

- Self check function
- Monitoring of running condition of main engine, auxiliaries and refrigerating containers

b) Instructor's console

- Setting up of initial conditions for exercises
(Sea water temperature, Engine room temperature, Draft, Running auxiliaries, Electric demand, Steam demand, Sea conditions)
- Introduction of ship's operation mode
(In port, stand-by Maneuvering in harbor, Ocean navigation)
- Setting up of faults and alarms
- Remote control of main engine imaging bridge control

4) Equipment components list

a) Training section

- Engine control console 1
- Printer for data logging 1
(installed on the above console)
- Printer for alarm logging 1
(installed on the above console)
- Main switch board 1
(installed on the above console)
- Group starter panel 1
(installed on the above console)
- Graphic panel 1
- Reefer container monitor 1

b) Instructor section

- Instructor's console 1
- Event printer (installed on the above console) 1

c) Computer section

- computer panel 1
- Digital computer 1 set
(installed on each console)
- CRT display 1 set
(installed on each console)

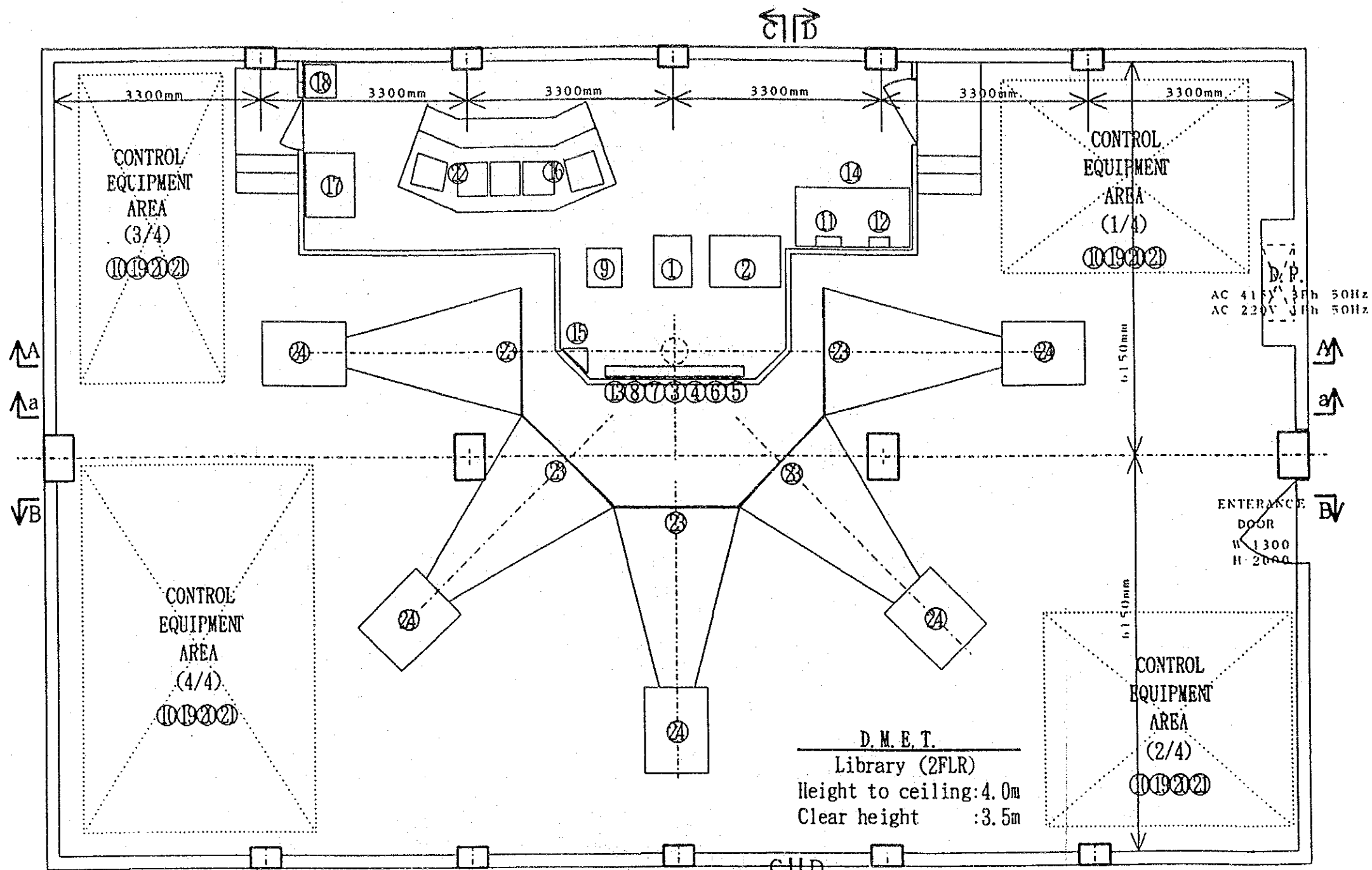
-Dummy sound generator
(installed on the above console)
-Voltage regulator

1

1

4-3-2 Arrangement Plan of the Equipment

Arrangement of above mentioned equipment is as shown in Fig. 4-1 to Fig. 4-6.



- | | | |
|--|-------------------------------|---|
| ① STEERING STAND | ⑩ ELECTRONIC IMAGE GENERATOR | ⑲ COMPUTER (Including system cabinet for PIO) |
| ② MAIN PROPULSION CONTROL STAND | ⑪ OWN SHIP'S POSITION DISPLAY | ⑳ MAGNETIC TAPE MEMORY |
| ③ RUDDER ANGLE INDICATOR | ⑫ INTERPHONE | ㉑ POWER CONTROL PANEL |
| ④ SHIP SPEED INDICATOR | ⑬ ELECTRIC CLOCK | ㉒ GRAPHIC DISPLAY CONTROLLER |
| ⑤ WIND SPEED INDICATOR | ⑭ CHART TABLE | ㉓ SCREEN |
| ⑥ WIND DIRECTION INDICATOR | ⑮ KEY FOR MORSE SIGNAL LIGHT | ㉔ PROJECTOR |
| ⑦ RATE OF TURN INDICATOR | ⑯ INSTRUCTOR'S CONSOLE | |
| ⑧ PROPELLER SHAFT REVOLUTION INDICATOR | ⑰ LASER-PRINTER | |
| ⑨ AUTOMATIC RADAR PLOTTING AID (ARPA) | ⑱ VIDEO-PRINTER | |

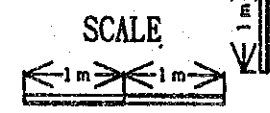


Fig. 4-1
ARRANGEMENT
OF
SHIP HANDLING
SIMULATOR

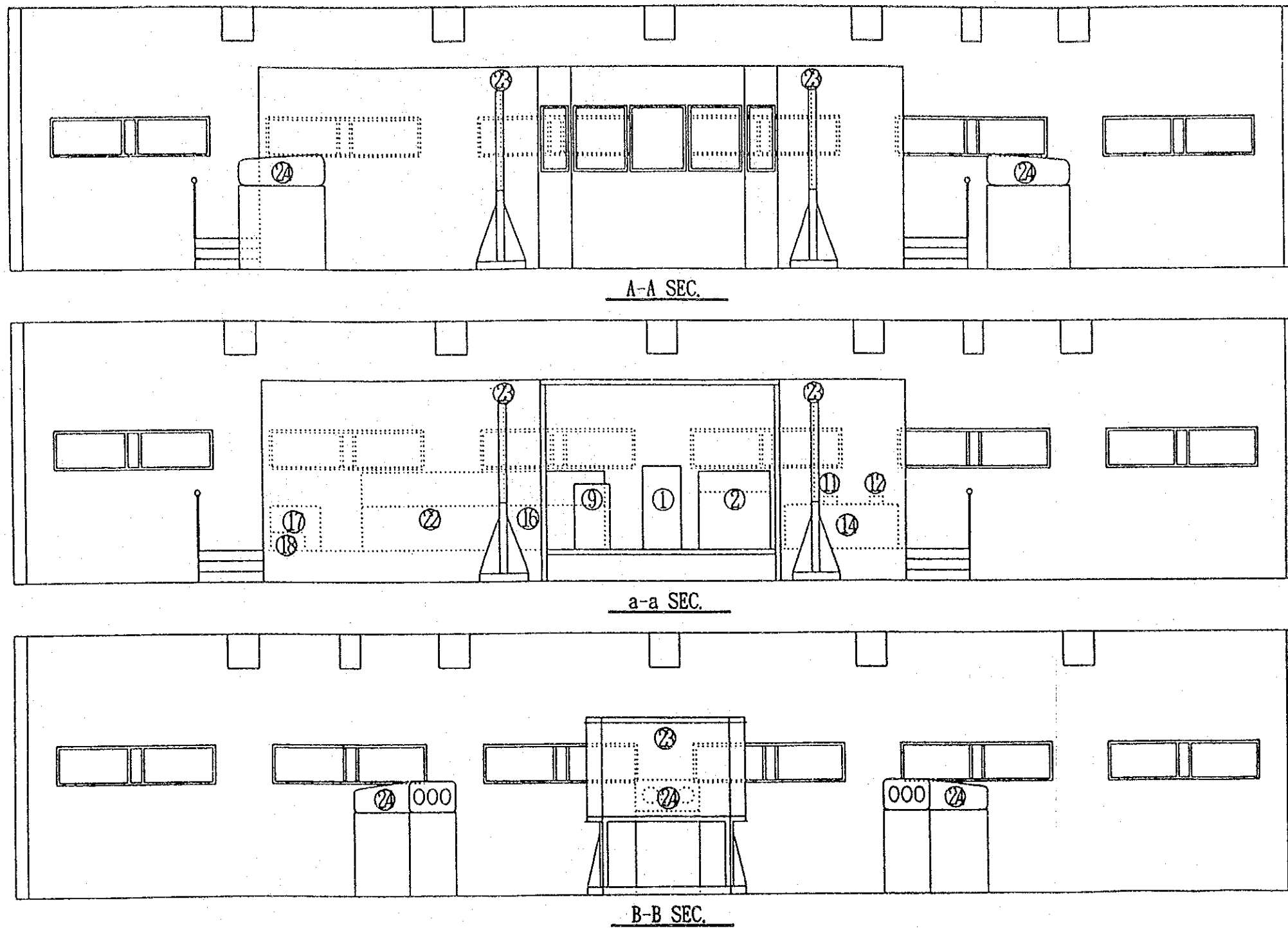
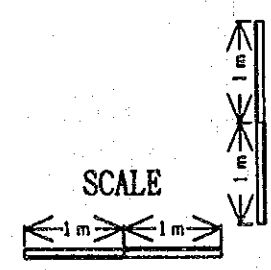


Fig. 4-2
 SEC. ARRANGEMENT
 OF
 SHIP HANDLING
 SIMULATOR(1/2)



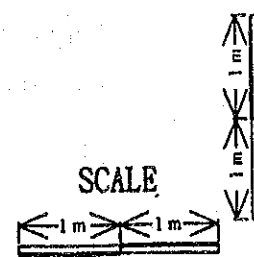
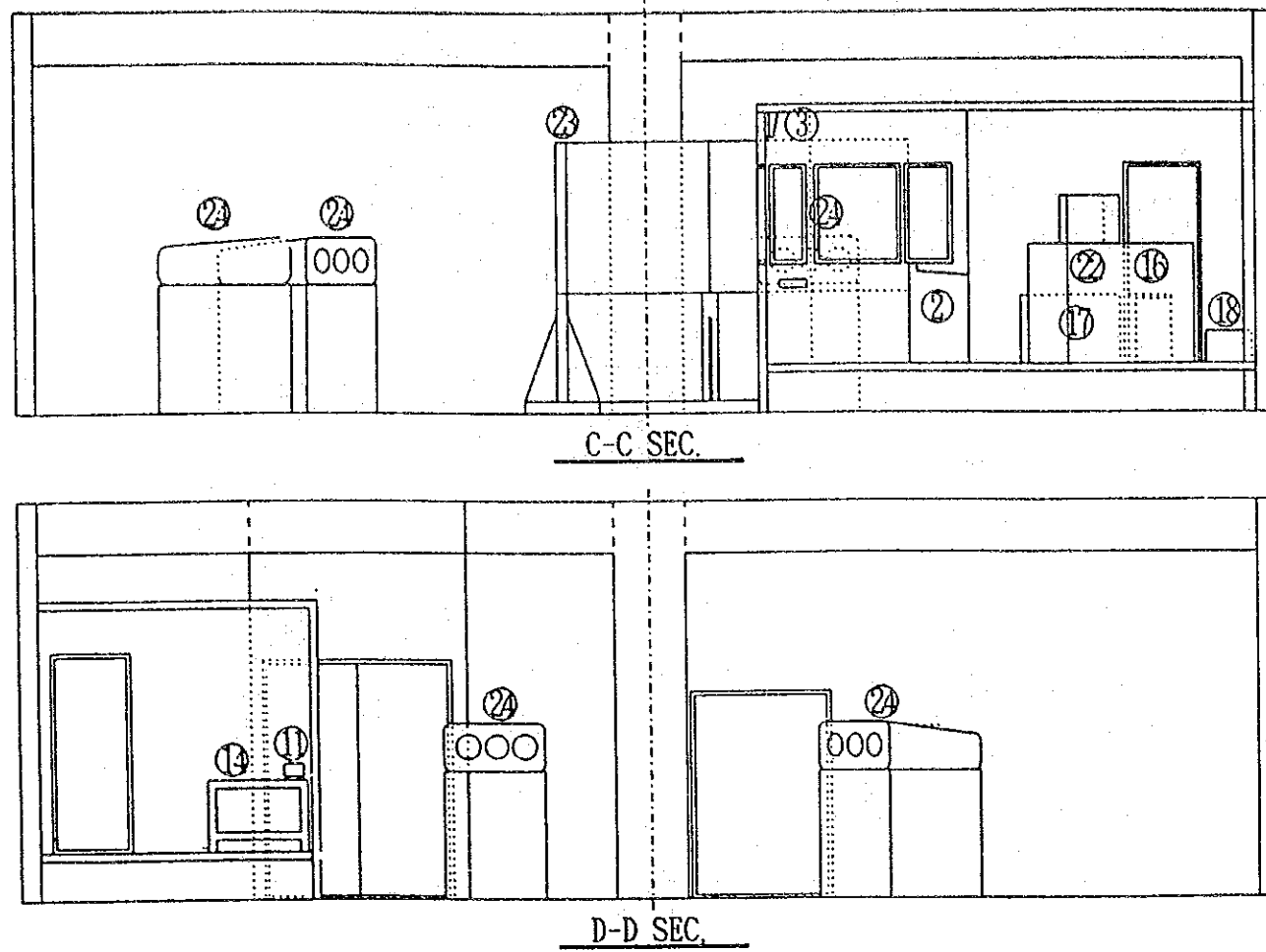
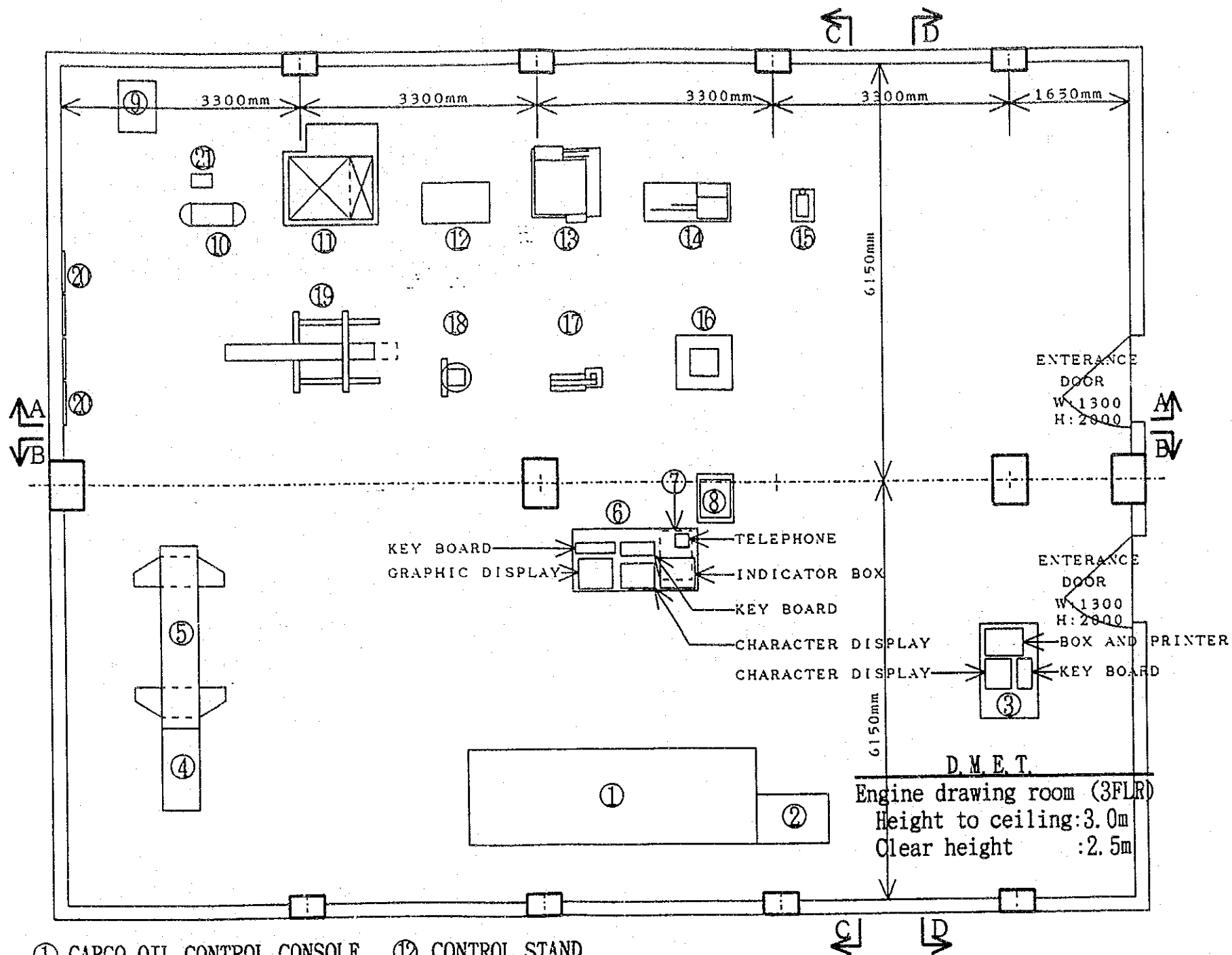


Fig. 4-2
 SEC. ARRANGEMENT
 OF
 SHIP HANDLING
 SIMULATOR (2/2)



- | | |
|------------------------------|--|
| ① CARGO OIL CONTROL CONSOLE | ⑫ CONTROL STAND |
| ② INERT GAS CONTROL CONSOLE | ⑬ HYDRAULIC POWER UNIT |
| ③ LOADING COMPUTER | ⑭ SOLENOID VALVE UNIT |
| ④ PUMP STAND | ⑮ HAND PUMP UNIT |
| ⑤ MIMIC DIAGRAM DISPLAY UNIT | ⑯ SLUICE VALVE |
| ⑥ INSTRUCTOR CONSOLE | ⑰ BUTTERFLY VALVE |
| ⑦ COMPUTER | ⑱ TWIN NOZZLE TYPE TANK CLEANING MACHINE |
| ⑧ SYSTEM TYPE WRITER | ⑲ SINGLE NOZZLE TYPE TANK CLEANING MACHINE |
| ⑨ CVCF | ⑳ PIPING DIAGRAM PANEL FOR SELF STRIPPING SYSTEM |
| ⑩ AIR COMPRESSOR | ㉑ TERMINAL BOX |
| ⑪ WATER TANK | |

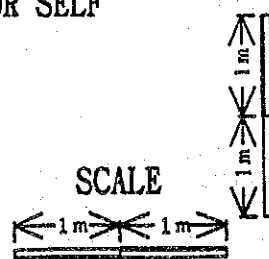


Fig. 4-3
ARRANGEMENT
OF
CARGO HANDLING
SIMULATOR

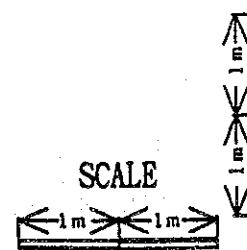
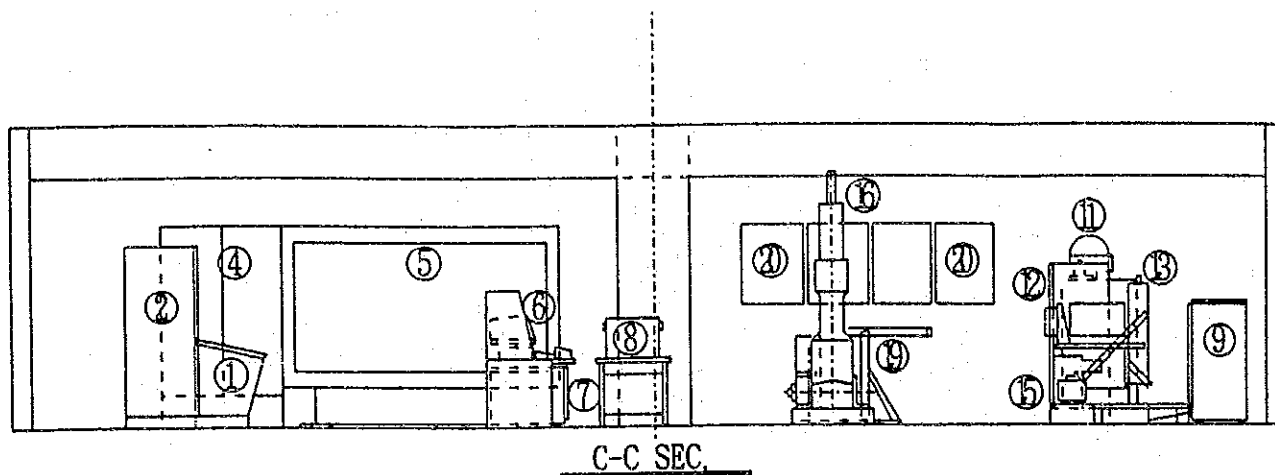
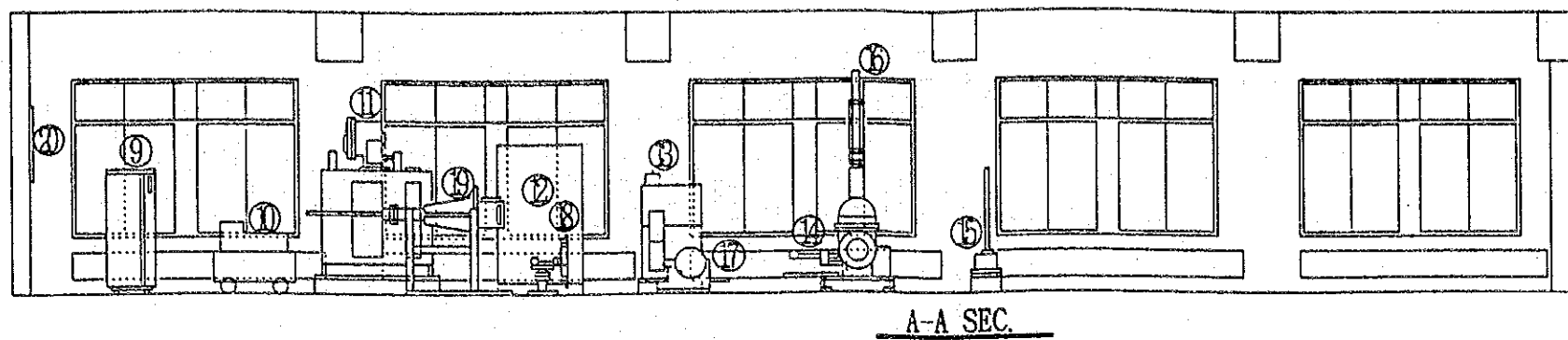
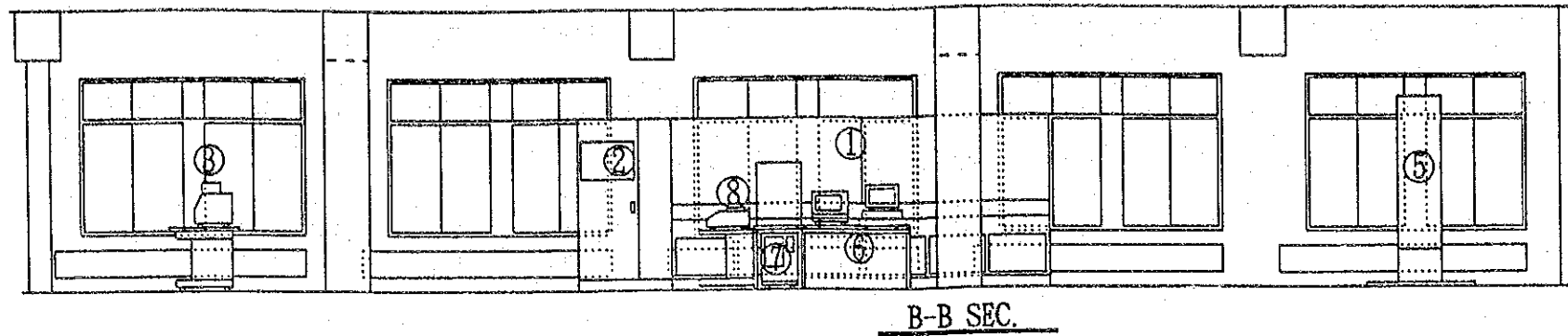
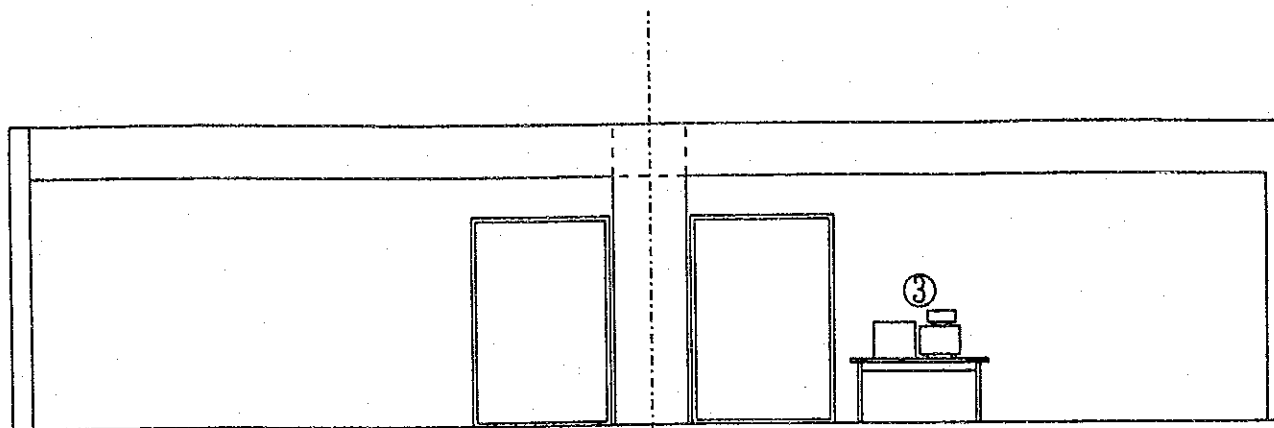


Fig. 4-4
 SEC. ARRANGEMENT
 OF
 CARGO HANDLING
 SIMULATOR (1/2)



B-B SEC.



D-D SEC.

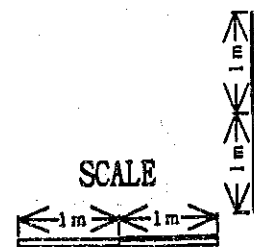
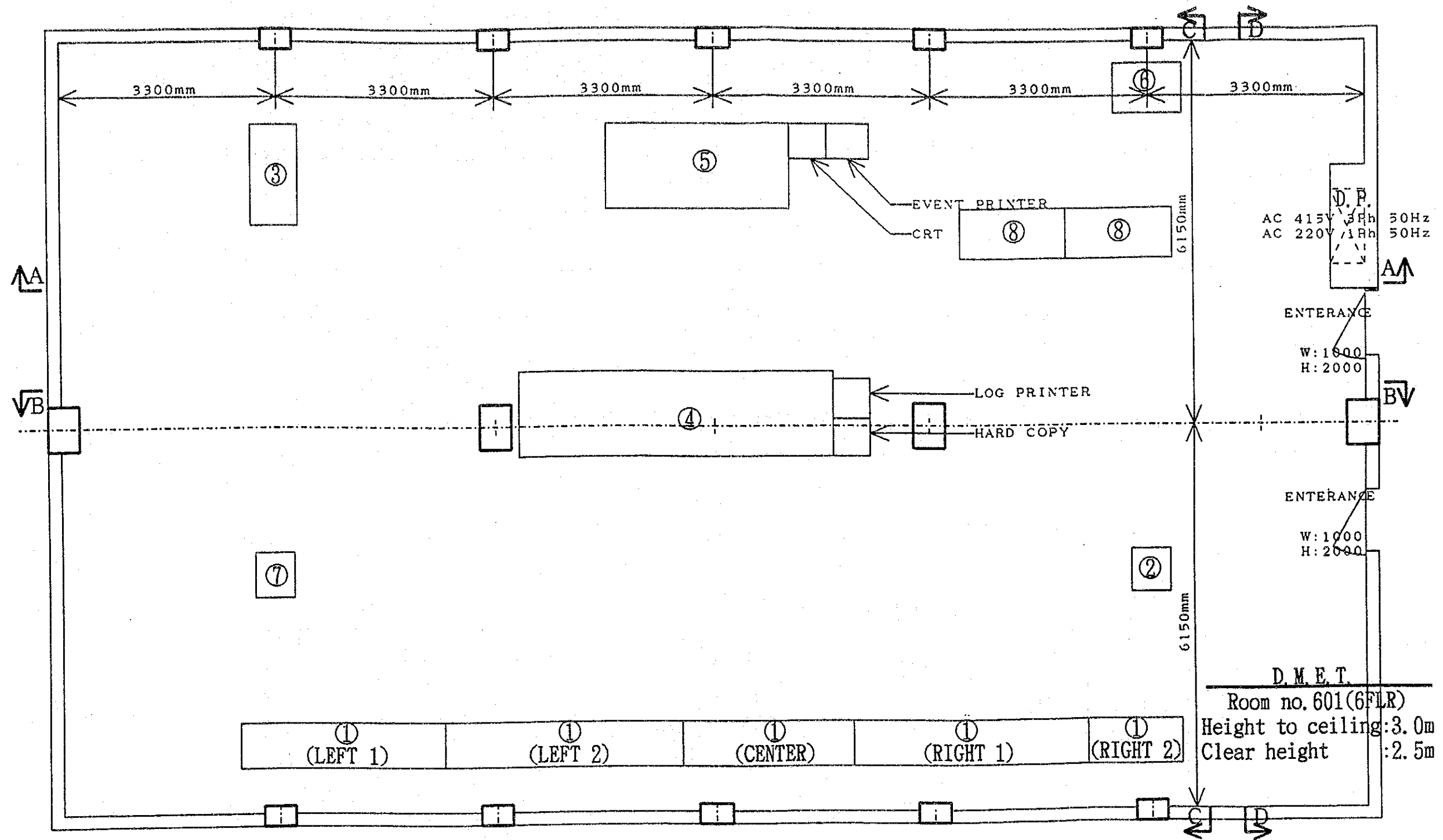


Fig. 4-4
 SEC. ARRANGEMENT
 OF
 CARGO HANDLING
 SIMULATOR (2/2)



- ① GRAPHIC PANEL
- ② M/E LOCAL CONTROL STAND
- ③ CPU PANEL

- ④ ENGINE CONTROL CONSOLE
- ⑤ INSTRUCTOR'S CONSOLE
- ⑥ DC POWER SUPPLY PANEL

- ⑦ REEFER CONTAINER PANEL
- ⑧ TABLE

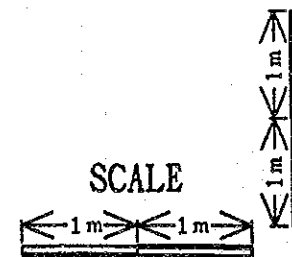
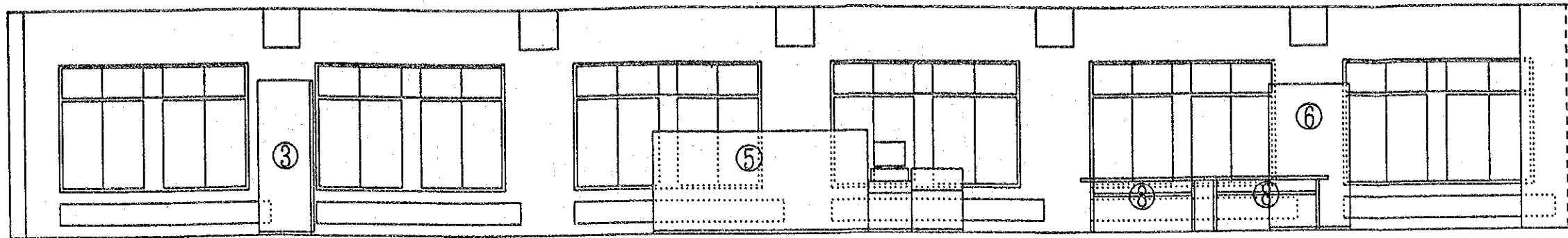
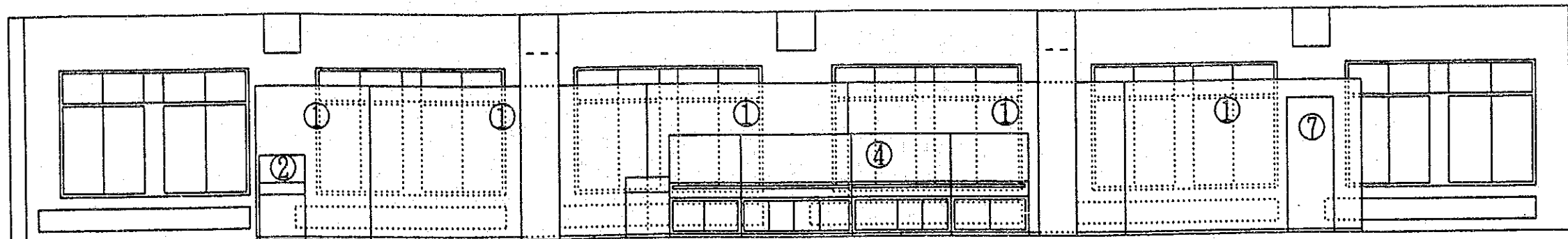


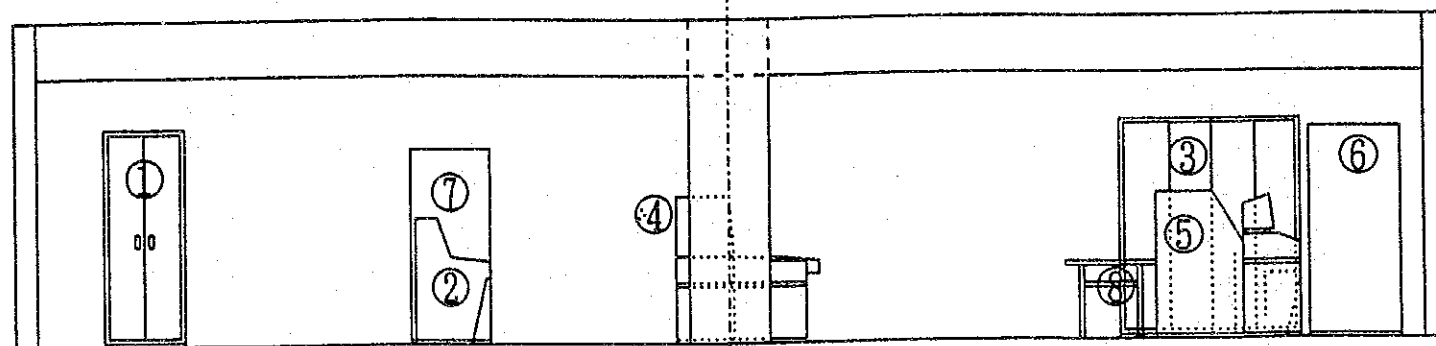
Fig. 4-5
ARRANGEMENT
OF
DIESEL MAIN
ENGINE
SIMULATOR



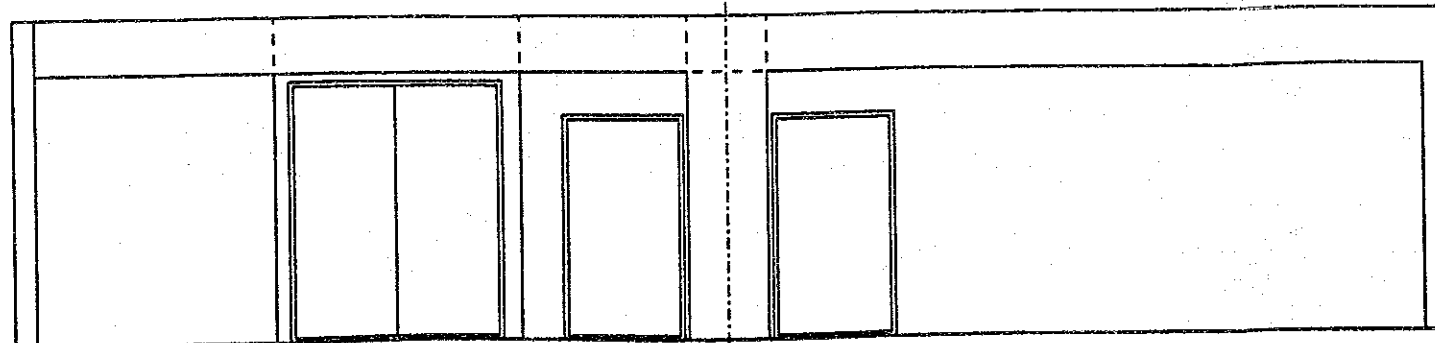
A-A SEC.



B-B SEC.



C-C SEC.



D-D SEC.

- ① GRAPHIC PANEL
- ② GROUP STARTER PANEL
- ③ CPU PANE
- ④ ENGINE CONTROL CONSOLE
- ⑤ INSTRUCTOR'S CONSOLE
- ⑥ DC POWER SUPPLY PANEL
- ⑦ REEFER CONTAINER PANEL
- ⑧ MAIN SWITCHBOARD
- ⑨ TABLE

Fig. 4 - 6

SEC. ARRANGEMENT
OF
DIESEL MAIN
ENGINE
SIMULATOR



4-4 PROJECT EXECUTION PLAN

4-4-1 Execution Policy

In consideration of the project being under the Japanese grant aid scheme, the following execution policy has been adopted.

- (1) The contents of the execution are the manufacture of the equipment in Japan, marine transport, installation of the equipment at the site, cutting hole and restoration work on the outer wall when the equipment is carried into the building. Considering such various stages of the work, an appropriate execution period and work plan should be established.
- (2) Before the equipment is transported to the site, there are procedures to be finished by the executive agency such as procedures for the counter part fund and prior procedures for customs clearance. Therefore, the time factor of such procedures, etc. on the Indian side should be taken into account in the execution plan so that the work schedule can be maintained as planned.
- (3) Since the equipment is special and delicate, high technology is required for their installation. Therefore, engineers should be despatched from Japan to guide their installation for an appropriate period.
- (4) Close communication should be made through exchange of opinions among DGS, LBC, the Consultant and the contractor for smooth execution of the work.

4-4-2 Precautions for Installation Work

Precautions to be taken for the installation work of the equipment are as follows.

- (1) Layout of the equipment should be determined so that a concentrated load is not generated taking into consideration the floor strength of the building.

(2) Consideration should be given so that electric wires are not damaged by rats.

(3) Airtightness of window frames should be secured.

4-4-3 Supervisory Plan

The consultant is required to organize a project team that will carry out supervisory work entrusted to him in the course of the execution of the project for its smooth completion.

In the execution of the supervisory work, the consultant is required to approve the manufacturing drawings, witness the commissioning test at the manufactures' factories and despatch his specialists for an appropriate period to witness and supervise the installation work, in such a manner as to contribute to the smooth execution of the project as far as its scope of work is concerned.

4-4-4 Procurement Plan

The equipment in this project is planned to be procured from only Japan in view of the limited time in the work schedule.

As for the materials required for installation of the equipment, those available in India are planned to be purchased from India and those unavailable there will be purchased from Japan.

4-4-5 Execution Schedule Plan

This project will be executed in two phases. The execution of the project after the conclusion of the Exchange of Notes between both governments on the Japanese grant aid for this project, will proceed in accordance with the following steps. In the first phase the ship maneuvering simulator and in the second phase the cargo oil handling simulator and the engine room simulator are planned to be supplied.

(1) Detailed design

Tender documents are prepared on the basis of the basic design study report and approved by the agencies concerned of both governments.

(2) Tender

Tender procedures include announcement of tender, qualification screening of tenderers, estimation and evaluation of tender and contract conclusion.

(3) Execution of work

The successful tenderer (including an engineering company) should obtain approval of the drawings, have the equipment inspected at their manufacturing stage, then transport them to India and install them at the site. On a full turn-key base, all such approvals and inspections should be made through the consultant.

(4) Completion of work

The equipment installed is tested, inspected and test-run in the presence of the consultant, LBS instructors and other parties concerned and compliance of the equipment with the contract specifications is confirmed. Also, guidance for the operation and handling of the equipment is given to LBS instructors. After successful results are obtained, the work is deemed to be completed.

The following periods are required for the work in both the first and second phases.

Detail design	2.5 months
Manufacturing and installation	12 months

The work schedule is shown in Fig. 4-7.

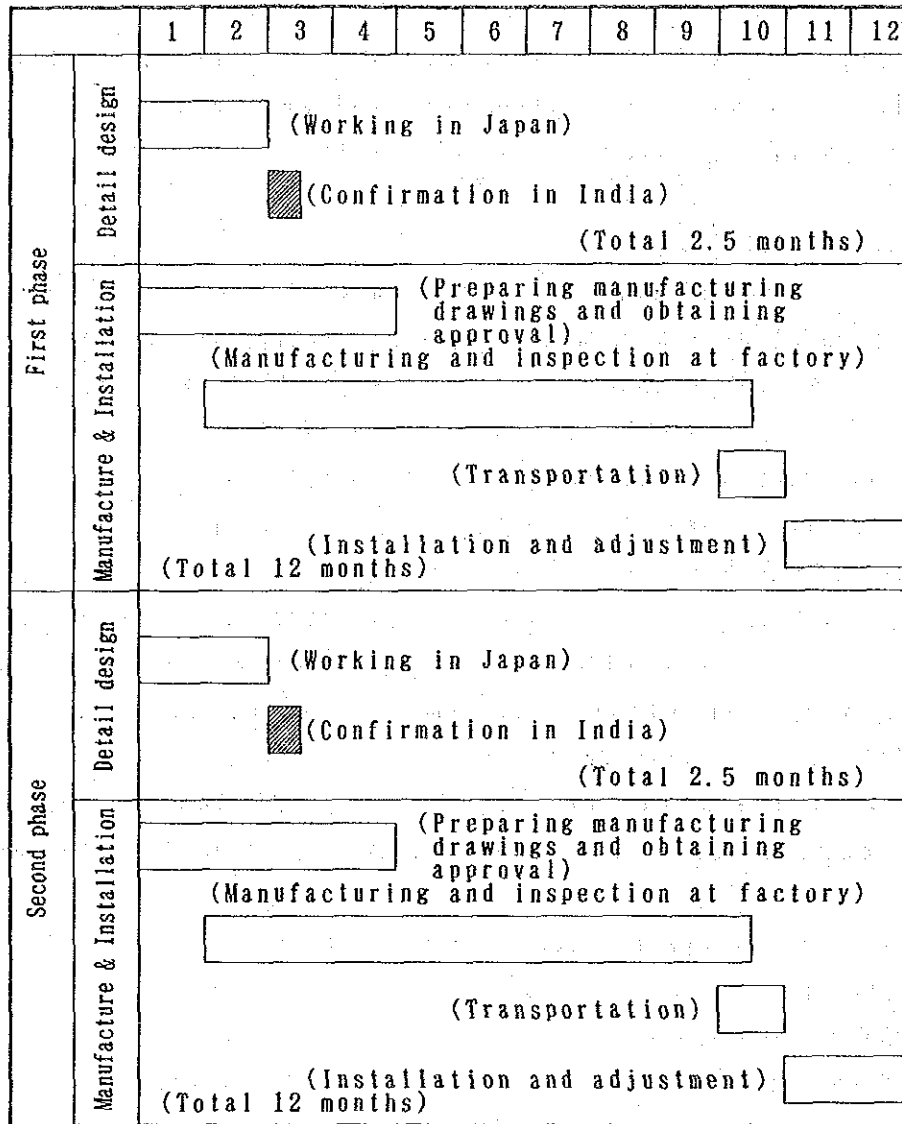


Fig. 4-7 Project Work Schedule

4-4-6 Implementation Cost on Indian Side

The implementation cost for the project to be borne on Indian side is estimated to be about 270,000 Rupees for the first phase and about 250,000 Rupees for the second phase respectively, if the project is realized under a grant aid of the Japanese government.

**CHAPTER 5 EFFECT OF PROJECT
AND CONCLUSIONS**

CHAPTER 5 EFFECT OF PROJECT AND CONCLUSION

5-1 EFFECT OF PROJECT

The following table summarizes the effect of this project and the improvement of the present situation by it.

Present situation and issue	Measures in this project	Effect of and improvement by this project
<p>1. The Republic of India plan to train one thousand seamen per annum to comply with the increasing demand of seamen due to the expansion of the national fleet and that from abroad. The total prescribed number of cadets in her ship officer training institutes is two hundred, and, in addition, certain number of science and engineering university graduates are trained separately. However, existing training equipmen can not sufficiently satisfy this requirement.</p>	<ul style="list-style-type: none"> • The training equipment shall be such that pre-sea post-sea and specialized education/training for ship officers can be conducted by using them. 	<ul style="list-style-type: none"> • Effective retraining of ship officers can be expected by introducing this equipment. • In the pre-sea education of the ship officer in seamen training institutes, quicker and more effective understanding on the outline of a real ship (bridge, engine room) and the assignments of officers on board can be given to the cadets, by using the equipment.
<p>2. Since present training equipment is not sufficient and many of them are outdated, training has to mainly rely on classroom lectures.</p>	<ul style="list-style-type: none"> • The equipment shall be composed of three kinds of simulators to enable the training equivalent to that on-board real ships. 	<ul style="list-style-type: none"> • Wider range and higher level of education can be accomplished.
<p>3. In the Indian fleet there are many old and low performance tankers or bulk carriers, and cargoes of high freight rates are mainly carried by foreign-flag liners and container ships. Thus, a large amount of foreign currency is flowing out to foreign countries in the form of freight.</p>	<ul style="list-style-type: none"> • The equipment shall be such that the equipment and performance of modern ship can be simulated. 	<ul style="list-style-type: none"> • Introduction of the equipment is useful for trainees to acquire a knowledge of modernized ships. Particularly, it is effective for the re-education of officers.

Present situation and issue	Measures in this project	Effect of and improvement by this project
<p>4. Concern over the safety of life at sea and environmental pollution has been growing worldwide recently, and ship officers are obligated to have knowledge on STCW convention and International Convention for Prevention of Pollution from Ships.</p>	<ul style="list-style-type: none"> • The equipment shall be such that the requirements by these international conventions are fulfilled by utilizing them. 	<ul style="list-style-type: none"> • The equipment is useful for trainees to understand high-efficiency ships, particularly, it is effective for the re-education of seamen. • Since trainees can gain sufficient knowledge on international conventions, no trouble will arise for the ships with Indian crews when calling at foreign ports. More opportunities will be provided to Indian seaman for working on board foreign ships. • Consequently, it can contribute to the promotion of employment and the acquisition of foreign currencies. • The retraining of ship officers is always possible.

5-2 CONCLUSION AND RECOMMENDATIONS

It can be expected that the execution of this project contributes to the development of the shipping industry in India and in the world, as well as to the expansion of the employment and the acquisition of foreign currencies in India, since ship officers of high operational technology can be supplied not only to the national fleet but to foreign ships.

This project is therefore essential to accomplish the government plans for promoting the shipping industry and for training ship officers and an immediate effect can be generated after its implementation. In view of the present situation of the seamen education in India where unsatisfactory aspects can be found, this project is deemed as an appropriate one from which a remarkable effect of education can be realized in respect of upgrading the quality of a larger number of Indian seamen.

However, to ensure the implementation of this project as intended, appropriate consideration is to be given to the following points.

- 1) The effort of the Indian government on the following points is expected in order to perform this project.
 - To budget a counterpart fund to be prepared in India for this project.
 - To make the equipment to be imported for this project free from custom duties, or alternatively to budget the custom duties, as well as to secure smooth custom clearance.
 - To secure the budget and personnel necessary for the maintenance and management of the equipment.
 - To prepare systems necessary for the maintenance and management of the equipment.

- 2) Organizing a system necessary for the maintenance and management of the equipment.
 - To conclude maintenance agreements with the manufacturers of the equipment or their agencies.

APPENDIX

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APPENDIX 1 STUDY TEAM MEMBER LIST

(1) Study on Basic Study (October 31 to November 19 1991)

<u>Specialty</u>	<u>Name</u>	<u>Position</u>
Leader	Mr. Takashi NAKAMURA	Professor Engineering Dept. Marine Technical College Ministry of Transport
Training Equipment Planning	Capt. Kazumi TANE	Professor Institute for Sea Training, Ministry of Transport
Project Coordinator	Mr. Tetsumi MURATA	Economic Cooperation Bureau, Ministry of Foreign Affairs
Training Program	Mr. Osamu YAMAGUCHI	OSCC
Training Equipment (Engine)	Mr. Toshio WADA	MICC
Training Equipment (Deck)	Capt. Soji SHIBATA	OSCC
Cost Estimation	Mr. Hiroshi AKIYOSHI	OSCC

(2) Explanation on the Draft Final Report
(January 26 to February 4 1992)

<u>Specialty</u>	<u>Name</u>	<u>Position</u>
Leader	Mr. Takashi NAKAMURA	Professor Engineering Dept. Marine Technical College Ministry of Transport
Project Coordinator	Mr. Takumi MATSUDA	Economic Cooperation Bureau, Ministry of Foreign Affairs.
Training Program	Mr. Osamu YAMAGUCHI	OSCC
Training Equipment (Deck)	Capt. Soji SHIBATA	OSCC

APPENDIX 2 STUDY SCHEDULE

(1) Study on Basic Design (October 31 to November 19, 1991)

<u>Order</u>	<u>Date</u>	<u>Contents of Study</u>
1	Oct. 31 (Thu)	Departure from Narita-Arrival at Delhi
2	Nov. 1 (Fri)	<ul style="list-style-type: none"> ○ Visit to India Office, JICA Discussion on the study schedule ○ Visit to Japanese Embassy in India Explanation on the objective of the study ○ Visit to Ministry of Finance Explanation of the objective of the study and questionnaires, etc. ○ Visit to Ministry of Surface Transport Explanation of the objective of the study and questionnaires, etc.
3	Nov. 2 (Sat)	○ Internal discussion on the study schedule
4	Nov. 3 (Sun)	○ Departure from Delhi-Arrival at Bombay
5	Nov. 4 (Mon)	<ul style="list-style-type: none"> ○ Visit to Directorate General of Shipping Explanation of the objective of the study, questionnaires, etc. Discussion on the requested equipment Explanation of JICA Grant Aid System ○ Survey of the training ship, "Rajendra" Discussion and survey on training of seamen

- 6 Nov. 5 (Tue) ○ Team member meeting
 Summary of the discussion results
 ○ Data collection
- 7 Nov. 6 (Wed) ○ Visit to Lal Bahadur Shastri
 Nautical & Engineering College (LBS)
 and Directorate of Marine
 Engineering Training (DMET)(Bombay)
 Explanation of the questionnaires
 Discussion on the requested
 equipment
 Discussion on the Minutes of
 Discussions
- 8 Nov. 7 (Thu) ○ Visit to Directorate General of
 Shipping
 Signing of Minutes of Discussions
 ○ Data collection
- 9 Nov. 8 (Fri) ○ Movement of the leader and officials
 Departure from Bombay-Arrival at
 Delhi
 ○ Visit to LBS
 Data collection
 Survey of the installation site
- 10 Nov. 9 (Sat) The leader and officials
 ○ Visit to India Office, JICA and
 Japanese Embassy
 Report on the study results
 ○ Team member meeting
 Rearrangement of collected data and
 study of additional data collection
- 11 Nov. 10 (Sun) ○ The leader and officials
 Departure from Delhi-Arrival at
 Narita
 Team member meeting

Rearrangement of collected data

- 12 Nov. 11 (Mon) ○ Visit to LBS
Discussion on the additional data collection and request for arrangements
- 13 Nov. 12 (Tue) ○ Visit to LBS
Discussion on technical specifications
○ Visit to Directorate General of Shipping
Discussion on the Minutes of Discussions on technical specifications
Request for arrangements of additional data
- 14 Nov. 13 (Wed) ○ Visit to LBS
Discussion on technical specifications
Data collection
- 15 Nov. 14 (Thu) ○ Visit to Directorate General of Shipping
Signing of Minutes of Discussion on technical specifications
○ Visit to LBS
Data collection
- 16 Nov. 15 (Fri) ○ Visit to Japanese Consulate General in Bombay
Report on the study results
Departure from Bombay-Arrival at Calcutta
- 17 Nov. 16 (Sat) ○ Visit to DMET (Calcutta)
Study and discussion on the training

equipment and data collection

- 18 Nov. 17 (Sun) ○ Departure from Calcutta-Arrival at
Delhi
- 19 Nov. 18 (Mon) ○ Visit to India Office, JICA
Report on the study results
○ Visit to Japanese Embassy in India
Report on the study results
- 20 Nov. 19 (Tue) ○ Departure from Delhi-Arrival at
Narita

(2) Explanation on the Draft Final Report
(January 26 to February 4 1992)

<u>Order</u>	<u>Date</u>	<u>Contents of Study</u>
1	Jan. 26 (Sun)	Departure from Narita-Arrival at Delhi
2	Jan. 27 (Mon)	○ Visit to India Office, JICA Discussion on the study schedule ○ Visit to Japanese Embassy in India Explanation on the draft report ○ Visit to Ministry of Finance Explanation on the draft report and supplement survey ○ Visit to Ministry of Surface Transport Explanation on the draft report and supplement survey ○ Departure from Delhi-Arrival at Bombay
3	Jan. 28 (Tue)	○ Visit to Directorate General of Shipping Explanation on the draft report and discussion

- Visit to Japanese Consulate
General in Bombay
Explanation on the objective of
the study, etc.
- 4 Jan. 29(Wed) ○ Survey of the training ship,
"Rajendra"
○ Visit to LBS, DMET (Bombay)
Supplement survey and discussion
on the draft report
- 5 Jan. 30(Thu) ○ Visit to Directorate General of
Shipping
The minutes is signed.
○ Data collection
- 6 Jan. 31(Fri) ○ The leader and officials depart
from Bombay
○ Data collection
- 7 Feb. 1(Sat) ○ The leader and officials arrive
at Narita
○ Data collection
- 8 Feb. 2(Sun) ○ Data collection
○ Departure from Bombay - Arrival at
Delhi
- 9 Feb. 3(Mon) ○ Visit to India Office, JICA
Report of the survey results
○ Visit to Japanese Embassy in India
Report of the survey results
○ Data collection
- 10 Feb. 4(Tue) ○ Departure from Delhi - Arrival at
Narita

APPENDIX 3 PERSONNEL WITH WHOM THE STUDY TEAM MET

(1) Study on Basic Design (October 31 1991 to November 19 1991)

1. Ministry of Finance
Director (DEA) Mr. Anupam Kulshreshtha
Under Secretary (DEA) Mrs. Sunita Chhibba
2. Ministry of Surface Transport
Joint Secretary-Shipping Mr. S.N. Kakar
Director Mr. P.K. Misra
Under Secretary Mr. K. Padmanabhacker
3. Directorate General of Shipping
Nautical Adviser to Capt. P.S. Barve
Government of India
Director Mr. N.K. Prasad
4. LBS Nautical and Engineering College
Principal Capt. S.S.S. Rewari
Ex. Principal Capt. G.K. Joseph
Senior Nautical Officer Capt. H. Subramaniam
Senior Engineering Officer Mr. B.N. Bera
Nautical Officer Capt. M.V. Naik
Engineering Officer Mr. J.K. Dhar
Deputy Director D.M.E.T. Mr. N. Mukhopadyay
5. D.M.E.T.
Director Mr. D.C. Agnihotri
Senior Engineering Officer Mr. B.N. Das
6. Training Ship, "Rajendra"
Captain Superintendent Capt. V.N. Kansara
Senior Nautical Officer Capt. Prabhat Kumar
7. Japanese Embassy in India
First Secretary Mr. K. Hama

8. Japanese Consulate General in Bombay
 Consul General Mr. T. Mutoh
 Consul Mr. K. Narumiya
 Deputy Consul Mr. N. Ishida

9. India office, JICA
 General Manager Mr. T. Hida
 Officer Mr. T. Sakai

(2) Explanation on the Draft Final Report
 (January 26 to February 4 1992)

1. Ministry of Finance
 Director (DEA) Mr. Anupam Kulshreshtha
 Under Secretary (DEA) Mr. S.K. Chuhan

2. Ministry of Surface Transport
 Joint Secretary-Shipping Mr. S.N. Kar
 Under Secretary Mr. K. Padmanabhachar

3. Directorate General of Shipping
 Nautical Adviser to Government of India Capt. P.S. Barve
 Nautical Adviser to Government of India Capt. S.S. Naphade
 Assistant to Director Capt. V.K.G. Nair

4. LBS Nautical and Engineering College
 Principal Capt. S.S.S. Rewari
 Deputy Principal Mr. B.N. Bera
 Ex. Principal Capt. G.K. Joseph
 Nautical Officer Capt. M.V. Naik
 Engineering Officer Mr. J.K. Dhar

5. DMET (Bombay)
 Deputy Principal Mr. N. Mukhopadyay
 Instructor Mr. A.G. Karvir

APPENDIX 4

(1) Basic Design Study

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY

ON

THE PROJECT FOR UPDATING TRAINING EQUIPMENT

FOR

NAUTICAL AND MARINE ENGINEERING EDUCATION

IN

INDIA

In response to a request from the Government of India, the Government of Japan decided to conduct a Basic Design Study on the Project for updating Equipment for Nautical and Marine Engineering Education (hereinafter referred to as "the Project") and entrusted the study to the Japanese International Cooperation Agency (JICA).

JICA sent to India the study team, which is headed by Mr. Takashi Nakamura, Professor Engineering Department, Marine Technical College, Ministry of Transport, and is scheduled to stay in the country from October 31 to November 19, 1991.

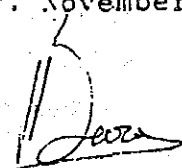
The team already held discussion with the officials concerned of the Government of India and conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The team will proceed to further works and prepare the Basis Design Study report.

Bombay, November 7, 1991

甲 村 肇

Mr. Takashi Nakamura
Leader
Basic Design Study Team
JICA



Capt. P.S. Barve
Nautical Adviser to Govt.
of India
D.G. Shipping
Bombay.

ATTACHMENT

1. Objective

The objective of the Project is to strengthen the training equipment of the Directorate of Marine Engineering Training (DMET) Bombay and those of the Lal Bahadur Shastri Nautical & Engineering (LBS) college, to conduct pre-sea and post sea training to meet the STCW Convention requirements as well as to enhance Nautical and Engineering Technology.

2. Project sites

The building has been constructed and can also be used in Bombay for use of DMET for installation of the equipment requested with the power distribution lines and other necessary facilities. The proposed building's area for installing the equipment are shown in Annex 1.

3. Executing Agency

The Directorate General of shipping under the Ministry of Surface Transport will be executing agency for the Project and responsible for its operation and maintenance after completion of the Project. The Indian side ensured that the necessary budget for effective implementation operation and maintenance of the project will be provided in line with the adequate number of the Indian personnel with sufficient knowledge and experience.

4. Items requested by the Government of India

After discussion with the Basic Design Study Team, the following items were finally requested by the Indian side.

- a) Ship Handling Simulator
- b) Diesel Main Engine Simulator
- c) Cargo Handling Simulator

However, the final components of the Project will be decided after further studies.

W B

5. Japan's Grant Aid System

- (1) The Indian side has understood Japan's Grant Aid system explained by the team which includes a principle for use of a Japanese consultant firm and Japanese contractors for the implementation of the Project.
- (2) The Government of India will take necessary measures as follows with respect to the Grant Aid by the Government of Japan to be extended to the Project.
 - (a) To construct the appropriate building area, if necessary with facilities for distribution of electricity and other incidental facilities before commencement of installation work.
 - (b) To ensure prompt unloadings, tax exemption, customs clearance at ports of disembarkation in India and prompt internal transportation therein of the equipment provided under the Grant Aid.
 - (c) To exempt Japanese national involved in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in India with respect to the supply of the equipment and services under the verified contracts. The Indian side mentioned that this exemption is subject to the approval of higher authorities according to the rules and regulations of the Government of India.
 - (d) To accord Japanese nationals whose services may be required in connection with the supply of the equipment and the services under the verified contract such facilities as may be necessary for their entry into India and stay therein for the performance of the Project.

6. Schedule of the Study.

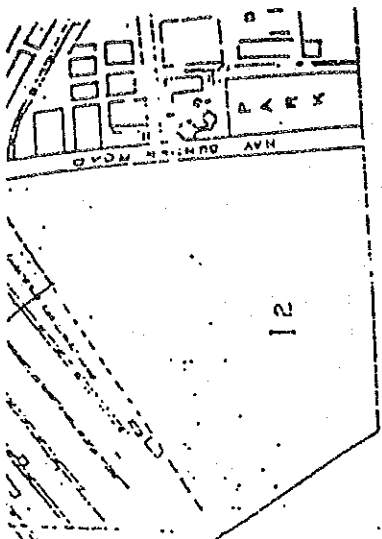
- (1) JICA draft final mission will proceed to further studies in India until January, 1992.
- (2) Based on the minutes of the discussions and technical examination of the study results, JICA will complete the final report and send it to the Government of India by May 1992.

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7. Technical Cooperation

The Indian side requested the need for the technical training of counterpart personnel in Japan in the field of maintenance and operation of the said equipment. *of*

The Indian side also understood that in case of the official request for the above, A-2, A-3, forms the Technical Training in Japan for the counterpart personnel should be submitted through diplomatic channels.



LOCATION PLAN
SCALE: 1" = 330'-0"

AREA STATEMENT OF EXIST.

- 1 N. OF CHS. COLLEGE BLDG
- 2 STUDENT'S HOSTEL
- 3 STUDENT'S HOSTEL
- 4 PRINCIPAL'S BUNGLOW
- 5 BENTLEY BLDG

TOTAL AREA

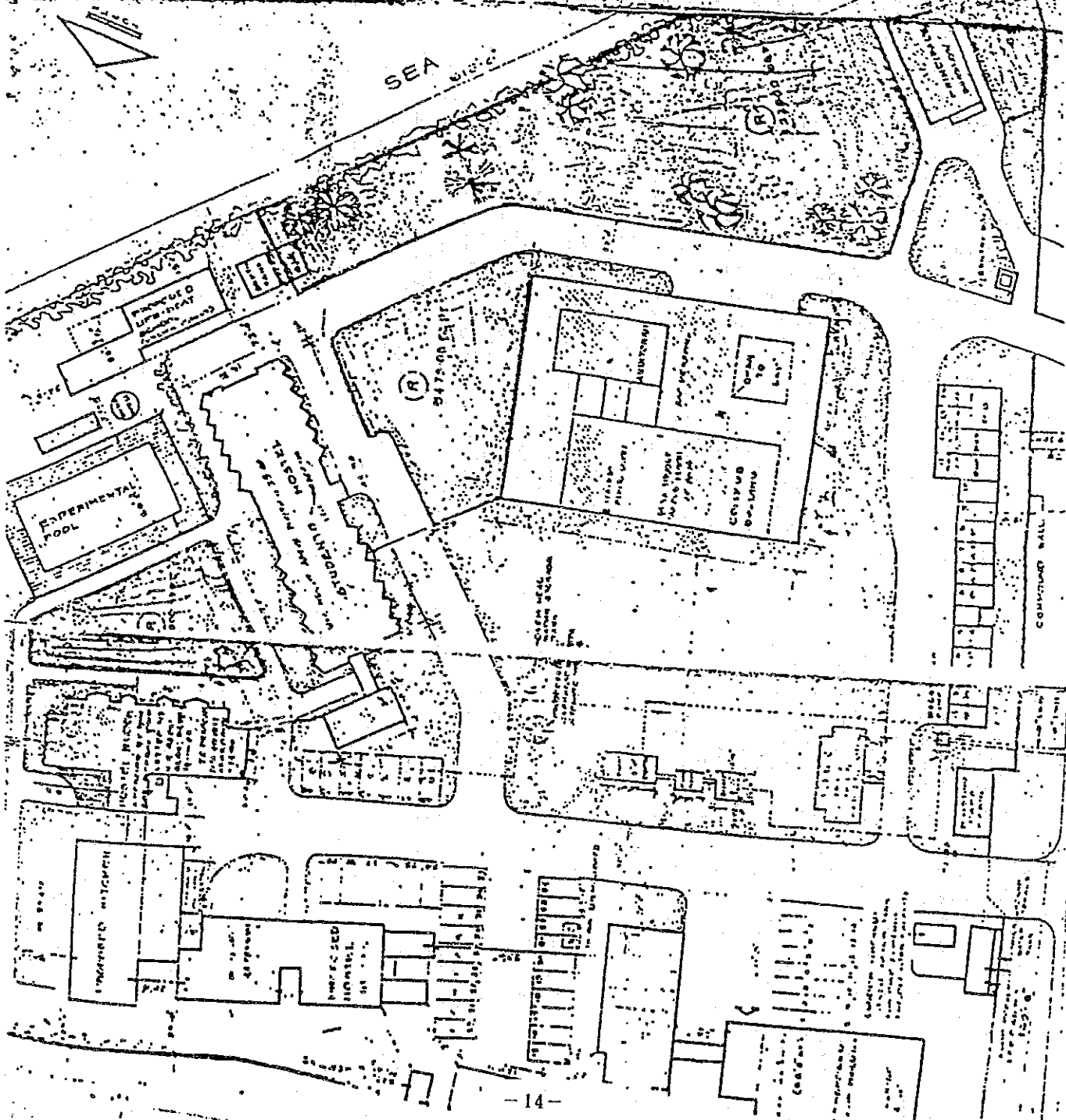
AREA STATEMENT OF PROPOS.

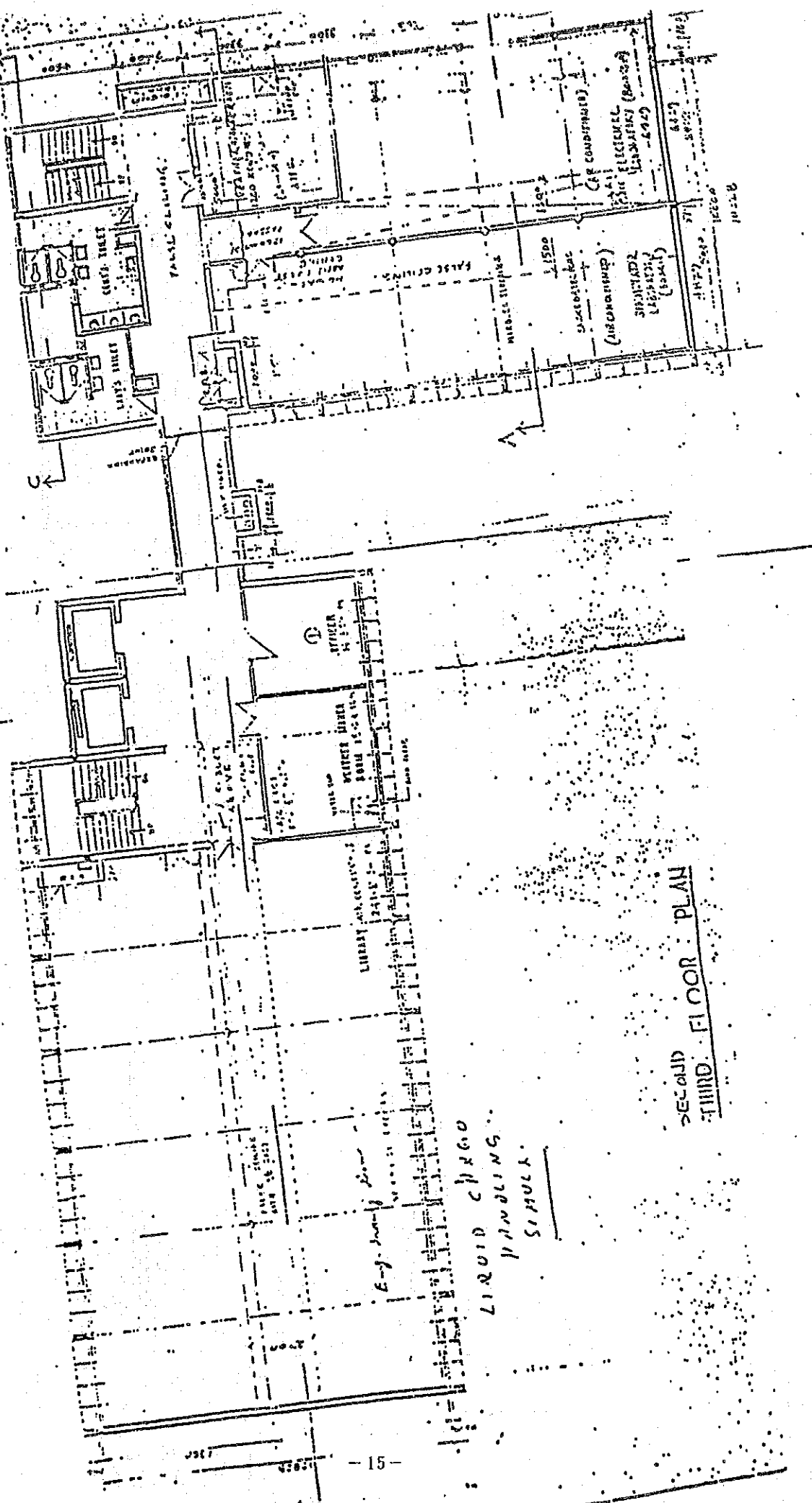
- 1 LIFE - BOAT TRAINING SCHOOL/SUBS
- 2 GARAGES & FOOT OFFICE & STORES
- 3 PROPOSED HOSTEL BLOCK & BUNGLOW
- 4 TYPE COURTS AREA TOTAL 3 RW
- 5 ADMINISTRATIVE BUILDING

ANNEX

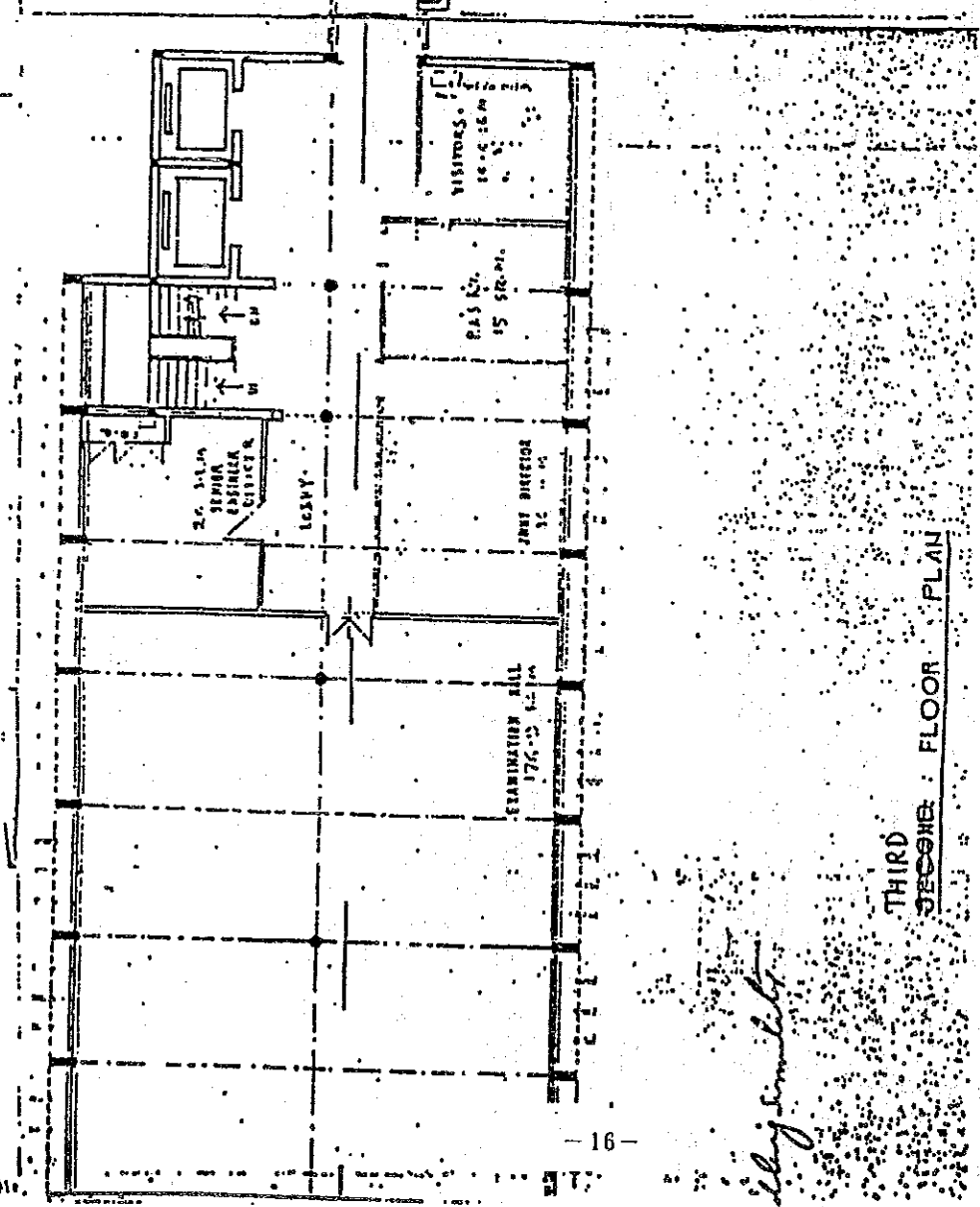
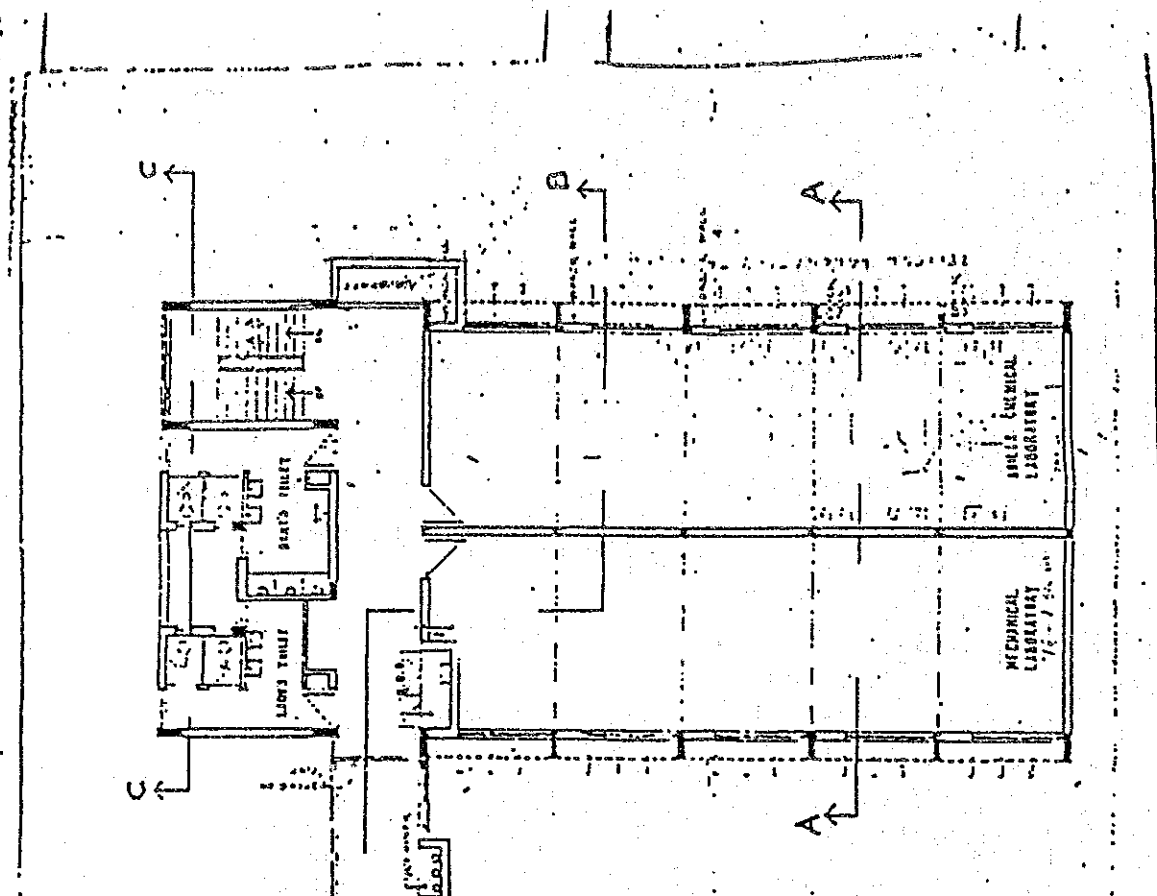
REFERENCE:

- 1 ADMINISTRATIVE BUILDING REF. DRAWING SA
- 2 LIFE BOAT TRAINING SCHOOL/SUBS REF. DRAWING SA
- 3 PROPOSED HOSTEL BLOCK & BUNGLOW REF. DRAWING SA
- 4 TYPE COURTS AREA TOTAL 3 RW REF. DRAWING SA
- 5 ADMINISTRATIVE BUILDING REF. DRAWING SA
- 6 LIFE BOAT TRAINING SCHOOL/SUBS REF. DRAWING SA
- 7 GARAGES & FOOT OFFICE & STORES REF. DRAWING SA
- 8 PROPOSED HOSTEL BLOCK & BUNGLOW REF. DRAWING SA
- 9 TYPE COURTS AREA TOTAL 3 RW REF. DRAWING SA
- 10 ADMINISTRATIVE BUILDING REF. DRAWING SA
- 11 LIFE BOAT TRAINING SCHOOL/SUBS REF. DRAWING SA
- 12 GARAGES & FOOT OFFICE & STORES REF. DRAWING SA
- 13 PROPOSED HOSTEL BLOCK & BUNGLOW REF. DRAWING SA
- 14 TYPE COURTS AREA TOTAL 3 RW REF. DRAWING SA
- 15 ADMINISTRATIVE BUILDING REF. DRAWING SA





SECOND FLOOR PLAN
THIRD FLOOR PLAN



THIRD FLOOR PLAN

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(2) Explanation on the Draft Final Report

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY

ON

THE PROJECT FOR UPDATING TRADING EQUIPMENT

FOR

NAUTICAL AND MARINE ENGINEERING EDUCATION

IN

INDIA

(CONSULTATION ON DRAFT REPORT)

=====

In October 1991, the Japan International Cooperation Agency (JICA) despatched a Basic Design Study Team on the project for Updating Equipment for Nautical and Marine Engineering Education (hereinafter referred to as "the Project") to India, and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

In order to explain and to consult India on the components of the draft report, JICA sent to India a study team, which is headed by Mr. Takashi NAKAMURA, Professor, Engineering Department, Technical College, Ministry of Transport, and is scheduled to stay in the country from January 26 to February 4, 1992.

As a result of discussions, both parties confirmed the items described on the attached sheets.

Bombay, January 30, 1992

中 村 峻

Mr. Takashi NAKAMURA
Leader
Draft Report Explanation Team
JICA

S.S. Naphade

Capt. S.S. NAPHADE
Nautical Advisor
(in charge) to Govt. of
India, D.G.S., Bombay

ATTACHMENT

1. Components of draft report

The Government of India has agreed and accepted in principle the components of the draft report proposed by the Team. Minor changes will be considered in the course of finalizing it.

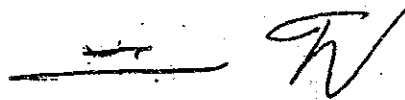
2. Japan's Grant Aid System

- (1) The Government of India has understood the system of Japanese Grant Aid explained by the Team.
- (2) The Government of India will take the necessary measures, described in Annex for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

3. Further Schedule

The team will make the final report in accordance with the confirmed items, and send it to the Government of India by May, 1992.

4. For the sake of smooth implementation of the Project, the study team requested that the India Government take necessary measures for the counter part fund allocation, custom clearance including the DGTD clearance and the acquisition of the permission necessary for the Project. The Indian Government agreed the request of the study team.



ANNEX: Necessary measures to be taken by the Government of India in case Japan's Grant Aid is executed.

1. To provide facilities for distribution of electricity, water supply and other incidental facilities to the Project site.
2. To bear commissions to the Japanese foreign exchange bank for the banking services based on the Banking Arrangement.
3. To exempt taxes and to take necessary measures for custom clearance of the materials and equipment brought for the project at the port of administration.
4. To accord Japanese Nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into India and stay therein for the performance of their work.
5. To maintain and use properly and effectively that the facilities constructed and equipment purchased under the Grant.
6. To bear all the expenses other than those to be borne by the Grant.



APPENDIX 5 CLASSIFIED SUBJECTS OF LESSONS FOR MARINE ENGINEERING COURSES

Subjects	Unit			Class Period
	Lesson	Individual Guidance	Practicals	
1st Year • ENGLISH LANGUAGE Written Communication Report writing-Principle and Practice of Communication, Editing Magazine, Professional Communication. Forms of Technical Writing. Technical Correspondence, Mechanics of presenting Technical Information- (a) Content, (b) Language, (c) Form	2			88
• MATHEMATICS-1 Revision on Basic Differential, Calculus Differential Calculus Integral Calculus Determinants and Matrices	2	1		132
• BASIC THERMODYNAMICS Thermodynamics Definitions Steam and Two Phase Systems Boiler and Evaporators The Second Law of Thermodynamics Ideal Gas Cycles	2	1		132
• BASIC ELECTRICITY Electric Circuit Secondary Cells Electromagnetism Electromagnetic Induction Capacitors Transients Electrical Measurements Instruments	2			88
• GEOMETRICAL DRAWING Introduction to Technical Drawing Curves used in Engineering Practice Development of Surface and Curves of Intersections Thread Formation, Nuts Bolts and Studs Pictorial Projections Orthographic Projections	1	3		176
• APPLIED MECHANICS-1 Vector Statics Non-Coplanar Forces Virtual Work and Machines Centroids Moment of Inertia Rectilinear Motion Curvilinear Motion Motion of Rigid Bodies	2	1		132
• STRENGTH OF MATERIALS-1 Simple Stresses and Strains Strain Energy in Simple Stresses Shearing Force and Bending Moment Thin Walled Shells Welded Joints	2			88

Subjects	Unit			Class Period
	Lesson	Individual Guidance	Practicals	
• MATERIAL SCIENCE-1 Structure of Atom Metals and Alloys Miscellaneous Engg. Materials Testing of Materials	1			44
• WORKSHOP TECHNOLOGY Common Workshop Tools Machine Process & Machine Tools Measuring Instruments & Inspection Fitting and Overhauling Safety Measures Welding	2			88
• MARINE BOILER General Consideration Governing the Design of Boilers Smoke-Tube Boilers Water-Tube Boilers Water-Heat Boilers Boiler Mountings Operation Care & Maintenance Combustion & furnace	2			88
• SEAMANSHIP, ELEMENTARY NAVIGATION AND SURVIVAL AT SEA Seaman & Their Duties Deck Equipment Navigational Lights and Signals Ropes Knots and Moorings Anchors Navigation Life boats & Life rafts Abandon Ship Survival at sea Practicals	1		1	88
• BOILER CHEMISTRY LABORATORY			1	44
• ELECTRICAL LABORATORY			1	44
• APPL. MECHANICS LABORATORY			1	44
• APPL. HEAT (THERMODYNAMICS) LABORATORY			1	44
• MATERIALS LABORATORY			1	44
• WORKSHOP EXERCISES Fitting Shop (Bench Work) Machine Shop (Lathe Work) Black Smithy Shop Welding Shop General Overhauling Work			4	176
1st Year Sub total	19	6	10	1,540

Subjects	Unit			Class Period
	Lesson	Individual Guidance	Practicals	
2nd Year • MATHEMATICS-2 Differential Equations Practical Equations of Engineering Importance Analytical Solid Geometry Vector Analysis Fourier series Laplace Transforms Statistics	2			48
• BASIC ELECTRONICS Electron Emission Semi Conductors Semi Conductor & Diodes (Semi Conductor Rectifier) Transistors (Semi Conductor, Amplifier) Regulated Power Suppliers Oscillators Transistor Power Amplifier Wave Shaping and Switching	2			48
• APPLIED MECHANICS-2 Friction Dynamics of Rotation Periodic Motion Drives and Breaks Governors	2	1		72
• STRENGTH OF MATERIALS-2 Bending Stress Shear & Torsion Compound Stress and Strain	2	1		72
• MATERIALS SCIENCE-2 Solid Solution Heat Treatment Fatigue Corrosion and Its Prevention Selection of Materials in Shipbuilding & Marine Engineering	2			48
• APPLIED ELECTRICITY Alternating Current & Voltage Single phase A.C. Circuit Harmonics in Alternating Current Three Phase Circuits Illumination Circuits	2			48
• APPLIED THERMODYNAMICS-1 Steam Cycle Steam Engines Reciprocating Compressors Mixtures Gases and Vapours	2	1		72
• ENGINEERING DRAWING Projection of ports Machinery Component Drawing Marine Component Drawing	2	4		144

Subjects	Unit			Class Period	
	Lesson	Individual Guidance	Practicals		
<ul style="list-style-type: none"> • MARINE AUXILIARY MACHINERY-1 Engine Room Layout Pumps Evaporators Pollution Preventions Deck Machinery 	2	1		72	
<ul style="list-style-type: none"> • SHIP FIRE PREVENTION & CONTROL Fire Extinguishing systems Aboard Ship Fire Protection Built in the Ship Detection and Safety Systems Fire Fighting Equipment Fire Control 	2	1		72	
<ul style="list-style-type: none"> • SHIP CONSTRUCTION-1 Ships Terms Residual Stresses in Ship's Structure Sections and Materials Use Bottom & Side Framing Shell & Decks Bulkheads & Deep Tanks Bow Construction Stern Construction 	2			48	
• ELECTRONICS LABORATORY-1			2	48	
• FIRE FIGHTING EXERCISES			2	48	
2nd Year	Lesson	22	9	4	792
	Practicals			40	960
	Sub total	22	9	44	1,752

Subjects	Unit			Class Period
	Lesson	Individual Guidance	Practicals	
3rd Year • MANAGEMENT SCIENCE Introduction to Management Principles & Practice Production Management Finance Personnel Management	2			48
• COMPUTER PROGRAMMING & NUMERICAL ANALYSIS Concept of Computer Programming Language Fortran Basic	2		2	96
• MECHANICS OF MACHINES-1 Turning Moment & Flywheel Kinematic and Link Mechanisms Cams Spur Gearing	2			48
• STRENGTH OF MATERIALS-3 Deflection of Beams Built-in and Continuous Beams Thin Curved Bar Thick Cylinders Struts	2			48
• ELECTRICAL MACHINE-1 Direct Current Machines D.C. Generators D.C. Motors Losses in D.C. Machines Transformers	2			48
• ELECTRONICS CIRCUITS Amplifier Operation Circuits Digital Circuits Converters(D _C -A) TTL Gates & CMOS Gates (Basic Logic Circuits) Industrial Electronics Communication Electronic Instruments	2			48
• HYDRODYNAMICS Introduction Hydrostatics Fluid in Motion Flow Through Pipes Fluid Friction Viscous and Laminar Flow Vortex Motion and Radial Flow	2			48

Subjects	Unit			Class Period	
	Lesson	Individual Guidance	Practicals		
<ul style="list-style-type: none"> • APPLIED THERMODYNAMICS-2 Properties of Mixture Gas Dynamics Steam Nozzles Steam Turbines Combustion and Dissociation Refrigeration 	2			48	
<ul style="list-style-type: none"> • MARINE AUXILIARY MACHINERY-2 Oil Purification Blowers and Compressors Steering Gears Shafting Dry Docking Other Marine Equipments 	2	1		72	
<ul style="list-style-type: none"> • MARINE INTERNAL COMBUSTION ENGINE-1 Practical Diesel Engine Cycle General Description of I.C. Engine Constructional Details of I.C. Engine Scavenging and Supercharging System Combustion of Fuels in I.C. Engines Cooling of I.C. Engines Safety and Prevention of Mishaps in I.C. Engines 	2			48	
<ul style="list-style-type: none"> • SHIP CONSTRUCTION-2 Free Board and Tonnage Shipyards Practice Ship Types Offshore Technology Ship Surveys 	2			48	
<ul style="list-style-type: none"> • NAVAL ARCHITECTURE-1 Geometry of ship & Hydrostatics Calculations Transverse Stability of Ships Resistance & Powering 	2			48	
<ul style="list-style-type: none"> • MARINE ENG. DRAWING & DESIGN Procedure in Machine Design Failure Criteria in Mechanical Design Machine Design Drawing 	2	4		144	
<ul style="list-style-type: none"> • ELECTRONICS LABORATORY-2 • VIVA VOCE EXAMINATION-3rd and 4th Year 			2	48	
3rd Year	Lesson	26	5	4	840
	Practicals				960
	Sub total	26	5	4	1.800

Subjects	Unit			Class Period
	Lesson	Individual Guidance	Practicals	
4th Year • ECONOMICS & COMMERCIAL GEOGRAPHY Nature and Significance of Economics Money Banking and Trade Economic Development of India Ocean Transportation Economics Principle of Marine Transportation Ports	2			88
• SHIP OPERATION AND MANAGEMENT Brief History of Shipping Marine Insurance Ship Operation Merchant Shipping Act	2			88
• MECHANICS OF MACHINES-2 Toothed Gearing Balancing Gyroscope Vibration	2			88
• ELECTRICAL MACHINE-2 Alternator Synchronous Alternator & Motor Three-phase Induction Motors Single Phase Motors Transmission & Distribution	2			48
• DIMENSIONAL ANALYSIS & FLUID MACHINES Dimensional Analysis & Dynamical Similarity Reciprocating Pumps Centrifugal Pumps Impulse and Reaction Turbines	2			88
• MARINE AUXILIARY MACHINERY-3 Marine Refrigeration and A.C. Plants Machinery and Cargo Ventilation Noise and Vibrations Fuels Lubrication	2			88
• MARINE STEAM ENGINEERING Marine Steam Turbines Layout of Turbine Plants Selection of Materials Constructional Details Lubrication of Turbines Operation & Maintenance	2			88
• INTERNAL COMBUSTION ENGINEERING-2 Fuel Pumps and Metering Devices Manoeuvring Systems Indicator Diagrams and Power Calculations Lubrication Systems Medium Speed Engines Gas Turbines Automation in Modern Diesel Engine Plants Maintenance of Diesel Engines	2			88

Subjects	Unit			Class Period
	Lesson	Individual Guidance	Practicals	
<ul style="list-style-type: none"> • NAVAL ARCHITECTURE-2 Longitudinal Stability and Trim Strength of Hull Propulsion & Propellers Rudder Theory Motion of Ship on Waves 	2			88
<ul style="list-style-type: none"> • MARINE MACHINERY SYSTEM DESIGN Strength Calculation for Design Other Design Consideration Marine Machinery Component Design Advanced Design of Marine Systems 	1	3		176
<ul style="list-style-type: none"> • MARINE ELECTRICAL TECHNOLOGY Power Generation and Distribution Rules and Regulations of Classification Societies and so Motor & Control Equipment Essential Equipment and Special Circuits Miscellaneous Marine Equipment and Alarm System Electric Propulsion Maintenance of Electrical Equipment 	2			88
<ul style="list-style-type: none"> • MARINE CONTROL ENG. & AUTOMATION Control System Graphical Representation of Signals The Dynamics of a single servo-mechanism for Angular Position Control Process Control Systems Analog Computing and Simulation Transmission Correcting Units Application of Controls on Ships 	2			88
<ul style="list-style-type: none"> • MARINE HEAT ENGINES & APPL. THERMODYNAMICS Marine Refrigerating and A.C. Plants Advanced Marine Steam Turbine Plants Gas Turbine Plants Binary Cycle Plants Transmission of Heat 	2			88
<ul style="list-style-type: none"> • ELECTRICAL EQUIPMENT LAB D. C. Machines A. C. Circuits and Equipment 			2	88
<ul style="list-style-type: none"> • SIMULATOR & CONTROL LABS Simulator Lab. Experiments Control Lab. Experiments 			2	88
<ul style="list-style-type: none"> • MARINE EXERCISES AND MARINE POWER PLANT OPERATION Running of 2-Cycle Diessel Engine (Coupled to alternator) Boiler Operation Running of a Steam Reciprocating Engine Running of Steam Turbine 			4	176

Subjects	Unit			Class Period
	Lesson	Individual Guidance	Practicals	
• MACHINE LAB EXPERIMENTS Mechanics of Machine & Lab. Experiments Vibrations Experiments Fluid Mechanics Experiments Heat Transfer Experiments			2	88
1st Year Sub total	19	6	10	1,540
2nd Year Sub total	22	9	44	1,752
3rd Year Sub total	26	5	4	1,800
4th Year Sub total	25	3	10	1,736
From 1st to 4th Year total	92	23	68	6,828

APPENDIX-6 CLASSIFIED SUBJECTS OF LESSONS FOR NAUTICAL COURSES
(T. S. "RAJENDRA")

Subjects	Class Period
1st Year	
• ENGLISH AND COMMUNICATION SKILLS (refer to Note)	
1. English Literature	50
2. Communication Skills	30
3. Practicals	20
	100
• APPLIED MATHEMATICS-PAPER 1	
1. Complex Numbers	10
2. Vector Algebra & Calculus	10
3. Differential Calculus	30
4. Differential Equations	30
5. Integral Calculus	12
6. Beta & Gamma Functions	8
	100
• APPLIED MATHEMATICS-PAPER 2	
1. Vector Analysis	25
2. Infinite Series and Fourier Series	35
3. Spherical Trigonometry	30
4. Simpson's Rules	10
	100
• NAUTICAL PHYSICS AND ELECTRONICS PAPER-1	
1. Dynamics	25
2. Heat	5
3. Hygrometry	22
4. Sound	5
5. Magnetism	5
6. Electricity	8
7. Electronics	5
List of Practicals	25
	100
• NAUTICAL PHYSICS AND ELECTRONICS PAPER-2	
1. Viscosity	8
2. Hydrostatics	8
3. Light	40
4. Electrostatics	8
5. Modern Physics	11
List of Practicals	25
	100
• NAVIGATION PAPER-1	
1. Principles of Navigation (including Theoretical & Practical Calculations)	60
2. Astronomy Navigation-Practicals	40
	100

Subjects	Class Period
<ul style="list-style-type: none"> • SHIP OPERATION TECHNOLOGY PAPER-1 1. General 5 2. Life Saving Appliances <ul style="list-style-type: none"> 1) Life Boat 2 2) Liferaft 2 3) Life Bouy 2 4) Life Jacket 2 5) Life throwing appliances 2 3. Fire Fighting Appliances 10 4. Survival at Sea 10 5. Fire Prevention and Fire Fighting 10 6. Rope and Wire 5 7. Cargo Gear <ul style="list-style-type: none"> 1) Blocks 3 2) Tackles 3 3) Derrick Rigs 4 4) Deck Appliances 10 Practicals 50 	
	120
<ul style="list-style-type: none"> • CHART WORK 30 Practicals 90 	
	120
<ul style="list-style-type: none"> • COLLISION PREVENTION AND MARINE COMMUNICATION PAPER-1 International Regulations for Preventing Collision at Sea 2 Steering and Sailing Rules <ul style="list-style-type: none"> 1. Conduct of Vessels in Any Condition of Visibility 5 2. Conduct of Vessels in Sight of One Another 5 3. Conduct of Vessels in Restricted Visibility 3 Marine Communication 15 Practicals 90 	
	120
<ul style="list-style-type: none"> • NAVIGATION ARCHITECTURE PAPER-1 Ship Construction <ul style="list-style-type: none"> 1. Introduction 60 2. Ship Stability 60 	
	120
<ul style="list-style-type: none"> • MARINE ENGINEERING AND CONTROL SYSTEMS PAPER-1 1. Mechanical Engineering Science 50 2. Electrical Engineering Science 10 3. Marine Engineering practice 20 	
	80
<ul style="list-style-type: none"> • Practicals-Mechanical Drawing 40 	
<ul style="list-style-type: none"> • ENVIRONMENTAL SCIENCE PAPER-1 1. Physical Meteorology 7 2. Energy Budget 8 3. Water in the atmosphere 7 4. Adiabatic Processes 8 5. Cloud 7 6. Visibility 8 	
	45

Subjects	Class Period
<ul style="list-style-type: none"> • OCEANOGRAPHY 1. Physical Properties of Seawater 2. Sea Ice 3. Oceanic Circulation System 4. Sea Waves 5. Tidal Phenomena 	<ul style="list-style-type: none"> 10 10 10 10 5
	45
<ul style="list-style-type: none"> • Practicals 1. Meteorology 2. Oceanography 	<ul style="list-style-type: none"> 20 10
	30

Subjects	Class Period
2nd Year	
• COMPUTER SCIENCE	
1. Classification of Computers	5
2. Learning Various Commands	15
3. Rules for Writing a Basic Programme	15
4. Rules for Writing Formulae and Paranthesis	5
5. Writing Basic Problems, on Line Terminal-Use	20
Practicals	40
	105
• APPLIED MATHEMATICS PART-3	
1. Bessel Functions and Legendra Polynominals	25
2. Partial Differential Equations	20
3. Laplace Transforms	25
4. Complex Variables	30
	100
• APPLIED MATHEMATICS PART-4	
1. Numerical Methods	30
2. Matrices	10
3. Elements of Statistics	20
Practicals	40
	100
• NAUTICAL PHYSICS AND ELECTRONICS PAPER 3-SECTION 1	
Electronic Communication	
1. Self-inductance and Inductive Reactance	5
2. Capacitance and Capacitive Reactance	5
3. Impedance	5
4. Effect of Current Flow	18
5. Descriptive Treatment of the Transmission	}
6. Modulation		12
	45
• NAUTICAL PHYSICS AND ELECTRONICS PAPER 3-SECTION 2	
1. Damped and Undamped Oscillations	8
2. Basic Transmitter	3
3. Principle of Piezo-Electric Effect	4
4. Principle and Working of Superheterodyne Receiver	}
5. Characteristics of Radio Receiver		15
	30
• NAUTICAL PHYSICS AND ELECTRONICS PAPER 4-SECTION 1	
Electronics	
1. Junction Transistors	20
2. Switching Circuits	12
3. Digital Electronics	3
	35
• NAUTICAL PHYSICS AND ELECTRONICS PAPER 4-SECTION 2	
1. Logic Gates	8
2. Electronic Counters	8
3. Integrated Circuits	6
4. Evolution of Microprocessors	18
Practicals	25
	65

Subjects	Class Period
<ul style="list-style-type: none"> • NAVIGATION PAPER-2 Principle of Navigation (Including theoretical & practical calculations) 1. The Celestial Sphere 3 2. The Ecliptic 3 3. Sidereal Hour Angle 2 4. Real and Apparent Motion of Sun 2 5. Measuring Time 4 6. The Position of a Body on the Celestial Sphere 3 7. Correction of Altitude of Sun, Stars, Planets and Moon 3 8. Simple Calculations 4 9. Nautical Almanac 1 	
	25
<ul style="list-style-type: none"> • Practical Navigation 1. To Find the Latitude by Meridian's Altitude of a Heavenly Body 6 2. To Find the True Azimuth of a Heavenly Body 4 3. To Obtain a Position by Use of Position Lines 20 4. Form an Observation of Any Heavenly Body 4 5. To Obtain Lat. & PL by Observation of Polaris 2 6. To Calculate the Approximate Time of the Meridian Passage of a Heavenly Body 4 	
	40
<ul style="list-style-type: none"> • Electronic Navigation System 1. Properties of Free Gyroscope 5 2. Principle of Position Fixing 5 3. Use of Radio Waves to Obtain Difference 5 4. Basic Principles of Position Fixing by Satellite 5 5. D.G. : Principles 5 6. Radar : Principles 5 	
	25
<ul style="list-style-type: none"> • Practicals 1. Sextant 10 2. Gyro Compass 4 3. Echo Sounder 4 4. Radar 12 	
	30
<ul style="list-style-type: none"> • SHIP OPERATION TECHNOLOGY PAPER-2 Cargo Work 1. Transportation of Goods by Sea 10 2. Introduction to Codes and Guideline for Carriage of Cargoes 4 3. Principles of Stowage/Securing of all Types of Cargoes 2 4. Code of Safe Practices for Merchant Seaman 3 5. Machinery for Handling of Cargoes 4 6. Care of Cargo on Board Ship 4 7. Planning of Stowage 3 8. Principles of Oil, Chemicals and Gases in Bulk 3 9. Calculations 2 	
	35

Subjects	Class Period
<ul style="list-style-type: none"> • Ship Maintenance Seamanship Anchor Work Manoeuvring and Berthing Management of Ship in Heavy Weather Practicals 	10 5 10 10 10 40
	85
<ul style="list-style-type: none"> • Ship Master's Business 1. Merchant Shipping Act 1958 2. Certificate of Officers 3. The Official Log Book 4. Crew Accommodation 5. Custom House Procedure 6. Load Line Marks 7. Safety of the Ship 8. Compulsory and Non-compulsory Pilotage 9. A General Knowledge of Shipping Practice 	10 20 10 10 30 10 30
	120
<ul style="list-style-type: none"> • VOYAGE PLANNING, MARINE COMMUNICATION AND COLLISION PREVENTION PART-2 Voyage Planning (Including Chart Work) 1. Elementary Knowledge of Passage Planning and Execution 2. To Find the Time and Height of High and Low Water 3. The Interpretation of a Chart or Plan 4. Development of Electronic Chart Display System 	2 2 2 2
	8
<ul style="list-style-type: none"> • Marine Communication 1. Introduction in Use of Radio Communication Equipment 2. Radio Regulations 3. Satellite Communication 4. Global Maritime Distress and Safety System 5. World Wide Navigational Warning System 6. Meteorological Broadcast 7. Search and Rescue Communications 8. Collision Prevention 	2 2 2 3 2 2 2 8
	23
<ul style="list-style-type: none"> • Practicalcs Voyage Planning Marine Communication Collision Prevention 	45 20 25
	90
<ul style="list-style-type: none"> • NAVAL ARCHITECTURE PAPER-2 Ship Construction 1. General Ideas on Ship's Plans 2. Shell and Deck Plating 3. Construction 4. General Pumping Arrangements 5. Midship Sections 6. Stress and Strains in Ships 7. Cause and Simple Methods of Preventing Corrosion 8. An Outline Knowledge of Functions of Classification Societies 	14 8 8 14 6 6 2 2
	60

Subjects	Class Period
<ul style="list-style-type: none"> • Ship Stability 1. Use of Simpson's Rules 2. Determination of C.G. of Ship 3. Transverse and Longitudinal Metacentres 4. Theory of Trim 5. Use of Stability 6. Cross Curves of Stability 7. Carriage of Deck Cargoes 8. Stowage of Grain 	<ul style="list-style-type: none"> 6 6 8 10 10 4 6 10
	60
<ul style="list-style-type: none"> • MARINE ENGINEERING AND CONTROL SYSTEMS PAPER-2 1. Mechanical Engineering Science 2. Marine Engineering System : <ul style="list-style-type: none"> 1) Auxiliary Machinery Systems 2) Internal Combustion Engines 3. Electrical Engineering Systems Practical-Workshop Practice 	<ul style="list-style-type: none"> 20 45 25 30
	120
<ul style="list-style-type: none"> • ENVIRONMENTAL SCIENCE PAPER-2 Oceanography and Meteorology Oceanography <ul style="list-style-type: none"> 1. Basic Concepts 2. Bathymetric Studies 3. Marine Resources <ul style="list-style-type: none"> 1) Fishing 2) Minerals 3) Power Meteorology Practicals 	<ul style="list-style-type: none"> 13 13 10 10 5 50 20
	? 120

Subjects	Class Period
3rd Year	80
• BASIC MARINE MANAGEMENT Practicals	20
	100
• NAVIGATION PAPER-3	
1. Principles of Navigation	25
2. Practical Navigation	40
3. Voyage Planning	25
	90
• Practicals	
Voyage Planning (2 Compulsory Questions)	15
Sextant	10
Gyro Compass	2
Meteorological Instruments-Maintenance & Observations	3
	30
• NAVIGATION PAPER-4	
Ship's Compass	
Electronic Navigation Aids	
Gyro Compass	5
Decca Navigator	5
Loran	5
Omega System	5
Satellite Navigation	8
Echo Sounding Devices	4
Radar	8
Direction Finder	5
	45
• Practicals	
Echo Sounder	3
Radar	10
Decca Navigator	4
Satellite Navigator	5
Direction Finder	8
	30
• SHIP OPERATION TECHNOLOGY PAPER-3	
Cargo Work	
Seamanship	35
Maintenance	10
Practicals	40
	85
• SHIP OPERATION TECHNOLOGY PAPER-4	
Ship Construction	35
Ship Stability	35
Marine Communication	10
Practicals (Collision Prevention)	25
Practicals (Marine Communication)	15
Maritime Law (Paper-1)	120
Maritime Law (Paper-2)	120
	360

Subjects	Class Period
<ul style="list-style-type: none"> • MARITIME COMMERCE Basic Aspects of Shipping Economics Introduction to the Theory of International Trade Organization of Ship Operations Shipping in the National Economy Basic Ideas on Port Management Others 	<ul style="list-style-type: none"> 20 20 20 20 20 20
	120
<ul style="list-style-type: none"> • Marine Engineering & Control Systems Marine Engineering Practice I. C. Engines (Contd.) Marine Propulsion Units (Main Engine Plant) Injection Control Automation & Control Eng. Safety Arrangements Practicals 	<ul style="list-style-type: none"> 10 10 20 5 25 20 30
	120
<ul style="list-style-type: none"> • ENVIRONMENTAL SCIENCE PAPER-3 Meteorology Concept of Airmasses & Fronts Tropical Revolving Storms Principles of Meteorological Analysis and Weather Forecasting Use of Meteorological Codes & Reporting Systems Principles of Voyage Planning & Weather Routing Pollution of the Air and Sea Hydrographic Surveying Practicals 	<ul style="list-style-type: none"> 10 15 10 5 10 10 5 30 20
	105

(NOTE) Total 100 lesson hours should be allocated to every course throughout three years.

APPENDIX 7 CONSUMABLES FOR TRAINING EQUIPMENT

(1) Ship Maneuvering Simulator

Consumables (per year)

	<u>Q' ty</u>	<u>Unit price</u>	<u>Price</u>
Recording paper for Video printer	10 boxes	¥ 5,000	¥ 50,000
Ink sheet roll for Video printer	50 pcs	¥ 6,900	¥345,000
Cleaning kit for Video printer	1 "	¥ 3,800	¥ 3,800
Recording paper for laser printer	10 boxes	¥ 3,800	¥ 38,000
Ink for laser printer (toner)	1 "	¥34,000	¥ 34,000
Tape for magnetic tape device	1 "	¥53,000	¥ 53,000
Head cleaner for magnetic tape device	1 pcs	¥ 1,300	¥ 1,300
Dry cell for clock	1 "	¥ 130	¥ 130
Pen for radar indicator	24 "	¥ 130	¥ 3,120
Electric bulb, fuse, etc.	1 "	¥12,500	¥ 12,500
	Sub-total		<u>¥540,850</u>

(2) Cargo Handling Simulator

Consumables (per year)

	<u>Q' ty(box)</u>	<u>Unit price</u>	<u>Price</u>
Recording paper for CHS and CPU printer	10	¥12,500	¥125,000
Recording paper for loading CPU printer	2	¥12,500	¥ 25,000
Recording paper for inert gas system recorder	5	¥12,500	¥ 62,500
Ink ribbon for CHS and CPU printers	15	¥ 7,500	¥112,500
Ink ribbon for loading CPU printer	5	¥ 7,500	¥ 37,500
Ink ribbon for inert gas system recorder	5	¥ 7,500	¥ 37,500
Electric bulb, fuse, etc.	1	¥12,500	¥ 12,500
	Sub-total		<u>¥412,500</u>

(3) Main Diesel Engine Simulator

Consumables (per year)

	<u>Q' ty</u>	<u>Unit price</u>	<u>Price</u>
Recording paper for printer	15 boxes	¥ 7,500	¥112,500
Ink ribbon for printer	20 pcs	¥ 5,700	¥114,000
Recording paper for warning device	3 boxes	¥ 7,500	¥ 22,500
Ink ribbon for warning device	4 pcs	¥ 5,700	¥ 22,800
Electric bulb, fuse, etc.	1 boxes	¥12,500	¥ 12,500
	Sub-total		<u>¥284,300</u>

APPENDIX-8 PRINCIPAL ECONOMIC INDEXES OF INDIA

DEVELOPMENT OF FINANCIAL BALANCE OF CENTRAL GOVERNMENT

(Billion Rupees)

Year	Financial Balance
1985/1986	△ 227.7
1986/1987	△ 276.3
1987/1988	△ 287.2
1988/1989	△ 307.8

DEVELOPMENT OF BUDGETS OF CENTRAL AND STATE GOVERNMENTS

(Billion Rupees)

	1986/87	1987/88	1988/89
Expenditure	1,007.9	1,121.7	1,300.5
Development	637.8	668.0	795.5
Non-development	370.1	433.7	505.0
Ordinary Revenue	648.2	734.9	857.1
Tax Revenue	495.4	569.8	669.3
Direct Tax	68.9	74.8	97.6
Indirect Tax	426.5	494.9	571.7
Non-tax Revenue	152.8	165.1	187.9
Deficit Covering	359.7	386.8	443.3
Domestic Capital Revenue	244.4	294.2	361.7
Net Overseas Aid	23.8	37.7	30.6
Financial Deficit	91.5	55.0	51.0

Source : Economic Survey 1985/86

DEVELOPMENT OF CONSUMER PRICE INDEX

(Index in 1985 = 100)

Year	1986	1987	1988	1989
Index	108.7	118.3	129.4	137.6

Source : Handbook for Overseas Economic Cooperation

Production Target of Main Items in the 7th Five-year Plan

	Unit	Fiscal 1984/85 (results)	Fiscal 1989/90 (target)
Cereals	Million tons	150.0*	178~183
Sugar	Ditto	6.2	10.2
Tea	Million kg	645*	766
Coal	Million tons	147.45	226
Cruid Oil	Ditto	28.99	34.53
Iron Ore	Ditto	42.2	58.1
Steel	Ditto	8.77	12.64
Cement	Ditto	30.1	49
Petroleum Products	Ditto	33.23	45.06~45.47
Caustic Soda	Thousand tons	687.9	950.0
Soda Ash	Ditto	801	1,140.0
Nitrogenous Fertilizer	Million tons	3.92	6.56
LD Polyethylene	Thousand tons	107.2	186.0
HD Polyethylene	Ditto	38.9	125.0
PVC Resin	Ditto	84.0	233.0

(Note) * shows tentative figure.

(Source) Seventh Five Year Plan, 1985-90

SECTORIAL COMPOSITION OF GROSS DOMESTIC PRODUCT (At 1980-81 Prices)
(Unit : Rs. crore, %)

Items	1988-89*	1989-90**	Growth Rate (%)
1	2	3	4
1. Primary Sector	65,128 (34.7)	66,902 (33.9)	2.7
1.1 Agriculture	57,370 (30.6)	58,695 (29.7)	2.3
1.2 Mining and Quarrying	3,339 (1.8)	3,598 (1.8)	7.8
2. Secondary sector	49,905 (26.6)	53,263 (27.0)	6.7
2.1 Manufacturing	37,710 (20.1)	40,489 (20.5)	7.4
3. Tertiary Sector	72,692 (38.7)	77,254 (39.1)	6.3
3.1 Trade, Hotels and Restaurants	23,920 (12.7)	25,450 (12.9)	6.4
3.2 Transport, Storage and Communication	9,893 (5.3)	10,612 (5.4)	7.3
3.3 Banking and Insurance	8,563 (4.6)	9,276 (4.7)	8.3
3.4 Public Administration and Defense	10,304 (5.5)	11,014 (5.6)	6.9
4. Total Gross Domestic Product (1+2+3)	187,725 (100.0)	197,419 (100.0)	5.2

Source : RBI Bulletin, March 1991

* (Revised Estimates)

** (Quick Estimates)

SECTORIAL WORKING POPULATION

(100 thousand)

	1982	1983	1984
Public Sector	159.46	164.56	168.66
Agriculture	4.57	4.76	4.89
Mining and Quarrying	8.32	8.84	9.27
Manufacturing	15.92	16.34	17.17
Electricity, Gas and Water Supply	6.98	7.21	7.32
Construction	11.12	11.20	11.19
Trade	1.13	1.18	1.24
Transport, Storage and Communication	27.81	28.26	28.64
Banking, Insurance and Real Estate	8.15	8.72	9.13
Services	75.47	78.06	79.80
Private Sector	75.47	75.22	73.43
Agriculture	8.51	8.47	8.19
Mining and Quarrying	1.29	1.20	1.13
Manufacturing	46.61	46.26	44.73
Electricity, Gas and Water Supply	0.36	0.37	0.39
Construction	0.71	0.68	0.66
Trade	2.77	2.75	2.76
Transport, Storage and Communication	0.60	0.59	0.57
Banking, Insurance and Real Estate	2.04	2.07	2.14
Services	12.59	12.83	12.88

Source : Economic Survey 1986-87

(Notes) 1. Workers of minor enterprises are not included.

2. As of the end of March of each year.

PRINCIPAL EXPORTS (Contd.)

(Value in Rs. Crores)

Sl. No.	Commodity	Unit of Quantity	1984-85		1985-86		1986-87		1987-88		1988-89		1989-90(P)	
			Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
	Agricultural and Allied Products :													
	Of which :													
	Coffee	Mill, Kgs	67.5	210	98.9	297	73.4	297	91.5	282	84	294	115	343
	Tea and Mate	Mill, Kgs	213.9	767	205.6	577	192.4	601	206.1	609	194	609	209	905
	Oil Cakes	'000 Tonne	828.9	137	806.9	190	1044.6	213	1126.5	409	1609	426	2205	546
	Tobacco	Mill, Kgs	98.7	178	80.5	185	89.3	135	72.2	126	52	126	71	175
	Cashew kernels	'000 Tonne	32.4	180	37.1	225	43.0	328	41.6	315	37	276	48	368
	Spices	'000 Tonne	103.0	207	89.0	279	97.0	334	88.4	324	100	272	97	247
	Sugar and Molasses	'000 Tonne	278.0	16	37.9	1	3.1	12	18.7	110	103	10	159	32
	Raw Cotton	'000 Tonne	40.7	60	35.7	68	202.3	339	80.2	21	17	21	53	125
	Rice	'000 Tonne	247.7	189	245.0	197	248.3	339	388.8	331	350	331	422	427
	Fish and Fish preparations	'000 Tonne	90.4	381	87.5	539	110.6	533	98.4	533	116	630	125	687
	Meat and Meat Preparations	Value	...	83	...	76	...	...	...	...	...	94	...	114
	Fruits and Vegetables and Pulses (excl. cashew)	Value	...	138	...	124	...	...	...	...	...	173	...	208
	Fruits and processed fruits & juices	Value	...	77	...	82	...	...	...	...	...	180	...	160
	Miscellaneous Processed foods (incl. processed fruits and juices)	Value	...	638	...	785	...	...	...	...	...	1164	...	1363
	Ores and Minerals (excl. Coal)													
	Of which :													
	Mica	Mill, Kgs	16.4	20	18.1	20	19.9	20	37.6	23	47	29	88	30
	Iron Ore	'000 Tonne	25.5	459	30.1	547	28.7	547	29.4	554	33	673	36	928
	Manufactured Goods													
	Of which :													
	Textile fabric & manufactures (excl. carpet hand-made)	Value	...	1718	...	1795	...	2179	...	3294	...	3694	...	5360
	Of which :													
	Cotton yarn, fabrics made-ups etc.	Value	...	620	...	574	...	637	...	1131	...	1133	...	1480
	Ready-made garments of all textile materials	Value	...	953	...	1067	...	1331	...	1818	...	2099	...	3224
	Coir yarn and manufactures	Value	...	28	...	34	...	34	...	30	...	32	...	41
	Jute manufactures incl. twist & yarn	Lakh Tonnes	3.0	341	2.5	244	2.9	244	2.6	241	2.2	235	2.9	296
	Leather & leather manufactures incl. leather, footwear, leather travel goods & leather garments	Value	...	724	...	770	...	922	...	1251	...	1522	...	1951
	Handicrafts (incl. carpet hand-made)	Value	...	1751	...	1881	...	2548	...	3247	...	5190	...	6285
	Of which :													
	Gems and Jewellery	Value	...	1237	...	1503	...	2074	...	2613	...	4392	...	5296
	Chemicals and allied products	Value	...	483	...	498	...	563	...	801	...	1236	...	2158
	Machinery, Transport Equipment and metal Manufactures including iron and steel	Value	...	956	...	954	...	1133	...	1497	...	2311	...	3284
	Mineral Fuels and Lubricants (incl. Coal)	Value	...	1823	...	655	...	418	...	657	...	518	...	740
	Others	Value	...	77	...	63	...	87	...	40	...	38	...	39
	Total :		...	11744	...	10885	...	12452	...	15674	...	20232	...	27681

Presumed value

PRINCIPAL IMPORTS (Contd.)

(Value in Rs. Crores)

Commodity	1984-85		1985-86		1986-87		1987-88		1988-89		1989-90(P)		
	Unit of Quantity	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
Food and Live Animals chiefly for Food (excl. cashew raw).....			854		679		N.A.		N.A.		N.A.		N.A.
Of which :													
Cereals and cereal preparations :	'000 T	977.4	695		212.3		66		774		378		378
Raw Materials and Intermediate Manufactures	'000 T	56.1	12896		49.1		64		61		77		77
Cashew nuts (unprocessed)	'000 T	60.3	87		80.2		120		173		172		172
Crude Rubber (including synthetic and reclaimed)	'000 T		234				N.A.		N.A.		N.A.		N.A.
Fibres :													
Of which :													
Synthetic and regenerated fibres	'000 T	39.3	60		37.8		33		37		69		69
(Man-made fibres)	'000 T	22.3	71		27.9		132		157		172		172
Raw Wool	'000 T	0.0	0		*		1		99		9		9
Raw Cotton	'000 T	71.0	32		8.3		3		6		11		11
Raw Jute	Mill. T	19.7	5409		18.5		4043		4358		6274		6274
Petroleum Oil and Lubricants			1008				N.A.		N.A.		N.A.		N.A.
Animal and Vegetable Oils and fats													
Of which :													
Edible Oils	'000 T	1141.2	921		1473.9		969		730		211		211
Fertilizers and Chemical Products	'000 T	7653.0	1346		6558.8		1082		984		1776		1776
Of which :													
Fertilizers and Fertilizers material			1088		1145		598		1884		2135		2135
Chemical Elements and Compounds													
Dyeing Tanning and Colouring material													
Medical and Pharmaceutical products and artificial resins													
Plastic material, regenerated cellulose and artificial resins													
Pulp and waste paper	'000 T	402.9	223		569.7		557		809		986		986
Paper, Paper board and manufactures thereof	'000 T	271.3	196		270.6		239		260		304		304
Non-metallic mineral manufactures													
Of which :													
Pearls Precious and semi precious stones, unworled or worked													
Iron and Steel	'000 T	1971.8	1032		3136.5		2018		3176		4242		4242
Non-ferrous Metals													
Capital Goods													
Manufactures of metals													
Non-electrical machinery, apparatus and appliances													
Electrical machinery, apparatus and appliances													
Transport Equipment													
Others (Unclassified)													
TOTAL			19658		20096		22244		28235		35412		35412

* Negligible

Not available

Presumed value

Flow of Fund in India (Net basis)

(Million Dollars)

Item \ Year	1985	1986	1987	1988	1989
ODA	1,592.1	2,119.5	1,838.8	2,097.3	1,906.4
Bilateral	544.1	1,032.1	927.0	929.2	1,138.9
of which biggest 5	UK (93.3)	Japan (226.7)	Japan (303.9)	Japan (179.5)	Japan (257.2)
	W. Germany (86.5)	W. Germany (166.5)	W. Germany (136.6)	W. Germany (152.3)	Sweden (203.1)
	France (65.2)	UK (162.1)	Holland (104.0)	Holland (115.2)	Germany (122.5)
	Holland (60.1)	Holland (101.1)	UK (76.6)	UK (112.6)	France (103.4)
	Canada (42.3)	Sweden (80.8)	France (69.4)	USA (91.0)	Holland (92.4)
Multilateral	1,048.0	1,087.4	911.9	1,168.1	767.5
ODF Bilateral	94.0	184.5	-77.0	308.2	296.3
Multilateral	185.7	385.9	678.7	1,312.3	1,216.7
PF	635.1	1,127.8	1,059.3	405.4	1,700.5
Total	2,506.8	3,817.7	3,449.0	4,123.2	5,119.9

Source : Overseas Economic Assistance Handbook, 1991

Sectorial Composition of Direct Loan Granted to India

(Million Yen)

Sector	1988		1989		1990		Total (1966-90)	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Electricity and gas	2	34,556	3	29,906	3	80,402	30	357,160
Transportation	1	3,508	1	1,256	—	—	7	19,935
Communication	—	—	—	—	—	—	10	69,867
Irrigation, flood Control and reclamation	2	7,513	1	84	—	—	3	7,597
Agriculture, forestry and fishery	—	—	—	—	1	7,869	1	7,869
Mining & manufacturing	3	19,059	2	1,687	—	—	17	132,113
Social service	1	9,244	—	—	1	7,964	1	17,208
Loan for development	1	19,500	—	—	2	32,970	3	52,470
Loan for merchandises	—	—	—	—	—	—	5	72,500
Others	—	—	—	—	—	—	5	72,500
Total	10	93,380	7	32,933	7	129,205	71	736,728

Source : Overseas Economic Assistance Handbook, 1991

Macro-Economic Index Numbers of the 7th Development Plan

(Rs. crores at 1984 - 85 prices)

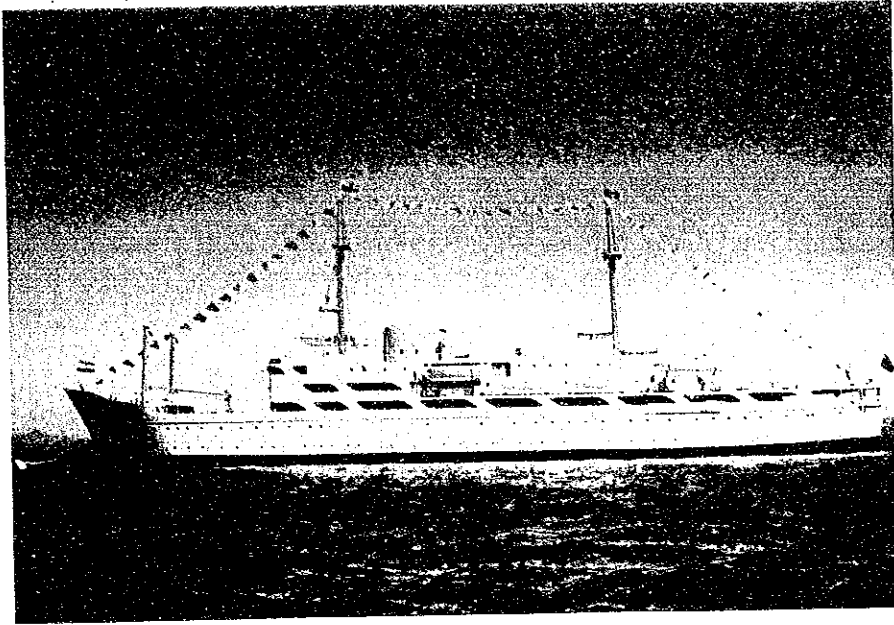
	1984 - 85	1989 - 90
GDP at factor cost	193,428	246,881
Indirect taxes less subsidies	24,334	35,064
GDP at market prices	217,762	281,945
Net factor income from abroad	(-)681	(-)500
Other current transfer	2,799	3,000
Disposable income	219,880	284,445
Gross domestic savings	50,738	68,997
Consumption exp. total	169,142	215,448
Private expenditure	146,308	185,285
Public expenditure	22,834	30,163
Gross domestic capital formation	53,388	72,997
Foreign savings	2,600	4,000
Rate of domestic savings	23.3	24.5
Rate of investment	24.5	25.9
Marginal rate of saving		28.4

Sectorial Composition and Growth Rate of GDP

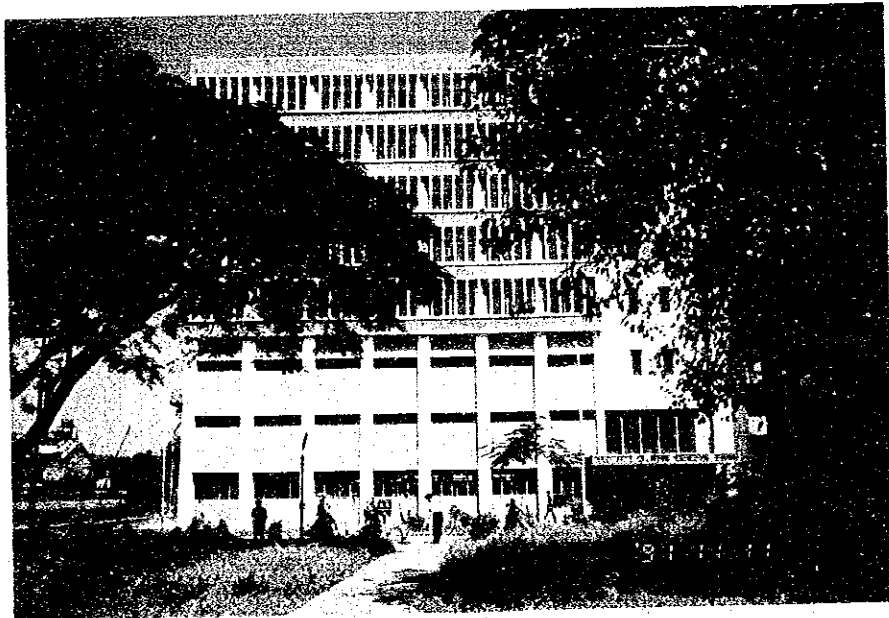
(%)

	Composition ratio			Growth rate	
	1984/85	1989/90	1999/2000	1984/85~ 1989/90	1989/90~ 1999/2000
Agriculture	36.9	32.7	25.5	2.5	2.4
Mining	3.5	4.8	3.8	11.7	3.5
Manufacturing	14.6	15.0	19.8	5.5	7.8
Electricity, gas and water supply	2.0	2.3	2.9	7.9	7.7
Construction	6.2	6.2	6.1	4.8	4.9
Transportation	5.6	6.2	6.4	7.1	5.3
Services	31.2	32.9	35.5	6.1	5.8
Total	100.0	100.0	100.0	5.0	5.0

Photographs



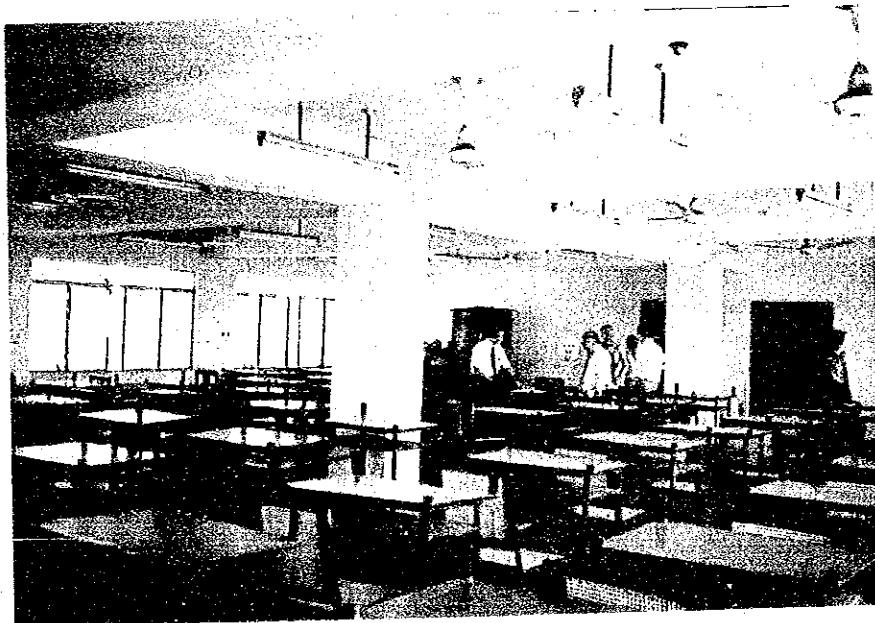
Training Ship "RAJENDRA"



Project Site (DMET, Bombay)



Overview of Lal Bahadur Shastri Nautical
& Engineering College (LBS)



Directorate of Marine Engineering Training (DMET),
Bombay (Installed with Engine Room Simulator)

JICA