CHAPTER 3 PROJECT DESCRIPTION

CHAPTER 3 Project Description

3.1 Purpose

The Arab Republic of Egypt has mentioned that the growth of marine tranportation industry and the training of personnel to work in this field is one of the most important targets for the development of the national economy. Arab and African countries are in the same situation as well. In order to train students of those countries, AMTA has conducted training and education in accordance with the international criteria provided in STCW Convention, but the AIDA III, the existing training vessel, which has been utilized for this purpose, has become considerably deteriorated, and as a result, training cruises and eductation programs have been restricted.

Accordingly, the purpose of this project is to provide a new training vessel appropriately designed as a replacement of the deteriorated AIDA III, to estabish an education system under which AMTA will be able to train the students by utilizing the new vessel in international conformity with the provisions of STCW, and also to contribute, through the education in AMTA, to the training of seamen of not only Egypt but also other Arab and African countries.

3.2 Study on Contents of the Request

3.2.1 Deterioration of the AIDA III

Having been in service for as long as 28 years since delivery in 1961 at a Dutch shipyard, the existing training vessel, the AIDA III, presents the following serious problems.

(1) Corrosion of Hull Construction Member

During dry-docking of the vessel in August 1989, extensive

repair work in hull part was carried out under the survey of the Lloyd's Register of Shipping as follows:

- Shell plates of six strakes in total at the cargo hold and fore peak tank were replaced.
  (Shell plate of one strake is assumed to be between about 1.8 m and 2.5 m in width.)

- Keel plates under the shaft tunnel and engine room were replaced.

- Shell plates of four strakes in total at aft peak tank were replaced.

- All boat deck plating were replaced.

- Longitudinal bulkheads of the starboard ballast tank adjacent to the shaft tunnel were replaced.

- Port side deck plating of the shaft tunnel was replaced.

- Shell plates around the propeller shaft bracket were replaced.

The Repair Report by Lloyd's Register of Shipping is shown in the Reference Data. (Appendix 5 and 6)
It may be fair to presume that considerably advanced corrosion has spread in not only the shell plates but also the double bottom plating of the engine room and all parts of the inner hull members, whose replacement would almost be impossible, and it seems to be difficult to return the vessel to its original hull strength, even if major replacement of her shell plates were to be carried out.

(2) Frequent Trouble with Main Diesel Engine

According to the Chief Engineer of the AIDA III, the manu-

facturer stopped producing this type of engine (2 diesel engines, 2,000 PS x 358 rpm, 8 cyl., manufactured by Deutze Diesel Co.), due to poor thermal stress design, soon after completion of the engine for the AIDA III. Since, in case of the AIDA III, cast steel cylinder heads were frequently cracked by thermal stress, three spare cylinder heads were stored on board.

It is said that some of the cylinder heads have been repaired by welding as many as three times.

Therefore, there is serious concern that the main engine will stop during a training. Under such circumstances, moreover, spare cylinder heads must always be maintained perfectly. The repair work by welding immediately after occurence of the defects probably adversely affects the cruising schedule of the vessel.

(3) Direct Current Power

The electric power of the AIDA III is direct current. Since there are no workshops to repair of DC motors in Egypt, motors with insulation defects must be sent to European countries for repair by rewinding, which requires a considerably long time before the motors are completely put in order.

Therefore, in case of motor failure in essential machinery, the motors of less essential machinery are dismantled and to replace the defective motors.

(4) Difficulty in Procuring Spare Parts

Mainly because the machinery of the AIDA III is outdated, it is very difficult to procure necessary spare parts, and the crew are compelled to machine, repair or recondition the defective parts by themselves at the workshop on board

the vessel. Therefore, the reliability of machinery and equipment on the AIDA III seems to be very low.

It might be added that spare parts are stored somewhat disorderly due to various kinds of repair and reconditioning work carried out for many years, and the improper location of the workshop and storeroom. (Shaft tunnel and C-Deck section over shaft tunnel.)

Although various kinds of spare parts are stored, it was heard that only the custodian knows what kind of and how many spare parts are ready for use.

Since it seems that considerable efforts have been devoted by the crew in order to keep the vessel always in good condition, the method and location of storing spare parts should be improved when designing the new training vessel.

(5) Outdated Machinery and Equipment

Needless to say, machinery installed on AIDA III are outdated and not suitable for the on-board training of the cadets.

Moreover, since boiler facilities are not provided on AIDA III, some training items important to the cadets of engine department, such as training of handling fire directly or operating machinery driven by steam, cannot be performed.

Living facilities for the cadets are far from modern, and consist of triple bunks in 15-person to 21-person rooms, and we fear that such poor facilities would depress the morale of the cadets.
Comparison between the floor space of crew's living quarters and that of the cadets is shown in Table 1, 3.2.

After the completion of the AIDA III, the modernization of

vessels has been so remarkable that it might be a matter of question to assign, in future, cadets who received training on such an out-dated vessel as the AIDA III to vessels provided with modernized machinery and equipment.

In addition to the various problems accompanied by old age, inadequacies regarding the needs of a training vessel in its facilities and functions, which resulted from the fact that the AIDA III was originally built as a passenger vessel, can be pointed out. For example, when compared with Shintoku Maru, which is a Japanese training vessel of the similar size, insufficient bridge area, chart room and wireless room on the AIDA III, as well as insufficiency and obsoleteness of machinery installed, are quite obvious.

3.2 TABLE 1 FLOOR AREA OF LIVING SPACE PER PERSON

(m²)

	JAPAN, TRAINING VESSEL SHINTOKU MARU 3,465 GT	AIDA III 2,733 GT	
TYPICAL CREW STATE ROOM	4 PERSONS, 2 TIERS BED 3.0 & OVER	4 PERSONS, 2 TIERS BED 2.1	
CADET STATE ROOM	6 PERSONS, 2 TIERS BED 2.2 & OVER	10 PERSONS, 2 TIERS BED 15 PERSONS, 3 TIERS BED 21 PERSONS, 3 TIERS BED	1.3 0.9 0.9

3.2 TABLE 2 FLOOR AREA OF TRAINING SPACE

(m²)

	SHINTOKU MARU	AIDA III
NO. OF CADETS	144	250 (NO. OF BED)
LECTURE ROOM CADETS SALOON(LECTURE ROOM)	92.8 151.4	NONE 63.7
WHEEL-HOUSE CHART ROOM WIRELESS ROOM	37.6 39.5 25.6	18.7 5.9 6.7
ENGINE CONTROL ROOM WORKSHOP	41.7 77.0	NONE UNIVERSAL MACHINE AND A TABLE IN SHAFT ROOM

3.2.2 The Requirement of the STCW Convention

In March 1967, TORY CANYON, a tanker of Liberian registry, grounded in the Strait of Dover, and the accident caused sea pollution over a wide area. Taking this opportunity, it was strongly intended to provide international standards of crew's qualifications, knowledge, skills and duties on watch in order to prevent sea disasters caused by crew's poor navigation techniques, and the work to prepare the convention for the above was executed with IMO as the core.

As a result, "INTERNATIONAL CONVENTION ON STANDARDS OF TRAINING, CERTIFICATION AND WATCH KEEPING FOR SEAFARERS, 1978" was adopted in London in 1978.

This Convention satisfies the requisite which became effective in April 1984 (twenty-five member nations and 50 percent of the total tonnages), and seventy-four member nations (72.41 persent of the total tonnages) had ratified, accepted, approved or joined the Convention as of August of 1989.

The Arab Republic of Egypt concluded this Convention as the fourth country in the world in September 1980 and has been making efforts to achieve the purpose of the Convention since the early stages.

The main contents of the Convention are as follows:

1) Basic principles to be observed in keeping a navigational watch (watch arrangement, fitness for duty, navigation, navigation equipment, navigational duties and responsibilities, navigation with a pilot embarked, protection of the marine environment, etc.)

2) Mandatory minimum requirements for certification of masters and chief mates.

The types of ships (the size of ship) are classified into the following three groups:

. 1,600-ton or more
. 200-ton or more and less than 1,600-ton
. less than 200-ton

The duties of the ships officers are classified into the following three classes:

. Master
. Chief mate
. Officers in charge of a navigational watch

Mandatory minimum requirements for certification are determined by the type of ship and the duty in the following three aspects:

. Medical fitness (particularly regarding eyesight and hearing)
. To have approved sea-going service (the length of sailing career)
. To have passed an appropriate examination to the satisfaction of the Administration.

3) Mandatory minimum requirements for deck rating forming part of a navigational watch (age, physical fitness, completion of approved sea-going service, experience or training concerning certain skills).

4) Basic principles to be observed in keeping a watch in port.

5) Mandatory mininum requirements for a watch in port on ships carrying hazardous cargo.

6) Basic principles to be observed in keeping an engineering watch by the engine crew (general operation, watch require-

ments, fitness for duty, protection of the marine environment, etc.).

7) Mandatory minimum requirements for certification of chief engineer officers, engineer officers and ratings.

The output of main engine is classified into the following two groups:

- 3,000 kW or more
- 750 kW or more and less than 3,000 kW

The duties of engine officers are classified into the following three classes:

- Chief engineer officer
- Second engineer officer
- Engine officers in charge of a watch in a traditionally manned engine room

Mandatory minimum requirements for certification are determined by the output of main engine and the duty in the following three aspects:

- Physical fitness (including the aptitude regarding eyesight and hearing).

- To have approved sea-going service

- The knowledge and skill concerning the operation of the engine

8) Mandatory minimum requirements for ratings forming part of an engine room watch (age, medical fitness, experience of sea-going service, certain knowledge and capabilities, etc.)

9) Mandatory minimum requirements for certification of radio officers.

10) Special requirements for tankers

One of the features of the STCW Convention is that it stipulates that any ship entering a port of a member nation shall be supervised by a supervisor of the country to ensure whether the ship satisfies the requirements of the convention from the viewpoint that the convention aims at promoting the safety of life and property at sea and the protection of the sea environment, and intends to achieve the above purpose by improving the navigation skill of the crew.

This is called the Port State Control. Even if a ship of the country which is not a party enters a port of a member nation, the supervisor may prohibit its navigation as the case may be if the requisites of the convention are not satisfied. Actually, such cases occurred in some ports in Europe, and the fact is that ships with crews that do not satisfy the provisions of this convention cannot enter the ocean going marine transportation market.

Therefore, the training institutes of seafarers for oceangoing ships must essentially consider the requisites of the STCW Convention in providing the curriculum and the contents of the education.

The requirements for deck officers (in charge of a navigational watch) are provided in Regulation II-4 and those for engineer officers (in charge of a watch in a traditionally manned engine room) are provided in Regulation III-4. The following is a summary of the provisions of minimum requirements concerning experience in sea service.

Regulation II/4

MANDATORY MINIMUM REQUIREMENTS FOR CERTIFICATION OF OFFICERS IN CHARGE OF A NAVIGATIONAL WATCH ON SHIPS OF 200 GROSS REGISTER TONS OR MORE

1. Every officer in charge of a navigational watch serving on a sea-going ship of 200 gross register tons or more shall hold an appropriate certificate.

2. Every candidate for certification shall:

(*a*) be not less than 18 years of age;

(*b*) satisfy the Administration as to medical fitness, particularly regarding eyesight and hearing;

(*c*) have approved sea-going service in the deck department of not less than three years which shall include at least six months of bridge watchkeeping duties under the supervision of a qualified officer; however, an Administration may allow the substitution of a period of special training for not more than two years of this approved sea-going service, provided the Administration is satisfied that such training is at least equivalent in value to the period of sea-going service it replaces;

(*d*) satisfy the Administration by passing an appropriate examination that he possesses adequate theoretical and practical knowledge appropriate to his duties.

Regulation III/4

MANDATORY MINIMUM REQUIREMENTS FOR CERTIFICATION OF ENGINEER OFFICERS IN CHARGE OF A WATCH IN A TRADITIONALLY MANNED ENGINE ROOM OR THE DESIGNATED DUTY ENGINEER OFFICER IN A PERIODICALLY UNMANNED ENGINE ROOM

1. Every engineer officer in charge of a watch in a traditionally manned engine room or the designated duty engineer officer in a periodically unmanned engine room on a sea-going ship powered by main propulsion machinery of 750 kW propulsion power or more shall hold an appropriate certificate.

2. Every candidate for certification shall:

(*a*) be not less than 18 years of age;

(*b*) satisfy the Administration as to medical fitness, including eyesight and hearing;

(*c*) have not less than a total of three years approved education or training, relevant to the duties of a marine engineer;

(*d*) have completed an adequate period of sea-going service which may have been included within the period of three years stated in sub-paragraph (c);

(*e*) satisfy the Administration that he has the theoretical and practical knowledge of the operation and maintenance of marine machinery appropriate to the duties of an engineer officer;

(*f*) have attended an approved practical fire-fighting course;

(*g*) have knowledge of safe working practices.

The Administration may vary the requirement of sub-paragraphs (c) and (d) for engineer officers of ships powered by main propulsion machinery of less than 3000 kW propulsion power engaged on near-coastal voyages, bearing in mind the effect on the safety of all ships which may be operating in the same waters.

According to the provisions of the Convention, any candidate for certification of officers in charge of a navigational watch shall have not less than three years' sea-going experience, in principle, and pass the qualifying examination for professional knowledge necessary for his duty, but it has been approved, under certain conditions, to shorten the three years' sea-going experience to one year's experience for students who received systematic training and education in school.

The curriculum of each course in AMTA is as explained already, and necessary knowledge and practical experience are integrated into the course of study and the course of training, in consideration of the provisions of STCW Convention.
In other words, the students in Nautical Studies, i.e. the candidates for deck officers, are to fulfil the requirements of one year's sea-going experience provided in the Convention by practical training aboard a training ship (for 4 months, which are equivalent to 6 months) and practical training aboard an Egyptian ship for 6 months, for 12 months in total; The students in Marine Engineering Studies, i.e. the candidates for engineer officers, are to fufil the requirements of experience for "an adequate period" by practical training aboard a training ship (for 4 months, which are equivalent to 6 months).

Therefore, there is no formal problem in this system, as the students in both course would fulfil the minimum requirements provided by the Convention.

On the other hand, the practical training aboard is carried out during the latter 6 months of the 12-month period, and has the following advantages and disadvantages.

. Establishment of on-the-job training system in shipping companies.

In the days when students had to seek personally the ships for practical training, it was very difficult to find such ships and that was one of the most serious problems. However, the system was greatly improved by ministerial decree in 1984, by which any ship sailing under the Egyptian flag is obligated to accept trainees.

. Qualified and experienced instructors are not available on merchant ships.

. Equipment and facilities necessary for training and education are not always available on merchant ships.

. Merchant ships are operated to transport passengers and cargo. In other words, their operation program is far from the educational program which is able to give the students effective and thorough training during the limited period.

. However, the students can gain experience through the actual transportation activities as a crew member of the ship.

Keeping the above advantage and disadvantages in mind, AMTA is paying due attention to ensure that the students do not waste time on the ships, ordering them to carry notes full of assignments to be completed, with the aim of producing better results from the job training on merchant ships.

In Japan and the U.S.A. the training system under which students receive practical training on a training ship for one year has been adopted for a long time after abolishing the job training system on merchant ships, but it may be reasonable for AMTA to study the present system so that it operates as effectively as possible, since the conditions of Egypt cannot afford to maintain an expensive training vessel as well as to bear the maintenance expenses.

3.2.3 Result of Study on Contents of Request

The most important factor in training system is how substantially effective training and education are carried out. Therefore, the training vessel on which training and education of the students will be carried out for six months, should

1) have adequate seaworthiness,

2) have adequate and appropriate accommodation and equipment,

3) be under the guidance of qualified instructors with plenty of experience, and

4) be in accordance with a training program which is planned properly.

It should be provided with these circumstances in which the training navigation can be performed.

As mentioned in 3.2.1, the existing training vessel, the AIDA III, has deteriorated considerably and it is feared the vessel cannot satisfy the hardware requirements mentioned in 1) and 2) above. The results of the recent navigation (see operation schedule to the AIDA III in 1987 - shown in para. 2.3.8 (2)) shows that the vessel's cruising area and period are restricted, therefore the time to solve such problems from the viewpoint of the efficiency in training has come.

Under such circumstances, we can reasonably say that a new training vessel approriate as a substitute for the AIDA III must be offered, and that the new training vessel is becoming indispensable for giving the students of AMTA the better education to comply the provisions in the STCW Convention.

3.3 Outline of Plan

3.3.1 Study on the Required Function of the New Training Vessel

1) Cruising Schedule

AMTA is planning to train 810 cadets anually on the new training vessel as shown in the following plan of on-board training for cadets.

Cruising schedule of the new training vessel on which these 810 cadets are to be trained is shown in Table 1, 3.3. According to this schedule on-board training is to be carried out all the year round and total number of cadets at one voyage is 50 to 160 and 160 is maximum as shown in lower part of the Table.

The big difference between the cruising schedule of the present training vessel, AIDA III, shown in Table 6, 2.3, and that of the new training vessel is that in twice long-term voyages for training cadets in Long-term Training Cource, the AIDA III cruises the Red Sea and the Mediterranean at both training voyages, while the new vessel is schedule to cruise to the Red Sea and the USA or Japan at the first training voyage and to the Red Sea and north Europe at the second voyage.

This difference shows the educational policy of AMTA which is endevouring to improve the training of prospective staff of vessels, namely students in Departments of Nautical faculty and Engineer fuculty.

This policy is very appropriate and the new training vessel must have such functions competent to such long-term cruising and conformable to the port regulations in the USA, Japan and north Europe.

PLAN OF ON-BOARD TRAINING FOR CADETS

(ANNUAL)

Guided Sea Training for Cadets	100 x 2 = 200 Cadets
Short Training for Cadets	160 x 2 = 320 Cadets
Electric and Computer Students	15 x 4 = 60 Cadets
Seamen's Center Ratings	45 x 4 = 180 Cadets
Catering Ratings	50 x 1 = 50 Cadets
	810 Cadets

3.3 TABLE 1

CRUISING SCHEDULE AND NUMBER OF CADETS ON BOARD

CADET	NO. OF CADETS	JAN.	FEB.	MAR.	APR.	MAY.	JUN	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
GUIDED SEA TRAINING	100 × 2			R.S.	R.S.	USA	/JAP		M.S.	/N.E.	R.S.	R.S.	
SHORT TRAINING	160 × 2		R.S.					R.S.					
ELECTRONIC & COMPUTER	15 × 4			———	———						———	———	
SEAMEN'S CENTER	45 × 4			———	———						———	———	
CATERING	50 × 1	———											
TOTAL NO. OF CADETS		50	160	160	160	100	100	160	100	100	160	160	100

R.S. ··· Red Sea M.S. ··· Mediterranean Sea N.E. ··· North Europe
USA ··· UNITED STATES OF AMERICA JAP ··· JAPAN

2) Ship's Complement

The propriety of 160 on-board cadets under the plan of AMTA is as follows:

The total number of the graduates from the officer courses

of navigation, engine and wireless up to 1988 after the opening of the school of AMTA in 1972 is 2,307.

Actually, the students have graduated from the school since 1975, three years after its opening, and the 2,307 graduates are considered to be the total number of graduates for 14 years. That is, the average number of graduates from the officer courses per year is approximately 185.

The number of graduates for the past 3 years is shown in Table 2, 3.3.

3.3 TABLE 2

NO. OF GRADUATES 1987-1989 COMPETENCY CERTIFICATE

YEAR	NAUTICAL CERTIFICATE				MARINE ENG. CERTIFICATE		
	3RD	2ND	1ST	MASTER	3RD	2ND	CHIEF
1987	3	106	43	15	137	116	36
1988	6	118	62	22	123	83	24
1989	13	86	40	29	94	81	39

3 cadets in navigation obtained the license of 3rd mate after completing the guided sea training in 2.5 years and on the job training practicc on a ocean-going ship in half a year, and 118 cadets obtained the license of 2nd mate in 1988, one year after completing on the job training practice on a ocean-going ship and the course at AMTA.

That means the total number of the 3rd mates and the 2nd mates are the number of persons who completed the guided sea training. In case of the engineer course on the other hand, cadets complete the guided sea training 3 years after entrance into the school and can apply the 3rd engineer's license, so the number of the 3rd engineers are just the number of persons who completed the guided sea training.

The number of the graduates in each year are shown in Table 3, 3.3 by simply reading horizontally the above number and classifying them by year and course.

3.3 TABLE 3

NO. OF GRADUATES EVERY YEAR

YEAR	NAUTICAL	MARINE ENG.	TOTAL
1987	109	137	246
1988	124	123	247
1989	99	94	193

AMTA explains that the number of incoming students to the school is decided by the Board of Directors. The Board, desiring to cultivate 200 qualified maritime officers who will complete basic studies, has decided to accept 320 incoming students to Nautical and Engineering Departments in consideration of that a certain number of students may drop out in course of basic studies.

Those 320 students join training vessel after study of 2nd semester (Nautical) or 3rd semester (Engineering) for short term onboard training, devided by two groups of 160 trainees respectively.

Thereafter, students join training vessel again, after completion of 4th semester (Nautical) or 5th semester (Engineering) for long term on-board training.

However, the number of students gradually decreases from 160 to 100 with the lapse of time.

Therefore, AMTA intends to make best use of the capacity of training vessel by embarking trainees of Electronics and Computer Studies, Seamen's Training Center and Marine

Catering Training Center in those vacant space of the Training vessel.

As mentioned above, 160 cadets on the new training vessel has been planned to obtain 200 graduates from the officer course in the future, based on the average number of graduates since the opening of the AMTA school (185 per year), and the actual number of the graduates of each of the past 3 years (246, 247 and 193). Consequently, this number seems to be reasonable.

3) Ship's Speed

According to the request of AMTA with the new training vessel, the service speed is to be 13.5 knots.

In checking the designed speed of a new vessel, three points should be taken into consideration, namely cruising area (navigation distance and days), training for acquiring navigational skill whilst on board and economy in operation.

Firstly, the cruising area of the new training vessel includes cruising to the U.S.A. and Japan as shown in Table 1, 3.3. The distance and number of days required for a cruise from Egypt to the U.S.A. or Japan is shown in Table 4, 3.3. The number of days for port calls port, added to the number of days required for round navigation, shows that a navigation schedule with enough allowance can be made, even if about one half of the six months' on-board training period (substantially four months) would be assigned to cruising to either the U.S.A. or Japan.

3.3 TABLE 4

NAVIGATION DISTANCE OF NEW TRAINING VESSEL

CRUISING AREA	DISTANCE (S. MILE)	DAYS, SINGLE TRIP
ALEXANDRIA/U. S. EAST COAST	ABT. 4, 300	ABT. 14
ALEXANDRIA/JAPAN	ABT. 7, 500	ABT. 25

Next from the viewpoint of training for acquiring navigational skill whilst on board, excessive high speed of the vessel would result in shortening the number of navigation days, and this is not desirable for the inexperienced trainees to become accustomed to sea going.

The training vessel, unlike conventional merchant vessels, needs not to have high speed, as far as the purpose of training can be attained, and moreover, moderate speed brings a great advantage in operational economy of the vessel.

Although one voyage to either the U.S.A. or Japan is included in the annual program, the main cruising area of the new training vessel will be the Mediterranean Sea and the Red Sea, and also in comparison with the speed of similar types of training vessels, such as the Shintoku Maru, the designed service speed of 13.5 knots is considered in a reasonable range.

4) Training Facilities

The training plans for the on-board cadets are shown in Table 5 and Table 6, 3.3 Therefore, a plan of the area, machinery, equipment and facilities required for the number of cadets given in the tables are necessary.

3.3 TABLE 5

PLAN OF TRANING AT SEA

GROUP OF CADETS		PLACE	TIME	NO. OF CADETS
DECK CADETS	DECK WORK	DECK	DAYTIME	15-17
	BRIDGE WORK	WHEEL-HOUSE	3-WATCHES	3-5
		CHART ROOM		8
		WIRELESS ROOM		4
ENGINEERING CADETS		ENGINE ROOM	3-WATCHES	10
		ENG. CONTROL ROOM		4
		WORK SHOP		4
DECK AND ENG. CADETS		LECTURE ROOM ETC	DAYTIME	30-40

3.3 TABLE 6

PLAN OF TRAINING AT ANCHORAGE

GROUP OF CADETS		KINDS OF TRAINING	TIME
DECK CADETS	3	NAVIGATION AND BRIDGE WORK, LECTURES	0830～1600
	1	SEAMANSHIP AND DECK WORK, LECTURES	
ENGINEERING CADETS	1	ENGINE, INCL. LECTURES	0830～1600
	1	ENGINEERING SYSTEM, INCL. LECTURES	
	1	REPAIR AND MAINTENANCE, INCL. LECTURES	

5) Study on the Supply Function for Lighthouses

AIDA III has performed supply to 4 solitary islands, Ashrafi, Shaker, Brother and Ded-lass islands, which are scattered in the Gulf of Suez or the Red Sea. Supply for the lighthouses are included in the role of Ports and

and Lighthouses Administration in MOMT, but the Ports and Lighthouses Administration plays a part role in the administration of the staff, the shipping and the harbour, so it has a close relationship with AMTA.

The lighthouses are supplied every one and a half or two months, and the supply materials are subsistence goods for the maintenance staff of the lighthouses, such as fuel for generator engines, spare parts, provisions, water, etc. The lighthouses personnel are changed at the same time.

The supply operation includes the lifting-up and lowering-down of work boats, cargo handling, the operation of work boats, drifting, and posture and position control of the vessel, etc., and each respect is a training theme suitable for the direct or indirect participation of the cadets as one of the factors of navigating techniques.

3.3.2 Management Organization and System

It was stated that the Ministry of Marine Transport will own the new vessel, Ports and Lighthouses Administration will be responsible for its operation and Management, and AMTA will plan the cadets' training schedules.

Ports and Lighthouses Administration and AMTA have the joint committee and the actual results of long term cooperation, also the supporting system of the Ministry of Marine Transport has been firmly established.

See Fig. 2, 2.2 as for the organizational relationship between Ports and Lighthouses Administration and AMTA.

3.3.3 Mother Port

We have received an answer from Ports and Lighthouses

Administration and AMTA that they decided on Alexandria Port to be the mother port for the new training vessel and to prepare a new pier for its exclusive use by 1991 and the Alexandria Port Authority has approved the matter of it.

Alexandria Port is located in the western part of the centre of Alexandria city and shows prosperity.
The head office of AMTA in Miami and the AMTA Seamen's Training Centre in Abu-Quir are located in the eastern part of the city. As for the location of each facility, see the Alexandria city map.

Alexandria Port is segregated from the urban district as a port facility by fences and gates, and guarded by the army. The pier and also Alexandria Shipyard are located in this segregated area.

Many small vessels are moored at the pier now. On its shoreside there is the main building of Pots and Lighthouses Administration, and this location is very convenient for the management.

The pier will be provided with fuel oil and fresh water supply facilities and a pier gate in addition to mooring equipment for the new training vessel. However, no crane will be provided.

Although many large-sized cargo ships were moored at buoys in Alexandria Port, it is seemed there was no problem with a channel to the pier etc. since the port has a wide water area.

The climate in Alexandria is very calm and satisfactory, and it is called the best port in the eastern part of the Mediterranean Sea.
A meteorological statistics table is shown in Reference Data. As shown in the data, the mean velocity of the wind in each month is 10 knots (approx. 5 m per sec.) or less, through the year.

Moderate gales of 6 on the wind scale (22 to 28 knots) occur once or twice per month in spring and winter, or about 7 days a year. They are considerably rate. As for wind direction, the north or the northwest wind prevails all the year round, but a south wind prevails in the morning in the spring and winter.

The south wind is the land wind in Alexandria facing the Mediterranean Sea. Therefore, there are 2 to 5 days of poor visibility per month in the spring and winter due to sandy wind, which is somewhat frequent.

3.3.4 Maintenance & Repair Facilities

Docking for intermedate and periodical survey of the new training vessel and its repair are expected to be caried out at four shipyards including the adjacent Alexandria Shipyard.

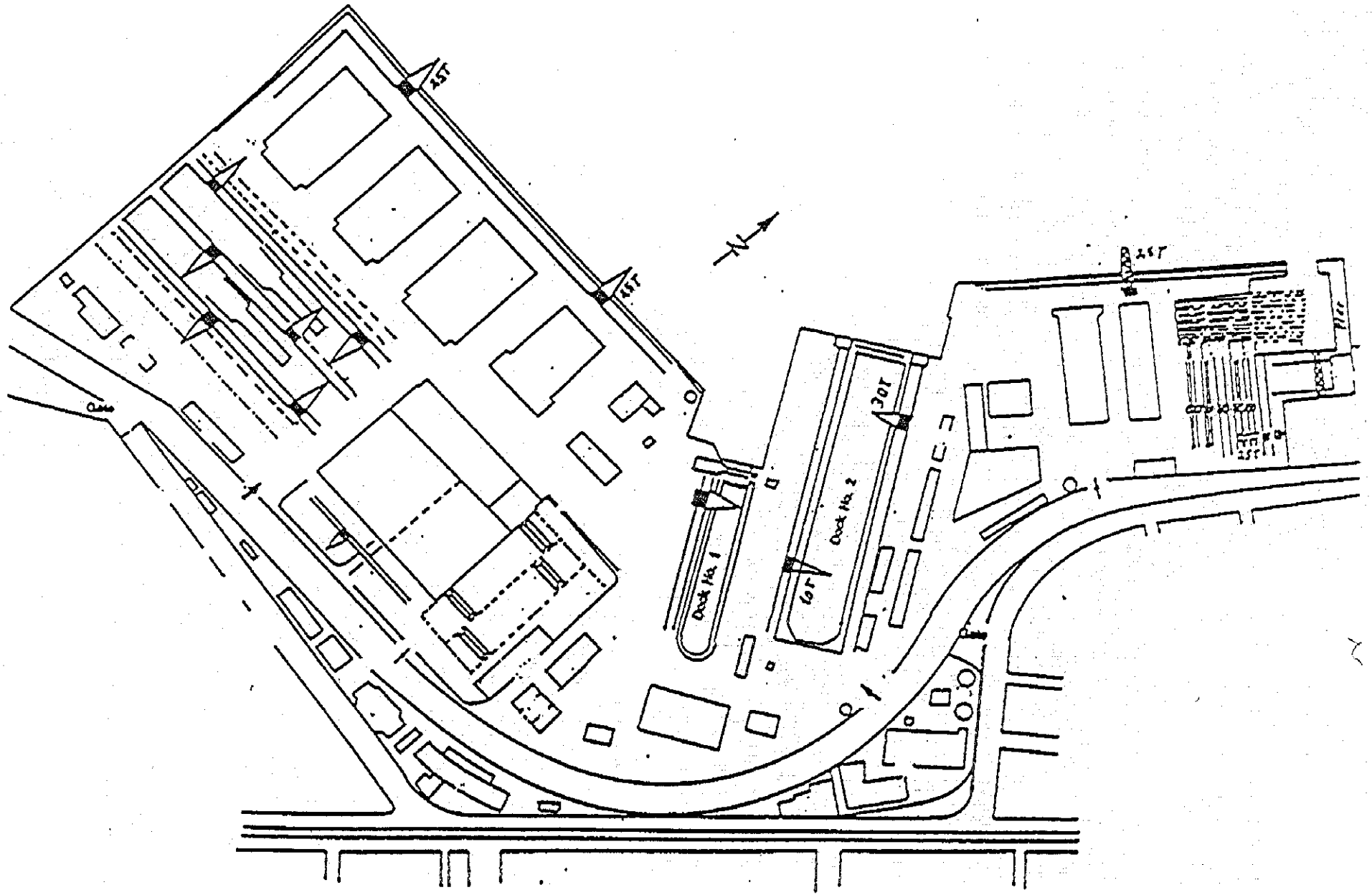
3.3 TABLE 7

DOCKING, REPAIRING SHIPYARD (PLAN)

No	NAME OF SHIPYARD	LOCATION
1	ALEXANDRIA SHIPYARD	ALEXANDRIA PORT
2	THE EGYPTIAN SHIPBUILDING AND SHIPREPAIRING CO.	ALEXANDRIA PORT
3	PORT SAID SHIPYARD (SCA)	PORT SAID PORT
4	SUEZ SHIPYARD (SCA)	SUEZ PORT

Alexandria Shipyard is the largest shipyard in North Africa, and was built in 1959 under the direction of the Government. The shipyard, as shown in Fig. 1, 3.3 has excellent facilities around vessel.

Recently, the shipyard built a 3,000 tons class RO/RO vessel.



3.3. FIG. 1 ALEXANDRIA SHIPYARD

Therefore, the shipyard seems to have sufficient capacity to repair the new training vessel.

The outline of the facilities of the shipyard is as follows:

Building facilities:
Berths: 2, Dimensions: 180 m x 28 m
Max. capacity: 38,500 dwt
Vessels built: Dry cargo, multi-purpose,
Lo/Lo-Ro/Ro and bulk carriers
Rigs and platforms: Jack-up rigs, mooring facilities,
production and accommodation platforms

Repair facilities:
Slipways: 4, for vessels up to 1,000 dwt
Graving Docks: 2, for vessels up to 85,000 dwt
Repair quays: Length: 1,200 m with 2 x 3t cranes
and 1 x 25t tower crane
Engine repairs: Complete diesel and Steam overhauls
Other work: Fabrication of heavy steel structures
and machined parts

3.3.5 Management Plan

1) Maintenance and Management Costs

The Arab Republic of Egypt stated that AIDA III would be scrapped or used for on-board education in a moored condition after the acquisition of the new training vessel, but as for the maintenance costs, nothing has been stated.

The estimated budget for the new training vessel prepared by Egyptian side is shown in Table 8, 3.3.
The plan says Ports and Lighthouses Administration and AMTA will bear together the cost amounting to approximately 116,000,000 yen a year. It is natural that the financial

source is divided into two from the viewpoint that the purpose of the operation of the new training vessel will be the supply for the lighthouses and the training for AMTA cadets.

3.3 TABLE 8

PRELIMINARY BUDGET OF MANAGEMENT AND MAINTENANCE FOR NEW TRAINING VESSEL

NO	ITEM	ANNUAL RUNNING EXPENSES		ANNUAL BUDGET
		PORTS & LIGHT-HOUSES L.E. (×1,000YEN)	AMTA U.S. DOLLARS (×1,000YEN)	(×1,000YEN)
1.	SALARIES + WAGES + SEA ALLOWANCE + TRAVELLING ALLOWANCE + OVERTIME AND PAR-TIME ALLOWANCE	63,000 (3,465)	376,000 (52,640)	(56,105)
2.	MAINTENANCE/REPAIR & DOCKING	217,000 (11,935)	10,000 (1,400)	(13,335)
3.	FOOD EXPENSES		209,000 (29,260)	(29,260)
4.	LIFE INSURANCE & FUEL & FRESH WATER	35,000 (1,925)	40,000 (5,600)	(7,525)
5.	MEDICAL EXPENSES		16,000 (2,240)	(2,240)
6.	TEACHING AIDS		4,500 (630)	(630)
7.	CLOTHING (CADET + STAFF)		8,000 (1,120)	(1,120)
8.	MISCELLANEOUS	23,000 (1,265)	33,000 (4,620)	(5,885)
	TOTAL	338,000 (18,590)	696,500 (97,510)	(116,100)

@ 55 YEN/LE
@ 140 YEN/U.S. DOLLAR

2) Maintenance & Repair Costs

The estimated maintenance cost in the maintenance and management cost of the new training vessel given by the Arab Republic of Egypt is approximately 13,335,000 yen.
(Ports and Lighthouses Administration:
217,000 LE, AMTA: U.S. $ 10,000)

The parts supply costs extracted from the actual results of the maintenance and repair cost for the Japanese training vessel of the similar size to the new training vessel are as shown in Table 9, 3.3.

3.3 TABLE 9

FEE FOR SPARE PARTS

MAINTENANCE AND REPAIR ITEM	FEE FOR SPARE PARTS (1,000 YEN)	KINDS OF SPARE PARTS
USUAL OVERHAUL OF MAIN ENGINE	700 / ENGINE	PISTON RINGS, PACKINGS, O-RINGS
OVERHAUL OF MAIN ENGINE AT INTERMEDIATE SURVEY	1,600 / ENGINE	APART FROM THE ABOVE, FUEL OIL PUMP, PLUNGER, BEARING OF PUMP DRIVEN BY MAIN ENGINE, BEARING OF TURBOCHARGER
OVERHAUL OF MAIN ENGINE AT PERIODICAL SURVEY	3,000 / ENGINE	APART FROM ABOVE, EACH BEARING METAL OF MAIN ENGINE, EXHAUST VALVE, GEAR BOX METAL
OVERHAUL OF ALMOST ALL AUXILIARIES EXCEPT M.E.	1,300 / ONCE	CONSUMABLE PARTS

Therefore the engine department spare parts costs for the intermediate survey or the periodical survey for the new training vessel are estimated to be approximately 4,500,000 yen to 7,300,000 yen.

(1,600,000 yen to 3,000,000 yen) x 2 engines
+ 1,300,000 yen
= 4,500,000 yen to 7,300,000 yen

A sufficient interval between main engine overhauls is 8,000 hr to 10,000 hr operation or 2 years on the new training vessel. Therefore, wether the intermediate servey or the periodical servey is carried out every 2 years, the overhaul of the main engine will be carried out while the vessel is docked for these servey.

AMTA wishes to overhaul the auxiliary machinery, excluding the main engine, once or twice a year for repairing and the training of the cadets. Assuming that AMTA wishes to overhaul most auxiliary machinery once a year, the average spare parts cost per year for the engine department is approximately 3,600,000 yen per year as shown in Table 10, 3.3.

3.3 TABLE 10

FEE FOR SPARE PARTS OF ENGINE DEPARTMENT ON NEW TRAINING VESSEL

YEAR	MAINTENANCE & REPAIR ITEM	PLACE	FEE FOR SPARE PARTS SUPPLY (1,000YEN)
1ST	AUX. MACHINE OVERHAUL	ON BOARD	1,300
2ND	INTERMEDIATE SURVEY + AUX. MACHINE OVERHAUL	DOCK	4,500
3RD	AUX. MACHINE OVERHAUL	ON BOARD	1,300
4TH	PERIODICAL SURVEY + AUX. MACHINE OVERHAUL	DOCK	7,300
	AVERAGE PER YEAR		3,600

On the other hand, if the estimation of maintenance and management costs by the Arab Republic of Egypt is considered to be the estimation of the average costs regardless of the costs in the nominal fiscal years (1st and 3rd year) and in fiscal years of intermediate and periodical servey, a surplus of over 25,000,000 yen can be produced by carrying over the budget of the nominal fiscal year and this amount can be appropriate to the inspection fee, the docking charge, the costs of the repairing for hull & engine departments and of the spare parts of the intermediate or the

periodical servey. (2 years x 13,335,000 yen - 1,300,000 yen = 25,390,000 yen).

The costs for the intermediate or the periodical servey and docking of a vessel similar to the new training vessel is expected to be 35,000,000 to 40,000,000 yen in Japan. The amount shown by the Arab Republic of Egypt is somewhat less than the costs in Japan, but it may be the reasonably expected costs for maintenance in the Arab Republic of Egypt, where the wage level is lower than in Japan.

The docking repair of AIDA III is now carried out at irregular intervals, and they say the repair costs of each docking is 400,000 dollars (56,000,000 yen) or 700,000 Egypt pounds (38,500,000 yen). Therefore, when the new training vessel enters service, maintenance and repair costs will be reduced considerably.

3) Arrangement of Work Force

All the current executive staff of AIDA III are from the Sea Training Sector of AMTA, and the staff of Ports and Lighthouses Administration will be dispatched on board for supply voyages to lighthouses.

Number of officer and crew for ship operation on existing AIDA III are 70 and those shall be shifted to the new training vessel. There will be no occurrence of new problems in recruiting or manning expences because the require number of officer and crew shall be reduced in 58 on the new training vessel.

CHAPTER 4 BASIC DESIGN

CHAPTER 4 Basic Design

4.1 Design Policy

From the examination of the contents of the requirements and the propriety of the plan, the policy for the basic design should aim at satisfying both functions of training seamen that AMTA has executed by using "AIDA III", and the lighthouse supply that Ports & Lighthouses Administration has carried out. It seems these two functions can be made consistent with each other.

The design policy on the newly designed vessel shall be as follows.

(1) The new training vessel shall be an optimum material satifying the provision of STCW, and the appropriate design, and the appropriate arrangement of lecture rooms and teaching materials based on an educational policy can give the greatest educational effect.

(2) Equipment of the new training vessel shall meet the education currriculum of AMTA and shall be selected with reference to the Japanese standard for training vessel's equipment. Then the new training vessel will be equipped with machineries, navigation systems and training materials, which are recently developed by the technical progress, than those for AIDA III.

(3) As for the machinery to be equipped on board, the ones easy to handle and maintain shall be selected. As for the spare parts, attention should be paid to supplying a quantity of 5 years standard so as to prevent an unexpected stoppage of the vessel due to lack of spare parts.

(4) Except those specified in the standard of the rule of

NIPPON KAIJI KYOKAI, parts and materials to be used are of Japanese Industrial Standard (JIS), the Builder's standard or Maker's standard.

(5) Units to be used shall be of the metric system, and drawings for approval, finish drawings and instruction manuals shall be all written in English.

4.2 Study on Design Conditions

As for conditions necessary to design the new training vessel, care should be taken in the following matters:

(1) Domestic rules and regulations or applicable international conventions on vessel's structure, equipment, etc.

As the results of investigation, there are no special domestic rules and regulations in the Arab Republic of Egypt, and it is enough to apply the International Convention for the Safety of Life at Sea (SOLAS) and other international conventions. However as for life saving equipment and fire extinguishing appliances, the rules for passenger vessels shall be applied since there is a large staff and crew on the vessel.

(2) Inspection by the Classification Society

The construction of the vessel shall be inspected by NIPPON KAIJI KYOKAI and the issuance and submission of documents and the like necessary for obtaining Egyptian registry by the Government of the Arab Republic of Egypt is entrusted to NIPPON KAIJI KYOKAI.

(3) Service area

The results of the examination on the educational contents

of AMTA indicate that the vessel's main service area is the Mediterranean Sea and the Red Sea. However, the plan includes ocean-going navigation to Japan or U.S.A., so the qualifications for ocean-going navigation and a cruising distance equivalent to oceangoing service shall be considered. Furthermore the Suez Canal and the Panama Canal rules are applied.

(4) Conditions on length, draft, etc.

Alexandria Port is expected to be the regular mooring port, and considering the breadth of the water course and the harbour depth, there is no special restriction in the principal dimensions of the newly planned vessel.

(5) Equipment for supply to lighthouse

Based on the results of hearing the actual condition for their supply to the lighthouses and of the actual investigation of AIDA III, the operability and safety of work boats and their davits shall be considered.

As frequent droppings and hoistings of anchor chain, and anchorage in heavy weather to some extent are expected in case of lighthouses supply, attention shall be paid to sizes of anchor and chain.

(6) Requests from Egypt concerning performance and equipment

The Egyptian side submitted 13 items of request concerning the performance and equipment of the vessel, when the basic design survey team visited Egypt. Followings are titles of major items, and whole contents of which are shown in item 1.4 (Minutes of discussions annex 1) of Appendixes.

1) Relocation of work boat
2) Increase of cruising range

3) Rearrangement of living quarters
4) Alteration in specification of cargo handling equipment
5) Charge in design condition of air-conditioner

When the draft report incorporating the result of our study on above items was explained to Egyptian authorities, additional request of 13 items was submitted from Egyptian side. Followings are the major items of these additional items, contents of which are shown in Appendixes.

1) Power increase of main engine
2) Strength increase of anchoring gear
3) Temperature condition of air-conditioner

(7) Climate and sea condition

Since the main service area of the vessel is the Mediterranean Sea and the Res Sea, atmospheric temperatures of 45 to 50°C and sea water temperatures of 32 to 34°C in summer shall be taken into account.

(8) In consideration of the cadets from Arab and African on board, a full investigation of their ways of life should be performed before designing.

4.3 Study on the Validity of the Basic Plan

In determining the principal particulars of the new training vessel, the results of the study are as follows.

(1) Gross tonnage

Gross tonnage is generally used as a value indicating the size of a vessel. The scale of the new training vessel required is approximately 3,000 gross tons. This scale has been considered to be appropriate after studying it on a

drawing by arranging the accommodation space for 270 persons, total sum of 160 cadets, 20 teaching staff including instructors, 32 persons relating to lighthouse supply and 58 seamen of this vessel, and the classrooms. In studying the scale of the new vessel, the standard of cadet's accommodation is assumed to be 8 persons in one cabin with 4 bouble-berths.

In this connection, AIDA III, which is now in service, is of gross gross tonnage, and there is lack of proper training rooms, etc. since it is an old passenger vessel has been altered to a training vessel. Judging from this case, 3,000 gross tonnage is not too large.

(2) Principal dimensions

The breadth of the vessel has a great influence on its stability. Although the breadth of approximately 14 m was required, that of 14.5 m has been adopted so as to obtain sufficient stability in consideration of the height of the centre of gravity since its substructure becomes relatively large-sized. The length and depth of the vessel have been determined so that they will correspond to the scale of 3,000 gross tonnage. However, the length is determined to be 86 m, slightly shorter than the required length of 90 m.

(3) Speed

Maximum speed is 15 knots and service speed is 13.5 knots. It may be a slightly lower speed as a training vessel, but it can be considered to be a fairly appropriate speed in consideration of vessel position measurement for training navigation techniques. (We have heard AIDA was designed to be 16 knots.) The calculation of the output of the main engine based on this speed shows that the sum of the continuous maximum outputs of 2 engines is 3,000 hp, and it is expected that the vessel will be considerably economical,

and its fuel consumption will be lower.

(4) Navigation area

Taking into consideration the possibility of long cruise for ocean-going training and operation schedule and economical operation of this vessel, the capacity of the fuel oil tanks shall be so designed that the vessel can sail for 30 days.

(5) Spare parts

In order to secure safety of vessels, the International Convention on Safety of Life at Sea stipulates that ship servey certificate is valid for 5 years at maximum, and vessels must undergo an intermediate survey in the middle of this period and a periodical survey before this period end. With a cycle of maximum period of five years, vessels must be surveyed and repaired and spare parts become necessary at that time.

Moreover, the rules of classification societies stipulate the kind and number of minimum spare parts to be stored aboard the vessel for use in unexpected accidents during her voyage, which are almost equivalent to the kind and number of spare parts required until the intermediate survey.

As to the new training vessel, since the spare parts for Japanese-made machinery are not so easily available in Egypt, spare parts usually required for five years until the periodical survey shall be supplied so that the vessel can be operated smoothly.

After the examination of the principal particulars of the new training vessel given in the basic design to determine whether its scale is appropriate or not, we have determined them as shown in the following 4.4 "Basic design" after amending a part

of the requirements.

4.4 Basic Design

4.4.1 General

(1) General description

The vessel to be twin screw, diesel driven training vessel with bulbous bow and transom stern, engine room placed semi-aft.

The duties of the vessel to be:

A. Navigation training for AMTA
B. Supplies for lighthouses
(Fuel for generator engine, parts, provision and fresh water)

(2) General arrangement

The vessel is to have two decks the under upper deck and three docks above the upper deck.

The vessel to be divided into the following compartments at each deck from forward:

On tanktop/below 2nd deck:
FPT, Bow thruster room, Deep tank, Ref and dry prov. store, Deep tank, Engine store space, Engine room, Deep tank, APT

On 2nd deck/below main deck:
FPT, Chain locker, Store space, Crew's/lighthouse worker's cabin, Cadet's mess/recreation/lecture rooms and library, Engine room, Cadet's lecture rooms, Gymnasium, APT

On main deck/below upper deck:
Bos'n store, Chain locker and store, Cargo hold, Crew's cabin, Crew's mess room and galley, Cadet's cabin, Steering gear room

On upper deck/below boat deck:
Officer's mess room, Officer's cabin, Lighthouse keeper's/ trainer's cabin

On boat deck/below nav. bri. deck:
Senior officer's cabin, Funnel casing, Awning deck space

On nav. bri. deck/below compass deck:
Wheel-house, Chart space, Air conditioning unit room

Look-out bridge for training not to be provided.

(3) Main dimensions

Length overall	abt. 86.00 m
Length between pp.	73.00 m
Breadth moulded	14.50 m
Depth, upper deck, moulded	9.50 m
Depth, main deck, moulded	7.00 m
Draft designed, moulded	5.00 m

(4) Deadweight

On designed draft (5.00 m)	abt. 1,400 t (metric)

(5) Gross tonnage

As per the UMS (1969) admeasurement	abt. 3,000 t

(6) Complement

Ship operation part	58 persons
Training part	180 persons
Lighthouse part	32 persons
Total complement	270 persons

(7) Capacity

Fuel oil tank (100%)	abt. 410 m^3
Fresh water tank (100%)	abt. 600 m^3
Ballast water tank (100%)	abt. 500 m^3
Cargo hold (bale)	abt. 100 m^3

(8) Speed, fuel consumption and radius

Maximum speed not less than 15.0 kn

On the light condition, at propeller shaft horsepower of total 3,000 ps (100% MCR), in calm sea.

Service speed abt. 13.5 kn

On designed draft of 5.00 m, at propeller shaft horsepower of total 2,550 ps (85% MCR), with 15% sea margin.

Fuel oil consumption abt. 10.8 t/day

When main engine running at 85% MCR and diesel generators serving for normal sea load of abt. 300 kW.

Maximum cruising days abt. 30 days

At 10.8 t/day consumption, with fuel oil 10% allowance.

(9) Flag, Classification and Rules

Flag	The Arab Republic of Egypt
Classification	Nippon Kaiji Kyokai (NK) NS* MNS*
Rules	SOLAS 1974, 1981, 1983 1992 (GMDSS) International Load Line Convention, 1966 International Convention for Preventing Collisions at Sea, 1972 MARPOL 1973, 1978 (Annex 1,4,5) International Tonnage Rule, 1969 Suez Canal navigation rule Panama Canal navigation rule USCG regulations for foreign flag vessels entering into the waters of the United States for pollution and navigation ILO convention No.92 (to apply to crew) National maritime rules of Egypt

(10) Delivery

The vessel to be delivered in Egypt, transporting the vessel from shipyard after completion in Japan.

(11) Spare parts

Scope of spare parts supply shall be as follows:

(1) Normal spares based on the class requirement and the manufacturer's standard.
(2) One (1) propeller for each of port and starboard.
(3) Extra spares of 5 years standard.

4.4.2 Hull

(1) Hull construction

Structual steel of hull construction to be mild steel approved by the Classification Society, and steel including casting and forging to have quality complying with the requirements of the Classification Society. Suitable numbers of transverse watertight bulkhead to be arranged below upper deck complying with the subdivision regulations for sea-going passenger ships of SOLAS. Transverse framing system to be adopted throughout the vessel.

(2) Outfitting and deck machinery

1) Steering

The rudder to be of a stream line balance rudder, maximum helm angle of 35 deg. to both sides.
The steering gear to be one set of electric hydraulic, 2-rams 2-cylinders type, with 2 pump units of each 100% capacity.

Steering speed: 28/65 s/deg.

Steering control possibility of manual steering or automatic gyro compass steering in wheelhouse, or emergency steering in steering gear room.

A telephone circuit to be provided between emergency stand in steering gear room and wheelhouse.

2) Anchoring and mooring

Anchor, anchor chain, duty of windlass, etc. to be selected from one rank higher than those specified by the classification requirement.

Bower anchors: High holding type (AC14), 2,100 kg x 2 sets

Anchor chain : Grade 2, 38 mm dia x 440 m

Anchor windlass: Electric hydraulic driven separated type, 2 sets
Each with 1-chain wheel, 1-warping head and 1-hawser reel.
Duty pull of 4.7t x 15 m/min. at hawser reel.

Mooring winch: Electric hydraulic driven separated type, 2 sets
Each with 1-warping head and 1-hawser reel.
Duty pull of 4.7t x 15 m/min. at hawser reel.

3) Life saving (per the passenger vessel standard)

4 - Lifeboats : Partially enclosed type, 51 persons, launching by gravity-type davit.

6 - Life-rafts : Inflatable type, 25 persons, launching by davit.

2 - Rescue boats : Inflated type, with diesel out-board motor, launching by davit.

12 - Lifebuoys

300 - Solid type life-jackets

6 - Self-igniting lights

12 - Parachute signals

6 - Rocket signals

2 - Self-activation smoke signal

1 - Lifeline throwing apparatus

EPIRB, two-way radio telephone, etc. to be complete per SOLAS.

4) Fire fighting (per the passenger vessel standard)

Engine room : Fixed CO_2 fire extinguishing system.
With fire/smoke detector

Accommodation: Hydrants and portable fire extinguishers.
With fire/smoke detector according to

	passenger regulations of SOLAS and manual call points.
Deck:	Hydrants
Cargo hold:	Fixed CO_2 fire extinguishing system. With smoke detector

Firemans outfits, portable fire extinguishers, etc. to be complete per SOLAS.

5) Deck crane

1-Elec-hydraulic single deck crane, 5t SWL x 12m radius

6) Work boat

2-Work boats for supplying lighthouses, GRP, open type, 25 persons on board with two 3 m^3 fresh water tanks and two 0.5 m^3 fuel oil tanks, having discharge pumps, each of 50m total head capacity, 60 ps diesel engine, abt. 8 knots
Handled by davits with hydraulic cylinders and winch.

Navigation light of work boat to be provided for work in night. Bulkwark to be arranged in way of work boat davits.

7) Bow thruster

1 - Bow thruster, electric driven, abt. 3t thrust

8) Watertight sliding door

One watertight sliding door to be provided at the water-tight bulkhead between engine store space and engine room and at the dumbwaiter casing.
Each to be hydraulically operated from wheelhouse and operating position above deck.

Watertight sliding door indicator to be provided at wheelhouse and operating position.

(3) Training aid equipment

2 - Overhead projectors
2 - Slide projectors
4 - Videos and TVs
15 - Sextants
4 - Azimuth measures
10 - Binoculars
1 - Photocopying machine, with enlarging function
2 - Handy size photocopying machines
1 - Generator control simulation panel
1 - Extended engine monitoring VDU terminal

(4) Cargo hold

One dry cargo hold having volume of abt. 100 m^3 to be arranged at the crew accommodation forward under upper deck.
To have a watertight steel pontoon hatchcover of 3.5 m (L) x 3.0 m (B), handled by deck crane on board.
Fixed CO_2 fire extinguishing system and smoke detector to be provided.

(5) Boarding arrangement

Accommodation ladder to be provided at port and starboard on upper deck.
The ladder to be operated by electric winch.
Gangway door of manually operated hinge type to be provided at port and starboard on main deck.
Portable gangway ladder to be supplied for this gangway.

(6) Accommodation

1) Private cabins

Ship operation part

1 - Captain	:	Day room, bedroom with own lavatory
1 - C/engineer	:	Day room, bedroom with own lavatory
1 - C/officer	:	Day room, with own lavatory (Bed to be separated from office by curtain)
9 - Officers	:	Single-berth cabin, with semi-private lavatory
1 - Doctor	:	Single-berth cabin, with semi-private lavatory
1 - Pilot	:	Single-berth cabin
44 - Crew	:	Two double-berth cabins (4P)

Training part

1 - Manager	:	Day room, bedroom with own lavatory
2 - Sen./inst.	:	Day room, bedroom with own lavatory (Bed to be separated from office by curtain)
8 - Instructors	:	Single-berth cabin with semi-private lavatory
1 - Cadet master	:	Single-berth cabin with semi-private lavatory
8 - Trainers	:	Double-berth cabin
160 - Cadets	:	Four double-berth cabins (8P)

Lighthouse part

4 - Officers	:	Single-berth cabin with semi-private lavatory
12 - Keepers	:	Two double-berth cabins (4P)
16 - Workers	:	Two double-berth cabins (4P)

The clear height at normal walking areas to be not less than 2,100 mm.

2) Public space

Galley, pantries, officer's dining saloon, officer's mess room, crew's mess room, trainer's/lighthouse keeper's mess room, cadet's mess/recreation/lecture rooms, library, lighthouse worker's mess room, hospital, clinic, wheel-house, chart room, radio office, ship office, trainer's office, purser's office, lecture rooms, common water closets, common shower rooms, cadet's lavatory, laundries, drying rooms, refrigerated provision chambers, dry provision chambers, changing room, and various stores and lockers to be arranged.

3) Refrigerated provision chamber

1 - Meat/fish room : abt. 50 m^3, -23°C
1 - Vegetable room : abt. 60 m^3, 3°C
1 - Lobby : abt. 8 m^3, -
2 sets of R-22 Compressors, either one set in standby, to serve the room.

4) Deck covering

Living quarters	7 mm thick latex type deck composition
Galley, lavatories and shower rooms	5 mm thick epoxy type deck composition
Laundries, ref. provision stores and provision stores	5 mm thick epoxy type deck composition
Senior officer's cabin	Carpet
Other officers class cabin and offices	Vinyl covering

Crews class cabin, cadet's cabin and lecture rooms	7 mm thick latex type composition
Exposed deck	Coated with paint Passage-ways to be covered by anti-slip rubber sheets or by the equivalents

5) Permanent awning:

Plastic permament awning to be fitted on the boat deck aft, and seating arrangement and service counter to be provided under the awning.

6) Furniture

Furniture to be generally of wood and outside material to be of "Lauan" for all classes.
Furniture of wood to be generally finished with lecquer polish.
Top of tables and desks to be covered with melamine plastic laminate.
Hardwares to be generally of nickel chrome plate brass.
Water closet to be of European type white vitreous china, with washing water arrangement.
Shower to have manual mixing valve.

7) Galley, pantry equipment

1 - Electric cooking range, 4 hot plates, 2 ovens, abt. 30 kW
1 - Electric convection oven, abt. 12.5 kW
1 - Electric baking oven, abt. 11 kW
1 - Electric brazing pan, abt. 10 kW
1 - Electric fryer, abt. 5.3 kW
1 - Steam soupe kettle, abt. 75 l

1 - Universal cooking machine, abt. 0.75 kW
1 - Dough mixer, large
1 - Meat slicer
1 - Refrigerator, abt. 1,064 l
1 - Freezer, abt. 1,036 l
5 - Ice cube makers
1 - Disposer
1 - Dishwasher, 55 rack/hr
1 - Electric warmer, abt. 7.5 kW
1 - Electric cold table, abt. 0.2 kW
5 - Coffee makers
2 - Electric water boilers, abt. 3 kW
1 - Electric water boiler, abt. 2 kW
3 - Electric water boilers, abt. 1 kW
6 - Water coolers
3 - Electric refrigerators, 100 l (in Cap., C/E, M/T cabin)
1 - Dumbwaiter

Sinks, dressors, cupboards, etc. to be arranged.

8) Accommodation air conditioning

Single-duct medium velocity type air conditioning units to be designed for nine segregated zones.

Cooling medium: R-22 direct evaporation

Design conditions:

Season	Outside	Inside
Summer	45 deg. C/60% RH	35 deg. C/50% RH
Winter	3 deg. C	20 deg. C

Recirculation of air to be 70% of total air supply.
No individual room temperature control to be provided.

Air conditioning system to be capable to reduce the air temperature inside public service area (saloon, lecture room, etc.) to about 28 deg. C.

(7) Painting

Painting schedule to be as followings:

Place	Kind of paint
Shell bottom	2 x chlorinated rubber A/C
	2 x chlorinated rubber A/F
Shell boot-top	2 x chlorinated rubber A/C
	2 x chlorinated rubber B/T
Shell topside	2 x chlorinated rubber A/C
	2 x chlorinated rubber T/S
Exposed deck	2 x alkyd A/C
	2 x alkyd finish
Superstructure	2 x alkyd A/C
	2 x alkyd finish
Engine room (except tanktop)	2 x alkyd A/C
	2 x alkyd finish
Engine room tanktop	1 x tar epoxy
Accommodation	2 x alkyd A/C
Ballast water tank	1 x tar epoxy
Fresh water tank	2 x epoxy paint

Aluminium or zinc anodes to be fitted in the outside shell to protect hull from corrosion.

4.4.3 Machinery

(1) Engine room outfitting

In the engine room, two sets of main engines for twin screw arrangement, three sets of diesel generators, steam boilers, and other various auxiliary to be installed.

Air conditioned engine control room is arranged in the engine room as well.

Adjacent to the engine room, air conditioned workshop and engine store space to be arranged.

Main engine to be designed under ambient temperature of 50°C and sea water temperature of 34°C.

Machinery to be generally of Japanese make under JIS standards.

Layout in the engine room to made considering ample space for operation and maintenance, and for training of cadets.

(2) Machinery particulars

1) Main engine

Four-stroke, medium speed, trunk piston, turbocharged marine diesel engine.

No. installed	:	2
Nos. cylinder	:	6 each
MCR	:	1,500 ps x 700 rpm
CSR	:	1,275 ps x 663 rpm
Fuel oil consumption	:	148 gr/ps.h at MCR by fuel oil 10,200 kcal/kg LCV.

2) Reduction/reversing gear

Type	:	Co-axial reversible reduction gear with hydraulic clutch.
Gear ratio	:	abt. 180/700 rpm at output/input
No. installed	:	2 sets

3) Propeller

4 - blades, fixed pitch propeller, Ni-Al-Bz., 2 sets

4) Generator engine

3 - Diesel engines of each abt. 420 ps x 1,000 rpm
Coupled to generator 350 kVA 50 Hz 380 V

5) Emergency generator engine

1 - Diesel engine for emergency generator of abt. 125 ps x 1,500 rpm
Coupled to emergency generator, 100 kVA 50 Hz 380 V

6) Boiler

Steam boiler plant,

1 - Oil fired boiler : 1,200 kg/h x 7 kg/cm^2
1 - Exhaust gas economizer : 200 kg/h x 7 kg/cm^2 connected to one main engine

7) Air compressor

2 - Main air compressors : abt. 7.5 kW elec. driven
1 - Aux. air compressor : abt. 3 ps diesel driven for gen. engines.

8) Purifier

2 - Fuel oil purifiers
2 - Lub. oil purifiers

9) Pumps

3 - Cooling sea water pumps
1 - Standby cooling fresh water pump
1 - General service/fire pump
1 - Bilge/ballast/fire pump
2 - Feed water pumps
1 - Sea water service pump
1 - Fresh water transfer pump
2 - Fresh water service pumps
2 - Drinking water service pumps
2 - Air conditioner cooling sea water pumps
2 - Hot water circulation pumps
1 - Sewage transfer pump
2 - Boiler water circulation pumps
2 - Standby lubrication oil pumps
1 - Fuel oil transfer pump
1 - Fuel oil service pump
2 - Standby gearbox lubricating oil pumps
1 - Bilge pump for oily water separator
1 - Emergency fire pump (outside engine room)

10) Fresh water generator

2 - Evaporating type, each 5 t/day

11) Pollution prevention measures

1 - Oily water separator: 15 ppm, 1 m^3/h
1 - Vacuum toilet system, with sewage holding tank
1 - Sewage treatment plant, biological type
1 - Incinerator for waste oil
1 - Incinerator for rubbish (outside engine room)

12) Workshop equipment

1 - Universal machine

1 - Drilling machine
1 - Grinder
1 - Electric sawing machine
1 - Electric arc welder
1 - Gas welder
1 - Injector pressure tester

13) Engine laboratory equipment

1 - Engine analyzer (portable type) to measure the indicated HP of each cylinder
1 - Exhaust gas analyzer (ORSAT type)
1 - Boiler water analyzer
1 - F.O., L.O. analyzer
1 - Shaft torque meter (in engine control room)

(3) Systems

1) Fuel oil system

Marine diesel oil to be used throughout, i.e. for main engines, generator engines and boiler.

Fuel oil tank to be heated by steam heating coil.

Fuel oil to be treated by purifiers.

2) Lubricating oil system

Main engine lubricating oil to be treated by purifiers, filter, heater, cooler, etc.

Lub oil tank to be heated by steam heating coil.

3) Cooling water system

Main engines and main generators to be cooled by fresh water.

Air compressors and refrigerating compressors to be cooled by sea water.

Heat exchangers to be shell-and-tube type.

Sea water back wash devices to be provided at sea chests.

4) Compressed air system

30 bar for engine starting and 7 bar for general use.

Air reservoir capacity to be 150% of rule requirement.

5) Ballast system

Individual pipe line arrangement with manually operated valves in engine room

6) Fresh water system

Hydrophore fresh water supply system to be separately provided for drinking water and general fresh water.

Drinking water supply system with hose for work boats to be provided on both sides of the vessel on main deck.

7) Hot water system

Hot water to be supplied by a hot water calorifier tank, heated by emission heat from generating engine or alternatively by steam.

Aux. electric heater to be provided.

8) Piping material

All piping to be of steel.

Cooling sea water pipes to be lined with polyethylene inside.

Drinking water and hot water pipes to be of stainless steel.

Identification of pipings to be provided by colour taping.

9) Machinery control and monitoring

Central control room to be provided in the engine room.

Video Display Unit (VDU) to be provided and necessary warning, monitoring and data recordings to be done in engine control room.

Main switchboard and group starter panels to be installed in engine control room.

Main engine control to be made remotely from wheel-house and engine control room by electric-pneumatic system.

4.4.4 Electric

(1) Electric generator

3 - Main generators : 350 kVA, 50 Hz, 380 V, AC 3 phase

1 - Emergency generator : 100 kVA, 50 Hz, 380 V, AC 3 phase

Each generator to be of enclosed, self ventilated, drip-proof, brushless, Class-F insulated.

(2) Electcic distribution

380 V AC for motors and heaters.

220 V AC for lighting, radio equipments, navigation equipments, alarm, etc. through transformer.

24 V DC for radio equipments, navigation equipments, alarm, etc., from storage battery.

(3) Switchboards

1 - Main switchboard in the engine control room.
To consist of generator panels, synchronizing panel, 380 V feeder panel, 220 V feeder panel, and starter panel.
1 - Emergency switchboard in the emergency generator room

(4) Radio equipments

1 - 400 W SSB radio telephone
1 - NAVTEX receiver
2 - VHF radio telephones
1 - Antenna multi-coupler
1 - Inmarsat with telex and telefax
6 - Walky talkies
3 - Two-way radio telephone apparatuses
2 - EPIRBs

Radio system to be complete as per GMDSS.

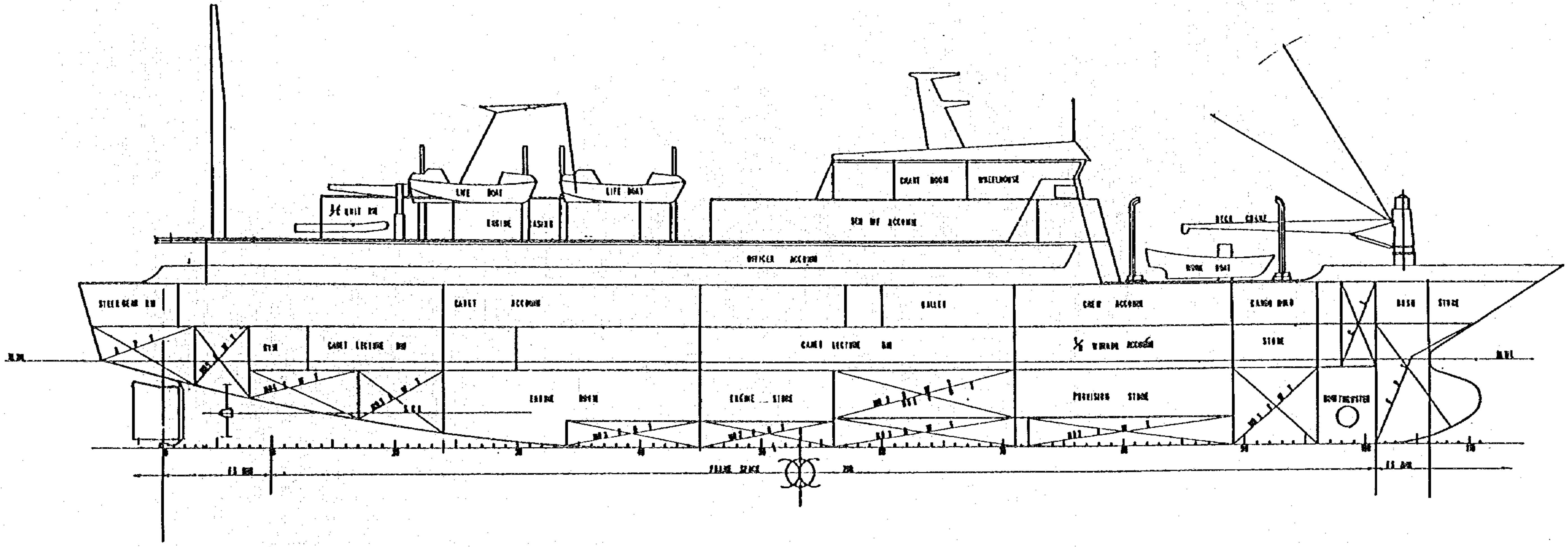
4.4.5 Navigation aids

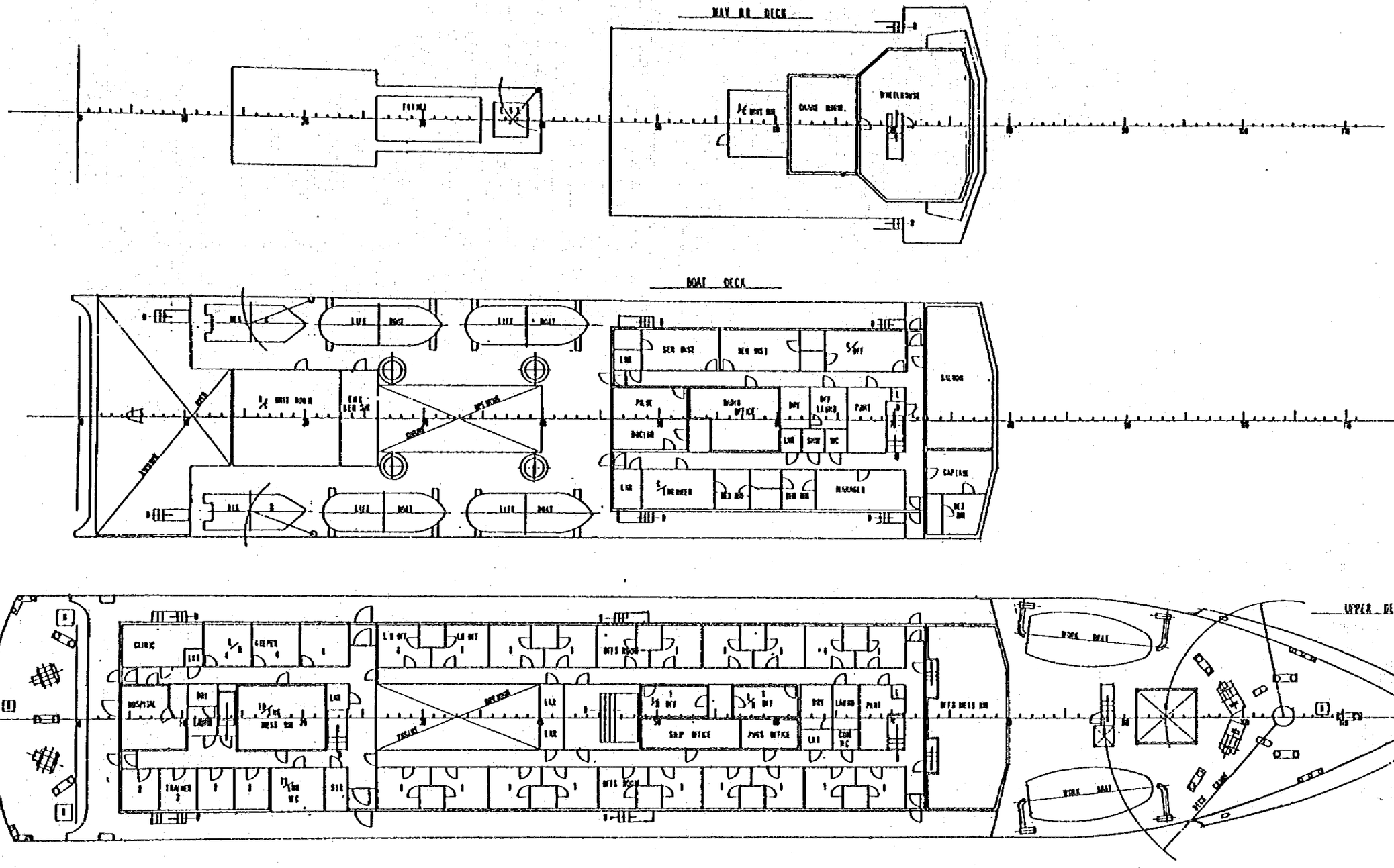
1 - Gyro compass with autopilot, with 7 repeaters
1 - Magnatic compass

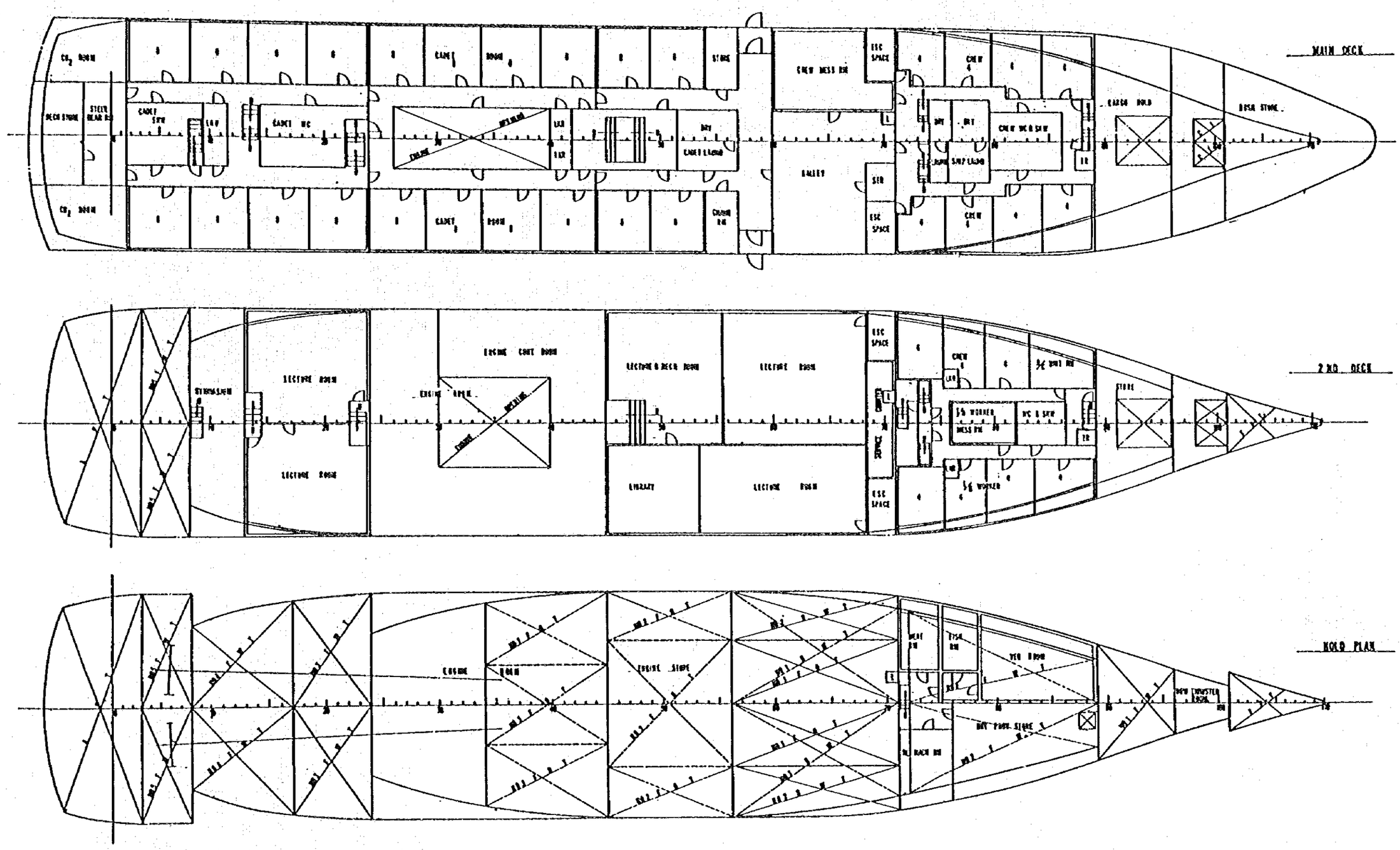
1 - Radar, true motion, X band, Raster-scan 28" display with ARPA, repeater in chart room
1 - Radar, true motion, X band, Color 14" display with manual radar plotting aid.
1 - Radio direction finder
1 - Echo sounder, recording type
1 - Air horn, with time controller
1 - Window wiper
2 - Clear view screens
1 - Anemometer and anemoscope
1 - GPS
1 - Decca navigator
1 - Loran C
1 - Ship's log, magnetic type
1 - Ship's log, doppler type
1 - Weatherfacsimile
1 - Turning rate indicator
1 - Track display with disc data recorder
1 - Public-address system
1 - Auto exchange telephone, 30 stations
1 - Common battery telephone, 1:2
1 - Engine telegraphs, 1:1
1 - Rudder angle indicator, 1:4
2 - Main engine tachometers, 1:3
1 - Central clock system, 1:25
1 - Daylight signal, portable type
1 - Searchlight, 1 kW
1 - Suez searchlight, 1 kW

4.4.6 General arrangement

The general arrangement based on the above basic plan is as follows.


LIFE BOAT
LIFE BOAT
ENGINE CASING
CHART ROOM
WHEELHOUSE
OFFICER ACCOMM
WORK BOAT
DECK CRANE
CADET ACCOMM
GALLEY
CREW ACCOMM
CARGO HOLD
CADET LECTURE RM
CADET LECTURE RM
STORE
ENGINE ROOM
PROVISION STORE
BOWTHRUSTER
FRAME SPACE


BAY RR DECK
BOAT DECK
UPPER DECK


MAIN DECK
2ND DECK
HOLD PLAN