y=6575 (S-N)

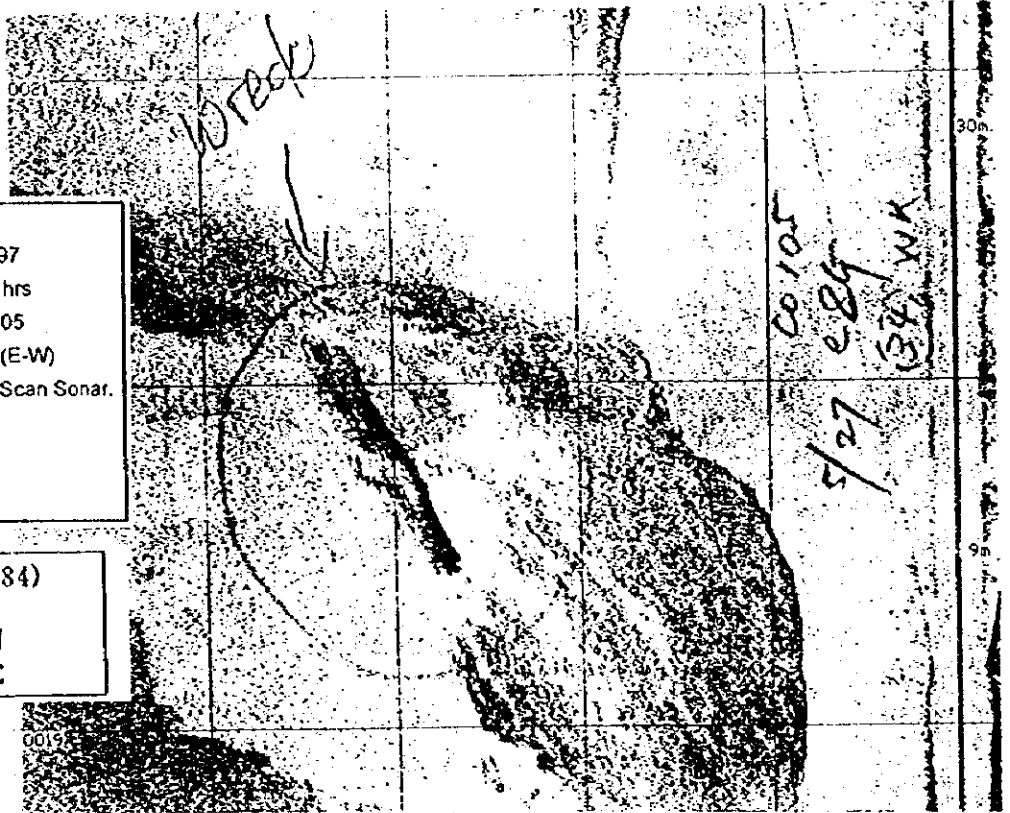
Records of Sunken Wreck

Area G

[Side Scan Sonar]

Point G
1) Date of Survey : 27/5/97
2) Time : 0936 hrs
3) Line No : Co, 105
4) Course : 270° (E-W)
5) Remarks : Side Scan Sonar.

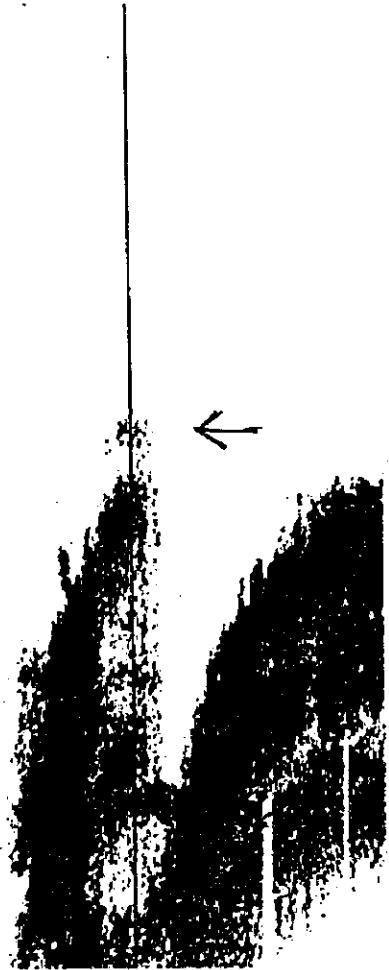
Position (WGS-84)
1° 08' 24" N
103° 45' 08" E



[Echo Sounder]

Point G
1) Date of Survey : 11/6/97
2) Time : 1016 hrs
3) Line No : Y=3475
4) Course : 180° (N-S)
5) Remarks : Echo Sounder.
Craft stopped over
wreck position for
lead line measurement.

11. Jun. Co. No. Y = 3475



Area H

[Side Scan Sonar] 30m

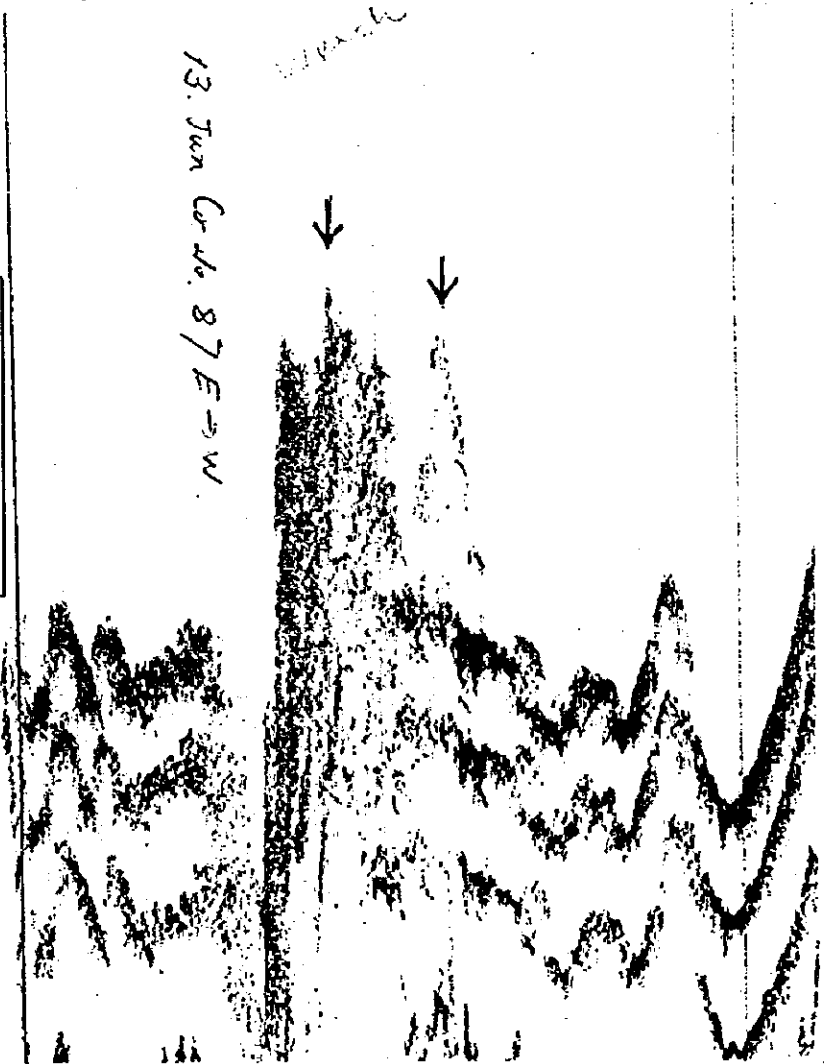
Area H
1) Date of Survey : 31/5/97
2) Time : 1337 hrs
3) Line No : Co, 89
4) Course : 090° (W-E)
5) Remarks : Side Scan Sonar.

Position (WGS-84)
1° 11' 14" N
103° 50' 02" E



[Echo Sounder]

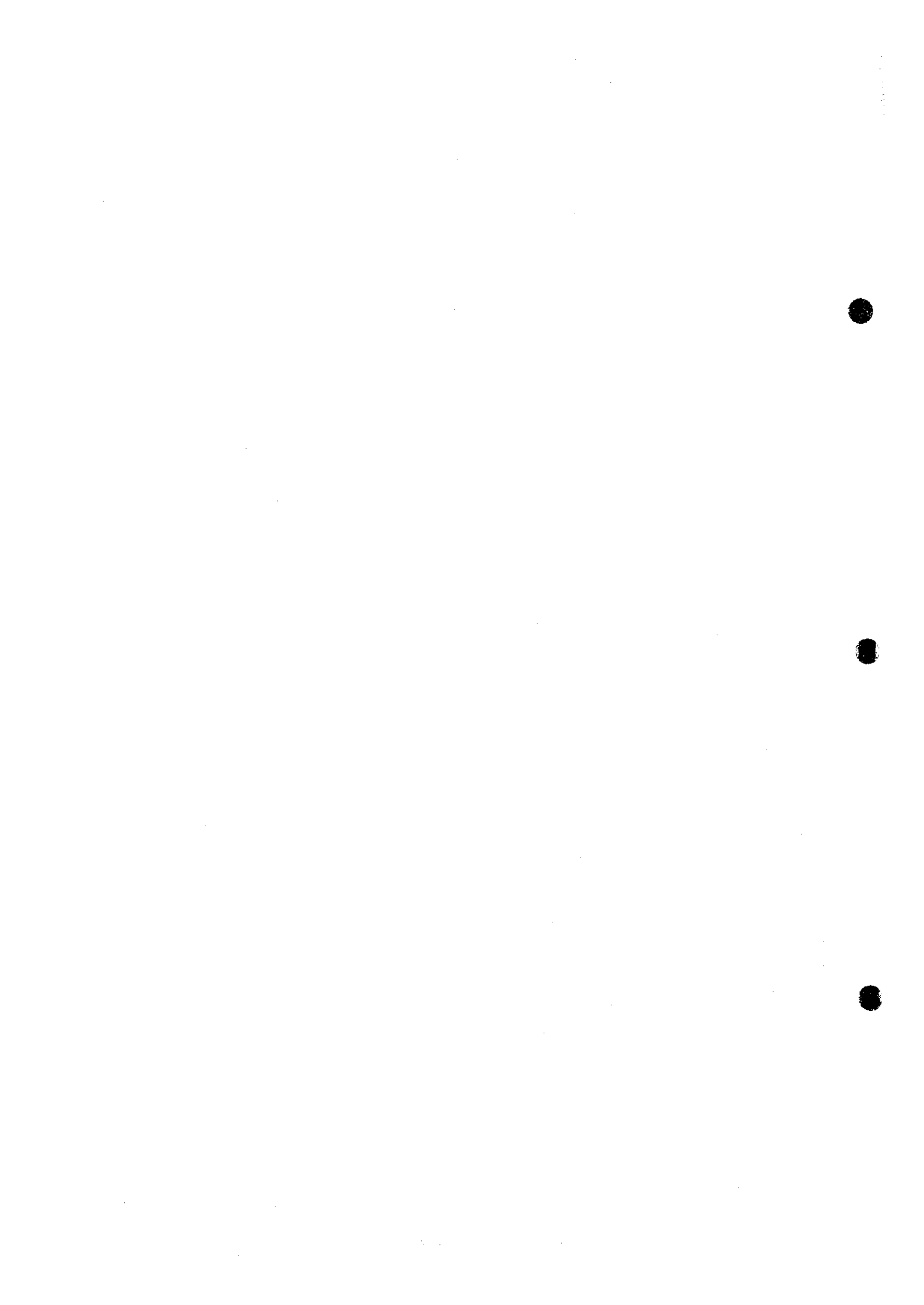
Area H
1) Date of Survey : 13/6/97
2) Time : 1051 hrs
3) Line No : Co, 87
4) Course : 270° (E-W)
5) Remarks : Echo Sounder.



Records of Sunken Wreck

Appendix 9

Records of Sand Waves



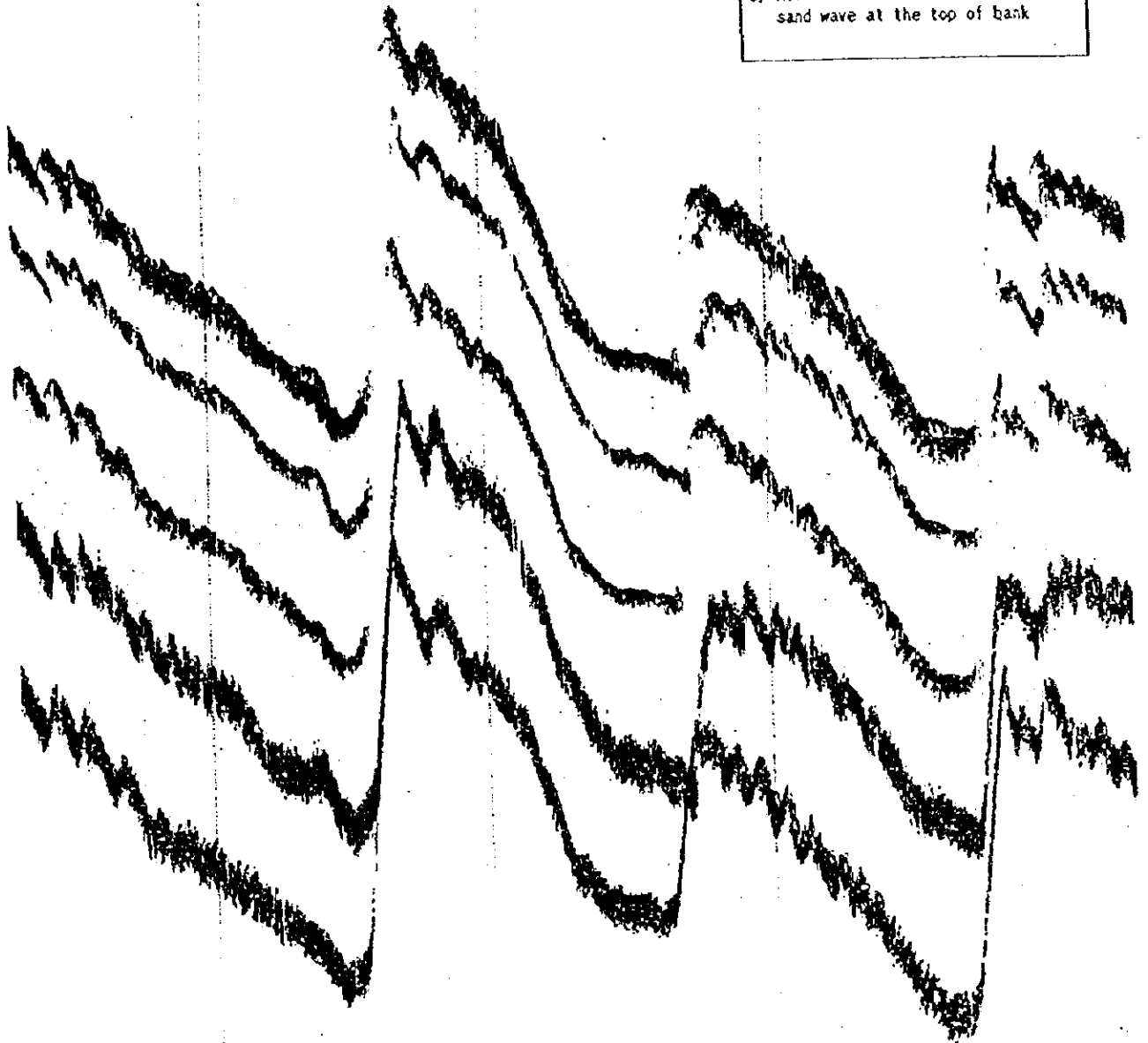
Area A-a

31.79M	30.86M	29.40M
32.41M	31.88M	30.60M
32.87M	32.15M	29.57M
32.09M	31.11M	29.12M
20M+2.0%	20M+2.0%	

CL
J
O

Area A-a (Echo Sounder)

- 1) Date of Survey : 17/10/97
- 2) Time : 1115 hrs
- 3) Line No. : Co. 113
- 4) Course : 90° (W-E)
- 5) Remarks :
sand wave at the top of bank



Records of Sand Wave

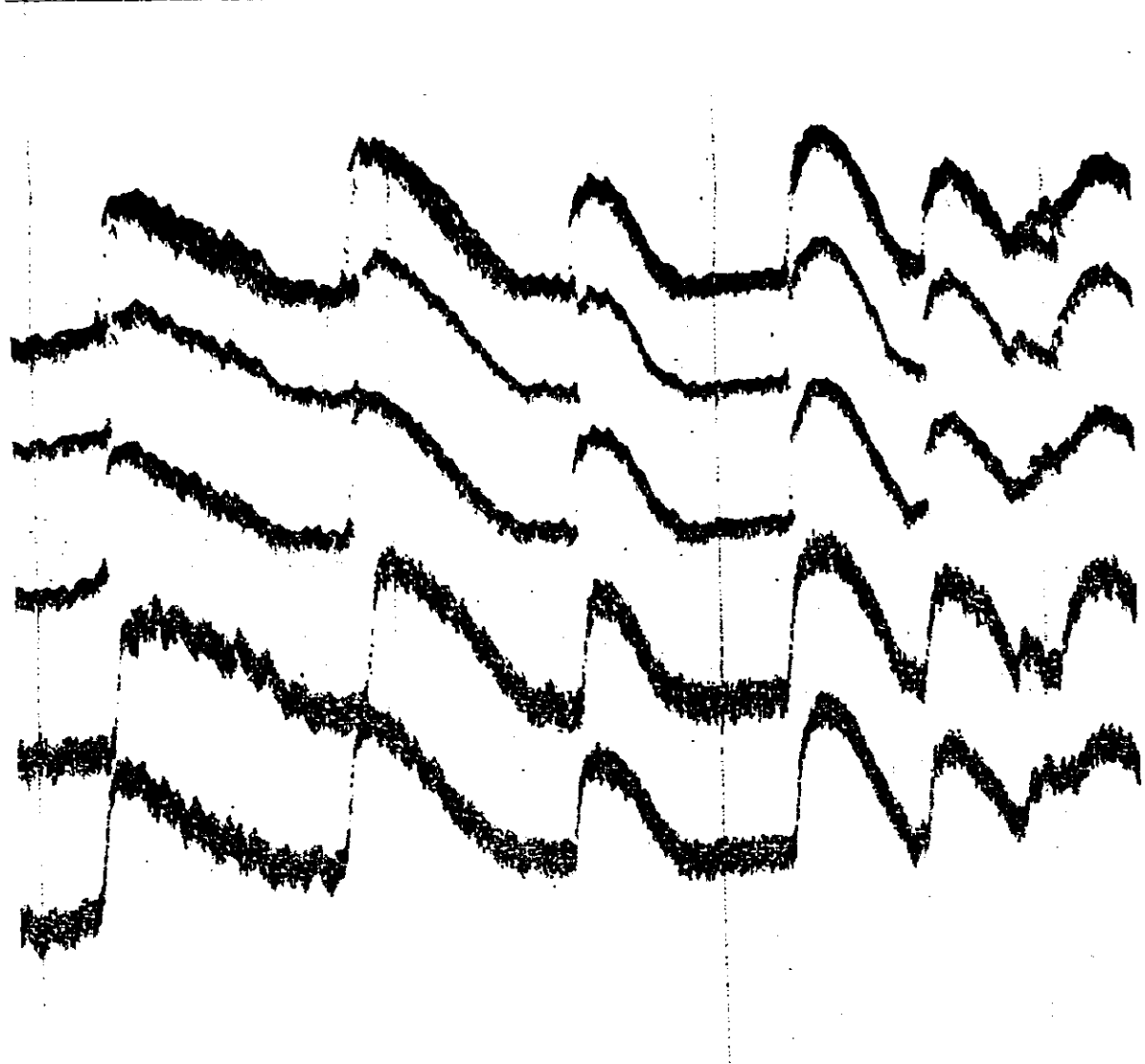
Area A-b

Area A-b (Echo Sounder)

- 1) Date of Survey : 12/10/97
- 2) Time : 1640 hrs
- 3) Line No. : Co, 185
- 4) Course : 90° (W-E)
- 5) Remarks : sand wave at the top of bank

27.64M	23.33M	25.63M
28.10M	23.91M	26.37M
28.45M	23.82M	25.05M
27.79M	23.47M	24.94M
20M+2.0%		

9/1
17A
3.14



Records of Sand Wave

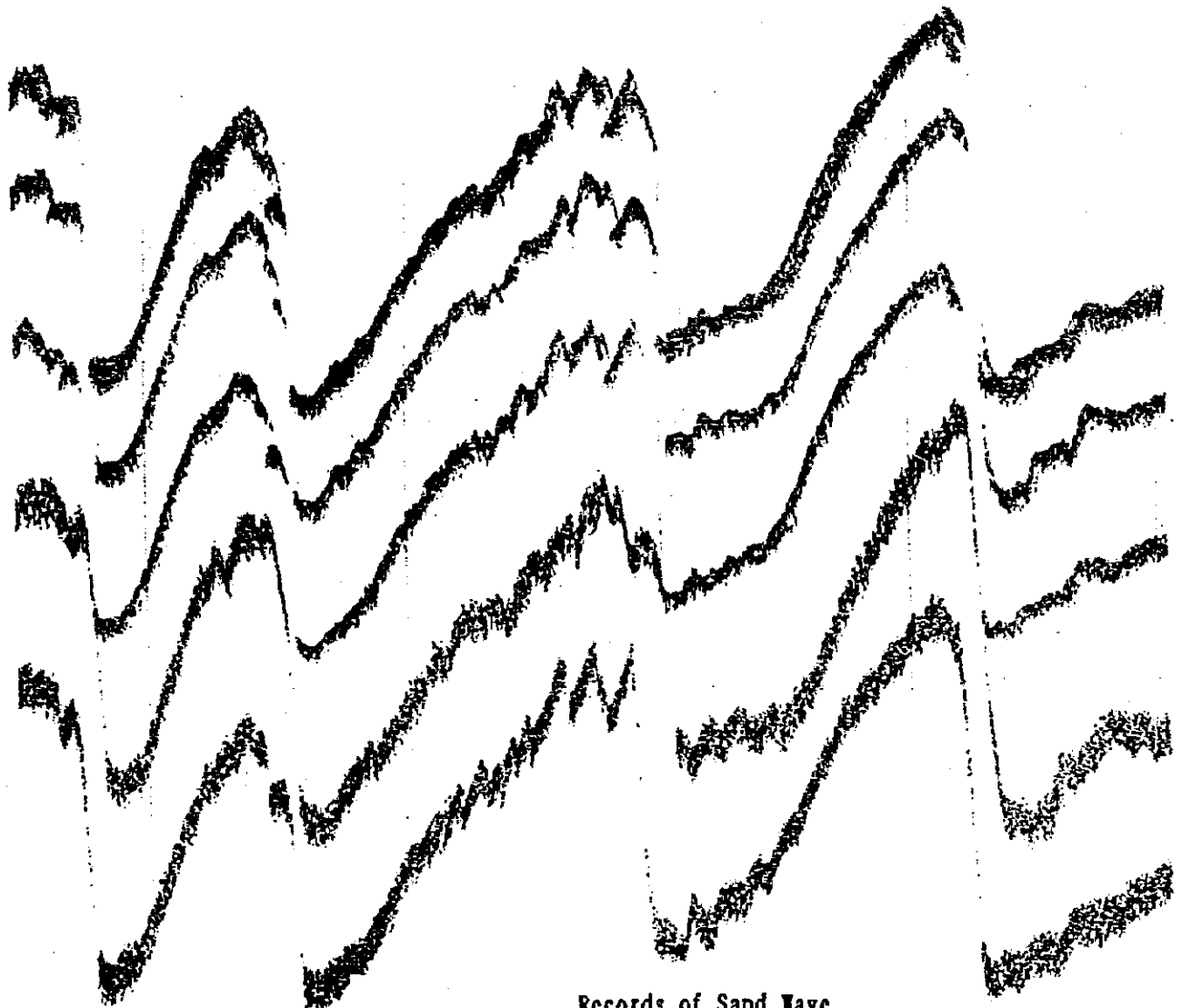
Area A-c

		31.15M
	34.42M	32.30M
	39.23M	33.65M
	38.05M	30.90M
2011+2.58		2011+2.58

1040 172

1070

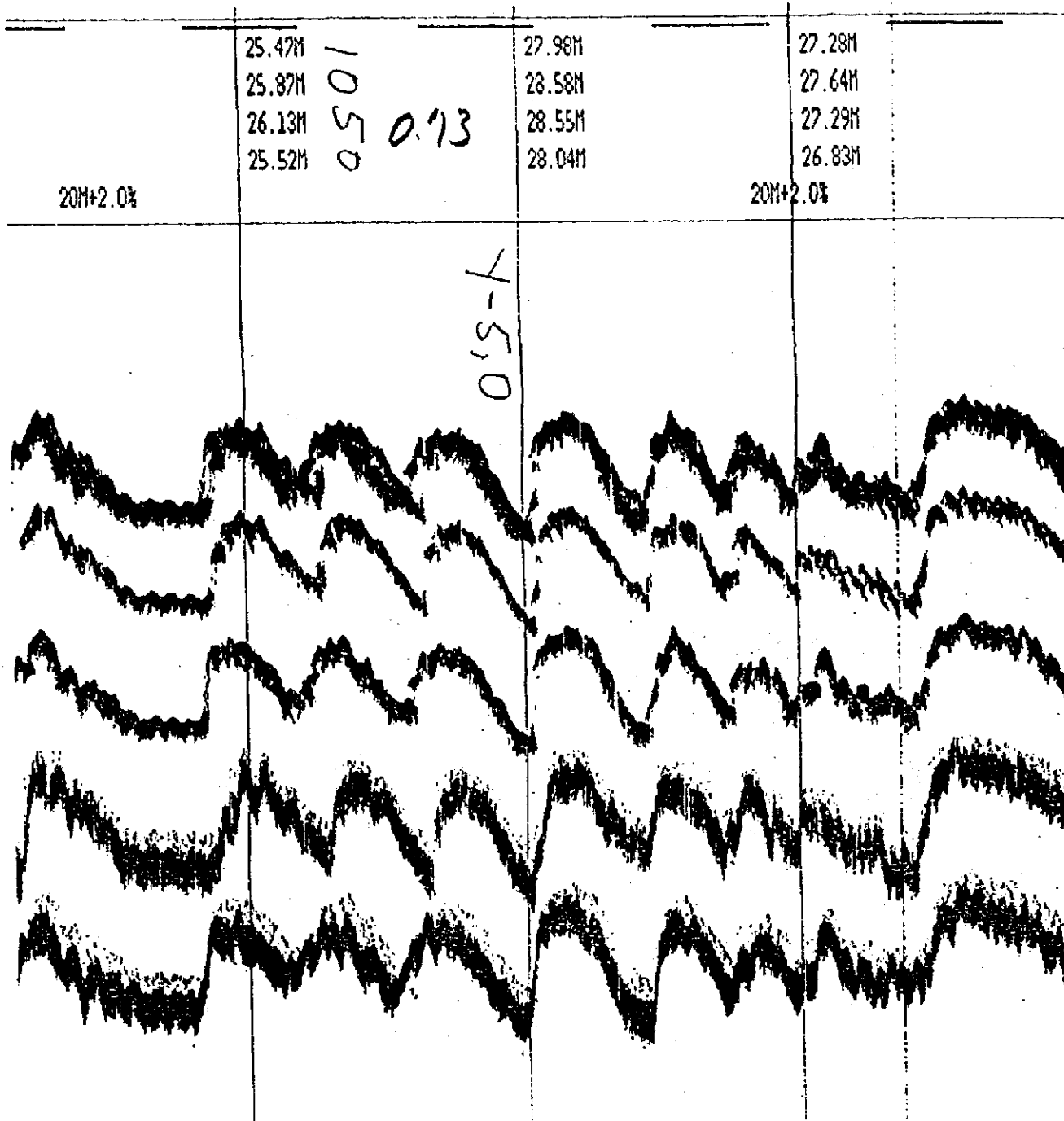
Area A-c (Echo Sounder)	
1) Date of Survey :	15/11/97
2) Time :	1040 hrs
3) Line No. :	Co, 79
4) Course :	270° (E-W)
5) Remarks :	sand wave at the foot of bank



Records of Sand Wave

Area A-d

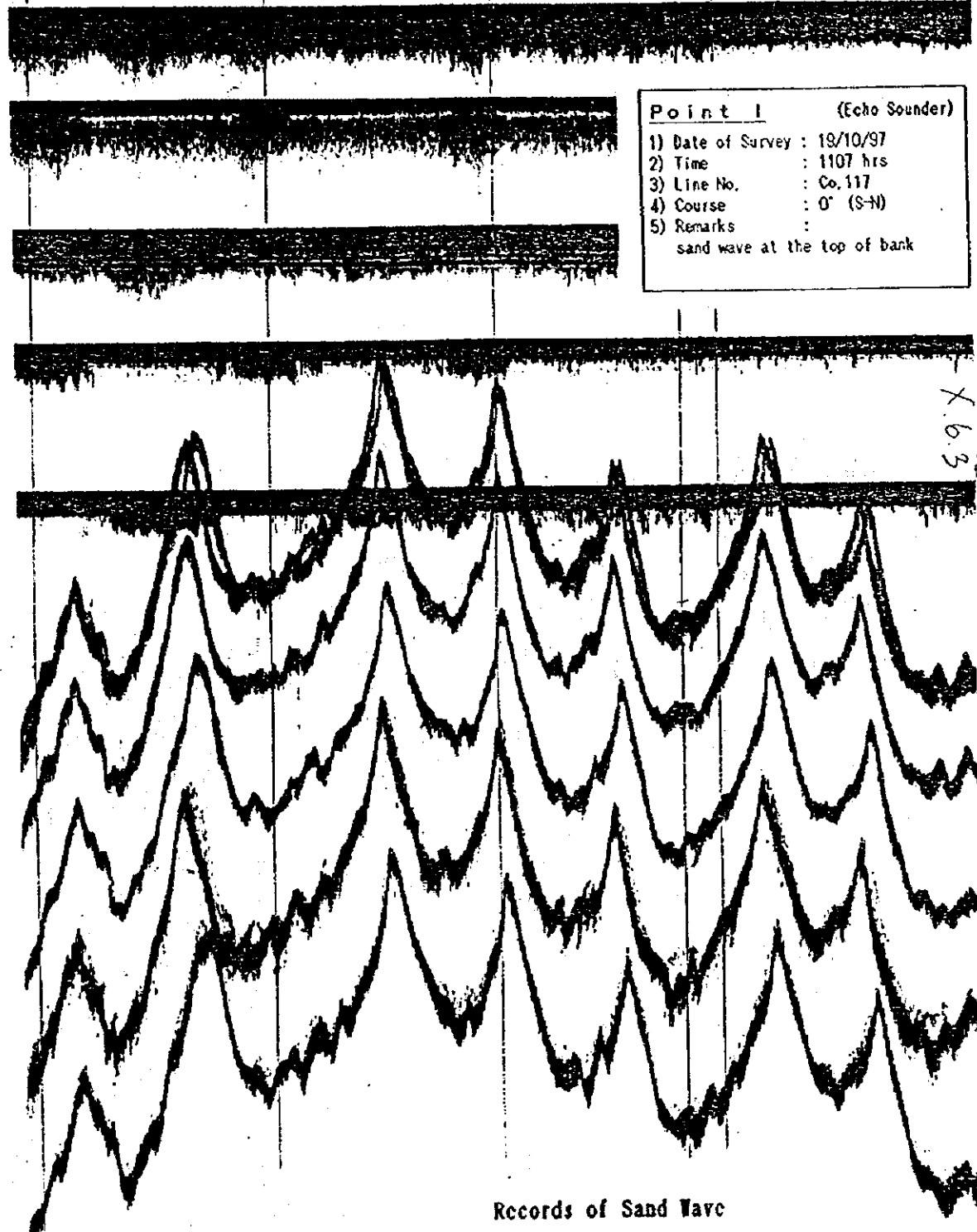
Area A-d (Echo Sounder)	
1) Date of Survey :	15/10/97
2) Time :	1050 hrs
3) Line No. :	Co. 149
4) Course :	90° (W-E)
5) Remarks :	sand wave at the entrance to southeast bound of TSS



Records of Sand Wave

Area 1

19.47M	16.47M	Point 1	16.56M
19.98M	16.58M	19/9 11:07	16.62M
20.29M	16.67M	Co 117 S-N	17.32M
19.99M	16.74M	0M+2.0% 8.4M	16.71M
			222 = 6



Point 1 (Echo Sounder)

- 1) Date of Survey : 19/10/97
- 2) Time : 1107 hrs
- 3) Line No. : Co. 117
- 4) Course : 0° (S-N)
- 5) Remarks : sand wave at the top of bank

Records of Sand Wave

Area k

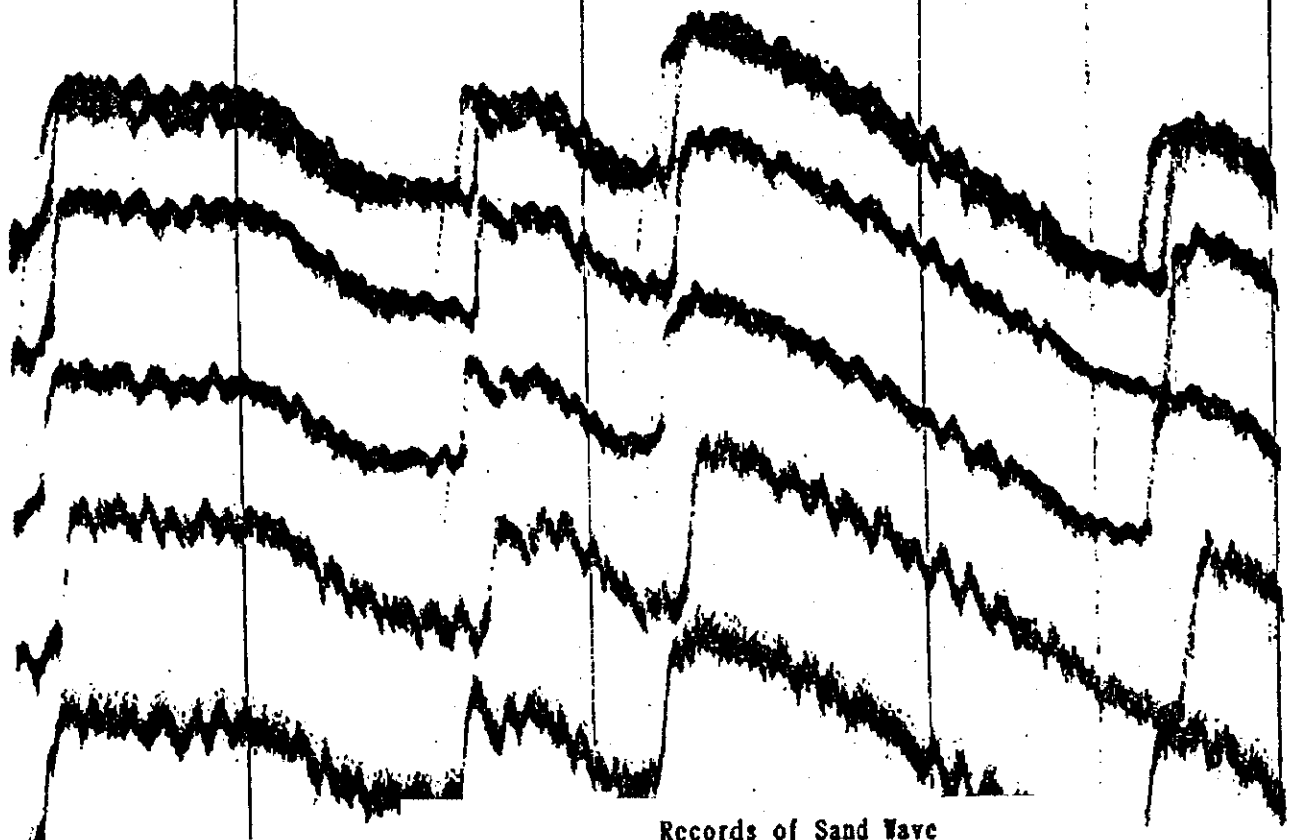
17.78M
18.25M
18.43M
18.14M

18.58M
19.01M
19.83M
19.12M
DM+2.0%
13.6 m

Point k
1/2 16:33
Co. 71 W →

18.95M
19.68M
19.49M
19.16M

Point k (Echo Sounder)
 1) Date of Survey : 02/11/97
 2) Time : 1633 hrs
 3) Line No. : Co. 71
 4) Course : 90° (N-E)
 5) Remarks :
 sand wave at the top of bank



Records of Sand Wave

1

2

3



JICA