2. Questionnaire及びその集計結果

（相手国関係機関用）

FOLLOW-UP TEAM
FOR
JICA EX-PARTICIPANTS
OF
GROUP TRAINING COURSE
IN
HYDROGRAPHIC SURVEY (INTERNATIONALLY ACCREDITED CATEGORY B COURSE),
PHYSICAL OCEANOGRAPHIC SURVEY and
NAUTICAL CHARTING

Questionnaire
for
the Relevant Authorities
in

It is much appreciated if you would complete this questionnaire and forward to the JICA office in order to accomplish our mission.
Please use additional sheet of paper and attach it herewith, if necessary.

* Name of Your Organization : _____

* Please explain briefly duties or services of your organization.

* Please attach an organization chart herewith.

JICA has been conducting the group training courses in Hydrographic Survey (Internationally Accredited Category B Course) annually and Physical Oceanographic Survey and in Nautical Carting every other year in accordance with the purpose and objective specified in Annex 1,2 and 3 respectively.

QUESTIONS

1. To which course mentioned below have your organization sent your staff members as participants?
   ( ) HYDROGRAPHIC SURVEY (INTERNATIONALLY ACCRDITED CATEGORY B COURSE)
   ( ) PHYSICAL OCEANOGRAPHIC SURVEY
   ( ) NAUTICAL CHARTING

2. Do the purpose and objective of each course accommodate the requirements of each field in your country ? (see Annex 1,2 and 3)
   ( ) Yes / ( ) No
   If "No", please describe the reason(s).

* HYDROGRAPHIC SURVEY (INTERNATIONALLY ACCRDITED CATEGORY B COURSE)

* PHYSICAL OCEANOGRAPHIC SURVEY

*NAUTICAL CHARTING

3. Is it necessary to change the above-mentioned purpose and objective in order to accommodate more adequately your country's requirement in each field?

( ) Yes / ( ) No

If "Yes", please describe your suggestion(s) or alternative purpose or objective(s).

4. How do you select your applicant for the JICA training course ? Please explain in detail your procedures for application.
(ex. Criteria of applicants, kinds of examinations or interviews and so on.)

5. How long do you usually need to select your applicant(s) ?

_____ month(s) _____ week(s) _____ day(s)

6. From which organization did you get the information of this training course (From whom did you get General Information (G.I) of this training course ?) and how did you inform it to the candidate in your organization ?

7. Does your organization evaluate your participants after returning from Japan ?

( ) Yes / ( )No

If "Yes", please tell how your organization evaluates.

8. Have your organization assigned your staff member or the relevant personnel in this field to participate in a similar training course/seminar in a foreign country other than Japan ?

( ) Yes / ( ) No

If "Yes", specify the following:

- Country : _____
- Year : 19 ___
- Name of Course/Seminar : _____
- Duration : ___ year(s) ___ month(s) ___ week(s)
- Organized by : _____
- Sponsored by : _____

- Country : _____
- Year : 19 ___
- Name of Course/Seminar : _____
- Duration : ___ year(s) ___ month(s) ___ week(s)
- Organized by : _____
- Sponsored by : _____

- Country : _____
- Year : 19 ___
- Name of Course/Seminar : _____
- Duration : ___ year(s) ___ month(s) ___ week(s)
- Organized by : _____
- Sponsored by : _____

9. Compared with the training course or seminar held in a foreign country other than Japan, do you have any suggestion or comment for improving our training course ?

10. Do you have any request concerning each course in order to accommodate more adequately your countries' requirement in respective field ?
If "yes", please describe it below.

* HYDROGRAPHIC SURVEY (INTERNATIONALLY ACCREDITED CATEGORY B COURSE)

* PHYSICAL OCEANOGRAPHIC SURVEY

* NAUTICAL CHARTING

11. Please answer technical questions below.

HYDROGRAPHIC SURVEY (INTERNATIONALLY ACCREDITED CATEGORY B COURSE)

(1) Purpose

The course in designed to upgrade knowledge of modern theory and technique of hydrographic survey for personnel engaged in the field of nautical charting and port and near shore surveys at the Category B level of the International standards of Competence for Hydrographic Surveyors.

For acquisition and processing of hydrographic survey data, the knowledge and technique now available and employed by the Hydrographic Department of Japan Maritime Safety Agency will fully be utilized.

The training course is also aimed at promoting friendly and cooperative relationship among participants as well as participants and members of the Hydrographic Department of Japan which will contribute to the future international hydrographic activities.

(2) Objective

In line with the International Standards, lectures and practice on hydrographic survey and data processing and related subjects will be given to the participants in the classroom and in the field. The theoretical and technical knowledge given in the lectures will be applied in the practical field training, where the participants will be exposed to and become familiar with various survey instruments, survey methods and procedures for conducting hydrographic survey operations. Observation and study tours will also be made to various research institutions, survey equipment manufacturers and other related organizations in the public and private sectors in Japan.

Upon successful completion of the training programme, the participants will acquire the extensive theoretical knowledge on hydrography and its related science and develop the technical capability to conduct hydrographic surveys, covering from and initial stage of survey planning to preparation of survey results in the form of a smooth sheet and survey report at the final stage, so as to be able to:

(1) prepare an execution plan of a hydrographic survey which meets the requirements for prescribed accuracy and specifications;

(2) use various survey instruments properly;

(3) carry out various typed of hydrographic surveys in accordance with their execution plans prepared;

(4) calculate, process and evaluate hydrographic survey data acquired; and

(5) prepare a final tracing or smooth sheet and a report of hydrographic survey carried out.

PHYSICAL OCEANOGRAPHIC SURVEY

(1) Purpose

The purpose of the course is to provide participants with basic/modern theoretical knowledge of oceanography as well as practical knowledge and techniques through lectures, practices, field training and observation and study tours.

The theoretical and technical knowledge given in the lectures will be applied in the practices and field training, where the participants will be exposed to and become familiar with various oceanographic instruments, observation methods and procedures for conducting an oceanographic observation, and they will become aware of the problems often encountered by a researcher in operations.

In addition, the participants will acquire the extensive theoretical knowledge oceanography and its related science and develop the technical capability to conduct and oceanographic observation including tide and tidal stream observations in coastal and offshore areas, covering from and initial planning stage to the compilation of the results of observations in the form of a report through the field training on board survey vessels.

The training course is also aimed at promoting friendly and cooperative relationship between the participants' countries and Japan in oceangraphic activities.

(2) Objective

At the end of the training period, the participants are expected to be able to:

(1) prepare and execution plan of an oceanographic observation which meets the requirements for the prescribed accuracy and specifications.

(2) use various oceanographic instruments properly;

(3) carry out various typed of observations in accordance with their execution plans prepared;

(4) calculate, process and evaluate oceanographic data acquired;

(5) prepare a final tracing and a report of oceanographic observation carried out.

Nautical Carting

(1) Purpose

The purpose of the course is to provide participants with:

(1) modern theory of nautical charting based on the format established by the International Hydrographic Organization and

(2) Knowledge and technique in drawing thematic charts to be used for preservation of marine environment and utilization of the ocean.

In addition, the participants will be trained to become familiar with computer mapping technology, because the information science is developing day by day and so are the needs for the computers.

(2) Objectives

The participants will be given lectures, practical training, observation tours to acquire the extensive theoretical and practical knowledge and techniques on nautical charting.

At the end of the training period, the participants are expected to be able to:

(1) process and evaluate hydrographic data and information including natural and social features,

(2) prepare and execution plan to publish nautical charts and other marine information maps,

(3) compile nautical charts and other hydrographic publications,

(4) use various charting instruments properly,

(5) exchange information on nautical charts and update them.

The total number of ex-participants in Egypt up to date accumulates for the course.

QUESTIONNAIRE

(HYDROGRAPHIC SURVEY)

1. Is a Hydrographic survey system supported by electronic comp ter in your organization?

2. Did you try to survey the use of the Transit Satellite System?

3. Did you survey the use of seismic profiler and side-scansonor?

4. Have you managed and preserve good results of the hydrographic sur ey?

   ex. Floppy disk with data filing or micro-film with data sheet

(PHYSICAL OCEANOGRAPHIC SURVEY)

1. Tidal observation

(1)How do you manage operate tide stations?

(2)Type of tidal gauge used

a. Do you use the floating type tide gauge?

b. What is the diameter of the tide well?

c. If you use the paper recording type gauge.

c.- 1 Which type of paper recording do you have ?
daily / weekly / monthly

c.- 2 How many scales are there in the tidal gauge?

d. If you do not use the paper recording type, what recording type do you have?

(3) Do you derive a daily mean sea level and monthly mean sea level from hourly height readings?

(4) Do you send tidal data to international organizations,etc.
(ex. GLOSS ?)

2. Tidal stream observation

(1) What type of a tidal stream meter do you have?

(2) How many days do you spend for the tidal current observation?

(3) Do you calculate harmonic constants of tidal currents?

3. Others

(1) What type of personal Computer is used for data processing?

(2) What operating system do you have?

(3) What programming Language do you have?

(NAUTICAL CHARTING)

1. Have you ever used Chart Specification of the IHO for nautical cha ting?

2. For arrangement in both compilation and drawing sections.

3. What type/models of instruments are currently used in your office for nautical charting?

4. Where do printing and the issue of charts take place?

Present situation in the publication of your nautical charts.

5. Number of issues for one year?

6. Kinds of charts?

7. In kind of field are your charts used?

8. Have you prepared your own chart original films, or prepared reproduction charts based on foreign original films?

   What is the ratio both charts?

(帰国研修員用)

FOLLOW-UP TEAM
FOR
JICA EX-PARTICIPANTS
OF
GROUP TRAINING COURSES
IN
HYDROGRAPHIC SURVEY (INTERNATIONAL ACCRDITED CATEGORY B COURSE)
PHYSICAL OCEANOGRAPHIC SURVEY
NAUTICAL CHARTING

Questionnaire for JICA Ex-Participants

You are kindly requested to complete this questionnaire and forward to JICA office. Please use additional sheet of paper and attach it herewith, if necessary.

1. Name of the course you've attended_____

2. Your Name and the Year of Participation (Fill in the below.)
(Please underline your surname or family name.)

Mr./Ms._____ 19__

3. Your Address & Phone Number (Fill in the below.):

· Residence_____ _____
_____ _____
_____ _____
Phone:_____ Fax.No.:_____ _____

· Mailing _____ _____
_____ _____
_____ _____

· Office _____ _____
_____ _____
_____ _____
Phone:_____ Fax.No.:_____ _____

4. Present Occupation (Fill in the below.):

- Position _____ _____
- Division or Department _____ _____
  _____ _____
- Name of Your Organization _____ _____
  _____ _____
- Type of Your Organization ( ) Governmental
  ( ) Local Governmental/Publi :
  ( ) Semi-Governmental
  ( ) Non-Governmental/Private

5. Your Career and Duties (Answer the below three questions.)

5-① Describe your career after returning home from Japan.

(Service Duration)				(Your Position)	(Organi zation Name
(Month)	(Year)	(Month)	(Year)		
①_____.	19__ ~	_____.	19__	_____	____ _____
②_____.	19__ ~	_____.	19__	_____	____ _____
③_____.	19__ ~	_____.	19__	_____	____ _____
④_____.	19__ ~	_____.	19__	_____	____ _____
⑤_____.	19__ ~	_____.	19__	_____	____ _____

5-② Describe briefly the duties of your services in your countr / at present.

5-③ Attach a chart of the organization to which you belong and indicate your section in annexed paper.

* Attach paper.

6. Applicability of the training course (Answer the below questions.

6-① To who and in what way did you report the knowledge and information which you had gained in Japan?

*To who _____

*In what way _____

6-② Which subject of knowledge and experience of the course could you apply to your job?

6-③ How did you applied them?

6-④ Point out difficulties, if any, in applying the knowledge and experience you acquired in the course to your job.

7. Have you attended a similar training programme or seminar in the field of Hydrographic Survey, Physical Oceanographic Survey or Nautical Charting in a foreign country other than Japan ?

( ) Yes / ( ) No

7-① If "Yes", specify the following :

- Year of Participation : 19___
- Duration of Course/Seminar : ___ year(s) ___ month(s) ___ week(s)
- Name/Title of Course/Seminar : _____
- Venue of Course/Seminar : (Country Name) _____
- Organized by : _____
- Sponsored by : _____

- Year of Participation : 19___
- Duration of Course/Seminar : ___ year(s) ___ month(s) ___ week(s)
- Name/Title of Course/Seminar : _____
- Venue of Course/Seminar : (Country Name) _____
- Organized by : _____
- Sponsored by : _____

7-② Attach its training curriculum, if any.

7-③ Compared with the training course or seminar held in a foreign country other than Japan, do you have any suggestion or comment or improving our training course ?

Thank you very much for your cooperation.

質問書回答

（帰国研修員所属先機関等）

1. 省略

2. 研修は要求にあっているか

はい	7
いいえ	0

3. 研修内容に変更を行う必要があるか

はい	1
いいえ	6

① 十分な訓練は、最新の水路測量の機器と知識を利用しなければならない。

4. 研修参加のための選抜方法

(1) 中国

① 研修コースの目的と同じ作業のニーズ、健康状態及び希望に従い候補者を選ぶ

(2) スリランカ

① インタビュー

② 関連分野の最低の教育資格と経験をもち、現在、当該分野に従事しているもの

(3) エジプト

① 直属の上司の指名

5. 選抜必要な期間

(1)	中国	3ヵ月
(2)	スリランカ	① 2週間
		② 1ヵ月
(3)	エジプト	① 1週間
		② 3週間

6-1. G. I. の入手先

(1) 中国　　国家科学技術委員会

(2) スリランカ　　Dept. of External Rexources

(3) エジプト　　The Ministry of Foreign affairs

6-2. 志願者への通知方法

(1) 中国　　志願者の所属期間から通知する

(2) スリランカ　　① 手紙による通知

② Ministry of Fisheries & Aquatic Resources を通じて手紙による通知

(3) エジプト　　手紙による通知

7. 帰国研修員の業績を評価しますか

はい　　5

いいえ　　2

(1) 中国

① 帰国研修員は、帰国後、詳細な概報を書き、所属期間を通じて帰国研修員の業績を担当部局が調査する。担当部局は研修員が学んだ知識を仕事に適用することを調査するため所属機関にでかける。

(2) スリランカ

① 帰国研修員は、帰国後、報告書を提出しなければならない。

(3) エジプト

① 帰国研修員からの概報を要求し、検討するため直属の長へ概報を提出する。報告を提出し、責任者へ意見を提出する。該当分野の向上を帰国研修員の直属の長に尋ねる。

8. 日本以外の他の国の同様の研修を職員に課していますか

はい　　4

いいえ　　4

10. 研修に関する意見

(1) 中国

・ できるならば、3コースとも職員を参加させたい。

(2) スリランカ

・ スリランカには訓練施設がないので水路測量技術者を要請する必要がある。

・ 最新の技術知識を得るために多くの訓練プログラムを計画しなければならない。

(3) エジプト

・ なし

質問書回答(帰国研修員)

1～5. 省略

6-① 日本で得た知識を誰に、どの様に報告したか。

(誰に)	上司	17	(どの様に)	報告書	10
	同僚	3		実地	8
				セミナー	4

方法(「どの様に」)については複数回答あり

6-② 仕事で生かされている研修成果

(1) 水路測量コース

- 測地学
- 地図投影法
- 自動データ処理方法
- 沿岸測量
- 港湾測量
- 測深
- 海岸線測量
- 潮汐
- 海図制作法

(2) 海洋物理調査コース

- 乗船研修
- 計算機によるデータ処理方法
- 観測及び測定技術
- データ　マネージメント
- 潮汐・潮流観測
- 波浪の研究解析
- 海洋観測計画

(3) 海図作成コース

- 測地学
- 地図投影法
- 図式
- 海図省略法
- 水路測量の作業の流れ

6-③ 研修成果をどの様に活用しているか。

(1) 水路測量コース

- 水路測量の計画
- 海底地質調査
- 底質採取
- 電波距離計、経緯儀、測深儀等の使用
- 水路測量技術者として毎日の仕事に使用
- 水路測量の必要な他の分野に援助、アドバイスを行う

(2) 海洋物理調査コース

- アンデラー験流器の使用と験潮観測
- ブイの設置や精密観測機器の選択
- A-OTT Kempten、sebu D-895、験流器 Mo-21 の使用
- 電子計算機の使用

6-④ 仕事上で研修成果を活用する上での障害

・ 問題なし	8
・ 近代的機器の欠乏	10
・ 計算機による大量な海洋データの処理	1
・ 実験が少ない	3
・ 熟練した訓練がない	4
・ 専門的サービスが必要	2
・ 日本からのアップデートされた知識、技能が途絶えている	1

7. 日本以外での水路測量、海洋物理調査または海図作成の研修に参加したことがあるか。

ある	4名
いいえ	19名

8. その他

(1) 水路測量コースに国際A級を設置する要望が2名あり

(2) 海洋物理調査コースに、海洋汚染及び今より長期間のデータ処理のコースを加える提案があった

日本以外での研修経験

	スリランカ水路測量／海洋物理調査研修員	スリランカ水路測量／海洋物理調査研修員	エジプト水路測量研修員	エジプト水路測量研修員
国名	タイ	タイ	イギリス	イギリス
機関名	Department of Marine Science Chalalongleorn University	① WMO ② ESCAP	Decca Survey Company	Decca Survey Company
後援機関名	U. N. O (I. M. O. AND I. H. O.)	① ドイツ ② UNDP		
後援機関名	1987年 2週間	① 1986年 1週間 ② 1989年 1週間	1985年 3週間	1985年 3週間
後援機関名	水路測量 海図作成	水路測量	電波測位	電波測位
後援機関名			JICA研修の方が、充実し、国際資格が得られる。	JICA研修の方が、充実し、国際資格が得られる。

質問書回答

（水路測量コース）

1. 水路測量システムで電子計算機を使用しているか

Ceylon Fishery Habours Corporation	はい	いいえ
Alexandria Port Authority	はい	いいえ
スエズ運河庁	はい	いいえ

2. 人工衛星を用いた測量を行っているか

Ceylon Fishery Habours Corporation	はい	いいえ
Alexandria Port Authority	はい	いいえ
スエズ運河庁	はい	いいえ

3. 音波探査とサイドスキャンソナーを用いた測量を行っているか

Ceylon Fishery Habours Corporation	はい	いいえ
Alexandria Port Authority	はい	いいえ
スエズ運河庁	はい	いいえ

4. 水路測量の成果の管理と保存はどの様に行っているか

スエズ運河庁	FD	マイクロフィルム

質問書回答

（海洋物理調査コース）

1. 潮汐観測

(1) 験潮所を管理運営しているか

スエズ運河庁　　はい　　いいえ

(2) 験潮器の形式

a. フロート型を使用しているか

スエズ運河庁　　はい　　いいえ

b. 験潮井戸の直径

スエズ運河庁　　20cm

c. 紙記録方式の場合

c-1 要旨の観測期間

スエズ運河庁　　日巻　　週巻　　月巻

c-2 記録の縮尺はいくらか

d. 紙記録方式でない場合、どのような記録方式を採用しているか

スエズ運河庁　　はい　　いいえ

(3) 観測値の整理として、毎正時値の月表を作成し、日平均水面、月平均水面を算出しているか

(4) 観測データは国際機関に提出しているか

スエズ運河庁　　はい　　いいえ

2. 潮流観測

(1) 保有流速計の形式

スエズ運河庁　　直読式 A-TTO

(2) 潮流観測の観測期間

スエズ運河庁　　1ヶ月

(3) 調和定数等を算出しているか

スエズ運河庁　　はい　　いいえ

3. その他

(1) データ処理に活用しているパーソナルコンピュータの機種

スエズ運河庁　　NEC 9801 Vm

(2) パーソナルコンピュータで使用している OS の種類

スエズ運河庁　　DOS

(3) プログラム言語の種類

スエズ運河庁　　Basic

質問書回答

（海図作成コース）

1. Chart Specification of the IHB（IHO海図仕様基準）が、海図作成に仕様されているか

中国測絵局	はい	いいえ
スエズ運河庁	はい	いいえ

2. 海図編集・製図分野における人員構成

	（海図編集）	（製図分野）
スエズ運河庁	9	4

3. 海図編集・製図分野で使用されている機器

中国測絵局	1/2プリンター、プロセスカメラ等
スエズ運河庁	手動、自動データ処理

4. 海図の印刷・刊行はどこで行われているか

中国	The Mapping Agency of the Navigation Guarantee

5. 海図の年間刊行数

6. 海図の種類

中国測絵局	1/2プリンター、プロセスカメラ等
スエズ運河庁	水深図、海底地形図

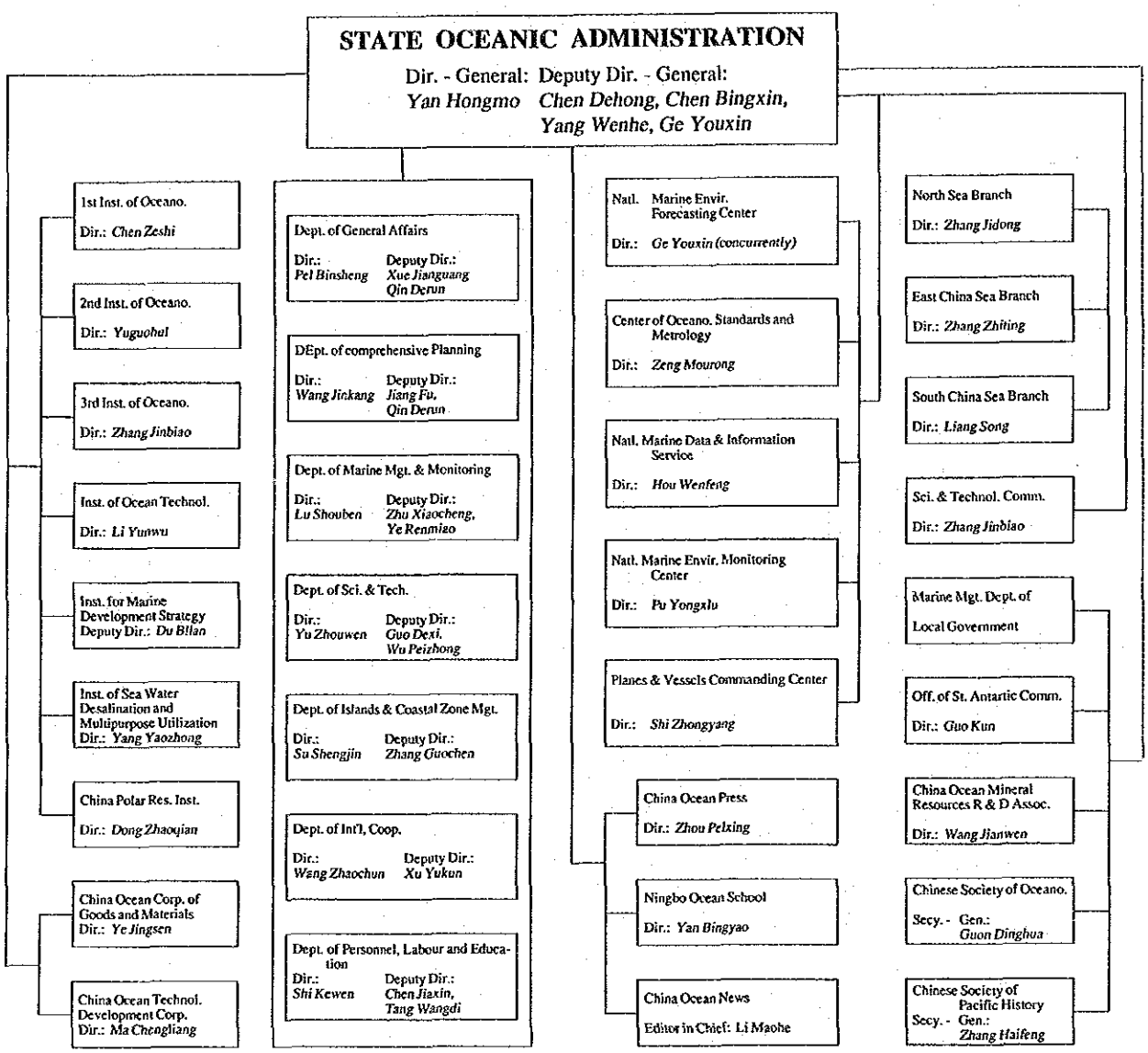
7. どのような分野において、海図は利用されているか

中国測絵局	
スエズ運河庁	ドッレジ、航海

8. フィルム原図は自国製か、それとも外国からのフィルム原図を元に複製海図が作成しているか
また、その比率はどうか

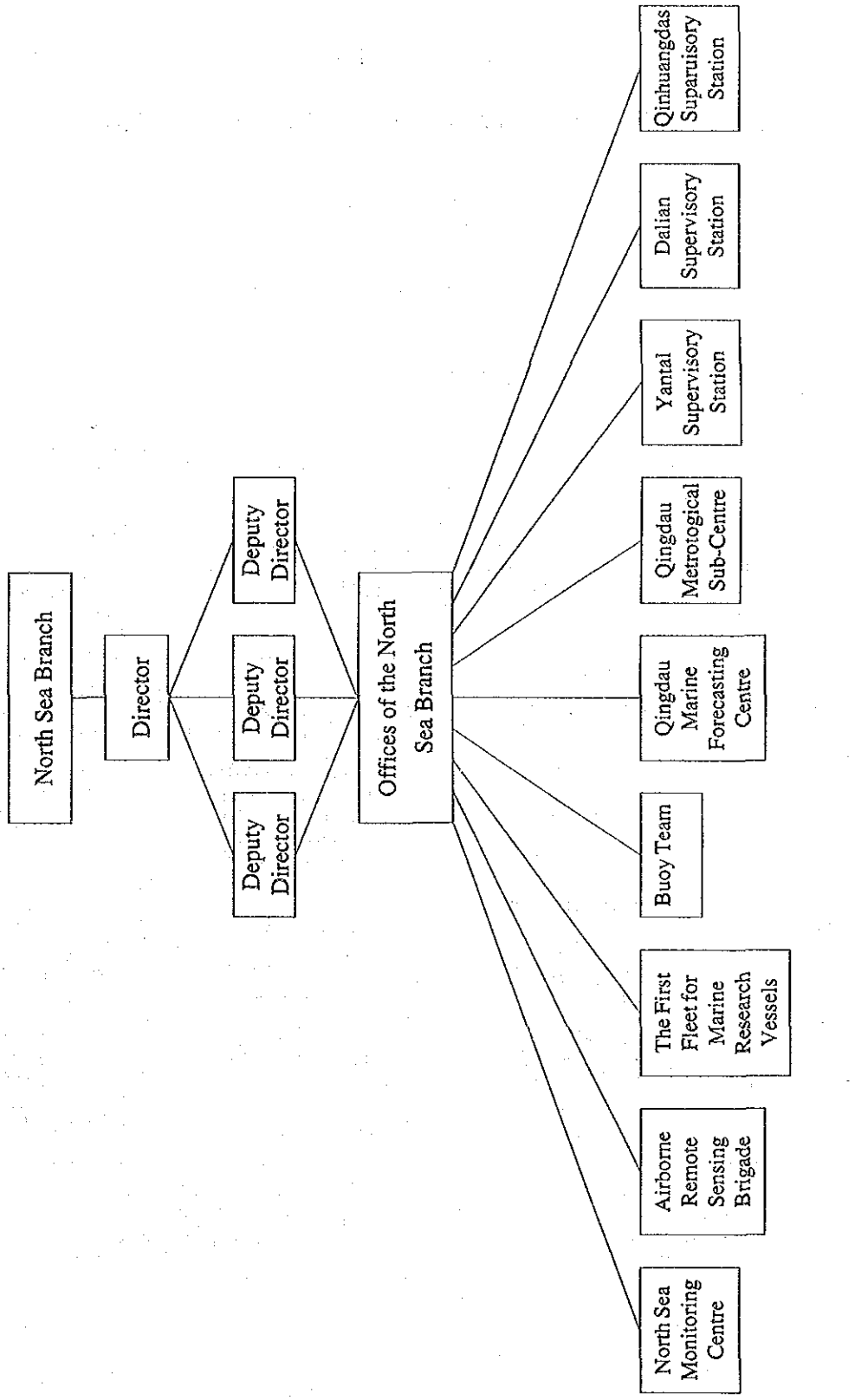
			（比率）
中国測絵局	自国製	複製海図	2.00
スエズ運河庁	自国製	複製海図	

国家海洋局　機構図


STATE OCEANIC ADMINISTRATION
Dir. - General: Yan Hongmo
Deputy Dir. - General: Chen Dehong, Chen Bingxin, Yang Wenhe, Ge Youxin
1st Inst. of Oceano.
Dir.: Chen Zeshi
2nd Inst. of Oceano.
Dir.: Yuguohui
3rd Inst. of Oceano.
Dir.: Zhang Jinbiao
Inst. of Ocean Technol.
Dir.: Li Yunwu
Inst. for Marine Development Strategy
Deputy Dir.: Du Bilan
Inst. of Sea Water Desalination and Multipurpose Utilization
Dir.: Yang Yaozhong
China Polar Res. Inst.
Dir.: Dong Zhaojian
China Ocean Corp. of Goods and Materials
Dir.: Ye Jingsen
China Ocean Technol. Development Corp.
Dir.: Ma Chengliang
Dept. of General Affairs
Dir.: Pei Binsheng
Deputy Dir.: Xue Jianguang, Qin Derun
DEpt. of comprehensive Planning
Dir.: Wang Jinkang
Deputy Dir.: Jiang Fu, Qin Derun
Dept. of Marine Mgt. & Monitoring
Dir.: Lu Shouben
Deputy Dir.: Zhu Xiaocheng, Ye Renmiao
Dept. of Sci. & Tech.
Dir.: Yu Zhouwen
Deputy Dir.: Guo Dexi, Wu Peizhong
Dept. of Islands & Coastal Zone Mgt.
Dir.: Su Shengjin
Deputy Dir.: Zhang Guochen
Dept. of Int'l, Coop.
Dir.: Wang Zhaochun
Deputy Dir.: Xu Yukun
Dept. of Personnel, Labour and Education
Dir.: Shi Kewen
Deputy Dir.: Chen Jiaxin, Tang Wangdi
Natl. Marine Envir. Forecasting Center
Dir.: Ge Youxin (concurrently)
Center of Oceano. Standards and Metrology
Dir.: Zeng Mourong
Natl. Marine Data & Information Service
Dir.: Hou Wenfeng
Natl. Marine Envir. Monitoring Center
Dir.: Pu Yongxiu
Planes & Vessels Commanding Center
Dir.: Shi Zhongyang
China Ocean Press
Dir.: Zhou Peixing
Ningbo Ocean School
Dir.: Yan Bingyao
China Ocean News
Editor in Chief: Li Maohe
North Sea Branch
Dir.: Zhang Jidong
East China Sea Branch
Dir.: Zhang Zhiting
South China Sea Branch
Dir.: Liang Song
Sci. & Technol. Comm.
Dir.: Zhang Jinbiao
Marine Mgt. Dept. of Local Government
Off. of St. Antartic Comm.
Dir.: Guo Kun
China Ocean Mineral Resources R & D Assoc.
Dir.: Wang Jianwen
Chinese Society of Oceano.
Secy. - Gen.: Guon Dinghua
Chinese Society of Pacific History
Secy. - Gen.: Zhang Haifeng

国家海洋局　北海分局機構図

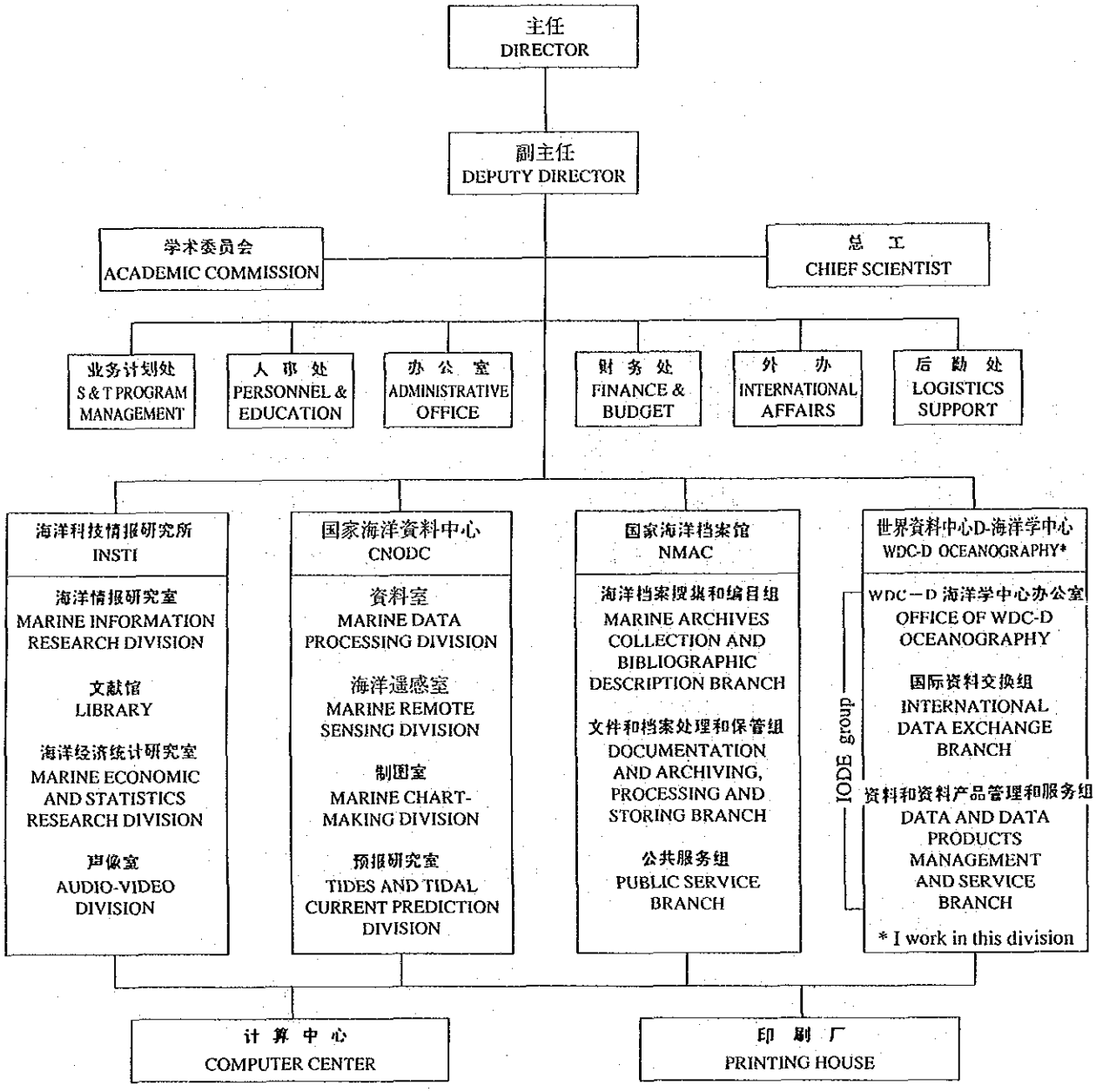
Chart of Organization



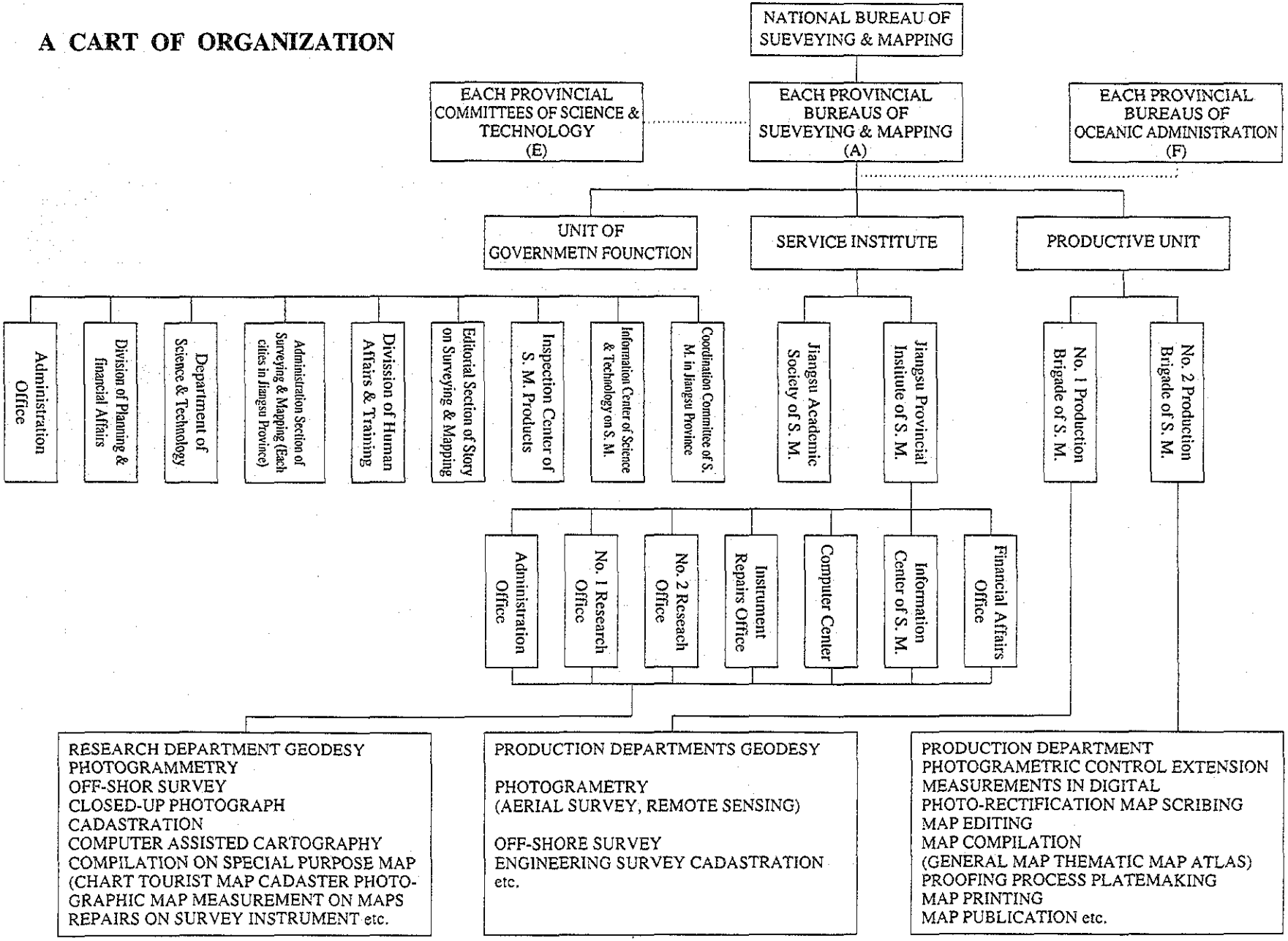
海洋データセンター機構図

国家海洋信息中心

NATIONAL MARINE DATA AND INFORMATION SERVICE

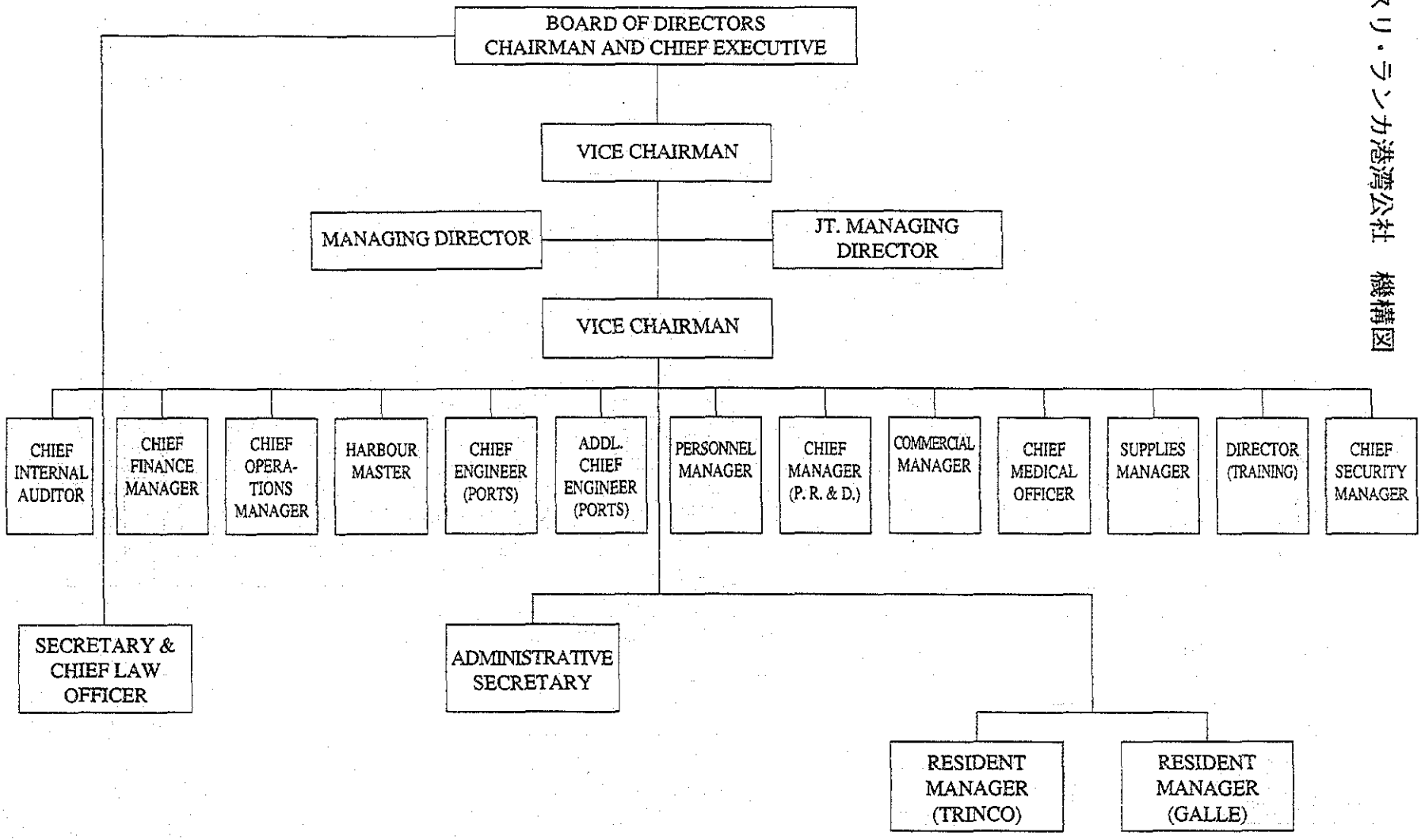


A CART OF ORGANIZATION



スリ・ランカ港湾公社　機構図

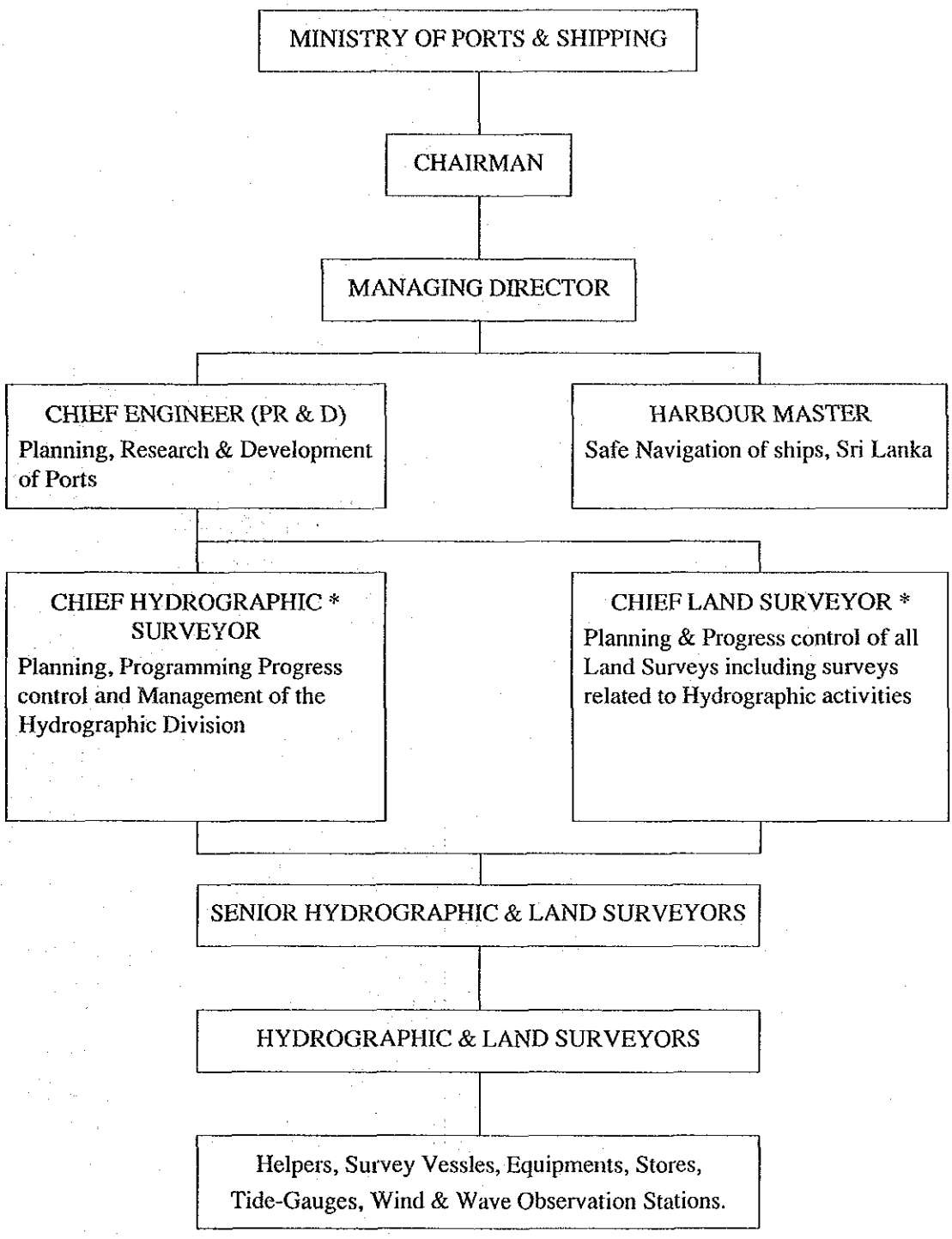
ORGANIZAITONAL STRUCTURE OF SRI LANKA PORTS AUTHORITY



ORGANIZATION CHART

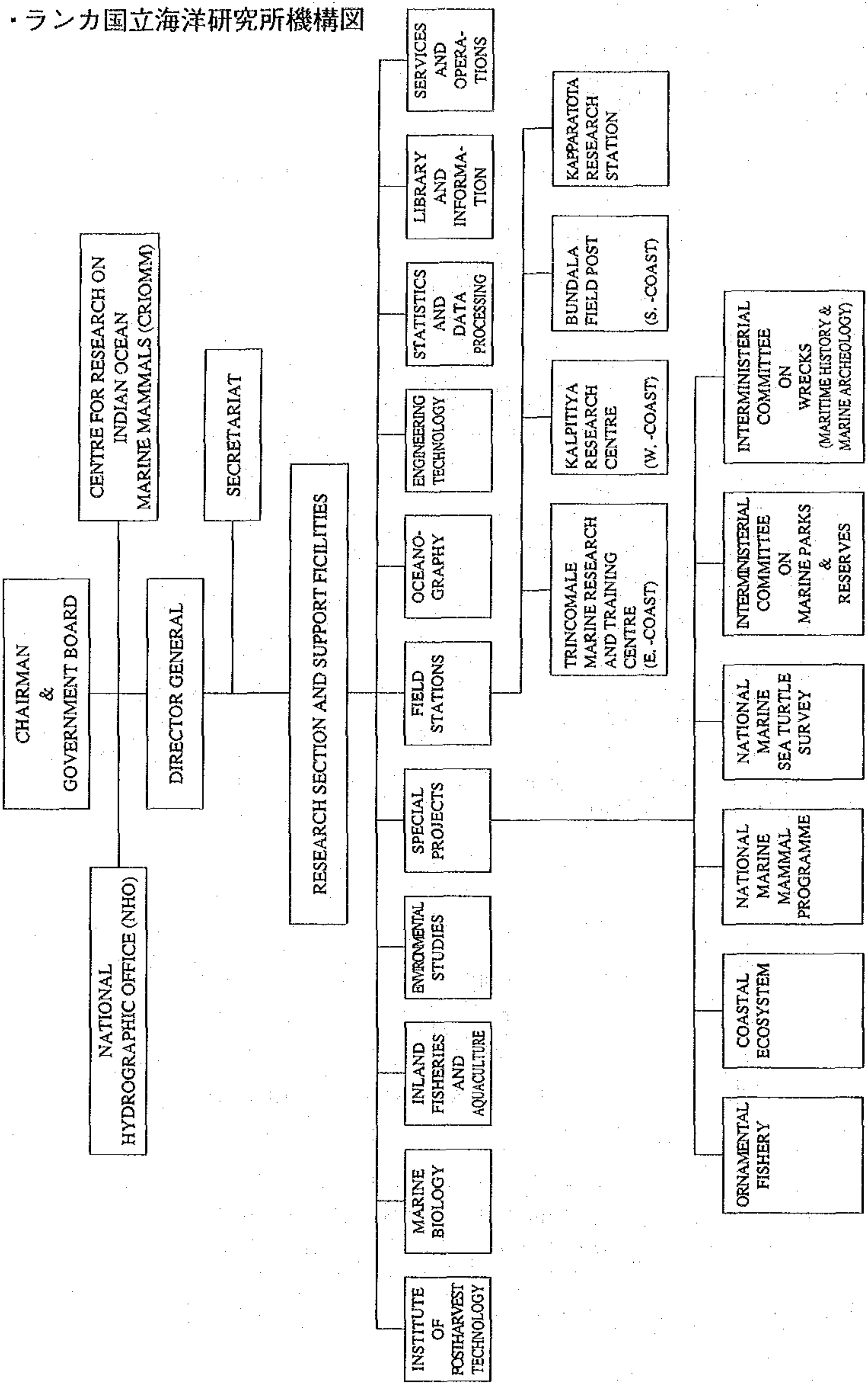
HYDROGRAPHIC OFFICE

SRI LANKA PORTS AUTHORITY

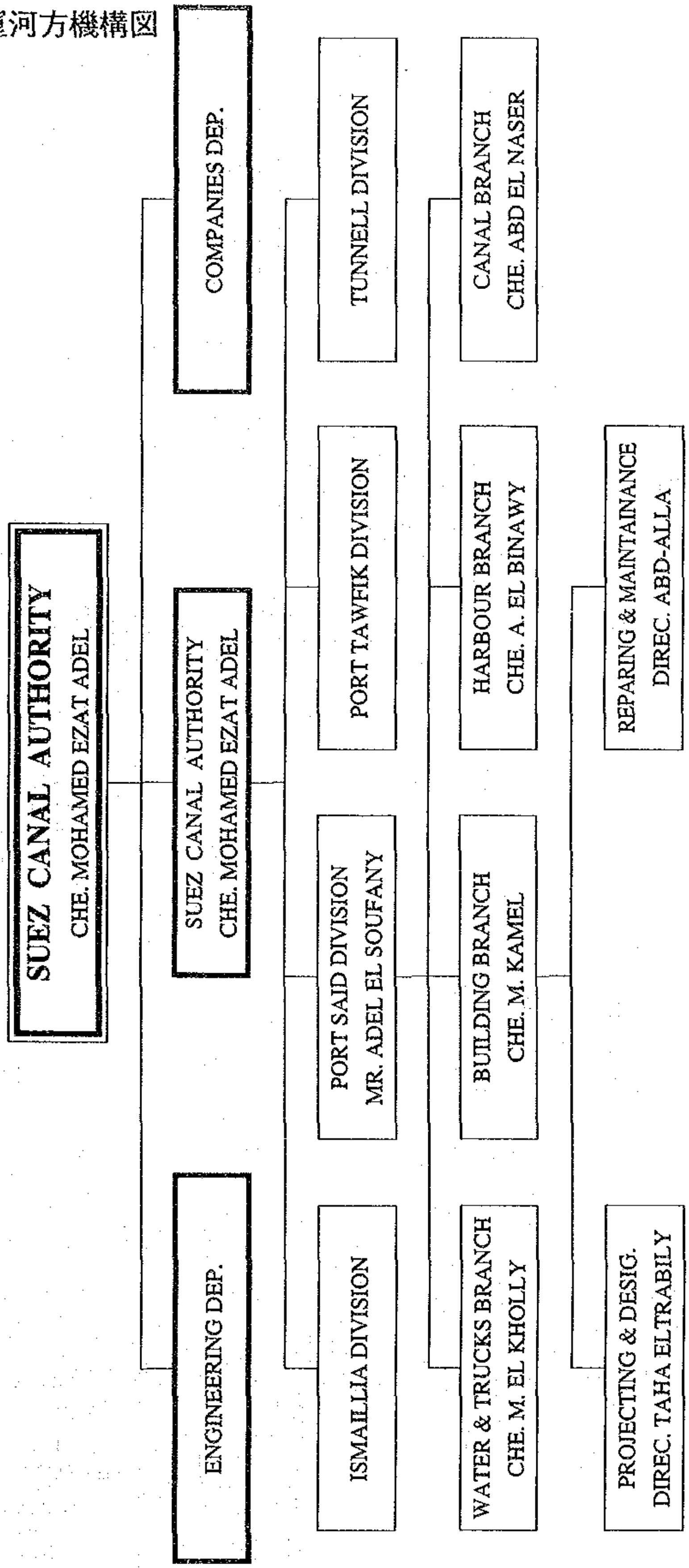


スリ・ランカ国立海洋研究所機構図

N A R A
NATIONAL AQUATIC RESOURCES AGENCY
ORGANIZATION CHART

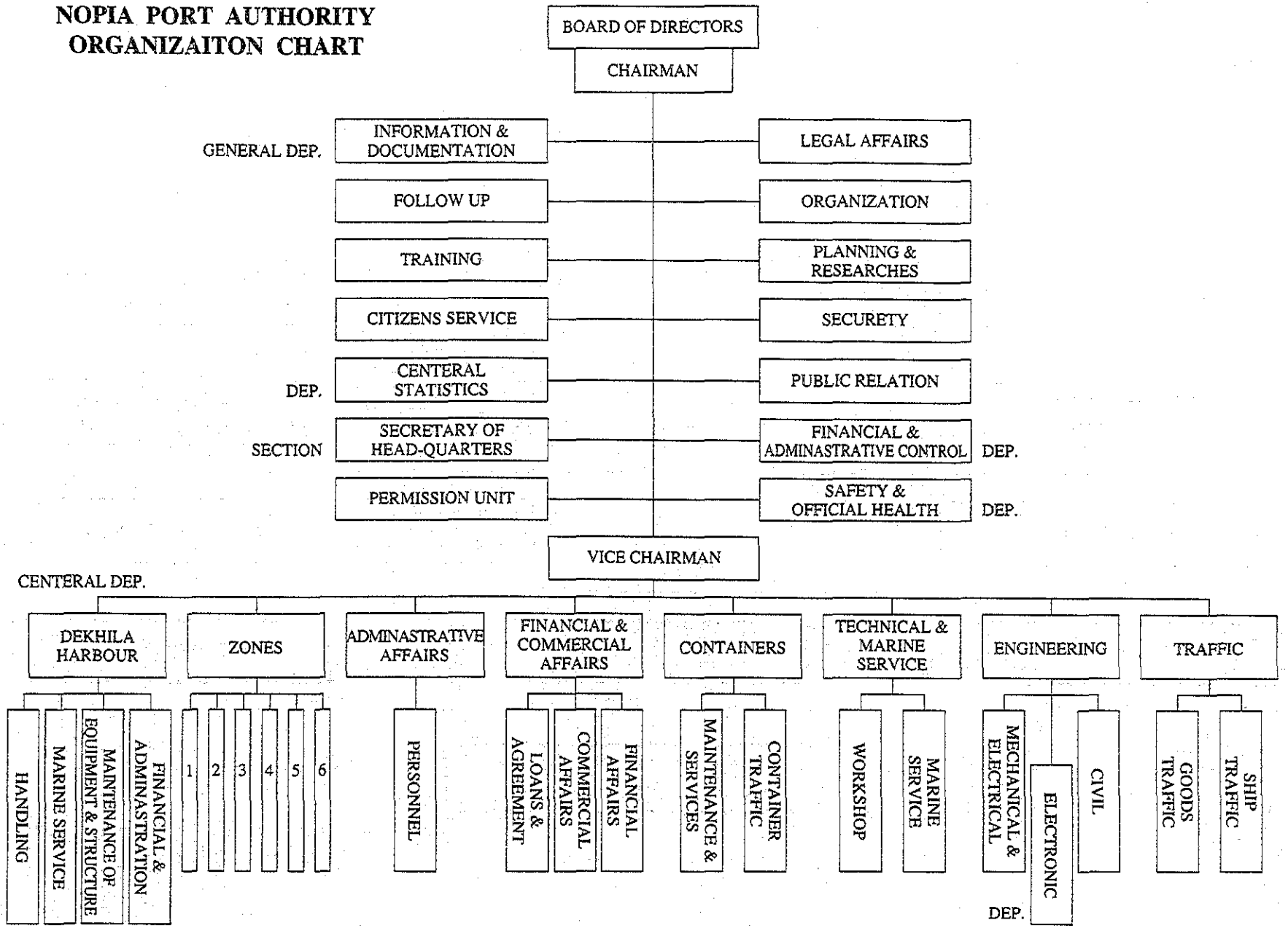


スエズ運河方機構図

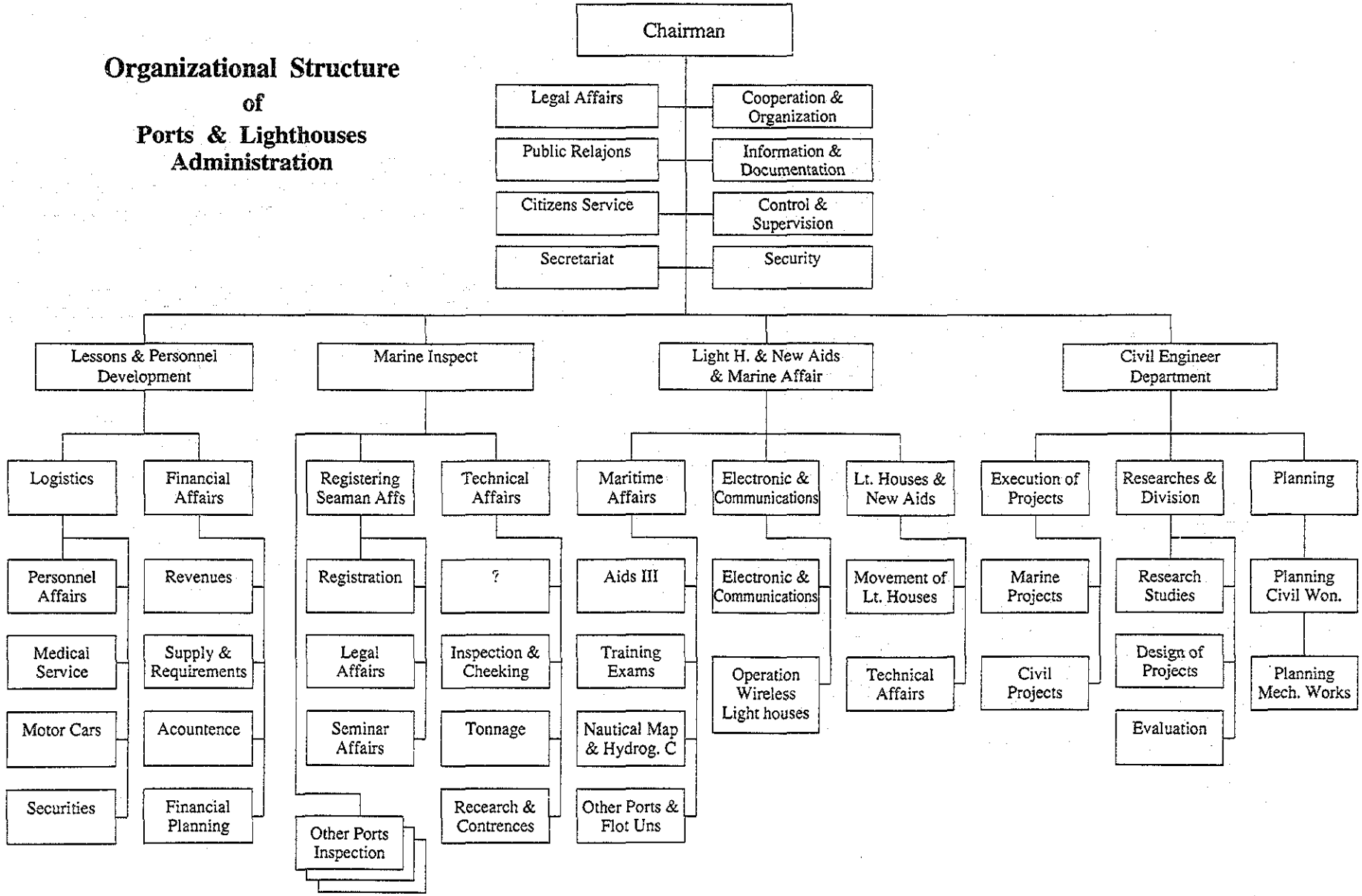


SUEZ CANAL AUTHORITY
CHE. MOHAMED EZAT ADEL
COMPANIES DEP.
SUEZ CANAL AUTHORITY
CHE. MOHAMED EZAT ADEL
ENGINEERING DEP.
TUNNELL DIVISION
PORT TAWFIK DIVISION
PORT SAID DIVISION
MR. ADEL EL SOUFANY
ISMAILLIA DIVISION
CANAL BRANCH
CHE. ABD EL NASER
HARBOUR BRANCH
CHE. A. EL BINAWY
BUILDING BRANCH
CHE. M. KAMEL
WATER & TRUCKS BRANCH
CHE. M. EL KHOLLY
REPARING & MAINTAINANCE
DIREC. ABD-ALLA
PROJECTING & DESIG.
DIREC. TAHA ELTRABILY

NOPIA PORT AUTHORITY
ORGANIZAITON CHART



Organizational Structure of Ports & Lighthouses Administration



3. セミナー配布資料

Classification: Sea level

Equipment name: Simplified self-recording tide gauge

Model: PFT-III

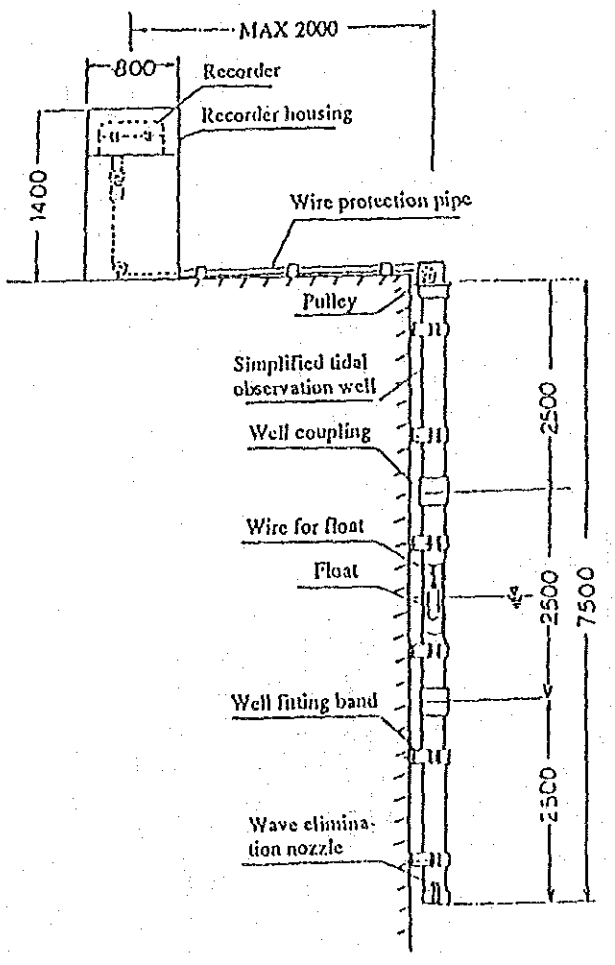
Manufacturer & Agency: Kyowa Shoko

General: The Fuess type tide gauge is used and the simplified tidal observation well made with a vinyl chloride tube is installed at a quay wall instead of a special well to measure the variation in sea level.

Specifications:

Measuring range	3.5 m or 7 m
Scale	1/10, 1/20
Recording paper	375 mm wide, 17 m long
Clock	Electric winding type, power supply 6 V
Dry battery	UM-1 × 4 pcs.
Float	φ114 mm, 245 mm high
Recorder outline dimensions	470 × 570 × 380 mm
Simplified tidal observation well	Vinyl chloride, φ165 mm in outside
Wire for float	φ1.8 mm, stainless
Housing dimensions	800 × 500 × 1,400 mm
Recording paper feed speed	200 mm/h

Configuration:



Classification: Sea level

Equipment name: Aanderaa automatic water level recorder

Model: WLR7

Manufacturer: Aanderaa (Norway)

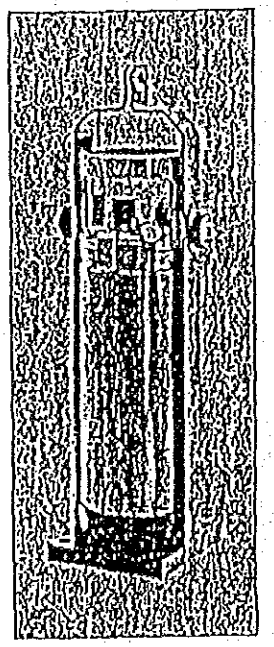
Agency: Aanderaa Japan Limited

General: Accurate water level is automatically measured with the quartz pressure transducer. Long-term, continuous records can be stored in the IC memory.

Specifications:

Sensor specifications	
Sensor type	Digital quartz pressure transducer
Sensor frequency	36 ~ 40 KHz
Measuring range	0 ~ 100 PSI (60 m) 0 ~ 400 PSI (270 m) 0 ~ 900 PSI (600 m)
Measuring precision	0.01% of the full scale
Resolution	0.001% of the full scale
Averaging time	Integration: 40 sec.
Water temperature sensor	Thermistor (Fenwal GB32JM19)
Water temperature range	-3°C ~ 35°C
Water temperature precision	0.1°C
Water temperature resolution	0.01°C
Response time	30 sec.
Salinity sensor (option)	Measuring range: 0 to 40 ppt Measuring precision: ±1% (FS)

Configuration:



Classification: Flow state

Equipment name: Current meter

Model: CM-2/2D/2P type

Manufacturer & Agency: Toho Densaku

General: This equipment is to measure the current velocity and direction around estuaries or coasts. By directly suspending the detector with the cabtire cord, measurement can be performed at any depth. The current direction and velocity values are directly read or recorded.

Specifications:

Features

• Easy handling • Direct-reading type [Analog CM-2 type] and [Digital CM-2D type] • Digital direct-reading and recording type [CM-2P type]

Measuring range

Flow velocity: 0.08 to 3.00 m/s with a precision of ±3% (F.S.)

* Products other than the above specification will be designed and manufactured on request.

Current direction: 0 to 360° (magnetic bearing, non-contact type) with a precision of ±8°

Current velocity averaging time

[CM-2/2D type] Selectable from 2.5, 20, 40 and 60 seconds.

[CM-2P type] 60 seconds

Power supply

[CM-2/2D type] UM-2 dry battery × 8 pcs. (built-in type)

[CM-2P type] 100 VAC ±10%, 50/60 Hz, 0.2 A

Battery service life

[CM-2 type] Approx. 20 hours under continuous operating

[CM-2D type] Approx. 12 hours under continuous operating

Recording paper

[CM-2P type] 57-mm wide, 48-m long, roll type

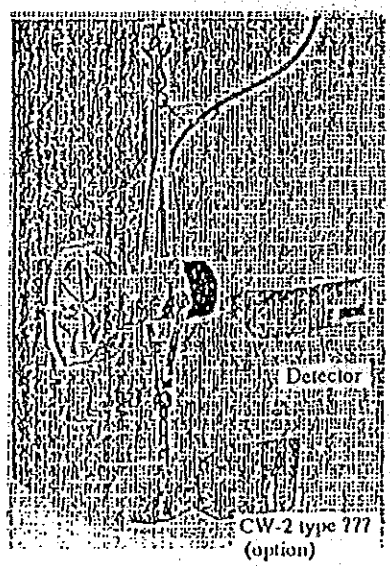
Recording interval

[CM-2P type] Manual or selectable from 1, 5, 10 and 15 minutes.

Configuration:

Dimensions and weight

	Dimensions (mm)	Weight (kg)	Remarks
Detector	φ138 (propeller) × 550	7.0	
Cabtire cord	φ10 × 50 m (standard)	7.0	Tensile strength: 150 kg or more
Indicator	110 × 180 × 180	3.0	[CM-2/2D type]: Battery and artificial leather case included
Housing	590 × 370 × 310	9.0	Wooden, varnishing finish
Measurement recorder	124(H) × 288(W) × 320(D)	7.0	[CM-2P type]



Classification: Flow state

Equipment name: ONO's automatic current meter

Model: OC type

Manufacturer & Agency: Kyowa Shoko

General: This equipment is mainly used for tidal stream observation and simultaneously records the current direction and velocity on the recording paper.

Specifications:

Measuring range: Current velocity: Propeller for weak stream: Approx. 0.02 to 1.5 m/sec (with certificate)
Propeller for strong stream: Approx. 0.05 to 3.0 m/sec (with certificate)
Adoption of the constant-pitch propeller enables high-precision measurement.

Recording period: Roll for 3 or 7 days

Installation depth: 100 m at maximum

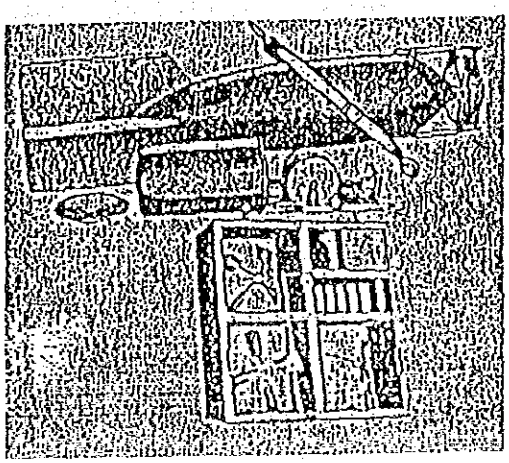
Configuration:

Entire length: 990 mm

Weight: 24.4 kg (in the air), 16.2 kg (in the water)

Accessories: Propeller each one for strong or weak stream, 6 self-recording pens, 1 set of 4 colors of ink, 1 scale, 15 recording paper rolls (6-m long), 1 set of three housings

Option: Deadweight, anchor, buoy, rope, iron angle steel triangle frame for installation



Classification: Flow state

Equipment name: Magnetic recording current meter

Model: MTC-II, III

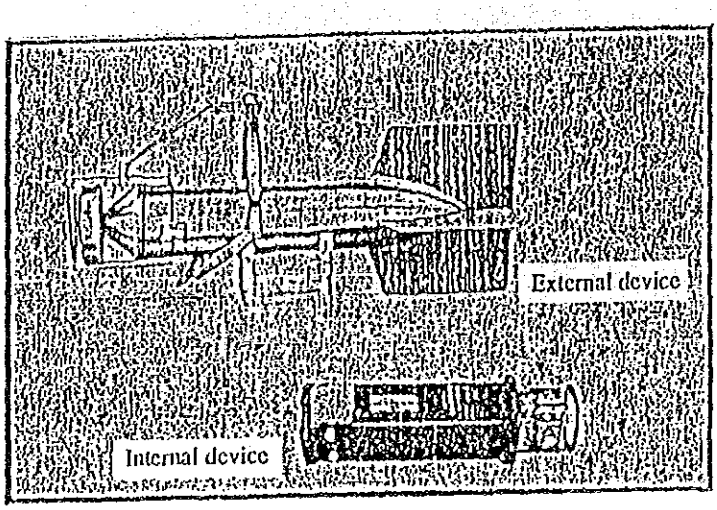
Manufacturer & Agency: Kyowa Shoko

General: The constant-pitch propeller which can measure weak and strong steams continuously by itself is used and the current direction and velocity measuring data is recorded on the built-in magnetic tape. The III type is equipped with the water temperature gauge in addition to the current meter.

Specifications:

Current velocity measuring range	0.02 ~ 5.00 m/sec	Current direction measuring range	0 ~ 360°
Current velocity measuring precision	Within 1%	Current direction measuring precision	±5°
Observation interval	2 to 99 minutes	Outline dimensions	267W × 520H × 970L mm
Observation time	1 to 9 minutes	Weight	37 kg (in the air)
Installation depth	200 m at maximum	Power supply	NiCd battery 12 V, 6 V, 3.5 Ah
Recording period	Approx. one month under 2-minute observation at intervals of 10 minutes		
Data items	Averages of direction and velocity values obtained during observation time		
Data format	Compatible with data recording formats specified in various standards including ISO-3407 and JIS-C6281.		
Tape used	Standard magnetic cassette tape for data exchange, CT-300 (manufactured by TEAC)		

Configuration:



Classification: Flow state

Equipment name: IC memory type current meter

Model: DLC-1/2

Manufacturer & Agency: Kyowa Shoko

General: This equipment is a propeller-type current meter using the constant-pitch propeller which can measure both weak and strong streams and the IC memory cassette as the storage medium.
The 2 type is the same as the 1 type plus the water temperature gauge.

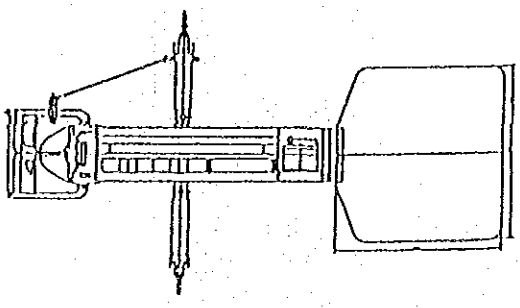
Specifications

Current direction measuring range: 0 ~ 360°
Current direction measuring precision: ±5°
Water pressure resistance: 20 kg/cm²
Observation period: 30 cycles (2-minute observation per 20 minutes, when the 250 kbyte memory cassette is used)
Observation mode: Selectable from 8 types of mode (2-minute observation per 20 minutes, for example)
Sampling: Current velocity .....Values are added every turn of the propeller and the average value is obtained for the observation period.
Current direction ... The bearing is detected every turn of the propeller and average current direction is obtained by weighted average.
Clock precision: ±13 second/month
Time adjusting: Set by the key switch.
Data recording method: IC memory cassette (with the protecting function)
Storage capacity: Selectable from 250 kbyte and 512 kbyte (250 kbyte as the standard)
Data retention time: 2 years (with built-in battery)
* The battery is replaced at the plant every two years.

Configuration

Outline dimensions: 1,150 (L) × 650 (H) × 182 (W) mm
Weight: Approx. 19 kg

Current meter body 1
Propeller ..... 1 (for current use)
Memory cassette ..... 1 (for current use), 250 kbyte
Battery ..... 1 (for current use), 6 V, 14 Ah
Interface board ..... 1 (for PC9801)
Tool 1
Housing for transportation 1



Classification: Flow state

Equipment name: Aanderaa current meter

Model: RCM-4S

Manufacturer: Aanderaa (Norway)

Agency: Aanderaa Japan Limited

General: This equipment is a built-in type measuring instrument, recording current velocity, direction and conductivity. The new-type shape of rotor adopted has less influence to ocean waves.

Specifications:

Measuring method

Self-balancing bridge type. Six channels are continuously measured and the results are recorded on the magnetic tape. 10-bit binary words are used for each channel.

Measuring speed: 4 sec/channel

Explanation of each channel

1. Reference

This controls RCM operation on the basis of a certain reading and is used to identify individual measuring instrument.

2. Water temperature

Sensor type: Thermistor (Fenwal GB32JM19)

Measuring range: Low range -2.46°C to 21.40°C (standard)
High range 10.08°C to 36.00°C
Wide range -0.34°C to 32.17°C
Polar region range -2.64°C to 5.62°C

Precision: ±0.05°C

Resolution: 0.1% of the selected range

63% response time: 12 seconds

3. Conductivity (option)

Sensor type: Dielectric cell

Measuring range: 0 to 77 mmho/cm (standard)
25 to 72 mmho/cm
25 to 38 mmho/cm

Resolution: 0.1% of the range

Calibration precision: ±0.025 mmho/cm

4. Water pressure (option)

Sensor type: Bourdon's tube drive type potentiometer

Measuring range: 0 to 100 psi, 0 to 200 psi, 0 to 500 psi, 0 to 1,000 psi, 0 to 3,000 psi (standard), 0 to 9,000 psi (for RCM5)

Precision: ±1% of the range

Resolution: 0.1% of the range

5. Current direction

Sensor type: Magnetic compass (magnetic needle is clamped to the potentiometer ring)

Resolution: 0.35°

Precision: ±7.5° at a velocity of 2.5 to 5 cm/sec
±5° at a velocity of 5 to 100 cm/sec
±7.5° at a velocity of 100 to 200 cm/sec

6. Current velocity

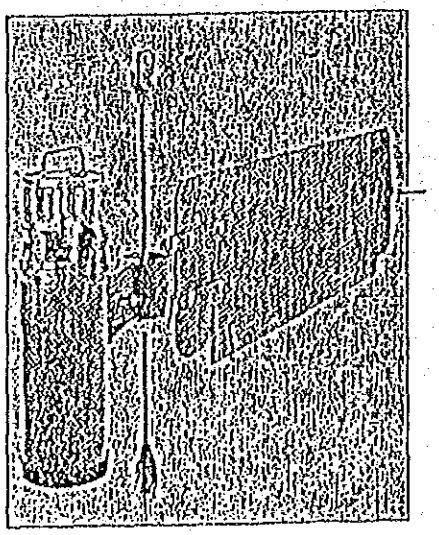
Principle of measurement:
The rotor revolution is magnetically conducted via the top face of the measuring instrument case. The electronic counter reads the number of rotor revolutions between observation interals. This electronic counter has circuits adapting 10 types of observation interval ranging from 0.5 minute to 180 minutes. The standard counter counts every 4 revolutions.

Measuring range: 2.5 to 250 cm/sec

Precision: ±1 cm/sec or ±2% of the actual velocity which is larger.

Initial velocity: 2.0 cm/sec

Configuration:



Classification: Sea level

Equipment name: Fuess type tide gauge

Model: LFT-III, V

Manufacturer & Agency: Kyowa Shoko

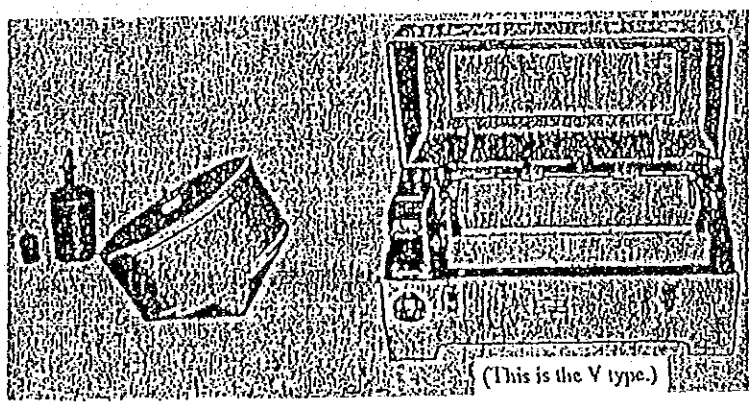
General: Fuess type tide gauge capable of continuous, one-month recording.

The III type has no timer. The V type stamps time marks to enable accurate time compensation on the recording paper.

Specifications:

Measuring range	3.5 m or 7 m	Dry battery	5 UM-1s (1 for the III type)
Scale	1/10, 1/20	Float diameter	φ300 mm (180-mm high)
Recording paper feed speed	20 mm/hour	Steel measuring tape for datum face	10 m (stainless)
Recording paper	375-mm wide, 17-m long	Outline dimensions	470 × 570 × 380 mm
Clock	Crystal clock, power supply 1.5 V	Crystal timer (V type)	Built-in type, 1 pulse/6 hours, timer power supply 6 V

Configuration:



(This is the V type.)

Classification: Flow state

Equipment name: Aanderaa current meter

Model: RCM7

Manufacturer: Aanderaa (Norway)

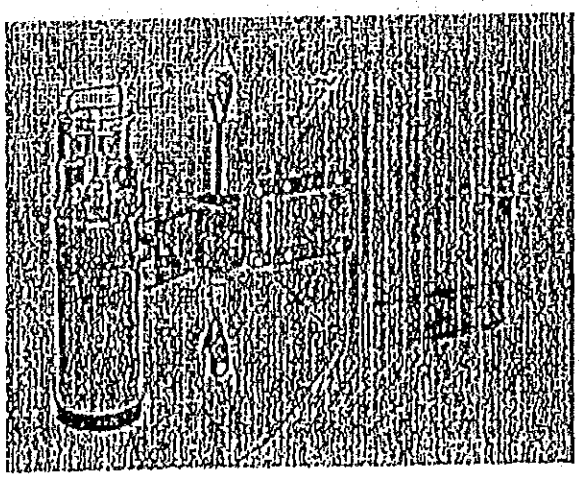
Agency: Aanderaa Japan Limited

General: Built-in recording type current meter manufactured by Aanderaa. This current meter automatically measures water temperature, conductivity, (salinity,) and water pressure in addition to current direction and velocity, and can store long-term records in the DSU (IC memory pack).
The RCM7 is usable at a depth up to 2,000 m.

Specifications:

Sensor specifications				
Ch. No.	Item	Sensor type	Measuring range	Precision, etc.
1	Reference	Unique numbers (0 to 1023) for measuring instrument identification and operation status check		
2	Water temperature	Thermistor (Fenwal GB32JM19)	Low range: -2.46 to 21.40°C High range: 10.08 to 36.00°C Wide range: -0.34 to 32.17°C Polar region range: -2.64 to 5.62°C	Precision: ±0.05°C Resolution: 0.1% of the selected range Response time: 12 seconds (63%)
3	Conductivity (option)	Electromagnetic induction type cell	0 – 74 mmho/cm (standard) 24 – 69 mmho/cm 24 – 36 mmho/cm	Precision: ±0.025 mmho/cm Resolution: 0.1% of the range * The salinity value is calculated during data processing.
4	Water pressure (option)	Bourdon's tube drive type potentiometer	0 – 100PSI, 0 – 200PSI 0 – 500PSI, 0 – 1000PSI 0 – 3000PSI (standard) 0 – 9000PSI (for RCM8)	Precision: ±1% of the range Resolution: 0.1% of the range
5	Liquid direction	Magnetic compass clamped to the ring type potentiometer	0 – 360	±7.5° at a velocity of 2.5 to 5 cm/sec ±5° at a velocity of 5 to 100 cm/sec ±7.5° at a velocity of 100 to 200 cm/sec Resolution: 0.35°
6	Liquid velocity	Liquid directional type rotor with one-side shield (magnet coupling type)	2.5 – 250cm/sec.	Precision: ±1 cm/sec or ±2% of the actual velocity Initial velocity: 2.0 cm/sec
Remarks	50 sets of liquid direction and velocity value data are obtained between observation intervals and vector-averaged to obtain northern or eastern component of velocity. Then they are converted into liquid direction and velocity values as the recorded data. Example: As for 10-minute or 20-minute observation interval, the average value is obtained every 12 seconds or 24 seconds, respectively, for getting 50 average values. As for not more than 5-minute interval, however, the 12-second interval is constant, thus the number of average values is reduced.			

Configuration:



Classification: Flow state

Equipment name: Memory electromagnetic type current meter

Model: ACM16M

Manufacturer & Agency: Aleck Denshi

General: This equipment can measure three-dimensional current with two horizontal components or the vertical direction added, and can measure the water temperature, conductivity and water pressure simultaneously.

Specifications:

Sensor item	Type	Measuring range	Precision
Electromagnetic velocity sensor A	φ90-mm, 3-axis sensor	0 ~ ±250 cm/sec.	±2% of the actual measuring value or ±1 cm/sec.
Electromagnetic velocity sensor B	φ90-mm, 2-axis sensor		
Electromagnetic velocity sensor C	φ20-mm, 3-axis sensor		
Bearing sensor	Hall element compass	0 ~ 360°	±2°
Slope sensor	2-axis electrode type	0 ~ ±60°	±1°
Water temperature sensor	Platinum resistance bulb	-5 ~ 40°C	±0.05°C
Conductivity sensor	Electromagnetic induction type cell	0 ~ 60 mS/cm	±0.05 mS/cm
Water pressure sensor	Variable electrostatic capacity type	0 to 175 m or other various range	±0.2 m
Turbidity sensor	Infrared backscattering type	0 ~ 200 ppm	±2%

Configuration:

Twenty Meter Type Survey Ship
"HAMASHIO"

Twenty Meter Type Survey Ship "HAMASHIO"

1. Introduction

In the Third Regional Maritime Safety Headquarters that control an extensive coastal area including the Bay of Tokyo and the Sea of Enshu to the Sea of Kashima, a 20 meter type survey ship, new "HAMASHIO" was put into service on March 25,1991 for the integration of coastal infirmation charts for disaster prevention which began in 1991, as a substitute for the worn-out 10 meter type survey ship "HAMASHIO" exceeding the life. In the following, an outline of this new "HAMASHIO" will be described.

The new "HAMASHIO" was built in the single year of 1990 and conduct such operations which have been done to secure the safe navigation of ships as harbor, track and correction surveys and such hydrographic operations as tidal current and coastal current observation, coastal sea condition survey and harbor survey, and also integration of coastal information charts for disaster prevention containing basic information on the depth, bottom materials and tidal cunentin harbors and their peripheral coastlines, which are indispensable for relief activities by ships upon occurrence of disasters, for example, great earthquakes such as Tokai Earthquake and South Kanto Earthquake that have been problems around the metropolitan area in recent years.

When a disaster occurs, the submarine topography may change. On this occasion, the new HAMASHIO will make an emergency survey in addition to ordinary survey operations in order to secure the safe navigation of ships.

2. Principal specification items

The new "HAMASHIO" has an improved overall capacity of operation and survey to meet the requirements for the integration of coastal information charts for disaster prevention being a new operation in addition to existing operations for updated maintenance of marine--

charts and its principal specification items are as follows:

Length overall:	20.3 m
Beam:	4.5 m
Draft:	2.4 m
Displacement:	42 tons
Gross tonnage:	32 tons
Cruising range:	200 miles (at 15 knots)
Speed:	Approx. 15 knots (full load condition, both side engine normal output), Approx.5 knots (full load condition, midship engine normal output)

Maximum number of embarked persons: 4

3. General arrangement and features

(A general arrangement plan is shown in Fig. 1.)

3.1 Performance

3.1.1 The normal cruising speed is 15 knots and the observation speed is about 5 knots. The ship type is the V-type in consideration of the propulsion performance and the ship models so far adopted.

3.1.2 The number of rudders is 3 to secure the steering performance at a low speed (Photo 1).

3.2 Structure and equipment

3.2.1 The measuring instruments in the steering house are accommodated in a console panel. A steering gear is arranged in the middle of the console panel. The gauges for the engines are located on the left side. A radar, gyrocompass, telephone set (dial-in), interphone for communication with the observation room, private channel telephone set and a remote indicator of the automatic sounding logger/processor are arranged on the right side (Photo 2).

3.2.2 An observation room is arranged behind the steering house for observation operations. The steering house is raised half floor to secure the backward viewing field and all its windows are glazed to secure an omnidirectional viewing field (Photo 3).

3.2.3 The crewmen's beds (6 beds) are fixedly provided with a warm water shower to make living more comfortable.

3.2.4 Mast equipment

For reasons of navigation under bridges and installation and adjustment of antennas of observation devices, the aluminum alloy mast on the hood of the observation room is a top tilting type. Because the mast is manually tilted, the lower part is designed to be heavy so that the upper part and the lower part may be balanced at the ratio of one to one (Photo 4).

3.3 Engine department

3.3.1 In order to obtain a normal cruising speed of 5 knots, the both side engines are two 450 h.p. engines, two axes and the required horse power is about 900 h.p.

3.3.2 During a survey, the ship navigates with a speed of about 5 knots for a long time. Accordingly, to avoid a long-time operation of the engines with a low load, a 115 h.p. engine, an axis is equipped. During regular navigation, the midship engine is stopped and the axis is put under idle rotation. (Photo 5)

3.4 Onboard boat and deck

The onboard boat is used for operations at shoals near coastlines that the survey ship "HAMASHIO" can not access and at Basin where small boats stay. The onboard boat is provided with a small Echo sounder and a precision electronic positioning system and can perform sounding (Photo 6).

This ship is provide with the following deck devices for operations with higher efficiency. A windlass is also used for observational operations and its raising rate is 12 m/min.

Onboard boat:	1
Onboard boat davit:	1 set, manual swing type
Windlass:	2 sets, motor-driven type, front and rear parts
Removable observation davit:	1 set, for front part operations; 3-direction roller: 3 sets, sterm, left side front and rear parts

3.5 Sounding and observation equipment department

Four transducers for the echo sounder and one transducer for the portable ADCP are fixed in the middle of the bottom of the ship.

The recorder of the automatic sounding logger/processor and the portable ADCP are accomodated in an exclusive rack (Photo 7).

4. Onboard devices

Table 1 Installed observation devices

	Observing device name	Observation item	Model name, etc.
1	Precision electronic positioning system	Measurement of position on the sea	U.S. DEL NORTE, trisponder model 542
2	Echo sounder (4-beam)	Measurement of depth	SENBON ELECTRIC CO., LTD. model PDR-601
3	Self-recording type current direction/velocity meter	Observation of current direction and velocity	AANDERAA, model RCM-7
4	Bottom sampler	Bottom material	RIGOSHA, Smith McIntyre, tubular type
5	Automatic sounding logger/processor	Data logging processing	SANYO TECHNO MARINE, model DHS-905
6	Portable ADCP	Observation of current direction and velocity	JRC, model JLN-632

4.1 Precision electronic positioning system

This system is the trisponder model 542 manufactured by U.S. DEL NORTE consisting of a digital distance measuring unit (DDMU), printer, remote indicator, main station transceiver, main station power supply unit, slave-station transceiver and slave-station power supply. A main station is installed in the survey ship, while the slave-stations are installed in 2 known points. XY display position data is output to the automatic sounding logger/processor. RS-232C signals are distributed by a distributor and then output to the portable ADCP.

The general performance of this system is as follows:

Digital distance measuring unit (DDMU)

Distance measuring range:	75 m to 80 km
Distance display:	99999.9 m, 4 distances
Accuracy:	± 1 m
Position display:	XY coordinate position
Resolution:	0.1 m
Data output:	RS-232C
Transmitting frequency:	Main station: 8960 MHz;
	Slave-station: 8860 MHz
Data updating interval:	0.1-5 see
Mainstation antenna directivity:	360° X 19°
Power supply:	22-27 VDC,1.9 A
Slave-station transceiver	
Antenna direcsvity:	110° X 7°
Power supply:	22-30 VDC, 450 mA at operating state,
	16 mA at stanby

4.2 Echo sounder

This echo sounder is the model PFR-60 I manufactured by SENBON ELECTRIC CO., LTD. and consists or a recorder and four transducer. Four-direction water depth data is displayed digitally as well as in conventional analog forms. Depth data is output to the automatic sounding logger/processor by RS-232C signals. The cut marks and fixing point numbers transmitted from this device can be printed on recording paper in the echo sounder. Figure 3 shows an record example of the echo sounder. The four transducers of the echo sounder are fixedly equipped on the bottom of the ship to simplify operations (Photo 8).

4.3 Self.recording type current direction/velocity meter

This is a self-recording type current direction/velocity meter model RCM-7 manufactured by AANDERAA and consists of an buoy and anchor. The current direction, velocity and water temperature of a tidal current or coastai current are continuously measured for a long period (about I month) at optional time intervals. The meter permits continuous observation for a weak current to a strong current. The observation data recorded on a magnetic cassette tape is processed by personal computer.

4.4 Automatic sounding logger/processor

This equipment can be roughly divided into a recorder for data collection fixed in the fsurvey ship and a processor for recorded data processing. The automatic sounding logger/ .processor model DHS-90S manufactured by SANYO TECHNO MARINE is adopted.

4.5 Portable type ADCP (Acoustic Doppler Current Profiler)

This profiler is the Doppler current meter model JLN-632 made by JAPAN which is generally called ADCP. The ultrasonic emitted from the transducer equipped in the bottom of the ship into the sea reflect when meeting particles (scattered Reflektor) and dust flowing together with seawater and sea bottom. By measuring a difference between the frequency of a transmitted ultrasonic wave and that of a reflected wave, namely, an Doppler effect, the speeds of the ship against the land and the water are obtained. With this data, the moving velocity and direction of the seawater can be found. When the surface of the sea bottom is within the range of sound wave beam reach, the absolute speed can be obtained together with the speed of the ship against the land. (Photo 9)

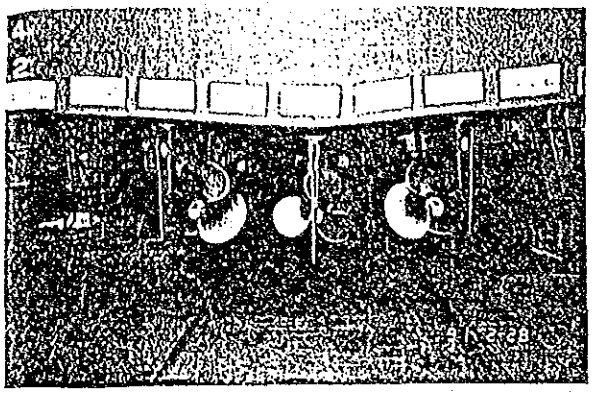


Photo 1 Propeller and rudders viewed from backward

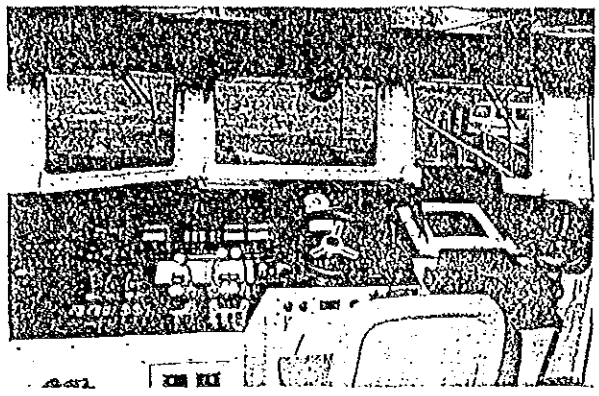


Photo 2 Console panel in the steering house

Photo 3 Rear wall of the steering house (near the entrance of the steering house)

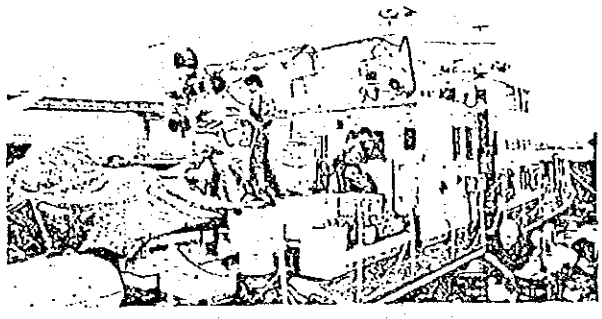


Photo 4 Tiled mast

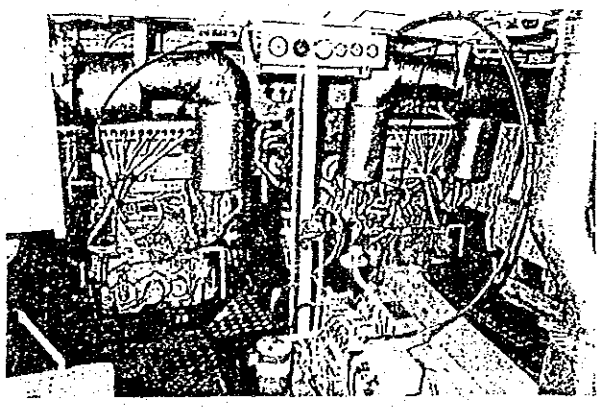


Photo 5 Both side engines (The engine in foreground is the midship engine.)

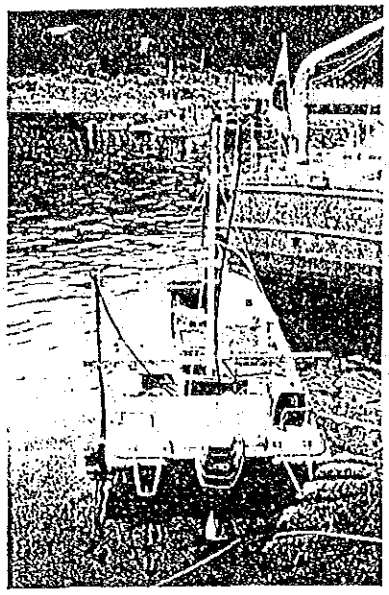


Photo 7 Observation devices

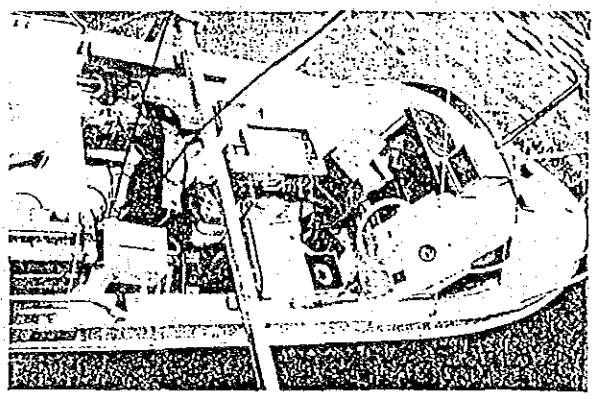


Photo 6 Equipment of onboard boat

Photo 8 Echo sounder transducer

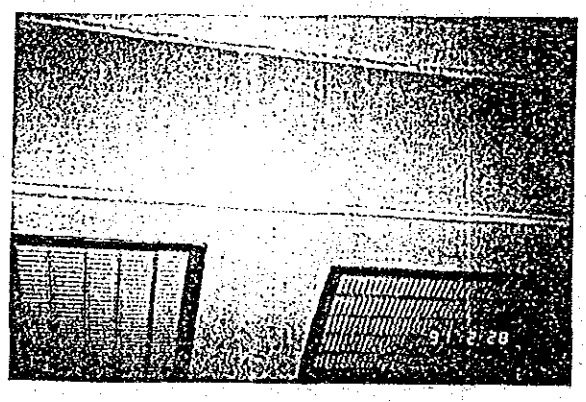


Photo 9 Portable ADCP transducer

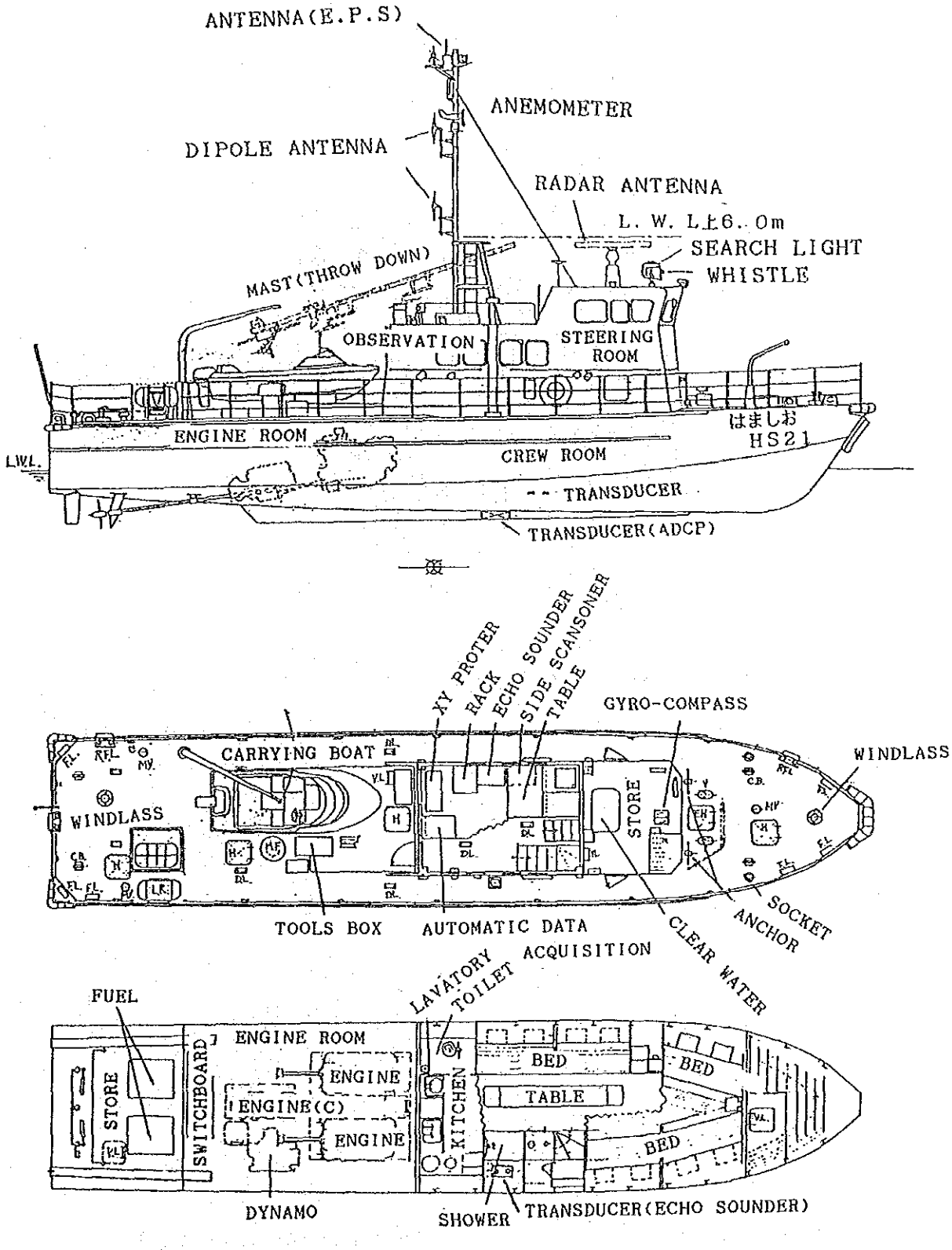


Fig. 1 General layout

Fig. 2 Example of record by echo sounder

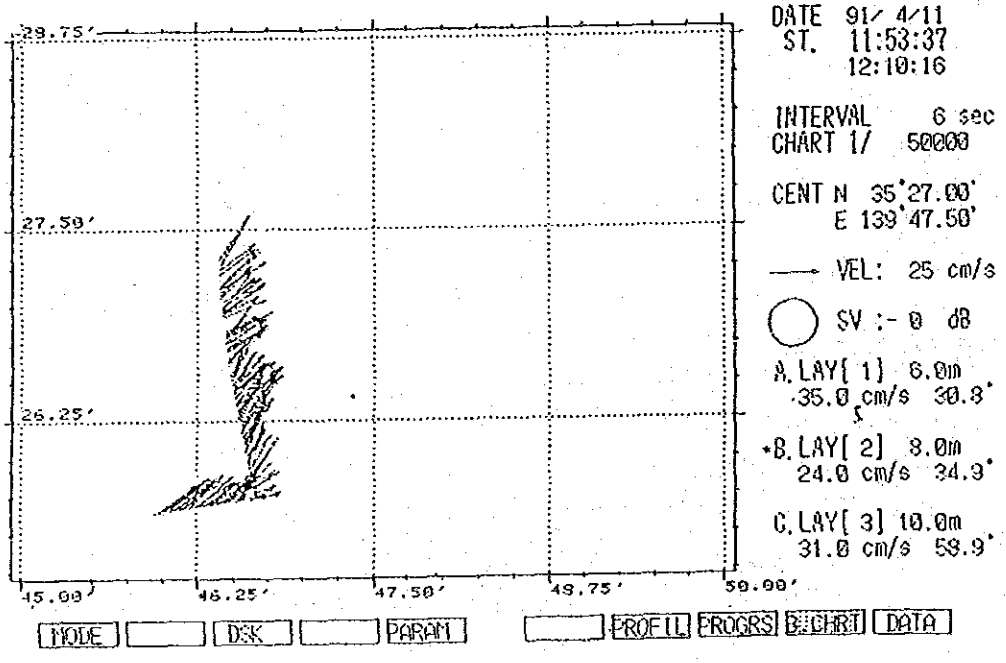


Fig. 3 Example of display by ADCP

Automatic Sounding System

Automatic Sounding System

1. Introduction

The Hydrographic Department of the Maritime Safety Agency presents information such as nautical charts and sailing directions, to ensure the safety of marine transport. In those efforts, keeping nautical charts up-to-date is very essential, and the sounding required for it has been improved in accuracy and working efficiency thanks to the development of instruments. Research on the automation of sounding of ficially began when the Hydrographic Association 1 took it up as a research project in 1973. Technical methods were established under this research, but since personal computers had not been as popularly applied as today, the hardware could no Ix completed

Later, the "Tenyo," a survey ship in November 1986, was mounted with an automatic sounding logger/processor made in England. Furthermore from about that time, compact and high performance personal computers became easily available, allowing the Hydrographic Department to pursue its own automation technology.

In the beginning of development, a portable system was used to allow surveying on a small survey boat or chartered boat, and data were recorded onto cassette tape without using any AC power supply and processed offline on land.

Also thereafter, research on the technological development for automation of sounding was continued, and.in March 1991 an automatic sounding logger/processor was installed in the "Hamashio," a 20-meter survey boats.

The system is briefly described below.

2. Structure and functions of the system (Fig.1)

This system consists of a recorder and a processor (Photo 1, 2). After the power is switched on, the system can be operated in interaction with the data displayed on the screen in Japanese. So, even a surveyor unfamiliar with the computer can easily operate the system.

2.1 Data logger

2.1.1 Outline

This instrument receives data of a precision electronic positioning system, echo sounder (four-beam type) and gyrocompass at RS-232C, and evaluates and calculates the data, to identify the location of the survey ship, and also displays the information necessary for sounding on the screen (Fig. 2). Measured data such as time, position and depth are stored in an FD, and the track of the survey ship is displayed on an XY plotter in real time. In the steering room, for easier steering, a remote display is installed to display the guide7

information required for steering, and in addition, the recorder can be remote-controlled by a touch screen in the steering room (Photo 3). Furthermore, to judge the necessityof, supplementary re-sounding at the site of survey work, the XY plotter displays a resounding check chart.

2.1.2 Functions

1) Determination of ship's position: Ship's position is determined by the two-distance method or the one-azimuth one-distance method using the precision electronic positioning system.
2) Input of commands: A keyboard, CRT display and the touch screen of the remote display are used.

   For example on the remote display in the steering room, a list of filed sounding lines can be displayed for selection of sounding lines. Furthermore, even during sailing on a sounding line, the CRT display can present parameters for confirmation, etc. as information other than steering guide information.
3) Data logging: Data recorded include the date and hour of sounding, coordinates of ship's position, measured vertical depth, four measured oblique depths and course, and they are stored in a 3.5-inch FD (2HD) and printed on a printer every second. Furthermore, the track of the survey boat is displayed on the XY plotter (max. A1 size paper) in real time.
4) Steering information: The remote display normally presents the information required for steering such as the ship's position as 5CY coordinates, bottom topographic features at depths of 20 m and less, the values indicated by the gyrocompass, planned survey course, deviation and track (Photo 4).
5) Transmitting and receiving data to and from peripheral instruments: The code number, calibration value, coordinates of slave stations, etc. required for the precision electronic positioning system can be entered from this system. The course data of the gyrocompass are converted from analog signals to digital signals and applied to this recorder at RS-232C Cut mark, measuring point number, sounding line number, etc. . are sent to the echo sounder from this system at RS-232C.
6) Data protection: An uninterruptible power supply unit supplies power for a short time in case of unexpected power failure or momentary power failure, to prevent system stoppage, vanishing of recorded data, damage to instruments, etc.
7) Production of re-sounding check chart: After completion of survey work, the daily recorded data are reviewed to compare measured vertical depths and measured oblique depths, and the oblique depths which are smaller than the corresponding vertical depths are marked with *.

2.1.3 Brief description of operation

The power of this system is switched on after the echo sounder, precision electronic positioning system and gyrocompass have been actuated. The system is then immediately actuated automatically, and a message is given to enter the value indicated by the gyrocompass. After completion of entry, the screen displays the main menu. Thereafter, the respective items of main menu can be selected to proceed with operation (Photo 5). The respective items can be processed as follows:

1) Guide information: The positional relation between the survey ship and the planned sounding line can be graphically displayed, and the information required for sailing on the planned sounding line can be displayed. The scale of the portion required for steering on the screen can be selected in six steps, for displaying the information at an optimum size.
2) Data logging started or stopped: Data recording can be started or stopped.
3) Parameters: The initial values required for operating the precision electronic positioning system can be set, for setting the datum point data for survey work, preparing the planned sounding line, etc.
4) Initialization: The initial values for the gyrocompass can be set, and the paper size, scale, graphic frame, title, etc. of the XY plotter for plotting the track can be set.
5) Bar check: This is selected for automatically logging bar check data. 6)
Information monitoring: Respective set values can be displayed, and measured values of ship's position, course, depths, gyrocompass values, etc. can be monitored in real time (Photo 6).

2.2 Data processor

2.2.1 Outline (Fig.3)

Collected data are variously corrected, added, deleted and calculated, to be compiled for production of charts, and then a track chart, sounding chart, contour chart, etc. can be produced on the XY plotter. As the processor proper, work station Model-345 produced by HP is used.

2.2.2 Functions

Collected depth data can be variously corrected by entering correction values of tidal level, draft, sounding velocity of water, etc., and can be further processed by addition, deletion, getting the smallest depth selected, correction in measured position, calculation and compilation. Then, they can be delivered as a sounding chart, track chart, contour chart, etc., and the data can be stored in a cassette tape (CMT). The correction, selection, compilation, etc. of track and depths are perPonned on the CRT display.

The track chart, contour chart, sounding chart, etc. are plotted by the XY plotter according to the smooth sheet graphical method. The floppy disc unit contains a data converter to

allow use under either OS environment of MS-DOS or HP-UX. For example, to prepare a file of planned sounding lines, control point, etc. used in the recorder, MS-DOS is used, and for data processing, HP-UX is used. Coastal line data are read by a digitizer and stored in an FD.

2.2.3 Brief description of operation

When the power is switched on, the main menu is displayed. Thereafter, the items to be processed are selected, to proceed with operation (Fig. 4). The respective items on menu can be processed as follows:

1) File transfer: All the measured data can be continuously read and stored into a disc, and also the planned sounding lines, control point, etc. for site survey work can be stored.
2) System parameters: Calculating conditions, plotting conditions and display conditions can be set.
   (1) The calculating conditions to be set include measured position correction, incorrect depths and depth selection.
   a) Measured position correction: For processing to automatically remove incorrect position data, calculating conditions such as bow deviation, ship's speed and interpolation time of continuous incorrect distance data are set.
   b) Incorrect depths: For processing to automatically remove incorrect depths, such conditions as depth to tx measured, depth variation and depth difference txtween two vertical depths are set.
   c) Depth selection: The depth is selected and depth indication intervals are set.
   (2) The plotting conditions to be set include plotting parameters such as grid intervals, sizes of various characters and coordinate origin, matters to be stated in the margin, and statement conditions of control point mark.
   (3) The display conditions to be set include character size, tidal height correction data, depth compilation screen scale, etc.
3) Input of control point and guide information: The control point of survey, locations of slave stations, position measuring method, preparation and compilation of sounding lines, etc. are set.
4) Input of tidal height: Name of tide station, tidal datum, date, and starting and ending times are entered, and the tidal height is entered via Keyboard every 10 minutes from tidal data

   Entered values are displayed on the screen as a tide curve, to allow input errors and data to be easily found.
5) Input of coastal line: Coastal line information is read from a nautical chart, land map, etc. using a digitizer, to prepare a coastal line file.

6) Bar check processing: From the correction values Y, Y1... Yn for measured depths X1, X2... Xn of the bars of bar check data, the a and b of $Y = aX + b$ are determined using a linear regression formula by minimum square method.
7) Coupling processing: The selection of the sounding lines to be processed, the retrieval of incorrect depths, the retrieval of incorrect positions, etc. are executed based on set system parameters.
8) Track compilation: The date and range of track are specified, and the track is adjusted in scale and compiled by eliminating partial errors and regional errors, moving, etc. (Photo 7)
9) Depth compilation: Bottom topographic features are displayed on the top and bottom portions of the screen of CRT display, and the deletion of incorrect depths and compilation are executed using a mouse. Furthermore, after completion of all corrections, depths to be adopted are displayed (Photo 8).
10) Preparation of track sheet: A track.sheet is prepared according to the TM projection by setting parameters to decide the scale, paper size, paper direction, necessity of coastal line indication and chart range. As the title, any place name, port name, etc. is stated at an optional position, selecting a proper character size. The track is drawn by connecting the positions at one second intervals by a solid line, and when any value of depth or position is incorrect, they are connected by a broken line, with + mark and time stated beside the line for each minute. (Fig. 5)
11) Automatic selection of depth: For depth selection, important depths are automatically retrieved on a meshed chart, and the shatter depth is selected.
12) Compilation of sounding sheet: The displayed chart is adjusted in scale, and depths are added and deleted. The entire chart of a small scale is displayed at the bottom right of the screen, to allow the position of the enlarged chart to be identified on the small scale chart (Photo 9). Depths not to be adopted are displayed only as dots at the corresponding points.
    (1) Addition method: If the addition of any depth is found necessary in the examined sounding chart, the dot displayed at the corresponding point is replaced by the depth value.
    (2) Deletion method: Any unwanted displayed depth is replaced by a dot, using a mouse.
    (3) Insertion method: If no dot is displayed at any point desired to be added, the corresponding depth is read from the analog recording paper, and the depth value is entered via keyboard together with the date and hour (Photo 10).
13) Preparation of sounding sheet: A sounding sheet is prepared as done in the preparation of a track sheet. The stating locations and.font of depths, and matters concerning the

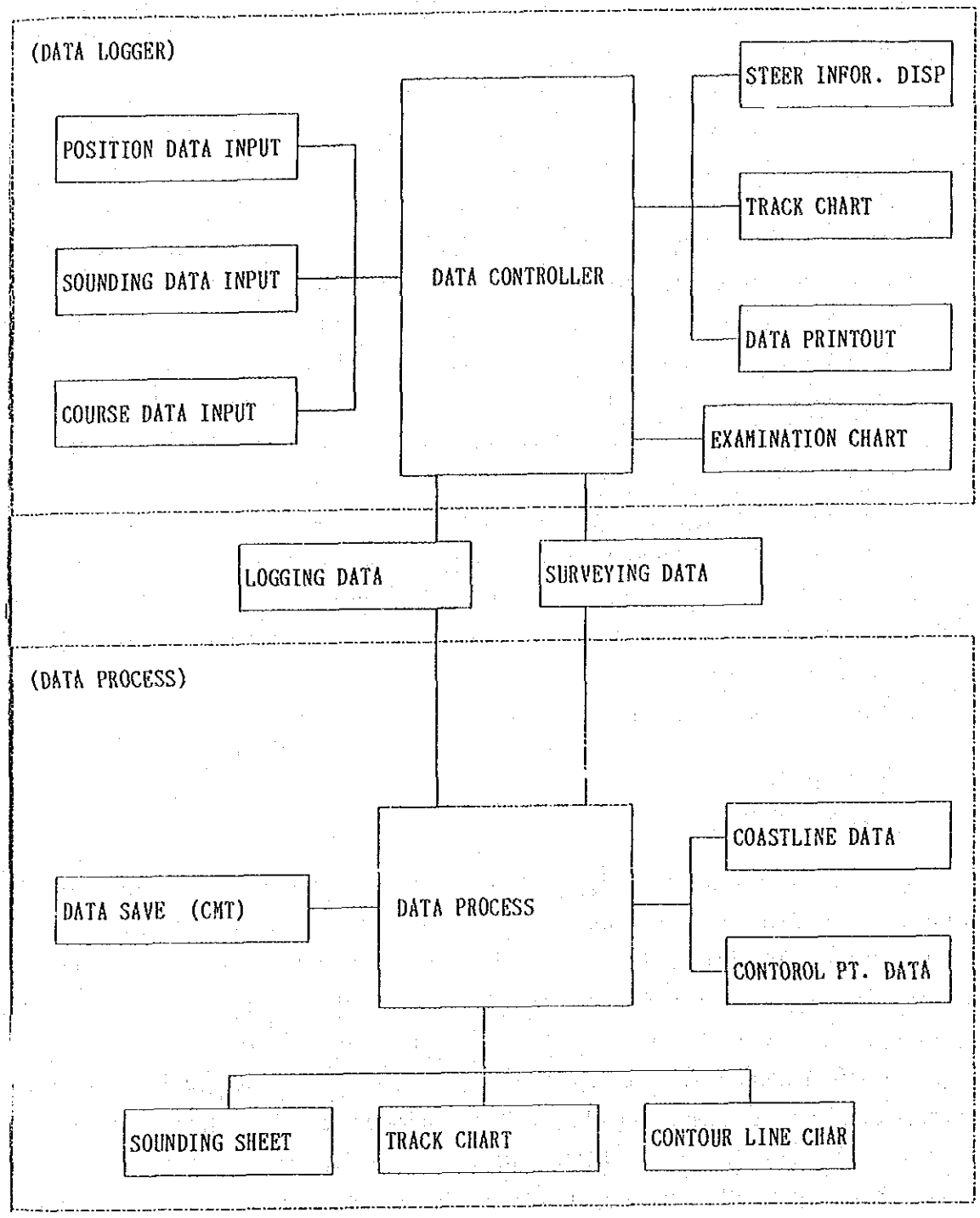
statement of the title conform to the Law for Hydrographic Activities. If any matter stated in the nautical chart must be stated, the longitude and latitude are entered, to calculate coordinates, and the values of longitude and latitude are stated at the conesponding point. As matters to be stated outside the neatline, the names of the members of the survey team such as the manager, deputy manager, etc. should be written in Kanji characters on the left. (Fig.6)

14) Contour sheet: Contour lines can be drawn at optional intervals. The title, neatline and other matters to be stated are in conformity with those in the track chart. On the contour sheet, a depth value and the point of the depth position can be supenimposed. The addition, deletion, correction, etc. of contour lines are carried out only on the screen, by displaying an enlarged chart. At the bottom right of the screen, the entire sea area is displayed, to allow the position of the enlarged part to be identified on the entire chart (Photo 11, 12, 13). Two types of curves--open and closed--are available for drawing contour lines from measured data. For computer graphic interpolation, Lagrange's interpolation and spline interpolation are usually used. This system uses spline interpolation by a cubic equation of plane curve with both open curve and closed curve. For a contour sheet, only computer processing is not enough, so that a surveyor is required to compile to let the XY plotter plot final results.

15) Management of filed After completion of processing or during processing, data can be saved from the disc unit to a CMT.
Furthermore, data stored in a CMT can be transferred to a disc.

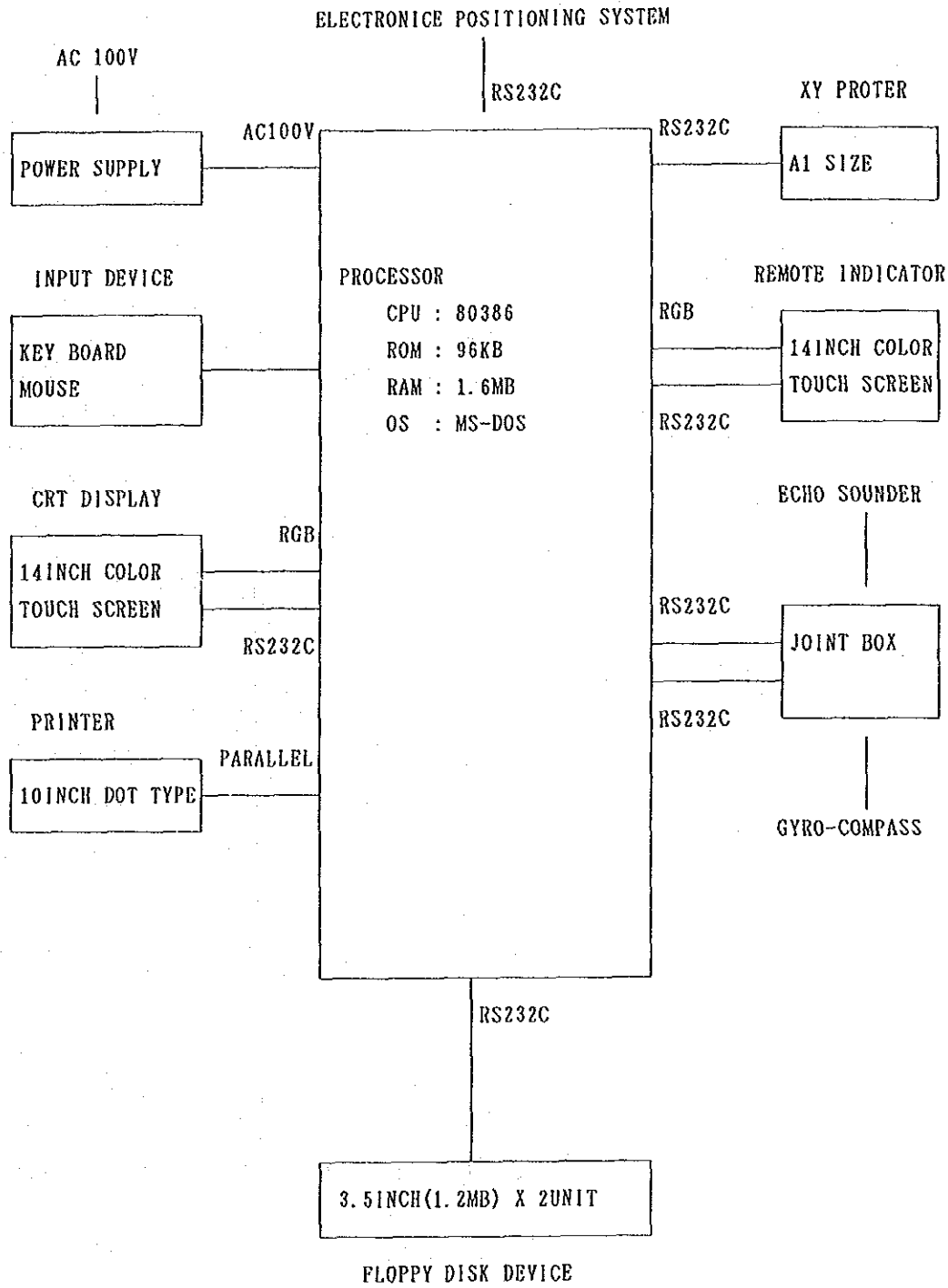
3. Afterword

The remote indicator in the data logger of this system displays such information as depths and bottom topographic features in color on a 14-inch screen, so that the steersman may safely operate the boat while identifying depths and bottom topographic features. Since the results of comparatively examining the values of vertical depths and oblique depths from the data daily recorded on board can be plotted on the plotter, the confirmation of shoals and the judgment as to the necessity of supplementary re-sounding can be easily made. In the conventional manual data arrangement, when frequent sounding had been performed in the same sea area, it took much time for selecting the smallest depth, but this system allows highspeed, high-accuracy processing. This system will be installed in regional headquarters, to speed up the correction of nautical charts in rapid response to social needs.



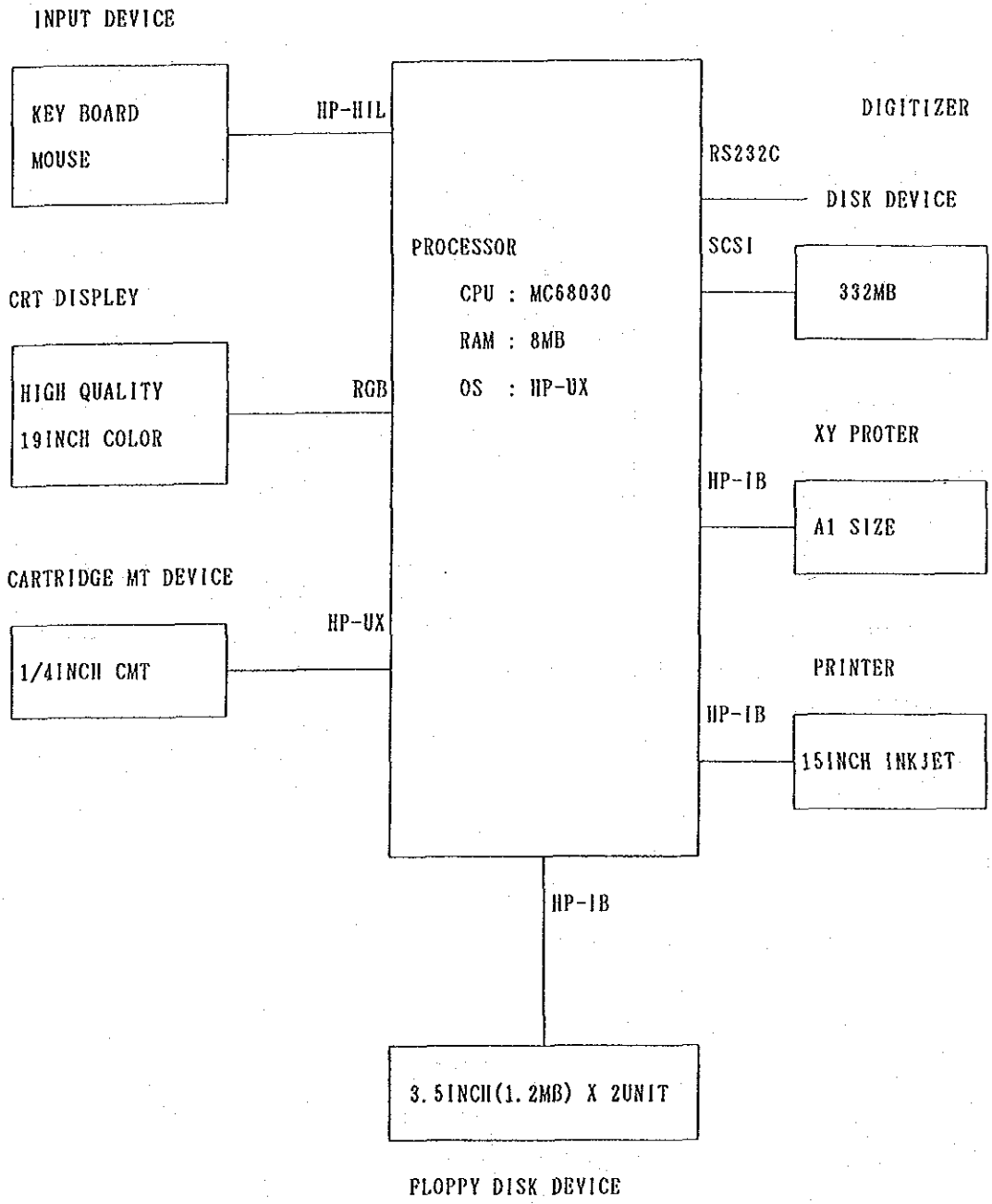
OUTLINE of SYSTEM

Fig. 1



BLOCK DIAGRAM of DATA LOGGER

Fig. 2



BLOCK DIAGRAM of DATA PROCESSING

Fig. 3

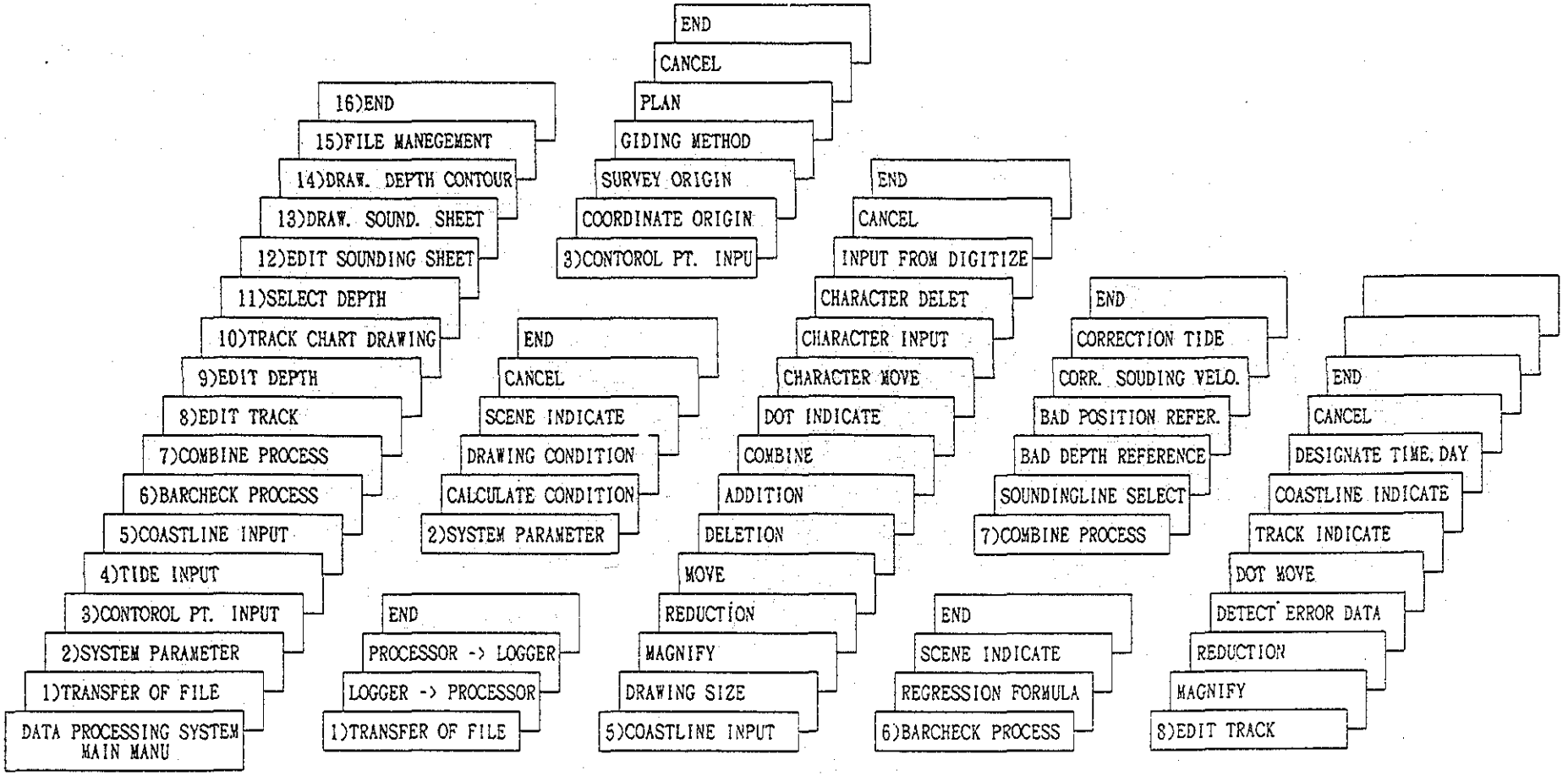

DATA PROCESSING SYSTEM MAIN MANU
1)TRANSFER OF FILE
2)SYSTEM PARAMETER
3)CONTOROL PT. INPUT
4)TIDE INPUT
5)COASTLINE INPUT
6)BARCHECK PROCESS
7)COMBINE PROCESS
8)EDIT TRACK
9)EDIT DEPTH
10)TRACK CHART DRAWING
11)SELECT DEPTH
12)EDIT SOUNDING SHEET
13)DRAW. SOUND. SHEET
14)DRAW. DEPTH CONTOUR
15)FILE MANEGEMENT
16)END
1)TRANSFER OF FILE
LOGGER -> PROCESSOR
PROCESSOR -> LOGGER
END
2)SYSTEM PARAMETER
CALCULATE CONDITION
DRAWING CONDITION
SCENE INDICATE
CANCEL
END
3)CONTOROL PT. INPU
COORDINATE ORIGIN
SURVEY ORIGIN
GIDING METHOD
PLAN
CANCEL
END
5)COASTLINE INPUT
DRAWING SIZE
MAGNIFY
REDUCTION
MOVE
DELETION
ADDITION
COMBINE
DOT INDICATE
CHARACTER MOVE
CHARACTER INPUT
CHARACTER DELET
INPUT FROM DIGITIZE
CANCEL
END
6)BARCHECK PROCESS
REGRESSION FORMULA
SCENE INDICATE
END
7)COMBINE PROCESS
SOUNDINGLINE SELECT
BAD DEPTH REFERENCE
BAD POSITION REFER.
CORR. SOUDING VELO.
CORRECTION TIDE
END
8)EDIT TRACK
MAGNIFY
REDUCTION
DETECT ERROR DATA
DOT MOVE
TRACK INDICATE
COASTLINE INDICATE
DESIGNATE TIME, DAY
CANCEL
END

Fig. 4

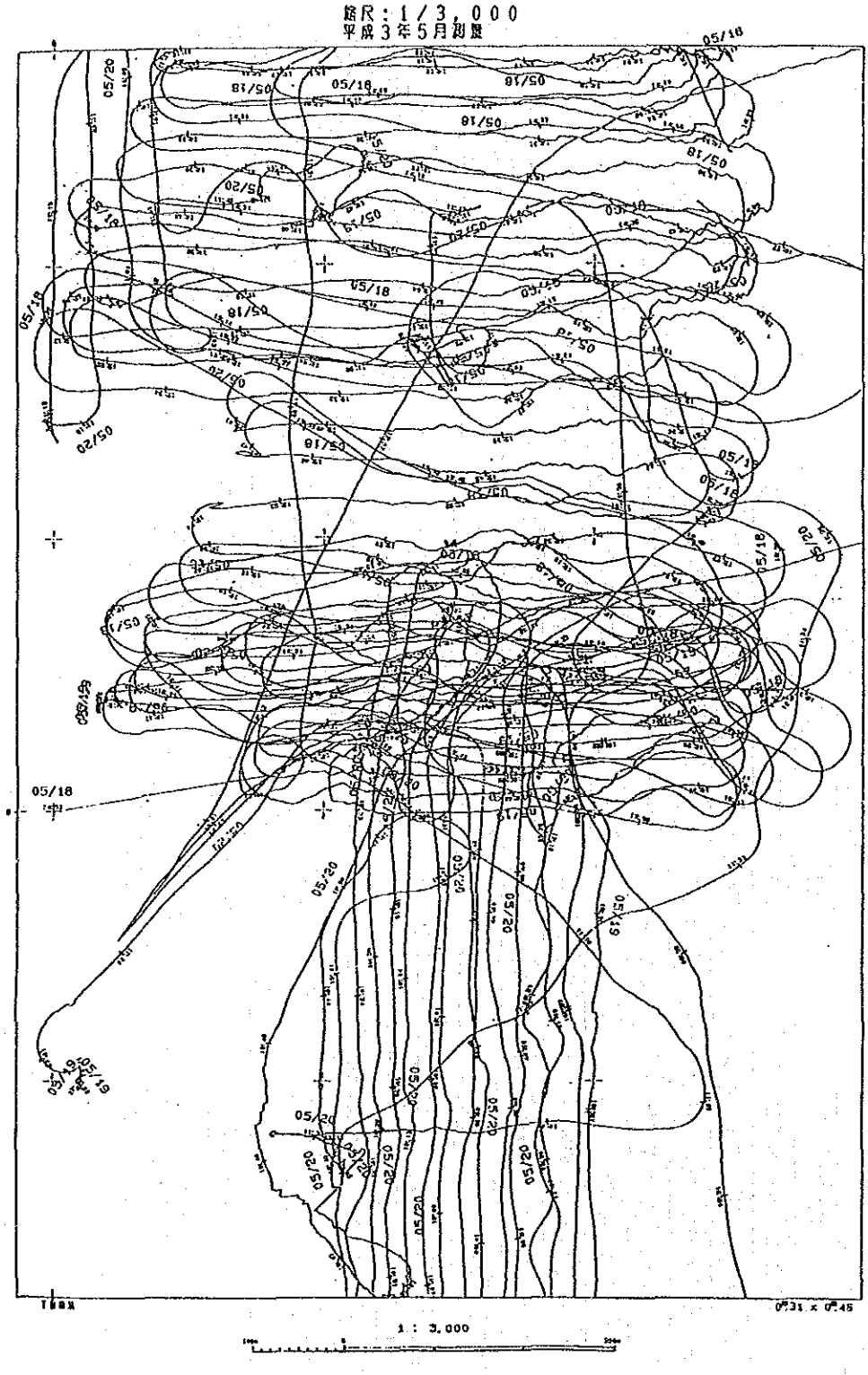


Fig. 5

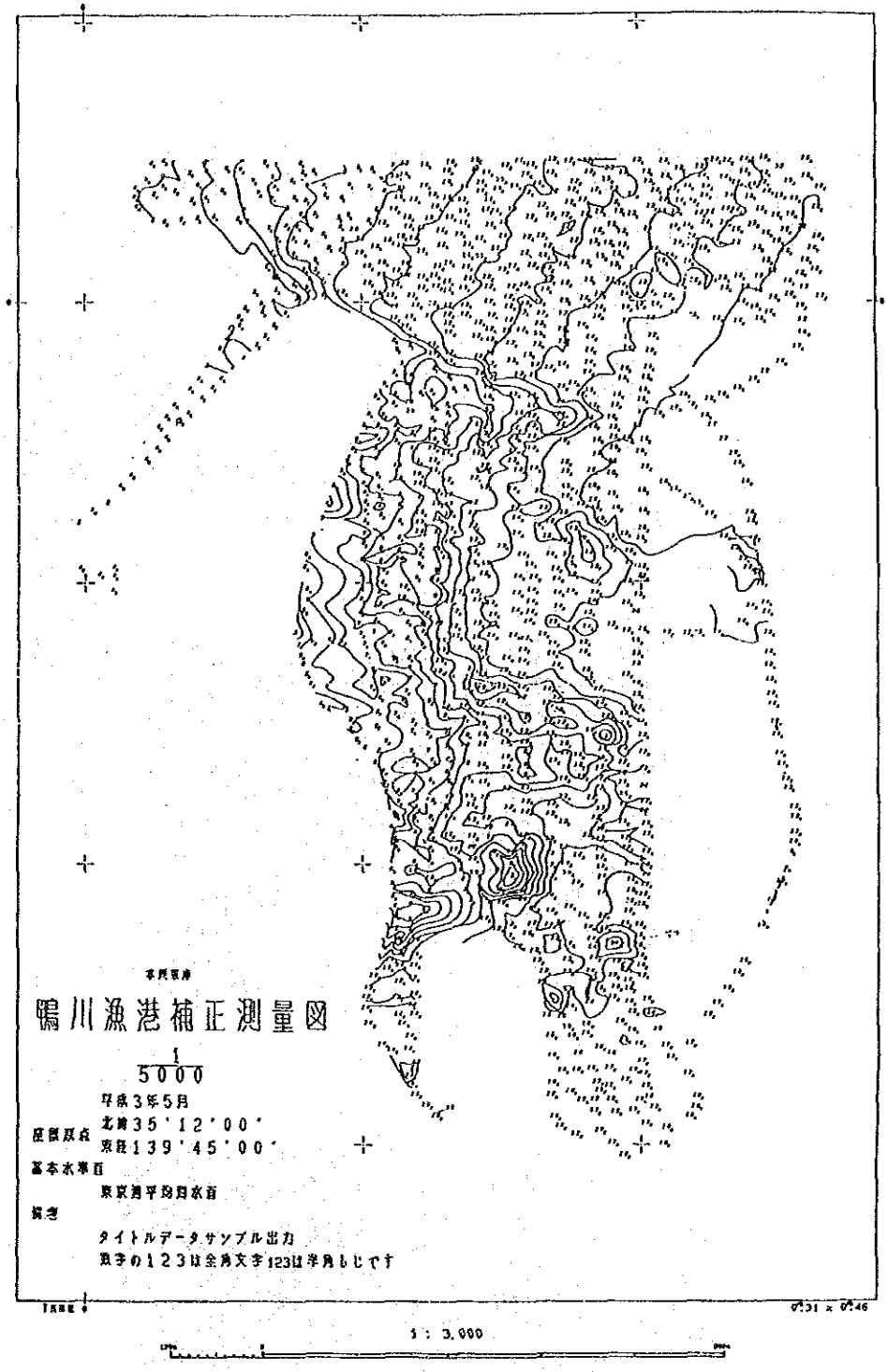

本図縮尺
鴨川漁港補正測量図
1
5000
平成3年5月
座標原点 北緯35°12'00"
東経139°45'00"
基本水準面
東京湾平均海水面
備考
タイトルデータサンプル出力
数字の１２３は全角文字123は半角もじです
1 : 3,000

Fig. 6

Photo 1

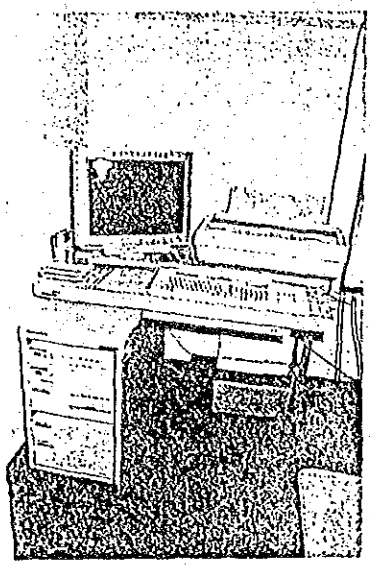


Photo 2

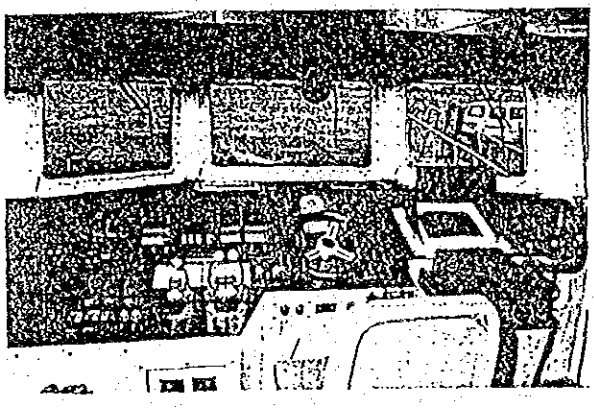


Photo 3

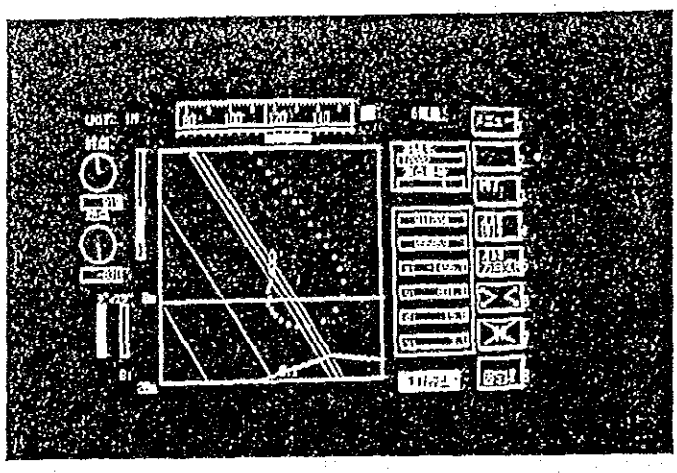
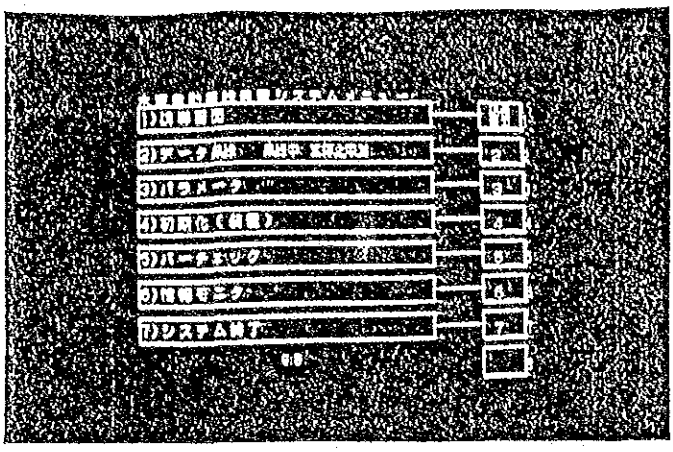


Photo 4



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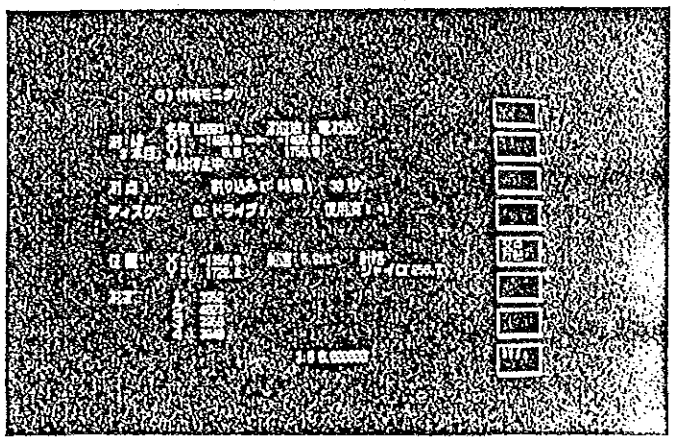

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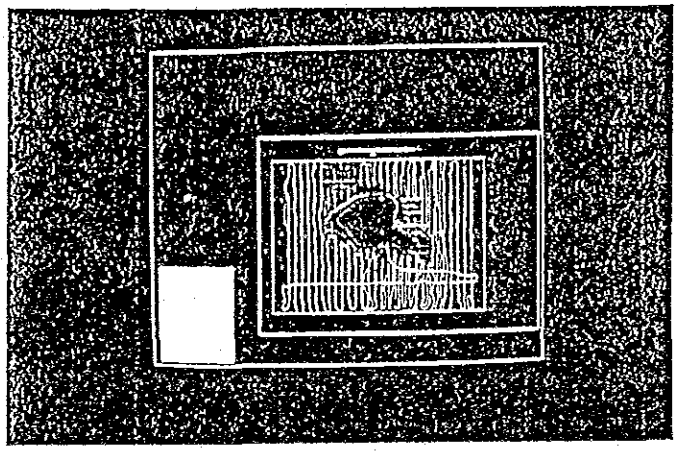

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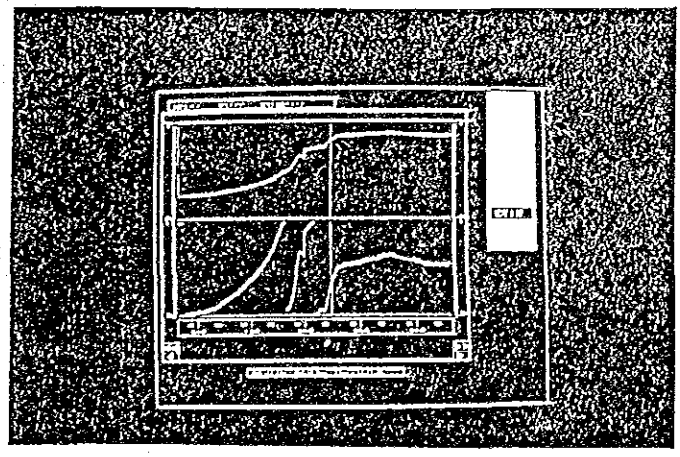

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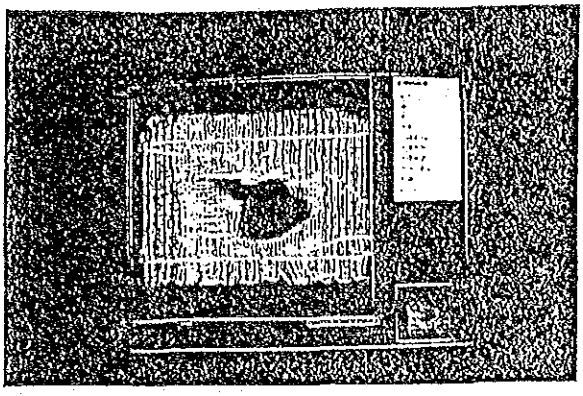

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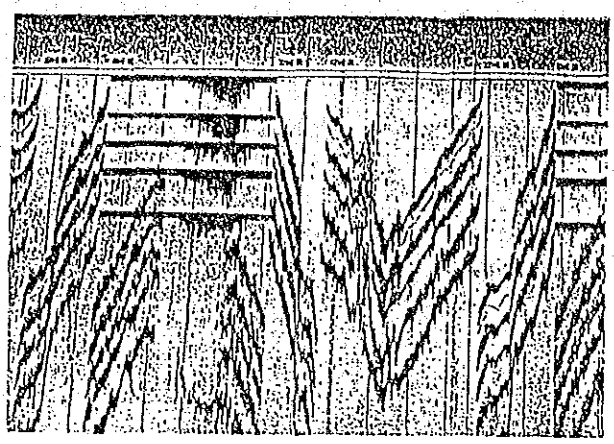

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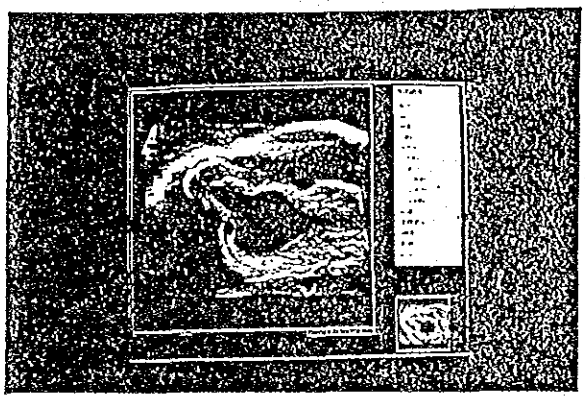

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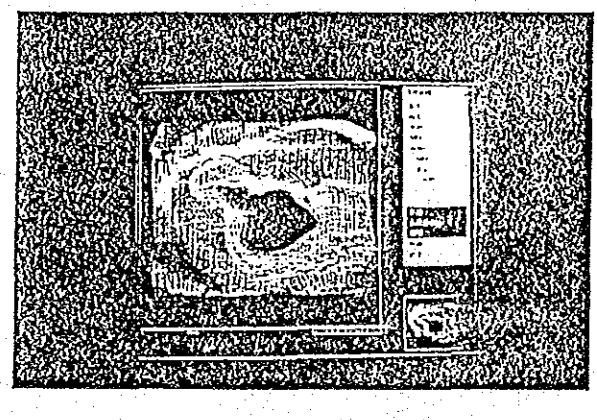

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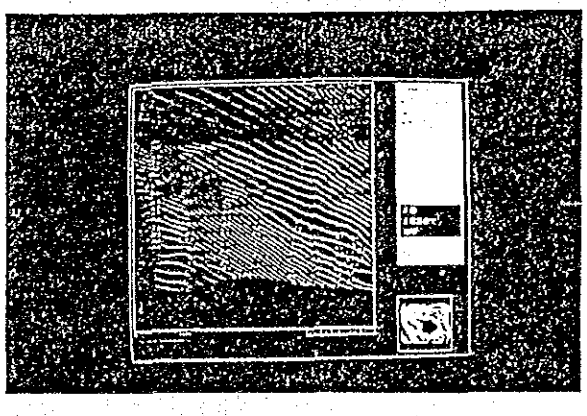

Photo 13

海洋物理調査コース帰国研修員一覧表（中国）

Year	Country	Name	Present post	Office address	Home address
1981	China	Mr. Guoming Wan	Deputy Director	North Sea Branch State Oceanic Administration 22 Fushun Rood. Qingdou P. R. China (Phone; 335513 - 352)	26 Xingan road. Qingdou P. R. China (Phone; 315213 EXT 569)
1982	China	Mr. XU Chong-jin	Senior Engineer Head of IODE group WDC-D for Oceanography	National Marine Date and Information Service 93 Liuwei Road. Hedong District Tianjin 300171. China (Phone; 244161 EXt 496)	77 Qiwei Road. Hedong District Tianjin 300171 P. R. China (Phone; 315213 EXT 569)
1983	China	Mr. Jiang Yihang			
1985	China	Mr. Guo-Zhi Li			

海図作成コース帰国研修員一覧表（中国）

Year	Country	Name	Present post	Office address	Home address
1991	China	Mr. Zhang Xin-Rong	Engineer	Jiangsu Provincial Bureau of Surveying & Mapping West Beijing Road. Nanjing. 210013 P.R. China (Phone; 025-635083)	

水路測量コース帰国研修員一覧表（スリランカ）

Year	Country	Name	Present post	Office address	Home address
1977	Sri Lanka	Mr. Joseph Angelo Andrew			
1978	Sri Lanka	Mr. P. Munasinghe			
1979	Sri Lanka	Mr. Willora Mudiyanselage Weerakoon Banda	Chief Land Surveyor Planning Research Development Division	Sri Lanka Ports Authority P.O. Box 595, Survey Branch Colombo, Sri Lanka (Phone: 421201-2364)	W. M. Weerakoon Banda "Dimutu" Vidarsana Mavata Galawila Watta Homagawa Sri Lanka
1980	Sri Lanka	Mr. Asoka Jayathilaka Wijesekara	Hydrographic Surveyor Hydrographic Office	Sri Lanka Ports Authority P.O. Box 595 Colombo, Sri Lanka (Phone: 421201)	No. 60/2, Mahalwarawa road Pannipitiya. Sri Lanka (Phone: 550129)
1981	Sri Lanka	Mr. E. M. T. Ekanayaka	Chief Hydrographic Surveyor Chief Engineer's Division	Sri Lanka Ports Authority P.O. Box 595, Survey Branch Colombo, Sri Lanka (Phone: 421201-2364)	No. 1/3, Kandy Road, Yakkala Sri Lanka
1982	Sri Lanka	Mr. Sinnathamby Velautham			
1983	Sri Lanka	Mr. Rankonde Mudiyanselage Somasiri Wellawa	Surveyor (grade 2) Planing, Research and Development	Sri Lanka Ports Authority P.O. Box 595 Colombo, Sri Lanka (Phone: 421201-2364)	Pahalawaraddone Estate Wellova Sri Lanka
1984	Sri Lanka	Mr. Manandawa Acharige Mithraprema			
1985	Sri Lanka	Mr. R. G. Sumanadasa			

Year	Country	Name	Present post	Office address	Home address
1986	Sri Lanka	Mr. Sumanadasa Ranawickrama Gamarachchige	Hydrographic Surveyor grade 2B Hydrographic Survey Section	Sri Lanka Ports Authority P.O. Box 595 Colombo. Sri Lanka (Phone: 421201-2806)	"Singhapura". Dandenikande. Beralapanatara. Matara Sri Lanka
1987	Sri Lanka	Mr. B. M. Karunaratna			
1990	Sri Lanka	Mr. Yapa Mididyanselage Lionel Bandara Yapa	Hydrographic Surveyor Hydrographic Survey Section	Sri Lanka Ports Authority P.O. Box 595 Colombo. Sri Lanka (Phone: 421201-2364)	No. 498. Udagama Ampitiya. Kandy Sri Lanka

海洋物理調査コース帰国研修員一覧表（スリランカ）

Year	Country	Name	Present post	Office address	Home address
1977	Sri Lanka	Mr. S. A. Kotalavela			
1978	Sri Lanka	Mr. T. M. D. Jeevananda de Silva			
1979	Sri Lanka	Mr. E. M. T. Ekanayana	Chief Hydrographic Surveyor Chief Engineer's Division	Sri Lanka Ports Authority P.O. Box 595, Survey Branch Colombo. Sri Lanka (Phone: 421201-2364)	No. 1/3. Kandy Road. Yakkala Sri Lanka
1980	Sri Lanka	Mr. Willora Mudiyanselage Weerakoon Banda	Chief Land Surveyor Planning Research Development Division	Sri Lanka Ports Authority P.O. Box 595, Survey Branch Colombo. Sri Lanka (Phone: 421201-2364)	W. M. Weerakoon Banda "Diautu" Vidarsana Mawata Gaiavila Watta Homagawa Sri Lanka
1984	Sri Lanka	Mr. Asoka Jayathilaka Wijesekera	Hydrographic Surveyor Hydrographic Office	Sri Lanka Ports Authority P.O. Box 595 Colombo. Sri Lanka (Phone: 421201)	No. 60/2. Mahalwarawa road Pannipitiya. Sri Lanka (Phone: 550129)
1985	Sri Lanka	Mr. Senpathi Raj Amaratunga			

海図作成コース帰国研修員一覧表（スリランカ）

Year	Country	Name	Present post	Office address	Home address
1987	Sri Lanka	Mr. S. W. S. Weerasinghe			

水路測量コース帰国研修員一覧表（エジプト）

Year	Country	Name	Present post	Office address	Home address
1985	Egypt	Mr. Wagdy Zaki Garas	Assistant Field Manager In Hydorographic Survey Division	Suez Canal Authority Egypt. Ismailia. Dreding Departement Planning and Hydorographic Survey Division (Phone; 064-394066)	Suez Canal Authority Buildings flat No. 653/20 Ismailia. Egypt (Phone; 064-394066)
1986	Egypt	Mr. Mostafa Mahmoud Imam Saleh	Chief of Hydrographic Survey Planning Division Dredging Department	Suez Canal Authority Egypt. Ismailia. Dreding Departement (Phone; 064-394061)	El Timsah Tower No. 36 Ismailia. Egypt (Phone; 064-394061)
1987	Egypt	Mr. Amir Mahmoud Sobhy Shalaby	Deputy Head (Project Division) Engineering Department Project Section	Suez Canal Authority Egypt. Ismailia. Engineering Department Project Section (Phone; 064-392865)	Suez Canal Houses-203/1 Villa Omar-Dbn-El Khatab Street Ismailia. Egypt (Phone; 064-393878)
1988	Egypt	Mr. Mahmoud Abd el-Gawad Farag	Directer of Works Engineering Department project section	Suez Canal Authority Suez Canal Authority ERshed Building Ismailia. Egypt	
1988	Egypt	Mr. Ahmed Mahmoud Mohamed Dahshan	Field Manger Hydrographic Survey Planning Division Dredging Department	Suez Canal Authority Egypt. Ismailia. Dreding Departement (Phone; 064-394061)	Suez Canal Authority Building No. 470/4 Ismailia. Egypt (Phone; 064-394061)
1989	Egypt	Mr. Medhat Mohamed Abd El-Hady Fouda	Directer of water treatment plant Department of Works	Suez Canal Authority. Department of Works Ismailia. Egypt Port-Said Works Section Water treatment plant (Phone; 225729)	52 Abo El-Salam Arif St. Port-Said. Egypt (Phone; 225921)
1989	Egypt	Mr. Mohamed Mahmoud Hosny Ahmed Aborala	Soil Mechanics Division Research Centre Engineering Department	Suez Canal Authority Ismailia. Egypt Research Centre Engineering Department (Phone; 064-394061)	524/5 Suez Canal Housing-Salnai Street nearby the Road Sporting Club Ismailia. Egypt (Phone; 064-320080)
1990	Egypt	Mr. Taha Abdo Aly El-Trabily	Directer of Works Port Said Division of Works-Public Works Department	El Graish & El Pourat Street Port Said Working Division Suez Canal Authority. Port Said. Egypt (Phone; 02-066-386471)	29. Adly & Sharkia Street Port Said. Egypt (Phone; 225921)
1991	Egypt	Ms. Zeinab Mozammel Abd El-sayed	Civil Engineer (Hydrographer) Hydrographic Department	Alexandria Port Authority (Phone; 4834321)	14 Hamman El Zhab Street. Attareen Alexandria. Egypt

海洋物理調査コース帰国研修員一覧表（エジプト）

Year	Country	Name	Present post	Office address	Home address
1984	Egypt	Mr. Ahmed Kamel Mohamed Ahmed Younes	Researcher Marine Geological and Geophysical Lab.	Ministry of Scientific Research Kayet Bey. Alexandria Egypt (Phone: 03-807138)	25 El-Nady Street Damanhour Behira Egypt (Phone: 045-337107)
1986	Egypt	Mr. Aly Abd Elfatah Sayed Ahmed	Works Field Manager Project Section	Suez Canal Autherity Building Engineering Dep. Ismailia. Egypt (Phone: 064-392867)	Suez Canal Autherity Buldings flat No. 523/10 Ismailia. Egypt (Phone: 064-392864)
1988	Egypt	Mr. Mohamed Abd El Fattah Hassan	Assistant Manger Engineering Depat. project Section	Suez Canal Autherity ERshed Building Ismailia. Egypt (Phone: 064-392352)	Suez Canal Autherity Buldings flat No. 476/3F Ismailia. Egypt (Phone: 064-392899)
1990	Egypt	Mr. Nabil Nasr El-Din Saad El-Batikhy	Assistance Lecture Pysocal Laboratory	National Institute of Oceanographic and Fisheries (Phone: 03-807138)	118 Said Mohamed Korayem St.. El-Manshia. Alexanderia Egypt (Phone: 03-4333153)

海図作成コース帰国研修員一覧表（エジプト）

Year	Country	Name	Present post	Office address	Home address
1989	Egypt	Mr. Usama Mohamed abdel Monsif Saker	Surveyer Dreging Departement Hydrographic Survey Division	Suez Canal Autharity Egypt - Ismailia (Phone: 394061)	Egypt - Ismailia - eshehk zayed - 3rd ringon buildind No.4 - flat No.7
1991	Egypt	Mr. Ezzat Mohamed Ibrahim Hussein	Hydrographic Surveyor Hydrographic Survey Devision Studies & Research Departement	General Adm. of marine structures Port & Lighthouses Administration Egypt - Alexandria Ras EL Teen. Gomrock. Gate No.1 (Phone: 203-802526)	Egypt - Alexandria EL Hadarah 57. Zaher Bayoumi Str.

5. 持ち帰り資料一覧

中国

国家海洋局

(1) パンフレット

国家海洋信息中心

(1) パンフレット

(2) CATALOGUE OF OCEANOGRAPHIC DATA OBSERVED BY CHINE Volume 1

(3) CATALOGUE OF OCEANOGRAPHIC DATA OBSERVED BY CHINE Volume 2

(4) Fourth course programme at the I. M. O. International Maritime Academy (Hydrography) - Trieste

海上安全監督局

(1) The Electronic Chart Display and Information System (ECDIS) in China

江蘇省測絵局

(1) 江蘇省地図帳

スリランカ

Sri Lanka Ports Authority

(1) Handbook

National Aquatic Resources Agency

(1) Handbook

エジプト

Suez Canal Authority

(1) MAP OF THE SUEZ CANAL.

※上記は、海上保安庁水路部に保管