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THE WORLD MARITIME UNIVERSITY
MALMÖ SWEDEN

THE ESTABLISHMENT OF A MARINE FIRE FIGHTING SCHOOL IN
ALGERIA

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ABDELKRIM REZAL
Algeria

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A Paper submitted to the Faculty of the World Maritime University
in partial satisfaction of the requirements of the Maritime
Education (Engineering) Course.

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

Signature: *Rez*

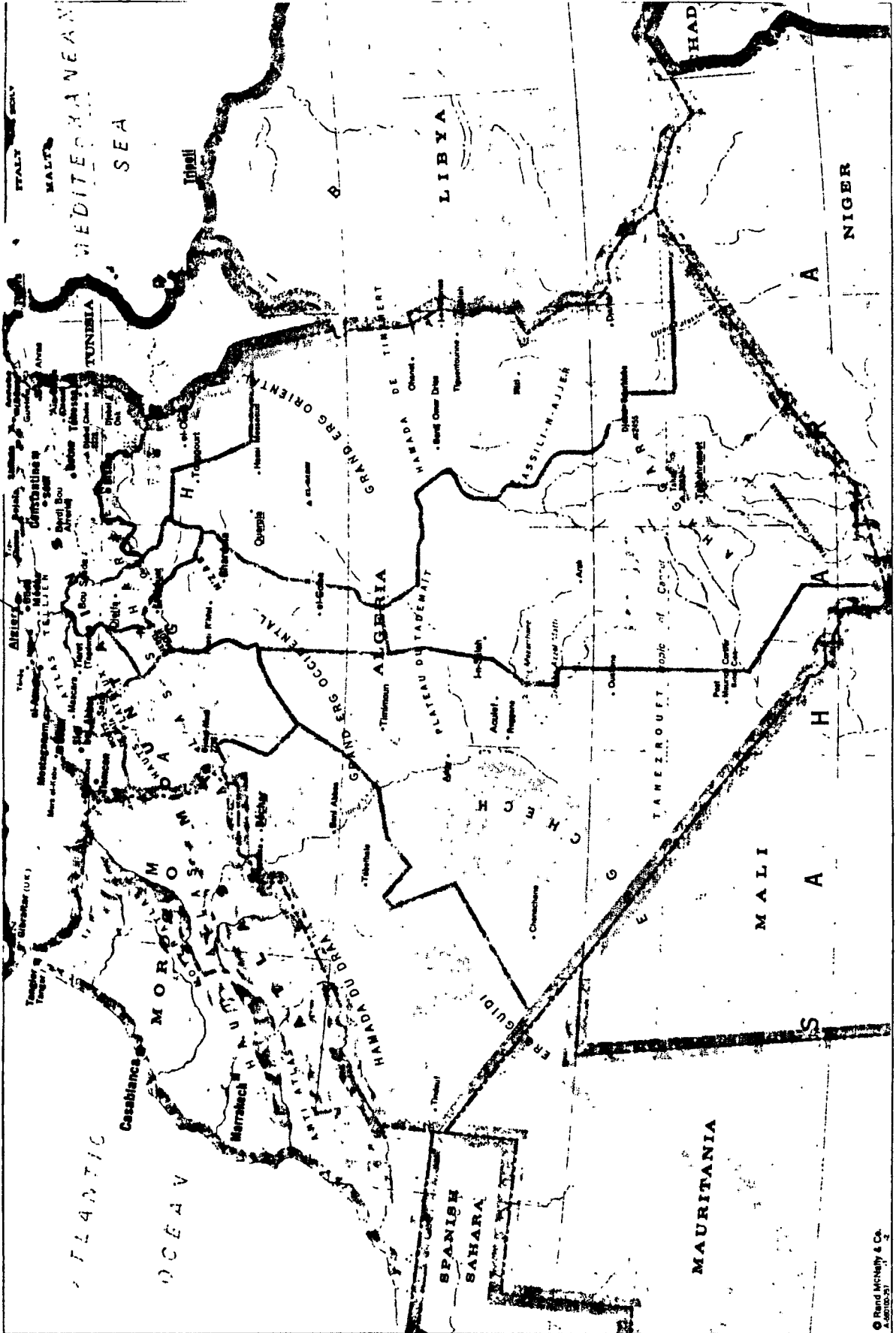
Date: 12 April 1985

Paper directed by:
Charles E Mathieu
Professor
The World Maritime University

APPROVED BY: *C. Mathieu*

MAP OF ALGERIA

Bou Ismail



Salek / 1980

A B S T R A C T

Establishing a modern Fire Fighting School to train the necessary personnel in the field of Marine Safety is imperative for any Maritime Nation.

- ✓ Throughout history and still nowadays fire is the worst enemy of the crew, cargo, vessels and the industry as a whole.
- ✓ The primary objective of this Paper is to provide a comprehensive study and a guideline to the Maritime Academy in Algeria for the day it undertakes to establish a Fire Fighting Centre.

In this work I shall mainly attempt to define and outline the detailed Syllabuses and Training Schemes for the Theoretical and Practical Training dealing with fire prevention, fire fighting and fire safety, for which purpose I have developed different Training Courses, including their objectives, main content and their duration.

Furthermore I have also provided recommendations and descriptions of the training facilities together with the necessary equipment and materials to carry out the various fire fighting exercises.

However, the financial aspect and cost involved for the establishment of such a Centre is outside the scope of this study.

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P R E F A C E

The reason for embarking on this topic is to enhance the standard of maritime training in Algeria, in compliance with IMO, STCW Convention, and to promote the safety on board ships.

It is also believed that this work may constitute a useful tool and provide valuable information and guidelines for any person in charge of setting up a Fire Fighting Program in his own country.

The sources of my findings are based mainly on the experience I gained on board merchant ships; the two Fire Fighting Courses attended respectively in the "Bataillon de Marins Pompiers" of Marseille and at the Fire Brigade Training Centre in Malmö, Sweden. These are complemented by information collected from several Maritime Institutions I visited in some advanced Maritime countries and from various Manuals dealing with Fire Fighting in general.

I am extremely grateful to Chief B L Hansen, who built the Washington State Marine Fire Training Centre which will be the most modern facility in the United States of America, for providing me with very helpful guidance and suggestions.

I am also deeply obliged to Professor, Vice Rector, Igor Jagniszczak of Szczecin Maritime Academy in Poland for providing some valuable information describing the Fire Fighting Program and facilities of his Institution.

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CHAPTER I

INTRODUCTION

✓ Each year fires cost industry a staggering amount not only in death and personal injury but also in property losses, insurance premiums and loss of productivity.

✓ In the shipping industry fires and explosions on board constitute the major part (40%) of marine casualties which on the whole cause the highest rate of death compared to other industries.

A comparison made in the United Kingdom in 1978 shows that the rate for deaths due to onboard accidents was 35 times the rate for manufacturing industry, ten times the rate for agriculture, nine times the rate for construction and four times the rate for mining.

✓ On the other hand, the average deaths due to fire and explosion only are much higher than those due to foundering, stranding, collisions, missing vessels, or other causes.

Throughout history mariners have gone to sea in all types of water craft and more often with very limited protection against the threat of shipboard fires.

✓ In the event of fire persons ashore often have available for immediate assistance of well-trained fire fighting professionals. Mariners are alone on board ship and when fires occur at sea they must remain on board and cope with these incidents to the best of their own abilities and facilities to hand.

These efforts, often because of the geographical separation and mainly because of the lack of knowledge, training and experience, have produced less than satisfactory results. At times even tragedy.

- ✓ The technological advance in ship design, construction and operation, together with the various new specialised vessels and the transport of the increasing amount of hazardous materials of all types, make it imperative for today's mariner to possess much more knowledge than his predecessors in many special areas - fire prevention, control and extinguishment are included in this.
- ✓ Even though Government Agencies and Maritime Administrations have over the years effected changes and promulgated Regulations that have greatly reduced the ever-present danger of fire aboard vessels, fire tragedies have continued to occur. It therefore must be the mariner's responsibility to be as well trained as possible and to understand the causes of fires so as best to prevent this from the outset.
- ✓ Furthermore, mariners must have a good working knowledge of the approaches that will best restrict the spread of fire and eventually to extinguish them.

CHAPTER II

BACKGROUND

Following major casualties, stringent and massive Regulations have been developed by the International Maritime Organisation (IMO), through Classification Societies and Maritime Administrations in order to improve the safety of ships and their equipment.

Among the many Conventions elaborated by IMO since its inception in 1959, SOLAS Convention is generally regarded as the most important International Treaty ever adopted as far as maritime safety is concerned.

Structural fire construction, fire protection, fire detection and fire extinction are some of the main areas dealt with by this Convention. Earlier SOLAS Conventions of 1913 and 1929 made only scant reference to this problem (except for creating fire zone limits to 131-foot length. It was not until 1948 that the problem was attacked internationally in depth.

It can be seen that the 1948 Conference recorded a firm measure of agreement (although the Delegates came together having established philosophies over the previous 15 - 20 years in their own country) in respect that materials of construction - hull, superstructure, decks, bulk heads, deckhouses must be of steel or equivalent. Class A* and B* division were stipulated in order to enclose escape stairways and passengers' accommodation, galleys, control spaces, wireless room, machinery .. ?

However, the Conference failed to agree upon a single method within accommodation spaces and this was because there was already in existence three proven national methods and each of them was acceptable.

SOLAS 48 has introduced Structural Fire Protection (SFP) to some depth in respect of passenger ships, whereas SOLAS 60 was the seed in cargo ships (400 tons gross).

The new requirement included:

- restricted use of materials other than steel for hull
- superstructure, bulkheads, decks, etc to be approved by Administrations and fire

It also refers to ventilation fans, machinery space, openings, skylights, etc.

In this respect we should remember that 1948 SOLAS came into force 19.11.1982 and the 1960 SOLAS came into force 26.3.83.

During the same period severe fire accidents occurred on board existing cruisers, causing many deaths and great damage.

Looking at the history of these cases it can be seen that in December 1963 the Greek liner LAKONA with a large British contingent among the passengers, caught fire with the loss of 125 lives.

In November 1965 the Panamanian cruiser YANBOROUGH CASTE carrying mostly American passengers caught fire and sank with the loss of 90 lives.

In April 1966 a modern cruiser the "VIKING PRINCESS" caught fire and had to be abandoned.

After these casualties Government Agencies and IMO recognised the need for further amendment to be considered.

With the bit between its teeth IMO passed another Resolution within 2 years adding a further part to SOLAS 1960. This was not to be applied in retrospect, i e, it would apply to ships whose keel was laid after the date of coming into force of the Amendment. This comprehensive Amendment was incorporated into SOLAS 1974.

It has several interesting features but the starting off point must be the concept that all six (6) boundaries to a compartment must have fire divisions of some category or other.

SOLAS 74 contains an impressive amount of detailed and stringent regulations as far as fire safety is concerned and their description is not the purpose of this paper.

However it may be said that although if ships of today are considered to be built to a very high safety standard, fire accidents are still being witnessed aboard vessels.

✓ From these unfortunate incidents it could be speculated whether the amount of safety regulations would have been necessary had all personnel been thoroughly trained and educated. Would, for example, all the present volume of fire appliances regulations and the degree of structural fire protection be so extensive if crews had been thoroughly trained in fire fighting.

✓ Governments and IMO have for a long time recognised this fact and since its inception in 1959 IMO has endeavoured not only to improve the safety of ships and their equipment but also to raise the standards of the crews which man them.

✓ Among the many Resolutions adopted in 1960 at the International Conference on Safety of Life at Sea, was one which called upon Governments to take all practicable steps to ensure that the education and training of seafarers in the use of aids to navigation, ship's equipment and devices was sufficiently comprehensive and was kept satisfactorily up to date.

It is also recommended that IMO and ILO (The International Labour Organisation) should co-operate with each other and with interested Governments in achieving these ends.

In response to this recommendation, the Governing Body of ILO and IMO's Maritime Safety Committee (MSC) established a Joint Committee on Training. This Committee had its first Meeting in 1964 and prepared the Document for Guidance 1966. This Document gave guidance on the education and training of masters, officers and seamen in the use and operation of aids to navigation, life saving appliances, devices for the prevention, detection and extinction of fires, and other equipment contributing to safety at sea.

The Document was subsequently amended, expanded and supplemented by the Joint Committee in 1975 and 1977.

Despite the success of this Document the IMO Council in 1971 decided that still further measures were needed to strengthen and improve standards of training and certification, and it requested the MSC to give urgent consideration to international standards of watchkeeping, training and certification.

The IMO Assembly which also met in 1971 decided to convene a Conference to adopt a Convention on the subject. Preparatory work was carried out by the IMO Sub Committee on Standards of Training and Watchkeeping, which prepared the text of a Draft Convention, an Annex containing requirements for Watchkeeping, Training and Certification, and a number

✓ of Draft Recommendations. The Conference met in 1978 and was attended by Delegates from 72 countries. This was the largest ever held by IMO. The Convention adopted The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers - "STCW" 76.

✓ STCW Convention is generally regarded as one of the most important International Treaties ever adopted as far as maritime safety is concerned. Some authorities regard it as second in importance only to the International Convention for the Safety of Life at Sea (SOLAS) and it is appropriate therefore that the requirements for entry into force (Article XIV) should be the same: one year after acceptance by 25 countries whose combined merchant fleets represent 80 per cent of world Gross Tonnage.

*File
STCW
76*

It is the first attempt to establish global minimum professional standards for seafarers. Previously the standards of training, certification and watchkeeping of officers and ratings were established by individual Governments usually without reference to practices in other countries. As a result standards and procedures vary widely even though shipping is the most international of all industries.

✓ The Convention prescribes minimum standards which countries are obliged to meet or exceed. In the majority of established maritime countries, standards are often higher than those stipulated in the Convention. In some countries however standards are not so high and by ratifying or accepting the Convention Governments undertake to implement and enforce its requirements. The effect of the Convention's entry into force will therefore be to raise standards in the world as a whole.

The Convention specifies that every officer of a sea-going vessel of almost any size and power must hold an appropriate Certificate of Competency. The holder of such certificates must meet certain requirements specified in the Annex to the Convention.

There are six (6) Chapters in this Annex containing Regulations governing the technical mandatory minimum requirements for certification of masters, chief engineers, deck, engine and radio officers. The minimum requirement stated in the Convention is considered adequate and would certainly increase the standard of competence of safety at sea.

The scope of this Convention is wide and details cannot be gone into here.

- ✓ Among the various areas of knowledge required for the certification of any deck/engine officer is the fire safety on board.
- ✓ The Convention states that every candidate should have adequate experience or undergone appropriate training in the field of fire prevention and fire fighting appliances. This includes:
 - ✓ - the ability to organise fire drills
 - the knowledge of classes and chemistry of fire
 - knowledge of fire-fighting systems
 - attendance at an approved Fire Fighting Course.
- ✓ It also states that every rating forming part of a navigational watch on a sea-going vessel should be familiar with the basic principles of fire fighting. These fire fighting courses are necessary to instill an appreciation of the danger of fire in ships - the main causes of such fires, the measures to be taken for the prevention of fire and the means which may be employed in fire fighting and fire extinguishing.
- ✓ The value of these courses has been recognised by IMO and the courses will become compulsory for all countries under the STCW Convention which entered into force on 28 April 1984.
- ✓ Due consideration given to the above, IMO Assembly adopted the Resolution A.437 (xi) on "Training of Crews in Fire Fighting" on 13 November 1979 (under Agenda Item 10(b)). It recommends that each member Government should aim at training all its seafarers in fire prevention and fire fighting to an extent appropriate to their functions on board ship and to this end the following:
 - ✓ (a) All seafarers should be instructed in the dangers of fire in ships and the ways in which fires are caused
 - (b) Training in the prevention and extinction of fires should be given as soon as possible in the career of every seafarer preferably in pre-sea courses
 - (c) Masters, officers and as far as practicable other key personnel who may also have to control fire fighting operations should have advanced training in techniques for fighting fire with particular emphasis on organisation, tactics and command
 - (d) Specialised additional training in fire fighting should be provided to masters, officers and ratings

of oil, chemical and liquefied gas tankers in accordance with Resolution 10, 11 and 12 of the International Conference on Training and Certification of Seafarers.

- (e) Where training in fire fighting is not included in the qualifications for other certificates, consideration should be given to the issue of specialised certificates indicating that the holder has attended a specified course of training in fire fighting.
- (f) In drawing up the Syllabus for the different courses competent authorities should take into account the theoretical and practical elements described in the Annexes of the Resolution.

Some countries have understood earlier the importance of such training and therefore have gained long experience and obtained noticeable results in the reduction of fire casualties.

- ✓ In the United Kingdom, for example, shipowners have for a long time provided training facilities and sponsorship of seafarers at the GCBS Fire Schools, and their long-standing acceptance that successful completion of the Course approved by the Department should be a mandatory pre-requisite for a Certificate of Competency for both deck and engineer officers.
- ✓ In conclusion it is firmly believed that the most effective way of increasing safety in general is to devote more of the available resources to crew education and training. This can be achieved by giving due consideration to the ratification and implementation of STCW Convention by every Government.
- ✓ As far as fire safety is concerned every maritime country should recognise the necessity to establish adequate training facilities in order to provide its seafarers with an approved and complete Fire Fighting Course.

CHAPTER III

✓ FIRE FIGHTING SCHOOL - WHY NECESSARY

Maritime transport in Algeria is undergoing considerable development. The Compagnie National Algerienne de Navigation (CNAN) created in 1963 operates under the auspices of the Ministry of Transport and Fisheries. The Company possesses five (5) ships in 1969, 42 in April 1976, 63 at the end of 1977 and 68 in 1983, together with 40 ocean-going tugs and 12 pilot launches. The forecast for 1990 is the eventual expansion to 140 vessels.

The fleet will be composed of 10 car ferries, 72 general cargo ships, 42 bulk carriers, 17 hydrocarbon carriers.

CNAN acquired a methane vessel in July 1976 and today owns a total of 9 such vessels of various sizes. This expansion of the fleet and the acquisition of such highly sophisticated and expensive vessels required parallel strengthening of the structure and the personnel of the Ministry responsible for Transport, particularly in the field of preparation and implementation of Legislation and related measures for the safety of navigation and maritime training.

With the assistance of IMO, the Algerian Government prepared a National Maritime Code which has been promulgated. This Code provides the machinery for putting into effect all the International Maritime Conventions approved by the Government.

Due consideration having been given to the above, Algeria has requested IMO to assist in the formulation of a Project in Maritime Safety which is included in the general development programme for maritime transport in the country. Execution of the Project will assist in the implementation of the requirements contained in International Conventions accepted by the Algerian Government. It will ensure the safety of ships in ports and at sea, with the additional aim of developing fire safety measures aboard ship and shore.

Training of Algerian Maritime Personnel is carried out by the Institut Supérieur Maritime (ISN), located in Bou-Ismaïl and with Annexes in Algiers and Mostaganem.

ISM caters for the training of merchant marine officers, administrators in maritime affairs and port officers. In order to meet the STCW requirement which states that all personnel should attend an approved basic or advanced practical fire fighting course relevant to their duties and responsibilities, the training of chief engineers and captains is carried out partly by the ISM as far as the theoretical side is concerned and one week practice is provided by the "Bataillon de Marins Pompiers" at Marseille, France.

The expenses involved in such training and the need to train the entire personnel, both shore-based and seafarers which is in a continuous state of expansion, is sufficient and comprehensive justification to establish an adequate Fire Fighting Institution in Algeria. Furthermore, in 1982 two serious fire cases occurred - one on board the car ferry "ZERALDA" during cargo handling operation in Marseille, and the other one on board the Roll On/Roll Off "M V TABLAT" while she was leaving the Port of "SETE" on her way to Algiers.

In both cases the fire fighting efforts of the crew were insufficient to suppress the fire and hence were obliged to call upon assistance from the Fire Department (Bataillon de Marins Pompiers) of Marseille which succeeded in getting the situation under control after a considerable amount of time, facilities used and efforts.

The severity of those fires and the costs of the damage involved gave incentive to the Algerian Government to enhance and strengthen the safety measures on board ships by putting special emphasis on the improvement of the training and education already available.

CHAPTER IV

ESTABLISHMENT OF FIRE FIGHTING CENTRE

Before establishing a Fire Fighting, the following items should be carefully considered and analysed:

- Financing and sponsorship
- Management
- Training facilities
- Instructors
- Trainees
- Courses available.

A. Financing

The financing may preferably be provided by the Ministry of Transport as far as the training is mainly intended to the personnel under its administration. This includes principally seafarers, fishermen, harbour personnel and may be extended to land and air transport personnel.

The financing must be enough to cover the following costs:

- Building and maintenance of the training facilities
- Purchasing of equipment and their maintenance
- Extinguishing agents and combustible equipment for demonstration and drills
- Instructors' salaries
- Trainees' accommodation and tuition.

In case of training provided to personnel of other industries or private companies, a certain fee must be applied.

B. Management

The management of the School should be under the authority and responsibility of the Maritime Institute of Bou Ismaïl.

It has to accomplish the following functions:

- Recruiting of the trainees
- Accommodation, tuition and transport
- Organisation and scheduling of the Course
- Maintenance of the facilities and equipment
- Appointment of Instructors.

C. Training Facilities

Training facilities should be located in the vicinity of the Maritime Institute to solve the transportation problems and to limit their cost and on the other hand for easy accessibility and for proper monitoring and maintenance.

They should also be reasonably remote from any habitation to avoid smoke nuisance or any accidental spread of fire or dangerous substances.

Since considerable amounts of water are needed for demonstration drills and cleaning, it would be preferable to locate the training facilities as near as possible to the sea and use salt water. With this system the problems of piping, drainage and the cost of fresh water will be effectively resolved.

The description of the facilities will be found in one of the forth-coming Chapters.

D. Instructors

The shortage of qualified instructors and teaching staff is one of the major difficulties facing any developing country. However, if there are any they generally either lack a consistent theoretical knowledge, or sufficient practical experience.

As far as the Training Centre in Algeria is concerned it would be practical from an early stage that there be close co-operation with the Fire Department. With this established they may provide the Institution with valuable help by appointing qualified instructors to carry out the practical side of the training.

They may also provide advice and recommendations concerning the technical aspect such as construction of the actual facilities, the acquisition of the necessary equipment and their maintenance.

As far as the theoretical courses are concerned they may be given by the Maritime Institute Teaching Staff. This may include teachers in Chemistry or Maritime Safety.

This solution will be applied until qualified instructors possessing both the theoretical and practical knowledge and experience will be available or trained.

E. Trainees

The primary objective of this fire fighting facility is to provide a thorough training for every seafarer, rating and mainly officers in shipping, fishing and offshore industries, as required by IMOs STCW Convention. It also concerns the candidates for deck engine officers' certificates and seamen currently pursuing their training in respective institutions and for those serving already on board vessels but requiring an approved fire fighting course.

However this programme may extend and expose the Fire Department and the marine community to the same training. This will greatly increase their ability to work together on the problems of fire areas and as a result their chances of success of fires in ports would be enhanced. It is known that 65% of most ship fires occur in port itself.

This training may also suit the land air transport personnel since the nature of their duties present some similar characteristics to those of the maritime field.

Last but not least it would be considerable interest and value to personnel of other industries and private enterprises. ✕

F. Courses available and their objectives

As stipulated in IMOs STCW Convention and in the Resolution A.437 (xi) adopted on 13 November 1979 on Training of Crews in Fire Fighting, the nature of courses available in any training institution should be at least of two categories. In the context of Algeria it might be most appropriate to have three (3) model courses to comprehensively cover the full range of marine personnel with different academic backgrounds, duties, responsibilities and objectives.

The Training Programme should consist of:

- Three (3) days, basic fire fighting Course designed: mainly for pre-sea training of cadets, able-bodied seamen, fishermen and other personnel who do not possess sufficient academic background.

The course will concentrate mainly on the practical aspect of fire fighting. The key objective is to provide the trainee with a basic knowledge of fire safety and sufficient information and experience to enable him to understand and evaluate the probability of suppressing a fire with the equipment to hand without endangering his personnels' safety.

This can be achieved by teaching how to correctly handle the right equipment at the right moment for different fire situations.

Furthermore the course should develop within the trainee the confidence which leads to a willingness to attempt to handle fire outbreaks.

- Five-day Intermediate Fire fighting Course:

This course will be designed for trainees with relatively higher education, able to understand and assimilate the theoretical and technical aspect of fire fighting and fire safety such as fire chemistry, vessel construction and arrangement, fire prevention, etc.

This will concern, for example, deck and engineer officers in charge of a watch, skippers, Maritime Safety Administration personnel, port facilities operators and the Fire Department's personnel which deals with shipboard and harbour fires.

The course will enable them to have an acceptable knowledge on the conception of fire and enough skill experience and the necessary aptitude to analyse and control fire situations, conduct satisfactory fire drills on board, and head successfully the crew or personnel in real fire emergencies.

- Ten-day Advanced Fire Fighting Course:

This course will be designed for masters, chief engineers, officers and as far as possible for other key personnel who may also have to control fire fighting operations. These candidates will be required to have advanced training in techniques for fighting fire with particular emphasis on organisation, tactics and command.

The course should be naturally provided as a complement to the training and knowledge acquired from the Basic Fire Fighting Course.

After completion of the course the trainee will possess a broad and complete theoretical and practical understanding of every aspect of fire fighting, fire prevention and fire safety.

The Syllabuses of these three (3) Model Training Courses will be designed in accordance to the IMO Resolution A.437 (xi) on training of crews in Fire Fighting, With additional information collected from more advanced Fire Fighting Schools and Manuals.

Specialised Additional Course:

According to the IMO Resolutions 10, 11 and 12, which specify that specialised additional training in fire fighting should be provided to masters, officers and ratings of oil, chemical and liquefied gas tankers, and due to the fact that Algeria is a pioneer in owning and operating a fleet of seven (7) LNG carriers, in addition to eleven (11) crude and products carriers of different sizes, additional and appropriate instructions concerning the safe operation of these types of vessels and the correct handling of their cargo should be inserted in the different courses cited above.

The scope of this information will be on the prevention of explosion and fire, their suppression and a good appreciation of the hazards involved.

In this Chapter different courses required have been defined together with their scope and application.

The next Chapter will deal mainly with their organisation, planning and the drawing up of the syllabuses and their content which is one of the primary objective of this Paper.

It is not either the intention to develop these syllabuses into complete and substantial texts on fire fighting. There are several Manuals and Text Books for this purpose. As a contrast the main areas and points a trainee should learn and be familiar with will be outlined and thus their necessity will be clarified.

DEVELOPMENT OF THE COURSES

A) Structure and Content

To be successful a fire fighting training programme must be carefully planned and logically structured. The details of its content should be tailored to the nature of the course, the trainees' background and ability and their future needs and objectives.

Before developing a course the following key questions might be asked:

- 1) How suitable is the course: Are its objectives, methods and outcome appropriate to the students?
- 2) How effective: Does it achieve satisfactory results?
- 3) How big: How much time, staff and resources does it need? How many Subjects? What range of students?
- 4) How complete: Does it need extra supporting material?
- 5) How complex: Is it difficult for teachers and students to work with?
- 6) How flexible: Is there room for innovation and adaptation by teachers and students?

To make the course most effective an analysis must be made of the objectives of each topic and item. Perhaps the major boost to deliberate course development comes from the realisation that an early attempt to decide the objectives can lead to better teaching and learning. Objectives are supposed to state as clearly and precisely what students should be able to do (or do better) as a result of working through their course.

The use of objectives is grounded in an assumption that the purpose of education is to help people to improve and possibly change.

They are to become somewhat different from what they were, developing their existing qualities and abilities and acquiring new ones. They are to change the ways they think, act and feel. They are to become more knowledgeable, more skillful, more confident, more rational, have more insight, more autonomy and so on. To achieve these goals the "content" of the course must be consistent in quality and quantity.

By content is meant - the ideas and the relationships between them that will be dealt within that course; what topics are to be included; what examples; what definitions; rules, theories, principles, generalisation, practice; what ideas belong to the course, what skills and abilities the trainee might develop in relation to these ideas; what attitudes should be encouraged, how must all this be decided?

Inevitably thinking about content will bring other questions to mind also. What about the best sequence for the content? Which teaching methods could be used? How should the students be assessed?

As far as sequence is concerned it must be dictated by the local structure of the subject. Sometimes it is clear that a certain topic cannot be learned without prior understanding of another topic. For instance, before a trainee can learn how to fight a fire he must first be aware of the enemy, i e, what fire is and how it destroys, the different types of fire, etc.

In another way, a good structure of the topics and events and good co-ordination between theoretical and practical parts during the lifetime of the course are the key factors for the success of a Training Programme.

Which teaching methods shall be used? A personal view is that in addition to the modern method of teaching with the use of different visual aids, the most effective way is the use of realistic examples and their handling. For instance, the best way to explain and describe a fire extinguisher is to actually show a real one and use it for demonstration. This direct method will enable the trainee to visualise, understand and grasp immediately what he is being told about.

Why and how to assess the students: Assessment is an attempt to get to know about the student and find out the nature and quality of his capacity to learn - his strengths and weaknesses, or his interests and aversions, his style of learning.

The assessment results may be utilised to improve the quality and methods of teaching.

A written examination must be conducted at the end of each course to ascertain the amount of knowledge and information the trainee has acquired during his training.

1. THREE-DAY BASIC FIRE FIGHTING COURSE:

1st DAY

Introduction to Marine Fire Protection:

Class Room: Time Length: 00.30

This class will introduce the student to the subject of marine protection and describe the course of training to be given together with its objectives.

It will include a general discussion of existing problems and relate limited statistical data regarding marine fires and their consequences.

Emphasis will be put on the continuous training on board ship through adequate fire drills.

Fire Chemistry

Class Room: Time Length: 02.00

This session will introduce the student to the basic principles of physics which govern the behaviour of fire. This includes the three elements of fire and explosion (the Fire Triangle).

1. Fuel
2. Source of ignition
3. Oxygen
4. Vaporisation
5. Ignition Temperature
6. Flash Points
7. Heat Transmission
8. Fire Gases and similar subjects.

The emphasis will be to enable the student to recognise the various stages which fires pass through during their development and to prepare him for a better understanding of the principles of fire extinguishing.

Fire Extinguishing Agents

This segment of the training will deal with the various types of extinguishing agents available and their proper use.

This will include the following:

- Water
 - * water/CO₂
 - * water/CO₂
- Foam
 - * Chemical foam
 - * Mechanical foam
- Powder
 - * Dry sand
 - * Dry chemical powder
 - * Carbon dioxide (CO₂)
- Inert Gases
 - * CO₂
 - * Steam
- Volatile Liquids
 - Carbon Tetrachloride
 - Methyl Bromide, etc
- Halogenated Extinguishing Agents
 - Halon 1301 1211

The safety and limitation of utilisation will be discussed.

Fire classifications will be explained and related to the proper extinguishing agents.

Fire Prevention

Class Room: Time Length: 01.00

This session will discuss the major causes of shipboard fires which are the most common and will concentrate on methods which can be used to prevent them.

This will include:

- Design features
- Careless smoking
- Spontaneous ignition
- Faulty electrical equipment
- Galley operation
- Welding and burning operations
- Fuel oil transfer, etc.

Fire Fighting Equipment

Class Room: Time Length: 01.00

The object of this class is to familiarise the student with the various items of fire fighting equipment found aboard such as:

- Ship's fire main system
- Operation of equipment
- Portable fire extinguishers
 - * Water expelling extinguishers
 - * Foam extinguishers
 - * CO₂ extinguishers
 - * Dry powder extinguishers, etc
- Fire blankets
- Hose
- Nozzles and branches
- Ship/shore connection
- Foam cannons
- Fixed installations on board and locations.

Introduction to Fire Tactics

Class Room: Time Length: 01.00

By the time students reach this portion of the classroom training they should have a fairly good understanding of fire behaviour, extinguishing methods and fire fighting equipment. This segment will introduce the student to the basic concepts of fire fighting tactics.

Case Histories of Shipboard Fires

Class Room: Time Length: 01.00

These case histories have a very serious purpose. They are presented so that seamen who have not had personal experience with shipboard fires may benefit from the experiences - bad or good - from those who have.

2nd DAY

Introduction to Practical Training

Training Site: Time Length: 00.30

Discussion about general safety precaution when fighting a fire.

Description and use of fireman's outfit, personnel equipment, smoke helmet or mask, fire-proof life line and harness.

Practical Training

Training Site: Time Length: 04.00

This practical session will introduce the student to face and combat more or less a real fire situation.

He will be familiarised with the use of different fire extinguishers on different types of fires.

He will extinguish smaller fires, e g, electrical fires, oil fires, propane fires

- Extensive fires with water (jet spray nozzles)
- Fires with either foam, powder or any other suitable chemical agent
- Entering and passing through with life-line but without breathing apparatus a compartment into which high expansion foam has been injected
- Extinguishing oil fire with fog applicator and spray nozzles, dry chemical powder or foam applicators

Introduction to Breathing Apparatus

Class Room: Time Length: 01.00

It is extremely important that the student should have a sound understanding of the proper procedures to be used when using a breathing apparatus. He must receive instruction on the capabilities and limitations of the type he uses and for those carried on board. He should learn the correct handling of the equipment, donning of the face piece and testing of the face piece - to face seal.

Practical Training

Training Site: Time Length: 02.00

During this session the student will acquire the skill to use

the breathing apparatus safely and will participate in fire drills simulating the emergency use of the equipment.

He will fight fire in smoke-filled enclosed spaces wearing self-contained breathing apparatus.

3rd DAY

Introduction to Search and Rescue

Training Site: Time Length: 00.30

This segment of training will introduce the student to proper methods for smoke diving and searching compartments to rescue victims and determine the seat of fire.

Practical Training

Training Site: Time Length: 02.00

After the introductory lecture the student will practice in smoke diving, wearing breathing apparatus.

He will be blindfolded, required to don masks, locate and safely remove a "victim" from a compartment.

Introduction for LNG fire fighting

Class Room: Time Length: 02.00

The student will learn the basic principle governing the handling and storage of LNG and appreciate the hazards involved. He will discuss the different methods to combat the fires commonly occurring on board LNG ships such as vent mast fires, etc.

Emergency Procedures

Class Room: Time Length: 01.00

During this session the student will be informed on how to react during emergency situations.

He will be aware of the general lines of actions and different steps to follow in case of fire and during the following situations:

- When the general alarm sounds
- Accommodation fire
- Engine Room fire
- Use of CO₂ in enclosed spaces
- Pump room fires

- Incident at manifold, tank overflow (oil tankers)
- Tank explosions, etc.

Emergency Medical Care

Class Room: Time Length: 01.00

The objective of this class is to familiarise the student with the basic practices during injuries associated with fires. He must learn how to protect the patient from additional harm, correct life-threatening conditions, and keep the patient stable until medical help can be reached.

Among the practices the student should acquire practical knowledge of resuscitation methods.

Final Examinations

Class Room: Time Length 01.00

This session will be used to conduct a written examination of the material presented during the training to evaluate both the student and the course.

Conclusion

As explained earlier, this Course is designed to provide for all seafarers an adequate and basic training in fire protection.

Its primary objective is to bring all the students to a starting point for further training in this field.

The development of the Course is not final but may be slightly re-arranged and supplemented.

2. FIVE-DAY INTERMEDIATE FIRE FIGHTING COURSE

1st DAY

Introduction to Marine Fire Protection

Class Room: Time Length: 00.30

This class will introduce the student to the subject of marine fire protection and describe the course of training to be given. It will include a general discussion of existing problems and relate limited statistical data regarding marine fires, including which types of vessels have the most fires, where the fires generally start aboard ship and subjects of similar nature. The importance of training must be advocated.

Fire Chemistry

Class Room: Time Length: 01.30

To fight fire effectively it is important to know the enemy. The session will introduce the student to the principles of physics which govern the behaviour of fire. It is a discussion of what fire is and how it destroys.

The class will discuss:

- Fire triangle
- Fire tetrahedron
- Extinguishment via the fire tetrahedron
- Fire spread
- Flammable materials and their characteristics
- Reactivity
- The hazardous products of combustion.

The objective is to enable the student to recognise the various stages which fires pass through during their development and to prepare him for a better understanding of the principles of fire prevention and extinction.

This session also covers the classification of fires.

Fires are classified according to the properties of the materials involved and thus, according to the most effective means of control and extinction which will be described in the next session.

Extinguishing Agents

Class Room: Time Length: 01.00

This segment of the training will discuss the various types of extinguishing agents available and their use. This will include a description of the physical properties of each agent which could be - liquid, solid or gas, and their specific extinguishing action such as:

- Cooling
- Smothering
- Oxygen dilution
- Chain breaking.

This will incorporate:

- * Water
- * Foam
- * Carbon dioxide
- * Dry chemical
- * Halogenated extinguishing agents
- * Sand
- * Sawdust
- * Steam
- * Ship board used as extinguishing agents.

A correct application of these agents to the different classes of fires will be discussed, including their strengths and limitations.

The student will also be familiarised with the proper maintenance procedures for each type of agent. The portion of this course will provide the student with the basic knowledge required for further training in tactics and marine fire protection systems.

Fire Prevention

Class Room: Time Length: 01.00

This session will be devoted to fire prevention measures which can be taken aboard ship. This class will discuss the types of fires which are most common, their causes, and will concentrate on methods which can be used to prevent them.

The fire prevention will cover the following items:

- Design features (SOLAS 74 Chp II - 2)
- Careless smoking

- Spontaneous ignition
- Faulty electric circuits and equipment
- Unauthorised construction
- Cargo stowage
- Galley operations
- Fuel oil transfer
- Welding and burning operations
- Repair and maintenance of shipyard operations
- Tanker loading and discharging operations
- Collisions.

Fire Fighting Equipment

Training Site: Time Length: 02.00

The objective of this class is to familiarise the student with the various items of fire fighting equipment found aboard ship (except fixed extinguishing systems which are discussed in a later class). This session will discuss such items of equipment as:

- Hose
- Nozzles
- Portable fire extinguishers
- Carbon dioxide extinguishers
- Dry chemical extinguishers
- Dry powder extinguishers
- Halon extinguishers
- Semi-portable extinguishers
- Portable foam systems
- Protecting clothing.

Basic operating techniques will be presented as preparation for later training. Heavy emphasis will be placed on proper maintenance of equipment. Additional instruction on the selection and purchase of equipment and confidence-testing procedures may be included.

2nd DAY

Introduction to Fire Tactics

Class Room: Time Length: 01.30

By the time students reach this part of the class room training they should have a fairly good understanding of fire behaviour

extinguishing methods and fire fighting equipment. This segment will introduce the student to the basic concepts of fire fighting tactics and procedures. The concepts of rescue, confinement, extinguishment salvage and overhaul will be briefly introduced. The primary objective of this session is to bring all the students up to a starting point for further training in tactics, and to be able to carry out successfully the practical training during the following sessions.

Introduction to Practical Training

Training Site: Time Length: 00.30

During this session the student will discuss the general safety precautions when fighting a fire, in other words, he will learn how to combat the fire without endangering his personal safety. This will include description and use of fireman's outfit, personnel equipment, smoke helmet or mask, fire-proof life-line and harness, etc.

Hose Lays Techniques

Training Site: Time Length: 01.00

This segment of the training will introduce the student to hose lays techniques. He will learn to handle correctly and rapidly the different types of hoses and connect them to fire hydrants, nozzles and applicators. As the fire hose is the most vulnerable part of the fire main, a particular emphasis will be put on the maintenance and prevention of misuse.

The student will also practice how to lay the hose flat on the deck, to fold, roll it up completely and finally to secure and stow it ready for instant use.

Practical Training

Training Site: Time Length: 04.00

The practical session will introduce the student to use the different equipment for facing and combating small and extensive live fire situations of different natures. He will use the various extinguishers to fight small fires, e g, electrical fires, oil fires, propane fires, etc. He will learn how to extinguish:

- Extensive fires with water (using jet and spray nozzles)
- Fires with either foam, powder or any other suitable chemical agent.

- Oil fires with fog applicator and spray nozzles, dry chemical powder or foam applicators.

He will enter and pass through with life-line but without breathing apparatus a compartment into which high expansion foam has been injected.

During this operation the Instructor must make sure that every student has been through every exercise and handled every equipment and tool.

The instructional technique should be elaborated into four steps:

Step 1 - Preparation:- The Instructor must find out how much the trainee knows about the subject or the equipment under discussion, arouse his interest and encourage discussion.

Step 2 - Presentation:- He must then explain, illustrate and demonstrate the operation. The Instructor should emphasise the key points and safety guidelines.

Step 3 - Confirmation:- The trainee must handle the tools or equipment, explain their operation and repeat the key points.

Step 4 - Demonstration:- The trainee has to demonstrate what he has learnt by using and operating the equipment and carrying out successfully all the practical exercises.

3rd DAY

Introduction to Breathing Apparatus

Class Room: Time Length: 01.00

It is extremely important that the student should have a fairly good idea about the construction of the apparatus and the different parts involved. He should also have a sound understanding of the proper procedures of use, maintenance and safety precautions. The student must be introduced to the different types of breathing apparatus, with good appreciation of their limitations and capabilities.

This segment will introduce the student for later training under actual fire conditions.

Practical Training with Breathing Apparatus

Training Site: Time Length: 02.00

During this session the student will acquire the skill and the ability to use the breathing apparatus safely. He will be required to place the equipment into operation correctly in a certain period of time and demonstrate that he can maintain self-control when participating in fire drills simulating the emergency use of the apparatus.

He will determine the seats of fire, fight the fires in smoke-filled enclosed spaces wearing self-contained breathing apparatus.

Introduction to Search and Rescue

Class Room: Time Length: 00.30

This segment of training will introduce the student to proper methods for smoke diving and searching compartments to rescue victims and determine the seat of fire and their origin.

Practical Training

Training Site: Time Length: 01.30

After the introductory lecture the student will practice smoke diving, wearing breathing apparatus and using a life line; operating in confined smoke-filled spaces in total darkness he will be required to don masks, locate and safely remove a victim from a compartment.

Case Histories of Shipboard Fires

Class Room: Time Length: 01.00

During this session the student will go through maritime history either by discussion or video films about real life tragedies which happened in the past.

These case histories have a very relative and serious purpose in shipboard fires to benefit from the experience of those who have and learnt from their mistakes and corrective actions as well as the right ones made.

In this case the student will obtain a good appreciation of fires and their disastrous consequences in human lives and property.

Emergency Medical Care

Class Room: Time Length: 02.00

The main objective of this session is to familiarise the trainee with the basic practices to adopt during injuries associated with fires. He must learn how to protect the patient from additional harm, correct life-threatening conditions, treat minor injuries and keep the patient stable until medical help can be reached.

He must be able to perform the following operations:

- Removing the patient (victim) from any situation threatening his life or the lives of the rescuers
- Correcting life-threatening problems and immobilising injured parts before transportation
- Transporting the patient in a way that minimises further damage to injured parts
- Administering essential life support while the patient is being transported
- Observing and protecting the patient until a medical team can take over
- Administering care as indicated or instructed
- Acquiring the knowledge of resuscitation (cardio-pulmonary) methods.

4th DAY

Marine terminology

Class Room: Time Length: 00.30

This portion of the training will introduce the student to the basic terms used on board ship. The material presented will be required for understanding of future sessions such as marine drawings, construction and arrangements.

The objective of the session is to prepare the student for further training and improve his ability to communicate with marine personnel by using the same language and terminology.

Vessel Construction and Arrangement

Class Room: Time Length: 01.30

This session will discuss and describe the major components of different types of vessels, their construction and arrangement. This may include break bulk cargo vessels, roll on/roll off ships, tankers,

container ships, etc.

The student will be briefly introduced to the SOLAS Convention and Classification Societies Rules as far as fire protection in ship construction is concerned. The class will begin the process of making the student familiar with the shipboard environment and prepare him for training to come.

Marine Drawing

Class Room: Time Length: 01.30

It is rare for emergency response personnel to be intimately familiar with the particular vessel on fire. Therefore it is important for the student to be able to quickly and correctly read basic marine drawings.

This session will define basic terms, symbols, line patterning, and techniques used in the preparation of general arrangement booklets and fire control plans.

Marine Fire Protection Systems

Class Room: Time Length: 02.00

There are numerous examples of ship fires where a major problem was the failure to use the fire protection systems built into the vessel (fixed fire extinguishing systems). One reason for this has been the lack of knowledge on the part of fire fighting and crew members on the systems capability and correct operating procedures. In many cases this has made fire fighting much more difficult and dangerous than it needed to be.

This session will provide the student with information on several types of systems commonly found on board ship. This will include the following:

- Fire main systems
- Water sprinkler systems
- Water spray systems
- Foam systems
- Carbon dioxide systems
- Galley protection
- Inert gas system
- Steam smothering system
- Fire detection system.

The design and installation of such systems will be briefly described but heavy emphasis will be put on the operation and maintenance.

Ship Board Field Trip

Aboard Ship: Time Length: 02.00

This session will be spent aboard a merchant vessel observing the items and features presented in the previous training. The objective is to reinforce information already presented and prepare the student for further training.

The visit should preferably be carried out on board a modern vessel such as a Roll On/Roll Off, container ship, incorporating most of the fire safety design features and systems.

Vessel Stability in Fire Fighting

Class Room: Time Length: 01.00

Failure to have a proper appreciation of the stability of a vessel has brought several fire fighting efforts to rather unsuccessful conclusion. The objective of this segment is to acquaint the student with the basic principles of vessel stability. It will discuss the forces which affect stability and how fire fighting can cause these forces to change. It will also explain the basic terms and steps which can be taken to improve the stability of a vessel. Reference to real case histories is strongly recommended.

Introduction to Damage Control

Class Room: Time Length: 01.00

Not all of the incidents to which emergency personnel are called to involving vessels are the result of fire. In certain cases they may involve uncontrolled flooding of the vessel due to equipment failure or structural damage. In other cases uncontrolled flooding may be part of the fire problem. This class will introduce the student to procedures for the control of progressive flooding and dewatering systems.

5th DAY

Marine Fire Tactics

Class Room: Time Length: 02.00

At this state of the training the student should have acquired a global understanding and a strong feeling about fires, after having been introduced and exposed to real but general fire fighting situations. During this session he will be instructed in marine fire tactics and correct fire fighting procedures, related directly to shipborne and port fires. This will include training on how to size up the fire and identify resources for effective extinguishment.

The class will discuss the following points:

- Establishing fire boundaries
- Direct and indirect a Hack extinguishment
- Ventilation, vertical, horizontal, combined and mechanical
- Protecting exposures
- Rescue
- Overhaul
- Various methods of hoseline extinguishment with the advantages of each
- Cabin fires
- Engine room fires
- Bilge fires
- Botswan's and paint lock fires
- Galley fire
- Fire electrical control panel.

Application of Fire Tactics for Different Types of Vessels

Class Room: Time Length: 02.00

The primary purpose of this session is to make the fire fighter aware of the particularity of hazards encountered on board different types of vessels. It might be considered a basic safety course for working on board ship during fire fighting operations.

This will incorporate the following areas:

- Cargo hold fire on a break-bulk cargo ship
- Tanker fires

- Container Fire
- * Container fire on deck
- * Container fire in a hold
- LNG Ship Fire
- * LNG spill involving a leak
- * LNG spill involving fire
- * LNG spill due to high energy impact (collision)
- Fire on a Passenger Vessel

For each type of these vessels the student must be familiar with the following lines of action:

- Origin of fire
- Size up
- Attack
- Confining the fire or spill
- Protecting procedure
- Ventilation
- Overhaul

Vessel Hazards

Class Room: Time Length: 01.00

The main objective of this session is to familiarise the student with the types of cargo carried on board ships.

A good knowledge of potential fire hazards is important information. The student will be introduced to manifest reading to determine the amount of each cargo on board.

A good interpretation of the International Maritime Dangerous (IMDG) Code must be provided to acquaint the student with particular characteristics of hazardous materials and their consequences in case of fire. He should be informed on the following items:

- Classification of hazardous materials, identification, stowage and segregation, etc

Emergency Procedures

Class Room: Time Length: 01.00

During this class the student will be instructed in the general lines of action in case of fire.

He must be familiar with the action to take and the guidelines to follow after the following situations:

- when discovering a fire
- when there is accommodation fire
- when there is engine room fire
- During the use of CO₂ in enclosed spaces
- During pump room fire
- Incident at the manifold/Tank overflow (oil tankers)
- Tank explosion
- Entry to enclosed spaces.

Command Post Operation

Class Room: Time Length: 01.00

Several fires can lead to disastrous consequences because of lack of co-ordination, communication and organisation. For a ship fire to be fought successfully it must be a combined and co-ordinated effort and often involves several agencies.

This course will train the student in the question of why a command post should be established, where to establish one on board the vessel, who should be in the command post and what tasks they should accomplish.

The class will also present information on what documents should be in the command post, communication problems and proposed solutions.

Legal Consideration of Marine Fires

Class Room: Time Length: 00.30

This class will outline the responsibility of the various agencies which may become involved with a ship fire in port. It will discuss the principles of comparative negligence, outline problems encountered at past fires and suggest ways to avoid similar problems in the future. Its purpose is to familiarise the student with the responsibility and the authority of those agencies which may be involved in marine fire fighting operations.

By the end of this session the student will be able to answer and understand the following key points:

- What is the problem
- Just who is responsible
- Responsibility - liability
- Who is in authority here

- The Fire Chief
- The Master
- Coast Guard/Captain of the Port.

Final Examination

Class Room: Time Length: 01.00

As mentioned earlier a final examination after any training programme is always necessary to assess the amount of knowledge the student has acquired and evaluate the quality of the course. It gives the necessary feedback for further improvement and continuous updating of the programme.

SUMMARY

This Intermediate Five-day Course covers wider areas and provides further details than the Three-day Basic Course. Consequently it will constitute an adequate part of the Ten-day Advanced Course with however a slight re-arrangement of the Courses.

3. TEN-DAY ADVANCED FIRE FIGHTING COURSE

This Course will extend more or less over the whole area of fire prevention, fire fighting and fire safety.

It will incorporate all the topics dealt with in the Intermediate Five-day Course, supplemented by other subjects dealing mainly with fire prevention programmes such as:

- Elements of effective programme
- Formal and informal training of personnel (crew)
- Periodic inspections
- Preventive maintenance and repair.

It will include also areas such as:

- Fire fighting procedures both at sea and ports
- Control of engineering systems
- Fire investigation and reporting
- Fire - legal aspects
- Further training in fire tactics
- Further training in Medical Care
- Organisation and responsibility.

In the following the topics already described in the previous Course will not be developed or repeated as the contents will remain more or less the same.

However some of them will be studied more in depth and therefore will require a longer time.

During this Course the practical training will be slightly reduced since it will be mostly experienced students who have already been to sea and certainly have attended one of the previous Courses.

After completion of this Course the student will have sufficient theoretical and practical background in fire fighting and matters associated with it, enabling him to understand and combat the fire, organise and direct fire operations, train the personnel and bear responsibility.

1st DAY

Introduction to Marine Fire Fighting

Class Room: Time Length: 00.30

Fire Chemistry

Class Room: Time Length: 02.00

Extinguishing Agents

Class Room: Time Length: 01.30

The student will be introduced to the handling, stowage and maintenance of these agents.

Fire Prevention

Class Room: Time Length: 02.00

This session will be mainly directed towards the safety measures related to both personnel and equipment and the enforcement of the different Regulations and Guidelines with fire prevention.

Fire Fighting Equipment

Class Room: Time Length: 02.50

Heavy emphasis will be placed on proper maintenance and correct handling of equipment. This class will include detailed instruction on the selection and purchase, and confidence testing procedures of the equipment.

2nd DAY

Introduction to Fire Tactics

Class Room: Time Length: 01.30

Introduction to Breathing Apparatus

Class Room: Time Length: 01.00

Introduction to Search and Rescue

Class Room: Time Length: 01.30

Case Histories

Class Room: Time Length: 02.00

The class will discuss real fire causes which occurred on board Algerian ships and other well-known historical casualties which happened in the past. Analysis of wrong and correct actions will be made. Presentation of video films is strongly recommended.

Miscellaneous Fire Safety Equipment

The equipment discussed during this session is not used to detect or fight fire but rather to protect personnel in the event of fire. This type can be classified into three categories:

- Constructional Features

- * Bulkhead and decks

- * Doors
- * Fire dampers
- Portable devices
 - * Fire safety lamp
 - * Oxygen indicator
 - * Portable combustible gas indicator or combined with oxygen indicator
 - * Fire axe
 - * Key
- Personnel equipment
 - * Fireman's outfit
 - * Proximity suit
 - * Entry suit, etc.

3rd DAY

Introduction to Practical Training

Training Site: Time Length: 00.30

Hose Lays Techniques

Training Site: Time Length: 01.00

Fire Fighting

Training Site: Time Length: 02.30

Practical Training with Breathing Apparatus

Training Site: Time Length: 02.00

Search and Rescue

Training Site: Time Length: 02.00

4th DAY

Marine Terminology

Class Room: Time Length: 01.00

Vessel Construction and Arrangements

Class Room: Time Length: 01.00

Reading Mating Drawings

Class Room: Time Length: 01.30

Types of Vessels

Class Room: Time Length: 02.00

The primary objective of this session is to familiarise the student with the different types of vessels he will be likely to serve on, or those calling into his port.

He will mainly discuss the particularity of each vessel as far as:-

- Design and construction
- Propulsion machinery
- Type of cargo
- Cargo handling
- Trading patterns.

Marine Engineering Systems

Class Room: Time Length: 01.00

It is very desirable that a good fight fighter should be familiar with some Marine Engineering Systems which are commonly the sources of ship fires. This will be of great help and understanding to him in carrying out both fire prevention and fighting successfully fires once they occur.

This will include:-

- Machinery propulsion systems
- Fuel oil piping
- Cargo pumps
- Electric motors
- Electric distribution panel
- Lighting
- Fans.

Marine Fire Protection Systems

Class Room: Time Length: 03.00

This lesson will mainly stress upon the correct operation and proper maintenance of the monitoring, systems, fire detection systems and fixed fire extinguishing systems.

5th DAY

Ship Board Field Trip

Aboard Ship: Time Length: 03.00

The first session of the fifth day will be spent aboard a modern merchant vessel preferably one which incorporates several fire protection systems. This visit will strengthen the knowledge and experience of those students (seafarers) who are familiar with these systems, and will acquaint those who are not.

Emergency Mooring

Aboard Ship: Time Length: 01.00

During the shipboard field trip the instructor will take the opportunity to introduce the students to the various mooring and anchoring system components in use aboard this ship. The primary objective is to acquaint the student with emergency procedures to move a vessel under fire conditions.

Vessel Hazards

Class Room: Time Length: 01.30

This class will discuss the typical contents of each major compartment aboard a typical vessel and the hazards those contents may create during a fire. The primary purpose is to make the fire fighter aware of the hazards to be found aboard ship which are not encountered ashore.

These will include materials involving fires of different classes.

Although vessels are constructed of metal and may appear incombustible, there are many flammable products aboard, which may be located in the cargo holds or on deck stowed in containers or in bulk stowage.

Some examples of such material:-

- The bridge contains wooden desks, charts, almanacs and other such combustible objects
- Wood in many forms may be found in the carpenter shop
- Various types of cordage are stowed in the boatswain's locker
- Emergency rockets and explosives for the line-throwing gun on the bridge wing
- Lumber for dunnage
- Rubber and plastics are used extensively for the insulation on electrical wiring.
- Flammable and combustible liquids in the form of fuel and diesel oil, lubricating oil in the engine room, etc
- Paints and varnishes
- Flammable gases
- Electric equipment
- Specific metal such as aluminium, magnesium, titanium, etc.

IMDG CODE

Class Room: Time Length: 01.30

The amount of dangerous cargo transported by ships has increased tremendously and so has the hazard associated with them in case of fire. It is of primary importance for the people who handle these goods and particularly the seafarers to have an adequate familiarity with the Regulations under the International Maritime Dangerous Goods Code (IMDG), and a complete awareness of the hazards involved in case of fire.

They must be acquainted with the classification identification, stowage and the use of the correct extinguishing agent, if a fire occurs.

6th DAY

Class Room: Time Length: 01.30

Introduction to Damage Control

Class Room: Time Length: 02.30

Damage Control Operations

Damage Control Basin

Time Length: 02.00

During this session the trainees will practice damage control operations by trying to stop leakages from hull openings of different shapes using several types of obturators found on board ships. Wearing diving equipment they also learn how to stop underwater leakages and perform rescue operations.

7th DAY

Accommodation Space Fires

Class Room: Time Length: 01.00

Marine Fire Tactics

Class Room: Time Length: 01.00

Engine Room Fires

Class Room: Time Length: 01.30

Cargo Hold Fires

Class Room: Time Length: 01.30

Container Hold Fires

Class Room: Time Length: 02.00

LNG Carrier Fires

Class Room: Time Length: 02.00

NOTE: During these sessions the student will be introduced to different fire-fighting tactics and procedures peculiar to some categories of ships with fires located in different places.

8th DAY

Pump Room Fires

Class Room: Time Length: 01.00

Tanker Deck and Tank Fires

Class Room: Time Length: 02.22

Instruments Operations

Class Room: Time Length: 01.00

Students will be trained in the operation of various instruments available to assist in the extinguishment of ship fires.

The course will discuss the operating features of various instruments and their limitations and capabilities.

Students will also be taught basic techniques to be used in obtaining readings and their interpretations, and thus they will be required to test for temperature, CO₂ and combustible gases during a laboratory session.

Bulk CO₂ Application

Class Room: Time Length: 01.00

This session will complement the session on instruments to prepare the students for the field application of CO₂ on board the drill operation. The class will discuss the procedures to follow when applying in CO₂ in bulk from the tanks, including safety measures, preparations, groundings, sealing, ventilation and test readings.

Bulk CO₂ Drill

Training Site: Time Length: 02.00

This session will constitute the field application portion of the previous segments on Instrument Operation and Bulk CO₂ Application.

The session will take place on the training vessel and involve the use of a Bulk CO₂ tank.

Students will be required to extinguish a simulated Class A Fire in the cargo hold by actually applying CO₂.

Students will set up for application, apply the CO₂, obtain test readings,

vent the CO₂, and assure the compartment is safe for personnel.

Final testing will be conducted under the supervision of a certified Marine Chemist.

Foam Operations

The student will be introduced to the different Foam Systems:

- Mechanical foam
- Chemical foam
- Foam generators
- Deck foam systems (Tankers)

The student will learn the description of the different equipment, their operation and maintenance.

9th DAY

Indirect Fire Fighting Attack

Class Room: Time Length: 01.00

During this session the student will be introduced to the indirect attack techniques employed when it is impossible for fire fighters to reach the seat of the fire. Generally this is the case when the fire is in the lower portion of the vessel such as cargo holds and engine rooms.

Manifest Readings

Class Room: Time Length: 01.00

The success of any fire fighting operation depends greatly on the very good appreciation of knowledge of the cargo on board, its nature, amount and location.

This session will be dedicated to the interpretation and reading of the Cargo Manifest.

Command Post Operations

Class Room: Time Length: 01.00

Legal Considerations of Marine Fires

Class Room: Time Length: 01.00

Port Contingency Planning

Class Room: Time Length: 03.00

The purpose of this planning is to increase efficiency when an emergency arises. In achieving this goal the planning process must anticipate

problems, their possible results and prepare solutions before the problems do occur.

The majority of fire incidents which will occur in a port are of a "routine" nature and are well within the capability of the local jurisdiction to handle. However when a major fire occurs it can quickly exhaust the locally available resources. This is especially true if the proper planning has not been done ahead of time.

There are numerous examples of fire ground decisions being made as they based on inadequate information or data, which would have been adequate if only the proper planning had been done.

Therefore during this session the students will discuss the following points:-

- Who is responsible for developing the Plan
- Identification of the interested Agencies such as:
 - * Fire Department
 - * Coast Guards
 - * Vessel Operators
 - * Insurance Underwriters
 - * Ship's Agent
 - * Port Authorities
- Determination of responsibility and interest of these Agencies
- Identification of resources
- Large industrial complexes, i e, nearby military bases, shipyards, commercial suppliers, local companies, which may be able to provide additional firefighting supplies
- Availability of experts with identification of their skills and function:
 - * Marine Chemist
 - * Coast Guard personnel
 - * Salvage expert
 - * Insurance personnel
 - * Shipyard personnel
 - * Pollution Contractors
 - * Marine Fire Protection System Contractors
 - * Ship's Agent
 - * State Department of Emergency Services
 - * Port Authority personnel
- Development of procedures which is the final step in preparing a comprehensive Fire Plan for its implementation.

Logistics and Air Operations

Class Room: Time Length: 01.00

This class will discuss the problems of supply and transportation of equipment, and people to or from the place of fire.

10th DAY

Class Room: Time Length: 01.30

An important facet of Marine Fire Protection are the small ships - tugs, pushboats, dredgers, supply vessels, ice-breakers and others which are given an auxiliary fire fighting role.

On the other hand the Fire Department units such as Trucker Pump Trailers, etc, may take part in ship fires.

During this session the student will discuss the limitations and capabilities of such units and the co-ordination in actions of the different parts involved with the ship's crew.

Emergency Medical Care

Class Room: Time Length: 04.00

The medical emergencies that arise in fire fighting situations are not limited to burns. Inhaling smoke from the fire can poison the victim but all types of injuries normally associated with any accident situation can occur during fire fighting owing to the restricted work, space, the rolling of the vessel, poor footing in water-soaked compartments, and poor visibility due to smoke. In addition smoke may cause respiratory arrest and fire fighters under strain may have heart attacks. Both cases require immediate action on the part of the rescuer.

During this session the student will be informed on the necessary steps to follow and how to react effectively during the following situations:

- Treatment of shipboard injuries
- Determining the extent of injury or illness
- Evaluating the accident victim
- Triage
- Head, neck and spine injuries
- Respiration problems and resuscitation
- Cardiopulmonary resuscitation
- Bleeding
- Wounds
- Shock

- Burns
- Fractures and injuries to the bones and joints
- Environmental emergencies
- Techniques for rescue and short distance transport.

Final Written Examinations

Class Room: Time Length: 02.00

The Examination will cover the whole material presented during the training.

The emphasis will be put on the most important points the trainee should keep and master during his career.

Clean Up

Class Room: , Time Length: 01.00.

4. TEAM TRAINING FROM SHIPS - One-day Course:

The traditional fire drills are obviously better than nothing at all. However there can be little doubt that the repetitive aspect of such training without practice due to the reluctance of some masters to set live fire on board, for safety reasons, may render these sessions monotonous and boring, and crew members end up learning very little.

Training consists basically of two parts which must come in the following order:

1. Teaching - learning process in which the necessary knowledge is communicated to the trainee.
2. Practice and demonstration of the necessary skills using the proper equipment.

Fire Drills on board usually lack the second part of the training, and therefore the Fire Fighting Centre may represent the best alternative to provide a short practical training for crews whose ship enters ports in the vicinity.

The training will be in teams such as The Emergency Squad.

A team is a group of people brought together to accomplish a common goal. The word team brings to mind the word co-ordination, co-operation and training.

The main problem with training personnel in marine fire fighting is lack of experience (people just do not get to fight ship fires every day) and the turnover in personnel.

The principle objectives of this Course which must be repeated as frequently as possible are as follows:

- Prevent the loss of skills
- Train new personnel as they come aboard
(individual and team training, hose team, search team, emergency squad)
- Take advantage of new information and experience.

The Course will consist of:

Emergency Procedure

Class Room: Time Length: 01.00

Organisation of Fire Practice on board

Class Room: Time Length: 01.00

Practical Training

Training Site: Time Length: 03.00

1. Use various types of portable fire extinguishers
2. Extinguish small fires, e.g., electrical fires, oil fires, propane fires
3. Extinguish extensive fires with water
4. Extinguish fires with either foam, powder or any other suitable chemical agent
5. Extinguish fire with water fog or any other suitable fire-fighting agent in a simulated accommodation room, engine room, galley, etc
6. Effect a rescue in a smoke-filled space wearing breathing apparatus.

CONCLUSION

If all crews could attend as periodically as possible such instructional and practical sessions at the Fire Fighting Centre, then the regularly scheduled fire drills on board their respective ships would be demonstrations of efficiency and promptitude rather than just training sessions. The training provided by the Fire Fighting School can be considered as excellent indeed, however, there remains a need for people's education to be continuously up-dated.

One way of doing this, which has become increasingly popular in recent years, is to use films.

Therefore a co-operation between the Training Centre and the ships should be established by providing copies of the different films available.

The films should cover the complete area of:

- Fire prevention
- Fire safety

- Basic fire fighting
- Command and Control.

The filming must preferably take place both at sea and in schools. Videotel Marine International Ltd is a leader in the training films business, working in co-operation with various training schools, the DOT, IMO and Shipowning Companies.

Another practical and efficient way of training and up-dating people on board is the use of instructional tapes, developed by the Swedish Maritime Fire Protection Committee. The programme is based on knowledge and experience gained by responsible officers on board and by fire-fighting experts ashore. The knowledge has been generalised into instructions and recorded on tape cassettes.

The cassettes are programmed in such a way that the crew is guided through a task, e g: Handling of fire-fighting equipment, or directed to different sections of the ship receiving information at the same time. They can listen over and over again until they have learnt what should be learnt.

Everybody on board should be allowed to increase his fire protection knowledge by means of tapes. This should be possible as this type of training is individual.

The following Instruction Tapes are offered:

Tankers

- Introduction
- Accommodation Spaces
- Engine room, Turbine
- Foam - Tank deck
- Water Extinguishers
- CO Extinguishers
- Powder Extinguishers
- Medium foam
- Riken Model 17
- Riken GP 204
- MSA Tankscope
- Servomex Type OA 262
- Attending nozzles
- Fire Fighting and Rescue, work in smoke-filled spaces.

Other Ships

- Introduction
- Accommodation
- Engine room, Diesel
- Cargo holds and decks
- Water - Fixed Fire Extinguishers Systems
- CO gas - Fixed Fire Extinguishers Systems
- Water Extinguishers
- CO Extinguishers
- Medium foam
- Attending nozzles
- Fire Fighting and Rescue; work in smoke-filled spaces.

Such instruction tapes should be distributed by the school to crew members relevant to their duties and responsibilities.

Issue of Certificates

With regard to IMO Resolution A.437 (XI) adopted 15 November 1979 on "Training of crews in fire fighting", chapter (9) states: "Where Training in fire fighting is not included in the qualifications for other certificates, consideration should be given to the issue of special certificates indicating that the Holder has attended a specified course of Training in fire - fighting."

The special certificates will be relevant to the different courses and issued for the trainees who have successfully taken part in the whole course and passed the final examination.

There will be: - A certificate for the Basic fire fighting course

- A certificate for the intermediate fire fighting course in accordance with the provisions of Annex I of IMO Resolution A.437 (XI)
- A certificate for the Advanced fire fighting course in accordance with the provisions of Annex II of the same resolution.

(see form of the certificate)

If the training is included in the qualification for other certificates, a special endorsement may be attached.

CHAPTER VI

TRAINING FACILITIES

The training facilities will be located within the Maritime Academy (Fig 1) with a reasonable distance from any living accommodation, and close to the sea water supply.

It will be constituted as any modern Fire Fighting System in the world, with the following parts:-

- An open field with different flammable liquid props simulating actual conditions using flammable liquids with live but controlled fires
- A three (3)- storey structure, compartmentalised with various occupancy configurations and capable of live fires within. This will simulate fire fighting operations in engine room, accommodation and bridge of a real ship.
 - * Some Training facilities have the opportunity of using very sophisticated installations. These "ships on dry land" consist of a land-locked concrete and steel "vessel" and is an exact reproduction of a ship, incorporating various compartments, equipment; and features of several different types of vessels. (See Appendix I). This solution ought to be very efficient, although it is very expensive.
 - * Other Training facilities have the preference of the use of inoperative small ships such as cargo ships, trawlers, fire-fighting boats, military ships, etc. This solution seems to be very economical since these old ships can be donated or purchased at very low prices. It can be an effective methods since it offers realistic fire-fighting procedures. These ships generally necessitate slight conversions, restorations and the installation of some safety measures.
- A damage control training compartment capable of being flooded. For this purpose we may use a constructed basin simulating a ship compartment or any hold of a small vessel.

A Open Field Facility

Class A Fire

For this purpose a concrete raised platform (see Fig 2) will be constructed in the shape of a spiral. It will be used for fire fighting exercises of Class A Fires, i e, fires that burn with an ember:

- Wood, paper, cloth, rubber. For these fires multi-purpose dry chemical extinguishers, wet water, and water with fog stream and straight stream are used.
- A tarred area will be needed for a good evolution of the exercises and an easy handling of the various equipment
- Six rectangular props with the following dimensions: 2 metres long x 1 metre wide x 0.40 deep. This prop will contain different oils - gasoline, diesel, crude, lubricating oil, etc. They will be attacked with foam extinguishers, water extinguishers and CO₂ extinguishers.
- One large prop with 8 metre diameter and 20,000 litre volume. This will be used for fighting fires of large surface with fog applicators, foam cannons and fog streams. It will be installed on a concrete slab.
- Bilge fire facility will be composed of floor plates similar to those found in an engine room; over a concrete prop of 3 metres x 0.50 meter. The bilge fires from flammable liquid fuel require CO₂, fog or foam as the extinguishing agent.

Gas Fires

For gas fires extinguishing exercises a gas ramp will be installed and this will be fed by propane.

Various Exercises:

a) Galley Fire

For this purpose a ship galley will be represented and at the entrance equipment used against deep-fryer fires will be disposed. They will be composed of a spray nozzle fitted on fog stream extinguishers, a hood, a protective pair of woolen gloves and a pair of approach light goggles.

b) Search and Rescue

To accomplish this exercise a flames passage of 1.50 metres wide x 5 metres long will be constructed. The operation will consist of searching for a dummy and bringing it to the starting point, using appropriate protective clothing.

Water Supply

The water supply will be provided from two different suction lines:

- a) The Institute Fireman System which will offer a large water reservoir in a tank with a pressure of 7 bars, built up with a double pump set and piping system of sufficient diameter (110 mm).
- b) A direct sea water suction line with a strainer and a mobile motor pump.

B. Three Storey Enclosed Structure

The construction of this building will be realised with bulkheads conveniently reinforced with steel and concrete in order to avoid the passage of flames, smoke and to resist the thermal stresses (e g, Class A bulkheads).

Ground Floor

(See Fig 3) In this compartment a cement prop of 3 metres x 1 metre x 0.40 metre deep and 1,000l volume will be used for extinguishing exercises and attempts.

In the basement a piping system will be arranged, necessary to feed this prop will fuel after each drill. This piping system should easily be drained after each filling of the prop in order to avoid accidents due to flame propagation.

In the same basement a draining system of the whole compartment after each exercise should also be installed.

All the doors of 1 metre x 0,80 metre wide must be flame-tight and high-temperature resistant.

The stairways and the supporting beams of the first floors should be of steel with high mechanical and thermal strength.

A concrete trap door of 3.50 metres x 2 metres will allow the exit or access of personnel to the ground floor during the fire drills without any risks.

First Floor

(See Fig 4) At this level two entrances with an airlock will be arranged to have access to the ground floor in order to complicate the extinguishing exercises.

- * The first airlock will lead to a straight stairway with hand rails, similar to those found in ships engine rooms.
- * The second airlock will lead to a lowering ladder identical to shaft tunnel escape on board.
- * A third door without airlock will give access to the first floor through a labyrinth with Class A bulkheads. This labyrinth will be connected at the back to the descent from the second floor to the ground floor with a steel platform of 0.80 metre wide.
- * The access to the second floor or terrace will be done through an external stairway placed on the back wall of the building.

This stairway will lead to near the entrance airlock joining the ground floor.

This descent will be constituted by steel stairway and handrail.

At the level of the first floor a plateau will join the platform to the stairway.

On the terrace two compartments of 3 metres x 2 metres each will be arranged.

- * The first compartment will be used for the installation of ventilation systems necessary to evacuate the smoke and will be duplicated for safety reasons, although one ventilator is large enough. Furthermore it must be reversible and work either as inlet or exhaust ventilation. The electric motors must be connected to the main electricity supply and at the same time to an emergency generator.
- * The second compartment will be used for the Fire Detection System and the CO₂ Fixed Installation System necessary for the safety and protection of the building. (The required quantity of CO₂ is 0.6 kg/m³ of compartment).

This Emergency System will be utilised in case of extension of a casualty impossible to overcome. It will be also used as a Monitoring System when the instructors are absent.

The Detection System must be out of service during the training of the students.

Another stairway must be arranged in order to have access to the platform of the first floor. It can be either in steel or in concrete.

A fire main which must be in zinc-coated steel or copper nickel alloy with 60 - 80 mm diameter will supply water to the different hydrants (10) located in the ground, first and second floors.

A pressure of 8 bars in the fire main will be provided by a fire pump.

In case of pressure drop in the water service pipes another pump will start automatically. The electric motors of the two fire pumps must be connected to the main electricity supply and at the same time to the emergency electric generator.

The necessary equipment for the safety of the building and for the training will be listed in the next Chapter.

C Damage Control Compartment

This compartment will be designed for the use of the different means of obturation commonly found on board ships. A bulkhead or wall will be fitted with pipings of different diameters connected to the same drum into which seawater is supplied.

From the control room one can operate these different pipings and increase deliberately the water flow rate simulating the hull "openings" of different depths.

Another plain wall will represent a ship hull where openings of different shapes will be arranged in order to use the various obturators which will be listed in the following Chapter.

The Piping System must fulfill a double function:

Discharge of seawater in the compartment for damage control exercises, and

The stripping of the same compartment once the training is over.

On the other hand this compartment can be filled at a level of 2.50 - 3 metres of water in order to practice diving operations with self-contained apparatus and narghilé (searching exercise of a dummy for example).

CHAPTER VII

STORAGE OF COMMODITIES

A. Storage of Combustible Materials

1) Class A Materials

This will include paper, wood, cloth, rubber, etc. These materials must be stored in a special compartment, in limited quantity and in good order to prevent eventual fires.

2) Class B Materials

Two tanks for diesel oil with a capacity of 3,000 litres will be buried and built to the standards of petrol stations.

Piping system perfectly tight will be arranged to feed the main props. This system must be easily drained in order to avoid flame propagation towards the tanks.

Another tank for gasoline with a capacity of 10,000 litres will also be installed for the ignition of the different props.

B. Storage of Equipment

Three compartments will be needed for this purpose:

- One compartment which is big enough to store the various fire fighting equipment
- A second compartment will be used for the storage of the firemen's outfits and breathing apparatus
- A third compartment including a workshop will be used for maintenance and repair of fire extinguishers and other equipment.

All these compartments must have an easy access and preferably located in the same area to facilitate the work for the instructors.

C. Reception of the Trainees

The Trainees should have at their disposal a changing room

with personal lockers and several showers to be used after exercises.

An Office will be necessary for the Managing Personnel of the Fire Fighting Centre to provide repartition of tasks between Instructors and Trainees.

CHAPTER VIII

EQUIPMENT - COMBUSTIBLES

A. Equipment and Protection of Personnel

1) Elementary Working Outfit - (20 sets):

- . Under-wear, cotton or woolen socks
- . Linen overall
- . Non-skid shoes, or
- . Pair of rubber boots
- . Helmet

2) Fireman's Outfit - (20 sets):

The above-mentioned outfit generally used against classical hazards (fire, water, etc) must be completed by the following:

- . A set of jacket, pants, impermeable to water, permeable to air and not ignitable
- . Plastic hard helmet (electrically insulated up to 440V) with a mining fitting
- . Anti-flash plastic goggles withstanding temperature up to 100^o C
- . A pair of PVC gloves with internal lining (electrically insulated up to 440V)
- . Cotton or woolen gloves
- . Fireman's belt
- . White cotton hood for face protection
- . Lifeline for investigation and intervention
- . Mining lamp (watertight and explosion proof)
- . Flash light (watertight and explosion proof)
- . Hose connection spanner
- . Breathing apparatus (Fénzy type with an autonomy of 1 hour whatever the physical constitution of the bearer).

3) Approach or Proximity Suit

A Proximity Suit consists of:

- . Jumper-type pants that cover the legs and upper part

- of the body including the arms
- . A hood (with a transparent heat-reflecting vision shield) that covers the entire head, shoulders and upper part of the body
 - . Heavy gloves with sleeves not less than 15 cm in length
 - . Special covering for the feet.

The outer surface of the suit is covered with a highly reflective material (the suit reflects as much as 90% of the radiant heat).

When properly donned the proximity suit encases the wearer in a heat-resistant envelope. It may be used to approach close to a fire but it is not designed to protect the wearer during direct contact with the flames. The suit must be completely in incombustible fabric and adjustable to fit all wearers. A self-contained breathing apparatus must be worn under the proximity suit, otherwise the intense heat near the fire can damage the wearer's respiratory tract.

4) Entry Suit - (2 sets):

The entry suit will protect the wearer from direct contact with flames up to a temperature of 815⁰ C during at least 90 seconds.

It may be used to enter flames for rescue, to close a fuel valve and for similar emergency tasks. However the wearer cannot linger in the flames. He must move in, do what is necessary and move out rather quickly.

The suit will not provide unlimited protection against flames.

The entry suit consists of:

- Boots
- Trousers
- Coat
- Hood.

Each of these is constructed of nine (9) layers of fiber-glass insulating material separated by aluminised heat-reflecting glass fabric. The outermost layer is aluminised fiberglass. The vision shield is of a special heat reflecting material and is sealed into the hood. Drawstrings and snap buttons on the suit provide an airtight seal around the wearer. The hood is attached to the coat with straps when

the suit is donned so that it cannot be accidentally removed. An air pack (demand type breathing apparatus is worn under the entry suit).

5) Underwater Investigation Equipment - (6 sets):

The personnel having the task of subsea work, or intervention in the water, should be protected by a suitable suit against hypothermia effects and accidental wounds. (Suits in Neoprene ...).

6) Miscellaneous Equipment - (5 sets):

- Electrical equipment handling:
 - * 100000V electrically insulated gloves
 - * Insulated handle tools
 - * Individual insulated blanket.

Clearing operations: For the handling of hot metallic pieces, sharp and shredded:

- . Leather gloves with asbestos lining
- . Leather gloves with asbestos lining and re-inforced internally by a coat of mail.

7) Personal Protection of the Instructors:

The continuous contact of instructors with an atmosphere contaminated by smoke and toxic gases, and the deficiency in oxygen, necessitate special protection in order to avoid accidents.

During smoke diving fire fighters perform a strenuous exercise and are exposed to a substantial heat load. Due to the risk of over-exertion it has been suggested that fire fighters (instructors) should regularly pass a health check. In addition to this health check they are required to carry while exercising:

- . Light mask in fabric sponge, easy to clean
 - . Anti-dust respirator protecting the mouth and nose.
- They must consist of cartridges easy to clean or change.

8) Explosimeters and Gas Indicators - (3 sets):

Flame Safety Lamp

The flame safety lamp is a device that is used to detect oxygen deficiencies in confined spaces. The lamp uses naphtha

as fuel for its flame. Changes in the flame size and its brightness indicate the relative amount of oxygen in the atmosphere being tested.

This lamp will be used for the exercise of familiarisation with fire without a breathing apparatus.

Oxygen Indicator

The oxygen indicator is an instrument that measures the amount of oxygen in the atmosphere of a confined space. The percentage of oxygen in the sample is indicated by the meter needle.

Explosimeter or Combustible Gas Indicator

The combustible gas indicator detects and registers concentrations of dangerous gases in the air in confined spaces and possible gas leakages. This device is similar in appearance to the oxygen indicator.

Hydrogen Sulphide and Carbon Dioxide Indicators

These indicators are used to detect toxic gases in the compartments before entry. The toxic gases are harmful to inhale or to the skin even at low ppm levels.

The permissible amount of toxic gas per cubic metre of air is indicated in ppm or mg/m³. The alarm is set to react long before the gas content has reached the safety limit.

B. Necessary Equipment for the Centre

1) Equipment for the protection of the building and the Trainees:

- . 2 portable fire pumps
- . 5 hoses of 20 metres
- . 2 Y-connections of 40 mm
- . 5 hose connection spanners
- . 5 nozzles (straight stream, fog stream)
- . 2 fog applicators (12 mm in diameter)
- . 2 pike head fire axes
- . 1 foam cannon with 5 cans of 25 litres.

2) Equipment for the Trainee

- . 4 hoses of 20 metres
- . 2 nozzles (straight and fog stream)
- . 1 fog applicator (∅ 12 mm)
- . 1 foam cannon with 4 cans of 25 litres.

4.1.3

C. Necessary Equipment for Damage Control Compartment

A (1) Piping repairs

- . Rubber, strings, steel or yellow brass wire
- . Metallic collars with bolts
- . Hooping apparatus
- . Plastic material plaster and thermosetting resin.

B (2) Hull repairs

- Batardeaus: Wood
 - . Rapid hardening cement
 - . Slow setting cement
- Oxy-gas cutting (welding workshop)
- Arc and oxyacetylene welding
- Use of a gudgeon planting gun.

C (3) Holes repairs

- . Collision material
- . Obturating plate (wood)
- . Sealing plug with base plate (wood)
- . Rivetted or bolted patches
- . Double sealing plug (wood)
- . Folding plate (wood)
- . Plate for cracks
- . Wood for prop
- . Hydraulic jacks for prop.

D (4) Mobile Stripping Equipment

- . 2 non-submersible electro-pumps
- . 2 sub-mersible electro-pumps
- . 2 eductors 30 m³/h (SAJ type)
- . 4 bendpipes (type C.E.Ps) with connections (Accessories for Educators).

E (5) Diving Equipment

- . 6 complete wet suits with air bottles
- . 6 "Narghilé" apparatus (air hose with sufficient length)
- . 1 Air compressor for filling the bottles and the supply air for the air hoses.

D. Necessary Equipment for the Open Field Facility

The open field will be protected by a firemain identical to the one used in the enclosed structure.

Ten (10) hydrants will be required to carry out the different exercises with hose lines.

The appliances necessary for the training and the protection of the Trainees will consist of:

- * 15 hoses of 20 metres with connections
- * 15 nozzles
- * 4 fog applicators
- * 4 foam cannons and 40 cans of emulsion product
- * 30 CO₂ extinguishers
- * 30 fog stream water extinguishers
- * 30 foam extinguishers
- * 2 mobile foam extinguisher (136 litres).

E. Fire Detection Equipment

A contact with a specialised manufacturer is preferable, for the supply of the different components with the possibility of training personnel for maintenance and repairs.

CONCLUSION

The problems of fire prevention and fire fighting on board ship has become more pronounced with the construction and operation of special types of vessels. In particular, the techniques of fire fighting on board container ships, car ferries, Ro-Ro vessels, combination carriers, oil, chemical and liquefied gas carriers amplify the need for a more systematic and organised approach to fire fighting techniques. These include the correct use of equipment and more effective fire-fighting drills than has been the common practice in the past.

The technological development of fire-fighting services ashore compared to those at sea over the past 20 years demonstrates the need for improvement at sea. There is a general urgency to enhance and upgrade the standards of training and the improvement of management skills in the organisation of fire fighting and fire prevention on board ships today.

There is a statutory obligation to develop basic, advanced and specialised levels of Maritime Training Courses in fire prevention and fire fighting for shipboard personnel in accordance with the provisions of 1978 STCW Convention.

The Courses developed in this paper together with the training facilities described will constitute an excellent mean to meet the requirements and objectives necessary to improve the safety of ships, crew and cargo against their worst enemy, i e, fire.

It is far from me to say that the Fire Fighting School will be the most advanced, but I am quite confident that for a new maritime nation with relatively limited resources, this will be perfectly adequate to cover all the needs for a reasonable cost outlay.

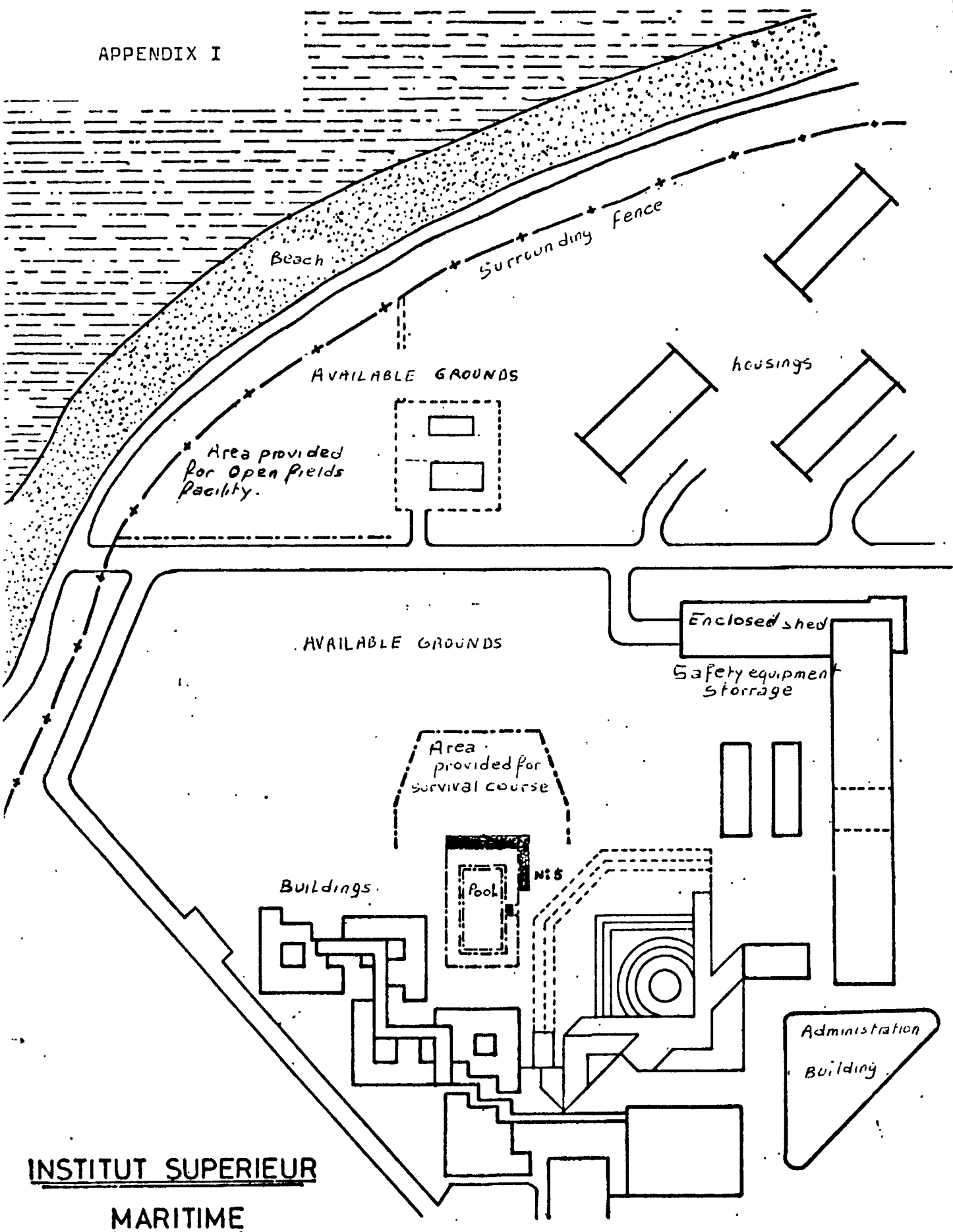
Some advanced maritime nations have already in operation very sophisticated and expensive training schools equipped to the extent that they even have mock-ups of ship structures to provide the near ultimate in realism.

In Appendix II a description will be found of the Training Facility of Lothian and Borders Fire Brigade Mercantile Marine Officers' Fire Training School, Mac Donald Road, Edinburg, and the Washington State Training Facility which is considered the finest Fire Training Centre in the world.

To conclude it could be added that whatever training efforts the country embarks upon, the long range objectives should be considered at the outset.

The Shipowners must have the responsibility to ensure that their officers and crew are well trained and also show a responsible attitude to the subject of fire by treating it with the respect which it deserves.

They must also ensure that adequate supervision is given with a continuing basis to the conduct of meaningful fire drills both at shore-based training facilities and on board their vessels.

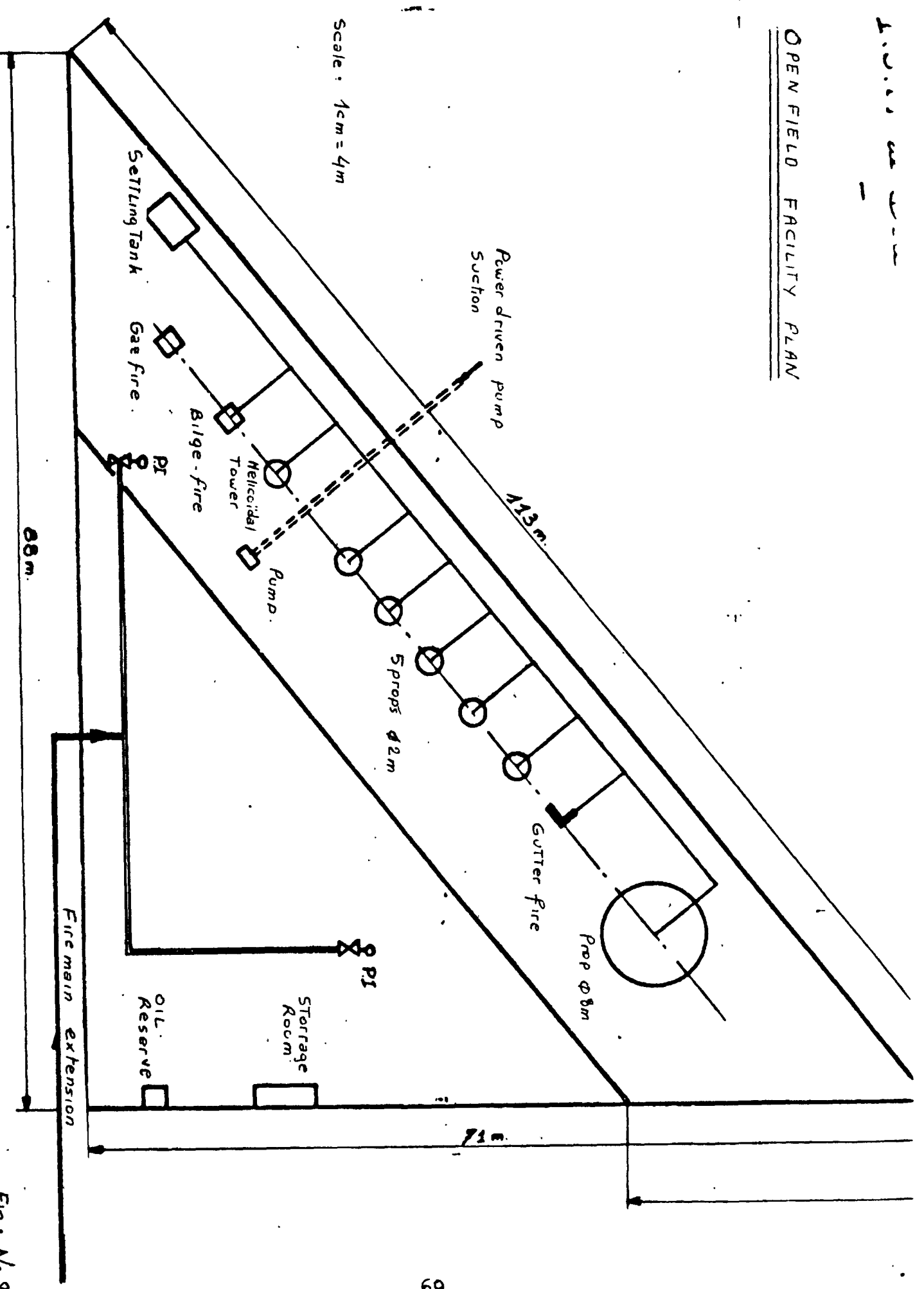


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Fig - Nr 1

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OPEN FIELD FACILITY PLAN



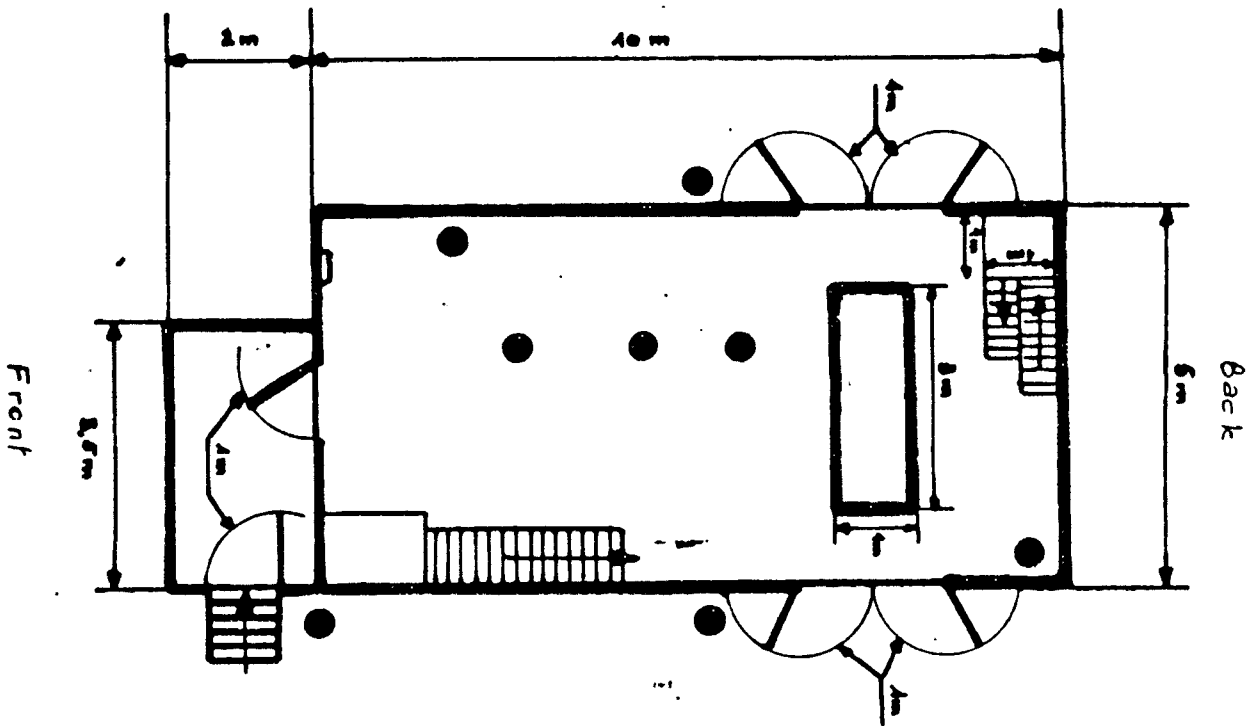
Scale : 1cm = 4m

113m

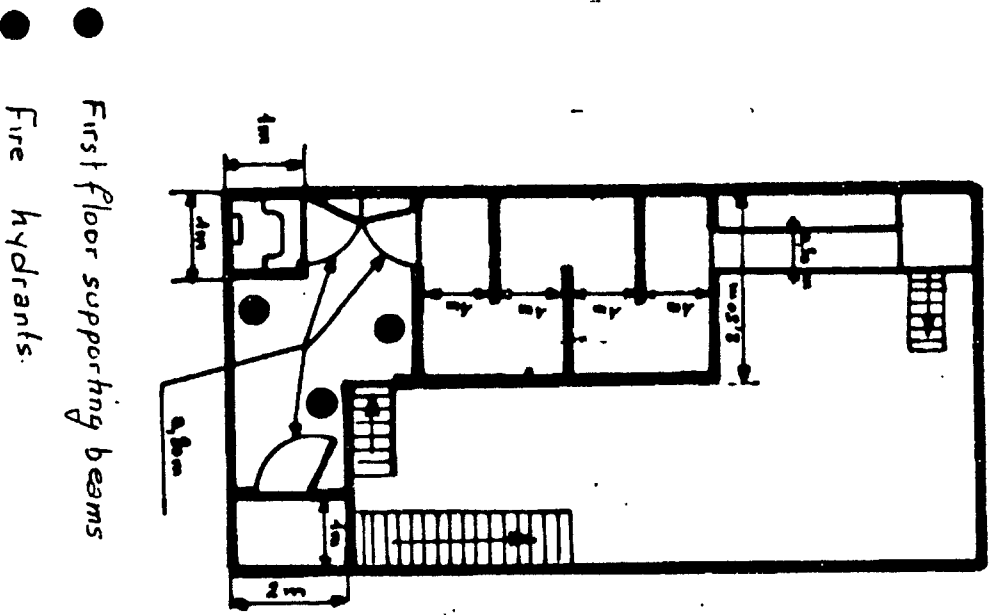
71m

Fig 1 Nr 2

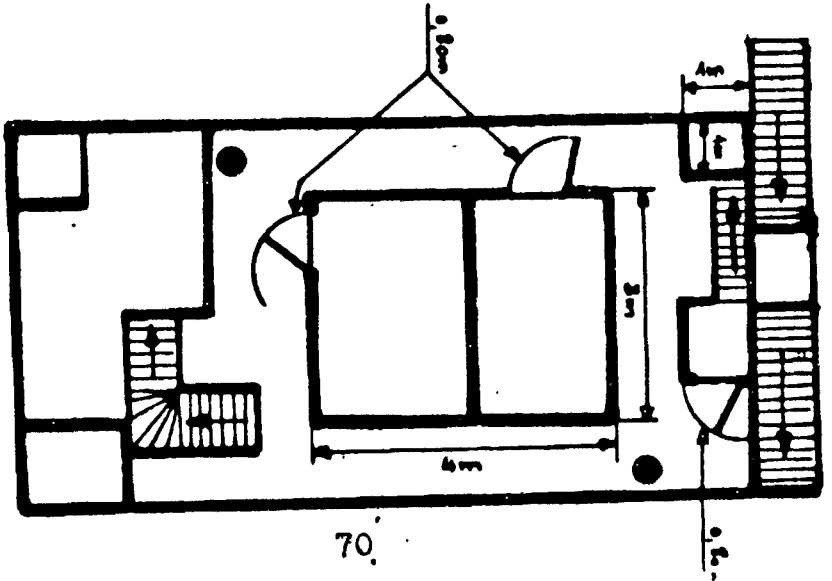
" Ground floor "



" 1st floor "

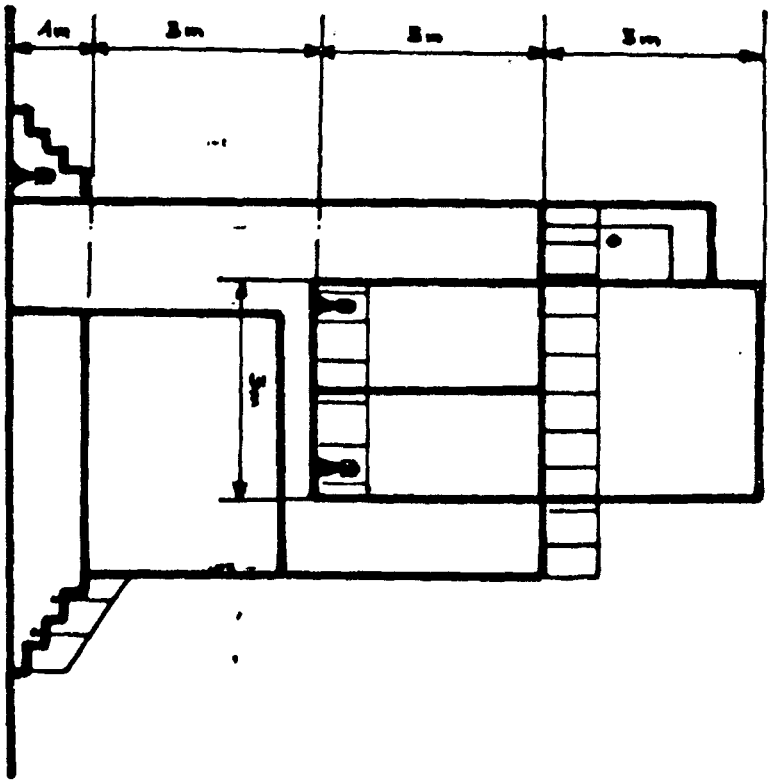


" 2nd floor with Terrace "



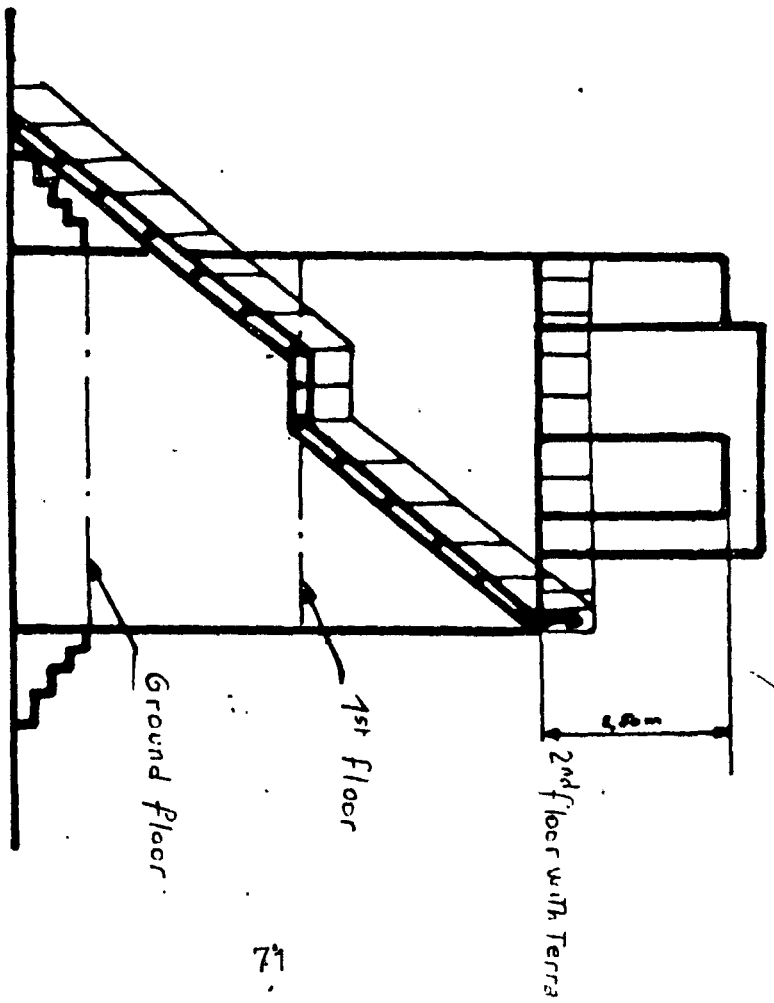
Topview of the Three Floors.

Fig. Nr 3.



Front

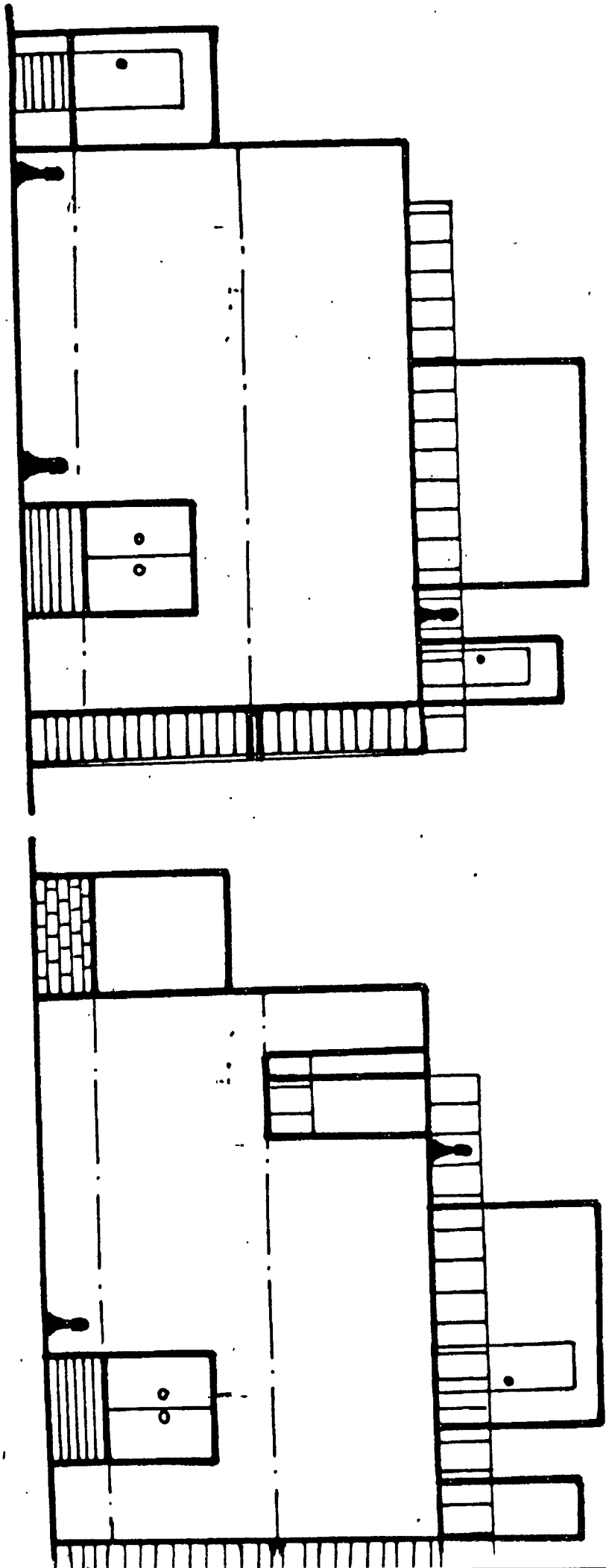
Front view



back

Enclosed Structure

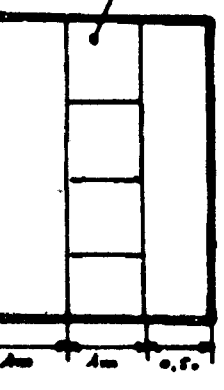
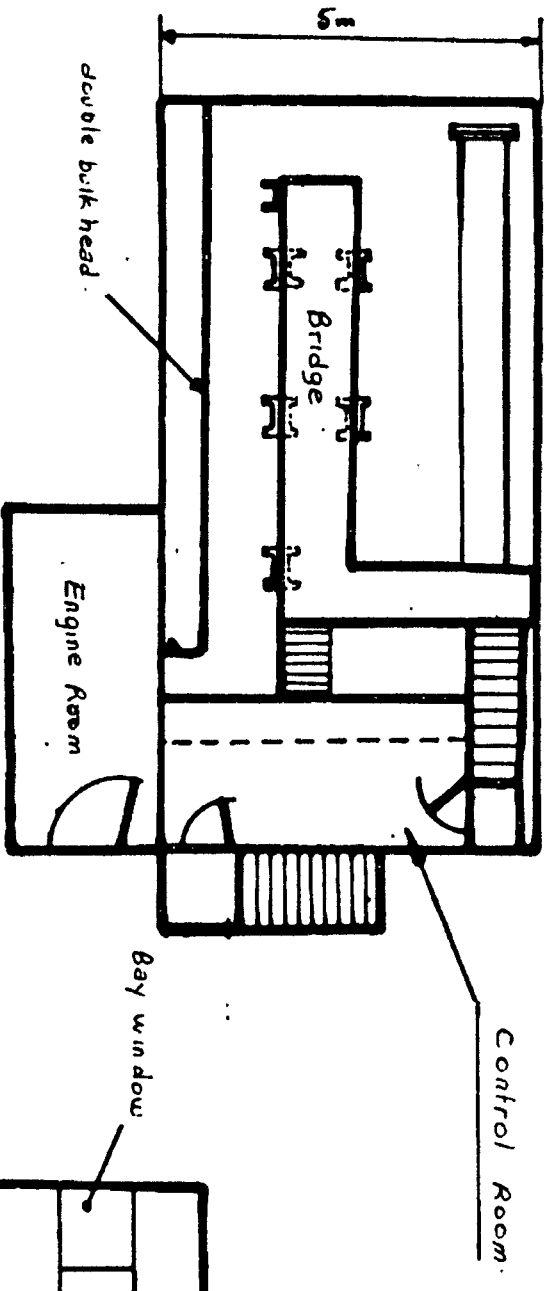
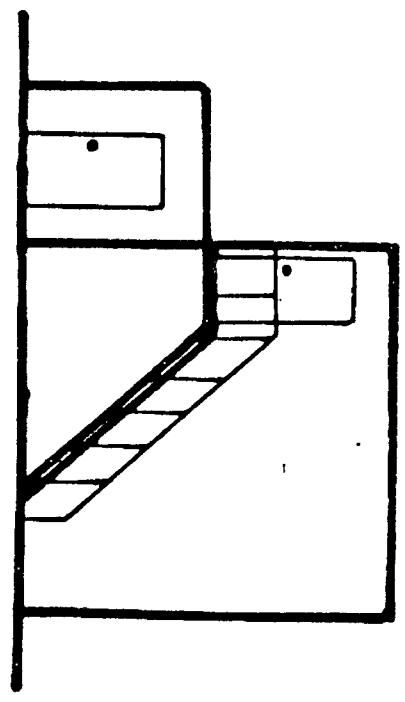
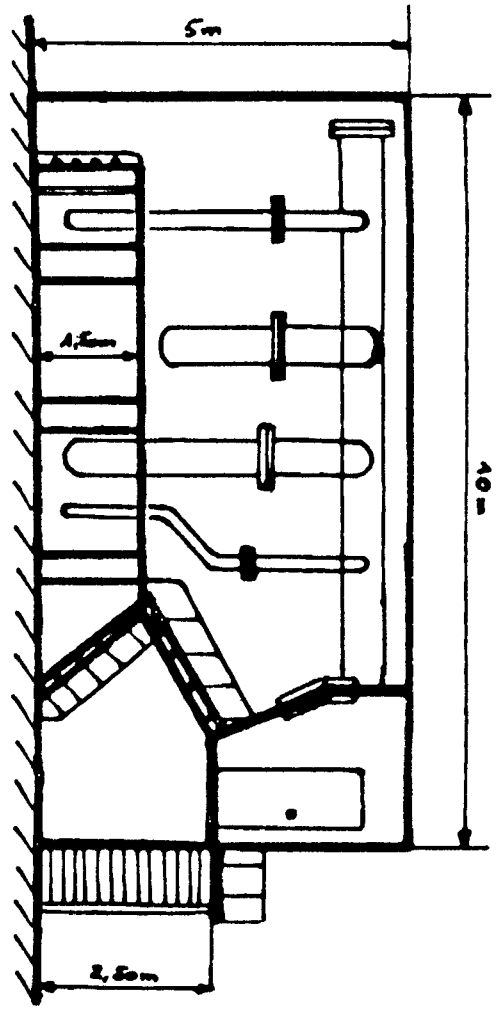
Fig. Nr 4



Right Side

Front view

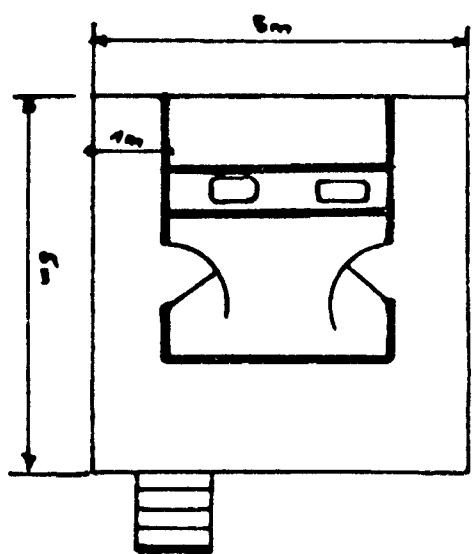
Left side



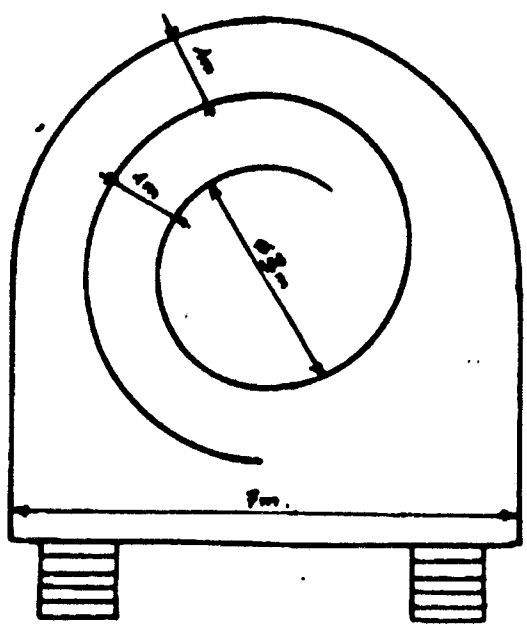
Damage Control
Compartments:

Detail of the room

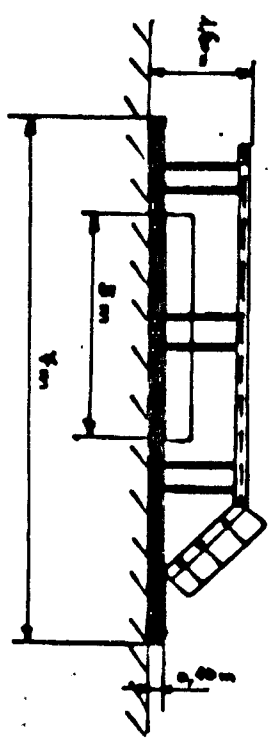
"Galley"



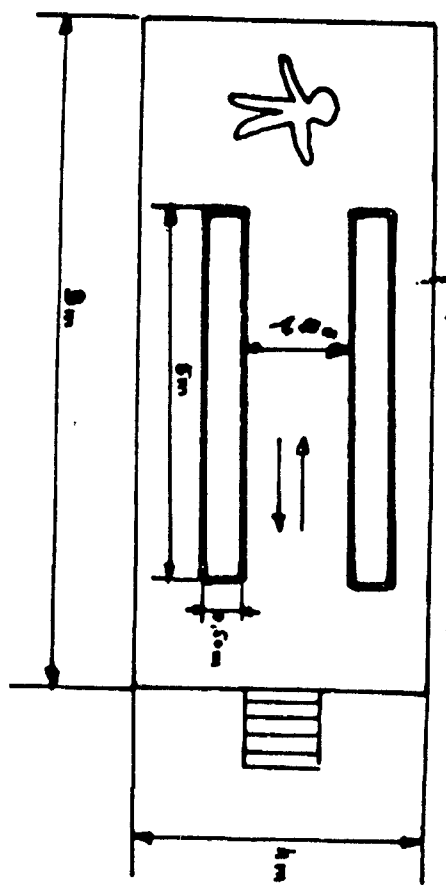
"Class A fire"



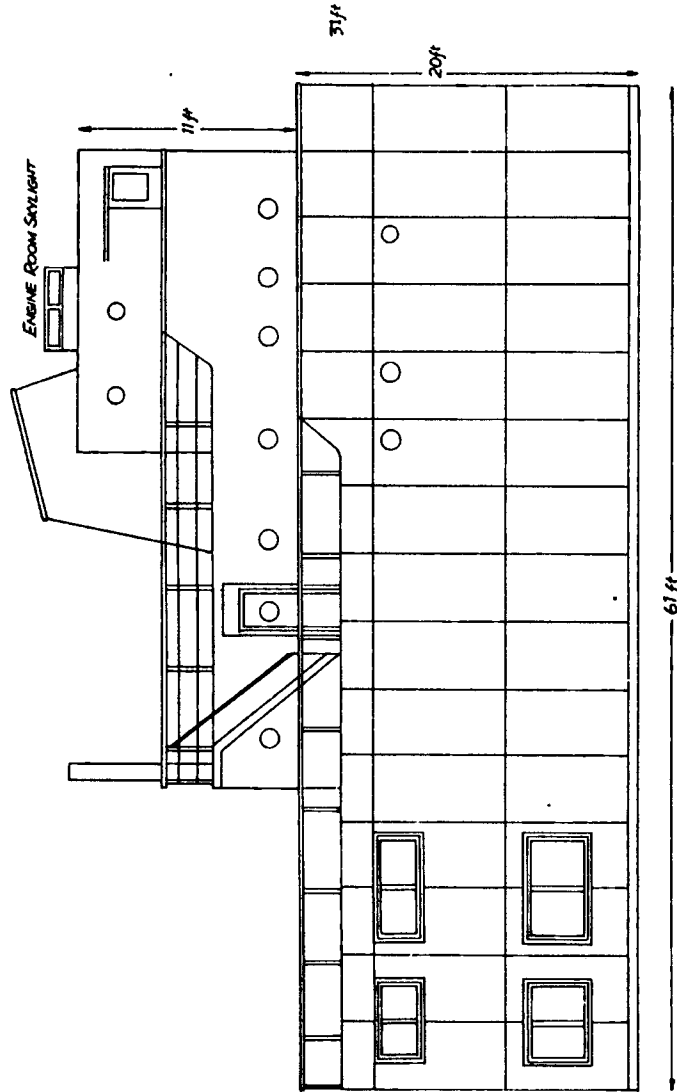
"Bilge Fire"



"Search and Rescue"



Open Field Facility



PROFILE

FIGURE 122. Profile Plan of Lothian and Borders Fire Brigade Mercantile Marine Officers' Fire Training School, McDonald Road, Edinburgh

THE TRAINING OF PERSONNEL

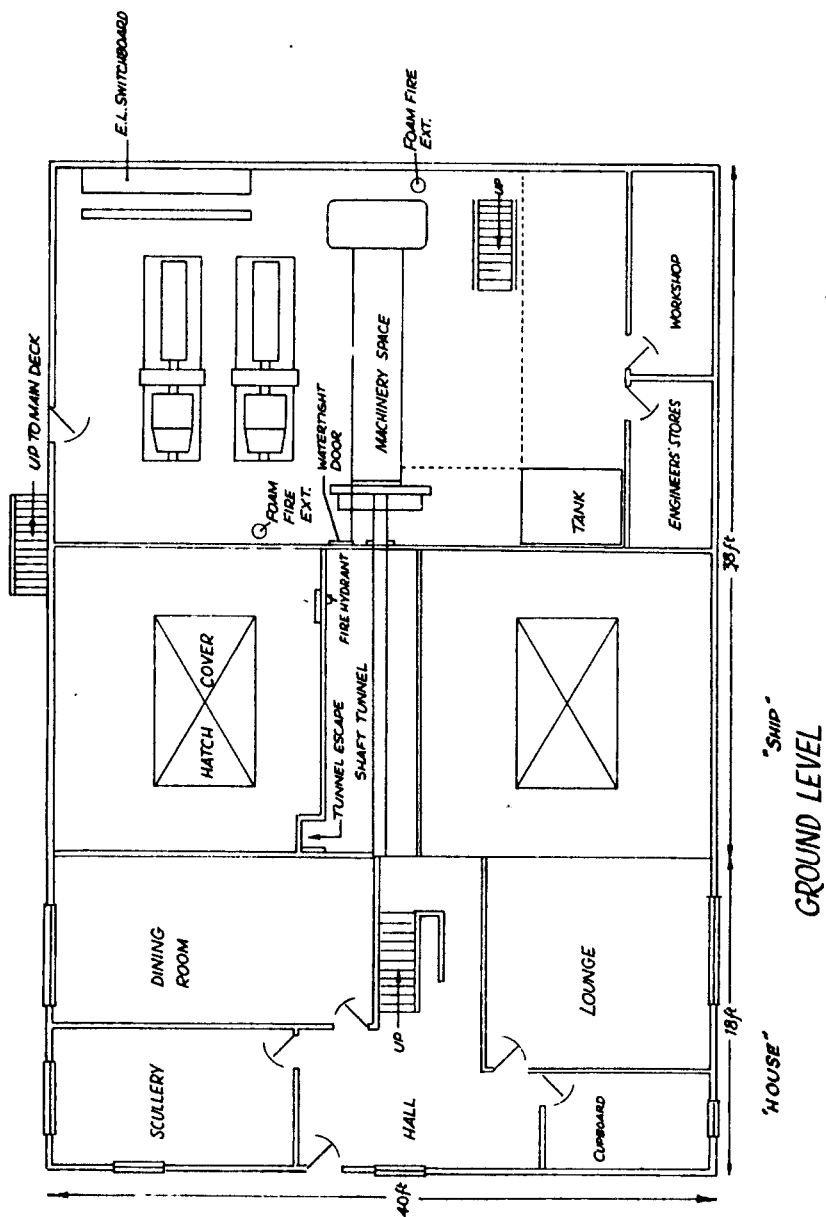
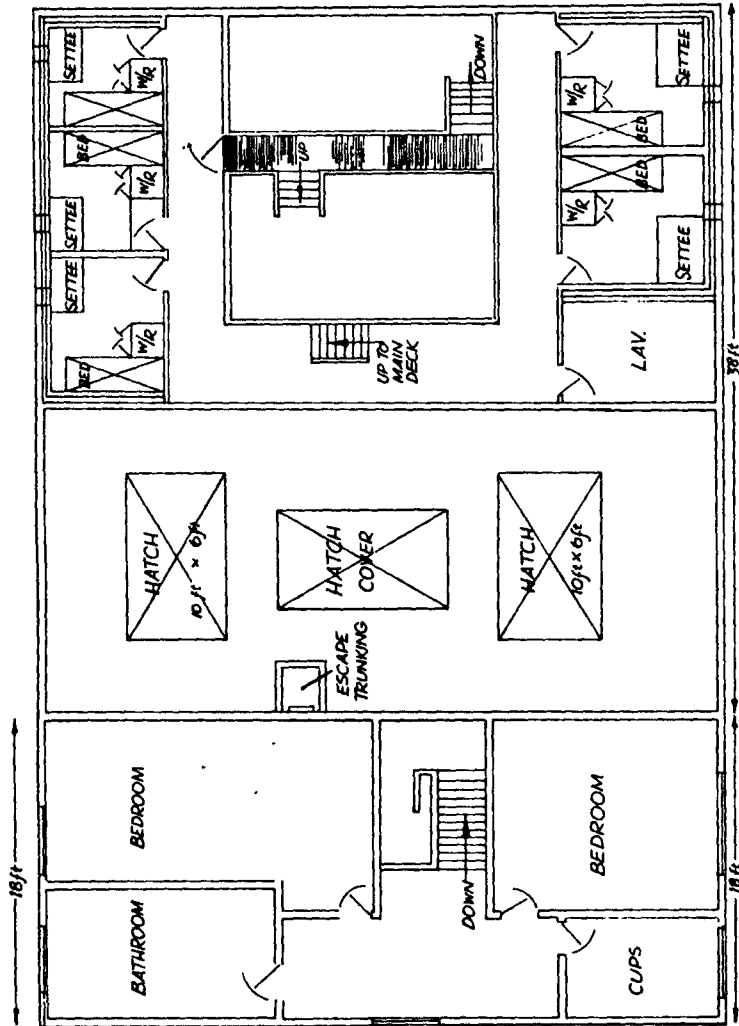


FIGURE 123. Ground Floor Plan of Lothian and Borders Fire Brigade Mercantile Marine Officers' Fire Training School, McDonald Road, Edinburgh.

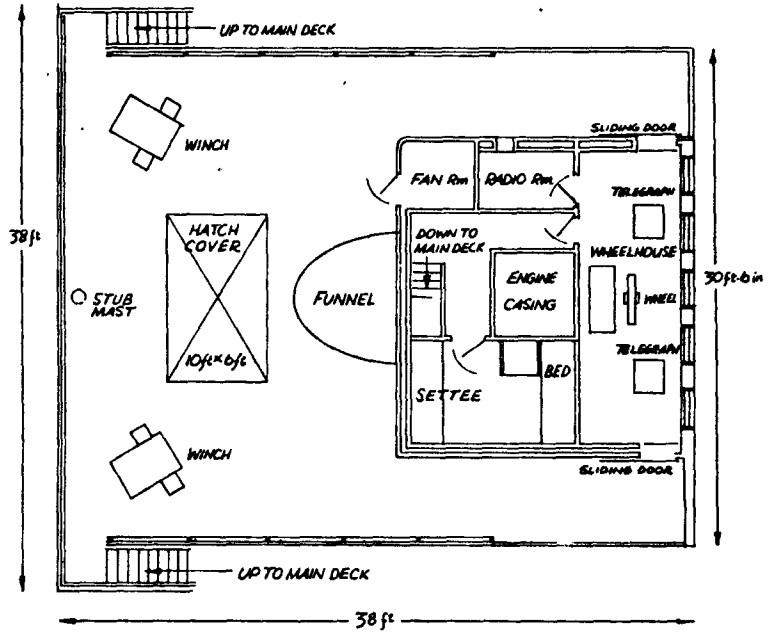
FIRE ABOARD



FIRST DECK

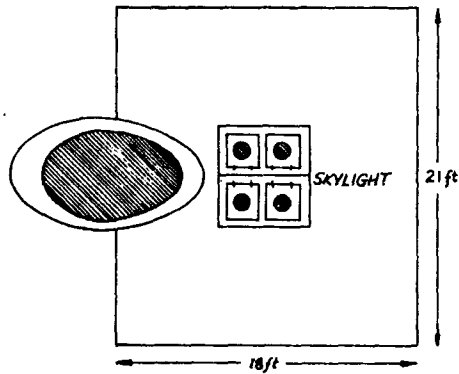
FIGURE 124. First Deck Plan of Lothian and Borders Fire Brigade Mercantile Marine Officers' Fire Training School, McDonald Road, Edinburgh.

FIRE ABOARD



NAVIGATING BRIDGE DECK

FIGURE 126. Navigating Bridge Deck Plan of Lothian and Borders Fire Brigade Mercantile Marine Officers' Fire Training School, McDonald Road, Edinburgh.



WHEELHOUSE TOP

FIGURE 127. Wheelhouse Top Plan of Lothian and Borders Fire Brigade Mercantile Marine Officers' Fire Training School, McDonald Road, Edinburgh.



STATE OF WASHINGTON

WASHINGTON STATE COMMISSION FOR VOCATIONAL EDUCATION

Building 17, Airdustrial Park, MS LS-10 • Olympia, Washington 98504 • (206) 753-5662

12/82

WASHINGTON STATE FIRE TRAINING FACILITY

- PURPOSE:** This unique one of a kind Fire Training facility will provide advanced live-fire and other emergency incident training opportunities for the firefighters of the state of Washington, those persons directly involved in marine shipboard firefighting; and those directly involved in mitigating transportation and handling of hazardous material incidents of an emergency nature.
- NEED:** Generally, firefighters and other related industries receive no systematic training in controlling fires and other life-endangering incidents including high-rise structures, shipboard emergencies and the transportation and handling of hazardous materials. Technology advancement requires constant updating of emergency incident strategy and tactics.
- SITE:** The site, 48 acres, has been obtained. An environmental impact statement has been approved and a zoning variance legislated. The construction of the access route is underway and major portion of the site construction ready to go to bid within the next 30 days.
- FACILITY:** The Fire Training Center, when fully implemented, will cost the state of Washington approximately \$10 million of which \$6,953,000 has been authorized and appropriated by the legislature. The access and utilities are currently under construction with site preparation and construction to commence within the next 60 days:
1. Eight (8) different flammable liquid props simulating actual conditions using flammable liquids with live but controlled fires.
 2. A two-story structure with a six-story tower is compartmentalized with various occupancy configurations and capable of live-fires within.
 3. Classroom/administration building and related support facilities.
 4. A shipboard prop using live-fire conditions to control fires and marine incidents as detailed in the following pages.

WASHINGTON STATE MARINE FIRE TRAINING CENTER

The following pages describe the Marine Fire Training Facility to be built at the Washington State Fire Training Center, North Bend, Washington. Those familiar with the field of marine firefighting are aware that there are few marine fire training programs presently available in the United States. Those which do exist were developed by the U.S. Navy, Texas A & M University and various maritime labor organizations.

The facilities which exist for such training range from open fields with flammable liquid props, to navy facilities built during World War II, to converted portions of vessels. The Washington State Marine Fire Training Center will be the most modern facility in the United States. It will be constructed from the ground up to train firefighters in realistic fire fighting procedures for all types of fires aboard ship. It will have training capabilities which do not exist in other facilities at this time.

The Marine Training Center will consist of a land-locked concrete and steel "vessel" approximately 127 feet in length. The structure will contain features of several different types of vessels, including:

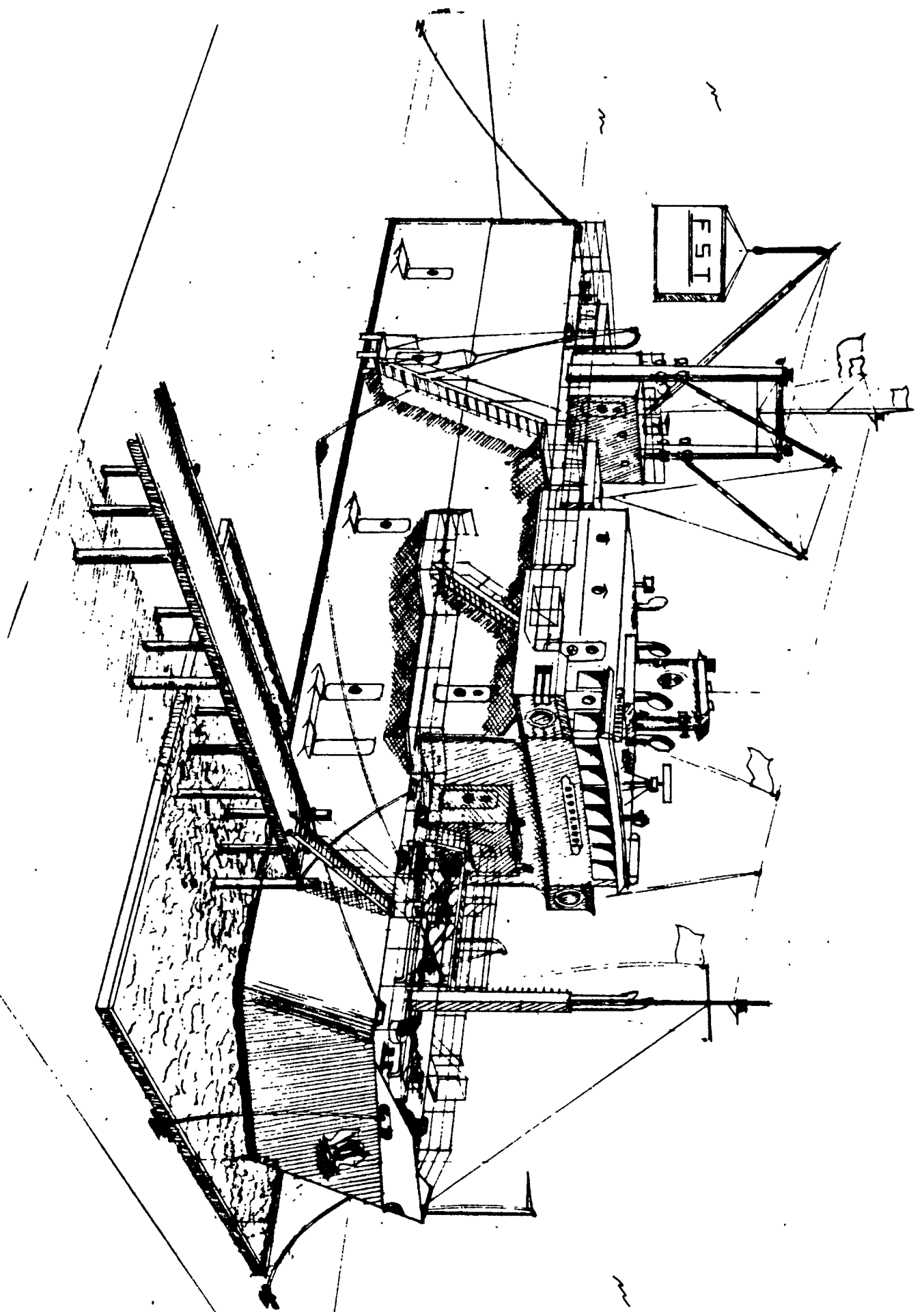
- A. A tank ship with 4 cargo tanks
- B. A two-level engine room with training props for both steam and diesel plants.
- C. A breakbulk cargo hold
- D. A bulk cargo hold
- E. A container hold
- F. A damage control training compartment capable of being flooded.

Plans call for construction to begin in 1983, with the facility available for training in the Spring of 1984. The facility will be capable of training 1000 persons each year and will be available to both firefighters and the maritime community.

The training curriculum offered to firefighters will be the most thorough in the United States. Training will be available from a basic 24-hour course, through an intermediate 40 hour course, to an advanced course of 80 hours.

In the near future, a modified training outline for Merchant Seamen will be added to the course curriculum.

The entire marine training center and its curriculum is the result of a joint effort by the fire service and maritime community in Washington State. An effort that we are very proud of, and which has led to the development of the finest marine fire training center in the world.



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