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Development of courses for the maritime training institute of the Shipping Corporation of India

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DEVELOPMENT OF COURSES FOR THE MARITIME TRAINING INSTITUTE OF THE SHIPPING CORPORATION OF INDIA

by

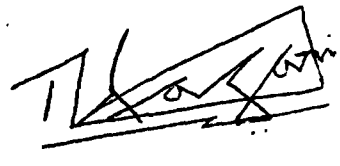
Tarasingh D. Hazari

India

November 1985

A paper submitted to the Faculty of the World Maritime University in partial satisfaction of the requirements of the MARITIME EDUCATION AND TRAINING (NAUTICAL) COURSE.

The contents of this Paper reflect my own personal views and are not necessarily endorsed by the UNIVERSITY.

Signature: 

Date: 15 November 1985

Directed and assessed by:
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DEVELOPMENT OF COURSES FOR THE MARITIME TRAINING INSTITUTE OF THE SHIPPING CORPORATION OF INDIA

By . . . T. Hazari

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MALMO SWEDEN

Title of Paper : " DEVELOPMENT OF COURSES FOR THE MARITIME TRAINING INSTITUTE OF THE SHIPPING CORPORATION OF INDIA "

By : Tarasingh HAZARI

Country : INDIA

Organisation : The Shipping Corporation of India Ltd., Bombay.

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Signature :

Date : 21 10 1985.

Directed and assessed by : Guenther ZADE, Professor, World Maritime University.

Co-assessed by : P.S. VANCHISWAR, Professor, World Maritime University.

ABSTRACT

"DEVELOPMENT OF COURSES FOR THE MARITIME TRAINING INSTITUTE OF THE SHIPPING CORPORATION OF INDIA"

The,"Shipping Corporation of India ltd." (SCI), is a public sector shipping organisation, registered at Bombay, owning and managing about 176 vessels of nearly six million tonnes DWT.

In 1973, in order to meet the training needs of fleet and shore personnel, a training department was formed. A few short courses were developed and conducted by hiring space in various colleges and institutes at Bombay.

With the growing needs of SCI, in regard to training of personnel and taking into account the requirements of, "International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978" (STCW 78), the idea was mooted to set up an, "SCI Maritime Training Institute". Land was acquired at Powai, a suburb of Bombay, in 1982/83 and construction of the institute has commenced in March 1985. It is expected that the institute would be functional by the end of 1986.

In this paper, an attempt has been made to plan and develop the various courses which would be required to be conducted at the SCI Maritime Training Institute.

PREFACE

The, "Shipping Corporation of India Ltd." (SCI), is in the process of setting up its own Maritime Training Institute to offer specialised short courses to maritime personnel.

I was selected by SCI, to join the World Maritime University (WMU) at Malmo, Sweden, for a two year course in Maritime Education and Training (Nautical), commencing from March 1984. After completion of the course in December 1985, SCI has planned to post me as one of the members of the faculty at its Maritime Training Institute.

One of the requirements of the Maritime Education and Training (Nautical) course, is to submit a paper to the WMU faculty prior completion of the course. Accordingly, this paper has been written, to fulfill this requirement.

The topic of the paper, namely, "Development of Courses for the Maritime Training Institute of the Shipping Corporation of India", was chosen because the main purpose for which I was sent to WMU was to acquire adequate knowledge so that on my return I could be utilised for the effective development of courses at the SCI Maritime Training Institute.

The paper has been divided into ten chapters. Chapter one gives an introduction to the company and its Training Department. The structure and induction of maritime personnel by SCI, has been described in chapter two. A number of courses which have been developed and are presently conducted by the Training Department, have been described in chapter three.

In chapter four, a study has been carried out of the requirements of the STCW Convention 1978, the STW Conference Resolutions and the Resolutions concerning education and training adopted at IMO Assembly sessions XI, XII and XIII. Maritime education and training presently being conducted at the various Indian institutions and by SCI, have then been compared with the above study and the courses which have evolved from the comparative

study, have then been developed in chapter six. Details and syllabi of some of these courses have been given in chapter eight.

A description of the physical facilities of the SCI Maritime Training Institute, has been given in chapter five and chapter seven highlights the importance of selecting, training and developing a good faculty. Finally, chapters nine and ten give a summary of courses, conclusions and recommendations.

The paper is only a beginning and provides an approach towards, "Development of Courses for the Maritime Training Institute of the Shipping Corporation of India". When I resume my duty in SCI, towards the end of the year, I hope to further develop chapter eight, "Details and syllabi of courses" and thereafter work on the actual development of the courses themselves.

Finally, if this paper is well accepted by the WMU faculty and further if SCI agrees to develop most of the courses proposed in this paper, it would give me the greatest satisfaction that my time and efforts put in at the World Maritime University, have been well spent.

T. Hazari.

ACKNOWLEDGEMENTS

In the preparation of this paper, I owe my gratitude and sincere thanks to all those who provided me with the encouragement, guidance and information and made it possible for me to complete this paper.

In particular, I would like to express my sincere thanks to:

- The Shipping Corporation of India, for sponsoring me for this course;

- My senior colleagues in the Technical Services Division of SCI, Capt. R.D. Kohli and Capt. V. Subramanian, who have been a constant source of inspiration and have always provided valuable guidance;

- My former lecturers at the Nautical College, Capt. T.K. Joseph and Capt. S.S.S. Rewari, for providing useful information;

- My colleagues in the various departments of SCI, for providing valuable support;

- Professors and Visiting Professors of the World Maritime University and Professors of the various institutions visited during field training, for providing valuable information;

- Professor G. Zade, for providing information and guidance whilst directing and assessing the paper;

- Professor P.S. Vanchiswar, for valuable suggestions and corrections whilst co-assessing the paper;

- Captain B. Wagner, for Computer Laboratory and Word Processing facilities;

- The staff of WMU, for their co-operation and use of various facilities;

- My colleagues at the WMU, for their friendly discussions; and

- My family, who have put up with the hardship of a prolonged separation and provided the support and encouragement to make it possible for me to pursue my studies at WMU.

T. Hazari.

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

1.1 Company Profile

The, "Shipping Corporation of India ltd." (SCI), is a public sector company, formed on 2nd October 1961 by the merger of two earlier companies, namely, "Eastern Shipping Corporation" and "Western Shipping Corporation".

SCI commenced operations in October 1961, with a fleet of 19 vessels of 139,000 GRT (192,000 DWT).

Extract from, "Objectives of Public Sector".

The public sector was developed in India to serve a number of policy objectives. Two of the important objectives have been : Development of infra-structure for economic development and promotion of self reliance.

A strong public sector is also important for national security to serve and maintain essential foreign trade specially during emergencies.

National Shipping is one of the most important "invisible" contributors to the country's balance of payments and has a special role in promoting exports.

Corporate objectives of SCI

The mission of SCI and its corporate purpose can be summarised in the following terms :

.1 to acquire, own and operate ships on a commercial basis so that the public sector has an increasing and predominant role within the national shipping industry.

.2 to promote and serve India's national foreign trade in general cargo and bulk commodities.

.3 to contribute towards meeting the requirements of coastal

shipping within the overall governmental policy for this sector.

.4 to provide non-commercial shipping services at the direction of Government of India or on behalf of Government in the larger national interest.

.5 to assist the Government of India in formulating and implementing appropiate national shipping policies.

.6 to serve and maintain India's position as one of the important maritime nations of the world.

Micro objectives of SCI

Based on the corporate objectives of SCI, the micro objectives of SCI are enumerated below. These provide the basis for strategic and tactical planning.

.1 Development of the fleet so that the public sector retains and increases its predominant position within the national shipping sector.

.2 Diversification of the fleet structure to meet the requirements of trade and of users.

.3 Acquisition of a larger market share in general cargo, dry bulk, liquid bulk and liquefied gas sub-sectors.

.4 Modernisation of the fleet and phasing out of obsolete ships.

.5 Evaluating new technological developments in the context of Indian situation and their application to meet national requirements.

.6 Generation of maximum possible internal financial resources for capital investment.

.7 Development of requisite human skills and their upgradation

through continuing training progammes.

.8 Maximisation of contribution to the balance of payments through earning and saving of foreign exchange.

.9 Modification of organisational structure to meet changing requirements.

.10 Diversification of the activities of the enterprise through venturing into new areas.

.11 Reinforcement of marketing and customer service provided to the company's clients.

The micro objective of SCI, enumerated at .7 above, is of utmost importance to this paper.

1.2 Fleet Structure

Enumerated below is the fleet structure of SCI as on 1-1-1985.

Fleet in operation

Type of vessel	No.	GRT	DWT
Overseas Dry Cargo vessels	76	788,255	1,088,542
(Container Oriented = 33)			
(Break - bulk = 43)			
Bulk carriers	23	658,894	1,169,501
Combination carriers	10	442,819	801,892
Tankers (V.L.C.C.)	2	279,640	553,555
Tankers (crude oil)	22	954,835	1,627,229
Tankers (product)	8	107,817	171,768
Colliers	2	19,310	29,881
Passenger - cum - cargo vessels . .	6	41,738	24,590
Timber carriers	2	7,299	10,723
Off - shore supply vessels	7	9,170	9,794
T O T A L	158	3,309,777	5,487,475

In addition, the following vessels which are owned by various government departments, are manned and managed by SCI.

Passenger - cum - cargo vessels . .	7	16,569	7,331
Off - shore supply vessels	2	1,342	1,866
Lighthouse tender	2	3,376	1,730
Research vessels	7	12,159	5,818
T O T A L	18	33,446	16,745
G R A N D T O T A L . . .	176	3,343,223	5,504,220

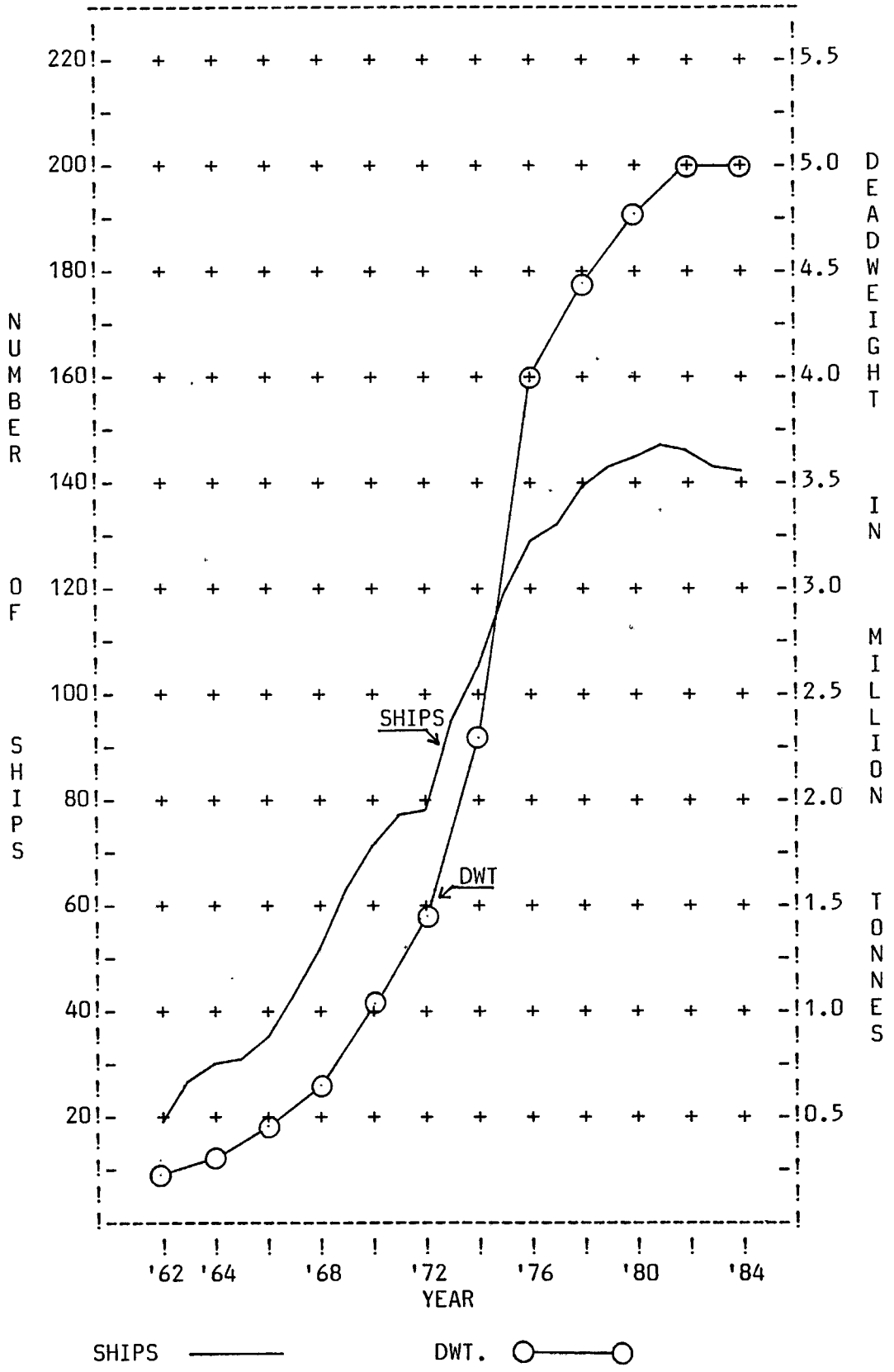
Fleet on order

Type	No.	DWT
Container oriented vessel	1	16,800
Tankers (crude oil)	3	185,400
Tankers (product)	4	163,000
Off - shore supply vessels	3	4,500
Bulk - carriers	12	540,000
T O T A L	23	909,700

There is a plan to acquire six cellular container vessels, each of 1400 TEUs capacity, by 1986 / 87 and further, there is also a plan to acquire Chemical Tankers by 1987.

Table 1.1, on page 7, shows the growth of SCI fleet from inception to 1-1-1985.

Table 1.1 Growth of SCI Fleet



1.3 Training Department of SCI

It will be observed from table 1.1,"Growth of SCI fleet", that there was a rapid growth in the fleet from 1961 to 1978. This led to a huge demand of trained manpower to man the fleet.

Traditionally, SCI obtained its requirements of trained officers from training ship,"Dufferin / Rajendra", for the nautical branch and from the,"Directorate of Marine Engineering Training", (D.M.E.T.), for the engineering branch.

At the end of 1972, it was observed that there was a large requirement of trained officers to man the growing SCI fleet. The training institutions could not provide an adequate number of trained officers to meet SCI's needs in entirety.

Hence, SCI set up a training department, to train adequate officers in order to bridge the gap between availability of trained officers from the training institutions and the number actually required for manning the fleet.

Now, as the initial high rate of growth of the fleet, has levelled off, there is a change in the situation. There is a surplus of trained officers. Hence, once again, the training institutions are able to cater to the requirements of SCI.

With the entry into force of SOLAS 1974, MARPOL 1973, their Protocols of 1978 and the STCW convention 1978, there has been a change in the role of the training department as most of the specialised courses required by these conventions, are not available elsewhere in the country.

Accordingly, the training department is now required to play a leading role in the following areas:

.1 Development and running of specialised short courses as required by STCW 78.

.2 Development and running of other courses to meet SCI's

requirements.

1.4 The need for SCI's Maritime Training Institute

SCI owns and manages a fleet of 176 vessels of 5.65 million tonnes DWT (as on 1-1-1985). The share of SCI in the Indian fleet is about 52 % .

The number of employees, both afloat and ashore is about 12,500.

There is a continuous need for updating the skills of our personnel in view of rapid technological developments.

There is a need to develop specialised training courses to meet the requirements of SOLAS and MARPOL Conventions, their Protocols 1978 and STCW Convention 1978. Most of these specialised courses are not being conducted in other training institutions in the country.

The Training Department is already developing and running some of the afore - mentioned courses. These courses are run at various locations in the city of Bombay, depending upon availability of physical facilities and residential accommodation for the course participants.

Based on the above factors, it was felt that there was an urgent need for SCI to set up its own,"Maritime Training Institute". Accordingly, in 1978, SCI took the decision of setting up its own,"Maritime Training Institute".

Land was acquired at Powai, a suburb of Bombay,in 1982 / 83. Construction of the Institute has commenced in early 1985 and it is expected to be functional by the end of 1986. The activities of the Training Department, which are now scattered in various parts of the city of Bombay, would then have a permanent place at the Institute at Powai. The Institute would provide both, physical facilities for imparting training, as well as residential accommodation.

1.5 Reccomendations of the SCI Maritime Training Committee

On 7-9-1978, the Chairman of SCI appointed a high - level committee to consider in depth the detailed project report on the setting - up of the SCI Maritime Training Institute.

The committee considered various aspects of training, its availability in India and the future needs of SCI.

Enumerated below, are some of the recommendations of the committee:

.1 There is an urgent need for SCI to develop its own training facilities for in - service training and supplementing compulsory training.

.2 The training campus shall be of a residential type .

.3 About 45 acres of land is required for setting - up of the institute.

.4 Training should be considered as an essential adjunct of ship operations to promote operational efficiency and safety.

.5 For more effective and broad - based training, the faculty should be drawn from SCI's operational and managerial staff both on posting and visiting basis and on visiting basis from selected industries, technical and management institutions.

.6 The courses enumerated in the detailed report are the basis for starting the institution. However, these are to be reviewed periodically based on the needs of SCI.

.7 Besides the training discussed, this institute should be developed to form the centre for;

- issue of technical bulletins,
- provision of professional library services,
- holding of symposiums and seminars,
- for data collection and dissemination of information.

CHAPTER TWO

MARITIME PERSONNEL OF SCI

2.0 MARITIME PERSONNEL OF SCI

2.1 Structure of Maritime Personnel of SCI

The structure of Maritime Personnel of SCI has been divided into three categories, namely;

- Officers,

- Petty Officers,

- Crew.

Table 2.1, on page 14, gives the break - up of the officers.

Table 2.2, on page 15, gives the break - up of the petty - officers.

Table 2.3, on page 15, gives the break - up of the crew.

Table 2.1 Break - up of Officers

OFFICERS

Deck	Engine
.1 Foreign - going	
Master	Chief Engineer Officer
Chief Officer	2nd Engineer Officer
2nd Officer	3rd Engineer Officer
3rd Officer	4th Engineer Officer
4th Officer	5th Engineer Officer
Cadet	Trainee Marine Engineer
Radio Officer	Electrical Officer
Trainee Radio Officer	
Purser	
Medical Officer	
.2 Home - Trade	
Master	
Chief Officer	
2nd Officer	
3rd Officer	
Junior Officer	

Table 2.2 Break - up of Petty - Officers

PETTY - OFFICERS		
DECK	ENGINE	CATERING
Skipper (F.V.)	Mechanician	Catering Officer
Skipper Mate (F.V.)	Fitter	Asst. Catering Officer
Immigration Officer	Asst. Fitter	
Nurse	Wireman	
Compounder	Pumpman	
P.O.Maintenance	Asst. Pumpman	

Table 2.3 Break - up of Crew

CREW		
Deck	Engine	Catering

2.2 Induction of Maritime Personnel into SCI

2.2.1 Officers

2.2.1.1 Navigating Officers

Prospective Navigating Officers join the SCI as a Cadet after completing a training programme of two years on the training ship "Rajendra".

Table 2.4, on page 18, gives a progressive flow chart for a Navigating Officer till he attains the rank of Master.

2.2.1.2 Radio Officers

Prospective Radio Officers join the SCI as a Trainee Radio Officer after obtaining their Radio Officer General Class Certificate of Proficiency from the Ministry of Communications.

Table 2.5, on page 20, gives a progressive flow chart for a Trainee Radio Officer till he attains the rank of Radio Officer.

2.2.1.3 Pursers

Prospective Pursers join the SCI as an Immigration Officer after obtaining a Bachelor's degree from a recognized University.

Table 2.6, on page 21, gives a progressive flow chart for an Immigration Officer till he attains the rank of Purser.

2.2.1.4 Medical Officers

Medical Officers are employed on Passenger vessels and occassionally on a Research vessel on certain cruises, when the complement exceeds 100 persons.

The minimum requirement for entry is a MBBS degree (Bachelor's degree in Medicine and Surgery), followed by two years of work experience in a hospital. Candidates are interviewed by the company's doctor.

2.2.1.5 Home - Trade Officers

Home - Trade Officers are generally ex - able bodied seamen or petty - officers who have completed the requisite sea service and have obtained a home - trade certificate of competency.

Table 2.7 on page 22, gives a progressive flow chart for a home - trade officer.

2.2.1.6 Engineer Officers

Prospective engineer officers join the SCI as a Fifth engineer, after completing the requisite training at the Directorate of Marine Engineering Training Colleges at Bombay / Calcutta.

Table 2.8 on page 23, gives a progressive flow chart for an Engineer Officer till he attains the rank of Chief Engineer Officer.

2.2.1.7 Electrical Officers

Table 2.9 on page 25, gives a progressive flow chart for the induction of Electrical Officers.

Table 2.4 Navigating Officers

12 years of general education with Mathematics, Physics and Chemistry as special subjects.
Inter - Science certificate.

!

All India Entrance Examination conducted by Indian Institute of Technology.

!

Successful candidates according to merit list, interview, medical and eye - sight examination, join Training Ship "Rajendra".The maximum number of cadets that can be admitted is 125 per annum.

!

Two years training on T.S."Rajendra", which is anchored in Bombay harbour.

!

Interview, medical examination and selection by SCI, based on number of vacancies.

!

Successful candidates join SCI as a Cadet.
Two years apprenticeship is the minimum requirement.
In practice, Cadets put in three years apprenticeship on various vessels.
Monitoring of shipboard training is done by a record book and a Cadet's diary.
Minimum nine months of apprenticeship is done on Cadet Training Ships which have a complement of ten to sixteen cadets and an additional Officer in - charge of training.
After a minimum period of one year at sea, Cadet's undergo a two months Mid - term course conducted by SCI. Details of the course are given at 3.8 on page 83.

!

Join Lal Bahadur Shastri Nautical and Engineering College.
Second Mate (F.G.) course ..... 6 months.
Second Mate (F.G.) examination conducted by Ministry of Shipping and Transport.
Certificate of competency, Second Mate (F.G.).

!

!

Rejoin SCI as Fourth / Third Officer.
Sea service required 24 / 18 months.

!

Rejoin Lal Bahadur Shastri Nautical and Engineering College.
First Mate (F.G.) course ..... 6 months.
First Mate (F.G.) examination conducted by Ministry of Shipping and Transport.
Certificate of competency, First Mate (F.G.).

!

Rejoin SCI as Second Officer.
Sea service required 24 months.

!

Rejoin Lal Bahadur Shastri Nautical and Engineering College.
Master (F.G.) course ..... 6 months.
Master (F.G.) examination conducted by Ministry of Shipping and Transport.
Certificate of competency, Master (F.G.).

!

Rejoin SCI as Chief - Officer.
Number of years of experience.

!

Promotion to Master.
Promotion from Chief - Officer to Master is based on seniority, satisfactory performance and adequate vacancies in the fleet. Presently, it takes a minimum period of two years sea service as Chief - Officer with a Master (F.G.) certificate, prior promotion to the rank of Master.

N.B. Attendance at Lal Bahadur Shastri Nautical and Engineering College is optional.However, almost every student joins the college to take advantage of the excellent preparatory courses, experienced faculty, library and a meeting place for discussions with other students.

Table 2.5 Radio Officers

Minimum 10 years general education.
Secondary School Certificate.

!

2 / 3 years Radio Officer's training course at one of six institutes at Bombay, Calcutta, Cuttack, Madras, Poona and Rajkot.
Course includes radio theory, practicals, log - keeping, servicing and maintenance of communications and navigation equipment.

!

Examination conducted by Ministry of Communications.
Radio Officer General Class Certificate of Proficiency.

!

Join SCI as Trainee Radio Officer.
Minimum six months of shipboard experience is necessary for the certificate to be valid.Trainee Radio Officer works under the charge of an experienced Radio Officer.
On completion of shipboard experience, a Trainee Radio Officer is free to join any Shipping Company as a Radio Officer.
SCI only provides the facility to fill in the requisite sea service so that the certificate is valid for seeking employment as a Radio Officer.

!

Some of the Trainee Radio Officers rejoin SCI.

!

Interview and selection by SCI, depending on number of vacancies.

!

Join SCI as Radio Officer. Initially, they are posted as a Second Radio Officer on a Passenger vessel. Later, after they have gained some experience and when a suitable vacancy arises, they can be posted as Radio Officer on any vessel.

N.B. A Radio Officer's Certificate is valid for three years. Certificate is re - validated if at least six months sea service has been completed, during the period of validity of the Certificate.

Table 2.6 Purser

Bachelor's degree from a recognised University.
Proficiency in typing, independent drafting, book - keeping and accounting.
Work experience in a commercial organisation will be an added qualification.
Preference is given to candidates not exceeding 30 years of age, unless exceptionally well qualified and experienced.

!

Written examination, interview, medical examination, typing proficiency test and selection by SCI.

!

Join SCI as an Immigration Officer.
Two weeks training with Fleet Personnel Department.
Two weeks training with Accounts Department.

!

Two years on - the - job training under guidance of an experienced Purser on board a passenger vessel.

!

Two weeks training with Accounts Department.

!

Posted on a Tanker as Immigration Officer.
5 years work experience.

!

Promotion to Purser.
Promotion to Purser is based on seniority, satisfactory performance and adequate vacancies in the fleet.

Presently, it takes a minimum period of seven years of work experience, prior promotion to the rank of Purser.

Table 2.7 Home - Trade Officers

Able - bodied seaman
48 months sea - service

Ex-- navy Petty Officer
(with suitable qualifications)

Junior Officer on Home - Trade vessel.
36 months sea - service.

Join Lal Bahadur Shastri Nautical and Engineering College.
Mate (H.T.) course ..... 6 months.
Mate (H.T.) examination conducted by Ministry of Shipping and Transport.
Certificate of Competency Mate (H.T.).

Interview and selection by SCI.

Join SCI as Third Officer on a Home - Trade vessel.
Promotion to Second Officer by seniority.
24 months sea - service.

Rejoin Lal Bahadur Shastri Nautical and Engineering College.
Master (H.T.) course ..... 6 months.
Master (H.T.) examination conducted by Ministry of Shipping and Transport.
Certificate of Competency Master (H.T.).

Rejoin SCI as Chief - Officer on a Home - Trade vessel.
Number of years of experience on Home - Trade vessels.

Promotion to Master (H.T.).
Promotion from Chief - Officer to Master (H.T.) is based on seniority, satisfactory performance and adequate vacancies in the fleet.
Presently, it takes a minimum period of two years sea - service as Chief - Officer with a Master (H.T.) certificate, prior promotion to the rank of Master (H.T.).

Table 2.8 Engineer Officers

Minimum 12 years general education, with Mathematics, Physics, and Chemistry as special subjects.

!

!	!
All India Entrance Exam. Conducted by Indian Institute of Technology.	Bachelor of Engineering (mechanical) degree, from a recognised Engineering College. 4 / 5 years course.
!	!
Interview, medical and selection based on merit list.	Interview, medical and selection.
!	!
Join Directorate of Marine Engineering Training (D.M.E.T.) College at Calcutta. 4 years training.	Join Directorate of Marine Engineering Training (D.M.E.T.) College at Bombay. 1 year marine engineer's orientation course.
!	!

!

Second class Engineer Part A examination (*).
Conducted by Ministry of Shipping and Transport.

!

Interview, medical and selection by SCI.

!

Join SCI as Fifth Engineer Officer.
18 months sea - service on various vessels.

!

Join Nautical and Engineering College (Bombay) or D.M.E.T. (Calcutta).
Second class Engineer Part B course and First class Engineer Part A course (*). Duration ..... 6 months.
Examination conducted by Ministry of Shipping and Transport.
Certificate of Competency Second class Engineer (Motor).

(*) - Graduate entrants are exempted.

!

Rejoin SCI as Fourth Engineer Officer.
Promotion to Third Engineer Officer is based on seniority.
18 months sea - service on various vessels.

!

Rejoin Nautical and Engineering College (Bombay) or
D.M.E.T. (Calcutta).
First class Engineer Part B course. Duration ..... 6 months.
Examination conducted by Ministry of Shipping and Transport.
Certificate of Competency First class Engineer (Motor).

!

Rejoin SCI as Second Engineer Officer.
Number of years of experience.

!

Promotion to Chief - Engineer Officer.
Promotion to Chief - Engineer Officer, is based on seniority, satisfactory performance and adequate vacancies in the fleet.

Presently, it takes a minimum period of two years sea - service as Second Engineer Officer with a First class Engineer's certificate, prior promotion to the rank of Chief Engineer Officer.

N.B. Attendance at Nautical and Engineering College (Bombay) or D.M.E.T. (Calcutta), for certificate of competency courses, is optional. However, most of the candidates join these courses to take advantage of the excellent preparatory courses, an experienced faculty, library and as a meeting place for discussions with other candidates.

Table 2.9 Electrical Officers

.1 Ex - navy personnel

Minimum 10 years of general education. Secondary School Cert.

!

All India Entrance Examination. Interview, medical and selection by Indian Navy.

!

!	!
Electrical Artificers	Electrical Mechanic
(Power or Radio).	(Power or Radio).
!	2 years experience in
4 years training course	Electrical Engineering.
at Naval Electrical	1 year training course.
Training School	!
(Jamnagar).	2 years work experience.
(Equivalent to Diploma	1 year training course.
in Electrical Engineering).	Leading Electrical Mechanic
!	(Power or Radio).
Number of years of work	!
experience.	2 years work experience.
!	1 year training course.
!	Petty - Officer
!	(Electrical or Radio).
!	!
!	2 years work experience.
!	1 year training course.
!	Chief Petty - Officer
!	(Electrical or Radio).
!	!

!

Minimum 15 years service in the navy. (Naval Requirement).

!

Interview, medical and selection by SCI.

!

Join SCI as an Electrical Officer.

.2 Personnel other than from the Navy

Minimum 10 years of general education.
Secondary school certificate.
Diploma in Electrical Engineering or an approved course of four years apprenticeship in electrical trade.

!

Minimum three years work experience.

!

Written test, interview, medical and selection by SCI.

!

Join SCI as an Electrical Officer.

N.B. A large number of Electrical Officers in SCI, are with an ex - Navy background as described on page 25.

2.2.2 Petty - Officers

2.2.2.1 Categories of Petty - Officers that have not been described

The following categories of Petty - Officers, have not been described in this paper as the number employed is less than five, in each category.

Skipper (F.V.), Skipper Mate (F.V.), Nurse and Compounder.

2.2.2.2 Petty - Officer Maintenance

A seaman with knowledge of carpentry is employed as a Carpenter, through the Seaman's Employment Office. They serve on board on a rotational basis, serving an article period of from nine to twelve months, each time.

After a number of years of service, based on capability and good performance, a Carpenter is inducted into SCI as a permanent employee in the Petty - Officer's cadre. He is given training in welding and in a fitter's trade. Thereafter, he is posted on board a vessel as Petty - Officer Maintenance, in lieu of a Carpenter. He works in the Deck Department and his work is similar to that of a Fitter in the Engine Department. He is also entrusted with the duty of taking daily routine tank and bilge soundings.

2.2.2.3 Assistant Pumpman, Pumpman, Assistant Fitter, Fitter and Mechanician.

Prospective Fitters join the SCI as an Assistant Pumpman, after completing a Diploma course in Mechanical Engineering.

Table 2.10 on page 29, gives a progressive flow chart for an Assistant Pumpman, till he attains the rank of Fitter.

There is a possibility of promotion for a Fitter,

to the rank of Mechanician, if he obtains a Deep Sea Driver's certificate.

Mechanicians holding Deep Sea Driver's certificate and with a number of years of sea experience are employed as watch - keeping engineers on small vessels with low power propulsion plants.

2.2.2.4 Wireman

Table 2.11 on page 30, gives a progressive flow - chart for the induction of wireman.

2.2.2.5 Catering Officer

Table 2.12 on page 31, gives a progressive flow - chart for the induction of Catering Officer.

Table 2.10 Assistant Pumpman --> Fitter --> Mechanician

Minimum 10 years of general education.
Secondary School Certificate.
2 years Diploma Course in Mechanical Engineering, or 2 years National Apprenticeship course in a Marine Workshop in the trade of a Fitter (Engine).

!

Work Experience : Minimum 2 years in a Marine Workshop, or Ship service.
Welding experience preferred.

!

Written test, Interview, Medical and selection by SCI.

!

Join SCI as an Assistant Pumpman.
Assistant Pumpman's Course ..... 3 weeks. See 3.12 on page 92.
Welding Course ..... 40 days. See 3.11 on page 91.

!

Posted on Tankers as Assistant Pumpman.
2 years service on tankers.

!

Promotion to Pumpman.
4 years service on tankers.

!

Promotion to Assistant Fitter.
4 years sea - service.

!

Promotion to Fitter.

There is a possibility of promotion to Mechanician if they obtain Deep Sea Driver's Certificate.

Promotions are based on vacancies and satisfactory performance.

Table 2.11 Wireman

Minimum 10 years general education.
Secondary School Certificate.

!

2 / 3 years Diploma Course in Electrical Engineering, or
Electrical Supervisor's Licence, or
Three years National Apprenticeship in the trade of Electrician

!

Work Experience : Minimum 2 years, preferably in a Marine Workshop.

!

Written test, Interview, medical and selection by SCI.

!

Join SCI as a Wireman.
Can be posted on any vessel.

After a number of years of sea - service there is a possibility of promotion to Electrical Officer, for those found suitable. This is done by an upgrading course of three weeks duration followed by a marine control engineering course of a further three weeks duration. Marine Control Engineering course has been described at 3.3 on page 57.

Table 2.12 Catering Officer

Minimum 10 years of general education.
Secondary School Certificate.

!

!

2 years Diploma Course.
Diploma in Hotel Management and Catering Technology.
OR
Certificate in Food Service Management.
(Issued by any of the institutes of catering technology and applied nutrition).

!

Minimum 1 year experience in catering department.

!

!

Minimum 3 years experience as Pantryman, General Steward, or Second Cook on board a ship.

!

!

Knowledge of cooking, catering, purchase of provisions, upkeep and care of culinary items, house - keeping, billing / accounting, record keeping, letter - writing and typing.

!

Written test, Interview and Selection by SCI.

!

Join SCI as an Assistant Catering Officer.
Assistant Catering Officer's course .... 1 month.
(See 3.13 on page 97 for details)
Posted as Assistant Catering Officer, in lieu of Pantry - man.
Minimum 2 years shipboard experience, under Catering Officer.

!

Posted as Assistant Catering Officer in charge of Catering Dept
Minimum 2 / 3 years work experience.

!

Promotion to Catering Officer.

Promotion to Catering Officer is based on seniority, satisfactory performance and adequate vacancies in the fleet.

2.2.3 Crew

Deck, Engine and Catering crew, are employed through the Seaman's Employment Office. They work on a rotational basis, for an article period of nine to twelve months service on board a ship, during each employment.

In order to take up a sea career as a member of the Deck, Engine or Catering crew, a person has to complete a minimum of eight years of general education and should have succesfully passed the eighth class.

There are four Ratings Training Establishments. The selection and allocation of candidates is done statewise. There is a six months training programme, after which the ratings enrol with the Seaman's Employment Office for allocation of a company / ship on a rotational basis.

For the last few years, intake and training of ratings in the Ratings Training Establishments, has been suspended due to the high rate of unemployment.

CHAPTER THREE

COURSES DEVELOPED/CONDUCTED BY SCI

3.0 COURSES DEVELOPED / CONDUCTED BY SCI

3.1 Courses Developed by Training Department

The Training Department of SCI, has developed a number of specialised short courses to comply with both, regulatory and SCI's requirements. The courses which are presently being conducted on a regular basis, are given in table 3.1, on page 35. Further, the courses which have been conducted, but are not being held on a regular basis, are given in table 3.2, on page 98.

Table 3.1 Current Courses Conducted by Training Department

COURSES / DURATION	PARTICIPANTS	DETAILS
Officers		
.1 Tanker Technology 2 weeks	Deck & Engineer Officers with minimum one year tanker experience.	3.2, page 37.
.2 Marine Control Engineering 3 weeks	Engineer & Electrical Officers.	3.3, page 57.
.3 Chief - Officer's Orientation 2 weeks	Chief - Officers.	3.4, page 60.
.4 2nd Engineer's Orientation 2 weeks	2nd Engineer Officers.	3.5, page 64.
.5 Fire - Fighting 3 days	All Officers.	3.6, page 68.
.6 Survival at Sea 1 day	All Officers.	3.7, page 78.
Cadets		
.7 Mid - Term 2 months	Cadets with minimum one year sea service.	3.8, page 83.
.8 Radar Observer 2 weeks	As above.	3.9, page 86.
.9 Fire - Fighting 1 day	As above.	3.10, page 89.

COURSES / DURATION	PARTICIPANTS	DETAILS
Cadets (Contd.)		
.10 Survival at Sea 1 day	Cadets with minimum 1 year sea service.	3.7, page 78.
Petty - Officers		
.11 Welding 40 days	Fitters, P.O. Maintenance, Asst. Pumpman.	3.11, page 91.
.12 Asst. Pumpman 3 weeks	Asst. Pumpman.	3.12, page 92.
.13 Asst. Catering Officer 1 month	Asst. Catering Officer.	3.13, page 97.
.14 Fire - Fighting 1 day	All Petty - Officers.	3.10, page 89.
.15 Survival at Sea 1 day	All Petty - Officers.	3.7, page 78.
Crew		
.16 Fire - Fighting 1 day	All crew.	3.10, page 89.
.17 Survival at Sea 1 day	All crew.	3.7, page 78.

3.2 Tanker Technology Course

3.2.1 Objectives

The objectives of the Tanker Technology course are as follows ;

- to comply with the requirements of SOLAS and MARPOL Conventions and their Protocols 1978, with special emphasis on Inert Gas and Crude - oil - washing systems, operation and maintenance;

- to comply with the following requirements of STCW 78;
  = Regulation V / 1, "Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Oil Tankers";
  = Resolution 10, "Training and Qualifications of Officers and Ratings of Oil Tankers"; and

- to comply with SCI's requirements of commercial and cargo loss prevention aspects of tanker operations.

3.2.2 Participants

The participants for this course are Deck and Engineer Officers who have completed a minimum period of one year's service on oil tankers.

3.2.3 Duration

The duration of this course is two weeks.

3.2.4 Faculty

The faculty consists of tanker experienced Masters and Chief - Engineer Officers.

The visiting faculty consists of :

- Chief Chemist, Doctor and a Safety Engineer from Hindustan Petroleum Refinery.

- An Officer from Tanker Department of SCI, having knowledge of commercial aspects.

3.2.5 Course Programme

Day 1

0930 - 1100 : Course Inauguration.
History and Development of Tanker Safety and Pollution Prevention.

1115 - 1245 : Origin and Physical Properties of Crude Petroleum

1345 - 1515 : Characteristics of Crude - oil and Petroleum Products.

1530 - 1700 : Sources of Ignition.

Films : 1. Chemistry of Petroleum Fire.
2. Safe handling of Light Ends.

Day 2

0930 - 1100 : Static Electricity and Space Charges. Bonding.

1115 - 1245 : Pumping and Piping arrangements. Stripping systems.

1345 - 1515 : Medical Aspects, Health Hazards and First Aid.

1530 - 1700 : Contd.

Films : 1. Static Electricity.
2. Fire Chemistry.
3. Centrifugal Pump.

Day 3

0930 - 1100 : Surge Pressure. Closed Ullaging systems.

1115 - 1245 : Gas evolution. Venting systems. Flame screens.

1345 - 1515 : Ballast and Cargo handling.

1530 - 1700 : Ship to Ship Transfer.

Films : 1. Resuscitation.
2. Don't go down the . . . .

Day 4

0930 - 1100 : Gas Detection Instruments.

1115 - 1245 : Tank Atmosphere Control, Non - Inerted ships.

1345 - 1515 : Tank - cleaning. Gas - freeing.

1530 - 1700 : Entry into enclosed spaces. Breathing Apparatus.

Films : 1. Use of Breathing Apparatus.
2. Entry into enclosed spaces.

Day 5

0930 - 1100 : Ship / Shore Safety Check List.

1115 - 1245 : Helicopter / Tanker Operations. Moorings.

1345 - 1515 : Emergency Procedures. Fire - Fighting.
Ship / Shore Emergency organisation.

1530 - 1700 : ICS Tanker Casualty Reports. Case studies.
Discussion on Tanker Safety.

Films : 1. Fire - fighting Part I & II.
2. Fire - fighting aboard tankers.

Day 6

0930 - 1100 : Commercial aspects. Contracts of affreightment.

1115 - 1245 : Cargo losses and loss prevention.

1345 - 1515 : Cargo calculations and procedures.

1530 - 1700 : Development of Pollution Prevention regulations, OILPOL 54 to MARPOL 73 / 78.

Films : 1. Fire a Hazard.
2. Troubled Waters.

Day 7

0930 - 1100 : MARPOL 73 / 78, Annex I, Regulations for the prevention of pollution by OIL. Annex IV, Regulations for the prevention of pollution by SEWAGE from ships. Annex V, Regulations for the
1115 - 1245 : prevention of pollution by GARBAGE from ships.

1345 - 1515 : Oil / water separators, Oil dispersants and effects.
1530 - 1700 : Oil Content Monitor. Oil Record Book.

Films : 1. Fighting Pollution.
2. Oil / water separator.

Day 8

0930 - 1100 : Changing ballast, processing slop, Retention on board, Load - on - Top.
1115 - 1245 : Emergency operations. Oil spill drill. Pollution Liabilities. CLC, Fund Convention, TOVALOP,CRISTAL.
1345 - 1515 : Sewage treatment plant. Incinerators.

1530 - 1700 : Salient features of SOLAS and MARPOL Protocols 78 Introduction to IGS and COW.

Films : 1. Fire Below.
2. Sewage Treatment Plant.

Day 9

0930 - 1100 : Boiler combustion control and boiler operations.

1115 - 1245 : Flammability Chart.

1345 - 1515 : Development of IGS. Revised Regulation 62 of SOLAS 74, as ammended.

1530 - 1700 : Inert Gas System.

Films : 1. IGS (BP).
2. Teamwork.

Day 10

0930 - 1100 : Oxygen analysing instruments. MSA Tankscope.

1115 - 1245 : Methods of gas replacement. Tank atmosphere control.

1345 - 1515 : Inert gas operations.

1530 - 1700 : Safety considerations with IGS and emergency operations.

Films : IGS (Videotel).

Day 11

0930 - 1100 : IGS maintenance. IG Generator.

1115 - 1245 : IG applications to Product tankers and Combination carriers.

1345 - 1515 : Principles and development of COW. Advantages and disadvantages of COW.

1530 - 1700 : COW equipment and design.

Film : COW (BP).

Day 12

0930 - 1100 : COW operations and equipment manual.

1115 - 1245 : Regulatory enforcement procedures. Check lists.

1345 - 1515 : Practical exercises. Preparing cargo discharge, COW and ballasting programmes.

1530 - 1700 : Continued.

Film : COW (Videotel).

Day 13

0930 - 1100 : Tanker equipment maintenance.

1115 - 1245 : Course discussion, evaluation.

3.2.6 Syllabus

The syllabus has been drawn up, taking into account the following ;

- STCW 78,
- MARPOL 73 / 78,
- SOLAS 74 and Solas Protocol 78,
- IMO's Inert Gas System,
- IMO's Crude Oil Washing System,
- Syllabus for Petroleum Tanker Safety Training, Merchant Navy Training Board, U.K.,
- SCI's technical and operational requirements.

Details of the syllabus are given below :

Part I : Tanker Safety

.1 Characteristics of crude oil and petroleum products :

- Explanation of the physical properties of crude oil and petroleum products.

- Volatility, flash point, Reid vapour pressure, true vapour pressure, partial pressure, boiling point and effect of pressure, saturated vapour pressure, viscosity, pour point

- Distillation of crude oil, boiling points, flash points and vapour pressures from gasoline to fuel oil.

- Flammability limits. Fire and explosion.

- Spontaneous ignition temperature.

- Classification of cargoes by flash point.

- Petroleum vapours. Vapour travel.

- Toxic properties.

- Corrosion hazards.

- Sour crudes, sweet crude, spiked crude, lead additives

.2 Sources of Ignition :

- Sparks - steel, alloys, magnesium, aluminium, grit.

- Sparks - electrical, switches, appliances, dangers of portable electrical equipment and wandering leads

- Sparks - chemical.

- Spontaneous combustion.

- Auto ignition temperature.

- Oil dropping on hot surfaces.

- Pyrophoric iron sulphides.

- Static electricity. The theory of the formation of static charges in ship and shore tanks.

- Application in practice to loading, discharging, gas - freeing and clearing lines. Loading rates and relaxation time.

- Ullaging and sampling. Static precautions.

- Flame screens and flame arresters, principles, heat absorption and quenching distances.

.3 Bonding

- Ship / shore bonding wires.

- Bonding of cargo hoses.

- Insulating flanges.

- Cathodic protection, ship / jetty.

- Bonding of tank - washing machines and hoses.

.4 Ship design and equipment

- General design of vessel from safety aspect. Hazardous and safe zones.

- Piping, pumping, tank and deck arrangements.

- Types of cargo pumps and their application for various types of cargoes. Stripping systems.

- Cargo heating systems.

- Tank cleaning and gas - freeing systems.

- Closed ullaging systems.

- Cargo tank venting systems. Pumproom ventilation. Accommodation ventilation system.

- Openings in superstructure.

- Safety factors of electrical systems.

.5 Tanker Operations

- Loading and discharging plans and procedures including ship to ship transfer.

- Charter parties and practices, contract of affreightment.

- Ullaging and sampling. Cargo calculations. Reduction of apparent cargo losses.

- Safety check lists. Ship / shore liaison. Communications.

- Importance of proper supervision of personnel.

- Ballasting and deballasting procedures.

- Tank cleaning and gas - freeing operations.

- Control of entry into pump rooms and enclosed spaces.

- General precautions.

- Operation of venting systems, pressure / vacuum valves and high velocity valves.

- Gas evolution from butanised / spiked crude, flammable range with reference to gasoline, JP4 type of fuel and kerosene.

- Tank atmosphere at all stages of Tanker operations.

- Gas concentration at deck level, dispersion and effect of weather conditions.

- Clearing lines and hoses. Surge pressure.

- Precautions with Sour crudes, high RVP cargoes, high viscosity and high pour point cargoes.

- Helicopter / Tanker operations.

- Principles of safe mooring.

- Combination carriers, precautions, changing over from oil to bulk and from bulk to oil.

- Discussion on Tanker casualty reports and Tanker safety.

.6 Health Hazards, Medical aspects

- Structure of body and the general effects of toxic substances on it. Effect of petroleum vapour, hydrogen sulphide, aromatics and leaded fuels.

- Harmful properties of various petroleum cargoes and additives.

- Danger of skin contact, inhalation, ingestion, accidental swallowing of cargo.

- Toxicity limits, both acute and chronic effects of toxicity, systemic poisons and irritants.

- Oxygen deficiency with particular reference to IGS.

- Suffocation and its treatment.

- Personnel accidents and associated first aid, handling of casualties from a toxic atmosphere.

- Artificial respiration and resuscitation.

.7 Breathing Apparatus

- Use and maintenance of Compressed Air Breathing Apparatus and Air Bellows Equipment.

- Safety harnesses and life - lines.

- Use of protective clothing and equipment.

.8 Entry into Enclosed Spaces.

- Tank cleaning, gas - freeing and preparations for entry into enclosed spaces. Procedures, precautions organisation and check list.

- Explosimeter, use and maintenance, functions and calibrations. Interpretation of Explosimeter readings in terms of toxicity and safe levels for man entry.

- Checking Oxygen content. Oxygen deficiency, inert gas.

- Hydrogen Sulphide and Aromatics Detector.

.9 Repair and Maintenance

- Preparation for Dry - docking / Lay - up for repairs.

- Repair work, dangers of opening up pumps, valves, pipelines

- Precautions to be taken before and during repair and maintenance work, including that affecting pumping, piping, electrical and control systems.

- Safety factors necessary in the performance of hot work. Control of hot work.

- Gas free certificates. Safe for entry. Safe for hot work.

.10 Emergency Operations

- Shipboard emergency organisation, including the need for ship / shore liaison.

- Emergency plan. Shipboard safety organisation, including role of safety officers and safety committee. Safety on board, in port and at sea.

- Emergency shut down during cargo operations. Action in the event of failure of services essential to cargo.

- Fire - fighting on oil tankers. Deck froth system.

- Action following collision, stranding, fire, spillages.

- First aid procedures. Rescue from enclosed spaces.

Part II Pollution Prevention

- Types and sources of Marine Pollution. Effects of pollution / ecological balance. Effect on human and marine life from release of oil at sea.

- Effect of specific gravity and solubility. Effect of vapour pressure and weather conditions on environmental pollution.

- OILPOL 54, with '62, '69 and '71 ammendments.

- MARPOL 73 / 78;

  = Annex I, Regulations for the prevention of pollution by OIL from ships.

  = Annex IV, Regulations for the prevention of pollution by Sewage from ships.

  = Annex V, Regulations for the prevention of pollution by GARBAGE from ships.

- Segregated ballast, Protective location, Dedicated clean ballast, COW.

- Conditions for discharge of oil / water mixtures from cargo spaces and machinery spaces.

- Shipboard operations likely to cause pollution.

- Oil record book.

- Dispersants and their effects, methods of cleaning, their advantages and disadvantages.

- Oil / water separators, Filtering units, Sewage treatment plants and Incinerators.

- Slop tank arrangements, changing ballast, oil content monitor, oil / water interface detectors, processing slops, Load - on - Top, Retention on Board, disposal of slops.

- Pollution liabilities, Certificate of Financial Responsibility, CLC and Fund conventions, TOVALOP and CRISTAL.

- Oil spills, Emergency Plans, Spill Drills, Cargo operations emergency shut down, Action following spillages, Ship / Shore organisation, oil booms, containment devices, Contingency planning.

Part III Inert Gas System

.1 Introduction

- Salient features of SOLAS Protocol 78, Introduction to IGS. Purpose, application, definitions.

.2 Principles

- Flammable limits. Effect of inert gas on flammability.

- Sources, composition, quality.

- Boiler operations and automatic combustion control.

- Methods of gas replacement, displacement and dilution. Cargo tank atmosphere control.

.3 Inert Gas Plant

- Regulation 62 of SOLAS 74 as ammended. Description of an inert flue gas system.

- Flue gas uptake points and isolating valves.

- Scrubber, Blowers, Re - circulating arrangements.

- Deck isolating valves, Deck water seal, non - return devices.

- Distribution system, inerting, purging, venting and gas - freeing arrangements.

- Pressure / vacuum valves, high velocity valves, purge - pipes, pressure / vacuum breakers, gas regulating valve, pressure / vacuum settings.

- Instrumentation, controls, shut - down and alarm systems.

- Effluent and drain piping. Materials used for construction of various components.

- Fixed and portable instruments for oxygen analysing.

.4 Operation of Inert Gas Plant

- Starting and stopping procedures. Safety checks.

- Plant failures. Procedures in case of failures.

- Inspection procedure, routine maintenance and repairs.

.5 Application to cargo tank protection

- Inerting of tanks, De - ballasting, Loading, Loaded passage, Discharging, Crude oil washing, Ballasting, Ballast passage, Tank cleaning, Purging prior to gas - freeing, Gas - freeing, Tank entry, Re - inerting.

- Preparation for repairs. Carrying out dry - docking / repairs with inerted tanks.

- Application to Product carriers.

- Application to Combination carriers.

.6 Emergency procedures

- Action in the event of failure of the inert gas system.

.7 Safety considerations with inert gas system

- Backflow of cargo gases.

- Health hazards.

- Tank pressure.

- Electrostatic hazards.

- Repair of inert gas plant.

- Hazards from pyrophoric iron sulphide.

.8 Inert gas Generator (IGG)

- Description, operation, maintenance.

- Topping - up operations with IGG.

Crude - oil Washing (COW)

.1 Introduction

- Salient features of MARPOL Protocol 78. Introduction to COW. Advantages / Disadvantages.

.2 Principles

- The characteristics of crude oil as a washing fluid and its contrast with water washing.
- Top washing, bottom washing, trim requirements.
- Methods of bleeding off from the cargo discharge.
- Maintenance of required washing fluid pressure.
- Washing at sea between discharge ports.
- Recirculatory washing.
- Relative priorities and requirements for the departure ballast tanks, arrival ballast, and cargo only tanks.

.3 Equipment and design

- Location of washing machines. Shadow diagrams.
- Washing machines, deck - mounted and submerged : types ; characteristics ; features of construction ; operating parameters.
- Drive units.
- Washing fluid supply and distribution systems.
- Stripping systems. Means of sounding tanks.
- Inert gas requirements.

.4 Generalized crude oil washing procedures

- Traditional pipeline ship, free flow ship and partial free flow ship.

- Single and multi - parcel cargoes.

- Optimization of procedure to wash with minimum extra berth time.

- Ballasting for departure with various ship and pipeline configurations.

- Procedure for washing at sea between discharge ports.

.5 Associated procedure

- Means for minimizing residues on board;
  = stripping of cargo tanks,
  = draining and stripping of cargo lines,
  = final discharge of cargo ashore.

- Water rinsing of arrival ballast tanks.

- Filling and ultimate discharge of arrival ballast.

- Discharge of departure ballast.

- Build - up and decanting of slop tanks.

- Requirements of Regulation 9 of Annex I, MARPOL 73 / 78.

- Avoidance of venting in port during ballasting operations.

.6 Safety

- Inert gas procedure.

- Maintenance and monitoring of inert gas quality and pressure.

- Stopping of washing / discharge under abnormal inert gas conditions.

- Electrostatic generation and the precautions required to avoid it.

- Pipework integrity.

- Avoidance of surge pressures.

- Spillage.

.7 Check lists

- Before entering port.

- Before commencing crude oil washing.

- After crude oil washing.

- After sailing.

.8 Regulatory enforcement procedures

- Operations and Equipment Manual.

- Oil Record Book.

- Sounding of tanks.

- Measurement of oil on top of departure ballast.

.9 Maintenance of plant and equipment

- Maintenance of equipment in accordance with manufacturers' instructions.

- Additional maintenance items.

.10 COW programmes

- Developing typical washing programmes under various conditions of cargo discharge such as single or multiport discharge and single and multigrade cargoes. Using bar diagrams for same.

3.2.7 Compliance with STCW 78

It will be observed that the course syllabus exceeds the recommended syllabus given in STCW 78, Resolution 10, Annex, "Recommendation on Training and Qualifications of Officers and Ratings of Oil Tankers".

However, it complies with the general principle of paragraph 2 of Regulation V / 1, STCW 78, an extract of which is reproduced below for ready reference.

"2. Masters, chief engineer officers, chief mates, second engineer officers and, if other than the foregoing, any person with the immediate responsibility for loading, discharging and care in transit or handling of cargo, in addition to the provisions of paragraph 1, shall have:

(a) relevant experience appropriate to their duties on oil tankers; and

(b) completed a specialized training programme appropriate to their duties, including oil tanker safety, fire safety measures and systems, pollution prevention and control, operational practice and obligations under applicable laws and regulations."

Hence, this course may be termed as an, "Oil Tanker Advanced Course".

3.2.8 Practical Training

In accordance with IMO's Resolution A.446(XI), "Revised Specifications for the Design, Operation and Control

of Crude Oil Washing Systems", given below is an extract of the requirements for qualification of personnel:

"5. QUALIFICATION OF PERSONNEL

5.2 Where a person such as the Master, the Chief Officer or the Cargo Control Officer assumes overall charge of a crude oil wash he shall:

(a) have at least one year's experience on oil tankers where his duties have included the discharge of cargo and associated crude washing. Where his duties have not included crude oil washing operations, he shall have completed a training programme in crude oil washing in accordance with Appendix II to these Specifications and satisfactory to the Administration;

(b) have participated at least twice in crude oil wash programmes one of which shall be in the particular ship for which he is required to undertake the responsibility of cargo discharge. Alternatively, this latter participation may be acceptable if undertaken on a ship that is similar in all relevant respects; and

(c) be fully knowledgeable of the contents of the Operations and Equipment Manual."

In order to comply with the requirements of the above resolution, on completion of the Tanker Technology Course, when Masters and Chief - Officers are posted on crude - oil carriers, practical on - the - job training is given to them. Practical training is imparted by tanker experienced Masters who are sent to these vessels at the cargo discharge ports. They also undertake short sea passages between discharge ports in case of multiport discharge.

On - the - job training is imparted for a minimum of five cargo discharge and crude oil wash operations.

Thereafter, the Master and Chief Officer are considered competent and are permitted to undertake subsequent crude oil wash operations independently, provided all the other requirements of the vessel's COW Operations and Equipment Manual are complied with.

3.3 Marine Control Engineering Course

3.3.1 Objectives

The objectives of the Marine Control Engineering course are as follows:

- to develop the knowledge and skills of Marine Engineers and Electrical Officers in the field of Marine Control Engineering; and

- to utilize the knowledge gained, in the improvement of performance with regard to operations, maintenance, trouble - shooting and repairs of shipboard automation systems.

3.3.2 Participants

The participants for this course are Engineer Officers and Electrical Officers.

3.3.3 Duration

The duration of this course is three weeks.

3.3.4 Faculty

The faculty consists of Chief - Engineer Officers and an Electrical Officer, with knowledge and experience in shipboard automation.

The visiting faculty consists of visiting professors from Indian Institute of Technology (I.I.T.) and National Institute for Training in Industrial Engineering

(NITIE).

3.3.5 Course Programme

Day 1

0930 - 1245 : Inauguration. Atomic theory.

1345 - 1700 : Electronic components and circuits.

Slides : Diodes.

Day 2

0930 - 1245 : Pneumatics. Pneumatic relays.

1345 - 1700 : Practicals in laboratory.

Day 3

0930 - 1245 : Pneumatic Controllers.

1345 - 1700 : Pneumatic Controllers contd.

Day 4

0930 - 1245 : Binary mathematics.

1345 - 1700 : Logic Gates.

Slides : Cathode ray tubes.

Day 5

0930 - 1245 : Oscillators, Multivibrators.

1345 - 1700 : Practicals in laboratory.

Day 6

0930 - 1245 : Amplifiers.

1345 - 1700 : OPS. Amplifier and applications.

Day 7

0930 - 1245 : Digital Electronics.

1345 - 1700 : Practicals in laboratory.

Day 8

0930 - 1245 : Hydraulics. Films on Hydraulics.

1345 - 1700 : Practicals in laboratory.

Day 9

0930 - 1245 : Hydraulic cranes and winches.

1345 - 1700 : Practicals in laboratory.

Day 10

0930 - 1245 : General Automation.

1345 - 1700 : Boiler Automation.

Day 11

0930 - 1245 : Digital Electronics and Applications.

1345 - 1700 : Boiler Automation.

Day 12

0930 - 1245 : Special semi - conductor devices.

1345 - 1700 : Gyro, Auto Pilot.

Day 13

0930 - 1245 : Main - engine Automation.

1345 - 1700 : General Automation.

Day 14

0930 - 1245 : Main - engine Automation.

1345 - 1700 : Test Instruments, Fault Finding.

Day 15

0930 - 1245 : Micro - processors.

1345 - 1700 : Micro - processors contd.

Day 16

0930 - 1245 : Evaluation, Examination.

3.4 Chief Officer's Orientation Course

3.4.1 Objectives

The objectives of the Chief Officer's Orientation course are as follows:

- to develop the knowledge of Chief Officers in the organisational, management and operational aspects;
- to utilize the knowledge gained, in the improvement of fleet performance, reduction in cargo claims and reduction in maintenance and repair cost; and
- to provide an interaction between ship and shore officers.

3.4.2 Participants

The participants for this course are Chief Officers holding a Master (F.G.) certificate.

3.4.3 Duration

The duration of this course is two weeks.

3.4.4 Faculty

The faculty for this course consists of Officers deputed by the various departments of SCI to cover the particular aspects for which the department is responsible.

3.4.5 Course Programme

Day 1

1000 - 1050 : SCI organisation.
1100 - 1150 : Maintenance on Liner vessels.
1205 - 1300 : - Contd. -

1400 - 1450 : Tanker operations and maintenance.
1500 - 1550 : - Contd. -
1605 - 1700 : Training concepts.

Day 2

1000 - 1050 : Crew management.
1100 - 1150 : Bulk Carrier operations and maintenance.
1205 - 1300 : - Contd. -

1400 - 1450 : Safety on Liner vessels.
1500 - 1550 : - Contd. -
1605 - 1700 : Maintenance of Hydraulic systems.

Day 3

1000 - 1050 : Commercial aspects of Container operations.

1100 - 1150 : Commercial aspects of Container operations.
1205 - 1300 : - Contd. -

1400 - 1450 : Classification, Statutory and Damage Surveys.
1500 - 1550 : - Contd. -
1605 - 1700 : Maintenance on Combination Carriers.

Day 4

1000 - 1050 : Commercial aspects of Tanker operations.
1100 - 1150 : - Contd. -
1205 - 1300 : Cargo care for reduction in cargo claims.

1400 - 1450 : Ship.- board Container operations.
1500 - 1550 : - Contd. -
1605 - 1700 : Securing of Containers.

Day 5

1000 - 1050 : Introduction to Data Processing and Computers.
1100 - 1150 : - Contd. -
1205 - 1300 : Visit to Computer department.

1400 - 1450 : Compliance with IMO Conventions.
1500 - 1550 : - Contd. -
1605 - 1700 : Optimising Fleet Performance.

Day 6

1000 - 1050 : Optimising Fleet Performance.
1100 - 1150 : Ship to Ship cargo transfer operations (Tankers).
1205 - 1300 : - Contd. -

1400 - 1450 : Repair Specifications. Dry - docking and paints.
1500 - 1550 : - Contd. -
1605 - 1700 : Films on management, team work, etc.

Day 7

1000 - 1050 : Chartering and Charter party clauses.

1100 - 1150 : Chartering and Charter party clauses.
1205 - 1300 : Oil cargoes loss prevention.

1400 - 1450 : Oil cargoes loss prevention.
1500 - 1550 : Merchant Shipping Act. Crew management.
1605 - 1700 : - Contd. -

Day 8

1000 - 1050 : PERT / CPM.
1100 - 1150 : Port operations.
1205 - 1300 : - Contd. -

1400 - 1450 : Tanker Charter party claims.
1500 - 1550 : - Contd. -
1605 - 1700 : Maintenance of Hydraulic systems.

Day 9

1000 - 1050 : Club Claims and Marine Insurance.
1100 - 1150 : - contd. -
1205 - 1300 : Data exchange between ship and office.

1400 - 1450 : Dry - docking / lay - up for repairs.
1500 - 1550 : Safety on Tankers.
1605 - 1700 : - Contd. -

Day 10

1000 - 1050 : Budgetory control and voyage analysis.
1100 - 1150 : - Contd. -
1205 - 1300 : Stevedoring cost control.

1400 - 1450 : Stevedoring cost control.
1500 - 1550 : Work / time study.
1605 - 1700 : - Contd. -

Day 11

1000 - 1050 : Internal Audit.

1100 - 1150 : Discussion on casualty reports.
1205 - 1300 : - Contd. -

1400 - 1450 : Acquisition of new vessels. Plans, Construction and Delivery. Guarantee defects.
1500 - 1550 : - Contd. -
1605 - 1700 : Feedback and course evaluation.

3.5 Second Engineer Officer's Orientation Course

3.5.1 Objectives

The objectives of the Second Engineer Officer's Orientation course are as follows:

- to develop the knowledge of the Engineer Officers in the organisational, management and operational aspects;

- to utilize the knowledge gained, in the improvement of fleet performance, reduction in fuel, maintenance and repair cost;

- to provide an interaction between ship and shore officers.

3.5.2 Participants

The participants for this course are Second Engineer Officers holding a First Class Engineer's certificate.

3.5.3 Duration

The duration of this course is two weeks.

3.5.4 Faculty

The faculty for this course consists of Officers deputed by the various departments of SCI to cover the various aspects for which the department is responsible.

3.5.5 Course Programme

Day 1

1000 - 1050 : Inauguration. SCI Organisation.
1100 - 1150 : Responsibilities of Chief and Second Engineers.
1205 - 1300 : Crew Management - I.

1400 - 1450 : Main Engine Decarbonisation and reports.
1500 - 1550 : - Contd. -
1605 - 1700 : Pollution Control.

Day 2

1000 - 1050 : Training concepts.
1100 - 1150 : Engine - room upkeep and routines.
1205 - 1300 : Crew Management - II.

1400 - 1450 : Auxiliary Engine Decarbonisation and reports.
1500 - 1550 : Safety devices and performance check on Auxiliary Engines.
1605 - 1700 : Cargo gear and Deck Machinery.

Day 3

1000 - 1050 : Classification Society Surveys.
1100 - 1150 : - Contd. -
1205 - 1300 : Safety Equipment Surveys.

1400 - 1450 : Boiler operations.
1500 - 1550 : Boiler maintenance.
1605 - 1700 : Compliance with IMO Conventions.

Day 4

1000 - 1050 : Inventory control.
1100 - 1150 : Spares management.
1205 - 1300 : Stores management.

1400 - 1450 : Main Engine crank case inspection.

1500 - 1550 : Shaft alignment.
1605 - 1700 : - Contd. -

Day 5

1000 - 1050 : Fuel oils.
1100 - 1150 : Fuel combustion.
1205 - 1300 : Fuel blending.

1400 - 1450 : Films on Fuel oils and Energy Management.
1500 - 1550 : New acquisitions and guarantee claims.
1605 - 1700 : Boiler water treatment.

Day 6

1000 - 1050 : Shipboard vigilance case study.
1100 - 1150 : Planned maintenance system.
1205 - 1300 : - Contd. -

1400 - 1450 : Human relations.
1500 - 1550 : - Contd. -
1605 - 1700 : Internal Audit.

Day 7

1000 - 1050 : Control systems and maintenance.
1100 - 1150 : - Contd. -
1205 - 1300 : Lubricating oils, range and specifications.

1400 - 1450 : Lubricating oils, care and handling.
1500 - 1550 : Lubricating oils, tests and interpretation of results.
1605 - 1700 : Film on Lubricating oils.

Day 8

1000 - 1050 : Commercial Aspects.
1100 - 1150 : Tanker operations and maintenance.
1205 - 1300 : Passenger ship operations and maintenance.

1400 - 1450 : Engine Performance. Scavenge air system.
1500 - 1550 : Engine Performance, fuel system.
1605 - 1700 : Cylinder lubrication.

Day 9

1000 - 1050 : Introduction to data processing and computers.
1100 - 1150 : - Contd. -
1205 - 1300 : Visit to computer department.

1400 - 1450 : Maintenance of Hydraulic systems.
1500 - 1550 : - Contd. -
1605 - 1700 : Film on Hydraulics.

Day 10

1000 - 1050 : Ship / Office data exchange.
1100 - 1150 : PERT / CPM case studies.
1205 - 1300 : Voyage repairs.

1400 - 1450 : Repair Specifications, Dry - docking / Lay - up.
1500 - 1550 : - Contd. -
1605 - 1700 : Films on Teamwork and Management.

Day 11

1000 - 1050 : Budget, Cost control, Voyage analysis.
1100 - 1150 : - Contd. -
1205 - 1300 : Maintenance of Refrigeration systems.

1400 - 1450 : Maintenance of Refrigeration systems.
1500 - 1550 : Fault finding and trouble shooting.
1605 - 1700 : Feedback and course evaluation.

3.6 Fire - Fighting Course

3.6.1 Objectives

The objectives of the Fire - fighting course are as follows:

- to comply with the requirements of STCW 78, Regulation II/2, "Mandatory Minimum Requirements for Certification of Masters and Chief Mates of Ships of 200 Gross Register Tons or More", Appendix to Regulation II/2, paragraph 11(d), "Attendance at an approved fire - fighting course";

- to comply with the requirements of STCW 78, 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", Appendix to Regulation II/4, paragraph 11(d), "Attendance at an approved fire - fighting course";

- to comply with the requirements of STCW 78, Regulation III/2, "Mandatory Minimum Requirements for Certification of Chief Engineer Officers and Second Engineer Officers of Ships Powered by Main Propulsion Machinery of 3000 kW Propulsion Power or More", paragraph 2(c), "have attended an approved practical fire - fighting course";

- to comply with the requirements of STCW 78, Regulation III/3, "Mandatory Minimum Requirements for Certification of Chief Engineer Officers and Second Engineer Officers of Ships Powered by Main Propulsion Machinery between 750 kW and 3000 kW Propulsion Power", paragraph 2(c), "have attended an approved practical fire - fighting course";

- to comply with the requirements of STCW 78, Regulation III/4, "Mandatory Minimum Requirements for Certification of Engineer Officers in Charge of a Watch in a Traditionally Manned Engine Room or Designated Duty Engineer Officers in a periodically Unmanned Engine Room", paragraph 2(f), "have attended an approved practical fire - fighting course";

- to comply with the requirements of STCW 78, Regulation IV/1, "Mandatory Minimum Requirements for Certification of Radio Officers", appendix to regulation IV/1, ".... radio officers shall have knowledge and training including practical training, in the following:", paragraph (e), "fire prevention and fire - fighting with particular reference to the radio installation";

- to comply with the requirements of STCW 78, Regulation V/1, "Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Oil Tankers", paragraph 1, "Officers and Ratings, who are to have specific duties and responsibilities related to those duties, in connexion with cargo and cargo equipment on oil tankers and who have not served on board an oil tanker as part of the regular complement before carrying out such duties shall have completed an appropriate shore - based fire - fighting course";

- to comply with the requirements of IMO resolution A.437(XI), "Training of Crews in Fire - fighting".

3.6.2 Participants

The participants for this course are all categories of Officers.

3.6.3 Duration

The duration of this course is three days.

3.6.4 Venue

This course is presently being conducted by the training institution, "Rehman", at Nhava Island in Bombay Harbour, as presently SCI does not have its own physical training facilities for fire - fighting. However, with the setting up of the SCI Maritime Training Institute at Powai, Bombay, where fire - fighting training facilities will also be provided, Officers will be trained at the SCI institute.

3.6.5 Faculty

The faculty for this course is provided by training institution, "Rehman", at Nhava Island in Bombay harbour.

3.6.6 Course programme and syllabus

Day 1 Theory

.1 Introduction

- Introductory talk on special need for sea - going personnel to be effective fire - fighters when required.

- Film, "Fire Chemistry", (30 minutes).

.2 Theory of Combustion

- Fire triangle, heat, fuel, oxygen. Ignition temperatures, spontaneous ignition, spontaneous combustion, range of flammability. Effect of heat on different combustibles, transmission of heat.

- Principles of fire extinguishing:
  = Starvation, removal or limitation of fuel.
  = Smothering or the limitation of oxygen.
  = Cooling or the limtation of temperature.
  = Examples of each.
  = Interference with flame reaction.

.3 Fuels

- Solid:
  = Carbonaceous, wood, linen, clothing, furniture, rope and canvas, electrical insulation, rags and waste, some plastics, curtains, towels, decorative finishes, general cargo.
  = Evolution of gases, smoke, danger of flashover, re - ignition, importance of surface area.

- Liquids:
  = Oils, Class A, Flash Point less than 73 F (23 C). Highly Flammable.
  = Class B, Flash Point between 73 F (23 C) and 150 F (66 C). Flammable.
  = Class C, Flash Point above 150 F (66 C). Combustible.
  = Crude oils, refined oils, spirits, paints, lubricating oils, oils in hydraulic pressure systems, e.g. telemotor and remote controls. Effect of Reid vapour pressure, ignition temperature and spontaneous ignition temperature.

- Gases:
  = Methane, propane, butane, liquified petroleum gas, liquified natural gas. Gases evolved when bunkering in empty tanks. Gases evolved in pump rooms. Concentration, stratification and vapour travel.

.4 Sources of ignition on ships

- The particular hazards, protective arrangements and devices and their limitations should be stressed in each case.

- Flame or smouldering source:
  = Lighted matches, cigarettes, open stove or galley fire, boiler fires.

- Heated surfaces:
  = Electric lamps, electric hot plates, heated surfaces in galleys and pantries, steam pipes, diesel exhaust pipes, boiler casings, hot machinery (e.g. pump glands) in gaseous spaces.

- Sparks and hot flying particles:
  = Friction and mechanical sparks, e.g. grinding, chipping, welding and cutting.
  = Impact of ferrous and non - ferrous metals, e.g. anodes and tools on tankers, seizure of moving machinery.

= Sparks from electrical switches and even hand torches in gaseous spaces.

- Electrical:
  = Overloading of circuits giving excessive current, poorly fitted or improper connections, e.g. twisting one wire with another, fitting extra capacity fuses, overloading of plugs and sockets by adding other appliances, chafing of wires, short circuits, sparks at motors etc. particularly in gaseous atmospheres.

- Spontaneous combustion:
  = Cargo of cotton, wet slurry, coal etc. storage of mattresses and bed linen, particularly if damp.

- Static electricity in gaseous atmospheres:

  = Steam, CO2 or Tank washing water spray in oil tank. Importance of electrically bonding tools and appliances.

.5 Fire Prevention

- Stress need for good house - keeping, care to avoid disposal of lighted cigarettes and matches, danger of smoking in bed, care to avoid faulty electrical fittings, security of possible sources of ignition in heavy weather, e.g. light or radio falling on floor or on combustible material, accumulation of rags, waste or oil drippings, to avoid completing the fire triangle by bringing heat and fuel together in air, e.g. towel or clothing in contact with electric light etc.

.6 Portable Extinguishers

- Types of extinguishers, principles, operating instructions. Methods of inspection, cleaning and recharging water, foam and dry powder extinguishers.

.7 Fixed Installations, Fire mains, pumps etc.

- Description of typical installation of water services, including emergency fire pump, E.R. isolating valve, International shore connection and hose connections. Use and care of fire hose and appropriate nozzles for various types of fire and for boundary cooling. Description and mode of operation of foam making branch pipe and inductor unit.

Day 1 Practical

.1 Portable and semi - portable extinguishers

- Operation by each participant of water CO2, dry powder and foam type portable extinguishers on carbonaceous fire (wood cribs or similar fire in braziers) and oil or spirit fire in steel trays. Water and foam extinguishers are to be recharged by the participants. Actual experience of the effect of using a water jet on an oil fire in a tray.

- The means of ignition could be arranged to be some action of a participant, e.g. dropping a lighted match, switching on a defective circuit, or spilling flammable liquid on to a hot surface, he would then have to give an alarm, go for an extinguisher, come back and put the fire out.

- Operation of larger sizes of extinguishers on larger oil or spirit fires.

.2 Hoses, nozzles etc.

- Coupling up hoses, use of jet and spray nozzles on carbonaceous and oil fires. Use of spray nozzle, water curtain and very fine spray on larger oil or spirit fire, two hoses method of attack.

- Use of foam making branch pipe and inductor unit on oil fire.

Day 2 Theory

.1 Fire Protection

- Merchant Shipping Fire Appliances rules dealing with the provision of fire protection on ships of various types.

- Passenger ships:
  = Fire protection, Zoning, fire - proof bulkheads, fire doors, fire integrity and fire insulation systems.
  = Patrol and alarm systems. Portable extinguishers in passenger and crew accommodation, in galleys and service spaces. Fire main, fire hydrants and hoses in accommodation and on deck. Sprinkler system in accommodation, with detection alarm on bridge, pressure tank and automatic pumps.
  = Fixed fire extinguishing systems for cargo holds and main machinery spaces and detection system.
  = Emergency fire pump, shut off valve in rising main, Fireman's outfit i.e. breathing apparatus and protective clothing.

- Cargo ships:
  = Generally as above, without sprinkler system, with reduced amount of protective bulkheads and without patrol alarm systems.

- Additional appliances on special ships:
  = Tankers.
  = Ro - Ro vessels.
  = Container vessels.
  = Ships carrying explosives.
  = Ships carrying dangerous goods as specified in the IMDG code.

.2 Respiration, Breathing Apparatus and Resuscitation

- Respiration and the need for the body to have oxygen. Effect of rest, work and excitement on breathing rate and oxygen intake.

- Film, "Emergency Resuscitation".

- Use of breathing apparatus when entering a space where smoke vapours or foul air may be present, whether a fire is evident or not.

- Types of breathing apparatus, description and use:
  = Helmet or face mask type with air hose supplied by bellows.
  = Self contained compressed air type.
  Constructional features, operation, reducing and demand valves. Use and maintenance of apparatus, precautions in use, signals and emergency procedure and by - pass valve. Rescue operations.

.3 Fireman's Outfit and Protective Clothing

- Breathing apparatus, electric lamp, axe, helmet, suit, gloves, boots, life line and signal plates.

.4 Fixed Fire Extinguishing Installations

- Description, operation, precautions, testing and maintenance:
  = Sprinkler system.
  = CO2 system.
  = Halon system.
  = Foam systems.
  = Inert gas system.

Day 2 Practical

.1 Breathing Apparatus

- Instruction in wearing and usage of each type of breathing apparatus. Each participant to operate in both types of breathing apparatus in a restricted smoke filled chamber for 15 to 20 minutes with simulated fires. Difficulties and dangers to be made clear by demonstration.

.2 Fixed systems of installation

- Demonstration and operation of mock - up of sprinkler system, CO2 system and foam system.

- Resuscitation:
  = All participants to have some practice in simulated resuscitation on a dummy provided for the purpose.

Day 3 Theory

.1 Built - in fire protection

Additional information on zoning and isolation of each zone by fire - proof doors, fire - proof and insulated bulkheads etc. and including:

- Ventilation arrangements and closure arrangements.
  = Importance of the isolation of a space on six sides, closure of all openings, means of stopping fans and closing ducts at main supply and between zones. Closure of machinery spaces, cargo spaces, pump rooms etc. The need to see that self - closing doors are not wedged open or hooked back except by fusible or magnetic catch and so prevented from operating in case of fire.

- Oil fuel arrangements.
  = Control of oil fuel pumps, boiler fans, remote control of valves on oil fuel tanks, where this could release oil into a fire, danger of isolated and badly situated tanks and of unsatisfactory level indicators, e.g. gauge glasses which break in a fire and float and wire arrangements which allow overflow to fall onto hot surfaces. Precautions to be taken at oil fuelling stations, tankers loading and discharging cargo.

- Fire control plans.
  = Importance of ready availability of plan showing the positions of all fire protection arrangements, remote control arrangements, fire appliances and muster

stations for fire parties.

.2 Control stations

- Concept of a protected space, with safe and easy access from deck to embarkation stations which can be used as a centre for fighting a fire. Desirability of remote controls to tanks, pumps and closing arrangements being grouped in or adjacent to such a station with fire plans, fire equipment of all kinds and muster lists being placed therein.

.3 Damage control

- Effects on stability of free water in the ship, how to reduce total input of water to any space and to remove excess water or allow it to drain to less dangerous position. Danger of any openings in ship's side, portholes, cargo doors etc. if vessel lists or due to sinkage. Possibility of bottom damage in shallow water.

.4 Organisation of Fire Parties

- Need for overall leadership possibly with a number of parties.

- Organisation of parties for combating following fires:
  = Accommodation and service spaces.
  = Cargo tank and deck spaces.
  = Machinery spaces.
  = Large "spill over" fire on a tanker.
  = Special cases - L.P.G., L.N.G., Ro-Ro, Container ship etc.

Day 3 Practical

.1 Fire fighting exercise

- Practical fire fighting exercises with and without breathing apparatus to give all participants of the course

a realistic and convincing experience of operating under conditions involving smoke, heat and flame in large fires. Exercises would show the need for organised fire parties, demonstrate common faults in fire fighting i.e. reliance on too small or unsuitable extinguishers and the impracticability of fighting a large fire single handed when a party is available at a short distance. The need to give a rapid alarm and to demonstrate the rapid increase in intensity to emphasize the need to attack quickly unless the fire can be controlled by closure e.g. ship's holds, until the necessary appliances are brought up.

.2 Types of fire to be simulated

- Accommodation with large quantities of smoke and heat. Demonstrate re - ignition and flash over from mattresses and curtains etc.

- Galleys and Pantries.

- Machinery spaces, introduce obstacles and limited access with considerable smoke. Demonstrate re - ignition and difficulty in bringing hoses to bear.

3.7 Survival at Sea Course

3.7.1 Objective

The objective of the Survival at Sea course is to comply with the requirements of STCW 78, Resolution 19, "Training of Seafarers in Personal Survival Techniques".

3.7.2 Participants

The participants for this course are all Officers, Cadets, Petty - officers, and Ratings.

3.7.3 Duration

The duration of this course is one day (8 hours).

3.7.4 Faculty

The faculty for this course consists of an experienced Master and an ex - Naval Petty - officer.

3.7.5 Course Programme and Syllabus

Session I

Duration .... 30 minutes. (Class Room)

Introduction

.1 Types of emergencies, such as fire, collision, stranding, etc.

.2 Needs to adhere to the principles of Survival to combat:
- Drowning.
- Exposure to sea / weather.
- Lack of nourishment / water.

.3 Survival factors. Equipment, knowledge and will to survive.

.4 Actions prior to abandonment:

- Drills and their value, use of Life Jackets, Lifebuoys, Life boats, Life rafts and Buoyant apparatus.

- Sensible use of time prior to abandonment:
  = Take possible precautions to minimise hazards likely to occur on abandonment.
  = Collect additional food, blankets, water etc.

- Importance of maintaining body heat:
  = Clothing, effects of immersion in cold / tropical waters.
  = Rate of heat loss.

- Panic and its consequences:
  = Caused by fear.
  = Drills and knowledge give confidence, boost up morale.

- Case history.

Session II

Duration .... 90 minutes (Class room)

Dry Drill

.1 Life Jackets, description, wearing and use.

.2 Life rafts:

- Rigid and inflatable types, operation, stowage, release auto / manual.

- Inflation and boarding.

- Description of parts, capacity, safety factors, fixed equipment.

- Ancillary equipment, survival pack, location aids, rations etc.

.3 Initial action on boarding life raft:

- Cut painter, clear away from vessel.

- Stream drogue.

- Close entrance.

- Maintain life raft.

.4 Film, "This is your life raft".

Session III

Duration .... 90 minutes (Class room)

.1 Principles of craftmanship:

- Protection:
  = Initial and secondary action in hot and cold climates, against fire, oil pollution, shark infested waters, treatment to injured survivors, seasickness, loss of body fluid, morale.

- Location:
  = Pyrotechnics, radio, torch, heliograph and improvisation.

- Water:
  = Dehydration, rationing, sources of water, seawater, urine, misbeliefs.

- Food:
  = Misbeliefs, eat carbohydrates, avoid proteins (e.g. fish and meat), survival ration, avoid alcohol.

.2 Medical Aspects

- First aid in survival environments:
  = Breathing difficulty, bleeding, unconsciousness, wounds, burns, resuscitation.

- Cold injuries:
  = Frostbite, immersion foot.

- Hypothermia:
  = Symptoms, causes, consequences, exposure, loss of body heat, body temperature less than 36.9 C, treatment, prevention.

.3 Films, "Survival at Sea", (Parts I and II).

Session IV

Duration .... 30 minutes (Class room)

.1 Rescue

- Helicopter rescue, hoisting and signals.

- Coast Guard, SAR procedures.

- Search and rescue organisations.

.2 Film, "Cold can Kill".

Session V

Duration .... 3 hours (Swimming Pool)

Wet Drill

.1 Life jackets, wearing and checking.

.2 Swimming with life jackets on.

.3 Floating in "HELP" posture (minimum heat loss posture).

.4 Rescuing procedure, towing, pushing.

.5 Inflating the life raft:
- Familiarisation, parts and equipment.
- Initial action on boarding.
- Rough weather routine.

.6 Jumping from 5 meter height with life jacket on.
- Entering life raft:
  = unaided .... twice each participant;
  = aided .... once each (as injured) particpant.

.7 Uprighting an inverted life raft, twice each participant.

3.8 Mid - term Course

3.8.1 Objectives

The objectives of the Mid - term course are as follows:

- to build up on the knowledge and skills acquired by the cadets during their pre - sea training and their practical training period at sea;

- to substantially cover the syllabus for Second Mate (F.G.) certificate of competency and to provide guidance to the cadets to enable them to effectively utilize their balance period at sea in preparation for the Second Mate (F.G.) examination;

- to complete the supplementary certificate requirements for Second Mate (F.G.) certificate of competency, such as:
  = Proficiency in Survival Craft course;
  = Survival at Sea course;
  = First Aid at sea course;
  = Fire fighting course; and
  = Radar Observer course.

3.8.2 Participants

The participants for this course are cadets with a minimum period of one year sea service.

3.8.3 Duration

The duration of this course is two months.

3.8.4 Faculty

The faculty for this course consists of experienced Masters, to cover the professional subjects.

The visiting faculty consists of college professors

to cover the academic subjects.

3.8.5 Course Programme

An outline of the course programme is given below:

.1 Subjects:

- Nautical Mathematics
- Nautical Physics
- General Ship Knowledge
- Bridge Equipment and Watchkeeping
- Meteorology
- Practical Navigation
- Chart Work
- Principles of Navigation
- Orals and Practicals
- Signals and Communications
- Special lectures on Container operations, Tanker operations.

.2 Proficiency in Survival Craft

In addition to class room lectures, practical training in handling of life boats is given by arranging visits to ships in the harbour and using their boats for training purposes.

.3 Survival at Sea Course

This course has already been described at 3.7 on page 78.

.4 First Aid Course

The duration of this course is one week and it is conducted by the staff of St. John's Ambulance.

.5 Fire - fighting Course

The duration of this course is one day and it is conducted by the training centre at Bharat Petroleum Refinery at Bombay. Details of this course are given at 3.10 on page 89.

.6 Radar Observer's Course

This course has been described at 3.9 on page 86.

.7 Visit to Nehru Planetarium

A special programme is organised by the Planetarium staff and together with an experienced Master, the astronomical aspects and salient features of celestial navigation are explained.

.8 Visit to Central Labour Institute

The training centre at the Central Labour Institute is equipped with working models of cargo handling gear. A special programme is organised by the Institute staff, to demonstrate, with the use of working models, the various forces that come into play and the load experienced per unit load on the various components of cargo gear, when handling cargo.

.9 Extra - curricular activities

- Yoga : Conducted by a visiting instructor from the Yoga Institute. It consists of 40 sessions, each of 40 minutes duration, held early in the morning.

- Physical Training : Held on days when Yoga practice is not in session.

- Parade Training
- Swimming
- Games : Choice of outdoor and indoor sports activities.

3.9 Radar Observer Course

3.9.1 Objectives

The objectives of the Radar Observer course are as follows:

- to comply with the supplementary certificate requirements for a Second Mate (F.G.) certificate of competency;

- to comply with the requirements of STCW 78, 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", Appendix paragraph 3, "Radar Navigation"; and

- to comply with the requirements of IMO Resolution A.483(XII), "Training in Radar Observation and Plotting".

3.9.2 Participants

The participants for this course are cadets with a minimum period of one year sea service.

3.9.3 Duration

The duration of this course is two weeks.

3.9.4 Faculty

The faculty for this course consists of experienced Masters and an experienced Electrical Officer with an ex - Naval background and having a good knowledge of Radar electronics.

3.9.5 Course Programme

Day 1

0800 - 1030 : Radio waves. Principles of Radar, simple block diagram.

1045 - 1245 : Important characteristics of targets, aspects etc. on detection and range.

1345 - 1600 : Radar reports. Introduction to plotting. Relative and True plots.

Day 2

0800 - 1030 : Radar plotting.

1045 - 1245 : - Contd. -

1345 - 1600 : - Contd. -

Day 3

0800 - 1030 : C.R.T.,"A" Scan, P.P.I.,Operating controls. Advanced block diagram.

1045 - 1245 : Radar picture and chart, weather effects, anomalous propagation.

1345 - 1600 : Radar plotting.

Day 4

0800 - 1600 : Ship visit for Radar practicals.

Day 5

0800 - 1030 : Blind and Shadow sectors, spurious echoes, Radar interference.

1045 - 1245 : Radar plotting.

1345 - 1600 : Factors governing maximum and minimum range. Effects of pulse length, pulse repetition frequency, horizontal beam width. Bearing and range discrimination.

Day 6

0800 - 1030 : Types of scanners, siting scanners, wave guide. Display unit, Transceiver unit etc.
1045 - 1245 : Misalignment of heading line / scanner. Errors in Radar ranges and bearings. Error of parallax.
1345 - 1600 : Radar plotting.

Day 7

0800 - 1600 : Ship visit for Radar practicals.

Day 8

0800 - 1030 : Radar log, Operation manual and records.
1045 - 1245 : Performance monitor. Radar maintenance.
1345 - 1600 : Application of Collision Regulations.

Day 9

0800 - 1030 : Radar plotting.
1045 - 1245 : - Contd. -
1345 - 1600 : - Contd. -

Day 10

0800 - 1030 : Radar beacons. Plotting aids, ARPA. Limitations.
1045 - 1245 : Radar plotting.
1345 - 1600 : Parallel index techniques. Application of Collision Regulations.

Day 11

0800 - 1600 : Ship visit for Radar practicals.

Day 12

0800 - 1600 : Ship visit for Radar practical examination.

Day 13

0800 - 1030 : Theory revision.
1045 - 1245 : Plotting revision.
1345 - 1600 : Class test.

Day 14

0900 - 1200 : Radar theory and plotting examination.

3.10 Fire - Fighting Course

3.10.1 Objectives

The objectives of the Fire - Fighting course are as follows:

- to comply with the requirements of STCW 78, Regulation II/6, "Mandatory Minimum Requirements for Ratings Forming Part of a Navigational Watch", paragraph 2.(d)(i), which is reproduced below:

  "2. Every Rating forming part of a navigational watch on a sea - going ship of 200 gross register tons or more shall:
  (d) have experience or training which includes:
  (i) basic principles of fire - fighting, ..."

- to comply with the requirements of STCW 78, Regulation III/6, "Mandatory Minimum Requirements for Ratings Forming Part of an Engine Room Watch", paragraph 2.(c)(i), which is reproduced below:

  "2. Every Rating forming part of an engine room watch shall:
  (c) satisfy the administration as to:
  (i) experience or training regarding fire - fighting, ..."

- to comply with the requirements of IMO Resolution A.437(XI), "Training of Crews in Fire - Fighting".

3.10.2 Participants

The participants for this course are Cadets, Petty - Officers, and Ratings.

3.10.3 Duration

The duration of this course is one day.

3.10.4 Venue

This course is presently being conducted by the training centre at Bharat Petroleum refinery at Bombay, as presently SCI does not have its own physical training facilities for fire - fighting. However, with the setting up of the SCI Maritime Training Institute at Powai, Bombay, where fire - fighting training facilities will also be provided, the afore - mentioned participants will be trained at the SCI institute.

3.10.5 Faculty

The faculty for this course is provided by the training centre at Bharat Petroleum refinery.

3.10.6 Course Programme

Day 1 Theory

0900 - 0950 : Elements of fire and explosion, fire triangle. Flammable materials, sources of ignition, spread of fire.

1000 - 1050 : Film, "Fire Chemistry". Classification of fire and applicable extinguishing agents. Main causes of fire on board ships.

1105 - 1200 : Fire detection, fire - fighting equipment, fixed installation, general equipment.

1205 - 1300 : Ship fire - fighting organisation. Fire - fighting methods.
Film, "Fire - fighting".

1400 - 1445 : Fireman's outfit and personal equipment.
Resuscitation methods.
Films, "Use of breathing apparatus" and "Resuscitation methods".

Practical

1500 - 1700 : .1 Extinguish small fires with various types of portable extinguishers. Re-charging portable extinguishers.
.2 Extinguish large fire with water, jet and spray nozzles.
.3 Extinguish large fire with foam.
.4 Effect a rescue in a smoke - filled space wearing breathing apparatus. Entry into enclosed space.

3.11 Welding Course

3.11.1 Objective

The objective of the Welding course is to provide practical training to certain Petty - Officers, so that they can develop their skills in workshop practice and welding which will then be utilised effectively, when on shipboard duties, for maintenance and repairs.

3.11.2 Participants

The participants for this course are Fitters, P.O. Maintenance and Assistant Pumpman.

3.11.3 Duration

The duration of this course is 40 days.

3.11.4 Brief Description

This course is conducted at the workshop of Advani Oerlikon at Bombay. Practical training is given to the participants in the operation of lathe machines, drilling, cutting, turning and welding.

3.12 Assistant Pumpman's Course

3.12.1 Objective

The objective of the Assistant Pumpman's course, is to provide an introduction to marine engineering practice and tanker operations prior to their joining shipboard duties.

3.12.2 Participants

The participants for this course are Assistant Pumpmen who have recently joined the SCI and may not be having any shipboard experience.

3.12.3 Duration

The duration of this course is three weeks.

3.12.4 Faculty

The faculty for this course consists of tanker experienced Masters and Chief Engineer Officers.

3.12.5 Course Programme

Day 1

1000 - 1050 : Course inauguration. Bio - data and general acquaintance.
1105 - 1200 : Ship's terminology, deck, accommodation, engine room and pump room.
1210 - 1300 : - Contd.-

1400 - 1450 : SCI and Shipboard organisation.
1500 - 1550 : Duties of Petty - Officers and Pumpmen.
1605 - 1700 : General tools and their applications.

Day 2

1000 - 1050 : Fresh water generator.
1105 - 1200 : Level and flow measurements.
1210 - 1300 : Stores and spares inventory.

1400 - 1450 : Introduction to tankers.
1500 - 1550 : Typical layout of cargo systems.
1605 - 1700 : - Contd.-

Day 3

1000 - 1050 : Special tools.
1105 - 1200 : Compressors and compressed air system.
1210 - 1300 : Electrical measurements.

1400 - 1450 : Internal combustion engines, main and auxiliary engines.
1500 - 1550 : Reciprocating pumps.
1605 - 1700 : Gauges.

Day 4

1000 - 1050 : Heavy weather precautions.
1105 - 1200 : Tanker safety.
1210 - 1300 : Pipe lines and expansion joints.

1400 - 1450 : Boilers.
1500 - 1550 : Cost control.
1605 - 1700 : Centrifugal pumps.

Day 5

1000 - 1050 : Bunkering precautions.
1105 - 1200 : Heat exchangers.
1210 - 1300 : Valves used on tankers.

1400 - 1450 : Enclosed spaces. Engine and pump room ventilation systems.
1500 - 1550 : Purifiers.
1605 - 1700 : Films on tanker safety.

Day 6

0900 - 1700 : Fire - fighting training at Bharat Petroleum refinery. See 3.10, page 89, for details.

Day 7

1000 - 1050 : Cetrifugal pumps.
1105 - 1200 : Temperature and pressure measurements.
1210 - 1300 : Cargo oil pump turbines.

Day 8

1000 - 1050 : Filters, types, uses and maintenance.
1105 - 1200 : Correct use of lifting gear, tackles etc.
1210 - 1300 : Cargo operations, loading and discharging.

1400 - 1450 : Ballasting and de - ballasting.
1500 - 1550 : Cargo pump starting and stopping precautions.
1605 - 1700 : Expansion joints and pipeline maintenance.

Day 9

1000 - 1050 : Basic Seamanship.
1105 - 1200 : Precautions of working on pressure lines.

1210 - 1300 : Lubrication, types of bearings and methods of lubrication.

1400 - 1450 : Tank cleaning and gas freeing.
1500 - 1550 : Stripper pump starting and stopping precautions.
1605 - 1700 : Fire control plan, deck, accommodation, engine and pump rooms.

Day 10

1000 - 1050 : CO2 system.
1105 - 1200 : Hydraulic system for cargo tank valves.
1210 - 1300 : Safety with electricity.

1400 - 1450 : Introduction to Pollution Prevention.
1500 - 1550 : Gland packings, types and application.
1605 - 1700 : Safety trips, remote switches.

Day 11

1000 - 1050 : Deck Froth system.
1105 - 1200 : Trouble indication of a running pump and remedial action.
1210 - 1300 : Hot work, welding and gas cutting precautions.

1400 - 1450 : Ullaging, sampling and static precautions.
1500 - 1550 : Operation of bilge systems.
1605 - 1700 : Films on Pollution Prevention.

Day 12

0900 - 1700 : Survival at Sea Course.
See 3.7 page 78, for details.

Day 13

1000 - 1050 : Inert gas system.
1105 - 1200 : - Contd.-
1210 - 1300 : Jointings, types and applications.

1400 - 1450 : Fire station duties, emergency shut down, quick closing valves, watertight doors, emergency escapes etc.

1500 - 1550 : Tanker equipment, closed ullaging system, venting system and stripping system.

1605 - 1700 : Introduction to crude oil washing.

Day 14

1000 - 1050 : Hydraulic deck machinery, windlass and winches, operation and maintenance.

1105 - 1200 : - Contd.-

1210 - 1300 : Inert gas system maintenance.

1400 - 1450 : Overhauling of valves.

1500 - 1550 : Watchkeeping routine, engine room and pump room.

1605 - 1700 : Alarms, signals, emergency action, flooding, fire casualty.

Day 15

1000 - 1050 : Care and maintenance of cargo pumps.

1105 - 1200 : Saturday routine, checking and trying out safety equipment and systems.

1210 - 1300 : Emergency generator, compressor.

1400 - 1450 : Care and maintenance of stripping pumps.

1500 - 1550 : Planned maintenance routines.

1605 - 1700 : Films on Tanker operations.

Day 16

1000 - 1300 : Written test, closing discussion and course evaluation.

3.13 Assistant Catering Officer's Course

3.13.1 Objective

The objective of the Assistant Catering Officer's course is to develop their knowledge and skill so that they would be able to effectively perform their shipboard duties as a Petty - Officer in charge of the Catering Department.

3.13.2 Participants

The participants for this course are candidates who have been selected for the post of Assistant Catering Officer.

3.13.3 Duration

The duration of this course is one month.

3.13.4 Brief Description

This course is conducted by the training institute "Rehman" at Nhava Island in Bombay harbour. It has been specially developed to cover shipboard catering management aspects.

Table 3.2 Other Courses Organized by Training Department

	COURSES / DURATION / Number Held	PARTICIPANTS	CONDUCTED BY
.1	Advanced Computer and Systems Concepts. Duration : 6 days Number : 2	Officers from Computer dept.	SYSCOM Bombay
.2	Budgetting and Cost Control Duration : 14 days Number : 3	Shore Officers	TRAINMAR Bombay
.3	Bulk Liquid Cargo Measurement and Loss Prevention. Duration : 5 days Number : 2	Masters, Chief - Officers, Shore Technical and Commercial Officers and Oil industry personnel.	Redwood International (U.K.)
.4	Container Shipping Management. Duration : 16 days Number : 2	Shore Technical and Commercial Officers	TRAINMAR Bombay
.5	Container Technology. Duration : 9 days and 3 days Number : 2	Masters, Chief - Officers, Shore Technical and Commercial Offrs.	Bremen Nautical Institute and SCI
.6	Corporate Planning Seminar. Duration : 2 days Number : 1	Shore Officers	SCI
.7	COW / IGS Seminar Duration : 3 days Number : 1	Masters, Technical Supdts. and Surveyors (Admn.)	BP Tanker Co. (U.K.)

COURSE / DURATION / Number Held	PARTICIPANTS	CONDUCTED BY
.8 Fire Fighting Duration : 3 days Number : 89	Ship's Officers	Naval Institution, "Shivaji" at Lonavala
.9 General Ship Management Duration : 16 Saturdays Number : 4	Shore Officers	Narottam Morarjee Inst. and SCI
.10 Hydraulic Deck Cranes Maintenance Duration : 5 days Number : 2	Engineer Officers and Engineer Superintendents	Hagglunds of Sweden
.11 Joint Shipping Management Seminar Duration : 6 days Number : 5	Shore Officers	Institute of Shipping Economics, Bremen and SCI
.12 M.A.N. Engines Duration : 5 days Number : 1	Engineer Officers and Engineer Superintendents	M.A.N. of West Germany
.13 Man Management Duration : 5 days Number : 4	Ship's Officers	SCI and visiting faculty
.14 Management Development Programme Duration : 14 days Number : 7	Shore Officers	Nagpur University
.15 Marine Transport Duration : 12 days Number : 1	Shore Officers	IMO, London

COURSES / DURATION / Number Held	PARTICIPANTS	CONDUCTED BY
.16 Material Management and Inventory Control Duration : 8 days Number : 1	Shore Officers	National Institute for Training in Industrial Engineering
.17 Refrigeration Duration : 3 days Number : 2	Engineer Officers and Engineer Superintendents	Kirloskar, Pune
.18 Safety in Engineering Industry Duration : 8 days Number : 1	Shore Officers	Central Labour Institute, Sion, Bombay.
.19 Seminar on Marine Pollution SEMARPOL '84 Duration : 6 days Number : 1	Technical Supdts. Surveyors (Admn.) Oil Industry Personnel	IMO London
.20 Senior Officer's Staff Course Duration : 8 days Number : 14	Masters and Chief Engineer Officers	SCI
.21 Tanker Safety, IGS and COW Duration : 12 days Number : 1	Ship's Officers Technical Supdts. Lecturers from Nautical and Engg. College and Surveyors (Admn.)	College of Nautical Studies (Warsash) and Wilson Walton (U.K.)
.22 Tanker Technology Workshop Duration : 4 days Number : 1	Ship's Officers Technical Supdts.	SCI

CHAPTER FOUR

COMPLIANCE WITH STCW 78

4.0 COMPLIANCE WITH STCW 78

4.1 General

One of the major breakthroughs in recent maritime history, with regard to setting of global minimum standards in education and training of seafarers,is the entry into force on 28-04-1984 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW 78).

Analysis of a number of maritime accidents have shown that on many occasions in spite of the vessels being very well equipped human error had contributed more than 80 % towards the cause of the accidents. In order to reduce this factor of human error, education and training of seafarers plays a very important role. Hence, by laying down the minimum standards of education and training in the STCW 78, it would improve the overall standards of education and training of seafarers on an international scale. It is indeed a laudable effort by IMO to meet their overall objective of safer shipping and cleaner oceans through higher standards of education and training of seafarers.

This convention was ratified by India in February 1985.

The general obligations under the Convention, are contained in Article I, which is reproduced below for ready reference:

"(1) The Parties undertake to give effect to the provisions of the Convention and the Annex thereto, which shall constitute an integral part of the Convention. Every reference to the Convention constitutes at the same time a reference to the Annex.

(2) The Parties undertake to promulgate all laws, decrees, orders and regulations and to take all other steps which may be necessary to give the Convention full and complete effect,

so as to ensure that, from the point of view of safety of life and property at sea and the protection of the marine environment, seafarers on board ships are qualified and fit for their duties."

4.2 Mandatory Minimum Requirements

The mandatory minimum requirements, in order to comply with the Convention, are contained in the Annex - Regulations, which are divided into six chapters as follows:

"Annex - Regulations

Chapter I General provisions
(Regulations I/1 - I/4)

Chapter II Master - deck department
(Regulations II/1 - II/8)

Chapter III Engine department
(Regulations III/1 - III/6)

Chapter IV Radio department
Radio watchkeeping and maintenance
(Regulations IV/1 - IV/3)

Chapter V Special requirements for tankers
(Regulations V/1 - V/3)

Chapter VI Proficiency in survival craft
(Regulation VI/1) ".

A study has been carried out at Table 4.1 on page 104, which gives a summary of the compliance by SCI, with the mandatory minimum requirements of the Convention.

Table 4.1 Compliance by SCI with the Mandatory Minimum Requirements of STCW 78

ANNEX - REGULATIONS	COMPLIANCE / REMARKS
Master - deck department	
II/1 : Basic Principles to be Observed in Keeping a Navigational Watch	Total compliance. Developed fleet circular and booklet.
II/2 : Mandatory Minimum Requirements for Certification of Masters and Chief Mates of Ships of 200 GRT or More	Total compliance. See table 2.4 on page 18 for training and certification.
II/3 : Mandatory Minimum Requirements for Certification of Officers in Charge of a Navigational Watch and of Masters of Ships of Less than 200 GRT	Total compliance.
II/4 : Mandatory Minimum Requirements for Certification of Officers in Charge of a Navigational Watch on Ships of 200 GRT or More	Total compliance. See table 2.4 on page 18 for training and certification.
II/5 : Mandatory Minimum Requirements to Ensure the Continued Proficiency and Updating of Knowledge for Masters and Deck Officers	Partial compliance. Refresher and Updating Courses to be developed.
II/6 : Mandatory Minimum Requirements for Ratings Forming Part of a Navigational Watch	Total compliance.

ANNEX - REGULATIONS	COMPLIANCE/REMARKS
II/7 : Basic Principles to be Observed in Keeping a Watch in Port	Total compliance. Developed fleet circular and booklet.
II/8 : Mandatory Minimum Requirements for a watch in Port on Ships Carrying Hazardous Cargo	Total compliance.
Engine department	
III/1 : Basic Principles to be Observed in Keeping an Engineering Watch	Total compliance. Developed fleet circular and booklet.
III/2 : Mandatory Minimum Requirements for Certification of Chief Engineer Officers and Second Engineer Officers of Ships Powered by Main Propulsion Machinery of 3000 kW Propulsion Power or More	Total compliance. See table 2.8 on page 23, for training and certification.
III/3 : Mandatory Minimum Requirements for Certification of Chief Engineer Officers and Second Engineer Officers of Ships Powered by Main Propulsion Machinery between 750 kW and 3000 kW Propulsion Power	Total compliance. See table 2.8 on page 23, for training and certification.
III/4 : Mandatory Minimum Requirements for Certification of Engineer Officers in Charge of a Watch in a traditionally Manned Engine Room or Designated Duty Engineer Officers in a Periodically Unmanned Engine Room	Total compliance.

ANNEX - REGULATIONS	COMPLIANCE/REMARKS
III/5 : Mandatory Minimum Requirements to Ensure the Continued Proficiency and Updating of Knowledge for Engineer Officers.	Partial compliance. Refresher and Updating courses need to be developed.
III/6 : Mandatory Minimum Requirements for Ratings Forming Part of an Engine Room Watch	Total compliance.
Radio department	
IV/1 : Mandatory Minimum Requirements for Certification of Radio Officers	Total compliance. See table 2.5 on page 20, for training and certification.
IV/2 : Mandatory Minimum Requirements to Ensure the Continued Proficiency and Updating of Knowledge for Radio Officers	Partial compliance. Refresher and Updating courses need to be developed.
IV/3 : Mandatory Minimum Requirements for Certification of Radiotelephone Operators	Total compliance.
Special Requirements for Tankers	
V/1 : Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Oil Tankers	Total compliance. Tanker Technology course has been described at 3.2 on page 37.

ANNEX - REGULATIONS	COMPLIANCE/REMARKS
V/2 : Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Chemical Tankers	Presently not applicable to SCI, as there are no Chemical Tankers in the fleet.
V/3 : Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Liquefied Gas Tankers	Presently not applicable to SCI, as there are no Liquefied Gas Tankers in the fleet.
Proficiency in Survival Craft	
VI/1 : Mandatory Minimum Requirements for the Issue of Certificates of Proficiency in Survival Craft	Total compliance.

4.3 Comments on compliance by SCI with the Mandatory Minimum Requirements of STCW 78

It will be observed from table 4.1, that with the exception of Regulations II/5, III/5 and IV/2, "Mandatory Minimum Requirements to Ensure the Continued Proficiency and Updating of Knowledge for Masters, Deck Officers, Engineer Officers and Radio Officers", there is total compliance by SCI with the mandatory minimum requirements of the Convention.

In order to illustrate the requirements of refresher and updating courses, given below is an extract of paragraph 2 of Regulation II/5 of the Convention.

"2. The Administration shall, in consultation with those concerned, formulate or promote the formulation of a structure of refresher and updating courses, either voluntary or mandatory, as appropriate, for masters and deck officers who are serving at sea, especially for re-entrants to sea-going service. The Administration shall ensure that arrangements are made to enable all persons concerned to attend such courses as appropriate to their experience and duties. Such courses shall be approved by the Administration and include changes in marine technology and relevant international regulations and recommendations concerning the safety of life at sea and the protection of the marine environment."

The requirements of refresher and updating courses for engineer officers and radio officers are similar to the above requirements for masters and deck officers.

Owing to continuous technological developments in the maritime sector and in order to comply with the requirements of the Convention, there is a vital need to develop the afore mentioned refresher and updating courses.

The development of refresher and updating courses will now be discussed in chapter six, "Development of Courses".

4.4 Recommendations / Resolutions

The Resolutions adopted by the Conference are contained in "Attachment 2" of the Convention. Although the requirements of the Resolutions are not mandatory, they are recommended by the Convention.

A study has been carried out at table 4.2 on page 110, which gives a summary of the compliance by SCI with the Resolutions of the Conference.

Table 4.2 Compliance by SCI with the Resolutions / Recommendations of STW Conference

RESOLUTIONS (Annex)	COMPLIANCE/REMARKS
1 : Recommendation on Operational Guidance for Officers in Charge of a Navigational Watch	Total compliance. Developed fleet circular and booklet. See also Reg. II/1.
2 : Recommendation on Operational Guidance for Engineer Officers in Charge of an Engineering Watch	Total compliance. Developed fleet circular and booklet. See also Reg. III/1.
3 : Recommendation on Principles and Operational Guidance for Deck Officers in Charge of a Watch in Port	Total compliance. Developed fleet circular and booklet. See also Reg. II/7.
4 : Recommendation on Principles and Operational Guidance for Engineer Officers in Charge of an Engineering Watch in Port	Total compliance. Developed fleet circular and booklet.
5 : Recommendation on Basic Guidelines and Operational Guidance Relating to Safety Radio Watchkeeping and Maintenance for Radio Officers	Total compliance. Developed fleet circular and booklet.
6 : Recommendation on Basic Guidelines and Operational Guidance Relating to Safety Radio Watchkeeping for Radiotelephone Operators	Total compliance. Developed fleet circular and booklet.
7 : Recommendation on Minimum Requirements for Certification of Radio Operators	Not applicable to SCI as there are no Radio Operators employed.

RESOLUTIONS (Annex)	COMPLIANCE/REMARKS
8 : Additional Training for Ratings Forming Part of a Navigational Watch	Total compliance. See also Regulation II/6
9 : Recommendation on Minimum Requirements for a Rating Nominated as the Assistant to the Engineer Officer in Charge of the Watch	Total compliance.
10 : Recommendation on Training and Qualifications of Officers and Ratings of Oil Tankers	Total compliance for Officers and Petty-Offrs. Partial compliance for Ratings. See also Regulation V/1.
11 : Recommendation on Training and Qualifications of Officers and Ratings of Chemical Tankers	Presently not applicable to SCI, as there are no Chemical Tankers in the fleet.
12 : Recommendation on Training and Qualifications of Officers and Ratings of Liquefied Gas Tankers	Presently not applicable to SCI, as there are no Liquefied Gas Tankers in the fleet.
13 : Training and Qualifications of Officers and Ratings of Ships Carrying Dangerous and Hazardous Cargo other than in Bulk	Partial compliance. Need to develope this course.
14 : Recommendation on Training for Radio Officers	Partial compliance. See also Regulation IV/1.
15 : Recommendation on Training for Radiotelephone Operators	Total compliance. See also Regulation IV/2.

RESOLUTIONS (Annex)	COMPLIANCE/REMARKS
16 : Technical Assistance for the Training and Qualifications of Masters and Other Responsible Personnel of Oil, Chemical and Liquefied Gas Tankers	Presently not required as expertise in Oil Tankers is available within SCI. However, may be required at a later date when SCI acquires Chemical or Liquefied Gas Tankers.
17 : Additional Training for Masters and Chief Mates of Large Ships and of Ships with Unusual Manoeuvring Characteristics.	Partial compliance. Need to develop this course.
18 : Radar Simulator Training	Need to develop this course.
19 : Recommendation on Training of Seafarers in Personal Survival Techniques	Total compliance. Survival at Sea course has ben described at 3.7 on page 78. See also Regulation VI/1.
20 : Training in the Use of Collision Avoidance Aids	Need to develop this course.
21 : International Certificate of Competency	For action by Administration.
22 : Human Relationships	Need to develop this course.
23 : Promotion of Technical Co-operation	-----

4.5 Further Resolutions adopted vide IMO Assembly sessions XI, XII, and XIII

Since the time when the STW Conference was held at London in July 1978, further Resolutions concerning education and training of seafarers vide IMO Assembly sessions XI, XII and XIII have been adopted. Some of these Resolutions have further augmented the requirements contained in the Convention. The requirements of these additional Resolutions are not mandatory, but are recommended for implementation.

A study has been carried out at table 4.3 on page 114, which gives a summary of the compliance by SCI with the Resolutions adopted at IMO Assembly sessions XI, XII, and XIII.

Table 4.3 Compliance by SCI with relevant Resolutions adopted after STW Conference

RESOLUTIONS	COMPLIANCE/REMARKS
A.437 (XI) Training of crews in fire - fighting.	
Annex I : Basic training of crews in fire - fighting.	Total Compliance. Fire - fighting course has been described at 3.10 on page 90.
Annex II : Advanced training in fire - fighting.	Total Compliance. Fire - fighting course has been described at 3.6 on page 68.
A.438 (XI) Training and qualifications of persons in charge of medical care aboard ship.	Need to develop this course.
A.481 (XII) Principles of safe manning.	Total Compliance.
Annex 1 : Contents of minimum safe manning document.	
Annex 2 : Guidelines for the application of principles of safe manning.	
A.482 (XII) Training in the Use of Automatic Radar Plotting Aids (ARPA).	Need to develop this course. See also Res. 18 and 20.
Annex 1 : Minimum requirements for Training in the use of ARPA.	
Annex 2 : Recommended Training Programme in the Operational Use of ARPA.	

RESOLUTIONS		COMPLIANCE/REMARKS
A.483 (XII)	Training in Radar Observation and Plotting. Annex : Recommended Training Programme in Radar Observation and Plotting.	Total Compliance. Radar Observer Course has been described at 3.9 on page 86.
A.484 (XII)	Basic principles to be observed in keeping a Navigational Watch on board Fishing Vessels.	Presently not applicable to SCI, as there are no fishing vessels in the fleet.
A.537 (XIII)	Training of Officers and Ratings Responsible for Cargo Handling on Ships carrying Dangerous and Hazardous substances in solid form in bulk or in packaged form.	Need to develop this course.
A.538 (XIII)	Maritime Safety Training of Personnel on Mobile Offshore Units.	Presently not applicable as SCI is not manning any of the Mobile Offshore Units.

4.6 Comments on Compliance by SCI with the Resolutions of STW Conference and later Resolutions

It will be observed from tables 4.2 and 4.3, on pages 110 and 114 respectively, that the following courses need to be developed to comply with the requirements of the Resolutions of STW Conference and later Resolutions adopted vide IMO Assembly Sessions XI, XII and XIII.

Resolution	Course
STW Conf. Res.10	Oil Tanker Familiarisation Course for Ratings.
STW Conf. Res.13 and A.537(XIII)	Dangerous and Hazardous Cargo Course. Basic course for Deck Ratings and P.O. Advanced course for Deck Officers.
STW Conf. Res.14	Radio / Electronic Equipment Maintenance Course for Radio Officers.
STW Conf. Res.17	Ship Handling Course for Masters and Chief Officers.
STW Conf. Res.18	Radar Simulator Training for Masters and Navigating Officers.
STW Conf. Res.20 and A.482(XII)	ARPA Course for Masters and Navigating Officers.
STW Conf. Res.22	Human Relationships Course for all Officers.
Res. A.438(XI)	Medical Care Course for Masters and Chief Officers.

The development of the afore-mentioned courses will now be discussed in chapter six, "Development of Courses".

CHAPTER FIVE

SCI's

MARITIME TRAINING INSTITUTE

5.0 SCI's MARITIME TRAINING INSTITUTE

5.1 General Description

The need for SCI to set up its own Maritime Training Institute has already been explained at 1.4, on page 9. The Institute will provide all the facilities for conducting specialised courses for maritime personnel. Courses will be offerred not only to SCI personnel, but also to maritime personnel of other Indian shipping companies and the Indian shipping industry.

The Institute is presently under construction. It is located at Powai, a suburb of Bombay, on about 45 acres of undeveloped land. Construction has commenced in April 1985 and is expected to be completed by the end of 1986.

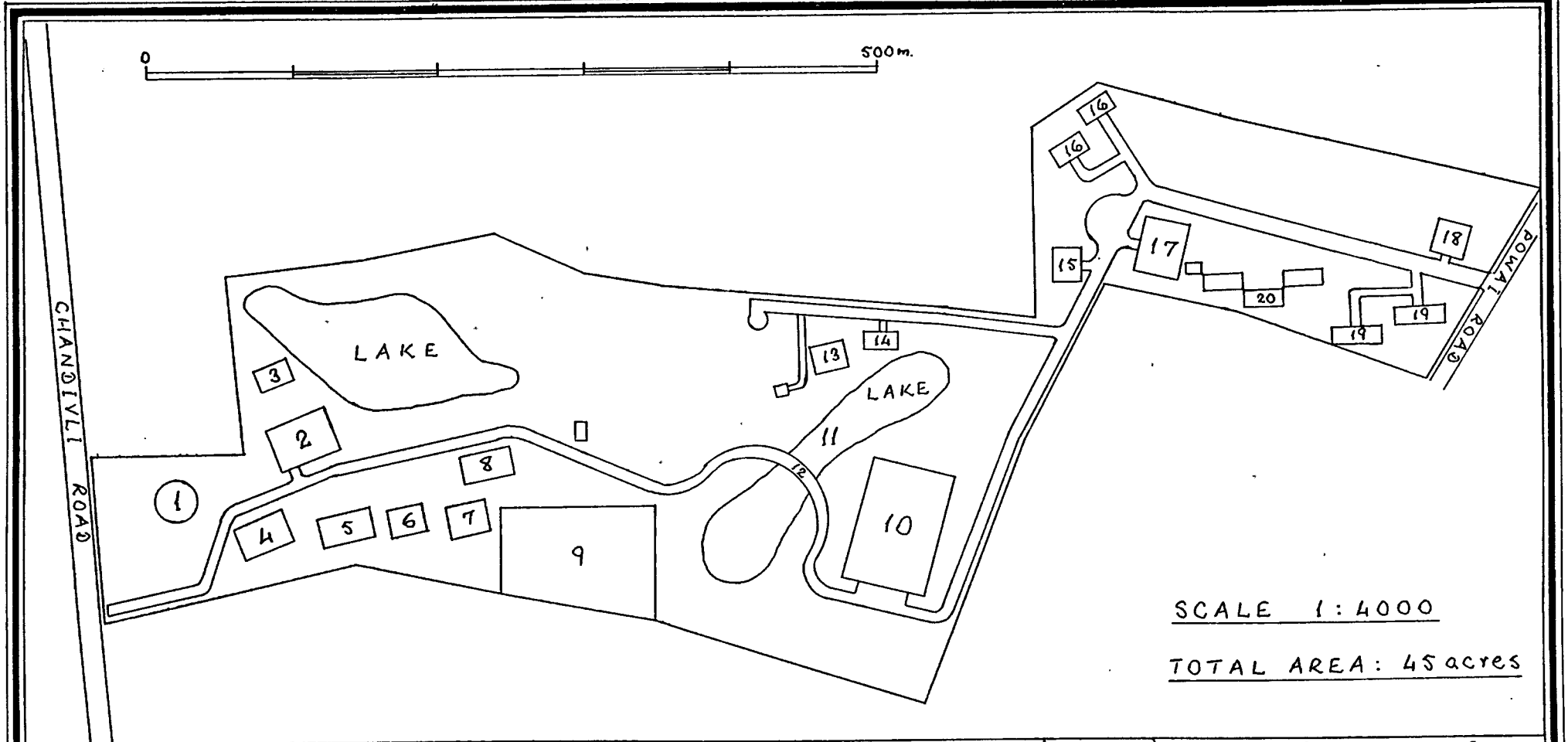
An outline of the layout of the institute is shown in the plan at fig. 5.1 on page 119.

5.2 Physical Facilities

5.2.1 Administrative Block

The Administrative Block will accommodate the following:

- Office of the head of the institution;
- Chambers for the heads of the departments;
- Rooms for members of faculty;
- Offices of Administrative and Accounts officers;
- Common room for members of the staff;
- Conference room;
- Space for Security officer and maintenance personnel;
- Visitor's space.



1 Gymnasium	10 Academic Block	19 Apartments for heads of Departments
2 Fire-fighting Training	11 Survival Training Pond	20 Apartments for faculty
3 Mock-up Model of ship	12 Bridge	
4 Cadets' Hostel	13 Director's Bungalow	
5 Petty Offrs' and Crews' Hostel	14 Guest House	
6 Dining Hall and Kitchen	15 Administrative Block	
7 Junior Offrs' Hostel	16 Apartments for Staff	
8 Senior Offrs' Hostel	17 Auditorium	
9 Reserved Land	18 Security Check Post	

FIG. 5.1 : OUTLINE LAYOUT OF SCI MARITIME TRG. INST.

5.2.2 Academic Block

The Academic Block will accommodate the following:

- Library;
- Class rooms;
- Laboratories, Instruments and Simulators;
- Exhibition Hall;
- Marine engineering workshop;
- Maritime research centre and model testing tank.

5.2.3 Library

Initially, the library has been designed to accommodate about 10,000 books, with seperate sections for general reference, journals and periodicals, reading area, research section and librarian's office. The library will be so designed that there would be scope for extension with the growth in the number of books.

5.2.4 Class Rooms

The number and size of the class rooms, would be as follows:

- Three class rooms, of about 150 square metres each;
- One class room of about 100 square metres;
- Four class rooms of about 75 square metres each.

Each class room would be provided with rolling black-boards and arrangements for audio-visual presentation.

5.2.5 Exhibition Hall

An exhibition hall would be provided for displaying various machineries, plants and equipments of maritime interest.

5.2.6 Marine Engineering Workshop

The area allocated for the workshop is about 300 square metres. The workshop would be equipped with the equipment generally found in a ship's workshop.

5.2.7 Maritime Research Centre and Model Testing Tank

An area of about 1000 square metres has been allocated for developing a maritime research centre and a model testing tank.

5.2.8 Auditorium

An auditorium of seating capacity 250 persons, will be constructed. The auditorium will be provided with cinematographic and video projection equipment. It will also be used for holding seminars and conferences.

5.2.9 Other Facilities

The other facilities will consist of the following:

- Hostels for Officers, Cadets, Petty Officers and Crew;
- Kitchen, Pantry and Dining arrangement for 150 persons;
- Residential Quarters for faculty and staff;
- Guest house for visiting faculty;
- Medical aid and essential services centre;
- Gymnasium, recreation area and playground.

5.3 Fire - Fighting Training Facilities

The fire - fighting training facilities would consist of a pump - house, fire - fighting area, smoke - room and a mock - up model of a ship.

5.3.1 Smoke - room

The smoke - room would consist of a two tiered concrete structure with ladders, platforms and railings, as

found on ships, for demonstration of breathing apparatus, fire fighting and rescue operations in smoke - filled compartments. CO2 and Sprinklers installation would also be provided for demonstration and visual observation of their action through large glass windows.

5.3.2 Mock - up Model of a Ship

The mock - up model of a ship will be constructed entirely of steel. Drawings showing an outline of the ship model are shown at figs. 5.2 to 5.5 at pages 123 to 123.3 respectively.

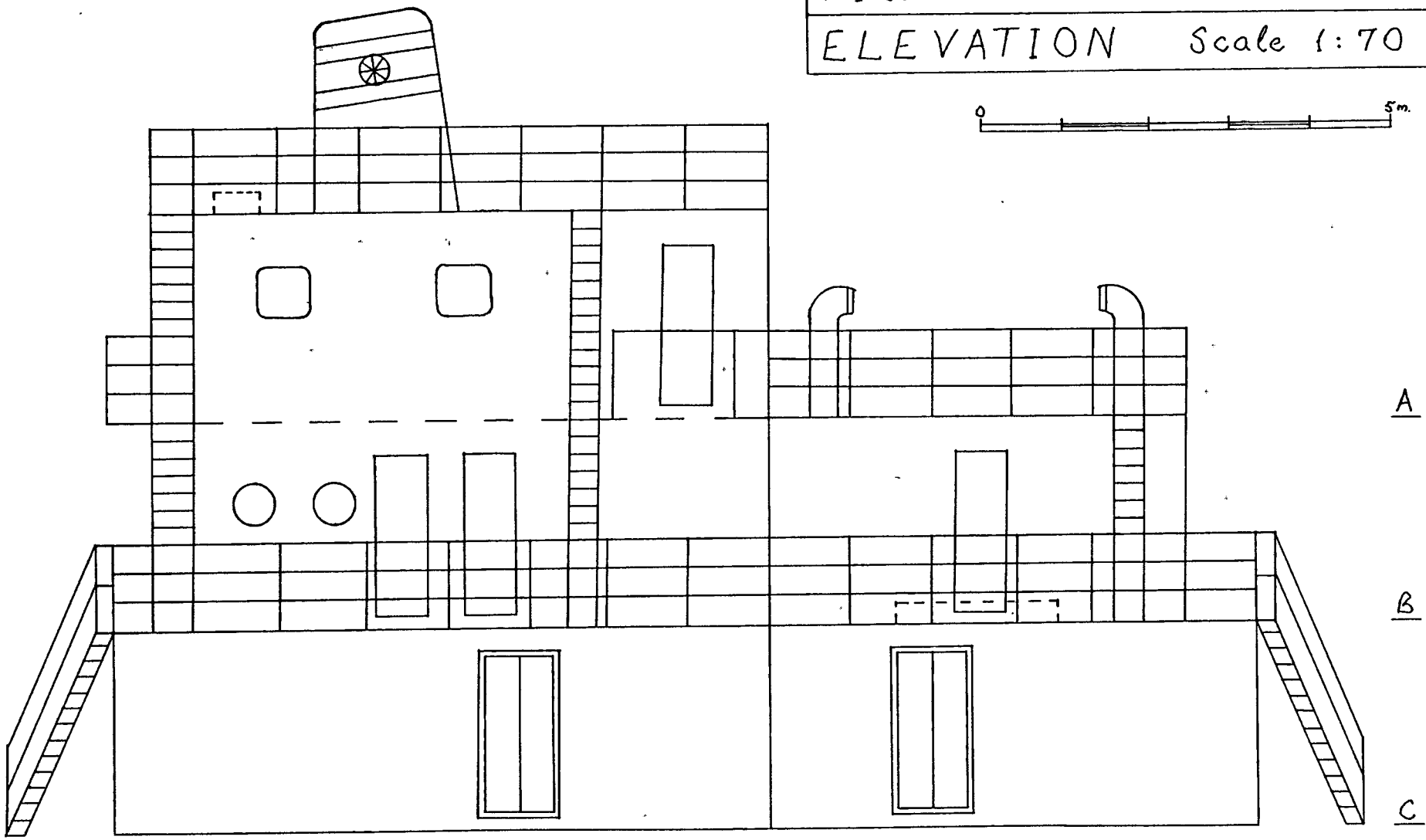
The model would be used to provide realistic fire fighting exercises with capability to simulate engine - room, cargo hold, galley and accommodation fires. Water mains, hydrants and other fire - fighting appliances as generally found on board ships, would also be provided.

5.3.3 Lecture / Demonstration Block

The lecture / demonstration block would consist of two class rooms, each of area of about 50 square metres, a staff room and a changing room for participants.

FIG. 5·2 MOCK-UP MODEL

ELEVATION Scale 1:70



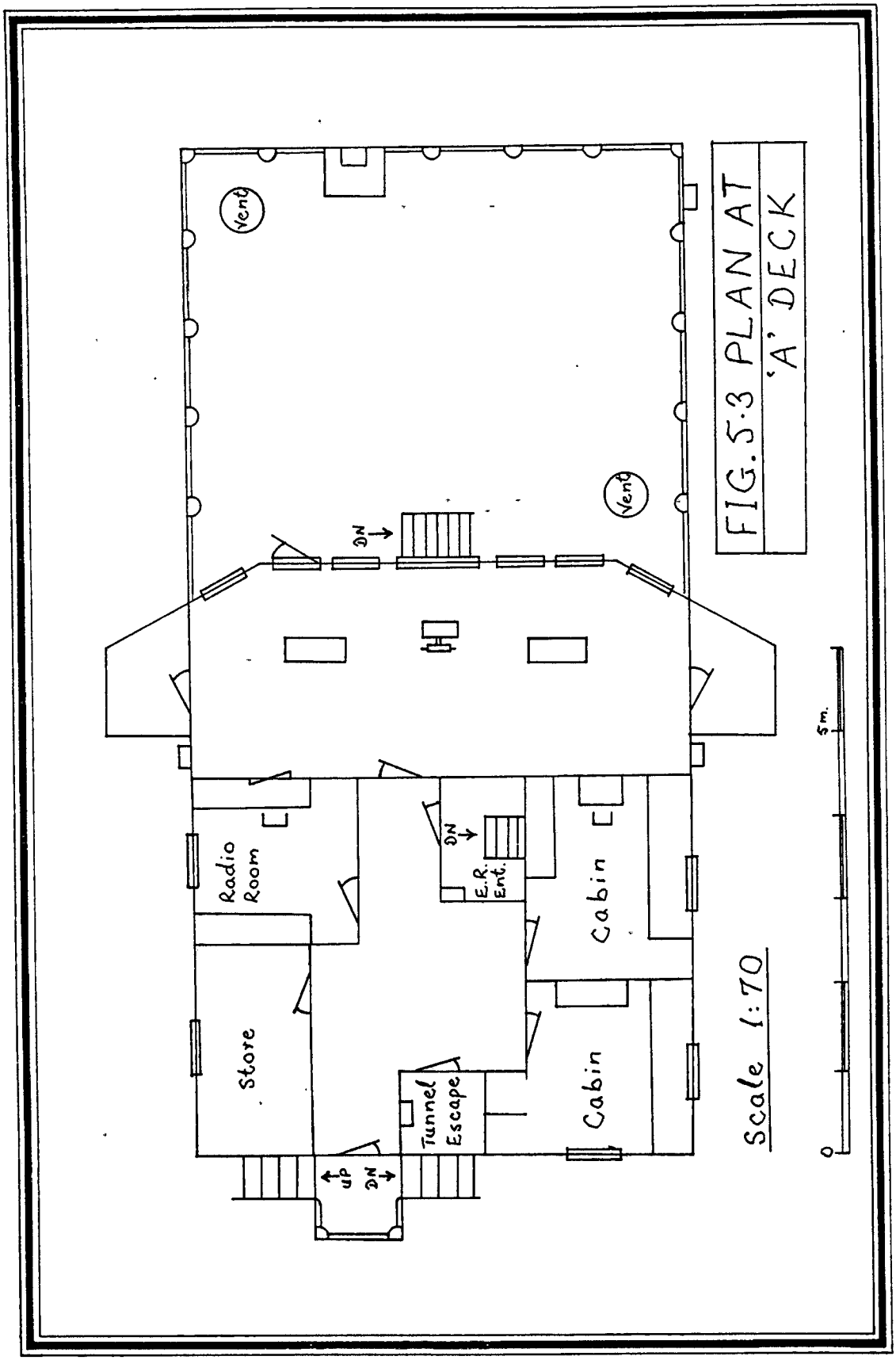


FIG. 5·3 PLAN AT 'A' DECK

Scale 1:70

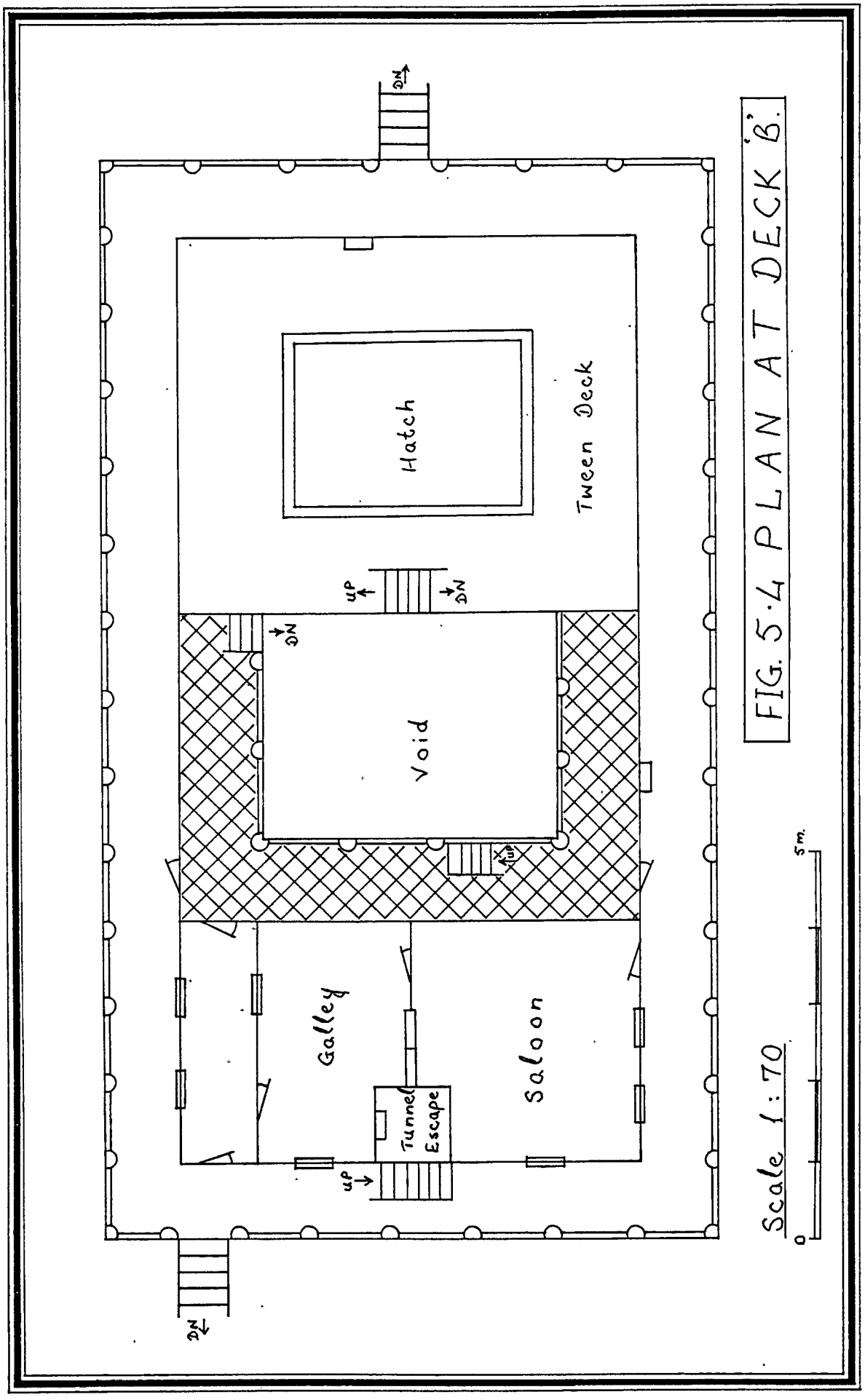


FIG. 5·4 PLAN AT DECK 'B'

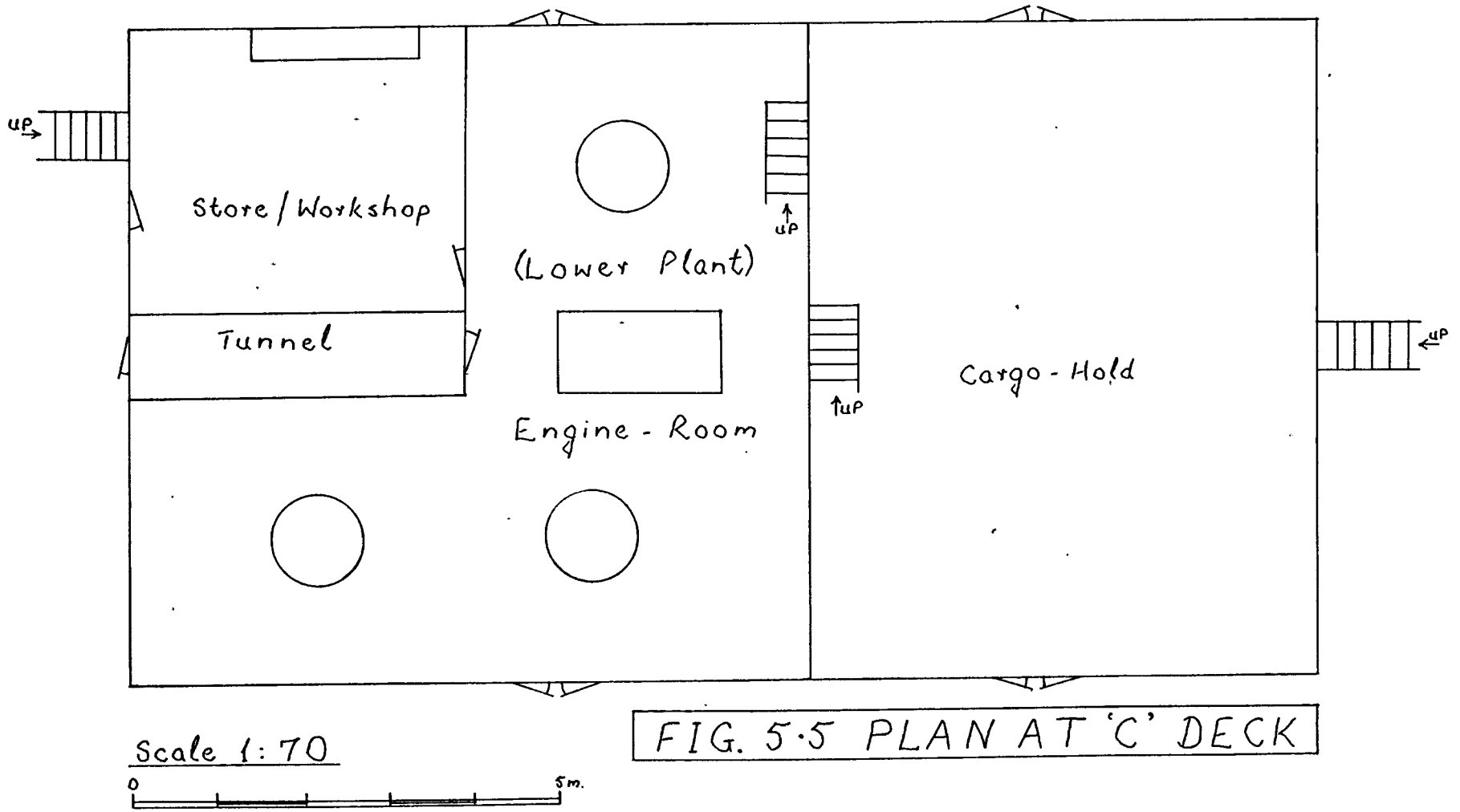


FIG. 5·5 PLAN AT 'C' DECK

5.4 Survival at Sea Training Facilities

Survival at sea training facilities would be provided in and around the natural pond shown in fig. 5.1 on page 119. Two class rooms, each of area of about 50 square metres and a changing room for participants, will also be provided.

5.5 Laboratories, Instruments and Simulators

5.5.1 Manoeuvering Tank

A manoeuvering tank will be provided for demonstration of manoeuvering and handling of vessels. Scale models of different types and sizes of ships would be operated in the tank by remote controls, to demonstrate berthing, unberthing, shallow - water effect, wind and current effect etc.

5.5.2 Laboratories

In the Academic block, space has been allocated to provide the following laboratories:-

- Navigation and Communications Laboratory;
- Seamanship Laboratory;
- Meteorology Laboratory;
- Control Engineering and Electronics Laboratory;
- Computer Laboratory.

5.5.3 Simulator

In the Academic block, space has also been allocated to accommodate a Radar Simulator.

CHAPTER SIX

DEVELOPMENT OF COURSES

6.0 DEVELOPMENT OF COURSES

6.1 What courses need to be developed?

When undertaking the task of, "Development of Courses", the first question that comes up is;

What courses need to be developed?

There are several answers to this question, but viewing it as a member of the SCI family, the answers can be sub-divided into the following three categories:

.1 Minimum

- To develop courses in order to comply with;
  = the Mandatory Minimum Requirements of the STCW Convention.

.2 Maximum

- To develop courses in order to comply with;
  = the Mandatory Minimum Requirements of the STCW Convention,
  = all the Resolutions of the STW Conference,
  = all the Resolutions related to STW Conference, adopted vide IMO Assembly sessions XI, XII and XIII, and
  = SCI's requirements.

.3 Middle

- To develop courses in order to comply with;
  = the Mandatory Minimum Requirements of the STCW Convention,
  = Selected Resolutions of the STW Conference,
  = Selected Resolutions related to STW Conference, adopted vide IMO Assembly sessions XI, XII and XIII, and
  = SCI's requirements.

The next question that comes up is,

Which of the three afore-mentioned categories of "Development of Courses" should be adopted?

.1 Minimum, .2 Maximum or .3 Middle.

Comments on each of these categories is given below:

.1 Minimum

It will be observed from chapter 3.0, "Courses Developed / Conducted by SCI", that a fair amount of progress has been made in developing courses beyond the Mandatory Minimum Requirements of the STCW Convention. Hence, restricting the development to the "Minimum" category, would be a retrograde step.

.2 Maximum

Considering the resources available within SCI, both financial and technical, it is presently not advisable to adopt the "Maximum" category for the development of courses.

.3 Middle

Considering the general objectives of SCI given in chapter one and the limited resources available, the "Middle" category is presently the most suitable for the development of courses.

Accordingly, this chapter will describe the courses that need to be developed on a selective basis from the numerous recommendations contained in the Resolutions of the STW Conference and other Resolutions adopted vide IMO Assembly sessions.

Further, when considering the courses that need to be developed, due to limited resources, it should be borne in mind that these courses should only be developed if they are

not being conducted by other institutions in the country. For example, pre-sea and post-sea Certificate of Competency courses for Nautical and Engineer officers, are already well established courses which are conducted by the Government's Maritime Training Institutions. Hence, the courses developed by the SCI Maritime Training Institute should not be in competition with these Institutions but should rather supplement them.

In India, in the field of Maritime Education and Training, there is a lack of adequate training facilities in the area of short specialised courses. Hence, the SCI Maritime Training Institute should concentrate its efforts in the area of development of short specialised courses.

6.2 Model Training Courses

During the seventeenth session of the IMO's Sub - Committee on Standards of Training and Watchkeeping, a list of, "Model Specialized Courses for Selective Offering", was given in the annex to paper 17/9. This list of courses is reproduced at table 6.1 on page 129.

The suggestions given in the list of Model Specialized Courses for Selective Offering have been taken into account in the Development of Courses described later in this chapter.

Table 6.1 List of Model Specialized Courses for Selective Offering

	Subject	Participants	Course Level	Remarks
.1	Dangerous and Hazardous Cargoes (Other than Special Requirements, oil, chemical and liquefied gas tankers)	Officers and Key Ratings	Advanced	STW Conference Resolution 13 Assembly resolutions A.537(XIII) and A.437(XI)
.2	Bridge Team Training and Passage Planning	Masters and Senior Deck Officers	Advanced	STCW Regulation II/1, 6(a) (STW Conference Resolutions 17, 18 and 20)
.3	Specialized oil, chemical and liquefied gas	Officers and Ratings	Familiarization	STCW Convention Chapter V Resolutions 10, 11 and 12
		Masters, Senior Officers and key Personnel	Specialized Training Programme (Advanced)	(Resolution 16) (Assembly resolutions A.286(VIII) and A.437(XI))
.4	Human Relationships	Supervisor Personnel	Advanced	STW Conference Resolution 22
.5	Shiphandling Simulator	Masters and Senior Deck Officers	Advanced	STW Conference Resolution 17
.6	Radar Simulator Training	Masters and Deck Officers	Advanced	STW Conference Resolutions 1 & 18, Assembly res. A.483(XII)

	Subject	Participants	Course Level	Remarks
.7	Automatic Radar Plotting Aids (ARPA)	Masters and All Deck Officers in Ships fitted with (ARPA)	Practical Use and Limitations (Advanced)	STW Conference Resolution 20 (Assembly resolution A.482(XII) Use of simulator included
.8	Radio/Electronic Equipment Maintenance	Primarily Radio Officers	Supplementary or Updating (Advanced)	STW Conference Resolution 14, Part II. Course may include use of simulator
.9	Medical Care	Persons in charge of Medical Care Aboard Ships	Advanced	IMO Resolution A.438(XI)
.10	Electronics	Engineer and Electrical Officers	Advanced	Course may include use of simulator
.11	Control Engineering and Automation	Senior Engineer Officers	Advanced	Course may include use of simulator
.12	Fuel Combustion and Plant Efficiency	Senior Engineer Officers	Advanced	
.13	Planned Maintenance for Machinery Installations	Senior Engineer Officers	Advanced	

	Subject	Participants	Course Level	Remarks
.14	Engineering Department Financial, Technical and Personnel Management	Senior Engineer Officers	Advanced	

6.3 Development of Courses for Compliance with the Mandatory Minimum Requirements of STCW 78

6.3.1 Extent of Compliance

It will be observed from table 4.1 on page 104 and 4.3 on page 108, that with the exception of Regulations II/5, III/5 and IV/2, "Mandatory Minimum Requirements to Ensure the Continued Proficiency and Updating of Knowledge for Masters, Deck Officers, Engineer Officers and Radio Officers", there is total compliance by SCI with the mandatory minimum requirements of the Convention.

6.3.2 Updating and Refresher Courses for Masters, Deck and Engineer Officers

The following certificate of competency courses are conducted by Lal Bahadur Shastri Nautical and Engineering College:

Nautical

.1 Master (foreign-going)
.2 First Mate (foreign-going)
.3 Second Mate (foreign-going)
.4 Master (home trade)
.5 Mate (home trade)
.6 Skipper (Fishing)
.7 Second Hand (Fishing)

Engineering

.1 Second Class Part A

.2 Second Class Part B

.3 First Class Part A

.4 First Class Part B

As the above courses are already being conducted on a regular basis at the Nautical and Engineering College, it would be very easy for the college to develop Updating and Refresher courses for Masters, Deck and Engineer Officers. A major part of the syllabus could be taken from the existing courses together with the incorporation of modern technological developments. The existing certificate of competency courses are of six months duration and hence an Updating and Refresher course of about three months duration, would be adequate.

A co-operation scheme can be organised between the College and SCI Maritime Training Institute so that the applicable short courses which have not been completed by the candidates can also be undertaken during the period of their stay for the Refresher and Updating courses.

6.3.3 Updating and Refresher Courses for Radio Officers

While considering Updating and Refresher Courses for Radio Officers, it will be observed that in the field of Maritime Communications, there has recently been a quantum jump from the "Marconi" era of wireless communications to the modern era of satellite communications.

With the advent of Satellite Communications, the role of Radio Officers is changing. On ships fitted with a Ship - Earth terminal of a Satellite Communications system, it is no longer essential for a Radio Officer to keep a radio watch for transmitting and receiving messages through a coast radio station in the morse code. Digital selective calling and automation in communications has made this possible. However, Radio Watchkeeping is still a requirement vide SOLAS and Radio Regulations, even if a ship is fitted with satellite communications equipment.

We are presently in the transitional stage, where satellite communications is gradually replacing the traditional wireless communications. The Radiocommunications and Safety of Navigation sub-committees of IMO, International Maritime Satellite Organization (INMARSAT) and International Telecommunications Union (ITU) are in the process of harmonising and revising SOLAS and Radio Regulations to take into account the new developments in the field of satellite communications and the Future Global Maritime Distress and Safety System (FGMDSS). An international conference is likely to be convened in 1987 and it is expected that the revised rules accepting satellite communications as the primary means of maritime communications will probably be implemented in the 1990's. Chapter IV of SOLAS 74 is also in the process of revision to incorporate the requirements of FGMDSS. Implementation of FGMDSS is planned for February 1st., 1990.

In Western Europe, in some of the countries, ships engaged on coastal trade that do not proceed beyond the range of a network of coast radio stations, are no longer required to carry a Radio Officer as the means of communication has been changed over to narrow band direct printing radio telex and voice transmissions by radiotelephony. Further, in some of these countries, training of Radio Officers has been suspended as it is envisaged that Radio Officers may not be required after the 1990's and the present number would be adequate to meet the requirements till then. For these countries where manning costs are very high this would benefit them by partly reducing the manning cost.

In SCI, ships acquired from 1983 onwards, are all fitted with a satellite communications equipment. Gradually, the Radio Officers would have to spend lesser time in the Radio room for their routine watchkeeping. Hence they can be better utilised in the maintenance and repairs of electronic equipment, consisting of navigational, communications, control and entertainment equipment.

Based on the above factors, it is proposed to develop a course for Radio Officers, to cover both updating of

knowledge and maintenance of electronic equipment, as follows:

Part I : This part should cover updating of knowledge, Satellite Communications and FGMDSS.

Part II : This part should cover maintenance of electronic equipment.

Details of this course are given in chapter eight.

6.4 Re-organization / Updating of certain existing courses

6.4.1 General

In chapter 3.0, "Courses Developed / Conducted by SCI", the existing courses, which are presently being conducted on a regular basis by the Training Department of SCI, were described. Some of these courses require re-organization and some of them require updating.

Considering modern technological developments, the following existing courses require re-organization or updating:

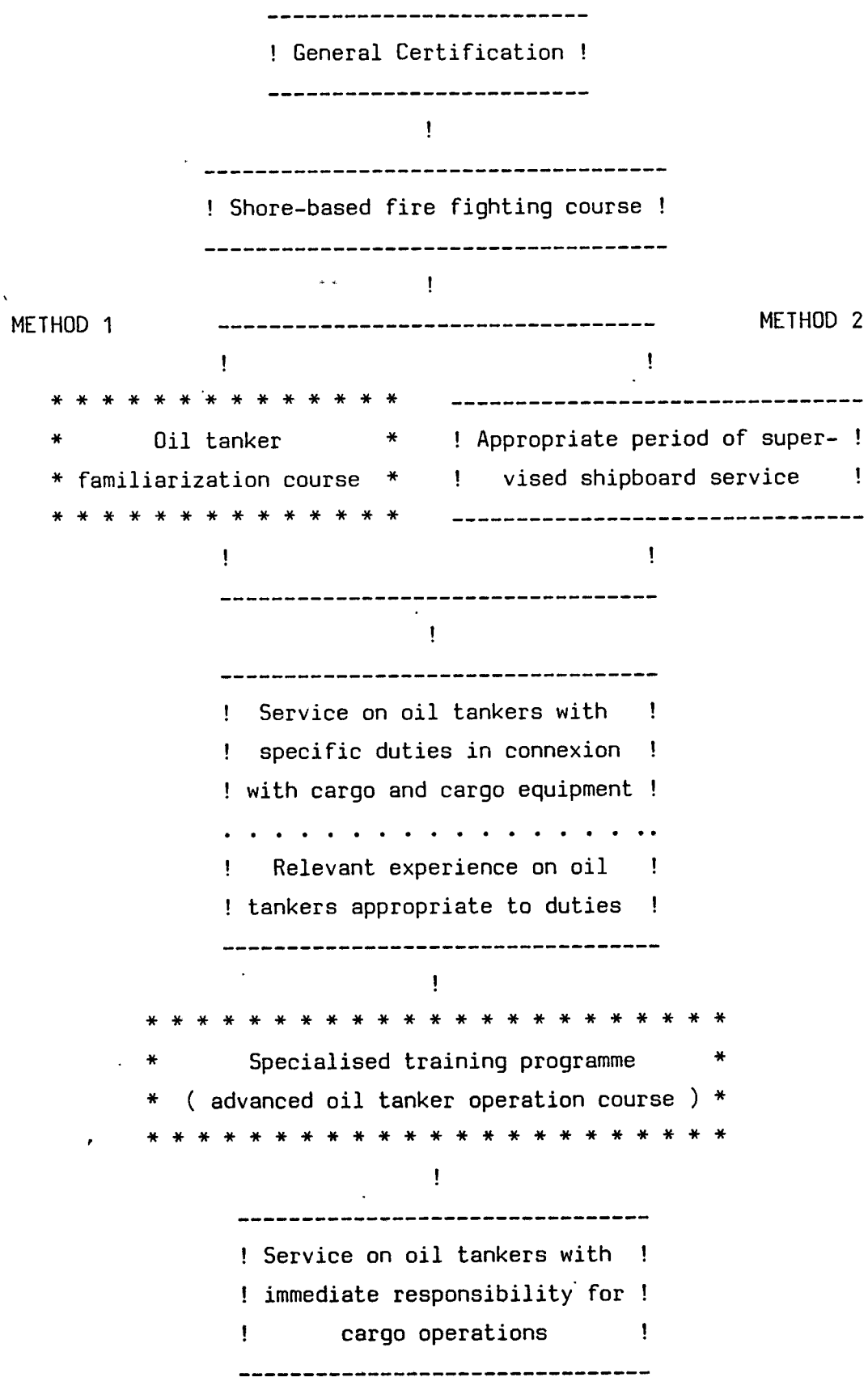
.1 Tanker Technology course . . .	Requires Re-organization. See 6.4.2 below.
.2 Marine Control Engineering course .	Requires Updating. See 6.4.3 page 139

6.4.2 Re-organization of Tanker Technology Course

6.4.2.1 General Principles

In accordance with the general principles laid down in the STCW Convention, Regulation V/1, Training and Qualifications of Masters, Officers and Ratings of Oil Tankers, there are two methods of training oil tanker personnel. The methods are illustrated in table 6.2 on page 135.

Table 6.2 Training of Oil Tanker Personnel



Source: Model Training Programmes based on STCW 78, (21 05 81); Considerations, Provisions and Syllabus of Oil Tanker Courses. By Prof. Capt. H. Kaps, Bremen Nautical Institute.

6.4.2.2 Comparison between Table 6.2 and Tanker Tecchnology course

It will be observed from the description of Tanker Technology course at 3.2 on page 37 that the participants for the course are Deck and Engineer Officers with a minimum of one year tanker experience. Hence, when compared with table 6.2, "Training of Oil Tanker Personnel", the existing Tanker Technology course is following method 2, i.e. appropriate period of supervised shipboard service, then service on oil tankers and followed by an advanced oil tanker operation course.

When the Tanker Technology course was initially developed, the above method was most suitable as it was better to train Officers who were already having tanker experience, first. SCI follows a policy of mixed manning, but on a selective basis, which means all officers have to be trained to be able to man any type of vessel in the fleet but a certain amount of selection is done by the Fleet Personnel department, prior posting an officer on a particular vessel, based on his qualifications, experience and reports and whether he would be suited for the particular vessel.

Considering the above factors, it is proposed that the training programme for Oil Tanker Personnel of SCI should be re-organized, as shown in table 6.3 on page 137.

Table 6.3 Proposed re-organized training programme for SCI's Oil Tanker Personnel

.1 Deck and Engineer Officers

Certificate of Competency

!

Shore - based Fire - fighting Course

(See 3.6 page 68, for details)

!

!

* *

* Oil Tanker Familiarization Course *

* (Duration : Two weeks) *

* *

!

!

Service on oil tankers with specific duties in connection with cargo and cargo equipment. Minimum one year experience on oil tankers appropriate to duties.

!

!

* *

* Advanced Oil Tanker Operation Course *

* (Duration : Two weeks) *

* *

!

!

For Masters and Chief Officers,
Service on oil tankers with immediate responsibility for cargo operations.
Practical on - the - job training for five cargo discharge and crude oil washing operations under supervision of Tanker experienced Masters.
Details of practical training are given at 3.2.8 on page 55.

.2 Pumpman / Assistant Pumpman

Assistant Pumpman's Course
(Duration : three weeks)
(See 3.12 page 92, for details)
!
Shore - based Fire - fighting Course
(Duration : one day)
(See 3.10 page 89, for details)
!
!
* * * * * * * * * * * * * * * * * * * *
* Oil Tanker Familiarization Course *
* (Duration : two weeks) *
* * * * * * * * * * * * * * * * * * * *
!
!
Service on Oil Tankers

.3 Radio Officers, Pursers, Electrical Officers, Petty - Officers other than Pumpman and Ratings

Shore - based Fire - fighting Course
(Duration : one day)
(See 3.10 page 89, for details)
!
!
* * * * * * * * * * * * * * * * * * * *
* Basic Oil Tanker Safety Course *
* (Duration : two days) *
* * * * * * * * * * * * * * * * * * * *
!
!
Service on Oil Tankers

6.4.2.4 Liquid Cargo Handling Simulator

A liquid cargo handling simulator provides an effective aid in bridging the gap between theory and practice of oil tanker operations. It makes it a lot easier for the trainer to explain the various principles and operations to the participants by demonstrating the same on the simulator. Further, it facilitates ease of understanding to the participants and enables them to get a feeling close to reality of tanker operations. It also generates enthusiasm, interest and motivation of learning by doing.

The importance of the above simulator was clearly seen when the students of the Maritime Education (Nautical) course visited the following institutions:

.1 Maritime Institute of Technology and Graduate Studies (MITAGS), Linthicum Heights, USA.

.2 Bremen Nautical Institute, FRG.

In the former institute, the students carried out a loading and discharging operations whilst at the latter institute the students carried out a complete cycle of oil tanker operations including inert gas and crude - oil washing operations as a part of the oil tanker familiarization course.

The estimated cost of a liquid cargo simulator is US$ 250,000. Although it would be good to have a liquid cargo simulator, but due to limitations in financial resources, it would be better to defer procurement to a later date.

6.4.3 Updating of Marine Control Engineering Course

The Marine Control Engineering course has been described at 3.3 on page 57. This course was developed and introduced in 1973, when SCI started acquiring automated ships. The course has been updated from time to time based on the developments in shipboard automation on newly acquired ships,

manufacturers' manuals and other available literature. For a number of years, there has not been any interaction between the above course and similar courses being conducted by other institutions in developed maritime countries. Hence, it is proposed that the permanent SCI faculty of this course, consisting of two marine engineers and an electrical officer be permitted to attend a short specialized course in marine automation, of about two weeks duration at the Flensburg Research Institute for Ship Operation in the FRG. On their return, they can update the marine control engineering course. An outline of the training requirements for Marine Automation, as per the philosophy of the Flensburg Research Institute for Ship Operation, is given at table 6.4 below.

Table 6.4 Outline of Training Requirements for Marine Automation

Common grounds

Physics, mechanics and mathematics for engineers.
Electronics and electricity.

Advanced grounds

Control engineering
Computer engineering
Process engineering (marine engineering)

Minimum 40 % of all training should be laboratory work carried out by the students themselves in groups of maximum three students.

Target

Trained engineer who thinks in systems, functions and technology for better process operation and fault finding.

Source : Presentation on Marine Automation, by Prof. Dr.-ing. F. Rickert, Flensburg Research Institution for Ship Operation, at seminar on Maritime Education and Training for heads of Maritime Training Institutions of Developing Countries, organised by World Maritime University, at Malmo in September 1984.

6.5 Recommended Courses vide Resolutions of STW Conference and later Resolutions

Based on the study carried out in chapter four, on the extent of compliance by SCI with the recommendations contained in the Resolutions of STW Conference and later Resolutions adopted vide IMO Assembly sessions XI, XII and XIII, table 6.5 on page 142, has been developed. The table also takes into account the suggestions given in the list of model specialised courses for selective offering vide seventeenth session of IMO's sub-committee on training and Watchkeeping, which has been described at 6.2 on page 128 and at table 6.1 on page 129.

6.6 Courses to be Developed to meet SCI's Requirements

In addition to the courses to be developed to meet STCW 78 requirements and the numerous recommendations contained in the STW Conference and later Resolutions, there are a number of courses which need to be developed to meet SCI's requirements. Such courses are given in table 6.6 on page 143.

Table 6.5 Courses to be Developed to Comply with Resolutions of STW Conference and later Resolutions

COURSES / DURATION	PARTICIPANTS	RESOLUTION
.1 Dangerous and Hazardous Cargoes Basic course 2 days	P.O.Maintenance, Deck Ratings.	STW Conf. Res. 13 and A.537(XIII)
.2 Dangerous and Hazardous Cargoes Advanced course 1 week	Deck Officers.	STW Conf. Res. 13 and A.537(XIII)
.3 Radio / Electronic Equipment Maintenance 3 months	Radio Officers.	STW Conf. Res. 14
.4 Ship Handling 1 week	Masters and Chief Officers.	STW Conf. Res. 17
.5 Bridge Team Training and Passage Planning 1 week	Masters and Chief Officers.	STW Conf. 17, 18 & 20
.6 Radar Simulator Training 1 week	Masters and Navigating Officers.	STW Conf. Res. 1, 18, A.483(XII)
.7 ARPA 1 week	Masters and Navigating Officers.	STW Conf. Res. 20 and A.482(XII)
.8 Human Relationships 1 week	All Officers and Petty Officers	STW Conf. Res. 22
.9 Medical Care 4 weeks	Masters and Chief Officers	Res. A.438(XI)

Table 6.6 Courses to be Developed to meet SCI's Requirements

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
.1	Cargo Securing 1 week	Deck Officers	SCI (Liner Div., Container Dept. & Training Dept.)
.2	Container Operations 2 weeks	Deck Officers	SCI (Container Dept. and Training Dept.)
.3	Fuel Combustion and Plant Efficiency 1 week	Chief and Second Engineer Officers	SCI (Training Dept.)
.4	Hydraulics 1 week	Engineer Officers	Jessop, Calcutta and SCI (Training Dept.)
.5	Hydraulic and Elementary Control Engineering 1 week	Deck Officers	SCI (Training Dept.)
.6	Micro-computer applications 4 weeks	All Officers	SCI (Computer Dept. and Training Dept.)
.7	New Ship Acquisition 1 to 2 weeks	Officers selected for joining new series of vessels	SCI (Technical Services and Training Dept.)
.8	Off-shore Operations 1 to 2 weeks	All Officers on Off-shore vessels	SCI (Off-shore Dept. and Training Dept.)
.9	Planned Maintenance 1 week	Chief and Second Engineer Officers	SCI (Technical Depts. and Training Dept.)

COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
.10 Research vessel Operations 1 to 2 weeks	Masters, Chief Engineer Officers Chief Officers & Second Engineer Officers of Research vessels	National Institute of Oceanography and SCI (Managed vessels Operations Dept. and Training Dept.)
.11 Ship Management 2 weeks	Masters and Chief Engineer Officers	SCI (Operations Depts. and Training Dept.)
.12 Yoga and Meditation During stay at the Training Institute	All Officers, Petty Officers and Ratings	Yoga Institute

6.7 An Integrated Approach

It will be observed from chapters three, four and six, that a number of short specialised courses have already been developed and further, a number of such courses still need to be developed, to meet the various requirements. Taking into account all the various courses, the structure seems very complex, however, by taking an integrated approach, a simplified structure can be developed.

In order to arrive at a total package of courses, which would be required to be conducted by the Training Department, the following tables and sections from this paper, have been referred to:

.1 Table 3.1 page 35, "Current courses conducted by training department."

.2 Table 3.2 page 98, "Other courses organised by training department."

.3 ----- 6.3 page 131, "Development of courses for compliance with the mandatory minimum requirements of STCW 78."

.4 ----- 6.4 page 134, "Re-organization / updating of certain existing courses."

.5 Table 6.5 page 142, "Courses to be developed to comply with the resolutions of STW Conference and later resolutions."

.6 Table 6.6 page 143, "Courses to be developed to meet SCI's requirements."

Finally, based on the above tables, a total package of courses which would be required to be conducted by the Training Department, has been developed at table 6.7 on page 146. The table integrates the requirements of the courses, both existing and new, in the SCI context.

Table 6.7 Total Package of Courses to be Conducted by Training Department

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Officers		
.1 *N	Updating and Refresher 6 months	Deck and Engineer Officers and Technical Supdts.	LBS Nautical and Engg. College and SCI (Trg. Dept.)
.2 *N	Updating and Radio / Electronic Equipment Maintenance 6 months	Radio Officers	St. Xavier's Institute and SCI (Training Dept.)
.3 *N	Basic Oil Tanker Safety 2 days	Radio Officers, Pursers and Electrical Offrs.	SCI (Training Dept.)
.4 *N	Oil Tanker Familiarization 2 weeks	Deck and Engineer Officers and Technical Supdts.	SCI (Training Dept.)
.5 *E	Advanced Oil Tanker Operation 2 weeks	Deck and Engineer Officers and Technical Supdts. with minimum one year oil tanker experience.	SCI (Tanker Dept. and Training Dept.)
.6 *N	Basic Chemical Tanker Safety 2 days	Radio Officers, Pursers and Electrical Offrs.	SCI (Training Dept.)
.7 *N	Chemical Tanker Familiarization 2 weeks	Deck and Engineer Officers and Technical Supdts.	SCI (Training Dept.)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Officers (Contd.)		
.8 *N	Advanced Chemical Tanker Operation 2 weeks	Deck and Engineer Officers and Technical Supdts.	SCI (Tanker Dept. and Training Dept.)
.9 *E	Fire - fighting (Advanced) 3 days	All Officers and Technical Supdts.	SCI (Training Dept.)
.10 *E	Survival at Sea 1 day	All Officers and Technical Supdts.	SCI (Training Dept.)
.11 *N	Dangerous and Hazardous Cargoes (Advanced) 1 week	Deck Officers and Marine Supdts.	SCI (Training Dept.)
.12 *N	Bridge Team Training, Passage Planning and Ship Handling 1 week	Masters, Chief Officers and Marine Supdts.	SCI (Training Dept.)
.13 *N	Radar Simulator Training and ARPA 2 weeks	Masters, Navigating Offrs. Marine Supdts.	SCI (Training Dept.)
.14 *N	Human Relationships 1 week	All Officers	SCI (Training Dept.)
.15 *N	Medical Care 4 weeks	Masters and Chief Officers	SCI (Medical Dept. and Training Dept.)
.16 *N	Cargo Securing 1 week	Deck Officers and Marine Supdts.	SCI (Liner Divn. Container Dept. & Training Dept.)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Officers (Contd.)		
.17 *E	Chief Officer's Orientation 2 weeks	Chief Officers	SCI (Various Departments)
.18 *N	Container Operations 2 weeks	Deck Officers and Marine Supdts.	SCI (Container Dept. and Training Dept.)
.19 *N	Fuel Combustion, Plant Efficiency and Planned Maintenance 2 weeks	Chief and Second Engineer Officers & Engineer Supdts.	SCI (Technical Depts. and Training Dept.)
.20 *N	Hydraulics 1 week	Engineer Officers & Engineer Supdts.	Jessop, Calcutta and SCI (Training Dept.)
.21 *N	Hydraulic and Control Engineering 1 week	Deck Officers and Marine Supdts.	SCI (Training Department)
.22 *N	Micro - computer applications 4 weeks	All Officers and Technical Supdts.	SCI (Computer Dept. and Training Dept.)
.23 *N	New Ship Acquisition 1 to 2 weeks	Officers joining new ships and Technical Supdts.	SCI (Technical Services and Training Dept.)
.24 *N	Off - shore Operations 1 to 2 weeks	All Officers serving on Off-shore vessels	SCI (Off - shore Dept. and Training Dept.)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
Officers (Contd.)		
.25 Research Vessel Operations *N 1 to 2 weeks	Masters, Chief Engr. Officers, Chief Officers, and Second Engr. Officers serving on Research v/ls. Technical Supdts.	National Institute of Oceanography and SCI (Managed vessels Dept. and Training Dept.)
.26 Second Engineer Officer's Orientation *E 2 weeks	Second Engineer Officers	SCI (Various Departments)
.27 Ship Management *N 2 weeks	Masters and Chief Engineer Officers	SCI (Operations Depts. and Training Dept.)
.28 Yoga and Meditation *N During stay at Training Institute	All Officers	Yoga Institute
Cadets		
.29 Mid - term *E 2 months	Cadets with minimum one year sea service	SCI (Training Department)
.30 Radar Observer *E 2 weeks	As above	SCI (Training Department)
.31 Fire - fighting *E 2 days	As above	SCI (Training Department)
.32 Survival at Sea *E 1 day	As above	SCI (Training Department)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Petty - Officers		
.33 *N	Basic Oil Tanker Safety 2 days	All Petty Officers except Pumpman	SCI (Training Department)
.34 *N	Oil Tanker familiarization 2 weeks	Pumpman	SCI (Training Department)
.35 *N	Basic Chemical Tanker Safety 2 days	All Petty Officers except Pumpman	SCI (Training Department)
.36 *N	Chemical Tanker Familiarization 2 weeks	Pumpman	SCI (Training Department)
.37 *E	Fire - fighting (Basic) 2 days	All Petty Officers	SCI (Training Department)
.38 *E	Survival at Sea 1 day	All Petty Officers	SCI (Training Department)
.39 *N	Dangerous and Hazardous Cargoes (Basic) 2 days	P.O. Maintenance	SCI (Training Department)
.40 *N	Human Relationships 1 week	All Petty Officers	SCI (Training Department)
.41 *E	Asst. Catering Officer 1 month	Asst. Catering Officers	T. S. "Rehman"
.42 *E	Asst. Pumpman 3 weeks	Asst. Pumpman	SCI (Training Department)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
Petty Officers (Contd.)		
.43 Welding *E 40 days	Fitters, P.O.Maintenance, & Asst. Pumpman	Advani Oerlikon and SCI (Training Dept.)
.44 Yoga and Meditation *N During stay at Training Institute	All Petty Officers	Yoga Institute
Crew		
.45 Basic Oil Tanker Safety *N 2 days	All Ratings	SCI (Training Department)
.46 Basic Chemical Tanker *N Safety 2 days	All Ratings	SCI (Training Department)
.47 Fire - fighting *E (Basic) 2 days	All Ratings	SCI (Training Department)
.48 Survival at Sea *E 1 day	All Ratings	SCI (Training Department)
.49 Dangerous and Hazardous *N Cargoes (Basic) 2 days	Deck Ratings	SCI (Training Department)
.50 Yoga and Meditation *N During stay at Training Institute	All Ratings	Yoga Institute

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Shore staff		
.51 *E	Budgeting and Cost Control 14 days	Shore Officers	TRAINMAR, Bombay
.52 *N	Computer Applications 4 weeks	Shore Officers	SCI (Computer Dept. and Training Dept.)
.53 *E	Container Shipping Management 16 days	Shore Technical and Commercial Officers	TRAINMAR, Bombay
.54 *E	General Shipping Management 16 days	Shore Officers Junior and middle management levels	Narottam Morarjee Institute of Shipping and SCI (various depts.)
.55 *E	Joint Shipping Management Seminar 9 days	Shore Officers Middle and senior management levels	Institute of Shipping Economics, Bremen and SCI (various departments)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

6.8 Observations on Total Package of Courses to be Conducted by Training Department

It will be observed from table 6.7, that the courses comply with the following requirements:

Courses for	STCW Convention	STW and other Resolutions	SCI Requirements
Officers	.1 to .10	.11 to .15	.16 to .28
Cadets	.30 to .32	--	.29
Petty Officers	.33 to .38	.39 to .40	.41 to .44
Crew	.45 to .48	.49	.50
Shore Staff	--	--	.51 to .55

It would be beyond the scope of this paper to describe each and every course mentioned in table 6.7, in detail. However, information on many of the courses and details on some of the courses, are given in chapter eight.

CHAPTER SEVEN

SELECTION AND TRAINING OF LECTURERS

7.0 SELECTION AND TRAINING OF LECTURERS

7.1 General Requirements

The most important requirement of the SCI Maritime Training Institute, would be a team of well qualified, well trained, dedicated and a highly motivated faculty. The success of the Institute would depend on the manner in which the lecturers are able to impart knowledge and the benefit of their experience to the participants. They should be able to set a good example so that the participants can hold them in high esteem and follow their footsteps.

7.2 Selection of Lecturers

The majority of lecturers, would be officers with a Master's or Chief Engineer's qualification. In order to get the right people for the job, selection of lecturers plays a crucial role. There would be no difficulty in getting the required number of lecturers from within the company as there are a large number of fleet and shore officers, capable of taking up the assignment.

SCI already has a system of selection of Superintendents, whereby, depending on the number of vacancies in the shore cadre, Masters and Chief Engineer Officers who have been in their respective ranks for a minimum period of two years and having a good record of service are selected for the post of Superintendent. The eligible officers are put through a screening committee before the final selection is done.

Generally, an officer is already well known to the SCI, prior his selection as a Superintendent as he would have already put in more than ten years of service with the company prior to obtaining the requisite rank and experience. Hence, in the case of the lecturers for the institute, a similar procedure can be adopted. After selection, the officer should be tried out as a lecturer for a minimum period of six months and if he is found suitable and he likes the adjustment to a lecturer's job, he should be absorbed as a lecturer.

7.3 Training of Lecturers at the World Maritime University

After a lecturer has been found suitable to continue in his assignment at the Institute, the next step, for SCI, would be to develop him into an effective lecturer by providing him with higher education and training. As the lecturer would be required to lecture to participants of equivalent qualifications and experience to that of his own, namely, Masters and Chief Engineer Officers, the only way to build up the standards of the Institute, would be to first build up the standard of the faculty.

* "The establishment of the World Maritime University provides a critical element now missing but necessary for a coherent and comprehensive system of training and education - an international centre for advanced study for high level specialized personnel in developing countries including maritime teachers, surveyors, inspectors, technical managers and maritime administrators."

The World Maritime University provides a pivotal link in the international system for training in the maritime sector. It complements, supplements and strengthens the training activities now being carried out in the developing countries. It is a unique institution which offers an advanced level of training in a number of different maritime fields at a single institution, which is presently not available elsewhere.

Based on the foregoing, it will be observed that the most suitable institution available for providing advanced high level education and training in the maritime sector, for the development of the faculty of the SCI Maritime Training Institute, is the World Maritime University (WMU).

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* Source: Foreword to Organisation and Structure of the World Maritime University, December 1982.
By Dr. C. P. Srivastava, Secretary - General, IMO.

7.4 Maritime Education and Training Courses of WMU

The World Maritime University has specially developed the Maritime Education and Training Courses for the benefit of prospective lecturers in maritime education and training institutions. The courses are divided into two fields, namely, nautical and engineering. As these courses would be the most appropriate courses for the lecturers of the SCI Maritime Training Institute, the modules of these courses have been enumerated at table 7.1, on page 158.

In addition, field trips are organised to various institutions in various countries. As an example, the field trips organised for the Maritime Education and Training (Nautical) Course of 1984 - 85 is illustrated at table 7.2, on page 161.

An outline of the WMU method of education and training is shown at table 7.3, on page 166.

Table 7.1 Course Modules of WMU's Maritime Education and Training Courses

MARITIME EDUCATION AND TRAINING

.1 United Nations System.	
.2 IMO: the Organisation and its work.	
.3 Introduction to maritime transportation.	
.4 Principles and aspects of maritime law.	
.5 " " " " " transportation Economics.	
.6 " " " " " " Safety.	
.7 " " " " prevention of marine pollution.	
.8 Planning, design and construction of ships.	
.9 Introduction to digital computers.	
.10 Principles of management.	
.11 Marine personnel.	
Nautical Field	**Engineering Field**
.12 Review and upgrading of mathematics as applicable to specialization.	.12 Review and upgrading of mathematics as applicable to specialization.
.13 Review and upgrading of physics and electronics as applicable to specialization.	.13 Review and upgrading of mechanics as applicable to specialization.
.14 Use of computers.	.14 Review and upgrading of physics, chemistry and thermodynamics as applicable to specialization.

Nautical Field	Engineering Field
.15 Theory and practice of maritime education and training.	.15 Review and upgrading of fluid mechanics as applicable to specialization
.16 Human information processing, teaching methods.	.16 Use of computers.
.17 Teaching technology.	.17 Theory and practice of maritime education and training.
.18 Organization and management of maritime education and training institutions and economics of maritime education and training.	.18 Human information processing,teaching methods.
.19 Assessment of students and examination of marine personnel.	.19 Teaching technology.
.20 Cargo handling systems and equipment.	.20 Packaged dangerous goods, solid and liquid cargoes, including necessary basics of documentation.
.21 Packaged dangerous goods, solid and liquid bulk cargoes, including necessary basics of chemistry and documentation.	.21 Law and practice of marine pollution prevention.
.22 Law and practice of marine pollution prevention.	.22 Selected topics of maritime law.
.23 Selected topics of maritime law.	.23 Machinery control and automation.
.24 Shipboard navigation instruments and systems.	.24 Selection, fabrication and care of shipbuilding material.
.25 Collision avoidance including use of radar.	.25 Marine electrical systems.
.26 Navigation simulators.	.26 Diesel engine operation, design, lubrication.

Nautical Field	Engineering Field
.27 Navigation support equipment, systems and services.	.27 Principles of naval architecture.
.28 Ship dynamics and manoeuvring of ships.	.28 Ship construction and shipyard operations.
.29 Ship stability and securing of cargo.	.29 Fire prevention, detection and fire fighting.
.30 Search and rescue, survival craft, survival techniques, life-saving equipment.	.30 Life-saving equipment and procedures.
.31 Marine accident investigation.	.31 Occupational safety and crew health.
.32 Man-machine systems, maritime ergonomics, work science.	.32 Personnel management and human relationships on board.
.33 Occupational safety and crew health.	.33 Marine accident investigation.
.34 Personnel management and human relationships on board.	.34 Maritime research.
.35 Maritime research.	.35 Special project / thesis.
.36 Special project / thesis.	

Source : Courses of Study, World Maritime University, July 1985.

Table 7.2 Field Trips of Maritime Education and Training (Nautical) Course of 1984 - 85

	Field Trip	Duration	Educational Gains
.1	Kockums Shipyard, Malmo. 3 visits.	3 days	Shipbuilding, from plate yard to main assembly hall and building dock. Stress analysis laboratory. Visit to Container / Ro-Ro vessel and a Cruise vessel in the building dock.
.2	Merchant Marine Academy, Kalmar, Sweden.	3 days	Use of Radar and Navigation Simulator in training of students for nautical certificates. Practical exercises on simulator.
.3	On board Viking line ferry, from Stockholm to Mariehamn and return.	1 day	Archipelago Navigation. Passage planning using constant radius of turn technique.
.4	Aalands Maritime Academy, Mariehamn, Finland.	1 day	Finnish system of nautical education and training. Exercise in Archipelago Navigation on Radar and Navigation Simulator.
.5	Danish Hydrographic Dept., Copenhagen.	1 day	Hydrographic surveying and production of sea charts.
.6	Swedish Hydrographic Dept., Norrkoping.	2 days	Hydrographic surveying and production of sea charts.
.7	Fire-fighting Course, Malmo Fire Brigade.	3 days	Lectures on fire prevention and fire-fighting, 1 day. Practical exercises, 2 days.

	Field Trip	Duration	Educational Gains
.8	Seagull A/S Horten, Norway.	1 day	Part task simulators for various navigation instruments and Radar simulator.
.9	Norcontrol A/S Horten, Norway.	1 day	Radar and Navigation Simulator, Diesel engine Simulator and Vessel Traffic Management System.
.10	Shiphandling Simulator, Hamburg, FRG.	5 days	Shiphandling Course. Various exercises, Approaching port, Anchoring, Berthing, Unberthing, Handling a VLCC with a steering gear breakdown (Amoco Cadiz) and clearing danger. Visit to Ships, Engines and Ocean Technology Exhibition. Exercise on Radar Simulator of Water Police Dept. using fast patrol boats on river Elbe.
.11	State University of New York Maritime College and Merchant Marine Academy, King's Point, New York, U.S.A.	4 days	U.S. system of maritime education and training. Graduate programme leading to Master of Science degree in Transportation Management Various facilities consisting of laboratories, library and simulators. CAORF Shiphandling Simulator
.12	Maritime Institute of Training and Graduate Studies, Linthicum, U.S.A.	5 days	Exercises on : Liquid Cargo Handling Simulator, Radar Simulator, LPG / LNG Simulator, Shiphandling Simulator. Laboratories and facilities.

	Field Trip	Duration	Educational Gains
.13	US Naval Academy, Annapolis, U.S.A.	1 day	Visit to the academy and various training facilities.
.14	US Coastguard Headquarters, Washington DC,U.S.A.	1 day	US Coastguard system.
.15	US Coastguard, Governor's island and Seaman's Church Institute, New York, U.S.A.	1 day	AMVER vessel reporting system. Search and Rescue organization. Radar simulator and training facilities.
.16	Sea Land Terminal, Port Elizabeth, U.S.A.	1 day	Sea - land's world wide container operations. Container handling facilities at Port Elizabeth. Computerised container tracking and computerised stowage.
.17	Swedish Meteorological and Hydrological Institute, Norrkoping, Sweden.	1 day	Weather forecasting, Satellite pictures, Weather Radar. Oceanographic instruments and equipment.
.18	Raytheon, Copenhagen, Denmark.	1/2 day	Demonstration of Raytheon Radar Video Recorder.
.19	Bremen Nautical Institute, FRG.	5 days	Continuation of Oil Tanker Course. Exercises on Liquid Cargo Handling Simulator, Loading, Discharging, IGS and COW operations. Navigation Lights Simulator. Radar Simulator.

	Field Trip	Duration	Educational Gains
.19	Bremen Nautical Institute, FRG. (Contd.)	5 days	Computer Laboratory. National Lifeboat Association, Search and Rescue. Bremen ports on board Senatorial launch. Krupp Atlas Elektronik, Demonstration of Shiphandling Simulator and newly developed Rasterscan Radar.
.20	Nautical College Amsterdam, Netherlands.	1 day	Dutch system of Nautical Education and Training. Facilities at the college, Computer Laboratory, Radar Simulator, etc.
.21	TNO - IWECO Delft, Netherlands.	1 day	Maritime Research facilities Shiphandling Simulator and Engine - room Simulator.
.22	Maritime Teachers' Training College Amsterdam, Netherlands.	1 day	System of education and course curriculum of Maritime Teachers.
.23	Enseignement Maritime Francais, Paris, France.	2 days	French system of Maritime Education and Training. The unique polyvalent system
.24	Ecole Nationale de Marine Marchande and Administration Centre for Maritime Affairs, Saint Malo, France.	1 day	Education and Training facilities at Maritime College. Data handling centre for Ship Security and Control. Paris Memorandum of Understanding. Computer data base system for Ship Inspections.

	Field Training	Duration	Educational Gains
.25	Ecole Nationale de la Marine Marchande, Le Havre, France.	1 day	Education and training facilities at Maritime College.
.26	Port of Rotterdam, Netherlands.	1 day	Rotterdam Port Operations. Vessel Traffic Management System.
.27	IMO, London.	3 days	Various facilities at IMO. Attended STW Sub-committee meeting, 18th. session.
.28	Disc Navigation, Sjoebo, Sweden.	1/2 day	Developing an electronic sea chart.
.29	Polish Sail Training Ship, "Dar Mlodziezy".	3 days	Voyage under sail from Malmo to Kattegat and return. Polish system of Maritime Education and Training. Training of cadets on board, "Dar Mlodziezy".
.30	Selesmar, Copenhagen, Denmark.	5 days	ARPA Training Course.
.31	Faculty of Maritime and Transport Studies, Rijeka and Marine School, Bakar, Yugoslavia.	2 days	Yugoslavian system of maritime education and training. Various training facilities.
.32	"Jugoregister" and Naval Academy, "Marshal Tito", Split, Yugoslavia.	2 days	Yugoslavian classification system, surveys, certification and control system. System of education and training Naval Officers and various training facilities.

	Field Trip	Duration	Educational Gains
.33	Maritime Academy, Warnemunde, GDR.	5 days	GDR system of Maritime Education and Training. Various training facilities. Computer programmes developed for distribution of cargo and ship stability. A mathematical approach to collision avoidance manoeuvres. Exercise on Radar Simulator.

Table 7.3 Outline of WMU Method of Education and Training

.1 Academic Programme

- In accordance with prescribed course modules.
  (See table 7.1, page 158, for example of course modules of Maritime Education and Training Courses)

* - General Philosophy of Academic Programme

" AS SCIENTIFIC AS NECESSARY

AND

AS PRACTICAL AS POSSIBLE ."

.2 Duration

- Two years divided into four semesters.

.3 Field Training

- See table 7.2, page 161, as an example of field training undertaken by Maritime Education and Training (Nautical) course 1984 - 85.

.4 Examinations

- Generally two / three per semester.

.5 Project

- A paper is to be written by every student, under the guidance of the course professor. The paper is to be submitted for assessment about two months before completion of the course.
- The paper is assessed by at least two assessors.
- This paper is an example of such a project.

.6 Assessment

- By marks obtained in written examinations.
- By class exercises.
- By home exercises.
- By field trip reports.
- By specific assignments given by course professors.
- By assessment of Project.

.7 Index for Grades

**	- 80 % and above . . .	Very good.
	- 60 % to < 80 % . . .	Good.
	- 50 % to < 60 % . . .	Satisfactory.
	- 40 % to < 50 % . . .	Subject to moderation.
	- 30 % to < 40 % . . .	Unsatisfactory.
	- 0 % to < 30 % . . .	Very unsatisfactory.

.8 Award of Degree

- A Master of Science degree is awarded to successful candidates.

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* Source : ZADE G., Lecture delivered at IMO / WMU Seminar for heads of Maritime Training Institutes from Developing Countries, September 1984.

** Source : WMU examination results, September 1985.

7.5 Specialized Training of Lecturers

On completion of the two year degree course in Maritime Education and Training at the World Maritime University, a lecturer will be able to teach the subjects related to his profession. However, if a lecturer is required to develop and conduct a specific specialized course, further training would be necessary but of a short duration. For example, if SCI plans to introduce a chemical tanker course, the faculty should be trained by a period of service of at least three months on board a chemical tanker of a well established chemical tanker company and should attend at least two chemical tanker courses in countries where such courses are well developed. Thereafter, the faculty would be able to develop and conduct the course.

Specialized training to lecturers should be given on a selective basis. At least two lecturers should be trained for each particular specialized course.

7.6 Visiting Lecturers

It will be observed from chapter three, "Courses Developed / Conducted by SCI", that a number of visiting lecturers are invited to cover topics of their specific area of specialization. This practice would have to continue as it would not be practicable for the SCI Maritime Training Institute to develop their faculty into every area of specialization when experts in the particular field are available and willing to offer their services.

7.7 Interaction between Training Institute, Head Office and Fleet

A healthy interaction between the training institute, head office and fleet, would go a long way in motivating the faculty and keeping up their interest, otherwise the institute will tend to be isolated from the real world.

Lecturers should be encouraged to make short voyages, at certain intervals, on recent acquisitions so that

they may supplement their theoretical knowledge with the latest practical knowledge. This will give the courses a greater practical bias.

Lecturers should also be circulated for short durations with their counterparts at the head office, or alternatively, some of the projects from the head office should be passed on to the institute, i.e. lecturers should also be included in the numerous head office project teams. This will bring about greater coherence between training institute, head office and fleet.

A summary of the proposed scheme for the selection and training of lecturers for the SCI Maritime Training Institute, is given at table 7.4, on page 170. Since the majority of the lecturers would be Masters and Chief Engineers, the proposed training scheme mainly refers to such lecturers. For the other lecturers the scheme would have to be altered to suit the specific area of specialization.

Table 7.4 Summary of Proposed Scheme for Selection and Training of Lecturers

Minimum Qualification : Master (F.G.) or First Class Engineer.

!

Minimum two years' service as Master or Chief Engineer Officer.
Selection by screening committee, based on performance, reports and willingness to serve as a lecturer.

!

Six months' trial period at SCI Maritime Training Institute.
If found suitable, to be absorbed as a lecturer.

!

Minimum one year's service as a lecturer.

!

To be sent to World Maritime University for a two year course in Maritime Education and Training.

!

Rejoin SCI Maritime Training Institute as a Senior Lecturer.

!

To attend short specialized training courses, depending on courses to be developed and conducted.

!

Continue at SCI Maritime Training Institute.

!

Short voyages, say one month every year,
on newly acquired ships.
Participation in conferences and seminars.
Participation in SCI projects.

!

Continual updating by attending short courses.

N.B. The above training scheme refers only to lecturers from the Nautical or Enginering field. For the other lecturers the scheme would have to be altered to suit the specific area of specialization.

CHAPTER EIGHT

DETAILS AND SYLLABI OF COURSES

8.0 DETAILS AND SYLLABI OF COURSES

8.1 Specialized Training Courses

Rapid technological developments, which have brought about major changes in shipping, have also brought about the need for specialized training courses.

A major part of education and training of a seafarer is covered at the maritime academies / colleges, where, the courses are well developed, syllabi and course curriculum are specified and a number of well written text books are available. However, with the continuous growth in specialization in shipping, special developments and events related to shipping, there is a time lag between the current maritime education and training provided by maritime academies / colleges and the actual shipboard requirements, in certain areas of specialization.

In order to bridge this gap, specialized short courses form an effective means. As the new developments begin to settle down and are well established, there should once again be a systematic and gradual transfer of specialized courses into the main stream of maritime education and training provided by maritime academies / colleges.

Such a dynamic approach to training will respond to developments in the shipping industry more rapidly, reduce the gap between job and training, will benefit shipboard personnel and finally will result in making seafaring safer, pollution free and more efficient.

8.2 Developing Specialized Training Courses

The demand for specialized training courses is often stimulated by special developments or events in the shipping industry. They could be a result of technological developments, findings of serious casualties or a combination of both. Considering the safety aspect, there is a constant need to reduce losses and considering the economic aspect,

there is a constant need to improve efficiency. A combination of the afore - said factors, results in the necessity to organize specialized training courses.

Once the need for a particular specialized training course has been recognized, the following would be the developmental steps :

- Preliminary framework;
- Aims and objectives;
- Participants : Entrance qualifications, number per course;
- Course contents, syllabus and course plan;
- Course duration, lecture hours and laboratory hours;
- Teaching methods, aids and facilities, laboratories, equipment and simulators;
- Course material and text - books;
- Field trips to special facilities;
- Number of trainers, desired qualifications, both academic and professional and minimum experience;
- Cost per participant per course;
- Initial trial courses;
- Regular courses;
- Course evaluation and continual updating.

A group of experts should be identified at the design stage of the course and they should be assigned the following tasks :

- Designing the course;
- Selecting and training the trainers;
- Developing the course material including audio - visual aids, tests etc., together with the trainers;
- Checking, evaluating and updating the course at regular intervals.

8.3 Courses described in this Chapter

In the concluding part of chapter six, at table 6.7, the total package of courses that would be required to be conducted by SCI, has been developed. Given below, is a break - up of the number of these courses, category - wise.

Category	New Courses to be Developed	Existing Courses
Officers	24	4
Cadets	--	4
Petty - Officers	7	5
Crew	4	2
Shore Staff	1	4
TOTAL	36	19

It would be beyond the scope of this chapter to provide details of each of the above 36 new courses to be developed. Hence, the courses described will be some of the new courses to be developed for officers, on a selective basis. These courses are enumerated at table 8.1, on page 175.

Once the courses for officers are in the process of development, it would be very easy to develop courses for petty - officers and crew, as they would be of a lower level.

Table 8.1 Description of Certain New Courses to be Developed for Officers

	COURSES / DURATION	PARTICIPANTS	DETAILS
.1	Updating and Radio / Electronic Equipment Maintenance 6 months	Radio Officers	8.4, page 176
.2	Chemical Tanker Courses 4 weeks	Deck and Engineer Officers and Technical Supdts.	8.5, page 183
.3	Dangerous and Hazardous Cargoes (Advanced) 1 week	Deck Officers and Marine Supdts.	8.6, page 191
.4	Radar Simulator Training and ARPA 2 weeks	Masters, Navigating Officers and Marine Supdts.	8.7, page 201
.5	Fuel Combustion, Plant Efficiency and Planned Maintenance 2 weeks	Chief and Second Engineer Officers and Engineer Supdts.	8.8, page 214
.6	Micro - computer applications 4 weeks	All Officers and Technical Supdts.	8.9, page 217
.7	Yoga and Meditation During stay at Training Institute	All Officers	8.10, page 229

8.4 Updating and Radio / Electronic Equipment Maintenance Course

8.4.1 Job / Training Gap

In SCI, ships acquired from 1983 onwards, are fitted with satellite communications equipment. Hence, we are now in the transitional stage and would be gradually changing over from the conventional method of wireless communications to the new era of satellite communications. Gradually, the Radio Officers would have to spend lesser time in the Radio room, for their routine watchkeeping. They could thus be better utilized in the maintenance, upkeep and repairs of electronic equipment, consisting of navigational, communications, control and entertainment equipment.

Traditionally, Radio Officers have been trained to operate conventional wireless equipment. With the advent of satellite communications, there is a big gap between job and training. In order to overcome this job / training gap, it is proposed that a suitable course should be developed consisting of two parts as follows :

Part I : Updating of knowledge, Satellite Communications and FGMDSS.

Part II : Maintenance of electronic equipment.

The course should be as practical as possible and mainly upto a technician's level.

Such a training programme would enable combination of two functions, i.e. operator and maintainer and it would be the most effective way of utilizing our existing Radio Officers.

The training requirements of Radio Officers of the future, or whether they would be replaced by Electronic / Communications Engineers, has not been discussed, as it is beyond the scope of this paper.

8.4.2 Objectives

The objectives of the Updating and Radio / Electronic Equipment Maintenance Course should be as follows;

- to comply with the following requirements of the STCW Convention 1978;
  = Regulation IV/2, "Mandatory minimum requirements to ensure the continued proficiency and updating of knowledge for Radio Officers";

- to comply with the following requirements of the STW Conference;
  = Resolution 5, "Basic guidelines and operational guidance relating to safety radio watchkeeping and maintenance for Radio Officers",
  = Resolution 14, "Training for Radio Officers"; and

- to acquire adequate knowledge and practical skills for the operation and maintenance of satellite communications and FGMDSS equipment and maintenance of electronic equipment consisting of navigation,control and entertainment equipment.

8.4.3 Participants

The participants for this course would be Radio Officers.

8.4.4 Duration

The duration of this course should be six months.

8.4.5 Faculty

The faculty should consist of an Electronic Engineer, Electronic Technician and a Radio Officer.

The visiting faculty could be drawn from the following institutes at Bombay :

- Indian Institute of Technology;

- National Institute for Training in Industrial Engineering;
- Victoria Jubilee Technical Institute;
- St. Xavier's Technical Institute; and
- Indian Navy (Radiocommunications branch).

8.4.6 Training of Faculty

Initially, the faculty should be trained. The first period of training should be in India, consisting of theoretical training at one of the technical institutes, followed by practical on - the - job training with electronic firms carrying out repairs to shipboard electronic equipment. The last part of the training would have to be undertaken abroad, with one of the manufacturer's of satellite communications equipment.

8.4.7 Course Development

On completion of the training course, the faculty, in co-operation with the visiting faculty, should develop the course.

8.4.7 Outline Syllabus

Part I : Theoretical Knowledge

.1.1 Adequate knowledge of principles of electricity and theory of radio to support theoretical knowledge of communications equipment.

.1.2 Adequate theoretical knowledge of the following equipment to enable maintenance of FGMDSS communications and other electronic equipment :

- MF, HF, VHF radio transmitters and receivers including hand - held and portable units;
- SSB, DSC, narrow-band direct-printing SITOR modems;
- INMARSAT ship earth stations;
- marine antenna systems, radiation and propagation;
- direction finding and homing equipment;

- NAVTEX receiver;
- satellite and terrestrial EPIRB;
- other radio communications and navigation equipment;
- auxiliary equipment;
  = teleprinter,
  = data storage and retrieval units,
  = visual display devices and computer terminals;
- power equipment;
  = storage batteries,
  = alternators,
  = generators,
  = inverters,
  = rectifiers.

.1.3 Additional theoretical knowledge and revision of fundamentals of electricity, electronics and radiocommunications as follows :

- basic electricity and direct current;
- primary and secondary cells;
- electromagnetism, inductance;
- alternating current, including non-sinusoidal wave shapes;
- single-phase and poly-phase power supplies;
- transformers and rotating machinery;
- transducers;
- cathode ray tubes;
- thermionic valves and semi-conductor devices;
- meters and electronic measuring instruments;
- combinational and sequential logic;
- electronic read-out devices such as nixi-tubes, light emitting diodes and liquid crystal displays;
- integrated circuits;
- microprocessors;
- amplifier circuits;
- oscillators and frequency synthesizers;
- types of modulation, frequency changing and detection;
- pulse circuits, non-sinusoidal wave shapes;
- servo systems;
- satellite and terrestrial antenna systems;

- electromagnetic wave propagation;
- waveguides, transmission lines and antenna matching;
- other circuits, components and systems in common use in shipborne radiocommunications and electronic navigation equipment including radio terminal equipment;
- basic principles of preventive and remedial maintenance;
- basic principles of printed circuit board repairs.

Part II : Practical Knowledge

.2.1 Practical knowledge and skills in electronic equipment maintenance and repairs, as follows :

.2.1.1 Knowledge of SOLAS 74 and ITU Radio Regulations as ammended, with particular emphasis on safety of life at sea and the prevention of unauthorized transmissions and harmful interference in the safety services.

.2.1.2 Detailed knowledge and ability to safely and efficiently operate FGMDSS and other communications equipment. Operation should include knowledge of :

- operating manuals;
- built-in test instruments;
- performance of equipment tests;
- antenna rigging and operational precautions;
- rotating machinery such as alternators, generators and inverters;
- storage battery charging procedures and safety precautions;
- transmitter tuning and antenna adjustment techniques;
- receiver tuning techniques for reception of SSB, DSC and narrow-band direct-printing signals;
- INMARSAT coverage areas and procedures for establishing satellite telephone and telex circuits under routine and emergency conditions.

.2.1.3 Detailed knowledge of the safe and efficient use of tools and test equipment normally used for maintenance and repair of FGMDSS and other communications equipment. As a minimum, Radio Officers should be skilled in the use of the following :

- general and specialized hand tools;
- soldering equipment;
- oscilloscope;
- signal generators;
- frequency counter;
- voltage, amperage and ohmeters;
- wattmeter;
- deviation meter;
- thermionic valves and semi-conductor testers;
- logic circuit probes, pulsers and current tracers;
- equipment for printed circuit board repairs.

.2.1.4 Detailed knowledge of systems analysis, logical fault finding and correct repair procedures. Such procedures should include as a minimum, knowledge of :

- schematic diagrams;
- soldering techniques;
- voltage, current and resistance checks;
- signal insertion and tracing methods;
- circuit alignment methods;
- neutralization, harmonic and parasitic signal suppression techniques;
- methods of alleviating electrical and electromagnetic interference such as bonding, shielding and bypassing;
- printed circuit board repair techniques.

.2.1.5 Knowledge of practical methods of preventive maintenance.

.2.1.6 Knowledge of supportive maintenance tasks, such as :

- recording of maintenance tests;
- preparing reports and maintaining records of repair work done and replacement parts used;
- requisitioning spares.

.2.1.7 Knowledge of preventive measures for the safety of ship and personnel in connection with hazards related to radio equipment including electrical, radiation, chemical, mechanical, explosion and fire hazards.

.2.1.8 The above practical training should be supplemented by visiting SCI ships in the port of Bombay, where communications and navigation equipment is being repaired. Participants should effectively participate under the guidance of the faculty.

The above syllabus has been developed, based on the following papers submitted to IMO's Sub - Committee on Standards of Training and Watchkeeping, 18th. session, September 1985 :

.1 STW/18/4/3, 19 July 1985,
Operator functions in the FGMDSS,
Training for Maintainers,
Note by the International Confederation of Free Trade Unions.

.2 STW/18/4/7, 7 August 1985,
Operator functions in the FGMDSS,
Knowledge Requirements for FGMDSS Maintainers - Class 1 and Class 2,
Note by the Government of the United States.

8.4.8 Navigation / Communications Equipment Laboratory

In order to undertake this training programme it would be very essential to have a well equipped laboratory for the purpose.

8.5 Chemical Tanker Courses

8.5.1 The need for developing Chemical Tanker courses

India imports a substantial quantity of bulk liquid chemicals for the chemical and fertiliser industries. SCI has a plan to enter this trade by acquiring Chemical Tankers by 1987.

One of the most sophisticated, complex and expensive ships in service today, are Chemical Tankers. There are stringent requirements to be complied with, namely, the International Bulk Chemical Code and Annex II of MARPOL 73/78.

In the bulk liquid chemical trade, the degree of hazard varies according to the type and construction of the vessel and the characteristics of the cargo carried. Many of the cargoes carried, do not present any additional hazard to the ship, the environment or to personnel although they often have strict cargo quality and handling criteria. On the other hand, many of the cargoes carried are extremely hazardous. Some typical hazards are enumerated below :

- High cargo density;
- High viscosity or pour point;
- High vapour pressure or low boiling point;
- Low flash point, wide explosive range or low auto - ignition temperature;
- Highly corrosive;
- Water reactive, reactive with air, reactive with other cargoes;
- Polymerizing, self - reactive;
- Highly toxic, irritant liquid or vapours;
- High heat requirement, high freezing point;

- Heat sensitive;
- Highly sensitive to impurities; etc.

However, in spite of the cargo related hazards, if safe practices are followed, a Chemical Tanker can be operated as safely as any other tanker. In fact, particularly when it comes to operating Chemical Tankers,

"THE SAFE WAY IS THE ONLY WAY".

In order to achieve high standards of safety, training is of vital importance and these courses should be developed before acquisition of Chemical Tankers.

8.5.2 Objectives

The objectives of the Chemical Tanker courses should be as follows :

- to comply with the requirements of STCW 78, Regulation V/2, "Mandatory Minimum Requirements for the Training and Qualifications of Masters, Officers and Ratings of Chemical Tankers";

- to comply with the requirements of STW Conference Resolution 11, "Training and Qualifications of Officers and Ratings of Chemical Tankers";

- to comply with the requirements of SOLAS 74, Chapter VII as ammended, Part B, "International Bulk Chemical Code";

- to comply with the requirements of of MARPOL 73/78, Annex II, "Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk"; and

- to comply with SCI's operational requirements.

8.5.3 Participants

The participants for this course would be Deck and Engineer Officers and Technical Superintendents.

8.5.4 Duration

The duration of these courses should be as follows:

- Chemical Tanker Familiarization course . . . . . 2 weeks;

- Advanced Chemical Tanker Operation course . . . . 2 weeks.

8.5.5 Faculty

The faculty should consist of Masters and Chief Engineer Officers, trained for the purpose.

The visiting faculty should consist of a Chemical Engineer, a Chemist and a Doctor from the chemical and fertiliser industries. The visiting faculty should also consist of a Technical Superintendent and a Commercial Officer from the Tanker Department.

8.5.6 Training of Faculty

Initially, the faculty, Technical Superintendents and senior officers that would be manning the first two vessels, should be trained. The training programme should consist of the following :

- Chemical Tanker Familiarization course at a reputed training institute abroad . . . . . 2 weeks;

- Practical, on - the - job training on board a Chemical Tanker of a reputed company . . . . . 3 months;

- Advanced Chemical Tanker Operation course . . . . . 2 weeks.

In addition, for the faculty only :

- Repeat Chemical Tanker Familiarization Course, but at a different training institute . . . . . 2 weeks;

- Repeat Advanced Chemical Tanker Operation Course, but at a different training institute . . . . . 2 weeks.

8.5.7 Course Development

On completion of training, the faculty, in co-operation with the visiting faculty, should develop the course.

8.5.8 Syllabi

* Chemical Tanker Familiarization Course

.1 Ship Design and Equipment

- Codes and regulations concerning Chemical Tanker Construction, equipment and classification;
- Tank arrangements;
- Tank coatings;
- Pipeline and pumping systems;
- Tank cleaning and venting facilities; and
- Electrical equipment.

.2 Cargo Properties and Reactions

- Physical properties, specific gravity, vapour pressure and density, partial pressure, boiling temperature, diffusion, flashpoint, auto - ignition temperature, flammable limits, viscosity, electrostatic charge generation;
- Chemical properties and reactions, chemical structure, symbols and nomenclature, chemical groups, reaction conditions, interaction, catalysis, polymerization, inhibitors, reactions with water and air;
- Toxicity of chemicals, toxicity limits (MAC, TLV, LD50);
- Identification of chemicals, Utilization of chemical dictionaries, handbooks and codes, and determination of properties.

.3 Operational Procedure

- Loading and discharging;
- Cargo calculation and stowage;
- Tank cleaning and gas freeing;
- Ship / Shore communications, port regulations; and
- Safety control.

.4 Hazard and Hazard Control

- Explosion and flammability risk;
- Health hazard;
- Reactivity hazard;
- Tank corrosion;
- Environmental pollution;
- Safety equipment and personal protection; and
- Measuring instruments.

.5 Emergency Operations

- Emergency organization plan;
- Fire - fighting on board Chemical Tankers;
- Collision and grounding situations;
- Tank leakages;
- First aid measures; and
- Rescue from enclosed spaces.

.6 Repairs and Maintenance

* Advanced Chemical Tanker Operation Course

.1 Properties and Reactions of Liquid Chemical Cargo

- General characteristics of liquid chemical cargo;
- Properties of selected liquid chemicals;
  Oxidizing agents, mineral acids, caustics, amines and amides, organic acids and anhydrides, esters, isocyanates, alcohols and glycols, aldehydes and ketones, phenols, olefines, parrafines, aromatic hydrocarbons, vinyl compounds, halocarbons and nitrocompounds.

.2 Cargo Containment

- Containment systems;
- Rules for construction, classification and equipment of Chemical Tankers;
- Tank structure;
- Tank material and coating;
- Double bottoms and cofferdams;
- Pumping and piping design; and
- Slop tanks.

.3 Cargo Handling Systems

- Types of cargo pumps;
- Pipes and hoses;
- Sealings and gaskets;
- Tank venting and inerting facilities;
- Gas detection and monitoring instruments;
- Cargo gauging systems;
- Cargo heating and cooling devices; and
- Cargo sampling and control.

.4 Operational Procedure

- International and national codes and regulations;
- Port regulations and communications;
- Cargo stowage;
- Cargo calculations;
- Tank and cargo survey;
- Tank cleaning and gas freeing; and
- Safety check lists.

.5 Cargo Hazards

- Health hazard, ingestion, inhalation, skin contact of toxic chemicals, toxicity limits, short and long term effects;
- Fire and explosion hazards, flammable limits, flashpoint, auto - ignition temperature;
- Chemical reaction hazards, cargo interaction, polymerization catalysis, auto - ignition, coating interaction, corrosion, heat from reaction;
- Environmental pollution, cargo spillage, drifting vapour clouds, reactions with water and air, ecological impact.

.6 Safety Equipment and Measures

- Measuring instruments, detection and monitoring of vapours, gases and flammable mixtures, oxygen control, application, calibration and maintenance of measuring instruments;
- Protective clothes and equipment for safe cargo handling;
- Fire - fighting measures and equipment;
- First aid measures, resuscitation, eye washing, skin cleaning, use of rescue sets, breathing apparatus, appliance of antidotes, and rescue from enclosed spaces.

.7 Emergency Procedures

- Emergency shut down of cargo operations;
- Emergency measures in case of fire and explosion;
- Emergency measures in case of cargo spillage;
- Emergency measures in case of chemical interaction and polymerisation;
- Emergency measures in case of collisions and strandings;
- Emergency plans, measured timing schedules, personnel assignment, life and health protection, and ship / shore communications.

* Source : Model Training Programmes based on STCW 78, (21 05 81) "Considerations, Provisions and Syllabi for Chemical Tanker Courses", by Prof. G. Bothe, Dipl.Chem., Bremen Nautical Institute (FRG).

8.5.9 Proposed Training Programme for SCI's Chemical Tanker Personnel

A proposed training programme for SCI's Chemical Tanker Personnel, is shown at table 8.2 on page 190. The table shows the training programme for Deck and Engineer Officers only. Training programmes for other Officers, Petty - Officers and crew would be of a lower level.

Table 8.2 Proposed Training Programme for SCI's Chemical Tanker Personnel

.1 Deck and Engineer Officers

Certificate of Competency

!

Shore - based Fire - fighting Course

(See 3.6 page 68, for details)

!

!

* *

* Chemical Tanker Familiarization Course *

* (Duration : Two weeks) *

* *

!

!

Service on Chemical Tankers with specific duties in connection with cargo and cargo equipment.
Minimum one year experience on Chemical Tankers, appropriate to duties.

!

!

* *

* Advanced Chemical Tanker Operation Course *

* (Duration : Two weeks) *

* *

!

!

For Masters and Chief Officers,
Service on Chemical tankers with immediate responsibility for cargo operations.
Practical on - the - job training for three months, under supervision of experienced Masters.

8.5.10 Technical Assistance

Resolution 16 of the STW Conference, covers the subject of, "Technical Assistance for the Training and Qualifications of Masters and Other Responsible Personnel of Oil, Chemical and Liquefied Gas Tankers".

As SCI does not have any previous experience with Chemical Tankers, a request for technical assistance for training personnel and for setting up training programmes for Chemical Tankers, could be availed of from IMO through their technical assistance programme.

8.6 Dangerous and Hazardous Cargoes (Advanced) Course

8.6.1 The need for developing Dangerous and Hazardous Cargoes Course

Dangerous and hazardous cargoes can be divided into three main categories, namely;

- Dangerous and hazardous cargoes in liquid bulk form,
- Dangerous and hazardous cargoes in solid bulk form, and
- Dangerous and hazardous cargoes in packaged form.

Dangerous and hazardous cargoes in liquid bulk form have already been covered in the Oil and Chemical Tanker courses, hence, this course will only cover dangerous and hazardous cargoes in solid bulk form and in packaged form.

In the last three decades, there has been a high rate of growth in the maritime transportation of dangerous and hazardous cargoes. This has resulted from the demand for chemicals due to industrialization of many countries. Today, there are about 100,000 dangerous and hazardous chemicals and substances, which are transported.

The total quantity of cargo which enters world sea-borne trade, is about 3700 million tonnes, of which, the share

of general cargo is about 1000 million tonnes and further, the share of dangerous goods in packaged form is about 100 million tonnes. Although packaged dangerous goods represent only ten percent by quantity of the total general cargo, the hazards involved in its transportation cannot be compared with those of general cargo, as even minor incidents can have catastrophic effects on safety of personnel, ships and equipment and harm to the environment.

In a recent incident in India, where about forty tonnes of Methyl Isocyanate gas leaked from a carbide plant in Bhopal, the highly toxic gas killed more than 2000 persons and injured at least 200,000 people, in what is now called the world's worst industrial disaster.

The Bhopal incident illustrates the need for a very high standard of safety and training in every aspect of handling dangerous and hazardous chemicals and substances.

In order to bring about greater awareness for the safe transportation of dangerous and hazardous cargoes and to comply with numerous international requirements, there is a vital need to develop this course.

8.6.2 Objectives

The objectives of the dangerous and hazardous cargoes course should be as follows :

- to comply with the requirements of SOLAS 74, Chapter II-2, "Construction - Fire Protection, Fire Detection and Fire Extinction" and Chapter VII, "Carriage of Dangerous Goods";

- to comply with the requirements of MARPOL 73/78, Annex III, "Regulations for the Prevention of Pollution by Harmful Substances carried by Sea in Packaged Forms, or in Freight Containers, Portable Tanks or Road and Rail Tank Wagons";

- to comply with the requirements of STCW 78, Regulation II/8, "Mandatory Minimum Requirements for a Watch in Port on Ships

Carrying Hazardous Cargo";

- to comply with the requirements of STW Conference Resolution 13, "Training and Qualifications of Officers and Ratings of Ships Carrying Dangerous and Hazardous Cargo other than in Bulk";

- to comply with the requirements of IMO Resolution A.537(XIII), "Training of Officers and Ratings Responsible for Cargo Handling on Ships Carrying Dangerous and Hazardous Substances in Solid Form in Bulk or in Packaged Form"; and

- to comply with SCI's operational requirements.

8.6.3 Participants

The participants for this course would be Deck Officers and Marine Superintendents.

8.6.4 Duration

The duration of this course should be one week.

8.6.5 Faculty

The faculty should consist of Masters, trained for the purpose.

The visiting faculty should consist of a Chemical Engineer, a Chemist and a Doctor from the Chemical Industry. The visiting faculty should also consist of Marine Superintendents in charge of cargo handling and stowage from Liner Division, including Container Cell.

8.6.6 Training of Faculty

Initially, the faculty should be trained by attending at least two courses at reputed institutes abroad, where such courses are well developed.

8.6.7 Course Development

On completion of training, the faculty, in co-operation with the visiting faculty, should develop the course.

8.6.8 Syllabus

PART I : GENERAL

.1 General Introduction

General introduction to the course, giving amounts and types of dangerous goods commonly carried by sea on conventional break-bulk ships and on specialized vessels like container and ro-ro ships, barge and bulk carriers. Accidents to be exemplified in order to impart an idea about the hazards of dangerous goods. The introductory lesson should convince the participants of the need for an effective control of the carriage of dangerous goods by sea and should create motivation amongst participants to effectively participate in the training course.

Training should be divided into two parts, a general part on the principles involved and a part on the application of such principles to ship operation.

.2 Principles

- Elementary science
  - = Physical characteristics and chemical properties of dangerous and hazardous substances.
  - = Explosion hazards (mass explosion, projection hazards) and travelling speed and distance of shock waves.
  - = Vapour pressure / temperature relationship, flash point, boiling point, explosive range and limits, specific gravity and vapour density.
  - = Basic chemical knowledge, including combustion.
  - = Reactivity with oxygen.
  - = Self-reactivity and decomposition.

= Reactivity with water.
= Reactivity among various substances and cargoes.
= Water solubility.

- Classification of dangerous and hazardous substances and materials possessing chemical hazards
  = IMO classes 1-9 and the hazards associated with each class. Materials hazardous only in bulk (MHB).

- Health hazards
  = Oral, dermal and inhalation toxicity limits.
  = Radiation contamination.
  = Necrosis of skin tissue.

PART II : TRAINING OF OFFICERS RESPONSIBLE FOR CARGO HANDLING ON SHIPS CARRYING DANGEROUS AND HAZARDOUS SUBSTANCES IN SOLID FORM IN BULK

.1 Conventions, Regulations and Recommendations

- Familiarization with SOLAS 74, Chapters II-2 and VII.

- Use of and familiarization with the Code of Safe Practice for Solid Bulk Cargoes (BC Code) with particular reference to :
  = Safety of personnel including safety equipment, measuring instruments, their use and practical application, and interpretation of results.
  = Hazards from cargoes which may liquefy.
  = Materials possessing chemical hazards.

- Familiarization with IMO Recommendations on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas.

.2 Shipboard Application

- Handling, stowage and segregation.

  = Class 4.1 - Flammable solids.

Class 4.2 - Flammable solids or substances liable to spontaneous combustion.

Class 4.3 - Flammable solids or substances which in contact with water emit flammable gases.

Measures used to prevent heating, ignition or the emission of toxic or flammable gases.

= Class 5.1 - Oxidising substances.
Reaction with acids.
Sensitivity to heat.
Explosive decomposition.
Separation from combustible materials.

= Class 6.1 - Poisonous (toxic) substances.
Contamination of foodstuffs.
Working areas and living accommodation.
Ventilation.

= Class 7 - Radioactive materials.
Types of ores and concentrates.
Full load shipments.
Segregation.
Decontamination.

= Class 8 - Corrosives.
Dangers from wetted substances.

= Class 9 - Miscellaneous dangerous substances.
Examples and associated hazards.

= Materials hazardous only in bulk (MHB)
Emission of flammable or poisonous gases when wet.
Spontaneous heating.
Oxygen depletion.
Anaerobic degradation with methane emission.

- Safety precautions and emergency procedures.

= Electrical safety in cargo spaces.

= Precautions to be taken for entry into enclosed spaces- that may contain oxygen - depleted, poisonous or flammable atmospheres.

= The possible effects of fire in shipments of each class.

= Emergency procedures for ships carrying dangerous goods. Emergency plans and procedures to be followed in case of incidents involving dangerous and hazardous substances. The use of individual entries in the Code of Safe Practice for Solid Bulk Cargoes in this respect.

- Medical first aid.

= The IMO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG).
Use and application in association with other guides.
Medical advice by radio.

PART III : TRAINING OF OFFICERS RESPONSIBLE FOR CARGO HANDLING ON SHIPS CARRYING DANGEROUS AND HAZARDOUS SUBSTANCES IN PACKAGED FORM

.1 Conventions, Regulations and Recommendations

- Familiarization with SOLAS 74, Chapters II-2 and VII.

- Familiarization with MARPOL 73/78, Annex III.

- Familiarization with IMO Recommendations on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas.

.2 Familiarization with the International Maritime Dangerous Goods (IMDG) Code

- Declaration, documentation, packing, labelling, and placarding. Freight container and vehicle packing. Portable tanks, tank containers, road tank vehicles and other transport units for dangerous substances.

- General requirements for stowage, securing, separation and segregation in different ship types.
  = General cargo ships.
  = Ro-ro ships.
  = Container ships.
  = Shipborne barges on barge carrying ships.
  = Combination carriers.

- Shipment of dangerous goods.
  Based on a flow chart and simple case studies, a shipment of dangerous goods from its first booking to the stowage or acceptance on board, should be followed.

  = Acceptance procedures of an offer for shipment of dangerous goods (listing by carrier).

  = Special procedures regarding the transport of dangerous goods in containers (FCL/LCL), responsibilities in packing, documentation, marking, labelling, etc.

  = Co-operation and communication between ship and port and operational procedures in port.

  = Preparation on board ship (tentative stowage plan for on / under deck cargo, segregation, etc., information for ship's personnel and safety preparations for loading).

  = Documents which should be received by the Master, the responsibility in comparing the physical shipment with documents and other responsibilities of the ship.

- Safety of personnel, including safety equipment, measuring instruments, their use and application and interpretation of results.

.3 Shipboard Application

- Handling, Stowage and Segregation.

= Class 1 - Explosives.
Hazard divisions, compatibility groups and stowage categories.
Suitability of cargo spaces.
Magazines.
Security.
Segregation within class 1.

= Class 2 - Gases (compressed, liquefied or dissolved under pressure) flammable, non - flammable and toxic.
Types of pressure vessels and portable tanks.
Relief and closing devices.

= Class 3 - Flammable Liquids
Classes.
Receptacles, tank containers and portable tanks.
Road tank vehicles.
Empty receptacles.
Ventilation and drainage of compartments.

= Class 4.1 - Flammable solids.
Class 4.2 - Flammable solids or substances liable to spontaneous combustion.
Class 4.3 - Flammable solids or substances which in contact with water emit flammable gases.
Measures used to prevent heating, ignition, or the emission of toxic or flammable gases.

= Class 5 - Oxidizing substances (agents) and organic peroxides.
Reaction with acids.
Sensitivity to heat.
Explosive decomposition.
Prevention of spillage.
Separation from combustible materials.

= Class 6 - Poisonous (toxic) and infectious substances.
Prevention of leakage.
Contamination of foodstuffs.
Working areas and living accommodation.
Ventilation.

= Class 7 - Radioactive substances.
Types of packages.
Full load shipments.
Segregation.
Decontamination.
Transport index.
Stowage limitations.

= Class 8 - Corrosives.
Dangers from leakage and spillage.
Dangers from wetted substances.

= Class 9 - Miscellaneous dangerous substances.
Examples and associated hazards.

= Materials hazardous only in bulk (MHB).
Examples and associated hazards.

- Safety precautions and emergency procedures.

= Electrical safety in cargo spaces.

= Precautions to be taken for entry into enclosed spaces that may contain oxygen depleted, poisonous or flammable atmospheres.

= The possible effects of spillage or fire in shipments of substances of each class.

= Consideration of events on deck or below deck.

= IMO Emergency Procedures for Ships Carrying Dangerous Goods.
Emergency plans and procedures to be followed in case of

incidents involving dangerous substances.

- Medical first aid.

  = The IMO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG).
  Use and application in association with other guides.
  Medical advice by radio.

The above syllabus has been developed, based on the following :

- IMO Resolution A.537(XIII), "Training of Officers and Ratings Responsible for Cargo Handling on Ships Carrying Dangerous and Hazardous Substances in Solid Form in Bulk or in Packaged Form"; and

- "Dangerous Goods - Training Aspects", lecture delivered by Capt. K. Brunings, at World Maritime University, September 1985.

8.7 Radar Simulator Training and ARPA Course

8.7.1 The need for developing Radar Simulator and ARPA course

Since the last four decades, marine radars have been developed into one of the most important navigational aids for the mariner. However, improper use of radar data or misinterpretation of radar data, may result in a catastrophic disaster. The famous "Stockholm / Andrea Doria" collision case is a typical example of what is now known as, "A Radar Assisted Collision". Hence, in order to train mariners, to interpret radar data correctly, "Radar Observer Courses", were developed.

Over the last decade, Radar Navigation Simulators have been developed into an effective tool for Radar and ARPA training. However, it must be borne in mind, that a good navigator is also a good seaman and he has to assimilate every available factor which exists in the real situation at sea, but

it is so far not possible to exactly simulate such a real sea situation, hence, the role of simulation techniques should not be overestimated. For best results, there should be a combination of simulator aided training and practical experience at sea. Further, with the aid of a simulator the amount of practice that can be given in a short span of time and the situations which can be created could be the most difficult ones which a mariner would be likely to encounter, this would build up the confidence of the participant and he would be well prepared to face the real situation at sea.

The development of Automatic Radar Plotting Aids (ARPA) is fairly recent. Improper use of ARPA may result in what can today be termed as, "A Computer Assisted Collision". Hence, Radar Simulator Training should be augmented to include ARPA training.

Recognizing the benefits of a simulator for Radar and ARPA training, a number of IMO Resolutions have recommended the use of such simulators for training.

Presently, SCI Navigating Officers undergo a Radar Observer course before obtaining their Second Mate (F.G.) certificate of competency. (See 3.9 page 86, for details). With the acquisition of a simulator, it would be possible to make this course more effective and further, based on the foregoing and considering the increasing number of ships being fitted with ARPA Radars, there is a need to develop Radar Simulator Training and ARPA course.

8.7.2 Objectives

The objectives of the Radar Simulator Training and ARPA course, should be as follows :

- to comply with the requirements of STCW 78, Regulation II/2, "Mandatory Minimum Requirements for Certification of Masters and Chief Mates of Ships of 200 Gross Register Tons or More", Appendix paragraph 4, "Radar equipment";

- to comply with the requirements of STW Conference Resolution 18, "Radar Simulator Training";

- to comply with the requirements of STW Conference Resolution 20, "Training in the Use of Collision Avoidance Aids";

- to comply with the requirements of IMO Resolution A.483(XII), "Training in Radar Observation and Plotting"; and

- to comply with the requirements of IMO Resolution A.482(XII), "Training in the Use of Automatic Radar Plotting Aids (ARPA)".

8.7.3 Participants

The participants for this course would be Masters, Navigating Officers and Marine Superintendents.

8.7.4 Duration

The duration of this course should be two weeks.

8.7.5 Radar Navigation Simulator

In order to conduct this course, it would be essential to acquire a Radar Navigation Simulator, from a reputed manufacturer.

8.7.6 Faculty

The faculty for the Radar Observer course consists of experienced Masters and an experienced Electrical Officer with an ex-Naval background and having a good knowledge of Radar electronics.

The same faculty could also be utilized for Radar Simulator Training and ARPA course after adequate specialized training.

8.7.7 Maintenance Technicians

In order to maintain the Radar Navigation Simulator and to provide logistic support to the faculty, maintenance technicians with an adequate background in electronics, would be required. They would also be utilized in the Navigation, Communications and Electronics laboratories.

8.7.8 Training of Faculty and Technicians

The Faculty and Technicians should be trained at the Simulator manufacturer's works, depending on their specific area of specialization.

The Faculty with a Master Mariner's background should be further given an on - the - job instructor's training, at one of the Maritime Colleges having a similar simulator.

8.7.9 Course Development

On completion of training, the faculty should develop the course and the simulator exercises.

8.7.10 Syllabus

The training would consist of the following main parts :

- Radar theory revision;
- Plotting techniques revision;
- Exercises on Radar Navigation Simulator; and
- ARPA training.

Part I : Radar theory revision

.1 Principles of Radar.

.2 Main units.

.3 Block Diagram;
- Modulator, Magnetron, Scanner, Time - base, Brightening pulse etc.;
- Transmitter;
- Receiver.

.4 Characteristics of Radar Pulses;
- Wavelength, Electro-magnetic spectrum, S - band, X - band;
- Pulse duration (length), Pulse repetition frequency;
- Pulse power;
- Beam width.

.5 Radar Receiver;
- Problem, Task, Principle, Technique, Local Oscillator, Mixer, I.F. Amplifier, Tuning, Amplification, Demodulation, Video Amplifier, Control, Quality.

.6 Time Base and Range Measurement.

.7 Fast Time Constant (FTC), (Anti-clutter Rain);
- Problem, Objective, Principle, Technique, Examples, Control, Disadvantage, Modern Alternative, Technique of differentiation.

.8 Sensivity Time Control (STC), (Anti-clutter Sea);
- Problem, Aim, Principle, Result, Technique, Video signal, Control, Modern Alternative.

.9 Cathode Ray Tube (CRT);
- Task, Technique, Electron Gun, Brilliance, Focus, Centering, Deflection Coils.

.10 Echo distortion and discrimination;
- Bearing distortion, Bearing discrimination;
- Range discrimination, Minimum range.

.11 Range and Bearing Measurement and Accuracy.

.12 IMO Resolution A.477(XI), "Performance Standards for Navigational Radar Equipment".

.13 False and Unwanted Echoes (Spurious Echoes);
- Side Echoes, Multiple Echoes, Indirect Echo, Second Trace Echoes;
- Interference, Spoking, Crossing high tension cables, Sea-clutter.

.14 Modes of Presentation;
- Relative motion, Head up, North up, Course up;
- True motion, North up, Course up;
- Centred, Off-centre.

.15 Comparative study of Technical Specifications.

.16 Radar Beacons and Transponders, Radar Reflectors, Radaflare.

Part II : Plotting Techniques Revision

.1 Manual plotting techniques, reflection plotters, plotting exercises, relative / true motion. Real time exercises on simulator.

.2 Identification of critical echoes
- Position fixing by radar from land targets and sea marks.
- Accuracy of position fixing by ranges and by bearings.
- Importance of cross checking accuracy of radar against other navigational aids.
- The value of recording ranges and bearings at frequent, regular intervals when using radar as an aid to collision avoidance.

.3 Course and speed of other ships

- Different methods by which course and speed of other ships can be obtained from recorded ranges and bearings;
  = unstabilized relative plot,
  = stabilized relative plot,
  = true plot.

- Relationship between visual and radar observations; detail, accuracy of estimates of course and speed of other ships. Detection of changes in movements of other ships.

.4 Time and distance of closest approach of crossing, meeting or overtaking ships

- Use of recorded data to obtain;
  = measurement of closest approach distance and bearing,
  = time to closest approach.

- The importance of frequent, regular observations.

.5 Detecting course and speed changes of other ships

- Effects of changes of course or speed by other ships on their tracks across the display.

- Delay between change of course or speed and detection of that change.

- Hazards of small changes as compared with substantial changes of course or speed in relation to rate and accuracy of detection.

.6 Effects of changes in own ship's course and speed or both

- On a relative motion display; effects of own ship's movements, effects of other ships' movements, advantages of compass stabilization of a relative display.

- On a true motion display.

- Effects of inaccuracies; of speed and course settings on a true motion display, of compass stabilization data driving a stabilized relative motion display.

- Effects of changes in course or speed by own ship on tracks of other ships on the display.

- Relationship of speed to frequency of observations.

.7 Application of the International Regulations for Preventing Collisions at Sea

- Relationship of the Regulations for Preventing Collisions at Sea to the use of radar.

- Action to avoid collision; dangers of assumption made on inadequate information and the hazards of small alterations of course or speed. The advantages of safe speed when using radar to avoid collision. The relationship of speed to closest approach distance and time and to the manoeuvring characteristics of various types of ships.

- The importance of radar observation reports being well defined; radar reporting procedure.

- Use of radar in clear weather, to obtain an appreciation of its capabilities and limitations, compare radar and visual observations and obtain an assessment of the relative accuracy of information.

- The need for early use of radar in clear weather at night and when there are indications that visibility may deteriorate. Comparison of features displayed by radar with charted features. Comparison of the effects of differences between range scales.

Part III : Exercises on Radar Navigation Simulator

- To be developed by the faculty.
  The simulator facilities should provide a capability such that the participants undergo a series of real - time exercises in basic radar format and also in ARPA format. Realistic exercises should be developed to provide the participants with a wide range of displayed information and to consolidate their ability to effectively use basic radar and ARPA systems.

Part IV : ARPA Training

Theory and Demonstration

.1 Digital Radar Data Processing :
- Problem, aim, principle, precautions;
- Quantization, range, bearing, amplitude;
- Improvement of signal, correlation, echo stretch, echo brightening, retiming, recycling;
- Rasterscan.

.2 ARPA Philosophy :
- Introduction;
- ARPA procedure overview;
- The acquisition and tracking windows;
- Target tracking;
- Filtering.

.3 ARPA Features :
- Acquisition;
- Vectors;
- Past trails;
- Alphanumeric data;
- Possible points of collision (PPC);
- Predicted areas of danger (PAD);
- Dangerous sectors;
- Trial manouvres;
- Operational warnings;
- Navigation lines;

- Speed and Course measurement.

.4 Errors and Limitations :

- Introduction;
- Sensor errors;
  = IMO Resolution A.422(XI), Annex 3,
  = Radar, errors in range, bearing error,
  = Speed input error,
  = Course errors,
  = Influence on vectors,
  = Influence on PPC's;
- ARPA errors (tracking errors);
  = Sea clutter,
  = Target swop,
  = Fast manoeuvre,
  = Display delay,
  = Reasons for target loss;
- Errors of interpretation;
  = Misinterpretation concerning vectors,
  = Misinterpretation due to ground or sea stabilized motion,
  = Misinterpretation because of display symbols.

.5 The possible risks of over - reliance on ARPA

- Appreciation that ARPA is only a navigational aid and that its limitations, including those of its sensors, make over - reliance on ARPA dangerous, in particular for keeping a look - out. Need to comply at all times with the basic principles and operational guidance for officers in charge of a navigational watch.

.6 The principal types of ARPA systems and their display characteristics

- Knowledge of the principal types of ARPA systems in use; their various display characteristics and an understanding of when to use ground or sea stabilized modes and north-up, course-up or head-up presentations.

.7 IMO performance standards for ARPA

- An appreciation of the IMO performance standards for ARPA, in particular the standards relating to accuracy.

.8 Factors affecting system performance and accuracy

- Knowledge of ARPA sensor input performance parameters - radar, compass and speed inputs, effects of sensor malfunction on the accuracy of ARPA data.
- Effects of the limitations of radar range and bearing discrimination and accuracy; the limitations of compass and speed input accuracies on the accuracy of ARPA data.
- Knowledge of factors which influence vector accuracy.

.9 Tracking capabilities and limitations

- Knowledge of the criteria for the selection of targets by automatic acquisition.
- Factors leading to the correct choice of targets for manual acquisition.
- Effects on tracking of "lost" targets and target fading.
- Circumstances causing "target swop" and its effects on displayed data.

.10 Processing delays

- The delays inherent in the display of processed ARPA information, particularly on acquisition and re-acquisition or when a tracked target manoeuvres.

.11 When and how to use the operational warnings, their benefits and limitations

- Appreciation of the uses, benefits and limitations of ARPA operational warnings; correct setting, where applicable, to avoid spurious interference.

.12 System operational tests

- Methods of testing for malfunctions of ARPA systems including functional self-testing.
- Precautions to be taken after a malfunction occurs.

.13 Manual and automatic acquisition of targets and their respective limitations

- Knowledge of the limits imposed on both types of acquisition in multi-target scenarios, effects on acquisition of target fading and target swop.

.14 When and how to use true and relative vectors and typical graphic representation of target information and danger areas

- Thorough knowledge of true and relative vectors; derivation of targets' true courses and speeds.
- Threat assessment; derivation of predicted closest point of approach and predicted time to closest point of approach from forward extrapolation of vectors, the use of graphic representation of danger areas.
- Effects of alterations of course and / or speed of own ship and / or targets on predicted closest point of approach and predicted time to closest point of approach and danger areas.
- Effects of incorrect vectors and danger areas.
- Benefits of switching between true and relative vectors.

.15 When and how to use information on past position of targets being tracked

- Knowledge of the derivation of past positions of targets being tracked, recognition of historic data as a means of indicating recent manoeuvring of targets and as a method of checking the validity of the ARPA's tracking.

Practice

.1 Setting up and maintaining displays

- The correct starting procedure to obtain the optimum display of ARPA information.
- Choice of display presentation; stabilized relative motion displays and true motion displays.
- Correct adjustment of all variable radar display controls for optimum display of data.

- Selection, as appropriate, of required speed input to ARPA.
- Selection of ARPA plotting controls, manual / automatic acquisition, vector / graphic display of data.
- Selection of the time scale of vectors / graphics.
- Use of exclusion areas when automatic acquisition is employed by ARPA.
- Performance checks of radar, compass, speed input sensors and ARPA.

.2 System operational tests

- System checks and determining data accuracy of ARPA including the trial manoeuvre facility by checking against basic radar plot.

.3 When and how to obtain information from ARPA display

- Demonstrate ability to obtain information in both relative and true motion modes of display, including :

  = identification of critical echoes;
  = speed and direction of target's relative movement;
  = time to and predicted range at, target's closest point of approach;
  = courses and speeds of targets;
  = detecting course and speed changes of targets and the limitations of such information;
  = effect of changes in own ship's course or speed or both;
  = operation of the trial manoeuvre.

.4 Application of the International Regulations for Preventing Collisions at Sea

- Analysis of potential collision situations from displayed information, determination and execution of action to avoid close quarters situations in accordance with International Regulations for Preventing Collisions at Sea.

The above syllabus has been developed, based on the following :

- "Radar and ARPA", lectures delivered by Dr. B. Berking, at World Maritime University, September 1984;

- IMO Resolution A.483(XII), "Training in Radar Observation and Plotting"; and

- IMO Resolution A.482(XII), "Training in the Use of Automatic Radar Plotting Aids (ARPA)".

8.8 Fuel Combustion, Plant Efficiency and Planned Maintenance Course

8.8.1 Purpose and Objective

In today's depressed shipping market conditions, where shipping companies are struggling for survival, an improvement in ship performance with a reduction in operating and maintenance costs plays a crucial role. The two key elements of survival are, "Efficiency and Economy".

Recently, with regard to shipboard machinery space operations, several new ideas have been developed, such as heavy fuel operation with one fuel on board, heat recovery etc. The fuel efficient ship of today, has reached a stage of maturity. The major aim behind these innovations is economy.

In order to economize in machinery space operations by achieving reductions in fuel, maintenance and repair costs, it would be necessary to train Senior Engineers in the economical aspects of fuel combustion, plant efficiency and planned maintenance.

8.8.2 Participants

The participants for this course would be Chief and Second Engineer Officers and Engineer Superintendents.

8.8.3 Duration

The duration of this course should be two weeks.

8.8.4 Faculty

The faculty for this course should be lecturers from the training department, having a Chief Engineer's background.

The visiting faculty would consist of Engineer Superintendents from SCI, Engineers from Oil Companies and Engineers representing manufacturers of machinery.

8.8.5 Course Development

This course can be developed in - house, by the faculty of the Training Department, in co-operation with the visiting faculty.

8.8.6 Outline syllabus

Part I : Fuel Combustion

- Introduction, high cost, poor quality.
- Quality and standards of bunkers, fuel specifications, shipboard and laboratory analysis, fuel oil treatment.
- Conditions for optimum combustion, how to achieve same.
- Monitoring, effects of improper combustion, associated maintenance.
- Reasons for improper combustion, fuel, design, and maintenance, economic effects, changing spares.
- Fuel standards, precautions against poor quality fuels.
- Use of high viscosity fuels, precautions, fuel blending.

- Marine lubricants, their suitability, care and handling, preservation, purification, sample analysis.

- Fuel and Lubricants, saving methods.

Part II : Plant Efficiency

- Efficiency of Main plants :
  Propulsion, Purification, Power generation, Refrigeration, Steering gear, Various control systems and Steam plants.

- Propulsion Efficiency
  = Fuel --> final thrust --> final speed.
  = Losses at every stage.
  = Minimisation of losses.
  = Maintenance and design aspects.
  = Power computation, various methods.
  = Slow steaming, economical speed, optimum speed.
  = New trends, the total concept of fuel efficient ships.

- Power generation efficiency.

- Refrigeration
  = Main plants, Air - conditioning, Domestic fridge, Cargo fridge and Reefer containers.
  = Maintenance, Compressor, Condenser, Evaporator, Cooling water pumps, Adjustments / Tuning.
  = Expansion valves, Insulation, Effects on Plant Efficiency, Insulation damage.
  = Design aspects, Balancing the system.
  = Refrigerated cargo spaces.
  = SCI's reefer containers.
  = Loss of freon gas, Precautions.

Part III : Planned Maintenance

- Purpose and Objectives.

- Planned vs Break - down maintenance.

- Development of routines for each item of machinery.

- Maintenance manuals.

- Typical examples from existing schedules that have been developed.

- Harmonisation with Classification and Statutory Surveys.

- Records and returns to head office.

- Maintenance of Registers, Change - over to Computerisation.

- Spares consumed and inventory control.

- Budget estimates and cost control on maintenance.

- Overall benefits, increased efficiency, reduced costs and lesser breakdowns.

8.9 Micro - computer Applications Course

8.9.1 Purpose and Objective

The development of computers has led to a revolution in data processing and information technology. The 80's have seen a growing interest and acceptance of computers for shipboard management functions. With decreasing costs and increasing capabilities of micro - computers, they are emerging as one of the vital components of ship's equipment.

The major factors which have spurred interest in the use of micro - computers for ship management are :

- Advent of low cost and high capability micro - computers;
- Maintenance problems overcome by replacement or redundancy using micro - computers;
- Stabilizing of software on few operating systems;
- Fourth generation languages;

- Data base management systems;
- Greater understanding of systems by shore staff;
- Acceptance and promotion of systems by shipboard personnel;
- Prevailing low freight rates, which have resulted in efforts to cut operating costs; and
- Advent of International Maritime Satellite Communications (INMARSAT).

Computers and information technology can improve efficiency and productivity, reduce documentation and increase dissemination of pertinent information. The use of satellites to provide television entertainment to ships at sea, distance learning courses via satellite links, the use of distributed computer systems on board ships for control and monitoring functions, the formation of main data bases accessible through hard copy print - outs or through visual display units and the use of Videotex and Teletext for dissemination of marine information, form part of a system of on-going development.

The following are the four major shipboard operational areas and activities where the influence of computers is growing :

- Machinery, including engine surveillance, performance monitoring, trend analysis and fuel efficiency, condition monitoring, maintenance planning, engine automation and electrical load control;

- Deck and cargo, including cargo management and monitoring, loading calculations and stability;

- Bridge, including navigation, collision avoidance, ship control, communications, voyage management including ship performance and economics; and

- Administration, including ship management, records, stores, stock control, accounts and training.

Figure 8.3, on page 220, is a systems concept diagram which illustrates the use of computers in shipboard

applications and figure 8.4, on page 221, illustrates the use of computers for an, "Integrated Ship Management Information System", linking ship and shore computers through satellite communications.

In SCI, a second generation mini - computer has been in use at the head - office, for the last two decades. It is likely to be replaced by a fourth generation computer, in the near future. Further, there is a likelihood that ships acquired from 1987 onwards, would have an increasing use of micro - computers for shipboard applications.

There is a need to train ship and shore officers in the use of micro - computers, as their influence is growing. With the gradual increase of micro - computers in the fleet and with the training of officers it would be possible to accrue the benefits of data processing and information technology for greater efficiency and economy.

8.9.2 Participants

The participants for this course would be all Officers and Superintendents.

8.9.3 Duration

The duration of this course should be four weeks.

8.9.4 Computer Laboratory

In order to conduct this course, it would be essential to have a well equipped computer laboratory. The laboratory should be equipped with about ten micro - computers, with disc drives, monitors and printers. These micro - computers could be procured from a reputed local manufacturer. The micro - computers should be IBM compatible as this would give access to a vast amount of software already developed for IBM computers. Maintenance of the computers should be on an annual contract basis with the manufacturers.

Figure 8.3 **SHIPBOARD APPLICATIONS**

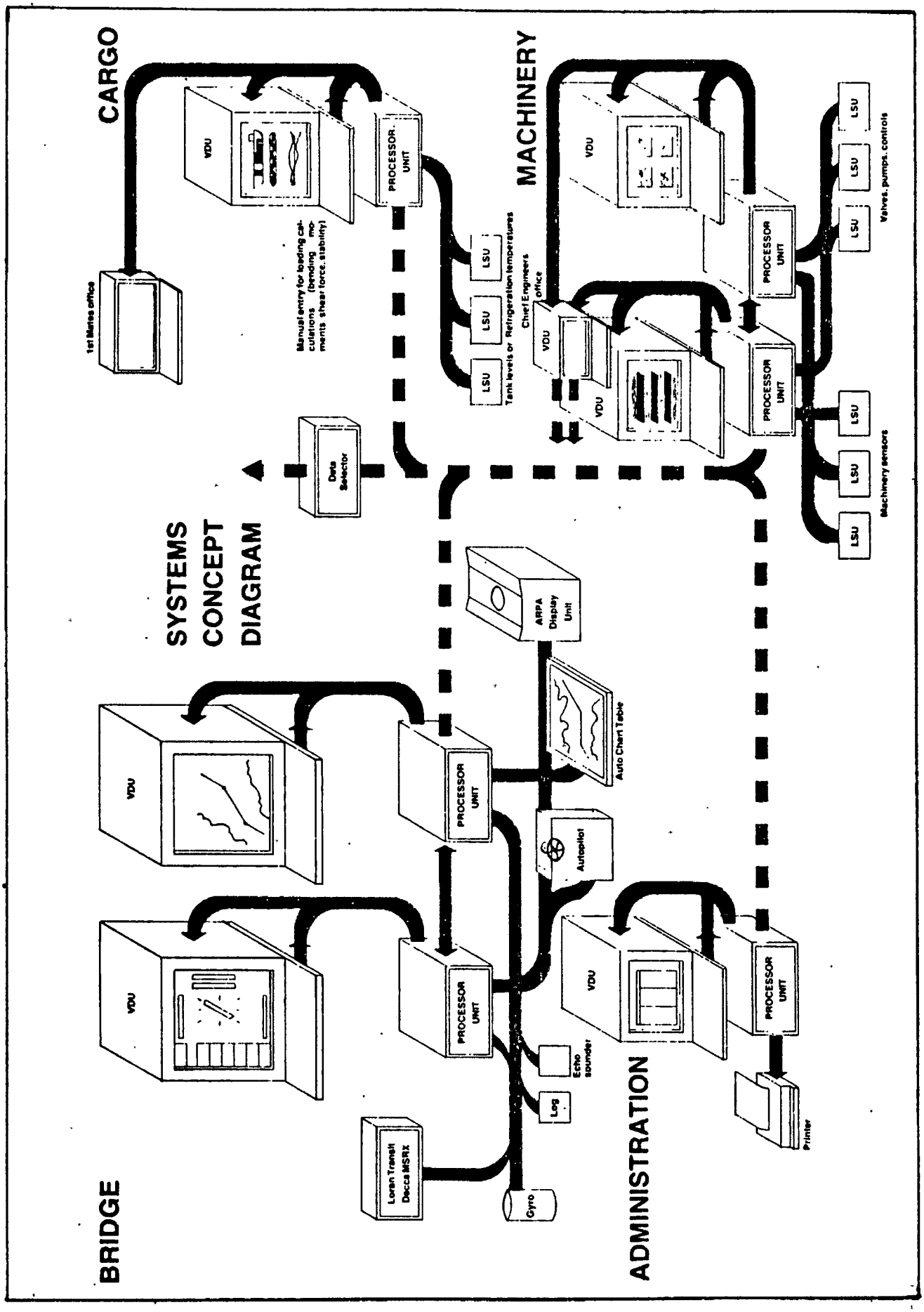
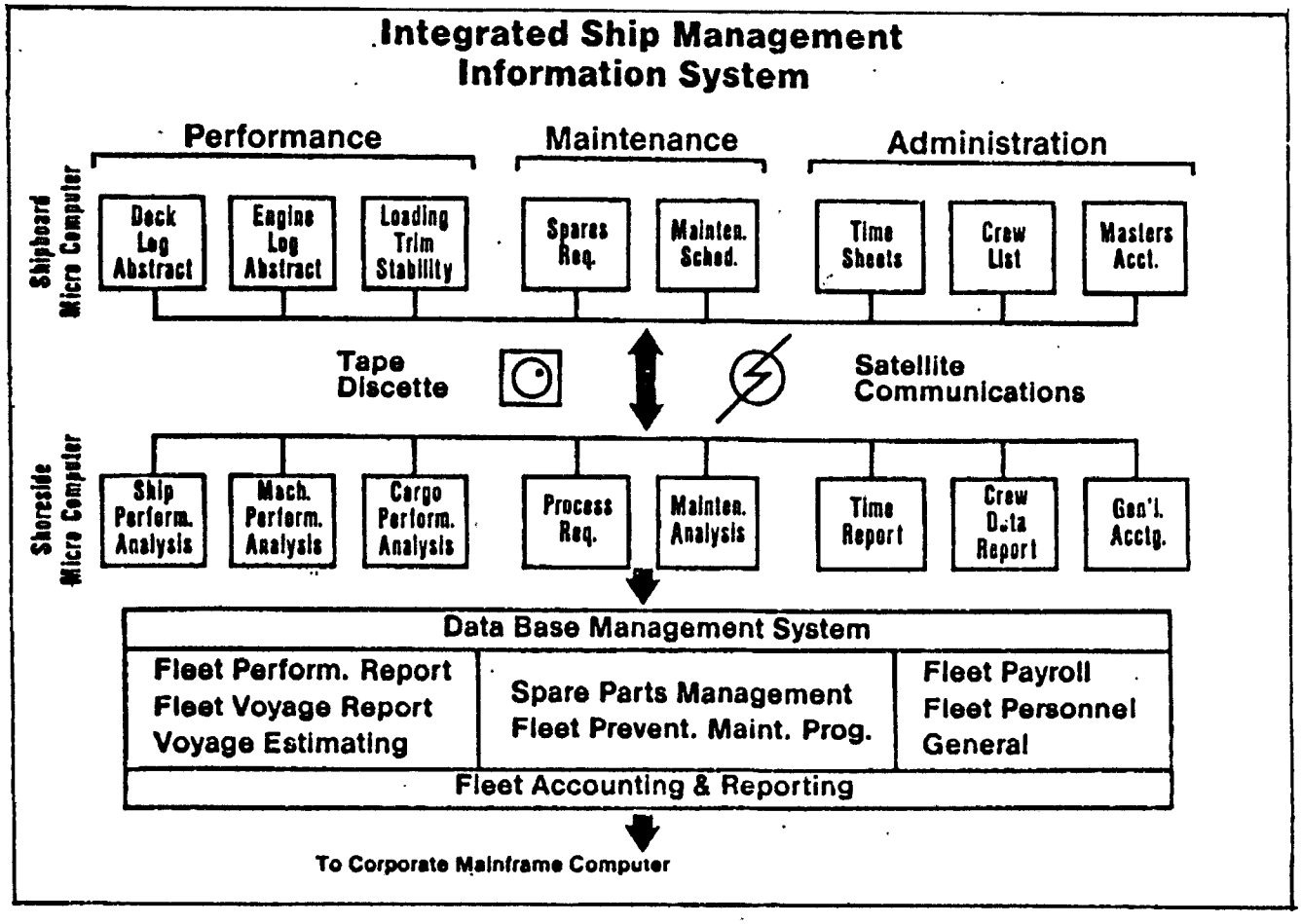


Figure 8.4 Integrated Ship Management Information System



8.9.5 Faculty

The faculty should consist of a computer programmer with teaching experience in the field. He should be assisted by other members of the faculty with a Master Mariner's and Chief Engineer's background. The assisting faculty should undergo a training in computers at one of the reputed institutions in Bombay.

The visiting faculty should consist of an Officer from the Computer Department of SCI.

8.9.6 Course Development

The Computer Programmer, Assisting Faculty that would be trained and the Visiting Faculty, should develop the course. Special exercises should be developed for participants with examples from shipboard applications.

8.9.7 Syllabus

The syllabus would consist of the following main parts :

Part I : Data Processing Concepts.

Part II : Programming Logic and Techniques..

Part III : Programming in BASIC.

Part IV : Computer Applications in Shipping.

Part I : <u>Data Processing Concepts</u>

.1 Introduction

- A computerized world. People and computers. Impact on society.
- Why study about computers?
- Computers for many purposes. Computers in Business, Education, Finance, Fine arts, Industry, Medicine,

Shipping, Transportation, etc.
- Instructions and Data.
- How the computer works. How people and computers differ.
- Basic components of a computer system.
- Telling the computer what to do. Special Instructions.
- Computer occupations.
- Computer trends.

.2 History and Development
- Early developments.
- Wheels and Levers.
- Punched Cards.
- Electromechanical Computing Machines.
- The First Computers (1942 - 1958).
- Second - Generation Computers (1959 - 1963).
- Third - Generation Computers (1964 - early 1970's).
- Fourth - Generation Computers (early 1970's to present)
- Future Generations - Fifth and beyond.
- The evolution of programming.

.3 Hardware
- Central Processing Unit.
- Storage concepts and devices.
- Data Representation.
- Data Recording Media. Hollerith punched cards, Paper tapes, Magnetic tapes, Magnetic Discs, Floppy Discs, etc.
- Input and Output Concepts and Devices.
- Buffers, Data Synchronizers.
- Main - frame computers, Mini - computers, Personal Computers, Micro - computers, General purpose computers and Special purpose computers.
- Modern Computer Systems.
- Bits and Bytes.
- ROM, RAM, ISAM, EPROM.
- Data Preparation.

.4 Software
- The Three Levels of Language.
- Machine Language.
- Symbolic Languages.

- Assembly Language.
- Higher - Level Languages.
- Interpretive Languages.
- Major Higher - Level Programming Languages.
- Structured Programming.
- Comparing Programming Languages.
- Choosing a Programming Language.

.5 Information Processing Systems

- Data Management. Data Structures.
- Manual versus Computerised systems.
- Centralised, Decentralised and Distributed Processing.
- On - line Processing.
- Time Sharing.
- Real - Time Information Processing.
- Designing a Real - Time System.
- Batch Processing.
- Multiprogramming. Multiprocessing.
- Operating Systems.
- Remote Computing Services.
- Accuracy Checks.
- Controls.
- Reusability of Data.
- Planning.
- Security and Privacy.
- Data organization and access methods.
- Word Processing.
- Data Base Technology.
- Management Information System.

.6 Data Communications

- Development of Data Communications.
- Components of a Data Communications System.
- Modems and Acoustic Couplers.
- Data Transmission.
- Error Correction.
- Computer Networks.
- Future Trends.

Part II : Programming Logic and Techniques

.1 Problem Solving
- Introduction and Objectives.
- The Programming Function.
- Problem Solving.
- Problem Solving in Data Processing Terms.
- Summary : Define, Plan, Test, Implement and Document the problem and plan.
- Programme and Data.
- Data and Device Characteristics.
- Systems Flowcharts and Data Formats.

.2 Introduction to Logic
- Basic Logic.
- Binary Arithmetic.
- Boolean Algebra.
- Venn Diagrams.
- Truth Tables.
- Decision Tables.
- Logical Operators.
- Exercises in Logic.

.3 Flowcharts
- The Programme Flowchart.
- Flowcharting Symbols.
- Flow Direction.
- Flowcharting Guidelines.
- Flowchart Construction.
- Subroutines.
- Flowchart examples.
- Flowchart Exercises.

.4 Programming Applications
- Analyzing the Problem.
- Developing the Flowchart.
- Coding the Programme.
- Executing the Programme.
- Testing and Debugging the Programme.
- Documenting the Programme.

- Branching and Looping.
- Comparing.
- Sample programme 1.
- Additional Processing Techniques.
- Control Breaks and Rolling Totals.
- Sample programme 2.

Part III : Programming in BASIC

.1 Basic Programming Rules
- Introduction.
- Screen Display Codes.
- The Operating System.
- Basic Statements.
- Line Numbers.
- Characters and Symbols.
- Programming Numbers and Variables :
  = Integer, Floating - Point and String Constants;
  = Integer, Floating - Point and String Variables;
  = Integer, Floating - Point and String Arrays.
- Beginning and Ending a Programme.
- System Commands.
- Expressions and Operators :
  = Arithmetic Expressions;
  = Arithmetic Operations;
  = Relational Operators;
  = Logical Operators;
  = Hierarchy of Operations;
  = String Operations;
  = String Expressions.

.2 Using BASIC
- Using the computer as a calculator.
- Getting Data into the Computer.
- Getting Data out of the Computer.
- Running Programmes.
- Arithmetic and Alphanumeric Operations.
- Illustrations of Simple BASIC Programmes.

.3 Programme Control
- The GOTO Statement.
- The IF / THEN Statement.
- The FOR / NEXT Statement.

.4 Functions and Subroutines
- Pre-defined functions.
- User - defined functions.
- Subroutines.

.5 Arrays

.6 BASIC Language Vocabulary
- With particular reference to the computer in use.

.7 MATRIX operations

.8 Simple BASIC Programmes
- Sample programmes and Exercises.

.9 Colour Graphics

.10 Word Processor Operations

.11 Data Base Operations

Part IV : Computer Applications in Shipping

.1 SCI's Computer Department
- Description of the system.
- Various programmes developed.
- Prospective plans.

.2 Integrated Ship Management Information System
- Description of the system.
- Linking ship and shore computers through satellite communications.
- Access to Data Banks.

.3 Shipboard Applications

- On the Bridge;
  = Navigation;
  = Collision Avoidance;
  = Ship Control;
  = Communications;
  = Voyage Management; and
  = Ship performance and economics.

- Machinery Space;
  = Engine surveillance;
  = Performance monitoring;
  = Trend analysis and fuel efficiency;
  = Condition Monitoring;
  = Planned Maintenance and status of surveys;
  = Stores and spares inventory control;
  = Engine automation and electrical load control.

- Deck and Cargo;
  = Cargo management and monitoring;
  = Loading and discharging programmes for tankers;
  = Cargo calculations for tankers;
  = Ship stability and stresses;
  = Cargo stowage;
  = Container stowage and tracking for container ships;
  = Planned maintenance and status of surveys;
  = Stores and spares inventory control.

- Administration;
  = Maintaining records;
  = Accounts of wages, Disbursements, Portage bills;
  = Crew overtime;
  = Stores and stock control;
  = Standard and routine letters;
  = Shipboard training programme package.

.4 Software packages developed for shipboard applications.

.5 Exercises on shipboard applications.

Project

During the course each participant should develop a small programme for a specific area of shipboard application.

The above syllabus has been developed based on the following :

- "Computer Laboratory", lectures and demonstrations by Capt. B. Wagner, at World Maritime University, April to December 1984.

- "Information Processing / Digital Computers", lectures delivered by Prof. G. Zade, at World Maritime University, May 1985.

- "Data Processing - An introduction with BASIC", by Donald D. Spencer, 2nd edition, 1982.

- "Entry Level with BASIC", training programme at National Institute of Information Technology (NIIT), Bombay, December 1983.

8.10 Yoga and Meditation Course

8.10.1 Background

Yoga and meditation have been a part of the ancient Indian cultural heritage. A long time ago, they were an essential part of the Indian system of education, but with the advent of urbanisation, industrialisation and changes in the system of education, they were discontinued.

About four centuries ago, an Indian yogi, "Patanjali", carried out an in - depth study and updated the practices of yoga and meditation to suit the prevailing conditions. For the last seventy years, there has been an attempt to further revive these practices and they have again been updated to suit the modern times. However, although a number of yoga schools have been opened, there are more than

fifty such schools in Bombay, but progress has been slow.

8.10.2 What is Yoga?

* "Yoga is more than physical exercises, it is part of a comprehensive system that can lead to the experience of innate perfection within each of us".

Yoga is a science for attaining total individual perfection. The aim of yoga is to bring us to a state of unity with our own essential nature. In order to achieve physical, mental, emotional and spiritual harmony, we need to practice yoga along with meditation. It is important to learn yoga from an adept teacher with strict adherence to the discipline involved.

There is a saying in the yoga scriptures, "If the body is weak, if the veins and nerves are weak, if there is no strength in the prana, the life force, to flow in and out, then how can you derive any joy from living?"

Regardless of what else you may have in your life, wealth, status, and / or endless degrees, but if your body isn't healthy, how can you enjoy any of it. Consequently, it is of primary importance to keep the body healthy and strong. Some people try to do this through sports, while others practice yoga. The asanas, or postures, of yoga do help to make the body pure and strong. Learning the postures also helps to maintain a good sitting posture for meditation and to lead a life of discipline and self - control.

Yoga submits that man lives at various planes of life, physical, mental, moral, emotional, intellectual, spiritual, etc. simultaneously and not compartmentally. Therefore any attempt to solve his problems must necessarily be through an integrated approach and not through an isolated one. Yoga which takes this basic fact into account is therefore not a science of any one thing, but the science of man.

While modern science and technology have

contributed much to material and physical comfort, they have failed to evolve man at the higher levels of his life which are equally or even more important in the real progress of human evolution.

* Source : "Hatha Yoga for Meditators", by Swami Muktananda.

8.10.3 What is Meditation?

Meditation is the blending of the physical, the mental, the intellectual and the spiritual into one harmonious whole. Meditation is the highest spiritual discipline. Through meditation man comes to experience peace within and without, internecine wars between desires are ended, conflicts between duties no longer wreck a meditator's nerves and the mind grows up to view life as a whole.

A strong body is indeed an asset as far as it goes, but a strong mind is surely a more valuable possession. Mind has been defined as, "Flow of Thoughts".

* "AS THE THOUGHT, SO THE MIND; and

AS THE MIND , SO THE MAN".

According to ancient Indian scriptures, meditation has been defined as follows :

"Meditation is the process by which the meditator entertains his entire mind in the contemplation of a series of similar thought - currents to the exclusion of all dissimilar thought intrusions, so that he may ultimately minimise his thoughts to the bare possible minimum of a single idea".

It is difficult to draw a line between yoga and meditation, as after some practice they merge into one another.

* Source : "Meditation and Life", by Swami Chinmayananda.

8.10.4 Advice from the "Bhagavad Gita"

The "Bhagavad Gita" was written about five thousand years ago. In chapter six of the Gita, a discourse is given on, "Yoga of Meditation". Given below are a few selected stanzas from the Gita, which contain advice on the importance of, "Yoga of Meditation".

* Through what methods can one attain this highest goal and assure for oneself the surest result? It is explained :

"Let the Yogi try to keep the mind steady, remaining in solitude, alone with the mind and body controlled, free from hope and greed".
(Chapter VI, Stanza 10).

"There, having made the mind one - pointed, with the actions of the mind and senses controlled, being seated on the seat, let him practice Yoga for the purification of the self".
(Chapter VI, Stanza 12).

"Arjuna asks :
The mind verily is O Krishna, restless, turbulent, strong and unyielding; I deem it quite (as) difficult to control as the wind".
(Chapter VI, Stanza 34).

"Krishna answers :
Undoubtedly, O mighty - armed, the mind is difficult to control and is restless; but, by practice, O Son of Kunti, and by dispassion it is restrained.
(Chapter VI, Stanza 35).

"Yoga, I think, is hard to be attained by one of uncontrolled self; but the self - controlled, striving, can obtain it by proper means".

* Source : Translation and Commentary of the Bhagavad Gita,
Chapter VI, "Yoga of Meditation",
by Swami Chinmayananda.

8.10.5 The need for Yoga and Meditation course

Seafarers face a very tough life. They are away from their families and friends, they work in a hazardous environment and generally lead an unnatural life due to social isolation. This results in working and living under constant stress and tension. Modern technology has brought several comforts to ease the burden of a seafarer but these are mainly material and physical comforts. Modern education and technology have done very little to enable a seafarer to gain intrinsic benefits which would ease his stress and tension.

By learning the practices of Yoga and Meditation, a well tried and established science from ancient times, from an adept teacher, during the period of a participants' stay at the SCI Maritime Training Institute, it would assist him in later continuing the practices on his own and to achieve self - development at the physical and mental levels. This would in turn assist him in withstanding the stresses and strains of life at sea, hence, the need for this course.

8.10.6 Duration

This course should be held for one hour each morning during the stay of the participants at the SCI Maritime Training Institute.

8.10.7 Faculty

The faculty for this course would be trained Yoga Teachers from the "Yoga Institute".

8.10.8 Course Programme

The course programme for the Yoga course is given at table 8.5, on page 234 and one of the methods of meditation is given at table 8.6, on page 235.

Table 8.5 Beginner's Yoga Course

*

SEQ.	YOGA POSTURE		FREQUENCY	TIME	LIMITATIONS
.1	Sukhasana		static	3 min.	arthritis
.2	Talasana	I	2 times	1 min.	nil
.3	"	II	"	1 min.	"
.4	"	III	"	1 min.	"
.5	"	IV	"	1 min.	"
.6	Konasana	I	3 times	1 min.	nephritis
.7	"	II	3 "	1 min.	"
.8	"	III	3 "	1 min.	colic
.9	Utkatasana		10 rounds	2 min.	arthritis
.10	Cakrasana		5 rounds	1 min.	neuronitis peritonitis
.11	Bhadrasana		4 rounds	1 min.	sciatica
.12	Yogamudra	I	5 rounds	1 min.	scoliosis
.13	"	II	5 "	2 min.	"
.14	Pascimottanasana	I	6 rounds	1 min.	scoliosis
.15	"	II	static	2 min.	"
.16	Dhanurvakrasana		static	2 min.	"
.17	Ardha-Matsyendrasana		5 rounds	2 min.	"
.18	Pavanamuktasana	I	4 rounds	1 min.	colitis
.19	"	II	static	2 min.	peritonitis
.20	Sarvangasana		static	2 min.	sclerosis
.21	Savasana	I	static	1 min.	nil
.22	"	II	static	5 min.	nil

Total YOGA Exercises 22 Time Reqd. 40 min.

* Source : "Yoga Asanas Simplified", by Shri Yogendra, Yoga Institute, Bombay.

Table 8.6 How to Meditate

*

.1 Seat

Sit on a thin, soft, flat cushion.

.2 Posture

It is preferable to sit in the padmasana, lotus posture, with the right leg over the left leg or any other comfortable pose you can conveniently manage. Vertebral column should be erect, hands interlocked (right over the left) and thrown in front. Eyes half open or closed and gaze concentrated on some object, a statue, photograph or OM - symbol placed before you.

.3 Thought Massage

After sitting on a comfortable asana and in the posture described above, relax the body and start massaging the various parts of the body mentally, neck, shoulders, upper arm, lower arm, hands, chest, abdomen, trunk, back, thighs, knees, legs and feet.

.4 OM - chanting by the mouth

After thought massage start chanting OM. Let the sound of chanting rise like a fountain, chant on. Let the OM - vibrations grow and expand around you and about you and form an enveloping atmosphere around you. Let the OM - vibrations unfold themselves into ever - winding ripples, chant on vigorously, powerfully and sincerely.

.5 OM - chanting by the mind

After having mastered the technique of chanting by the mouth, the next step is to stop chanting OM silently by the mind. Put a sudden stop to chanting as though someone has shouted the order "Stop", to reach the thoughtless state of mind. The order to stop must come from within you. If this is found difficult, as some meditators will find it so, you can thus chant louder and louder in the mind and by the mind and when you have reached the peak, slowly and steadily reduce the tone of this mental roar into just a normal mental chanting and reduce it still further into a mere mental whisper. This soft inner whisper of OM - chanting may be allowed to drown and dissolve

itself into the Great Silence Within.

.6 Thoughtless state of mind

When you stop mental chanting and be, for a split moment, in the thoughtless state (i.e. there are no thoughts in your mind), hold on to that state as long as you can. As soon as the first thought breaks in and disturbs the peace and silence of the thoughtless state of the mind, chant again to enable you to retire again into the thoughtless state. The process may be repeated as many as three times during one sitting.

* Source : "Meditation and Life", Swami Chinmayananda.

CHAPTER NINE

SUMMARY

9.0 SUMMARY

9.1 Summary of Courses to be Conducted at the SCI Maritime Training Institute

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Officers		
.1 *N	Updating and Refresher 6 months	Deck and Engineer Officers and Technical Supdts.	LBS Nautical and Engg. College and SCI (Trg. Dept.)
.2 *N	Updating and Radio / Electronic Equipment Maintenance 6 months	Radio Officers	St. Xavier's Institute and SCI (Training Dept.)
.3 *N	Basic Oil Tanker Safety 2 days	Radio Officers, Pursers and Electrical Offrs.	SCI (Training Dept.)
.4 *N	Oil Tanker Familiarization 2 weeks	Deck and Engineer Officers and Technical Supdts.	SCI (Training Dept.)
.5 *E	Advanced Oil Tanker Operation 2 weeks	Deck and Engineer Officers and Technical Supdts. with minimum one year oil tanker experience.	SCI (Tanker Dept. and Training Dept.)
.6 *N	Basic Chemical Tanker Safety 2 days	Radio Officers, Pursers and Electrical Offrs.	SCI (Training Dept.)
.7 *N	Chemical Tanker Familiarization 2 weeks	Deck and Engineer Officers and Technical Supdts.	SCI (Training Dept.)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Officers (Contd.)		
.8 *N	Advanced Chemical Tanker Operation 2 weeks	Deck and Engineer Officers and Technical Supdts.	SCI (Tanker Dept. and Training Dept.)
.9 *E	Fire - fighting (Advanced) 3 days	All Officers and Technical Supdts.	SCI (Training Dept.)
.10 *E	Survival at Sea 1 day	All Officers and Technical Supdts.	SCI (Training Dept.)
.11 *N	Dangerous and Hazardous Cargoes (Advanced) 1 week	Deck Officers and Marine Supdts.	SCI (Training Dept.)
.12 *N	Bridge Team Training, Passage Planning and Ship Handling 1 week	Masters, Chief Officers and Marine Supdts.	SCI (Training Dept.)
.13 *N	Radar Simulator Training and ARPA 2 weeks	Masters, Navigating Offrs. Marine Supdts.	SCI (Training Dept.)
.14 *N	Human Relationships 1 week	All Officers	SCI (Training Dept.)
.15 *N	Medical Care 4 weeks	Masters and Chief Officers	SCI (Medical Dept. and Training Dept.)
.16 *N	Cargo Securing 1 week	Deck Officers and Marine Supdts.	SCI (Liner Divn. Container Dept. & Training Dept.)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

	COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
	Officers (Contd.)		
.17 *E	Chief Officer's Orientation 2 weeks	Chief Officers	SCI (Various Departments)
.18 *N	Container Operations 2 weeks	Deck Officers and Marine Supdts.	SCI (Container Dept. and Training Dept.)
.19 *N	Fuel Combustion, Plant Efficiency and Planned Maintenance 2 weeks	Chief and Second Engineer Officers & Engineer Supdts.	SCI (Technical Depts. and Training Dept.)
.20 *N	Hydraulics 1 week	Engineer Officers & Engineer Supdts.	Jessop, Calcutta and SCI (Training Dept.)
.21 *N	Hydraulic and Control Engineering 1 week	Deck Officers and Marine Supdts.	SCI (Training Department)
.22 *N	Micro - computer applications 4 weeks	All Officers and Technical Supdts.	SCI (Computer Dept. and Training Dept.)
.23 *N	New Ship Acquisition 1 to 2 weeks	Officers joining new ships and Technical Supdts.	SCI (Technical Services and Training Dept.)
.24 *N	Off - shore Operations 1 to 2 weeks	All Officers serving on Off-shore vessels	SCI (Off - shore Dept. and Training Dept.)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
Officers (Contd.)		
.25 Research Vessel Operations *N 1 to 2 weeks	Masters, Chief Engr. Officers, Chief Officers, and Second Engr. Officers serving on Research v/ls. Technical Supdts.	National Institute of Oceanography and SCI (Managed vessels Dept. and Training Dept.)
.26 Second Engineer Officer's Orientation *E 2 weeks	Second Engineer Officers	SCI (Various Departments)
.27 Ship Management *N 2 weeks	Masters and Chief Engineer Officers	SCI (Operations Depts. and Training Dept.)
.28 Yoga and Meditation *N During stay at Training Institute	All Officers	Yoga Institute
Cadets		
.29 Mid - term *E 2 months	Cadets with minimum one year sea service	SCI (Training Department)
.30 Radar Observer *E 2 weeks	As above	SCI (Training Department)
.31 Fire - fighting *E 2 days	As above	SCI (Training Department)
.32 Survival at Sea *E 1 day	As above	SCI (Training Department)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
Petty - Officers		
.33 Basic Oil Tanker Safety *N 2 days	All Petty Officers except Pumpman	SCI (Training Department)
.34 Oil Tanker familiarization *N 2 weeks	Pumpman	SCI (Training Department)
.35 Basic Chemical Tanker Safety *N 2 days	All Petty Officers except Pumpman	SCI (Training Department)
.36 Chemical Tanker Familiarization *N 2 weeks	Pumpman	SCI (Training Department)
.37 Fire - fighting (Basic) *E 2 days	All Petty Officers	SCI (Training Department)
.38 Survival at Sea *E 1 day	All Petty Officers	SCI (Training Department)
.39 Dangerous and Hazardous Cargoes (Basic) *N 2 days	P.O. Maintenance	SCI (Training Department)
.40 Human Relationships *N 1 week	All Petty Officers	SCI (Training Department)
.41 Asst. Catering Officer *E 1 month	Asst. Catering Officers	T. S. "Rehman"
.42 Asst. Pumpman *E 3 weeks	Asst. Pumpman	SCI (Training Department)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
Petty Officers (Contd.)		
.43 Welding *E 40 days	Fitters, P.O.Maintenance, & Asst. Pumpman	Advani Oerlikon and SCI (Training Dept.)
.44 Yoga and Meditation *N During stay at Training Institute	All Petty Officers	Yoga Institute
Crew		
.45 Basic Oil Tanker Safety *N 2 days	All Ratings	SCI (Training Department)
.46 Basic Chemical Tanker *N Safety 2 days	All Ratings	SCI (Training Department)
.47 Fire - fighting *E (Basic) 2 days	All Ratings	SCI (Training Department)
.48 Survival at Sea *E 1 day	All Ratings	SCI (Training Department)
.49 Dangerous and Hazardous *N Cargoes (Basic) 2 days	Deck Ratings	SCI (Training Department)
.50 Yoga and Meditation *N During stay at Training Institute	All Ratings	Yoga Institute

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

COURSES / DURATION	PARTICIPANTS	CONDUCTED BY
Shore staff		
.51 Budgeting and Cost Control *E 14 days	Shore Officers	TRAINMAR, Bombay
.52 Computer Applications *N 4 weeks	Shore Officers	SCI (Computer Dept. and Training Dept.)
.53 Container Shipping Management *E 16 days	Shore Technical and Commercial Officers	TRAINMAR, Bombay
.54 General Shipping Management *E 16 days	Shore Officers Junior and middle management levels	Narottam Morarjee Institute of Shipping and SCI (various depts.)
.55 Joint Shipping Management Seminar *E 9 days	Shore Officers Middle and senior management levels	Institute of Shipping Economics, Bremen and SCI (various departments)

*N - denotes, "New course to be developed".

*E - denotes, "Existing course".

9.2 Summary of Proposed Scheme for Selection and Training of Lecturers

Minimum Qualification : Master (F.G.) or First Class Engineer.

!

Minimum two years' service as Master or Chief Engineer Officer.
Selection by screening committee, based on performance, reports and willingness to serve as a lecturer.

!

Six months' trial period at SCI Maritime Training Institute.
If found suitable, to be absorbed as a lecturer.

!

Minimum one year's service as a lecturer.

!

To be sent to World Maritime University for a two year course in Maritime Education and Training.

!

Rejoin SCI Maritime Training Institute as a Senior Lecturer.

!

To attend short specialized training courses, depending on courses to be developed and conducted.

!

Continue at SCI Maritime Training Institute.

!

Short voyages, say one month every year,
on newly acquired ships.
Participation in conferences and seminars.
Participation in SCI projects.

!

Continual updating by attending short courses.

N.B. The above training scheme refers only to lecturers from the Nautical or Enginering field. For the other lecturers the scheme would have to be altered to suit the specific area of specialization.

CHAPTER TEN

CONCLUSIONS AND RECOMMENDATIONS

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

.1 One of the micro - objectives of SCI, namely, "Development of requisite human skills and their upgradation through continuing training programmes", is of the utmost importance to this paper.

(1.1, .7, pages 3 and 4)

.2 Initially, the Training Department was set up to train adequate Officers in order to bridge the gap between availability of trained Officers from the Training Institutions and the number actually required for manning the fleet.

(1.3, page 8)

.3 The Training Department is now required to play a leading role in the development and running of specialized short courses, to meet the requirements of STCW 78 and other operational requirements of SCI.

(1.3, page 8)

.4 The continuous need to update the skills of SCI personnel in view of rapid technological developments, the need to develop specialized short courses and the need to provide physical and residential facilities for training, led to the decision for SCI to set up its own Maritime Training Institution.

(1.4, page 9)

.5 In 1978, the SCI Maritime Training Committee recommended the urgent need for SCI to develop its own training facilities for in - service training and to supplement compulsory training. It further recommended that training should be considered as an essential adjunct of ship operations to promote operational safety and efficiency and that the faculty should be drawn from SCI's operational and managerial staff and from selected industries, technical and management institutions.

(1.5, page 10)

.6 With the exception of Updating and Refresher courses for Masters, Deck Officers and Radio Officers, there is total compliance by SCI, with the Mandatory Mininmum Requirements of the STCW Convention.

(4.3, page 108)

.7 Owing to continuous technological developments in the maritime sector and in order to comply with the requirements of the STCW Convention, there is a vital need to develop the afore - mentioned Updating and Refresher courses.

(4.3, page 108)

.8 A fair amount of progress has been made by SCI in developing courses beyond the minimum requirements of the STCW Convention. Hence, restricting the development of courses to meet the minimum requirements only, would be a retrograde step.

(6.1, .1, page 127)

.9 The most important requirement of the SCI Maritime Training Institute, would be a team of well qualified, well trained, dedicated and a highly motivated faculty. The success of the institute would depend to a great extent on the faculty.

(7.1, page 155)

.10 Rapid technological developments, which have brought about major changes in shipping, have also brought about the need for specialized short courses. Such courses will respond to developments in the shipping industry more rapidly, reduce the gap between job and training, will benefit shipboard personnel and finally will result in making seafaring safer, pollution free and more efficient.

(8.1, page 172)

10.2 Recommendations

.1 Owing to limited resources, courses should be developed on a selective basis. By taking an integrated approach and taking into account the requirements and recommendations of the STW Conference and other requirements, a total package of courses

which would be required to be conducted by the SCI Maritime training Institute has been developed and enumerated at 9.1 on page 238.

(6.1, .3, page 127 and
6.7, page 145)

.2 As certificate of competency courses are already being conducted by the Nautical and Engineering College, it would be very easy for the College to develop Updating and Refresher courses for Masters, Deck and Engineer Officers.

(6.3.2, page 132)

.3 A co-operation scheme can be organised between the College and SCI Maritime Training Institute so that the applicable short courses which have not been completed by the candidates can also be undertaken during the period of their stay for the Updating and Refresher courses.

(6.3.2, page 132)

.4 As the number of vessels fitted with satellite communications, in the SCI fleet, is growing, Radio Officers on these vessels will have to spend lesser time in the Radio Room for their routine watchkeeping. Hence, they can be better utilized in the maintenance and repairs of electronic equipment. A suitable course has been proposed for Radio Officers to cover both, updating of knowledge and maintenance of electronic equipment.

(6.3.3, pages 133 and 134)

.5 There is a need to re-organize the training programme of SCI's Oil Tanker Personnel, as proposed in the scheme given at table 6.3, on page 137.

(6.4.2.2, page 136)

.6 In order to select and train the faculty, a proposed scheme is given at table 7.4, on page 170.

.7 The most suitable institution available for providing advanced high level education and training in the maritime sector, for the development of the faculty of the SCI Maritime Training Institute, is the World Maritime University.

(7.3, page 156)

.8 In addition to the education and training given at the World Maritime University, further specialized training should be given to the lecturers on a selective basis, in a particular field of specialization.

(7.5, page 168)

.9 The practice of utilizing the services of visiting lecturers should be continued as it would not be practicable to develop the resident faculty into every area of specialization when experts in the particular field are available.

(7.6, page 168)

.10 A healthy interaction between the training institute, head office and fleet, would go a long way in motivating the faculty and keeping up their interest, otherwise the institute will tend to be isolated from the real world.

(7.7, page 168)

10.3 Simulators

One of the best methods of imparting training and skills in order to achieve perfection, is by the principle of, "Learning by Doing". This principle can best be illustrated by an ancient Chinese proverb, which is given below :

"I was told and I forgot;
I saw and I remembered;
I did and I understood."

With the advent of simulation techniques, the above principle is very effectively utilized for training. Simulation has already developed into a very successful tool for training people for complex tasks, especially when great risks are involved. It has been effectively used by the aviation

industry, for training pilots, for more than three decades. Its entry into the maritime world has been relatively recent, but it has already been developed into an effective means for training, for example, simulator training courses for Masters and Pilots. The primary need for simulators has originated from the fact that well trained mariners will provide a high contribution to safety.

A number of simulators have been developed for maritime training. They range in cost and complexity from part task simulators, which are on the lower end of the scale, to full mission ship bridge simulators, which are on the upper end of the scale.

In paragraph 8.7.1, on page 201, the need for developing a Radar Simulator and an ARPA course has been emphasised. Further, in paragraph 8.7.5, on page 203, it is stated that in order to conduct the afore-mentioned course, it would be essential to acquire a Radar Navigation Simulator, from a reputed manufacturer. Hence, it is recommended to acquire such a simulator at an early date, in order to develop this course.

In paragraph 6.4.2.4, on page 139, the benefits of using a Liquid Cargo Handling Simulator for Oil Tanker training has been high-lighted. Although it would be good to have such a simulator, but due to financial constraints, it would be better to defer procurement to a later date.

Further, in addition to the foregoing, a number of good simulators have been developed for maritime training and some of them are enumerated below :

- Slow Speed Diesel Engine Simulator;
- Medium Speed Diesel Engine Simulator;
- Steam Propulsion Plant Simulator;
- Navigation Lights Simulator;
- Cryogenic Simulator for LPG / LNG ships;
- Full Mission Bridge and Shiphandling Simulator, etc.

Although it would be good to have the aforementioned simulators for improving the quality and effectiveness of training, but once again, due to financial constraints it would be better to defer procurement.

Finally, for the time being, the only simulator which would be urgently required for the SCI Maritime Training Institute, would be a Radar Navigation Simulator.

10.4 Institute to be Open to All Indian Maritime Personnel

In order to conserve scarce resources and as the number of institutions offering specialized short courses is limited, the SCI Maritime Training Institute should be open to all Indian Maritime Personnel.

10.5 Institute to be Open to Maritime Personnel from Neighbouring Countries

Further, as the number of institutions offering such courses in the region, is also limited, the Institute should be open to Maritime Personnel from neighbouring
* countries. A regional co-operation scheme should be worked out as this would be beneficial to all the neighbouring countries.

10.6 Technical Assistance vide IMO's Technical Assistance Development Programme

As SCI does not have any previous experience with Chemical Tankers, a request for technical assistance for training personnel and for setting up training programmes for Chemical Tankers, could be availed of from IMO through their technical assistance programme.

(8.5.10, page 191)

* Source : "Establishment / Administration of Maritime Affairs in Developing Countries", lectures delivered by Prof. P.S. Vanchiswar at World Maritime University, April / May 1985.

10.7 Participation with the World Maritime University for Continuous Updating

Owing to continuous developments in the maritime sector, a participation and co-operation scheme should be developed with the World Maritime University, to keep abreast of new developments.

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