Setrac College of Offshore Training

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BASIC SAFETY TRAINING COURSE

TRINEEE HANDOUT

Personal Safety & Social Responsibility

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Trainee Handout

OBJECTIVES OF THE COURSE

To impart knowledge and skills to make a seafarers competent :

1. To take effective steps to observe “Safe Working Practices” and eliminate personal injuries and accidents to self and shipmates.

2. To prevent pollution “Safer Ships and Cleaner Oceans”

3. To create a healthy atmosphere through behavior Interpersonal relationship, Co-operation and belongingness

COURSE OUTLINE

SR. NO	SUBJECT	HOURS
1	**EMERGENCY PROCEDURES ON BOARD**	3
	Types of Emergency: collision, fire, foundering Shipboard contingency plans for response to emergencies. Emergency signals, muster list, muster stations, correct use of personal safety equipment. Action to take on discovering potential emergency. Action to take on hearing emergency alarm signals. Value of training and drills. Knowledge of escapes routes and internal communication and alarm systems.	
2	**POLLUTION PREVENTION** Effects of operational or accidental pollution of the marine Environment Basic environmental protection procedures	3
3	**SAFETY PHILOSOPHY AND SAFE WORKING PRACTICES** Importance of adhering to safe practices Safety and protective devices. Entering enclosed spaces: procedures and precautions.	1.5
4	**SAFE THINKING AND ACCIDENT PREVENTION ON BOARD**	1.5

	Familiarization with international measures concerning Accident protection and occupational health.	
5.	**COMMUNICATION ON BOARD** Fundamentals of Communication Effective Transmission Skills. Effective Listening Skills. Methods to improve Communication Transactional analysis Shipboard Examples.	3
6	**INTERPERSONAL RELATIONSHIPS** Elements involved in team building Effective working in multilingual / multicultural environment. Interdependence and mutual respect. Discipline, self-control and professionalism case studies and discussion.	3
7	**SOCIAL RESPONSIBILITIES** Employment conditions. Individual rights and obligations Drug and alcohol abuse	1.5
8	**COURSE DISCUSSION AND EVALUATION**	1.5
	TOTAL	**18**

COURSE TIME TABLE

PERIOD	DAY 01	DAY 02	DAY 03
1st PERIOD **0900 – 1030**	EMERGENCY PROCEDURES ON BOARD **SH**	SAFE WORKING PRACTICES **VIDEO – 03** **SH**	INTERPERSONAL RELATIONSHIP **SH**
1030-1040	**Tea Break**		
2nd PERIOD **1040 – 1140**	EMERGENCY PROCEDURES ON BOARD – Contd **SK**	SAFE WORKING PRACTICES **SK**	INTERPERSONAL RELATIONSHIP **AM**
3rd PERIOD **1140-1240**	EMERGENCY PROCEDURES ON BOARD **AM** **VIDEO – 01**	ACCIDENT PREVENTION ON BOARD **AM** **VIDEO – 04**	INTERPERSONAL RELATIONSHIP **AM**
1240 – 1320 - LUNCH BREAK			
4th PERIOD **1320-1420**	POLLUTION PREVENTION **AK**	COMMUNICATION ON BOARD **SK**	SOCIAL RESPONSIBILITIES **SK**
1420 - 1430	**Tea Break**		
1430 – 1600	POLLUTION PREVENTION **AK** **VIDEO – 02**	COMMUNICATION ON BOARD **AM**	COURSE DISCUSSION AND EVALUATION **AK**

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Chapter 1

Human relationships on board ship

An **interpersonal relationship** is an association between two or more people that may range from fleeting to enduring. This association may be based on limerence, love, solidarity, regular business interactions, or some other type of social commitment. Interpersonal relationships are formed in the context of social, cultural and other influences. The context can vary from family or kinship relations, friendship, marriage, relations with associates, work, clubs, neighbourhoods, and places of worship. They may be regulated by law, custom, or mutual agreement, and are the basis of social groups and society as a whole.

A relationship is normally viewed as a connection between two individuals, such as a romantic or intimate relationship, or a parent–child relationship. Individuals can also have relationships with groups of people, such as the relation between a pastor and his congregation, an uncle and a family, or a mayor and a town. Finally, groups or even nations may have relations with each other, though this is a much broader domain than that covered under the topic of interpersonal relationships. See such articles as international relations for more information on associations between groups. Most scholarly work on relationships focuses on romantic partners in pairs or dyads. These intimate relationships are, however, only a small subset of interpersonal relationships. Interpersonal relationships can also include friendships, such as relationships involving individuals providing relational care to marginalized persons.

These relationships usually involve some level of interdependence. People in a relationship tend to influence each other, share their thoughts and feelings, and engage in activities together. Because of this interdependence, most things that change or impact one member of the relationship will have some level of impact on the other member.[1] The study of interpersonal relationships involves several branches of the social sciences, including such disciplines as sociology, psychology, anthropology, and social work. The scientific study of relationships is referred to as "Relationship Science" and distinguishes itself from anecdotal evidence or pseudo-experts by basing conclusions on data and objective analysis. [2]

Development

Interpersonal relationships are dynamic systems that change continuously during their existence. Like living organisms, relationships have a beginning, a lifespan, and an end. They tend to grow and improve gradually, as people get to know each other and become closer emotionally, or they gradually deteriorate as people drift apart, move on with their lives and form new relationships with others. One of the most influential models of relationship development was proposed by psychologist George Levinger.[3] This model was formulated to describe heterosexual, adult romantic relationships, but it has been applied to other kinds of interpersonal relations as well. According to the model, the natural development of a relationship follows five stages:

1. *Acquaintance* – Becoming acquainted depends on previous relationships, physical proximity, first impressions, and a variety of other factors. If two people begin to like each other, continued interactions may lead to the next stage, but acquaintance can continue indefinitely.
2. *Buildup* – During this stage, people begin to trust and care about each other. The need for intimacy, compatibility and such filtering agents as common background and goals will influence whether or not interaction continues.
3. *Continuation* – This stage follows a mutual commitment to a long-term friendship, romantic relationship, or marriage. It is generally a long, relative stable period. Nevertheless, continued growth and development will occur during this time. Mutual trust is important for sustaining the relationship.

4. *Deterioration* – Not all relationships deteriorate, but those that do tend to show signs of trouble. Boredom, resentment, and dissatisfaction may occur, and individuals may communicate less and avoid self-disclosure. Loss of trust and betrayals may take place as the downward spiral continues, eventually ending the relationship. (Alternately, the participants may find some way to resolve the problems and reestablish trust.)
5. *Termination* – The final stage marks the end of the relationship, either by death in the case of a healthy relationship, or by separation.

Friendships may involve some degree of transitivity. In other words, a person may become a friend of an existing friend's friend. However, if two people have a sexual relationship with the same person, they may become competitors rather than friends. Accordingly, sexual behavior with the sexual partner of a friend may damage the friendship (see love triangle). Sexual activities between two friends tend to alter that relationship, either by "taking it to the next level" or by severing it.

Legal sanction reinforces and regularizes marriages and civil unions as perceived "respectable" building-blocks of society. In the United States of America, for example, the de-criminalization of homosexual sexual relations in the Supreme Court decision, Lawrence v. Texas (2003) facilitated the mainstreaming of gay long-term relationships, and broached the possibility of the legalization of same-sex marriages in that country.

Flourishing relationships

Positive psychologists use the term "flourishing relationships" to describe interpersonal relationships that are not merely happy, but instead characterized by intimacy, growth, and resilience.[4] Flourishing relationships also allow a dynamic balance between focus on the intimate relationships and focus on other social relationships.

Background

While traditional psychologists specializing in close relationships have focused on relationship dysfunction, positive psychology argues that relationship health is not merely the absence of relationship dysfunction.[5] Healthy relationships are built on a foundation of secure attachment and are maintained with love and purposeful positive relationship behaviors. Additionally, healthy relationships can be made to "flourish." Positive psychologists are exploring what makes existing relationships flourish and what skills can be taught to partners to enhance their existing and future personal relationships.

[] Adult attachment

Healthy relationships are built on a foundation of secure attachments. Adult attachment models represent an internal set of expectations and preferences regarding relationship intimacy that guide behavior.[5] Secure adult attachment, characterized by low attachment-related avoidance and anxiety, has numerous benefits. Within the context of safe, secure attachments, people can pursue optimal human functioning and flourishing.[5]

[] Love

The capacity for love gives depth to human relationships, brings people closer to each other physically and emotionally, and makes people think expansively about themselves and the world.[5] In his triangular theory of love, psychologist Robert Sternberg theorizes that love is a mix of three components: (1) passion, or physical attraction; (2) intimacy, or feelings of closeness; and (3) commitment, involving the decision to initiate and sustain a relationship. The presence of all three components characterizes consummate love, the most durable type of love. In addition, the presence of intimacy and passion in marital relationships predicts marital satisfaction. Also, commitment is the best predictor of relationship

satisfaction, especially in long-term relationships. Positive consequences of being in love include increased self-esteem and self-efficacy.[5]

[] Theories and empirical research

[] Confucianism

Confucianism is in fact a study or a theory of relationship.

[] Minding relationships

The mindfulness theory of relationships shows how closeness in relationships may be enhanced. Minding is the "reciprocal knowing process involving the nonstop, interrelated thoughts, feelings, and behaviors of persons in a relationship."[6] Five components of "minding" include:[5]

1. Knowing and being known: seeking to understand the partner
2. Making relationship-enhancing attributions for behaviors: giving the benefit of the doubt
3. Accepting and respecting: empathy and social skills
4. Maintaining reciprocity: active participation in relationship enhancement
5. Continuity in minding: persisting in mindfulness

[] Culture of appreciation

After studying married couples for many years, psychologist John Gottman has proposed the theory of the "magic ratio" for successful marriages. The theory says that for a marriage to be successful, couples must average a ratio of five positive interactions to one negative interaction. As the ratio moves to 1:1, divorce becomes more likely.[5] Interpersonal interactions associated with negative relationships include criticism, contempt, defensiveness, and stonewalling. Over time, therapy aims to turn these interpersonal strategies into more positive ones, which include complaint, appreciation, acceptance of responsibility, and self-soothing. Similarly, partners in interpersonal relationships can incorporate positive components into difficult subjects in order to avoid emotional disconnection.

[] Capitalizing on positive events

People can capitalize on positive events in an interpersonal context to work toward flourishing relationships. People often turn to others to share their good news (termed "capitalization"). Studies show that both the act of telling others about good events and the response of the person with whom the event was shared have personal and interpersonal consequences, including increased positive emotions, subjective well-being, and self-esteem, and relationship benefits including intimacy, commitment, trust, liking, closeness, and stability.[7] Studies show that the act of communicating positive events was associated with increased positive affect and well-being (beyond the impact of the positive event itself a). Other studies have found that relationships in which partners responded to "good news" communication enthusiastically were associated with higher relationship well-being.[8]

[] Other perspectives

[] Neurobiology of interpersonal connections

There is an emerging body of research across multiple disciplines investigating the neurological basis of attachment and the prosocial emotions and behaviors that are the prerequisites for healthy adult relationships.[5] The social environment, mediated by attachment, influences the maturation of structures in a child's brain. This might explain how infant attachment affects adult emotional health. Researchers

are currently investigating the link between positive caregiver–child relationships and the development of hormone systems, such as the HPA axis.

[] Applications

Researchers are developing an approach to couples therapy that moves partners from patterns of repeated conflict to patterns of more positive, comfortable exchanges. Goals of therapy include development of social and interpersonal skills. Expressing gratitude and sharing appreciation for a partner is the primary means for creating a positive relationship. Positive marital counseling also emphasizes mindfulness. The further study of "flourishing relationships could shape the future of premarital and marital counseling as well."[5]

Team Building refers to a wide range of activities, presented to businesses, schools, sports teams, religious or nonprofit organizations designed for improving team performance. Team building is pursued via a variety of practices, and can range from simple bonding exercises to complex simulations and multi-day team building retreats designed to develop a team (including group assessment and group-dynamic games), usually falling somewhere in between. It generally sits within the theory and practice of organizational development, but can also be applied to sports teams, school groups, and other contexts. Team building is not to be confused with "team recreation" that consists of activities for teams that are strictly recreational. Teambuilding is an important factor in any environment, its focus is to specialize in bringing out the best in a team to ensure self development, positive communication, leadership skills and the ability to work closely together as a team to problem solve.

Work environments tend to focus on individuals and personal goals, with reward & recognition singling out the achievements of individual employees. "How to create effective teams is a challenge in every organization"[1] Team building can also refer to the process of selecting or creating a team from scratch.

Team Building

Reasons for Team Building include

- Improving communication
- Making the workplace more enjoyable
- Motivating a team
- Getting to know each other
- Getting everyone "onto the same page", including goal setting
- Teaching the team self-regulation strategies
- Helping participants to learn more about themselves (strengths and weaknesses)
- Identifying and utilizing the strengths of team members
- Improving team productivity
- Practicing effective collaboration with team members

What are Team Building Exercises and what is their purpose?

Team building exercises consist of a variety of tasks designed to develop group members and their ability to work together effectively. There are many types of team building activities that range from kids games to games that involve novel complex tasks and are designed for specific needs. There are also more complex team building exercises that are composed of multiple exercises such as ropes courses, corporate drumming and exercises that last over several days. The purpose of team building exercises is

to assist teams in becoming cohesive units of individuals that can effectively work together to complete tasks.

[] Types of Team Building Exercises

Communication Exercise

This type of team building exercise is exactly what it sounds like. Communications exercises are problem solving activities that are geared towards improving communication skills. The issues teams encounter in these exercises are solved by communicating effectively with each other.

• Goal: Create an activity which highlights the importance of good communication in team performance and/or potential problems with communication.

Problem Solving/Decision Making Exercise

Problem Solving/Decision making exercises focus specifically on groups working together to solve difficult problems or make complex decisions. These exercises are some of the most common as they appear to have the most direct link to what employers want their teams to be able to do.

• Goal: Give team a problem in which the solution is not easily apparent or requires the team to come up with a creative solution

Planning/Adaptability Exercise

These exercises focus on aspects of planning and being adaptable to change. These are important things for teams to be able to do when they are assigned complex tasks or decisions. • Goal: Show the importance of planning before implementing a solution

Trust Exercise

A trust exercise involves engaging team members in a way that will induce trust between them. They are sometimes difficult exercises to implement as there are varying degrees of trust between individuals and varying degrees of individual comfort trusting others in general.

• Goal: Create trust between team members

[] Subgroups of Team Building Exercises

- simple social activities - to encourage team members to spend time together
- group bonding sessions - company sponsored fun activities to get to know team members (sometimes intending also to inspire creativity)
- personal development activities - individual programs given to groups (sometimes physically challenging)
- team development activities - group-dynamic games designed to help individuals discover how they approach a problem, how the team works together, and discover better methods
- psychological analysis of team roles, and training in how to work better together

(and combinations of the above)

Team interaction involves "soft" interpersonal skills including communication, negotiation, leadership, and motivation - in contrast to technical skills directly involved with the job at hand. Depending on the type of

team building, the novel tasks can encourage or specifically teach interpersonal team skills to increase team performance.

[] Models of Team Behavior

Team building generally sits within the theory and practice of organizational development. The related field of **team management** refers to techniques, processes and tools for organizing and coordinating a team towards a common goal - as well as the inhibitors to teamwork and ways to remove, mitigate or overcome them.

Several well-known approaches to team management have come out of academic work.

- The forming-storming-norming-performing model posits four stages of new team development to reach high performance. Some team activities are designed to speed up (or improve) this process in the safe team development environment.
- Belbin Team Types can be assessed to gain insight into an individual's natural behavioral tendencies in a team context, and can be used to create and develop better functioning teams.
- Team Sociomapping is an visual approach to team process and structure modelling. This model is based on social networks approach and improves the team performance by improvement of specific cooperation ties between the people.

[] Organizational Development

In the organizational development context, a team may embark on a process of self-assessment to gauge its effectiveness and improve its performance. To assess itself, a team seeks feedback from group members to find out both its current strengths and weakness.To improve its current performance, feedback from the team assessment can be used to identify gaps between the desired state and the current state, and to design a gap-closure strategy. Team development can be the greater term containing this assessment and improvement actions, or as a component of organizational development.

Another way is to allow for personality assessment amongst the team members, so that they will have a better understanding of their working style, as well as their fellow team mates.A structured teambuilding plan is a good tool to implement team bonding and thus, team awareness. These may be introduced by companies that specialize in executing teambuilding sessions, or done internally by the human resource department.

Teamwork and leadership

In leadership training programs, I often ask participants to define teamwork. Working in different teams, their definitions are often similar.A typical definition is: *A group of people, contributing their individual knowledge and skills but working together to achieve a common goal/task.*

New ways of using teams

Modern technology and new ways of doing business are changing the ways we use teams, but the underlying principles and benefits remain.Distance is less of a barrier. Many people find themselves in teams where individual team members are based all over the country, or in some cases, all over the globe.In some companies, team members based in different time zones can progress a project 24 hours per day, six days per week. I know a growing Australian consulting firm that uses overseas based PowerPoint developers and ors for major reports and presentations. Consultants complete the drafts by late afternoon, and return to work the next morning to have the completed product waiting for them. This effectively saves one working day.Virtual teams are increasingly common. Members of a team may never meet face to face. They collaborate from different parts of the word through telephone calls, email, file sharing technology and other online meeting methods.

Why the increased use of teams? Organisations have embraced teams and teamwork as an effective way of doing business. The last 20 years has seen the replacement of 'supervisors' by 'team leaders'.Companies have embraced these concepts because they work. Employee motivation and morale improves dramatically when people feel valued and when their contributions make a difference.It is good to be part of something that is worthwhile***.***

Managing teamwork is challenging Some organisations fail to gain the benefits that teamwork can provide.Team composition is critical for success. The definition outlined above highlight three important teamwork fundamentals***:***

- A team is a group of people made up of individuals who each contribute their individual knowledge and skills. Synergy, where the collective whole is greater than the sum of the individual parts, often occurs where teamwork is working well. Teams benefit because individuals often do not have **all** the knowledge and skills necessary.

- Working together is essential. Harmony and a positive attitude are critical. If the team is not working together, then the expected gains will not materialise.

- An understanding of the common goal/task is also critical. People have to be clear as to why the team exists and what the purpose is.

In the absence of any of the above three features teams will fail. Not everyone has a positive experience.Teamwork has to be well managed. A balanced team composition is essential. Team members have to be carefully selected. The full range of knowledge and skills required must be present. Team members need to be committed to the task.If you have the right team composition and approach, team synergy can take over. But it has to be set up correctly. The team members have to be willing and ready to participate.

Conclusion

Teamwork as a concept has grown over the last 20 years. However, teamwork success is not automatic. Teams have to be established for the right reasons. Team member selection is very important, as is ensuring that the team purpose is clear and agreed upon

Chapter 2

Communication

1. Introduction

Communication is the process of exchanging messages or information between two or more parties. Businesses today are heavily dependent on information to meet organizational needs. Effective communication plays a key role in fulfilling these needs and contributes significantly to organizational success. Despite its importance, business communication has not grown, as it should. Realizing this, both industry and academic sectors have begun training employees and students on business communication and its relevance. It has become all the more evident that business communication is vital for effective functioning of business units.

2. The Importance of Communication

Effective business communication is crucial for the success of individuals as well as organizations. Good communication skills help individuals effectively interact with others in an organization. These skills are important for career development as they boost confidence; ensure clarity of thought and information flow. Good communication is a prerequisite for good managers.
It is essential for organizations too. An organization is benefited by the internal and external information gathered and passed on by employees. The management can use such information to gain an edge in business.

3. The Basic Forms of Communication

The basic forms of communication are of two types such as verbal and non-verbal communication. It can be in the form of meetings, speeches or writing, gestures or expressions.

Non-verbal communication
Non-verbal communication is a primitive form of communication that does not involve the use of words. It rather uses gestures, cues, vocal qualities, spatial relationships etc. to convey a message. It is commonly used to express emotions like respect, love, dislike, unpleasantness, etc.Non-verbal ommunication is less structured compared to its verbal counterpart and is most often spontaneous. As it is not planned, it is sometimes considered more reliable than verbal communication, as it reflects the communicator's true feelings.Non-verbal communication enhances the effectiveness of the message as gestures and body language are registered easier and quicker with the audience than verbal communication. on-verbal communication, when combined with verbal communication, makes a presentation more effective and has greater impact on the audience.

Verbal communication

However, non-verbal communication has its limitations. Many complex ideas, thoughts or messages have to be communicated sequentially to be meaningful. Verbal communication involves the arrangement of words in a structured and meaningful manner, adhering to the rules of grammar. The message is then conveyed to the audience in either spoken or written form.

Speaking and Writing

Effective verbal communication involves the use of both speech and writing to transmit a message. While oral communication is more effective in reaching a focused target audience, as it involves interaction and additional non-verbal cues to augment the speech, written communication is necessary for reaching a large number of scattered recipients. Depending on the situation and the requirements, businesses use both the spoken as well as written channels for communication.

Listening

Businesses have far not paid much attention to listening as a skill. Equal importance should be given to listening and expression. Oral communication cannot be effective unless the audience is good at listening and most of its content is forgotten after a presentation. Developing good listening skills is essential for grasping the contents of an oral presentation and retaining them.

4. The Process of Communication

Communication goes through a process, involving the following phases:

• Sender
• Message
• Channel
• Receiver
• Feedback

5. Barriers to Communication
The process of communication is susceptible to many barriers. These can be categorized into problems caused by the sender, problems in message transmission, problems in reception, and problems in receiver comprehension.

6. Dealing with Communication Barriers
Though most communication barriers require situation specific handling, a few basic methods for dealing with them are available. These methods such as know your subject, focus on the purpose, know your audience, and be organized.

The Basic Process of Communicating
To achieve precision and effectiveness in communicating, you should understand the basic process of communication. It has four requirements:

- A message must be conveyed.
- The message must be received.
- There must be a response.
- Each message must be understood.

Let's look at these requirements one at a time.

A Message Must Be Conveyed
That sounds simple enough. You know what your thoughts are, and you know how to translate them into words. But that's where we lose the simplicity.
Each of us has our own mental dialect. It is the common language of the culture in which we grow up, modified by our own unique life's experiences. Our life's experiences add color and shades of meaning to different words.
When you speak, your mental dialect must be translated into the mental dialect of the hearer. So the words you speak acquire a different color when they pass through the ears of the person who hears you.

It Depends Upon Where You Are
You can probably think of numerous opportunities for misunderstandings on your job and in your culture. If you tell your travel agent you want a flight to Portland, be sure to specify Maine or Oregon. Otherwise, you may end up on the wrong coast. A colleague of mine once flew to Ohio to keep a speaking engagement in Columbus. Too late, he realized that the group he was to address was in Columbus, Georgia. If someone in my hometown of High Point, North Carolina asks me, "How did Carolina do in the

big game last night?" I know the reference is to the Tar Heels of the University of North Carolina. If somebody in Columbia puts the question in those precise words, I know that "Carolina" means the Gamecocks of the University of South Carolina. In most cities, if you ask a newsstand operator for the Sunday Times, you'll be handed a New York Times. But in St. Petersburg, Florida, or Seattle, Washington, you're likely to get the local newspaper.

A Message Must Be Received

The second basic requirement of the one-on-one communication process is that the message be received and understood. Effective communicators know that they have not conveyed their meaning until they have made sure that the other person has received it exactly as they sent it. They test, with questions and observations, to make sure that the real meaning they wanted to convey has passed through the filters and has been received and understood.

There Must Be A Response

The goal of all communication is to obtain the desired response. You want to say something correctly, and have your hearer understand what you mean by it. But you also want the hearer to do something in response.

Each Message Must Be Understood

Once a message has been delivered, received and responded to, it's time to take stock of what each person has communicated. The cycle of communication is complete only when you come away with a clearer understanding of the person with whom you sought to communicate. You may not always agree with the other person, and the other person may not always agree with you -- but it is important that you understand each other

Chapter 3

Rights, Obligation

Seafarers' rights is a complex area since your rights can exist at different levels and they can be overlapping and sometimes conflicting. Therefore if you have a legal problem, you will need to seek advice from your union and from a lawyer who will discuss your specific situation. This information is general advice only.

Sources of Seafarers' Rights:

Flag State law

A ship has the nationality of the flag that it flies. Also, under international law, the laws of a flag State apply to a ship regardless of the location of the ship. Therefore you - as a seafarer - are entitled to the protection of, and are governed by, the laws of the flag State wherever the ship is and regardless of your nationality. For example, if you are a Filipino seafarer on a Panama flag ship, you have rights (and obligations) under the laws of Panama. So, always be aware of what flag your ship is flying and where necessary, ask for assistance to find out what are the laws of that flag State.

Port State law

When your ship enters a port, that port State can exercise certain powers over the ship whilst it is in port. Generally a port State does not intervene in the internal affairs of a ship unless there is a dispute which concerns the peace and good order of the port (for example if a crime is committed on board a ship). However in many jurisdictions around the world, if you have a legal claim, for example for unpaid wages, you will be able to start a legal action in the courts of the port State. Again where necessary, ask for assistance to find out what are the laws of the port State.

Basic Rights Under ILO

ILO recommended basic minimum wage for Seamen

The main aim of the minimum basic wage for the able seafarer is to provide an international safety net for the protection of, and to contribute to, decent work for seafarers.It is based on the provisions of the ILO Seafarers' Wages, Hours of Work and the Manning of Ships Recommendation, 1996 (No. 187) which recommends that the basic pay or wages for a calendar month of service for an able seaman should be no less than the amount periodically set by the Joint Maritime Commission, which is bipartite body of shipowners and seafarers established by ILO. The Recommendation itself define seafarer as "any person defined as such by national laws or regulations or collective agreements who is employed or engaged in any capacity on board a seagoing ship …."

The Joint Working Group of the Joint Maritime Commission met in July 2003 and agreed on joint interpretation of the total monthly minimum wage of able seamen.

This interpretation only relates to the earnings for an Able Seaman and should not be construed as implying an interpretation of the earnings that should be received by other grades of seafarer. The following principles are applicable as found in the relevant ILO Maritime Instruments:

- **Your home State**

You will be able to rely on rights contained in your home State law if that law governs your contract of employment. Otherwise, if you are in trouble when abroad, your home country should provide support and assistance through its consular offices. Therefore ask for assistance through consular officers.

- **Your contract of employment**

Your individual contract of employment will set out what your rights are as between you and your employer. Your contract may be (1) a private contract and/or (2) a collective bargaining agreement produced by a trade union or an employers' association and/or (3) a form of contract in which the government has taken an active role (such as the POEA Contract: Standard Terms and Conditions governing the employment of Filipino Seafarers onboard Ocean Going Ships). Your contract may be directly with the shipowner, or it may be with a manning agent, or it may be with some other agent for the shipowner. All these different arrangements can affect your rights. However above all it is important that you have a copy of your contract of employment, that you read it and that you know what rights are contained in it.

- **International laws**

International laws are laws made at the highest level between States. Since it was founded in 1919, the International Labour Organisation (ILO) has set international labour standards for all workers, and specifically has set standards for seafarers in more than 65 Conventions and Recommendations. These instruments, taken together, constitute a comprehensive set of standards and concern practically all aspects of living and working conditions of seafarers. In February 2006, a new Maritime Labour Convention 2006 was adopted which is a single, coherent international maritime labour standard for seafarers. The Maritime Labour Convention 2006 will come into force when sufficient ratifications are obtained. Human rights instruments also exist at international and regional level which may be relevant to the rights of seafarers.

ALSO AT THE INTERNATIONAL LEVEL, CONVENTIONS OF THE INTERNATIONAL MARITIME ORGANISATION (IMO) IMPOSE OBLIGATIONS ON STATES, A NUMBER OF WHICH HAVE THE EFFECT OF CREATING BENEFITS FOR SEAFARERS.

Chapter 4

Environmental Protection

Marpol 73/78 is the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" is short for marine pollution and 73/78 short for the years 1973 and 1978.) Marpol 73/78 is one of the most important international marine environmental conventions. It was designed to minimize pollution of the seas, including dumping, oil and exhaust pollution. Its stated object is: to preserve the marine environment through the complete elimination of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances. The original MARPOL Convention was signed on 17 February 1973, but did not come into force. The current Convention is a combination of 1973 Convention and the 1978 Protocol. It entered into force on 2 October 1983. As at 31 December 2005, 136 countries, representing 98% of the world's shipping tonnage, are parties to the Convention. All ships flagged under countries that are signatories to MARPOL are subject to its requirements, regardless of where they sail, and member nations are responsible for vessels registered under their respective nationalities.

Annexes

Marpol contains 7 annexes, concerned with preventing different forms of marine pollution from ships:

*Annex I - Oil
*Annex II - Noxious Liquid Substances carried in Bulk
*Annex III - Harmful Substances carried in Packaged Form
*Annex IV - Sewage
*Annex V - Garbage
*Annex VI - Air Pollution

Annex I – Oil

Operational discharges of oil from tankers are allowed only when all of the following conditions are met:

- the total quantity of oil which a tanker may discharge in any ballast voyage whilst under way must not exceed 1/15,000 of the total cargo carrying capacity of the vessel;
- the rate at which oil may be discharged must not exceed 60 litres per mile travelled by the ship; and
- no discharge of any oil whatsoever must be made from the cargo spaces of a tanker within 50 miles of the nearest land.

An oil record book is required, in which is recorded the movement of cargo oil and its residues from loading to discharging on a tank-to-tank basis.In addition, in the 1973 Convention, the maximum quantity of oil permitted to be discharged on a ballast voyage of new oil tankers was reduced from 1/15,000 of the cargo capacity to 1/30,000 of the amount of cargo carried. These criteria applied equally both to persistent (black) and non-persistent (white) oils. On a ballast voyage the tanker takes on ballast water (departure ballast) in dirty cargo tanks. Other tanks are washed to take on clean ballast. The tank washings are pumped into a special slop tank. After a few days, the departure ballast settles and oil flows to the top. Clean water beneath is then decanted while new arrival ballast water is taken on. The upper layer of the departure ballast is transferred to the slop tanks. After further settling and decanting, the next cargo is loaded on top of the remaining oil in the slop tank, hence the term load on top.

Special Areas A new and important feature of the 1973 Convention was the concept of "**special areas**"

which are considered to be so vulnerable to pollution by oil that oil discharges within them have been completely prohibited, with minor and well-defined exceptions. The 1973 Convention identified the Merranean Sea, the Black Sea, and the Baltic Sea, the Red Sea and the Gulfs area as special areas. All oil-carrying ships are required to be capable of operating the method of retaining oily wastes on board through the "load on top" system or for discharge to shore reception facilities.This involves the fitting of appropriate equipment, including an oil-discharge monitoring and control system, oily-water separating equipment and a filtering system, slop tanks, sludge tanks, piping and pumping arrangements.

Segregated Ballast Tanks Segregated ballast tanks (SBT) are required on all new tankers of 20,000 dwt and above (in the parent convention SBTs were only required on new tankers of 70,000 dwt and above). The Protocol also required SBTs to be protectively located - that is, they must be positioned in such a way that they will help protect the cargo tanks in the event of a collision or grounding.

Crude Oil Washing Another important innovation concerned crude oil washing (COW), which had been developed by the oil industry in the 1970s and offered major benefits. Under COW, tanks are washed not with water but with crude oil - the cargo itself. COW was accepted as an alternative to SBTs on existing tankers and is an additional requirement on new tankers.

Clean Ballast Tanks For existing crude oil tankers (built before entry into force of the Protocol) a third alternative was permissible for a period of two to four years after entry into force of MARPOL 73/78. The dedicated clean ballast tanks (CBT) system meant that certain tanks are dedicated solely to the carriage of ballast water. This was cheaper than a full SBT system since it utilized existing pumping and piping, but when the period of grace has expired other systems must be used.
The 1992 amendments to Annex I made it mandatory for new oil tankers to have double hulls – and it brought in a phase-in schedule for existing tankers to fit double hulls, which was subsequently revised in 2001 and 2003.

Annex II: Control of pollution by noxious liquid substances

Annex II details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk.Some 250 substances were evaluated and included in the list appended to the Convention. The discharge of their residues is allowed only to reception facilities until certain concentrations and conditions (which vary with the category of substances) are complied with. In any case, no discharge of residues containing noxious substances is permitted within 12 miles of the nearest land. More stringent restrictions applied to the Baltic and Black Sea areas.

Annex III: Prevention of pollution by harmful substances in packaged form

The first of the convention's optional annexes. States ratifying the Convention must accept Annexes I and II but can choose not to accept the other three - hence they have taken much longer to enter into force.Annex III contains general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications for preventing pollution by harmful substances.The International Maritime Dangerous Goods (IMDG) Code has, since 1991, included marine pollutants.

Annex IV: **Prevention of pollution by sewage from ships** The second of the optional Annexes, Annex IV contains requirements to control pollution of the sea by sewage.

Annex V: Prevention of pollution by garbage from ships This deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of. The requirements are much stricter in a number of "special areas" but perhaps the most important feature of the Annex is the complete ban imposed on the dumping into the sea of all forms of plastic.

GARBAGE TYPE	OUTSIDE SPECIAL AREAS	IN SPECIAL AREAS
PLASTICS & GARBAGE WITH PLASTIC CONTENT	DISPOSAL PROHIBITED	DISPOSAL PROHIBITED
FLOATING DUNNAGE, PACKING & LINING MATERIAL	> 25 MILES OFFSHORE	DISPOSAL PROHIBITED
CARGO RESIDUES, PAPER, RAGS, GLASS, METAL & SIMILAR REFUSE	>12 MILES OFFSHORE	DISPOSAL PROHIBITED
FOOD WASTE	> 12 MILES OFFSHORE	DISPOSAL PROHIBITED
FOOD WASTE USING COMMUNITER *	> 3 MILES OFFSHORE	> 12 MILES OFFSHORE
OILY RAGS & WASTE	DISPOSAL PROHIBITED	DISPOSAL PROHIBITED
INCINERATOR ASH	> 12 MILES OFFSHORE	DISPOSAL PROHIBITED
HAZARDOUS REFUSE LIKE PYROTECHNICS, BATTERIES, LAMPS, MEDICAL WASTE ETC	DISPOSAL PROHIBITED	DISPOSAL PROHIBITED

Annex VI: Prevention of Air Pollution from Ships The regulations in this annex set limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances.

Oil Record Book

Machinery space operations are to be recorded in the Oil Record Book Part I in accordance with regulation 17 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).Oil Record Book Part I is provided to every oil tanker of 150 gross tonnage and above and every ship of 400 gross tonnage and above, other than oil tankers, to record relevant machinery space operations. For oil tankers, Oil Record Book Part II is provided to record relevant cargo/ballast operations.

The Protocol of 1997 (Annex VI - Regulations for the Prevention of Air Pollution from Ships) The Protocol was adopted at a Conference held from 15 to 26 September 1997 and adds a new Annex VI on **Regulations for the Prevention of Air Pollution from Ships** to the Convention. The rules set limits on sulphur oxide (SOx) and nitrogen oxide (NOx) emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances.The new Annex VI includes a global cap of 4.5% m/m on the sulphur content of fuel oil and calls on IMO to monitor the worldwide average sulphur content of fuel once the Protocol comes into force.Annex VI contains provisions allowing for special "SOx Emission Control Areas" to be established with more stringent control on sulphur emissions. In these areas, the sulphur content of fuel oil used on board ships must not exceed 1.5% m/m. Alternatively, ships must fit an exhaust gas cleaning system or use any other technological method to limit SOx emissions. The Baltic Sea is designated as a SOx Emission Control area in the Protocol. Annex VI prohibits deliberate

emissions of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs). New installations containing ozone-depleting substances are prohibited on all ships. But new installations containing hydro-chlorofluorocarbons (HCFCs) are permitted until 1 January 2020.The requirements of the IMO Protocol are in accordance with the Montreal Protocol of 1987, as amended in London in 1990. The Montreal Protocol is an international environmental treaty, drawn up under the auspices of the United Nations, under which nations agreed to cut CFC consumption and production in order to protect the ozone layer. Annex VI sets limits on emissions of nitrogen oxides (NOx) from diesel engines. A mandatory NOx Technical Code, developed by IMO, defines how this is to be done. The Annex also prohibits the incineration on board ship of certain products, such as contaminated packaging materials and polychlorinated biphenyls (PCBs).

Revised MARPOL Annex II (noxious liquid substances carried in bulk)
The revised Annex II *Regulations for the control of pollution by noxious liquid substances in bulk* includes a new four-category categorization system for noxious and liquid substances. The revised annex is expected to enter into force on 1 January 2007.

The new categories are:

- **Category X**: Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a major hazard to either marine resources or human health and, therefore, justify the prohibition of the discharge into the marine environment;

- **Category Y**: Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify a limitation on the quality and quantity of the discharge into the marine environment;

- **Category Z**: Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a minor hazard to either marine resources or human health and therefore justify less stringent restrictions on the quality and quantity of the discharge into the marine environment; and

- **Other Substances**: substances which have been evaluated and found to fall outside Category X, Y or Z because they are considered to present no harm to marine resources, human health, amenities or other legitimate uses of the sea when discharged into the sea from tank cleaning of deballasting operations. The discharge of bilge or ballast water or other residues or mixtures containing these substances are not subject to any requirements of MARPOL Annex II.

The revised annex includes a number of other significant changes. Improvements in ship technology, such as efficient stripping techniques, has made possible significantly lower permitted discharge levels of certain products which have been incorporated into Annex II. For ships constructed on or after 1 January 2007 the maximum permitted residue in the tank and its associated piping left after discharge will be set at a maximum of 75 litres for products in categories X, Y and Z - compared with previous limits which set a maximum of 100 or 300 litres, depending on the product category.Alongside the revision of Annex II, the marine pollution hazards of thousands of chemicals have been evaluated by the Evaluation of Hazardous Substances Working Group, giving a resultant GESAMP2 Hazard Profile which indexes the substance according to its bio-accumulation; bio-degradation; acute toxicity; chronic toxicity; long-term health effects; and effects on marine wildlife and on benthic habitats.As a result of the hazard evaluation process and the new categorization system, vegetable oils which were previously categorized as being unrestricted will now be required to be carried in chemical tankers. The revised Annex includes, under regulation 4 Exemptions, provision for the Administration to exempt ships certified to carry individually identified vegetable oils, subject to certain provisions relating to the location of the cargo tanks carrying the identified vegetable oil.

Chapter 5

SOPEP, Anti Pollution Procedures, Equipment & Drill

Ships are provided with anti pollution equipment and an onboard organization to prevent and mitigate oil pollution. The equipment is placed at specified locations and should be readily available at these location. The Chief Officer is responsible for the maintenance and storage of this equipment. Crewmembers will assist in containment and clean up as directed by the Chief Officer. Ships are provided with 'Shipboard Oil Pollution Emergency Plan ("SOPEP")' to fight accidental pollution .

The Shipboard Oil Pollution Emergency Plan ("SOPEP")

The Shipboard Oil Pollution Emergency Plan ("SOPEP") is to be seen as an information from the owners to the Master of a particular ship. It advise the Master how to react in case of an oilspill to prevent or at least mitigate negative effects on the environment. The Plan contains operational aspects for various oilspill scenarios and lists communication information to be used in case of such incidents.

Legal Background It is compulsory for all ships of more than 400 Gross Tons (Oil tankers of more than 150 GT) to carry a SOPEP onboard. The required contents is described in MARPOL Convention Annex I Reg. 26. "Guidelines for the Development of a Shipboard Oil Pollution Emergency Plan" are published by IMO under MEPC.54(32) 1992 as amended by MEPC.86(44) 2000. The SOPEP forms an integral part of the IOPP certificate. It's existence is verified in the Supplement to the IOPP Certificate. In any case the SOPEP has to be approved by the flag state administration of the flag the ship is presently flying or by a classification society on behalf of this flag.

Scope The Plan consists generally of 4 Sections with the mandatory contents and it's Appendices with additional information as contact addresses and data plus a set of certain drawings for easy reference for the Master. The provided SOPEP sample plan has been prepared as a **general guidance** how to write such a plan in accordance with the new IMO Guidelines as amended in March 2000. It has to be seen as an example how the contents basically could be written in order to fulfil the requirements

All pretexted steps and preventive measures have to be seen as an example only.

The individual SOPEP should be prepared in line with the "Table of Content/ Index of Sections" as per sample. It has to be **tailored carefully** to the particular ship and company procedures and policies. Specific instructions should be incorporated according to ship type, purpose, and company requirements.

Especially for tankers actions in regard to the cargo tanks and cargo handling have to be included in the instructions. The contents of the plan have to be fully in line with the instructions given by the company within the ISM Safety Management Manual.

Table of Contents

The SOPEP shall consist of the following Chapters:

1. Ship identification data
2. Table of Contents
3. Record of Changes
4. Section 1: Preamble
5. Section 2: Reporting Requirements
6. Section 3: Steps to control Discharges
7. Section 4: National and Local Coordination
8. Minimum Appendices:
    - List of Coastal State Contacts
    - List of Port Contacts
    - List of Ship Interest Contacts
9. Ship's drawings:
    - General Arrangement Plan
    - Tank Plan
    - Fuel Oil Piping Diagramm
10. Further appendices on owners' decision

Special parts to observe

The ship's identification data page may contain the owner's/manager's address. However it is advisable to list all communication data in the Appendix "Ship Interest Contacts", as changes in telephone numbers. etc. can be altered by the owners and the amendments need not to be approved. The statement about the person being responsible for reporting (page 11 of the sample) has to filled in respectively.

Special remarks about availability of additional information sources (pages 21/22 of the sample) have to be entered in the plan only if they are available. It has to be pointed out that assistance in any stability calculations especially in case of any hull damage can be rendered by this society only if a agreement is existing for the particular vessel within GL's Emergency Response Service. The responsibility schemes for the (pages 23/24 of the sample) have to be tailored exactly to the present crew rankings onboard.

Anti Pollution Equipment

Ships and vessels are supplied with Oil Spill Equipment. A typical example is given below:

Position 1: Main deck, close to cargo and bunkering areas.

EQUIPMENT: 6 Bags of Absorbent Material

2 Rubber Buckets

2 Shovels, and/or Scoops

2 Empty Drums

Position 2:

LOCATION: Main deck, forward of the Accommodation Block.

EQUIPMENT: 6 Bags of Absorbent Material
2 Rubber Buckets
2 Shovels, and/or Scoops

2 - 200 liter Empty drums

Oil Pollution Absorbent Pads

600 liters of Oil Spill Degreaser / Detergent

2 Air Portable Pump

1 Set Protective Clothing

- The oil spill equipment has to be mobilized to the proper location before starting of cargo / bunker operations.
- The portable pumps must be tested before the operations and connected to the driving source.

Example of a Typical Anti Spill Organization

Radio Officer: Secretary to master.

- Transmits and receive reports as requested by the Master.
- Keeps log of events and progress. The Master can also assign these duties to Third Officer.

Chief Officer: Oil Pollution Control Officer, also keeping the Master advised and updated on the situation.

- Mobilizes Oil Pollution Team as necessary, to limit the oil spill and to start the clean-up operations.

Chief Engineer: In charge of Engine Department.

- In charge of bunker operations
- Takes action as directed by Master, or Oil Pollution Control Officer.
- Starts fire/foam pump as required.

Deck Officer on duty: (Loading: Topping Off cargo tanks)

- In the event of oil spilled on deck, stops the loading by advising the loading Master.
- Reduces the level of the overflowed tank to empty/slack tank.
- Mobilizes Oil Pollution Team
- Alerts and inform the Master/Chief Officer of the incident.

Pump man (on Tankers): Assist the Chief Officer.

- Ensures that the air driven pump are properly rigged/tested before starting the cargo operations and that all other Oil Spill Equipment is readily available at the established locations.
- Responsible for recovering the oil spilled on deck by operating the air driven pumps, collecting the oil in slop tanks or other slack tank.

Fitter

- The fitter and the pump man must ensure that the air portable pumps are rigged and tested before the start of bunkering operation and that all other **Oil Spill Equipment** is readily available at established locations.
- In the event of an oil spill on deck, assists the pump man in operating the air portable pumps to recover the oil into empty drums, slop tanks, or into Engine Room empty tank (if available), under directions of the Chief Engineer/Oil Pollution Control Officer.

Engineer on duty:

- Assists the Chief Engineer during the bunkering operations.
- Ensures that air/electric power is maintained on deck during the bunkering or cargo operations.
- Other duties as directed By Chief Engineer.
- Prepares for Fire-fighting. Ensures that sufficient air pressure on deck is maintained.

Deck hands on deck:

- If an oil leakage is detected, immediately alert the officer on duty.
- Prepare for pollution Control action.
- Position sorbet material to prevent any oil from reaching the railing. Commence clean -up by using the on-board clean –up equipment.

- Proceed to their emergency station and await orders from Oil Pollution Control Officer and Chief Engineer.

Chapter 6

Emergency Procedures

Shipboard emergency preparedness is required under chapter 8 of the ISM Code referred to in chapter IX of the SOLAS Convention, as amended, under chapter III, regulation 24-4 of the SOLAS Convention, as adopted at the SOLAS Conference November 1995, and under MARPOL 73/78, Annex 1, regulation 26.To implement the SOLAS and MARPOL regulations, there must be shipboard procedures and instructions. These Guidelines provide a framework for formulating procedures for the effective response to emergency situations identified by the company and shipboard personnel.In this context the main objectives of these Guidelines are:

- to assist companies in translating the requirements of the regulations into action by making use of the structure of the integrated system;

- to integrate relevant shipboard emergency situations into such a system;

- to assist in the development of harmonized contingency plans which will enhance their acceptance by shipboard personnel and their proper use in an emergency situation;

- to encourage Governments, in the interests of uniformity, to accept the structure of the integrated system as being in conformity with the provisions for development of shipboard contingency plans as required by various IMO instruments, and to refer to these Guidelines when preparing appropriate national legislation.

. General remarks

1.1 The ISM Code establishes an international standard for the safe management and operation of ships by defining elements which must be taken into account for the organization of company management in relation to ship safety and pollution prevention. Since emergencies, as well as cargo spillage, cannot be entirely controlled either through design or through normal operational procedures, emergency preparedness and pollution prevention should form part of the company's ship safety management. For this purpose, every company is required by the ISM Code to develop, implement and maintain a Safety Management System (SMS).

1.2 Within this SMS, procedures for describing and responding to potential shipboard emergency situations are required. If the preparation of response actions for the many possible varying types of emergency situations which may occur are formulated on the basis of a complete and detailed case-by-case consideration, a great deal of duplication will result.

1.4 To avoid duplication, shipboard contingency plans must differentiate between "initial actions" and the major response effort involving "subsequent response", depending on the emergency situation and the type of ship.

1.5 A two-tier course of action provides the basis for a modular approach, which can avoid unnecessary duplication.

1.6 It is recommended that a uniform and integrated system of shipboard emergency plans should be treated as part of the International Safety Management (ISM) Code, forming a fundamental part of the company's individual Safety Management System (SMS).7 An illustration of how such a structure of a uniform and integrated system of shipboard emergency plans with its different modules can be incorporated into an individual SMS is shown in appendix 1.

Evaluating and Responding to an Emergency

Any shipboard emergency can be broken down into three primary elements:

Recognition, Response, and Report.

Recognition that there is an emergency situation is the key to adequately dealing with a shipboard emergency. *Recognition* includes:

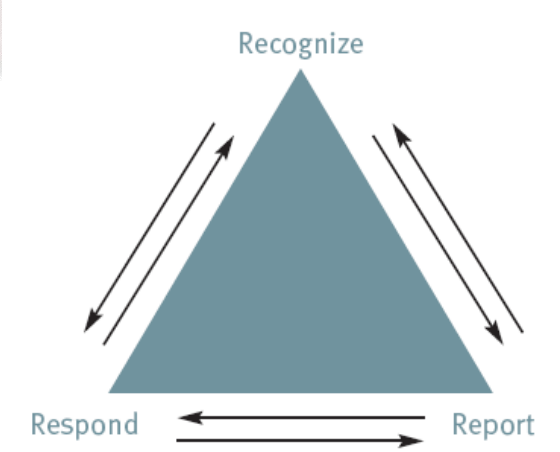
- The nature of the emergency (fire, flood, etc);
- The extent of the emergency (fire in a waste bin or something larger);
- The timing of the emergency (how much time before the emergency will cause human or property damage).

Failure to recognize that an emergency exists is one of the prime causes of maritime disasters. The *Herald of Free Enterprise* and *Estonia* capsizing both occurred because the extent of a developing emergency was not recognized in a timely manner.

Response to an Emergency:

- In a timely manner;
- With adequate and appropriate resources;
- Taking action to mitigate or reduce the threat that the emergency will spread to other areas;
- Taking action to protect passengers and others not involved in the response.
- *Reporting* or communicating is another key factor in combating an emergency:
- Timely and accurate communication of the situation from the scene to the command to permit an accurate response;
- Timely and accurate communication from the command to the emergency teams;
- Timely communication as appropriate to external resources and contacts (e.g. SAR Authorities, Other Vessels, Company).

The core components of recognition, response and reporting can be viewed as the corners of a triangle:



While recognition of an emergency is a key first element, the sequence of triangle elements is dynamic. The next step may be an immediate scene response, or response with a simultaneous report or

communication to an external resource. Subsequently, recognition of a developing or changing situation may require a change in response or reporting. This triangle concept can be used to evaluate past emergencies as well as be used as an aid in an ongoing emergency. Almost all passenger vessel disasters can be traced to a failure in one of the elements of this triangle. At the very least, disasters have been exacerbated by a failure in one of these elements. This can be from failing to link the elements properly or it can be from a lack of adequate resources available in one of the elements. A classic example of this is the *Titanic*. After the ship had struck the iceberg, the recognition of the situation was fairly well accomplished and internal communication was also sufficient. Problems came in the response (lack of lifeboats), and the report (limited ways to communicate the distress to others). The elements and process of *Recognize*, *Respond* and *Report* apply equally to the distressed vessel, any vessels attempting to aid the stricken vessel and responding SAR authorities.

Potential emergency situations

Potential emergency situations should be identified in the Plans, including but not limited to, the following main groups of emergencies:

1. Fire
2. Damage to the ship
3. Pollution
4. Unlawful acts threatening the safety of the ship and the security of its passengers and crew
5. Personnel accidents
6. Cargo related accidents
7. Emergency assistance to other ships.

The majority of shipboard emergencies can be classified within the above-mentioned main groups.

For example, the main group "Damage to ship" can be subdivided to identify further shipboard emergencies, which may require very different responses, such as:

*** collision**

*** grounding/stranding**

*** heavy weather damage**

*** hull/structural failure, etc.**

The detailed response actions should be written in a way to set in motion the necessary steps to limit the consequence of the emergency and the escalation of damage following, for example, collision orgrounding.In all cases priority should be given to actions which, in turn, protect life, the marine environment and property. This means, that "**initial actions**" which are common for all ships, regardless of their type and cargoes carried, should be fully taken into account when formulating **"subsequent response"** procedures.

Steps to initiate external response:
* search and rescue co-ordination;
* buoyancy, strength and stability calculations;
* engagement of salvors/rescue towage;
* lightering capacity;
* external clean-up resources;
* Ship drift characteristics
* General information:
* co-operation with national and port authorities;

* public relations.

Although shipboard personnel should be familiar with the Plan, ease of reference is an important element in compiling and using an effective plan. Allowance must be made for quick and easy access to essential information under stressful conditions.
Every effort should be made to assure that information regarding:

- ship interest contacts;
- coastal State contacts;
- port contacts,

Are readily available.

Collision / imminent collision: There are sets of rule to guide you for taking actions if a risk of collision exists between ships or other marine crafts. These rules called COLREGS are mandatory and must be followed while navigating except in the most exceptional cases if there are valid reasons for you for not following these rules. These rules must be fully understood by the navigating officers to enable them to take correct action because the lives on board depend entirely on your action.

- **Fire:** One of the most common accidents on board is fire. The sequence of actions to be taken to deal with fire is denoted by the letters itself as given below:

F	-	FIND
I	-	*INFORM*
R	-	RESTRICT
E	-	EXTINGUISH

Heat / oxygen /fuel forms the three sides of a fire triangle and if any of these three components can be eliminated, the fire will die. This is achieved by:

- Cooling with water
- Smothering with steam or co_2 to cut off oxygen
- Starving the fire by removing or restricting fuel supply.

The hazards of fire on board and the action to be taken to avoid fire must be well understood. Some of the precautions to avoid fire on board are given below:

- Follow the smoking regulations.
- Do not smoke in open area, alleyways, toilets, and other prohibited spaces and certainly not in bed.
- When ashore do not smoke in the port area if prohibited.
- On tanker, the smoking areas are marked and they will have at least two doors separation from outside to avoid inflammable gases entering in these spaces.

- Never use lighters on board because these may create spark if dropped by chance from your pocket on the deck.

- Always use approved safety torches.

- Do not use unauthorized electrical appliances in your cabin. Make shift connection and loose wiring must be avoided at all times. Use of radio or other electronic gadgets on tanker deck is strictly prohibited. Use only the inbuilt aerial connections for radio T.V. etc.

- The very important aspects of avoiding a fire hazard are to keep your ship neat and clean at all times. Some of the material, if left to lie, will catch fire, which is termed as spontaneous combustion.

- Never use dustbin as ashtrays.

- Never drag any metallic item on the deck. The friction between the deck and item may cause spark and will lead to fire.

- While carrying out maintenance, use non-sparking tools for chipping and hammering jobs.

- On board tankers one of the major fire hazards is static electricity. There are many causes and circumstances of static electricity. You are advised to be familiar with safe tanker practices and work under the guidance from your senior officers.

- Never hesitate to ask if in doubt and never cut corners and compromise on safety.

- Always use intrinsically safe equipment duly approved.

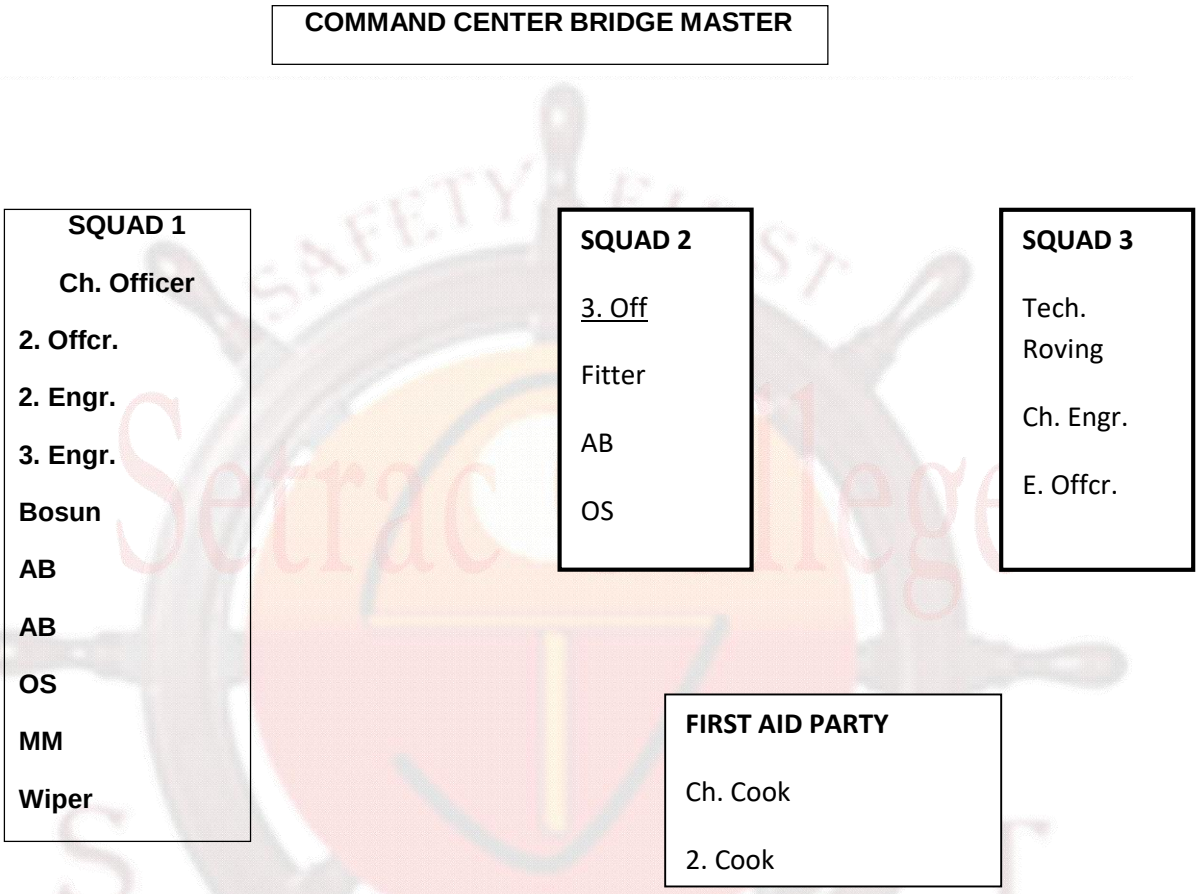
- Take all necessary precaution against fire before doing hot work. Uses a check lists so that nothing is missed out mostly all ships have a permit system for hot work, sample of which is shown for reference. Welding and gas cutting equipment must always be maintained in good shape.

- When carrying dry cargo, consult material safety data sheets for the cargo being carried and take appropriate precautions against fire and toxicity. Coal is likely to emit methane, which is inflammable. Using surface ventilation under the supervision of your senior must disperse these gases.

- **FOUNDERING (SINKING):** The causes of this may be grounding, heavy weather, lack of stability, collision, shift of cargo etc. All necessary precaution must be taken to avoid a calamity of this magnitude well in time. If the ship has to be abandoned, the master gives the order verbally.

SHIPBOARD CONTINGENCY PLANS FOR RESPONSE TO EMERGENCIES

A typical shipboard Response to an Emergency



SQUAD 1 This squad generally musters at the Emergency Headquarters, which is marked as EHQ oh hearing the Emergency alarm. Squad 1 on receipt of the nature and location of the emergency gears up for combating the emergency. For e.g. if the nature is fire in accommodation then the members of squad 1 wear Compressed Air Breathing Apparatus (CABA), carry charged fire hoses.

SQUAD 2 This squad is the support squad, which assists Squad1. The members of squad 2 generally muster on the poop deck and gets additional hoses ready for boundary cooling (a process of cooling the bulkheads from the exterior – outside). The 3rd Officer who is generally In-charge of this squad takes 1 seaman and lowers one of the lifeboat to embarkation deck ready for boarding. Then this squad waits for any further assistance, if required by Squad 1.

SQUAD 3 This squad consists of Chief Engineer Officer and the Electrical Officer. These members mainly carry out duties of isolation of power supply, taking over the emergency generator in case does not start automatically on blackout condition and general overview of technical aspect of fire fighting.

FIRST AID PARTY This group consists of Ch. Cook, 2nd Cook and Steward. Chief Cook is the incharge of the stretcher team and first aid. Assistant will keep provisions and blankets etc. ready.

SHIP BOARD CONTINGENCY PLANS

These plans aim to assist personnel effectively dealing with emergency. Their primary purpose is to set in motion the necessary actions to stop or minimise damage and to ensure that the action taken are in a structured, logical and timely manner. These plans must be:

- Realistic, practical and easy to use.
- Understood by both personnel ashore and on board.
- Evaluated, revised and updated regularly.

In the absence of the plan

- In the heat of moment lack of planning will result in confusion, mistakes and failure . To advise key people.
- Delays will be incurred and time will be wasted, leading to worsening of the situation.
- As a result, the ship and crew may be exposed to increasing hazard and damage.

The contingency plan should identify different types of emergency, which may arise on a particular ship and may include:

- Allocation of duties and responsibilities.
- Actions to be taken to regain control of a situation.
- Communication methods with in and outside ship.
- Procedures for requesting assistance.
- Procedures for notification.
- Procedures for dealing with media/ ashore authority.

Procedures for dealing with emergency should, as far as possible, are consistent in a fleet. The most effective organization for dealing with emergency situations should be adopted. A casualty procedure is formulated by management in office to provide proper backup systems for ship in distress. Such procedures should be tested from time to time during emergency drills. Proper procedures should be published and followed for outside assistance such as salvaging.Potential emergency situations likely to be found in a ship should be analysed and procedures for controlling then drawn up and practiced during

drills. The company's safety manual contains detail of contingency planning, emergency organisation and other safety advice specific to the company's fleet, complimentary to that, available in other publications.Important helpful technical guidance in the form of check list have been issued by various industrial organisation such as the International chamber of Shipping, the oil companies International marine forum and the International association of independent tanker owners.

DISTRESS SIGNALS

The following signals used or exhibited together or separately indicate distress and need of assistance:

(a) A signal sent by radiotelephony consisting of the spoken word "May day".
(b) A rocket parachute flare or a hand – flare showing a red light.
(c) A smoke signal giving off orange coloured smoke.
(d) A gun explosive signal fired at an intervals of about a minute.
(e) A continuous sounding with any fog - signaling apparatus.
(f) Rockets or shells throwing red stars fired one at a time at short intervals.
(g) Slowly and repeatedly raising and lowering arm outstretched to each other.
(h) The Radiotelegraph signal.
(i) A Radiotelephone alarm signal.
(j) Signals transmitted by emergency positioning indicating Radio Beacons.

Attention is drawn to the relevant sections of the International code of signals.

EMERGENCY SIGNALS

These may differ from ship to ship. Your foremost duty is to know them as soon as you join the ship. Generally the signals will be:

- **General emergency / Fire**

Alarm: continuous ringing of alarm bells followed by seven short and one long blast on the ships whistle.

Meaning: Emergency situation has arisen or fire has been detected on the vessel.

Action: Proceed immediately to emergency muster station. Take your life jacket with you.

- **Lifeboat stations**

Alarm: Continuous sounding of short / long blasts on vessel whistle followed by alarm bells.

Meaning: Proceed to lifeboat station.

Action: Collect life jacket and emergency equipment and prepare for launching.

Note : order to abandon ship will be by master verbally

Other Alarm: these apply to specific crewmembers and must be well understood.

Muster lists / muster station

Specific muster list are prepared on every ship defining specific duties of each crewmember in clear and concise manner in case of any emergency station. Muster lists must be kept upto date incorporating any changes of crew or equipment on board the vessel. These are posted at conspicuous places on board such as bridge, ECR and one on each deck for easy accessibility. In addition, an individual duty roster should be posted in all cabins describing emergency task for each crew. Muster list will specify fire and emergency signals followed on board that vessel and will include following duties:

- Preparation and launching of survival craft.
- Closing of w/t doors, scuppers and other openings.
- Use of communication equipment.
- Stopping vents and closing manual vent flaps.
- Isolating electrical supply to the affected areas.
- Use of fire extinguisher. Fire hoses, fireman's outfit etc. & backup.
- Any special instructions.
- Muster of passengers (if applicable)

For launching the conventional open lifeboat, the duties are typically allocated as follows:

Bowman:	Clear lifeline, check falls, ship plug, if applicable, passes painter forward, check tricing pendant and prepares browsing –in tackle and ship tiller.
Stern sheet:	Clears lifeline, checks falls, ship plug, check Tricing Pennant, prepares browsing and tackle and ship tiller
Ford gripes/pins:	Release gripes and unships pin to allow davit to be Lowered.

Aft gripes/pins: Same as above.

Painter:	Passes the boat painter from outside the vessel

clear of all Obstructions and makes fast on main deck bits.

Ladder: Lowers boat ladder for embarkation by the Lowerer once the boat has taken to water.

Lowerer: Lowers the boat first to the embarkation deck and after Boarding by the crew, to the water level.

Standby: To collect extra water, medicines and blankets etc.

For lifeboats of different designs, that is, enclosed and free fall type different launching Instructions will apply.

Action on Hearing Emergency Alarm Signals

On hearing emergency alarm signals, all hands on board must rush to the Emergency Station as set out in muster list. Take your life jacket with you and wear proper clothing. Specially warm cloths in winter. In abandon ship situations; hypothermia is a major cause to life, which highlights the importance of wearing as much warm clothing as is practical.After reaching the muster station, which may be emergency head quarters or any other place designated by the master, test communication and take a head count to ensure nobody is missing. If so, the priority is to carry out search for the missing person lest he may be trapped in a hazardous situation inside the vessel. The muster must be orderly and all movements henceforth should be controlled by the in-charge.

Correct Use of Personal Safety Equipment

Personal protective equipment does not reduce the hazard of injury but only afford some protection against the hazards that still remain. So your step towards injury protection is to eliminate the potential hazardous condition on board. Defective or ineffective equipment provide no defense. It is therefore essential that the correct item of equipment is used and should be properly stored in designated places. The wearer should check the equipment each time before use.Personal safety equipment includes: safety helmets, ear protectors, safety goggles, facial shields, dust masks, life jacket and lifeboat.Safety helmets must be worn with a chinstrap so that it does not fall while working at a height and create an additional safety hazards. Also if one of your hands is occupied keeping the helmet in place, then the task itself becomes unsafe. The helmet must be strong enough to absorb a reasonable, which can be expected on board ship and should have a harness for supporting the wearer's head. Ear protectors must be worn in the engine room, pump room and other machinery spaces and while chipping with power tools to guard against high noise levels.

Dark goggles are to be used while welding to ward off infra red/ ultraviolet rays, which can be disabling for the eyes. Transparent goggles should be worn when there is danger of exposure of foreign bodies such as chipping, hammering, painting, anchoring, grinding and handling chemicals etc. Dust mask are used to keep away poisonous or dangerous gases. They do not provide protection against toxic gases or oxygen deficient atmosphere which may be encountered in cargo or blast tanks. For this purpose, breathing apparatus is to be used having a fresh supply of air and keeping a positive pressure inside the facemasks to avoid toxic fumes being sucked in.Resuscitators containing oxygen for medical use and should not be carried to or near the place of fire to avoid danger of explosion. Before using BA sets, complete checks are to be carried out for detection of any leaks, proper fitting of face mask, functioning of warning whistle and pressure gauge.

Leather gloves provide protection against rough or sharp objects such as handling wires. Heat resisting gloves when handling hot objects and rubber gloves in case of acids and chemicals should be used. Non-skid type safety boots must be worn at all times while working on deck or in machinery spaces to guard against slips and crush injuries. Untied laces create a tripping hazard. While working aloft, safety belt or harness properly secured by a lifeline should be used and in addition. Life jacket or work vest when working over side i.e. while rigging gangway or painting draught marks. A lifebuoy with sufficient line must be kept handy near the place of work.

Aprons and body suits are useful while handling chemicals or acids, which are corrosive by nature. Overalls should preferably have full sleeves and not be loose fitting to avoid being caught in running machinery and sharp edges.

Action on discovering potential emergencies

*** Collision / imminent collision**:

- Sound general alarm.
- Inform master as soon as possible (in all emergencies).
- Anchor, if feasible.
- If collision unavoidable reduce impact.
- Shut all weather tight doors and switch on lights.
- Muster crew and count heads.
- Send out urgency/ distress message (if required).
- Sound all spaces.
- Check for fire and damages.
- Prepare lifeboats for launching.
- Exchange identities with other vessel i.e. name, last port, next port of call, Port of registry.
- Standby to render any assistance to the other vessel. It is a duty to render

Assistance to anyone in danger of being lost at sea.

- Inform coast station / owners / chartered.
- Maintain accurate records (important in all emergencies).

- **Main engine failure:**
  - Display N.U.C. Lights / shapes.
  - Changes to hand steering and switch on both steering motors.
  - Broadcast nature of emergencies to all ship in vicinity and coast station.
  - Prepare for anchoring if in anchoring depth.
  - Prepare all means of communication and have them ready for immediate use.
  - Check effect of likely roll in heavy weather on cargo.

- **Steering Failure**:
  - Switch to hand steering or NFU mode.
  - If no response rush to emergency steering in the steering compartment.
  - Slow down engines and stop.
  - If in danger of collision / grounding – give emergency stop on main engines.
  - Exhibit NUC lights or shape.
  - Broadcast warning to ships in vicinity and coast station.

- Prepare for anchoring if feasible.
- Check effects of likely roll on cargo.

- **Fire**
  - Sound alarm and announce location of fire.
  - Stop ventilation to the affected spaces.
  - Muster crew and count heads.
  - Send out urgency / distress message as directed by master.
  - Keep survival craft in readiness for launching.
  - Contact coast station / owners etc.
  - Arrange and prepare for receiving assistance from other ships / coast stations.

- **Foundering**

  - Confirm flooding (after collision / grounding etc.)
  - Start pumps to pump out water.
  - Check extent of damage and contain if possible
  - Send out urgency / distress message.
  - Prepare survival craft.

- **Oil Spill**

- Raise alarm
- Stop all cargo operation and depressurize lines by opening appropriate valves.
- Arrest leaks as soon as possible.
- Make all efforts to contain oil in side vessel.
- Inform local authorities at once if any oil escapes over board.
- Prepare main engine for evacuation of the berth if in port.
- Put oil spill contingency plan in action.
- Clean docks using SOPEP GEAR.
- Local authorities have granted use Oil Spill Dispersants (OSD) only after permission.
- Minimise pollution and protect environment.
- Treat the emergency at par with fire.

- **Piracy**

- Sound general alarm.
- Increase speed and alter course to seaward.
- Switch on all lights and dazzle attackers with search lights.
- Fire warning rockets and operate water hoses to repel pirates.
- Alert shore authorities and ships in the vicinity.
- If boarding succeeds crew to retreat safe locations.
- Offer no resistance, stay calm and do not be heroic.
- Broadcast urgency / distress message.
- Inform international marine bureau (IMB).

- **Man overboard**

- If the man is in sight take a round turn.
- If out of sight take Williamson turn.
- Sound general alarm
- Put engines on standby for man oeuvre.

- Post lookouts preferable at high locations with all around visibility.
- Broadcast urgency message.
- Prepare rescue boat and have first aid squad ready.
- Pick up survivor on windward side to avoid vessel drifting over the casualty.
- Prepare for medical evacuation of the casualty if serious.

SHIPBOARD SPILL MITIGATION PROCEDURES

Shipboard Equipment to mitigate an Oil Discharge

Shipboard clean up equipment shall be readily available on the Main Deck. The Chief Officer is responsible for the maintenance and storage of this equipment. Crewmembers will assist in containment and clean up as directed by the Chief Officer.

The Appendix A checklists contain crew responsibilities and procedures for mitigating oil discharges. Appendix B identifies the location on-board of equipment to mitigate an oil discharge.

Ships and vessels are supplied with Oil Spill Equipment as follows:

Position 1: Main deck, close to cargo and bunkering areas.

EQUIPMENT: 6 Bags of Absorbent Material

2 Rubber Buckets

2 Shovels, and/or Scoops

2 Empty Drums

Position 2:

LOCATION: *Main deck, forward of the Accommodation Block.*

EQUIPMENT: *6 Bags of Absorbent Material*

2 Rubber Buckets
2 Shovels, and/or Scoops

2 - 200 liter Empty drums

Oil Pollution Absorbent Pads

600 liters of Oil Spill Degreaser / Detergent

2 Air Portable Pump

1 Set Protective Clothing

- The oil spill equipment has to be mobilized to the proper location before starting of cargo / bunker operations.

- The portable pumps must be tested before the operations and connected to the driving source.

Radio Officer: Secretary to master.

- Transmits and receive reports as requested by the Master.
- Keeps log of events and progress. The Master can also assign these duties to Third Officer.

Chief Officer: Oil Pollution Control Officer, also keeping the Master advised and updated on the situation.

- Mobilizes Oil Pollution Team as necessary, to limit the oil spill and to start the clean-up operations.

Chief Engineer: In charge of Engine Department.

- In charge of bunker operations
- Takes action as directed by Master, or Oil Pollution Control Officer.
- Starts fire/foam pump as required.

Deck Officer on duty: (Loading: Topping Off cargo tanks)

- In the event of oil spilled on deck, stops the loading by advising the loading Master.
- Reduces the level of the overflowed tank to empty/slack tank.
- Mobilizes Oil Pollution Team
- Alerts and inform the Master/Chief Officer of the incident.

Pump man (on Tankers): Assist the Chief Officer.

- Ensures that the air driven pump are properly rigged/tested before starting the cargo operations and that all other Oil Spill Equipment is readily available at the established locations.
- Responsible for recovering the oil spilled on deck by operating the air driven pumps, collecting the oil in slop tanks or other slack tank.

Fitter

- The fitter and the pump man must ensure that the air portable pumps are rigged and tested before the start of bunkering operation and that all other **Oil Spill Equipment** is readily available at established locations.
- In the event of an oil spill on deck, assists the pump man in operating the air portable pumps to recover the oil into empty drums, slop tanks, or into Engine Room empty tank (if available), under directions of the Chief Engineer/Oil Pollution Control Officer.

Engineer on duty:

- Assists the Chief Engineer during the bunkering operations.
- Ensures that air/electric power is maintained on deck during the bunkering or cargo operations.
- Other duties as directed By Chief Engineer.
- Prepares for Fire-fighting. Ensures that sufficient air pressure on deck is maintained.

Deck hands on deck:

- If an oil leakage is detected, immediately alert the officer on duty.
- Prepare for pollution Control action.
- Position sorbet material to prevent any oil from reaching the railing. Commence clean -up by using the on-board clean –up equipment.

- Proceed to their emergency station and await orders from Oil Pollution Control Officer and Chief Engineer.

Chapter 7

Safety On Board

Most accidents on board ship are caused through **carelessness** and 80% of all accidents involving ships are reported to be due to human error.

Following is a diagram depicting the quantum of unsafe practices for each fatal injury:

It is your duty as member of the ship's crew to ensure that as far as possible you maintain clean, orderly and safe places of work and in your living accommodation. While the master will from time to time inspect your cabin and the public spaces, it is upto you to ensure that you keep these area clean and tidy at all times.

Protective Clothing including safety helmets, safety boots, overalls, wet and cold weather gear must be looked after by yourself to make sure that such gear is always ready for use. It must be cleaned and dried regularly and stored in a safe place where you can find it a short notice. Proper clothing especially safety and protective clothing must be especially at all times when at work.

Safety Awareness is the duty of every man on board. Make a habit of checking any piece of life saving or fire fighting equipment you may pass during your way. If it is not or does not appear to be immediately ready for use, report this to the senior officer.

Work Hazards include tools and equipment left around, cleaning material not properly disposed off, opening and machinery not properly guarded. Always work on basis you may suddenly be called away and do not leave anything which could be dangerous to yourself on return or to another person taking up your job, entering or passing your place of work.

All ships will have in place a system of issuing permits prior entering enclosed spaces, commencing hot work or performing a job on an electrical piece of equipment. This is primarily intended as a checklist to ensure no safety precautions are missed out or bypassed.

Some other areas of work will need special attention from you:

- Safe gangway: Ensure that the gangway is maintained safe for use of shipboard and shore personnel, is properly lit, free from any obstruction and at correct inclination. The landing platform gangway and approach areas should be maintained non-skid. Correctly rigged safety net a lifebuoy with light and line must be placed. Gangway watches should be continuous for security purposes with efficient means of communication.

- In port, ship/shore safety checklist should be filled in after verifying that all safety requirements are met and continued to be so during the entire stay.

- Mooring stations are a critical operation. A significant number of accidents take place during these times due to lack of observance of good seamanship practices. Work must be carried out in orderly manner.

- All lifting gears must be checked for any defects prior use and safe working load (SWL) of any piece of equipment must never be exceeded.

- Fatigue is a culprit in the creation of dangerous occurrences or accidents. Ensure that you and your colleagues are properly rested. Under heavy workloads off – periods should be properly utilized to catch up on your sleep. An exhausted person is not only physically sluggish but his mental faculties also get affected to a great extent, which eventually may put not only that person but his colleagues also in a grave danger.

- Some ports of the world are affected by some diseases, which must be guarded against.

- Cold and hot weather precautions should be taken by the use of proper and protective clothing.

- Handling chemicals and fumigation of the vessel should be carried out with caution.

- Slips and falls contribute to majority of near misses and accidents on board. Non-skid safety shoes must be worn and all working areas kept free of oil.

- All applicable signs and notices must be placed in a right place to caution anyone before a dangerous occurrence takes place.

- While lifting a load proper lifting position must be adopted and excess weight avoided. Ensure proper hold especially if the vessel is moving in a seaway. Do not hesitate to requisition assistance if required.

- Before entering the refrigerator room's emergency alarms and escape procedures should be checked. If you smell a gas do not enter.

- Power tools must have guards in place and the work must be done with full concentration and properly dressed.

- All dangerous occurrences, hazardous conditions and accidents must be reported faithfully to avoid any recurrences in the future. Feedback from the ship's crew must be encouraged and all concerning aspects should be discussed in Safety Committee Meetings. These meetings form a vital link in the personal safety for everyone on board and are held at regular intervals.

- Read and follow all safety related M – notices, which will surely help in creating safety awareness.

Safety on board is teamwork and every member of this team is required to be discharging his duties in an efficient and professional manner because the chain is as strong as the weakest link in it.Accidents have causes – they do jot just happen. Most can be foreseen and prevented. This booklet is written to encourage you to avoid accidents simply by taking due care. No matter how routine your job, make a habit of adopting the safe working procedures, which are recommended. In particular, make sure that you always have regard for the safety of yourself and of others**.**

Entering Enclosed Spaces

The atmosphere of any enclosed or confined space may be deficient in oxygen or contain flammable or toxic fumes. These conditions may put at risk the life or health of the persons entering it. The enclosed spaces where entry precautions are required include: cargo holds, DB tanks, pump room, fuel and ballast tanks, cofferdams and duct keel, stool spaces, pipe trunks, battery and chain lockers and CO_2 rooms. For man entry, the space must be checked for oxygen, hydrocarbons and toxic gases. The requirement for man entry is 21% oxygen and 1% of LEL for hydrocarbon gases and if the entry is for the purpose of hot work then in addition to 21% oxygen, the hydrocarbon content should remain zero.The enclosed space must not be entered unless the following precautions have been taken:

- The atmosphere of the space is tested for oxygen content with oxygen analyzer HC content with explosimeter / tank scope and toxic gases with multi gas detectors.
- A responsible person is designated to take charge of the operation.
- All potential hazards, relevant to that space are identified.
- Enclosed space entry permit is duly filled.
- Procedures before and during the entry are followed.
- Ventilation must be continued while the manpower is inside.

Oxygen deficiency in a hold occurs due to rusting, which consumes oxygen, carriage of some oxygen absorbing cargoes like concentrates or after inerting. Oil cargoes may contain toxic gases such as hydrogen sulphide, benzene, and carbon monoxide which remains in tank along with hydrocarbon vapour after discharge. Some chemicals are absorbed through skin.The space to be entered should be guarded against ingress of harmful vapours by positively blanking off pipelines leading to the space. The space should be thoroughly cleaned to avoid deposits / sludge which give off dangerous fumes. The sampling of these gases should be done at various vertically and horizontally scattered locations to detect and remove any localised concentration of gases. The officer on watch should be informed of any space, which is to be entered so that he does not stop the fans, open remote operated valves or close the escape doors. Warning notices should be placed on the relevant controls or equipment. Access to and with in the space should be well illuminated.

Rescue and resuscitator equipment should be placed ready for use at the entrance to the space. The number of person entering space should be limited to those who actually need to enter. Communication link upto the bridge or CCR should be maintained and checked at frequent intervals. If unforeseen difficulties or hazards develop, the work should be stopped and the space evacuated so that the situation can be reassessed. In the case of any emergency the general alarm is to be sounded so that the backup is immediately available.The importance of regular rescue drills cannot be over emphasised to prove the ship's rescue plans under difficult and different circumstances. Anyone likely to use breathing apparatus should be thoroughly familiar and confident with its use. Under no circumstances rescue should be carried out without the rescuer properly donning the breathing apparatus himself.

ENCLOSED SPACE ENTRY PERMIT

TO BE COMPLETED AS APPLICABLE BY OFFICER IN CHARGE OF ENTRY AND APPROVED BY MASTER BEFORE SPACE IS ENTERED

SPACE TO BE ENTERED_____

REASON _____

ENTRY AND EXIT POINTS _____

ATMOSPHERE CHECKED BY_____

READING OXYGEN_____**TOXIC**_____**IIC**_____

NAMES OF PERSONS ENTERING_____

TIME AND DATE OF ENTRY _____

EXPECTED TIME OF EXIT _____

COMMUNICATION METHOD_____ **FREQUENCY**_____

LINK MAN OUTSIDE SPACE NAME_____

OFFICER ON BRIDGE DECK INFORMED	
TYPE OF VENTILATION IN USE	
PERSONAL OXYGEN METER CHECKED	
S.C.B.A.READY OUTSIDE SPACE	
S.C.B.A.PRESSURE GAUGE READING	
RESUSCITATION EQUIPMENT READY AND CHECKED	
RESCUE LINE, HARNESS AND SAFETY LAMP READY	

SIGNED

_____ _____

OFFICER IN CHARGE **MASTER**

DATE TIME

HOT WORK PERMIT ***DATE***_____

DESCRIPTION OF WORK

LOCATION_____

DURATION OF PERMIT (MAX. 6 Hrs) FROM_____TO_____

SAFETY CHECKS

1. Area Cleared Of Combustible Material	
2. Area And Adjacent Compartment Gas Free/ Inerted	
3. No Bunker Transfer Operation Or Blast Movement In Progress	
4. All Liquid And Vapour Lines Isolated To Area	
5. Fire Equipment Made Ready	
6. Fire Watchmen Posted And Instructed	
7. Communications Established Between Fire Watchmen & Bridge	
8. Emergency Procedures Discussed	
9. Port Approval Obtained (If Required)	

SPECIAL PRECAUTIONS

- OFFICER IN CHARGE OF SAFETY APPROVAL / GRANTED

- NAME_____RANK_____ MASTER_____
- SIGNATURE_____ DATE_____
- TIME_____

ELECTRICAL ISOLATION CERTIFICATE

TO BE FILLED WHENEVER ANY PERSON OTHER THAN ELECTRICIAN IS GOING TO WORK ON ANY EQUIPMENT WHERE THERE COULD BE A HAZARD OF ELECTRIC SHOCK, IF THE ELECTRICAL PART IS NOT ISOLATED.

THIS PERMIT IS VALID FROM:_____(DATE & TIME)
THIS PERMIT IS VALID UPTO:_____(DATE & TIME)

EQUIPMENT ON WHICH WORK IS TO BE DONE: ----------
WORK IS TO BE DONE BY:: .....
WORK IS TO BE DONE BY: .....
SUPPLY ISOLATED BY ELECTRICIAN AT: _____
WORK COMPLETED AND CLEARED BY: _____
(NAME OF PERSON REPORTING WORK COMPLETION)
SUPPLY RECONNECTED BY ELECTRICIAN AT: _____

_____

RESPONSIBLE OFFICER OR
ELECTRICIAN

NOTE: PERMIT SHOULD BE FILLED AND GIVEN TO PERSON DOING THE JOB WHO MUST RETURN TO THE RESPONSIBLE OFFICER AFTER COMPLETION OF THE WORK.

Chapter 8

]INTERNATIONAL SAFETY MANAGEMENT CODE

(I.S.M.CODE)

The International Safety Management Code (I.S.M.Code) for the safe operation of ships and pollution prevention was established by IMO in 1993, which can be termed as the marine Equivalent to ISO 9000.

Purpose:

- To provide an International Standard for the safe management and operation of ships and for pollution prevention.
- Ensure safety at sea, prevention of human injury or loss of life and avoidance of damaging the environment, particularly the marine environment and to property.
- To take account and to follow the mandatory rules and regulations recommended by the organisation, administration, classification societies and marine industry.

ACCIDENT PREVENTION ON BOARD

General Duties & Responsibilities of Seafarers:

1. Seafarers should participate in ensuring safe working conditions and should be encouraged to express view on working procedures.
2. Seafarers should have the right to remove themselves from dangerous situations or operations when there is an eminent and serious danger to their safety and health.
3. Should co-operate with the ship owners.
4. Use and take care of protective clothing / equipment at their disposal
5. Participate in safety and health meeting
6. Seafarer should not operate or interfere with equipment, which they are not authorised.
7. Orders should be given and taken clearly and understood.

CAUSES OF ACCIDENT

Avoidable causes:

Carelessness	-	Lack of proper attitude
Unawareness	-	Lack of instructions
Ignorance	-	Lack of onboard training
Fatigue	-	Lack of sleep, rest
Machinery failure	-	Mostly is avoidable through routine inspection and preventive maintenance

a) Unsafe actions:

1) Procedures not followed
2) Shortcuts taken

3) Poor attitude

b) Productivity only concerned

1) Too busy for safety
2) Safety receive lip service only
3) Safety during slock period only.

c) Inadequate onboard training

1) Poor or incomplete instructions
2) Insufficient written procedures
3) No job safety analysis

d) Poor work environment

1) Unsafe conditions
2) Inadequate and improper tools/equipments
3) Poor house keepings
4) Inadequate rust, vapour, noise control

COMMON CAUSES OF INJURY

(a) Striking against or being struck by an object.
(b) Caught in, on or between objects.
(c) Falling at the same level or to a different level.
(d) Contact with hot and cold object.
(e) Inhaling / absorbing through the skin / swallowing.
(f) Over exertion while lifting/ pulling/pushing.

TECHNIQUES FOR PREVENTING ACCIDENTS

(a) Determine the cause of all accidents.
(b) Investigate (loss or injury) all accidents.
(c) Investigate crewmember complaints / grievances.
(d) Follow safety suggestions.
(e) Review work procedures**.**
(f) Perform Job safety analysis on hazardous job.

SAFETY THINKING AND ACCIDENT PREVENTION ON BOARD

International measures covering accident protection & occupational hazards**:**

Of all the international hazards dealing with maritime safety, the most important is the international. Convention for safety of life at sea. (SOLAS). It is also one of the oldest, the version having been adopted in 1914. The incident which led to this convention was sinking of titanic on her voyage when more than 1500 passengers and crew died. It lays down rules regarding construction, life saving appliances,

communication, safety of navigation, carriage of grains and dangerous goods.MARPOL 73/78 deals with protection of marine environment due to oil discharges, noxious substances, sewage and garbage from ships.

IMDG Code sets out standard for carriage of dangerous goods by sea and hence ensuring the safety of ships.Collision regulations of 1972 (COLREGS) contain mandatory rules to be observed by ships when navigating in the seaway and have contributed immensely in the prevention of accidents due to collisions.STCW'95 Convention is also aimed at furthering the cause of safety on board by laying down minimum standards of competence for the seafarers in the prevention of fatigue related accidents by setting out minimum rest periods. Load line rules of 1966 establish the minimum free board requirements so that the sea worthiness of the ship maintained in all condition of loading. Monitoring of the requirements of the conventions is carried out by port State Control inspectors who have the authority to detain unseaworthy or unsafe ships due to construction or manning deficiencies. Dock regulation of the individual countries, code of safe working practice for merchant seaman (UK), M-Notices, international health regulation and other ILO regulations covering crew safety have also contributed to minimising the occupational hazards on board ships. In addition to the international measures, the companies have their own safety/health requirements, which are covered in their safety, drug and alcohol and operational manuals.

IMO has instituted safety management code (ISM code) for safe operation of ships and pollution prevention. It's objective is to prevent human injury or loss of life, to avoid damage to the environment and to the property. This is ensured by requiring the shipping companies to provide safe working practices and environment, establish safe guards against all identified risks and continually improve safety management skills of personnel preparing for emergencies**.**

VALUE OF TRAINING AND DRILLS

The purpose of training and drill is to ensure that crewmembers gain confidence in controlling situations that are likely to arise in emergency. They should aim to cover all likely emergency situations. Refresher courses and "on the job" familiarization training form a part of such exercise. The drill should mobilize the shore based management emergency contingency plans under simulated condition. They should be carried out regularly to test the effectiveness and clarity of emergency plans. On joining the vessel familiarize yourself immediately with the location and operation of life saving and fire fighting appliances nearest to your cabin and read company's safety and training manual at your earliest. Check escape route from your cabin and workplace to the lifeboat station and emergency muster station. Know your muster station and emergency duties. Have your officer in charge explain if you do not understand, check your lifejacket and find nearest location of fire alarm to your cabin. Though knowledge of the correct operation of all equipment is your priority, nevertheless in emergency, if you are in doubt about the correct operation of LSA/FFA equipment, do not panic, as the instructions will be printed on them in a clear and concise manner.

It is a requirement to hold at least one fire and abandon ship drill every month on cargo and every week on passenger vessels. Drills must b held within 24 hrs. of sailing if more than 20% of crew is changed at the last port. On most ships, the frequency of these drills is kept weekly even in case of cargo ships for better training. Every lifeboat is required to be launched and maneuvered in water at least once in three months. If one of the motor lifeboats in designated as the rescue boat, this drill should be utilized to check the speed of boat, which should not be less than 6 knots with full compliment. Correct use of other life saving appliances should be demonstrated to crew as soon as possible, but not later than two weeks after joining and should include:-

- Donning of life jacket

- Use of lifebuoys and attachments
- Donning of thermal protective aids (TPAs) and immersion suits
- Launching procedure for liferafts
- Instruction on the use of rockets, hand flares, smoke signals, and line throwing apparatus (LTAs)

These demonstrations are held concurrently with the weekly drills. They also include survival procedures, cause and treatment of hypothermia and first aid.

KNOWLEDGE OF ESCAPE ROUTES, INTERNAL COMMUNICATION AND ALARM SYSTEM

Knowledge of escape routes from your cabin and workplace is paramount importance for the survival of personnel on board. Finding your way out in complete darkness and smoke should be practiced at frequent intervals. Relevant exit and arrow sign are additional posted to guide you to safety.Communication with in the ship is carried out by public address system which is operable from the bridge and also from the individual telephones, voice operated telephones are at the bridge, engine room, EHQ, steering compartment, pumps room and other important spaces. Walkie-talkies provide a vital link in the communication system and are virtually reachable in all spaces with in the ship. Battery operated loud hailers are used for main deck. For abandon ship situation 3 Walkies talkies for emergency use are required for communication between ship and survival crafts and amongst survival craft after abandonment.Emergency alarms are capable of being operated from bridge, EHQ and manually from various strategic locations within the accommodation block and engine room. The system is audible throughout the living quarters, engine room and pump room. The fire alarm is also actuated automatically by fire, smoke or heat sensors placed in the engine room and living spaces. On certain ships, they automatically close the fire doors on each deck by releasing the magnetic stoppers. Manual fire alarms are activated by breaking the glass and operating push button, which is also clearly marked in red. The emergency alarm may be supplemented by a public address system to announce the nature of emergency or location fire.

Chapter 9

Social Responsibility

Employment conditions

"Articles of Agreement or Service Contract"

It is an agreement of service-condition between the owner and the crew**.** (Master represents the owner/management). It contains all terms and condition of service viz:

- Duties
- Wages (Collective Bargaining Agreement) and allowances
- Length of Service
- Penalties for disobedience, wrongful act, misbehavior, negligence, etc.
- Provision of food and accommodation
- Repatriation to home port

  All crewmembers are expected to behave in orderly and obedient manner to Master. All officers including other crew members are to note that it is their duty to ensure that no wrongful action on their part would cause hurt or injury to any other person, the ship, its cargo or ship owner.

Responsibilities of ship owners:

1. Safety and health of all seafarers on board should have a suitable policy on the safety and health which agreeable with national and international laws.
2. Provide and maintain ships, equipment, and tools, operating manuals as far as possible so that there is no risk of accident or injury to seafarers.
3. As per national and international laws decide manning levels, taking into account necessary standards of fitness, state of health, experience, competence and language skills to ensure the safety and health of seafarers. (Working and living conditions, working hours, rest periods, adequate accommodation, nutrition, valid competency, proficiency and medical certificates, ensure common language skills for accident-free operation of the ship).
4. Monitor the performance of equipment and personnel.
5. To establish safety and health committee on board ships who implement ship owner's safety and health policy.
6. To arrange for regular safety inspections of theirs ships, its equipments and machinery at suitable intervals by competent classification societies and their representatives.

Crew Agreements:

1. The employer (through Master) will employ each seaman (officer/crew) and the seaman will serve in the capacity and at the rate of wages expressed against his name.
2. Wages will not accrue for any hours during which a seaman refuses or neglects to work when required or is absent without leave or for any period during which a seaman is incapable or performing his duties by reason of illness or injury which has been caused by his own willful act or default.
3. If any pension fund/provident fund scheme exists, then the contributions to such funds as per company's laws will be deducted from your wages.
4. Any seaman who incompetently performs his work in the capacity in which he was first employed under the agreement may be re-rated by the Master.
5. Agreement may be terminated: -

a) By mutual consent
b) Medical evidence indicates that a seaman is incapable of continuing to perform his duties due to illness/injury.
c) Appropriate notice in terms of the agreement

d) If in the opinion of the master, the continued employment of the seaman would be likely to endanger the ship or any person on board.
e) If a seaman having been notified of the time of the vessel is due to sail, is absent.
f) If the Master is satisfied that a breach of conduct has occurred.

Individual rights and obligations:

Each seaman agrees

- To join the ship in the time specified by the company /master
- To submit to inoculation, vaccination on and any other health precautions as may be directed by the master
- To return in good condition (fair wear and tear expected) before the termination of his engagement/contract all articles provided for his personal use during the period of his engagement/contract.
- That all stores and provisions issued to the crew are only for use and consumption on board the ship and any unused or unconsumed stores or provisions remain the property of the employer.

Acts of Misconduct:

1. Assault
2. Willful damage to ship or any property on board.
3. Theft or possession of stolen property
4. Possession of offensive weapons
5. Persistent or willful failure to perform duty
6. Unlawful possession or distribution of drugs.
7. Conduct endangering the ship or persons on board
8. Combining with others at sea to impede the progress of the voyage or navigation of the ship.
9. Disobedience of orders relating to safety of the ship or any person on board
10. To be asleep on duty or fail to remain on duty if such conduct would prejudice the safety of the ship or any person on board.
11. In capacity through the influence of drink or drugs to carry out duty to the prejudice of the safety of the ship or any person on board.
12. To smoke, use a naked light or an unapproved electric torch in any part of the ship carrying dangerous cargo or stores where smoking or the use of naked lights or unapproved torches is prohibited.
13. Intimidation (frighten), coercion (persuade by force) and interference with the work of other employees.
14. Behavior which seriously detracts from the safe and efficient working of the ship; and the social well-being of any other person on board (e.g. ragging).
15. Causing or permitting unauthorized persons to be on board the ship whilst it is at sea (e.g. giving shelter/food to stowaways).

Actions which may be taken when breach of Code/Conduct is done:

1. Informal warning by crew in-charge (C/O or 2/E).
2. Formal warning by head of department, which will be suitable, recorded (C/O or C/E).
3. Formal warning by the master recorded in the ship's official logbook.
4. Written reprimands (warning) administered by the Master and recorded in the ship's official logbook.

Some examples where Master has authority to make a deduction from wages:

1. Seaman absence without leave.
2. Committed breach of code of conduct.
3. Willful damage to ship's equipment, and also in respect of a seaman's failure to return in good condition (fair, wear and tear expected) articles provided by the employer for the seaman's personal use.

Confidential Report of officers and crew:

Sent once every three months to head office and owners. The Confidential report contains the officers and crews conduct, ability, obedience, initiative, integrity, loyalty, honesty, leadership, qualities, sobriety, personal relationship with crew etc. etc.The reports are sent when Master or Chief Engineer or Chief Officer signs off. No copies are kept on board.

DISCIPLINE:

Discipline is an attempt to help managers to determine what needs to be done, when their people begin to regress and behave less maturely than in the past. Disciplinary intervention is necessary to redefine roles and expectations.Remember when disciplining an individual:

a) Don't blow your cool
b) Don't attack personalities
c) Be specific
d) Be timely
e) Be consistent (No favourites)
f) Don't threaten
g) Be fair

GUIDANCE ON PREVENTION OF DRUG AND ALCOHOL ABUSE

Drug and Alcohol abuse directly affect fitness and ability of a seafarer to perform watch-keeping duties. Seafarers found to be under the influence of drugs or alcohol should be permitted to perform watch-keeping duties until they are no longer impaired in their ability to perform those duties.Administration should consider developing the national legislation:

i. Prescribing a maximum of 0.08% blood alcohol level (BAC) during watch keeping duty as a minimum safety standard on their ships and
ii. Prohibiting the consumption of alcohol within 4 hours prior to serving as a member of a watch.

The OCIMF guidance on the subject, which is considered the most widely accepted international guidelines, is attached.

Oil Company's International Marine Forms (OCIMF) Guidelines For The Control Of Drugs & Alcohol On Board shipDrug & Alcohol abuse and its adverse effects on safety is one of the most significant social problems of our time. It is, appropriately, receiving attention both in the public eye and in Government legislation. An example specify to the Marine industry, of Government attention in this issue is the U.S. Coast Guard (USCG) Regulations on the testing of personnel on National and Foreign Flagships.

Recognizing the potential, serious impact on the Marine incidence, the Oil Company's International Marine Forum (OCIMF), and the Marine industry in general, have over years develop guidance aimed at encouraging safe ship operation and protection of the environment. Whilst tanker companies have generally operated with strict policies related to drugs and alcohol use on board their ships. OCIMF considers that the industry as a whole reassess the control of drugs and alcohol on the board ships.OCIMF recommends that shipping company should have a clearly written policy on drug and alcohol which is easily understood by the seafarers as well as shore based staff. In order to enforce their policy, companies should have rules of conduct and controls in place, with the objective that the no sea farers will navigate ship or operate its on board equipment whilst impaired by drugs and alcohol. It

is recommended that the seafarers be subject to testing and screening for drugs and alcohol abuse by means of combined programme of unannounced testing should be sufficient so as to serve and effective determine to such abuse.

The misuse of legitimate drugs, or the use, possession, distribution or sale of illicit or unprescribed controlled drugs which causes or contributes to unacceptable job behaviour should require the seafarers to be excused from duty, until such times they are repatriated, or treated for the cause of after effects. The suggested list of substances to be prohibited should include, but not be limited to marijuana, cocaine, opiates, phencyclidine (PCP) and amphetamines and their derivatives. In this regard, the International Chamber of Shipping (ICS) has published guidelines on recognition and detection of drug trafficking an abuse entitled "Drug Trafficking and Drug Guidelines for owners and Masters on Recognition of Consumption. This Company policy should provide for control of onboard alcohol distribution and monitoring of consumption. This policy should support the principle that officers and ratings should not be impaired by alcohol while performing schedule duties.

OCIMF recommends that officers and ratings observe a period of absenteeism from alcohol prior to closing up on scheduled watch. This may be either a fixed period, such as the 4 hours required by the USCG, or a minimum period of 1 hour of abstinence for each unit of alcohol consumed (refer to section 3.4 for example of approximate alcohol unit conversions). Whichever method is used to determine the abstinence period, the objective should always be ensure that prior to going on schedule duty, the blood alcohol content of the seafarers is theoretically zero. Officers and ratings should be aware that local regulations might be in place and where this is the case, it is recommended that these be strictly adhered to where they exceed they guidelines. Recognizing that all seafarers must be able to respond At any time to an emergency situation, the International Maritime Organisation (IMO) is considering including guidance to administrations on maximum permissible blood alcohol content (BAC) permitted whilst on board .

BASIC GUIDELINES ON CONSUMPTION OF ALCOHOL

Any consumption of alcohol by persons onboard shall not result in blood alcohol concentration (BAC) of more than 0.04% by weight at anytime. Watch keeping Officers and Ratings will not consume any alcoholic beverages four hours prior to their watch-keeping duties.

No alcoholic beverages are to be served on the dining table during meal hours. It is brought to attention of all persons onboard that 2 units of alcohol consumed within the hour will result in BAC of 0.04% by weight and for their guidance 1 unit of alcohol may be defined as follows:-

APPROXIMATE ALCOHOL UNIT CONVERSIONS

	Volume	Units		Volume	Units
Beers, Cider and Ledgers.			Table wines others>6.0%<12% Alc. By Vol.	**10 cl.** **I liter bottle**	**1.0** **10.0**
Extra strength (>4.0%<6.0% Alc. By Vol.)	10 oz 30 cl	2.5 2.5	Sherry Forfeited Wines Others (>12% <16% Alc. By Vol.)	6 cl 1 liter bottles	1.0 16.0
Ordinary Strength (>1% <4.0% Alc. By Vol.)	10 oz 30 cl	1.0 1.0	Spirits, Liquor, Liqueurs, Others (>16%<40% Alc. By Vol.)	1 oz 3 cl.	1.0 1.0
Low Alcohol (>0.05% < 1.0% Alc. By Vol.)	10 oz 30 cl	0.5 0.5	Any other low alcohol Beverage (>0.05% <1.0% Alc. By Vol.)	10 oz 30 oz	0.5 0.5

Alcohol metabolizes out of body at an average rate of (1) one unit of alcohol per hour.

SHORT TERM EFFECTS OF ALCOHOL CONSUMPTION

*	UP TO 0.04% FEELING OF WELL BEING	SOME JUDGEMENT IMPAIRMENT TALKATIVE RELATED SOCIABLE.
*	0.04% - 0.08% RISK STATE	JUDGEMENT IMPAIRMENT MOVEMENT AFFECTED FALSE CONFIDENCE
*	0.08% - 0.15% DANGEROUS STATE	SLOW SPEECH BALANCE AFFECTED EYE SIGHT BLURRED FALLING A SLEEP VOMITING
*	0.15% - 0.4% DRUNKEN STUPOR	HEAVY BREATHING DEAD DRUNK INCONTINENCE COMA
*	0.4% - 0.6% DEATH	SHOCK AND DEATH

DRUGS

Recognising the potentially serious impact of marine incidents, the Oil Companies International Marine Forum (OCIMF) and the marine industry have over the years developed guidance aimed at encouraging safe ship

operation and protection of the environment. Whilst tanker companies have generally operated with strict policies related to drug and alcohol use, OCIMF considers that it is timely that the industry as a whole reassess the control of drugs and alcohol onboard ships.

Shipping companies should have a clearly written policy on drug and alcohol abuse that is easily understood by seafarers as well as shorebased staff. In order to enforce their policy, companies should have their rules of conduct and controls in place with the objective that no seafarer will navigate a ship or operate its onboard equipment while impaired by drugs and alcohol. It is recommended that appropriate seafarer be subject to testing and screening for drugs and/or alcohol abuse during routine medical examinations.

The misuse of legitimate drugs, or the use, possession, distribution or sale of illicit or unprescribed controlled drugs onboard ship has to be strictly prohibited. The suggested list of substances to be banned should include, but not limited to, marijuana, cocaine, opiates, phencyclidine (PCP) and amphetamines.

In this regard, the International Chamber of Shipping (ICS) has published guidelines on recognition and detection of drug trafficking and abuse entitled "Drug trafficking and Drug Abuse: Guidelines for Owners and masters on Recognition and Detection".

ANTI DRUG AND ALCOHOL POLICY"

A. General and Drugs

01. Before signing on the vessel every crewmember has to carry out not only a general medical examination', but also blood and urine tests proving that no alcohol and drug abuse is existing, if possible.

02. It is strongly forbidden to have, to use, or to smuggle drugs and legitimated drugs on board of the vessel. Disregarding will cause immediate dismissal, where the crewmember has to bear all repatriation expenses.

03. The use of other substances which alone or in combination can cause or contribute to unacceptable job performance or unusual behaviour is prohibited.

04. Any crewmember using prescribed medicines which can cause or can contribute to unacceptable job performance or peculiar behaviour shall report this to the master.

05. drugs observed or found on the vessel have or be reported to the master immediately. After investigation the master has to inform the company immediately.

B. Alcohol

06. It is not allowed to consume alcohol during duties. Disregarding will cause immediate dismissal, where the crewmember has to bear all repatriation expenses.

07. All crewmembers have to observe a periods of 4 hours abstinence from alcohol prior to scheduled wachtkeeping or other work duties.

08. During leisure the consumption of alcohol has to be controlled and should never exceed that persons' manner, disposition, speech, general, appearance of behaviour is affected.

09. It is only allowed to bring alcohol on board of the vessel from the master. The sale is always under the discretion of the master.

10. The master has to report every crewmember, who exceeds the consumption of alcohol to the company after corresponding entries have been done in the log book. If such an overconsumption occurs again, the immediate dismissal follows and the crewmembers has to bear all repatriation expenses.

11. The alcohol content in the blood has not to be higher than 0,4 $^{0}/_{00}$ during the complete stay on board. The master is obliged to carry out unannounced alcohol test at any time.

12. With the signature I confirm the receipt and observance of company's "Anti Drug and alcohol Policy"

_____ _____

date, time vessel's name

_____ _____

Rang/name i. Capital letters Signature/Crewmember

DRUGS THAT YOU SHOULD KNOW

.It is estimated that there are in excess of 10,000 regular abusers of "hard drugs" such as heroin and cocaine in the UK. There are also many thousands of other abusers of the so-called : soft drugs like cannabis and amphetamines. Drug user comes from every social group and every type of background. Abuse of any drug can lead to addiction and overdoses of " hard drug" can lead to death. Intravenous drug abuse is also well recognized as a source of transmission of the Hepatitis B and AIDS viruses. Contrary to widely held belief there are no safe drugs. They can all lead to physical and mental deterioration, affect behavior adversely and impair the ability to work. This can jeopardize personal safety, the safety of the others, the ship and the environment. The most commonly abused drugs are:

DEPRESSANTS **They Depress the central nervous system**

Opioids: heroin (H, smack, junk), morphine, codeine, opium, methadone, pethidine. Cannbis (grass, pot, weed, hash, dope, joint, reefer)

STIMULANTS *They stimulate the central nervous system.*

Cocaine (coke, snow, crack).Amphetamines (speed, uppers, whizz, blues, sulpha)*HALLUCINOGENS*
Alter moods and perception. Lysergic acid diethylamide (LSD, acid).

Chapter 10

Ships and Public Health

Over one hundred outbreaks of infectious diseases were reported to be associated with ships between 1970 and 2000 (WHO 2001). Reported outbreaks included legionellosis, typhoid fever,salmonellosis, viral gastroenteritis, enterotoxigenic *E coli* infection, shigellosis, cryptosporidiosisand trichinosis. Naval, cargo and cruise vessels have all been affected often with serious operational and financial consequences. These reported outbreaks represent just a small proportion of the total disease burden attributableto ship-acquired disease. For every notified and reported case listed in outbreak reports, there are likely to be orders of magnitude more cases that go unreported.

Ships can have significance to public health beyond just their role in ship-acquired infection. For example, ships can transport infected humans and other vectors, such as mosquitoes and rats,between ports and, therefore, act as a means of international disease transfer.If proper control measures are not in place, ships are particularly prone to disease outbreaks.Ships are isolated communities with crowded living accommodation, shared sanitary facilities and common food and water supplies. Such conditions are favourable to the spread of infectious diseases. The inevitable publicity that breaks out along with a disease outbreak aboard ship can seriously impact financially on the ship owners and those relying on use of the ship for transport or leisure.

Becoming ill aboard ship can be particularly dangerous because the ship may be isolated from modern medical centres. Furthermore, once an outbreak has been reported aboard ship it may not be permitted to dock. It is estimated that 1.2 million seafarers are employed on general cargo vessels. Many spend months at sea, sometimes in remote regions of the world. Cargo ships on long voyages are isolated communities. Good sanitation conditions on vessels are crucial both to the health of seafarers and to the shipping industry's ability to attract and retain competent employees.

Historically ships have played an important role in transmitting infectious diseases around the world. The spread of cholera pandemics in the nineteenth century was thought to be linked to trade routes and facilitated by merchant shipping. Efforts to control human disease on ships, can be traced back to the Middle Ages when in 1377, Venice and Rhodes denied access to ships carrying passengers infected with the plague and the term "quarantine" was coined. On arrival travellers were detained in isolation for 40 days before they were allowed to proceed to their final destination. Overcrowding on ships, filth and lack of personal hygiene were often associated with epidemics of typhus fever. Preventive measures, such as quarantine, delousing,and maintaining personal cleanliness by use of soap, were gradually adopted, and the incidence of typhus decreased.

International Health Regulations

The International Sanitary Regulations were developed in 1951 to prevent the spread of six infectious diseases – cholera, plague, yellow fever, smallpox, typhus and relapsing fever. These regulations were revised and renamed the International Health Regulations (IHR) in 1969.1The purpose of the International Health Regulations is, and remains, as being: "to provide security against the international spread of disease while avoiding unnecessary interference with international traffic".The IHR were amended in 1973 and 1981. The diseases now subject to these regulations were reduced to three: plague, yellow fever and cholera. In 1995 the World Health Assembly called for the regulations to be revised. The target date for submission of the revised IHR to the World

Health Assembly is May 2005 and a draft revision has been completed dated 12 January 2004 (WHO 2004). Since the IHR applies to world traffic, ships, aircraft, other conveyances, travellers and cargos are its primary considerations for arrivals. Ships and aircraft are discussed specifically in their own "Guides". The Guides provide a summary of the health basis behind the IHR and help to bridge the gap between the regulation, as a legal document, and the practical aspects of implementation of appropriate practices.

Setrac College of Offshore Training

Personal Safety & Social Responsibility

Trainee Handout

TRAINEE MANUAL

PST

PREFACE

The Primary aim of P.S.T. course is to train the seafarers, when a ship is threatened by any natural forces, to combat these forces as to save the life of people and the ship. Therefore the purpose of P.S.T. course is as below:

In line with the international convention on the "SAFETY OF LIFE AT SEA – 1974 and the convention on STANDARD OF TRAINING CERTIFICATION AND WATCHKEEPING – 1978" which recommended that all seafarers to equip with survival techniques.

A merchant ship complement consists of competent crew as necessary to fight any emergency situations on board most efficiently keeping in view the safety of self and others who are fighting the situation under their command.

Based on the duties and responsibility assigned to each member of the crew and same being carried out faithfully, within command of the ship, such controls help to ensure the effectiveness of the organization in carrying out either plan o for action of different type of situation. The master of the vessel who have the major control functions of the ship is assisted by his subordinates.

The need to training and maintenance of all fire fighting appliances and life saving appliances (FFA & LSA) is greatly emphasized.Effectiveness and efficiency of any emergency operation is achieved to its maximum only when every body follows the master list instruction and carryout faithfully.

As everybody knows that, a trained person can think so many ways and means to achieve his goal by way of initiative . It clearly indicates that all seafarers have to undergo a short of training/modular courses to produce better results.

Therefore the importance of training / courses is :-

a. To update all seafarers with the day to day advanced technology to react in correct manner during any emergency situation.
b. To achieve a more rapid transfer of information and skill regarding new developments in maritime technology to seafarers.
c. To adopt appropriate measures to his own safety and safety of others by use of survival equipments in a correct way by his proper and timely action and initiative thereby prevent emergencies.

TIME TABLE

Period	Day 1	Day 2	Day 3	
1 **0830** **to** **1000**	• Introduction Safety & Survival	Emergency radio equipment (Lecture and Demonstrations) EPIRB,SART, Portable Radio in Survival Craft	Personal Life-saving appliances	**SURVIVAL DRILL IN SWIMMING POOL**
2 **1010** **To** **1140**	• Emergency situations • Evacuation	Emergency radio equipment (Lecture and Demonstrations)	Personal Life-saving appliances Survival at sea	
3 **1140** **To** **1240**	Survival Craft and Rescue boats	Helicopter assistance	Personal Life-saving appliances	
4 **1240** **to** **1340**	Survival Craft and Rescue boats	Sea Survival -Dangers to survivors -Best use of survival craft facilities	Assessment	

Index

1.

PRINCIPLES OF SURVIVALS AT SEA

Regular training of all personnel in life boat and life raft drills and its equipment's which prepare them for any emergency and knowledge of actions to be taken when called to survival craft stations to get them ready at shortest possible time and to prepare them in all respect without any delay, when required to abandon the ship oiling, oil platform by way of lowering the survival craft in water, taking the survival craft around the ship, look for survivors around the ship must be told to the survivors especially during practical drills including all safety rules.

There is no suitable for practical experience in lifeboat in a rough sea can be very hazardous operation. Therefore boat drill and life raft drills should be carried out in a professional manner so as to ensure that everyone on board can gain experience in the launching and handling of lifeboats. Each lifeboat should be launched with its assigned crew abroad and maneuvered in the water at least once every three months times making every one familiar with the procedure.

1. Principles of survival includes the following points:
    a. Valve of training and drills
    b. Need to be ready for emergency
    c. Action to be taken when called to survival craft station.
    d. Actions to be taken when required to abandon ship.
    e. Action to be taken in the water.
    f. Action to be taken when abroad survival craft.
    g. Main dangers to survivors when the water.

2. Special duties assigned to each crew member as directed in the muster list must be carried out faithfully.
3. Knowledge of all types of life saving appliances normally carried on board ship including its equipment's.
4. Knowledge of various types of devices used for launching survival craft.
5. Method of launching survival craft in rough weather.
6. Use of painter, sea anchor, steering oar, and wave oil.
7. Radio devices carried in survival craft including APIRB, SART etc
8. Use of first aid kit effects of hypothermia and its prevention.
9. Use of protective clothing, shelter cover or exposure cover.
10. Method of starting and operating lifeboat engine.
11. Use for rescue boat emergency radio EPIRB SART and pyrotechnics immersion suits, thermal protective aids and other devices.
12. How to handle a life boat in rough weather including steering, towing and beaching.
13. Knowledge of Helicopter pick up.
14. How to rig the breeches buoy and knowledge of various type of signals.
15. Will power to live or to survive.

Chapter 2.

LIFE SAVING APPLIANCES LIFE BOATS

A. LIFEBOAT

In official terminology, it is a boat which sustain the life of people from the time of Abandon Ship until the rescue come. Properly constructed and shall be of such form and proportions that they have ample stability in a sea way and sufficient free boat when loaded with their full complement of persons and equipment. All lifeboats shall have rigid hulls and shall be capable of maintaining positive stability when in an upright position in clam water and loaded with their full complement of persons and equipment.

All ships carries lifeboats and life rafts for the purpose of safety of personnel out at sea until help arrives. On abandoning ship boats should be pulled or driven clear or of the stricken vessel. These boats are of special design and construction such as opened lifeboats partially enclosed lifeboats, partially enclosed self righting lifeboats, self righting totally enclosed lifeboats, free fall self righting totally enclosed lifeboats, totally enclosed self lowering self righting (fir protected) and water sprinkler system with air support system , and rescue boats are manned whenever there is great threat to life and property of the vessel. These boats are fitted on with internal buoyancy tanks or compartments sufficient to float if the boat is flooded and open to the sea.

All life boats shall be sufficient strength to enable them to be safely lowered them into the water when loaded with their full complement of persons and equipment and be capable of being launched and towed when the ship is making head way at speed of 5 knots in clam water. Its hull and rigid canopy shall be fire retardant or non combustible.Seating shall be provided on the thwart, benches or fixed chairs fitted as low as practicable in the lifeboat. Each lifeboat shall be of sufficient strength to withstand when loaded with its full complement of persons and equipment and with when applicable skates or fenders in position, and in lateral impact against the ship side at an impact velocity of at least 3.5 m/s. and also a drop into the water from a height if at least 3 meters.

The vertical distance between the floor surface and interior of the boat shall not be less than 1.3 m for a lifeboat permitted to accommodate 21 persons or less and 1.7 m for 24 persons and more. No lifeboat shall be approved to accommodate more than 150 persons having an average mass of 75 kg and all wearing lifejackets that can be seated in a normal position

without interfering with the means of propulsion or the operation of any of the life boat's equipment.

LIFE BOAT ENGINE

The engine shall be provided with either a manual starting system or power starting system, with two independent rechargeable energy sources of power for radio and search light. The engine shall start at an ambient temperature of 15degree C or at different temperature capable of operating for not less than 5 minutes after starting from cold upon the lifeboat out of water. The speed of lifeboat when loaded with its full complement and equipment shall be at least 6 knots when towing a 25 persons life raft loaded with its full complement of persons and equipment's. The engine should be air cooling or water cooling system.

Starting Engine

1. Check that there is sufficient fuel in the full tank or pre check the oil level and there should not be water in the fuel , if water is there open the bottom of screw plug and drain out the water from the fuel tank, when oil starting flowing down then screw down the plug.
2. Connect or open the fuel supply by opening the fuel supply lever, check the dip stick lubricating oil level at two points i.e. engine and the gear box.
3. Prim the full system if necessary.
4. Check that the gear lever is in neutral position.
5. Turn throttle control level to almost vertical on fast position.
6. Move the decompression level towards the fly wheel and fit starting handle.
7. Now turn handle slowly from 3 to 20 turns to prime combustion chamber and lubricating system.
8. Crank the engine really fast and when speed is obtained return the decompression lever, to the fire position , but continue to crank until the engine fires.
9. Must remove starting handle and reduce engine speed as required.
10. Or push in the choke gradually until the engine is running smoothly.
11. Must remove starting handle and reduce engine speed as required.
12. Or push in the choke gradually until the engine is running smoothly.
13. If the engine running smoothly and cooling water discharge is steady, put the helm over in the required direction and engage the gear lever Ahead or Astern. Adjust speed with the throttle control.
14. In case of rescue boat, outboard engine, never run or never test or outboard engine out of water. The reason is the impeller is a tight fit and will rip in seconds if operated dry.
15. After starting the engine check oil pressure gauge to check the flow of oil.

Stopping Engine

1. To stop the engine turn throttle control anti-clock wise and hold it until the engine stops or if fitted pull the remote stopping control.

2. Close the fuel supply lever.

Note : To ensure a fuel supply free of sediment and continuous running in an emergency lifeboat and rescue boat fuel tanks should be thoroughly cleaned out annually.

DESALTING APPARATUS

Contents of the `Permute' sea desalting kit (Approved by D.O.T)

2 cardboard container.

1 storage bag of rubberized fabric with securing cord.

1 storage bag of rubberized fabric with filter pad drinking tube, plug and lanyard, chemical charges each containing 4 cubes.

After removing the contents of the pack, a metal plug is inserted in the purifier bag outset tube. The bas is then filled with sea water to the level indicated and one chemical charge of 4 cubes is added. The content are kneaded for 5 minutes and then shaken occasionally during a period of 30 minutes. The reaction between the chemical charge and dissolved salts in the water is then complete, and clear drinking water can be squeeze through the outer tube into the mouth or into a container. Residual solids and salts are retained by the filter pad in the purifier bag, these deposits are rinsed from the bag before the next desalting operation. Full instructions are printed on the storage bag.

B. LIFEJACKETS

Every lifejacket must have a proper workmanship (orange in color) and highly visible in colour). A lifejacket is made of non inflaming material and so designed that :

a. It can be worn or don within a period of 1 minute without any help or assistance after demonstration
b. From 1st July1986 should be worn one way only but old types of life jacket which is still carried on board ship's are being worm inside out or both way and cannot be donned incorrectly.
c. Capable of turning the wearer to safe floating position in still water within 5 second and support the head so that the mouth shall be not less than 120 mm (6 inches) above the water.
d. Unaffected by oil or oil products and it will not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 sec

e. Be fitted with a strong loop to facilitate towing or rescue a man.
f. Be fitted with an approved plastic whistle attached by a lanyard.
g. It allow the wear to jump from a height of at least 4.5 m into the water.
h. It turn the body of an unconscious man around over his back to an angle of 20° from vertical and keeps his face 120 mm clear of water.
i. It shall allow the person wearing it to swim and board a survival craft.
j. Be fitted with a light of 0.75 candla power for 8 hrs or 50 flashes per minutes upto 2 hours and can be connected or disconnected.
k. A lifejacket which depends on inflation for buoyancy shall have not less than 2 separate compartment.
l. It shall inflate automatically or immersion or be capable of being inflated by month.
m. It shall be marked with it serial number, its trade marks : M.O.T. or D.O.T. stamp and the word FRONT is to be printed on both sides of the lifejacket . A child lifejacket which support upto 32 kgs of weight is marked as child, and 32 kgs and upward which support the weight is marked adult. Children lifejacket should be marked child.
n. 5% extra carried on passenger ships and cargo ships should be stored on deck near embarkation deck or at muster stations.
o. Every ship must carry an approved type of lifejacket for evry person on board. Unless these can be adapted by children a ship must also carry a sufficient number of lifejackets which are suitable for children.
p. Be fitted with a retro reflective tapes or material.

Note: It is important to understand that lifejackets are issued to every individual person on board the ship which support him in water until rescue comes.

HOW TO JUMP INTO THE WATER WITH LIFEJACKET ON

As far as possible avoid jumping into the water. Try to board a survival craft without getting wet or getting into the water, by ladder, ropes, nets, lifeline, water hoses etc. Lifeboats and davit launching life rafts are boarded from the embarkation deck. If due to any reason, it becomes necessary to jump, you do so from a height of not more than 4.5 m to 6 m. Make sure that the tapes of the lifejacket must be tight. You must jump only clear of propellers i.e stern or bow on a higher side only. Before jumping make sure that there are no obstructions in your way and that you are not jumping on to a boat or on the canopy of a lifeboat, life raft or any such flotation.

Sea around if any lifeboat or life raft is nearer to you. Draw their attention by calling lifeboat or life raft or using whistle, then look parallel to the horizon, hold down your lifejacket by one hand and block your nose with other, keep your feet together and never jump head on dive, jump feet first , and swim clear of the ship or swim nearest to your boat or life raft or board it. Do not try to swim much longer distance. Try to attract attention by lowing whistle provided in your lifejacket or swim back stroke and wait to pick you by rescue boat. If life

boat or life raft is not seen then you must swim at least 100m, clear of the vessel, you will be picked up by the rescue boat in course of time.

C. IMMERSION SUITS

1. IMO general requirements for immersion suits.

a. The immersion suit shall be constructed with waterproof rubberised material such that:

i. It can be unpacked and donned without any assistance within 2 minutes taking into account any associated clothing, a lifejacket if the immersion suit is to be worn in conjunction with a lifejacket.

ii. It will not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds.

iii. It will cover the whole body with exception of the face, hands shall also be covered unless permanently attached gloves are provided.

iv. It is provided with arrangements to minimize or reduce free air in the legs of the suit.

b. An immersion suit which also complies with the requirements for a lifejacket may be classifieds lifejacket.

c. An immersion suit shall permit the person wearing it, and also wearing a lifejacket, it the immersion suit is to be worn with a lifejacket, then the person should be able to:

i. Climb up and down a vertical ladder at least 5m (16.25ft) in length.

ii. Perform normal duties during abandonment.

iii. Jump from a height of not less than 4.5 (14.9 ft) into the water without damaging or dislodging the immersion suit, or being injured, and .

iv. Swim a short distance through the water and board a survival craft.

d. An immersion suit which has buoyancy and is designed to be worn without lifejacket shall be fitted with a light and a whistle.

e. If the immersion suit is to be worn in conjunction with a lifejacket, the lifejacket shall be worn over the immersion suit. A person wearing such an immersion shall be able to don lifejacket without assistance.

D. THERMAL PROTECTIVE AIDS

Thermal protective aids are made of water proof low convective, insulating material . These will be required for all persons in open lifeboats who have not been equipped with immersion suits. These are light weight strong plastic bag or suits with arms which cover the whole of the body, with the exception of the face. They are highly visible in colour and easy donned. Their function is to reduce both convective and evaporative heat loss from the wearer's body. They can be removed in the water in 2 minutes, if the wearer finds it difficult to swim. They provide thermal insulation to the body in temperature ranging from 20° to 30°C.

E. INFLATABLE LIFE RAFTS

The inflatable life raft is made of rubberized material coated with synthetic fabric and it shall have even number of buoyancy tunes. They may be circular in shape, oblong or hexagon shape, usually double buoyancy tube and both shall be independent of each other. If any one of the tube damage than the other shall be capable of supporting all the persons the raft is certified to carry.

Construction must in included a canopy of double layer of highly visible in colour will protect the occupants against exposure and shall have a means of catching rains, from which there is a tube leading into the raft for collecting of rain water. Both the inside and outside of the canopy have a lamp , powered by separate sea water activated batteries, burns at a 4 luminous candela power for at least 12 hours. The outside lamp could be fixed or flashing. The power can be saved during day light by disconnecting the batteries. Even life raft includes double floor, double layers of canopy, double buoyancy tubes and a number of pockets which will fill with water, when the raft is launched, together with gas bottle give stability to the raft in a sea way.

Every lift raft shall be so constructed as to be capable of withstand exposure of 30 days afloat in all sea climate is dropped in the water from its stowage height of 18 meters, there will be no damage to the life raft, and its equipment. If the life raft is to be stowed at a satisfactorily drop tested from at least from that height.

The floating life raft shall be collapsible of withstanding repeated jumps on it from a height of at least 4.5 meters above on its floor with and without the canopy erected. The life raft and its fittings shall be constructed as to enable it to be towed at a speed of 2 knots in calm water when loaded with its full complement and with one of its sea anchor streamed. The life raft shall have double layers of canopy to protect, the occupant from exposure which is automatically set in place when the life raft is launched and water borne.

The sub-division of the buoyancy of the compartment and the means of inflation are to be such that if only half of the compartment is inflated, the raft will still support its approved complement of survivors. The gas used for inflation of the raft must not be injurious to the occupants. Inflation is to occur automatically by the pulling of the painter attached with gas bottle device. Means must be provided topping up the buoyancy compartments and must be capable of operating through the temperature range, ranging from –30°C to +65°C . The raft must be stowed so that it is readily available in an emergency, inflate and break free from ship if ship sinks, no extra lashings shell used to secure the raft in its stowage position. They must be fitted with an automatic release mechanism know as hydrostatic release unit (HRU) . The life raft maybe contained in GRP containers or valises. They are kept or stored on cradle

or ramps specially built onboard ships on the ships side and its painter must be secured to a strong point onboard ship with week-ink attached to H.R.U.

Retro reflecting tapes must be fitted on the top side as well as bottom of the life raft. The raft inflated with CO2 gas and some extra gas at the ratio of 3.5 gm nitrogen gas at the rate of per person capacity of the life raft is added which act as an anti freeze agent. The gas contained in the gas cylinder is depend on the size and type of life raft which is from 6 kg weight to 8.5 kgs weight. The gas is non inflammable and non toxic, through it can cause asphyxiation in case of gas leak. Should the life raft capsize or inflated upside down it is capable of being easily righted up by one or two persons, by means of righting strap is provide facing towards the windward side. The raft is provided with one or two opening. Every opening is fitted with a ladder or boarding ramp to enable survivors in the water to climb abroad the raft. The total weight of the life raft with its container should not exceed 185 kgs in cargo ships. Life raft carried in merchant ships are from 12 persons 20 & 25 persons capacity. 6 persons capacity life raft are only supplied in such types of ships where the place of work is 150 meter and more from the stem or stern. If the distance from stem or stern is 150 meters and more on forward and aft then 6 persons capacity life raft are provided on both sides to those persons working there and they don't have enough time to reach their embarkation stations and also they will get their life jackets from these places.

The life raft are packed in its GRP (Glass Fiber Reinforced Plastic) containers or canvas made valises is placed abroad ship. The end of the raft painter must be made fast a strong point on the ship. It sometimes happens that on tugging the painter to activate the gas bottle for inflation of raft only half the raft inflates. This is probably due to that fact that some life rafts have two gas bottles, therefore give the painter another tug which will most probably activate the second gas bottle and inflate the raft completely.

Remember that life raft must never be inflated on deck because it might get damage by friction or chaffing or by any sharp objects.

They should be thrown overboard before inflation when ordered abandon ship davit launched life rafts must be swing out outboard and then be inflated and boarded at the embarkation deck level.

Launching of life raft

Preparations must be made before launching a life raft such as :

a. Removing all obstacle railing etc.

b. Rig the boarding ladder.
c. Make sure that its painter must be secured to a strong point or if it is brought launching positions, its painter must be secured before throwing the life raft over board.
d. Throw the life raft over board.
e. Pull all the slacks of the painter and gives hard tug or pull, it with inflate within the period of 20 to 30 seconds time and one minute in between 5°c to 20° c 3 minute in 0° to 30° c.
f. If the life raft inflate upside down, it can right up by one or two persons facing windward as per the size of the life raft. 12 persons and below one person and 13 and above 2 persons are required to right up the life raft.

Instructions of immediate action in a life raft

Upon entering the life raft, the instructions on survival card, concerning immediate action should be read carefully by the in-charge or any senior survivor to the other survivors. The instructions should be written in one of the official languages of the country or in appropriate language and or in English. After all the occupants have boarded the life raft the leader should do the following.

a. Pull all the slacks of the painter towards the ship and cut the painter and get clear off the ship to a safer distance.
b. Look for any survivor in water if any and pick them up and get away from the ships side as soon as possible with the help of paddles and sea anchor . If the sea is rough 2nd sea anchor can be used which is kept in the emergency pack.
c. Close up all entrance flaps of the life raft if the sea if rough or cold winds are blowing.
d. Ensure sea anchor streamed when clear of the ship's side.
e. Read survivor instructions.

F. LIFEBUOYS:

An approved lifebuoy shall be capable of floating in fresh water at least 24 hrs with ½ kgs of iron suspended from it and must be constructed of solid cork, synthetic material or other equivalent . Its inner diameter is 400 mm or 16 inches and the external diameter is 32 inches or 80mm shall bepaited a highly orange visible colour. The major axis of the section shall be 6 inches or 15 cm and the minor axis shall be 4 inches or 10 cm . With 4 equal distance bucketed to 9.5 mm of buoyant rope must be seized round the outside edge.

1. Lifebuoys must be readily available on both side of the ship and at least one near the stern of the ship.
2. One on each side of the ship at mid ship point, must have a buoyant line of length equal to twice the dropping height or 30 meters of 8 mm dia whichever is the greater lifebuoys must be fitted with light maker functioning for 2 hours flashing or continuous.

3. While two lifebuoys shall be provided with self activating light and orange smoke signal and be capable of quick release from the navigating bridge in case any person fall overboard, burning period of light is 2 hours and for smoke 15 minutes.
4. Each lifebuoy shall be marked in block capital letters the name of the ship and port of registry on which it is carried.
5. Have a mass of not less than 2.5 kg 3, 3.5, 4, 4.5 , 5, 5.5 and not more than 6 kgs.
6. Lifebouy attached with light and smoke marker should not be less that 4 kg of weight and upward.
7. Be fitted with 4 grabline not less than 9.5 mm in dia 4 time the outer diameter and the grabline shall be secured at 4 equidistant points around the outer circumstances of the lifebuoy to form four equal loop not less than 60 cm each.
8. Light should not be less that 2 candla power all round or 50 flashes per minutes.
9. Buoyant lines 30 m length non kinking, 9 mm dia and breaking strength of not less than on Kn force.
10. Can be dropped from a stowage height or 30 meters and it should retain its shape.
11. Be of a highly visible orange colour.
12. It should not be adversely affected by oil or any oil products.
13. Life buoy should not be painted in any other colour except these required for ceremonial use.
14. A lifebuoy should be of circular shape and is made of

a. Polyarenthene or synthetic material
b. Cork
c. Copake or balasa wood
d. Thermacol in cased or covered in plastic cover etc.

Chapter 3

EMERGENCY PROCEDURES

GENERAL EMERGENCY ALARM SIGNAL

It is an only signal for summoning crew and passengers when ever any emergency occur, to their muster station. It consists of seven and more short blast followed by one long blast on the ship's whistle or siren and additionally on an electrically operated bell or kiaston or other equivalent warming system. Emergency signal, which shall be powered by the ship main power supply or the emergency source of electrical power in case the ship's power supply fail. The system shall be capable of operating from the navigating bridge except for the ship's whistle, also from other strategic points. It shall be audible throughout at the working places engine room and all the accommodation.On hearing the emergency signal, all persons must go to their muster stations as per the must list. They must put on their warm clothing or water proof clothing or extra clothing including head cover cap, pullover and collect their life jacket or donning their lifejackets and have a good drink of water, and swing into action to save the ship, by way of controlling the situation and preparation of all life saving appliances.

THE MUSTER LIST

The muster list shall be prepared by the master of the vessel before the ship proceeds to sea, and format of the muster list for a passenger ship must be approved by the government and it must be kept revised at all times as necessary if more than 25% o the crew changes.

The muster list shall specify :

1. The muster list shall show all the special assigned to the different members of the crew against their name and rank to ensure that :

a. Closing of water tight doors, fire doors, valves, scuppers, vent pipes side scuttles, sky lights, port holes cowless and other similar opening.
b. Equipping survival craft by way of such as extra food, biscuits, sugar cubes, tinned milk, tinned fruits, fresh fruits and milk products, extra water, extra fuel and blankets etc.
c. Name of key persons and
d. Substitutes of key persons, incase any one of the key persons who may become disabled, taking into account different types of emergencies may call for personnel with variety of skills.
e. Mustering of passengers and donning of lifejackets correctly and that they are suitable clad.
f. The general preparation of life saving appliances, such as lifeboats and life rafts to their embarkation deck.

2. The muster list shall show all the special duties for fighting the fire having ragard to the ship's fire control plans, such as managing of fire parties, fire fighting equipment etc.
3. Carrying of emergency radio EPIRB, SART, as detection equipment.
4. Ship's pyrotechnics (12 numbers from the bridge)
5. Sounding of an emergency signal.
6. The order of abandon ship by the master of the vessel, copies of the must list must be posted in conspicuous places, including the navigating bridge, crew accommodation and engine room.

And in passenger ships the list shall show the location of passenger muster stations. Usually these will be the public rooms, so as to protect passengers from the weather. In such places illustrations and instructions are to be posted including passenger cabins, at muster stations and other passenger spaces, informing them of their muster stations and how to done lifejackets. general emergency signals, their lifeboats and life raft station, abandonship signal and essential action to be taken in an emergency. They may be issued with a card and cards are also posted at individual cabin or berth.

EMERGENCY STATIONS

Everyone think that they will never have to abandon ship and most people never have to but emergency do occur when they are least expected. It is absolutely essential to know what to do and how to do it. For that essential knowledge of LSA and F.F.A. equipment's the must, the vessel you have joined. So that in an emergency you are about to use one quickly and effectively. Make a habit of always taking a long drink of fresh water whenever the signal for boat drill, abandonment drill or emergency station is sounded. You must read the muster list on joining your vessel and must be responsible in the event of having to abandonment or in the event of fire, and if such any other duties are allocated to you in the must list such as to carry EPIRB. SART , Emergency Radio, extra provisions, water fuel, blankets etc.On hearing the emergency signal, every person will go to their muster station as per the muster list.

The Boats crew will do the following and prepare their lifeboats and life rafts and bring them to the embarkation deck, and do the following :

a. Remove the guard rail.
b. Two persons will go inside the lifeboat and remove the boat cover etc.
c. Pass the toggle painter forward from inner side of the sling and rapport plug shipped Lifeline clear falls clear, rudder shipped (Some boats have two plugs one forward and one aft and some boats have only one plug).
d. Have all the crew and passengers mustered and lifejacket checked.
e. Check all lifeboat equipment to ensure that they are properly secured and ready use.
f. Test the engine both head and stern for a period of not less than 3 minutes.
g. Report to the bridge and if permission given, then let go the gripes and lower the board to the embarkation deck.
h. Before it will become necessary to abandon ship, to have some extra gear put in the boat such as emergency radio EPIRB, SART, blankets, tinned food, biscuits, notebooks, pencils, extra torches, waterproof watch, batteries (cell) and bulbs, palm and needles,

ship’s pyrotechnics, extra water, extra fuel, boat charts etc. Never jump in hurry if left onboard or lower your lifeboat or life raft if possible. Remember that your ship is number one lifeboat. The ship’s damage control and fire fighting organization should be efficient to overcome any emergency. For that you have been trained by frequent drill sand training programs from time to time to make the best possible of the ship’s equipment’s Many lives have been lost by premature and unnecessary abandonment of ship’s.

Never jump without lifejacket. Always try to keep dry and board the lifeboat or life raft. Do not try to swim unnecessarily, it uses vital energy and assist hypothermia to set in. If you are in the water try to board your lifeboat or life raft. Wet clothes are better than no clothing, wring out top layer of wet clothing and put it on again as quickly as possible.

Chapter 4

ABONDON SHIP PROCEDURES

ABANDON SHIP SIGNAL There is no statutory ABANDON SHIP SIGNAL. It is likely to be given verbally and through a public address system by the Master of the vessel only. It may be different from ship to ship and company to company. Before giving abandonment order, fire fighting damage control party, wheel house, engine room, radio room, must be called off and final report made by each lifeboat, to the bridge. Then the master of the vessel give the order, to man the boats and clear the ship's side and danger area to a safer distance about 0.25 nautical miles.

ABANDON SHIP :

When all our efforts to save the stricken vessel prove to be unsuccessful, the ship will be abandoned. But never leave your vessel until it leaves you. Your ship is the safest lifeboat. Never jump in panic. Good organization and training will help to ensure that available time is used to its best effect and that abandoning the vessel is carried out in as safe a manner as possible and without panic, maintaining complete discipline , silence, strict adherence to orders and immediately controlling any evidence of panic, using force if necessary. All members of he crew and passengers will be required to exercise self control, courage and usefulness. Failure to observe all these facts may result in unnecessary loss of life. Public address system should be fully utilized.

The last person to abandon the vessel will be the master and those who engage in controlling the fire, radio officer, chief engineer and that no one left on board. Before leaving the vessel all machinery should be stopped and water tight doors and hatches should be tightly closed.

When ordered to man the boats and life rafts, should be lowered with as many people abroad as possible and try to lower all life boat and life raft and should then quickly clear the ship side and lie off ready to embark the remaining complement from the water if any. This will avoid a dangerous waiting period alongside the vessel . Except in rough weather the life boats and life rafts should be secure together and towed well clear of the wreck area by a motor lifeboat, and rescue boat should go around the wreck area to pick up any survivors if any in the water, swimmers should group themselves together and support each other till the rescue boat come to pick up swimmers must move away from the ship as quickly as possible since when it founders to avoid violent local section.

REMEMBER

1. NO SHIP IS TO BE ABANDONED.EXCEPT BY ORDR OF THE MASTER.
2. As apart from the general emergency alarm signal, the maser of the vessel will designate a special signal for ABANDON SHIP.
3. There is to be a separate signal for the practices of boat and fire drills . The letter “B” is commonly used.
4. There is to be a special signal for `Fire Station’ and the rapid ringing of a gong or electric bell is commonly used.

Chapter 5

SEA SURVIVAL

1. Search for survivors and rescue them as soon as possible by way of maneuvering the life boat or rescue boat. In the case of life raft throw them the rubber ring or rescue quit.
2. Never try to swim for off distance, bring the lifeboat, rescue boat or life raft closed to the survivors.
3. Never try to swim in the sea in case of feeling warm or hot, only just take a dip with rescue ring, as life boat or life raft is very prone to wind and they may drift away from you.
4. Stream the sea anchor to avoid leeway or drifting your boat or life raft. Use sea anchor and or paddles for maneuvering the life raft away from the wreck. Heave up to the sea anchor, there is a spare sea anchor in the life raft emergency pack.
5. Check for nay leakage , if any repair the raft. Repair kit is supplied in the emergency pack and after repair top up the raft with bellow. Leak stoppers are provided for temporary repair. Patch damage as detailed on emergency repair kit.
6. Join other life raft and lifeboats together with the longest line possible to prevent snatching minimum 10 meters.
7. Bale out raft and mop up with sponge, salt free sponge for collecting up due or condensation, it should be collected before sun rise.
8. Wring out all wet clothing and keep as dry as possible. It is better to have wet clothing on the body than no clothing on it.
9. Adjust entrances as per the weather condition.
10. Inflate floor with bellow to insulate you from the cold sea and vice versa. Do not over inflate as flow has no outlet escaping of air.
11. Issue sea sickness tablets to every one and sea sickness bag. It is a remedy to prevent a person from dehydration and seasickness bag.
12. Treat injured make them comfortable and as warm as you can with clothing or hugging them or cuddling them.
13. Read the instructions in the first aid kit before treating them.
14. No water or food for the first 24 hours to any one except, sick persons or injured. Water and food can be given to them as required or the person who have, had lot of bleeding or dehydration by way of vomiting.
15. Put trust worthy person as in-charge of good and water.
16. Try to stay put nearer the position of the wreck. This will help rescuers looking for survivors.
17. Arrange duties or watches as lookout inside and outside the lifeboat and life raft. In cold ½ an hour and normal weather 2 hours duty. Protect the lookout against exposure to hot or cold weather.
18. One or two man can right up the capsized raft by standing on the gas cylinder and heaving back on the righting strap facing windward and two or three men can right up the open, capsized lifeboat by holding the keep grab line.
19. Top up the raft with bellows as the gas contracts at night when it is colder. But during the day the gas will expand and probably blow off through the escape valve. Do not worry about this as these valves are safety valves.
20. Keep a log for recording every day happening.

21. Water: There are three liter of fresh water in lifeboat and one and a half liters in life raft for each person, half liter per day per person. No water during the first 24 hours as your body is already full of water, and if water is issued on the first day it will go as waste in the form of sweat and urine. Water should be given at sunrise mid-day and sunset. Do not cut down this ration. If you do, you will weaken yourself. Only when you are down to the last cans, should you save for the following day at the rate of ¼ liter a day.

22. Sources of water

a. Raid water
b. Due or condensation
c. Snow
d. Desalting apparatus

23. Do Not

a. Do not drink urine
b. Do not drink sea water
c. Do not dilute fresh water with sea water
d. Do not drink alcohol.
e. Do not smoke
f. Do not chew or suck ice, first melt it and then drink it.
g. Try and increase your water ration by way of collection rain water. Drink as much as you can and save the cans water. Drink rain water first as it will not keep fresh for longer.
h. If no water at all keep button in the mouth, it will keep your mouth moist and take slow and long breath through nose.

24. A food ration totaling not less than 10,000 (Kj) Killojules, kept in air tight and water tight tinfoil packing. The ration shall be readily divisible into four one day proportion per person. Food ration should be given at morning and evening only. Do not cut down this ration. It should be only when you are on the last day then save one cube for the following day.
25. In case of tropical area deflate the flower to help cooling during the day time but inflate it again at night as tropical nights can be cold. Keep your clothes or canopy wet during day. Rinse them out before sunset and get the raft as dry as possible before sunset. Avoid sunburn for direct exposure to the sun. Do not swim and do not leave your raft, it may drift away fast.
26. Distribute crews evenly and bunch together for warmth in case of cold and be at ease in case of warm climate.
27. Rig emergency transmitter abroad, and switch on EPIRB and SART. Once they are switches on should not be switched off.
28. Watch for frost bite and hypothermia.
29. Collect useful floatsam and some time, we have to look for EPIRB , SART or emergency radio also, in case if we are not able to carry them in the lifeboat.
30. Take charge of weapons or any sharp objects.
31. Take charge of all pyrotechnics.
32. In case of very cold, the cloths are wet, then close both the entrance of the life raft. People wearing wet clothing will soon find that air becomes saturated and no further cooling of their bodies occurs. Heat balance is achieved after 20 to 25 minutes time.
33. Take any unoccupied survival craft in tow and use them for store, sleeping accommodation and as back up raft for use, in future emergency.

34. Do not massage frost bite, keep feet dry, as possible, keep moving fingers and toes, move ankles and knees, clench fingers and stretch limbs, wrinkle face and nose, ear with hands. This keep the blood circulating. Put feet up for at least 5 minutes in every hour, keep weather cover closed except for small opening to ensure ventilation.
35. You have survived so far. Do not get panic, help each other by way of self moral. Have confidence in yourself and to have ability to stay alive to have will power to stay alive. You must make yourself fit in all climatic condition, whether you are in lifeboat or life raft . Try to find out ways and means to survive , by way of your leadership qualities.

How to survive in a life raft

a. Identify person's incharge of the life raft.
b. Post of lookout .
c. Open equipment pack
d. Issue anti-sea sickness medicine and sea sickness bags.
e. Dry life raft floor and inflate floor if appropriate.
f. Maneuver towards other life rafts, secure life rafts together and distribute survivors and equipment between survival craft as required.
g. Administer first aid if appropriate.
h. Arrange watches and duties.
i. Check life raft for correct operation and any damage and repair as required.
j. If CO2 is leaking into the life raft's ventilate the life raft by opening up entrance flaps, and detect the leak, repair it and top of life raft by topping of pump.
k. Check functioning of canopy lights and if possible disconnects power during day time.
l. Prepare and use detection equipment such as SART, EPIRB including radio equipment.
m. Gather up any useful floating objects.
n. Protect against heat, cold and wet conditions.
o. Decided on food and water ration.
p. Make proper use of available pyrotechnics.
q. Prepare action for:
i. arrival of rescue units
ii. Being taken in tow
iii. Rescue by helicopter
iv. Landing
v. Beaching

RADAR REFLECTOR

A radar scanner is only as effective as reflector which turns it signal. Therefore for a reflector a signal, the reflector must be visible to the scanner.

Large high sided ships such as VLCC's particularly when they are proceeding light, will have a large are ahead which is screened from the saner, by the bows. Moreover they will probably

be proceeding ahead at a fast speed. Obviously then unless an object is seen by the scanner will ahead of the hsp or it may not be seen at all. But the time it is sighted by the look out man (if needed it is sighted) it may be to late for the ship to after course, should it be on a collision course with a small boat or life raft.

It is therefore essential that a radar reflector is mounted as high as possible. A minimum height of 4 m (13ft) above sea level will give an effective coverage over a minimum radius of 5 miles. The reflector should if at all possible, never be mounted any lower than this. It should be mounted in as near a vertical position as possible and should not be masked by an metal part of the superstructure (metal masts will not create enough shadow to cause concern).

Some life rafts now include radar reflective strips in their canopies.

One life raft, life boats and sailing yachts which are not provided with a radar reflector, the only alternative is to keep the sails or canopy wet with sea water. However, the actual effectiveness of a wet sail or canopy is very dubious while the continued effort required would mean that it could only be carried out when a vessel was sighted.

SHARKS

If there is shark infested area then the people should group together (not lash each other) facing outwards. Retain all clothing especially on legs and feet . Keep quite and as stationary as possible and only move to keep the shark in sight. Bind bleeding , wounds and if necessary to move to do so with rhythmic strokes. Getting into an oil patch will help you, but our best defense is to get into the boat or life raft, if this is possible. Never try to temper with shark or whale or trial your hand in the water from the boat or life raft.

Hydrostatic release unit (HRU)

The lashing or securing strap of a life raft container on deck must be secured by an automatic release mechanism. This usually takes the form of a hydrostatic release.

RATIONS FOR LIFE BOATS AND LIFE RAFTS (KHJ) KILO JOULES

Totally food ration for reach person not less than 10,000 KJ (kilo Joules) is kept in an airtight pack, capable of being opened with wet or cold hands and stowed in water tight containers per person. The ration shall be readily divisible into four equal one day portion per person and 3 litters of fresh water per person at the rate of ½ liter per day per person in lifeboat and ½ liters of fresh water per person in the life raft at the rate of ½ liter per person per day is supplied. No food and water to the issued for the first 24 hours to any person except or injured or dehydrate persons after abandoning the vessel or ship. In lifeboats and raft, one third of the water may be replaced by desalting apparatus capable of producing fresh water within 2 days or 48 hours. No food or water is carried in rescue boats.

Equipment of inflatable life rafts : Solas A Pack

1. buoyant rescue quit at least 30 meters of buoyant line.
2. Two sponges, one salt free for collecting condensation.
3. One safety knife with a buoyant handle for 12 persons or below and 2 safety knifes 13 person and above.
4. One buoyant bailer, for 12 person or below and two buoyant bailer 13 persons and above.
5. Two sea anchors, one permanently attached. Second sea anchor can be secured in case of rough weather.
6. Two buoyant paddles.
7. One rust proof graduated drinking vessel.
8. One survival instruction manual/card
9. Instructions for immediate action
10. A puncture repair kits a toping of pump or bellows.
11. One first aid kit in water proof casing
12. One plastic whistle
13. One water proof electric torch
14. One radar reflector or one (SART)
15. One day light signaling mirror or heliograph
16. One set of fishing tackle
17. One set of life saving signals
18. Size anti sea sickness tablets and sea sickness bag for each p

Chapter 6

SEARCH AND RESCUE TO SURVIVAL

It is a stark fact that life saving search and rescue (SAR) a featured subject in safety of life at sea and at any moment , become a matter of vital concern to any mariner. A disaster at sea can result in your being cast away either in a lifeboat or life raft with your ultimate fate dependent on outside assistance.

The effectiveness and efficiency of the search and rescue services are well known but no matter how dedicated their efforts, their work will be useless if you can survive as a cast ways until you are located. However to meet the short term needs of the survivor the life boat and life rafts are equipped with the requirement, for few days, such as water, food, first aid kit, signaling equipment and even survival instructions are in the life boats or life rafts, but the signaling equipment and even survival instructions are in the life boats or life rafts, but the range of possible survival situation in infinite. The odds in your favor will be vastly improved if you acquire survival information and techniques before any emergency arises.

1. Breathing through the nose to minimize saliva evaporation.
2. Talking only when necessary.
3. Water drinking in the cool of the morning, mid day and evening in small sips.
4. Using sea water at day time to we clothes to reduce heating but cloth should dry before sunset as nights are very cold.
5. New swim unnecessarily.
6. Use your signaling devices whenever required but carefully and reasonably. Remember in location, signaling, you may never have a second chance to make good first impression successful search and rescue depend on survival. You need the knowledge and skill from which justified self confidence and self belief arise, for they give you the best chance of surviving, and you need to acquire them before any emergency occurs.

POINTS TO BEAR IN MIND BEFORE JUMPING:

If there is no survival craft available it may be preferable to abandon ship from the bow or weather side in order to get clear of the ship side with more certainly.

1. Have your lifejacket well secured and hold it down by crossing the arms over the chest blocking of the nose with one hand.
2. Make sure that every thing clear in the water, such as any floating object etc.
3. Draw attention of the life boat or life raft if any nearby with whistle.
4. Never dive, keep your feet together, look straight ahead and cross legs while jumping.

5. Swim on your back stroke. Try to board the life boat or life raft as soon as possible. Never swim for longer periods.
6. Never jump more than 4.5 to 6 meters height.
7. As far as possible, avoid jumping into water. Try to board survival craft without getting into the water by ladders, life line, water hose and scramble nets or available means.

Chapter 7

TRAINING DRILLS & MAINTANANCE

1. On bard training In the use of ship's Life Saving Appliances, Fire Fighting Appliances including survival craft equipment's lifeboat radio, life boat engine and pyrotechnics shall be given as soon as possible to the new crew but not latter then two weeks after a crew member joins the ship.

2. Instructions In the use ship's of the life saving appliances and fire drill including survival crafts lowering / hoisting of boats and launching appliances shall be given as the same interval, in the form of drills, covering all different parts of the ship's life saving system within the period of two months . Such as abandon ship operation, use of inflatable life rafts, davit launching life raft, hydrostatic release gear unit (HRU) problem of hypothermia first aid treatment for hypothermia and other injuries etc.

Records the date when any muster or drills are held such as , details of abandon ship drills and fire drills, and instruction of other LSA, FFA and onboard training including opening and closing of water tight doors, fire doors and other opening shall be recorded in the log book as prescribedby the administration. If a full muster or training drill training is not held at the appointed time, then entry shall be made in the log book stating the reason

3. **Training manual** : Every ship shall carry a training manual which shall contain instruction and information in easily understood languages by all crew members and shall be made available in an appropriate languages in all crew accommodation, recreation room each crew cabin, library and bridge . The ship's training manual may be used for instructional purposes and also as reference material where significant numbers of crew member's are non English speakers. The training manual carrying instructions and information on the life saving appliances provided in the ship are the best book on the best method of survival. The material may be provided in audio visual from poster or as set of notes.

PRACTICE MUSTER AND DRILLS

1. Each member of the crew shall participate in at least one abandon ship drill and one fire drill every month.
2. The drill of the crew shall take place within 24 hours of the ship leaving a part if more than 25% of the crew have not participated in abandon ship and fire drill on board that particular ship in the previous month.
3. On ship engaged on an international voyage which is not a short international voyage muster of passengers shall take place within 14 hours after their embarkation. Passengers shall be given instruction in the use of the lifejackets and how to done them lifejacket, emergency signal and action to be taken on hearing an emergency signal summoning of passenger to the muster stations with general emergency alarm signal to their lifeboat and life raft station and making them aware of the order of abandon ship.

4. On a ship engaged on a short international voyage, if a muster of passengers is not held on departure the attention of all the passengers shall be drawn to the emergency instructions.
5. Each abandon ship drill include
    a. Summoning of the passengers and crew to the muster stations whenever the general emergency alarm signal is sounded and ensuring that they are made aware of the order to abandon shop specified in the muster list.
    b. Reporting to muster station and preparing for the duties described in the muster list to each crew members.
    c. Checking that the passengers and crew are suitably clad.
    d. Checking that the lifejackets are correctly donned.
    e. Lowering of at least one lifeboat where practicable.
    f. Starting and operating each lifeboat engine. These should be done and run the engine ahead and stem for a total period of not less than three minutes.
    g. Operation of davits used for launching survival craft.

6. Different lifeboats should be lowered in compliance with requirements at successive drills.
7. Each lifeboat shall be launched with its assigned operating crew and maneuvered in the water at least once every 3 months during an abandon ship drill. However all such life boats shall be lowered at least once every 3 months and launches at least annually.
8. Rescue boat other than lifeboats shall be launched each month with their assigned crew abroad and maneuvered in the water.
9. If lifeboat and rescue boat launching drills are carried out with ship's making head way at 5 knots shall be practiced in shattered water because of the dangers involved in the water.
10. All emergency lighting system for mustering and abandonment shall be tested at each abandon ship drill. They include embarkation deck, including water area, companion on way alleyways. These lighting system is provided from ship's main source of electric supply or if this system fail then emergency source of electric supply.
11. In all passengers ships abandonment and fire drill shall take place weakly and in cargo ships shall take place every fortnight.
12. Before the ship leaves port to any destination and at all times during the voyage or in the harbour, all LSA and FFA . Shall be in working order and ready for immediate use.

MAINTENANCE

1. <u>All life saving</u> appliances and their components which are subject to excessive wear and tear with the time and use, need to be replaced regularly or whenever required.
2. <u>Weekly inspection</u> : All survival craft, rescue boats and launching appliances should be physically and visually be inspected to ensure that they are ready for use.
3. <u>Lifeboats and rescue</u> boat's engine shall be run ahead and a stern for a total period of not less than 3 minutes.
4. <u>The general emergency</u> alarm system should be tested from all strategic points weekly. Before testing the emergency alarm, crew must be inform about testing the system.
5. <u>Monthly inspection :</u> Inspection of the life saving appliances including lifeboat equipment shall be carried out using the check life ensure that they are complete and in good working order. A report of the inspection shall be entered in the log book.

6. Wire falls of launching appliances:

a. At 30 months wire falls of lifeboats to be turned end to end.

b. At 5 years, wire falls to be renewed, unless this required earlier by their condition.

c. Stainless steel wire falls may be kept for a longer period provided that they are in good condition.

d. If the falls of a lifeboat worn out of up to 11% of the circumstances on or 7 to 11 wire of a signal strand and damage or broken then whole wire falls is required to renew without any delay as the question of safety of the people at the time of launching of the life boat.

7. Periodic Survey : Life raft, inflatable life boats rescue boats, inflatable life jackets, hydrostatic release unit (HRU) EPIRB, SART, must be send for yearly (12 months) intervals survey by the administration to a proper and approved service station to inspect and maintenance to ensure maximum performance in the marine safety field. If there is any delay in servicing then the period may be extended up to 5 months by the administration or however in cases where it appears proper and reasonable, the administration may extent this period to (12+5) = 17 months.

8. Offence: It is an offence for the life saving appliances on any ship to be in defective condition and under the power's contained in section 430 and 431 of the Merchant Shipping Act 1894, a ship may be detained until such defects have been rectified. Additionally, in some cases proceedings may be taken against the owner or company and master if such appliances are not kept at all times fit and ready for use.

Chapter 8

DISTRESS SIGNALS

PYROTECHNICS

All pyrotechnics must be kept in a weather tight container and have a storage life of 3 years with their date marked on them. The out dated pyrotechnics must not dumped or disposed off at sea but should be returned to the manufacturer only.

1. Rocket parachute Flares:

At lest 12 rocket parachute per vessel on bard a passenger ship and cargo ship to be carried and in addition in those required in the lifeboat and life raft under the new 1986 LSA Regulation. Although only 2 are carried in lifeboat and life raft on short international voyages. At the time of firing a rocket parachute flare, it should be fired at angle which obtained an altitude at least of 300 meters. Descend rate 5 meter/sec, burning time at least 40 seconds, totally extinguished at a height of 45 to 50 meters above the sea level.

Luminous intensity not less than 30,000 t0 40,000 candle power and extinguish above the sea at about 45 to 50 meters.

When an observer sea a rocket in a air at time or in low visibility they must take its bearing. Rocket parachute flares draw the attention of ships, ashore people, helicopter, search and rescue plan indicating that survivors are there. Remember rocket parachute flare should not be fire when any helicopter or plan approaching.

Under normal conditions rocket parachute flares can be fired vertically if there is no wind, if a strong wind is blowing they should be fired at some angle about 10-15 degree according to the speed of wind. If fired into the wind the rocket will tend to seek the wind direction and be deflected at a larger angle and will not reach to a required height of 300 meter, this will rescue its chances of visibility.

If low visibility or low could are there rocket may be fired about an angle of 45 degree downward direction. I has approximate range of about 20-25 miles but in very clear visibility it may be seen about 35 miles range, if a plane flying at 3000 feet height.

2. Hand held red flares

These hand held red flares, 6 per lifeboat and life raft are carried in long international voyages, but 3 in number in lifeboat and life raft in short international voyages.

a. Luminous intensity – 1500 candala power.
b. Burning period 55-60 sec.
c. Range of visibility 5-7 miles
d. Hand flares should be held up at lee ward side at arms length.

Buoyant Smoke Signals

2 per life boat and life raft omitted thick orange smoke for a period of not less than 3 to 3.5 to 4 minutes while the signal is floating in calm water. One buoyant smoke flat is carried in solas B pack.

It has low effect in case of strong wind. A very effective day time signal especially when viewed from above approximate range 5 to 7 miles.

Note : Distress signals burning red in colour are also known as red distress signals such a s rocket parachute and hand held red flares.

LIFE SAVING ARRANGEMENTS FOR SRACH AND RESCUE AND DISTRESS CALL:

Most maritime countries of the world provides lifesaving service for persons in distress in their `coastal areas'. One of the biggest factor in providing assistance is that, they maintained a 24 hours radio watch on the international distress frequencies and also a certain classes of ships are also required to keep a watch at sea. For this, ships are fitted with suitable radio equipment of these distress frequencies to provide immediate life saving service for the rescue of people in distress within their reach around the coasts by playing an important part by way of assistance or saving of the life of people.

Provides that the master of vessel shall, so far as he can do so without serious danger of his own vessel, her crew and passengers, render assistance to every person, even if such person be an enemy who is found at sea in danger. If he fails to do so, he is guilty, of a misconduct

behavior. If the master of any ship in distress requisitions any ship that has answered his call. It is the duty of the master of the requisitioned ship to comply with the requisition by continuing to proceed with full speed to the assistance of the vessel, aircraft or person is in distress at sea must be made or written in official log book.

STATUTORY DISTRESS SIGNALS

These are :

1. A gun or other explosive signal fired at intervals of about a minute.
2. A continuous sounding with any fog signaling apparatus.
3. Rocket or shells throwing red stars fired one at a time of short intervals.
4. A signal made by R/T or by radio telephony or radiotelegraphy or by other signaling method consisting of the group (SOS) in the Morse code.
5. The international code signal of distress by NC.
6. A signal consisting of a square flag having above or elbow it a ball or anything resembling a ball.
7. Flames on the vessel burning tar, oil barrel etc.
8. A rocket parachute flares or hand flare showing red light.
9. A smoke signal giving of orange colour smoke.
10. Slowly and repeatedly raising and lowering arms outstretched to each side.
11. The radio auto alarm signal (12 dashes) on 500 KHZ.
12. The radio telephone alarms signal (two tone) on 2182 KHZ.
13. Signal transmitted by EPIRB) emergency positioned indicating radio beacons.
14. A piece of orange colored canvas with either a black square and circle for identification from the air.
15. A dye marker such as in green or orange in colour.

AUTHORITY TO USE DISTRESS SIGNALS

a. No signal of distress should be used by any vessel unless master of the vessel is in serious and imminent danger or that another vessel or aircraft is in serious and imminent danger and cannot be itself send distress signal.
b. Masters are also reminded of the need to cancel or revoke a distress call if the ship is in longer in danger. Failure to do so on such occasion resulted in serious loss of time.

LIFE SAVING AND DISTRESS SIGNALS.

The importance of instantly recognizing all distress signals and being full conversant with their use, together with the procedure for rendering assistance cannot be too strongly empbaszied. Most maritime countries provide life saving service to persons in distress in

their coastal areas. One of the biggest factors in providing assistance is the 24 hours radio watch required to be maintained by vessels of 500 tones gross and upwards. These watches are kept on a frequency of 500 KHz radio telegraphy (R/T) . The watch is to be maintained at all time except when operator is performing other necessary work and to keep a loudspeaker watch. Silent periods are laid down for 15 to 18 and 45 to 48 minutes past each hour of GMT during which the frequency of 500 KHz must not be used except for distress, urgency safety signals. In the case for R/T the silent periods for 2182 KHz are from 00 to 03 and 30 to 33 minutes passed each hours of GMT. During the silent period vessels which do not come under the merchant shipping Radio Rules required to maintain a watch.

When an operator hears a distress call he must answer it . At the same time allowing a sufficient intervals of ships to acknowledge it which are closed to the distressed vessel.. He must then inform his master for all call, weather other ships acknowledge it, and position of those ships. Master may then instruct him to repeat the call on the distress frequency, acknowledge it. These units are able to transmit on 500 and 8364 KHz and to receive on 500 KHz . They are also able to automatically transmit on 500 KHZ, the auto alarm signal 12 dashes of 4 seconds each having on second intervals, all made within a minute followed by SOS set three time, together with a subsequent long dash of 10 to15 sec. So that listeners can take a radio bearing of the transmitter. On 8364 KHz the same signal is automatically keyed with the exception of the auto alarm signal. Coast Radio station who keeps watch on 500 and 2182 KHz and VHF channel 16. A reply call is relayed on 500 KHz and also on 2182 KHz.

The signal must be revoked if assistance is no longer required.

Failure to this may cause unnecessary waste of time and anxiety to the other person, such as search and rescue aircraft airship.

PROCEDURE FOR TRANSMITTING DISTRESS OR URGENT SIGNALS.

Frequencies used are 500 KHz (RT) and 2182 HZ(RT) . Any other frequency may be used. However, timely assistance may be summoned more quickly on that frequency. The (RT) alarm signal is automatically keyed and sends 12 ashes in one minute. This operates the auto alarm of the other ships. If indicates to ships and cost radio station that a distress call is about to be transmitted. It is immediately followed by SOS sent three times and 10 to 15 second long dashes on auto alarms so that operator may take bearing of the R/T distress call, after a period of 2 minutes which follows operators to stand by for an important call or message.

The call consists for SOS sent three times, followed by the word `DE' followed by the ships call sign sent three times. Then follows the message, which consists for the ships name, position nature of distress and assistance required, including in this, for a vessel if drifting, direction of drift, fire flooding ran ground etc. Lastly there should be sent two 10 to 15 second dashes to enable radio bearing to be taken. Other signal, visual and sound should be used in the darkness and poor visibility. On 2182 the R/T alarm signal consists of two tones transmitted alternately and automatically over a period of 30 seconds to one minute should be used. After 2 minutes the R/T distress call should be sent, consisting of the distress signal MAY DAY spoken word three times, followed by the word DE, this is followed by the ship's name and spoken three times. This distress message is then send as per R/T procedure.

EMERGENCY POSITION INDICATING RADIO BEACON (EPIRB)

Emergency position indicating radio beacon is basically a 406 MHz transmitter, operating through the COSPAS, SARASAT search and rescue satellite system . EPIRB is basically meant for safety of life at sea during emergency when activated EPIRB transmits a coded distress signals in the UHF band 406.025 MHz for alerting search and rescue (SAR) authorities via a low power signal at 121.5 MHz and 243.0 MHz in VHF , band as receiving frequency to assist in search and rescue operations. The EPIRB is activated either manually or automatically.

To activate the EPIRB manually pull the locking pin at the top of beacon. When the beacon is put in the water, or released automatically from the sinking ship there by transmission will start automatically and will stop when the beacon is lifted out of the water . Once the EPIRB is switched on it should not be switched off. On all ships other than those operating within VHF range of coast station and equipped with VHF EPIRB has a float free arrangement . This will operate in the 406 MHz and which will allow its location by polar orbiting station of the COSPAS, SARSAT system.

The EPRIB signal will included a short coded message which will give SAR authority an information concerning the type of beacon. It has to be capable of transmitting continuously for a period for not less than 48 hours and have batteries that do not need replacing at more than 5 years storage life. It must be of a highly visible colour, fitted with retro reflecting material and be capable of floating uptight in clam water.

Great care should be taken while handling the EPIRB . False alarms initiated by misuse of any emergency beacons contributed to the biggest signal increase in the type of jobs we were called to and therefore to the cost of the rescue service we provide.

Sometimes what happens of (SARSAT) search and rescue satellite alarms which turned out to be caused by careless or thoughtless use of beacons, jumped from 45 to 52 in 1991. This means we needlessly expanded more than power or hours and search and rescue aircraft/ helicopter flying time than before while we looked for people we thought were in distress. The helicopter and (nimrods) a large long range maritime patrol aircraft, used on search and rescue duties, while most beacons were switched on accidentally by means of carelessly knocked over the beacon while careless handling or while keeping in a cupboard. Be careful as SARSAT equivalent can receive EPIRB of 121.5 and 243 MHz are also used for homing purposes of Civil / search and rescue aircraft . On no account should they be tampered with or apart from authorized test, activates. However, we certainly hope they will not be, and one way of ensuring this is to prevent the transmission of spurious signals. The EPIRB are many makes and different in sizes and makes . An important milestones for use in life rafts, lifeboats as mounted in its brackets on board ship to release itself automatically from a special mounting bracket when the ship submerged to a depth of 1.5 meters to 4 m of depth. A hydrostatic mechanism free the EPIRB enabling it to rise to the surface and become activate.

How to operate the EPIRB

EPIRB can be operated manually or it can be operated by throwing it in the water or if the ship sink. It automatically release by HTRU unit when submerged in water a depth of 1.5 to 4m depth. In the lower bottom part, two screw heads are fitted . As the EPIRB released and float free from the sinking ship, a lithium battery get operated and EPRIB get activated and automatically start transmitting the coded message every 50 to 60 second in interval.

EPRIB can be operated manually also. Remove the safety pin provided in the upper part by putting the cord and remove the auto / on switch to ON to operate the EPRIB . EPIRB can be kept in the lifeboat or in the water. If EPIRB is operated automatic and if it is lifted from the water it will switched off automatically.

EPIRB can be tested by way of the test switch provided in the EPIRB . Press the test switch for one to two second then release it. The red lamp will burn and it started flashes briefly. After a few seconds the 2n^{d} light of the EPRIB will burn and both these two light giving flashes for 14 to 15 seconds, then 2n^{d} lamp will switched off automatically and the last lamp will continue to flash for the duration of the test period of about 75 seconds. EPRIB should be sent every 12 months for servicing of its battery or battery replacement. If cannot send then service period can be extended to 5 months and during this 5 months time servicing should be completed and certificate to be obtained.

SART (SEARCH AND RESCUE RADAR TRANSPONDER) IN LIFEBOAT OR LIFE RAFT)

Enables a survival craft to show up on a search vessels radar display as an easily recognized series of dots. As most vessels of any size carry radar, then the appeal of SART, is that the nearest ship can be used to locate a lifeboat or life raft without the need for special direction finding equipment. The SART transmits on 9.2 GHz and 9.5 GHz and a typical ships radar will transmit a stream og high power pulses on a fixed frequency between 9.2 GHz to 9.5 GHz. It will collect the echoes received or the same frequency and appears on the ships display unit with echoes dotted around which shows the ship itself at the center if the screen and the relative or true bearing of each echoes pulses from the search and sending back 12 series of pulses in responses, which the radar will then display as if they were normal echoes. A series of dots is therefore shown on the display must easier to spot then a signal echo. Direction of echoes depends upon the height of SART antenna set higher above sea level. Therefore ranges of echoes appear between nautical mile to 10 nautical miles . Airborne detection of SARTS at ranges upto 40 nautical miles given an initial search height of 3000 feet.

DISPLAY UNIT SHOWING THE ECHOES RECEIVED FROM A SARTS.

The one shown is located is nautical mile distant at a bearing of 195° SART is designed t be triggered by the 3 cm radar's of searching ships and aircraft's and will cause a serious of dots to appear on their radar screens. The carriage of a radar transponder in survival craft will except it from the requirement to carry radar reflector . When the survival craft SART ECHOS are pick up by the ship's SART at the survival craft will give a blip which can be heard, means you have been detected.

Three two way radio telephones

At least three two way radio telephones are required for voice communication between the present vessel and a rescue boat or survival craft or different survival craft. The use of portable two way radio telephones should be practiced, they should also carried during drills,

in the survival craft an the rescue boats by the incharge itself. Care should be taken not to use them on channel 16 as the channel 16 provides a working channel acceptable locally to the Administration.

SUMMARAIZING THE REQUIREMENTS OF RADIO AND GLOBAL MARITME DISTRESS AND SAFETY SYSTEM (GMDSS)

The portable radio apparatus should, if possible be placed in a survival craft. It is made to withstand a drop into the water and so that in an extreme emergency it can be dropped overboard to be picked up later by a boat. Although it will withstand a drop into water. It may be damaged by striking floating debris and would cause serious injury, if it struck a person in the water. The radio would be out into a survival craft to which a radio officer is assigned. Some one other than the radio officer should be responsible for collecting the portable radio and taking it to the survival craft. The radio officer will be busy with distress message on the ships equipment until the late monument. Eac ated. No transmission should be possible from the EPIRB used for demonstration purposes. All passenger ships and cargo ships of 500 tones gross tonnage (GRT) and upward will required at least 3 portable two way VHF radiotelephone and in addition a radar transponder on each side of the ship, stowed so that they can be rapidly placed in any survival craft other than the additional life raft or lifeboats, that must be carried when the survival craft are more than 100 meter from the stem or stern. Cargo ships of 300 grt ft and upwards but not less than 500 grt will require at least two way VHF radiotelephones and one radar transponder. The requirements for radar transponder may be most by having a transponder stowed in each survival craft, in which case they would replace the radar reflectors required under the existing rules. The radar transponder is triggered by radar pulses in 9 GHz band 3 cm wave length or transmit a signal showing as a raw of dots o the display of the radar which triggered it. An audible or visual signal will indicate to survivors the transponder has been triggered. Distress alerting will be carried out by the ships satellite EPIRB which would be transferred to a survival craft on abandoning the ship.

IN GENERAL : 406.025 MHz EPIRB

i.. The satellite EPIRB should be capable for transmitting a distress alert to a polar or orbiting satellite and be automatically activated after float free.

i. The EPIRB should be of an automotive float free type. The equipment mounting and releasing arrangements should be reliable even under extreme conditions.

ii. Be so designed that the electrical positions are water tight at depth of 10 m for at least 5 min and if water leakage should not affect the performance of the beacon.
iii. If time permits, should be carry to the one of the lifeboats and be capable of manually activated and manually deactivated and be capable of floating upright in calm water and have positive stability.
iv. Be capable of being dropped into the water without damage from a height of 20 m.
v. Be capable of being tested, without using the satellite system to determine that EPIRB is capable of operating properly.
vi. Be capable of highly visible yellow / orange colour and be fitted with retro reflective material and be equipped with a buoyant lanyard of about 10 m suitable for use as a together when floating free.
vii. Be provided with a low light 0.75 candle power by darkness to indicate its position and not affected by sea water or oil and prolonged exposure to sunlight.
viii. The battery should have sufficient capacity to operate the satellite EPIRB for a period of at least 48 hours.
ix. The satellite EPRIB should be so deigned as to operate under any:
a. Ambient temperatures of 20°C
b. Lcing
c. Relative wind speed upto 100 knots.
d. After stowage at temperature between – 30° C to + 65°C.

x. Have local manual activation, remote activation may also be provided from the navigating bridge, while the device is installed in the float free mounting navigating bridge , while the device is installed in the float free mounting.
xi. Be designed to release itself and float free before reaching a depth of 4m at a list or trim or upto 45°
xii. Should have LABELLING for
a. Brief operating instructions.
b. Expiry date of the primary battery used,.
xiii. A unique ship station identity should be made part of all message and once it is switched on should not be switched off.
xiv. Periodic inspection and testing of EPIRB shall at interval not exceeding 12 months and if necessary have their sources of energy replaced . however in cases where it appears proper and resonable the administration may extend this period to 5 months.

USE OF ROCKET LINE THROWING APPLIANCES AND LANDING SIGNALS

Under the safety convention rules life saving stations will reply to a vessels distress signal as followed.

Landing Signals

a. By day with an orange smoke signal or `three thunder lights' fired at minute intervals or, by night with three white stars, fired at minute intervals. These signals indicate that the vessel has been seen and that assistance will be given as soon as possible.

b. In many countries the following signals are used when small boats are landing survivors of wrecked vessels.
By way : a vertical motion of a white flag or the arms and

By night : the vertical motion of white light.

To mean : This is the best place to land.

A second white light may indicate a direction of landing or alternatively, a

green star of `K' in Morse.

c. By day, the horizontal motion of a white flag of the arms extended horizontally.
By night, the horizontal motion of a white light.

To mean landing here is highly dangerous.

Alternatively the letter `S' maybe used in Morse or a red star rocket.

d. To mean: landing here is highly dangerous . A more favorable place lies in the direction indicated.
By day : A white flag is moved horizontally and is then affixed in the

ground. A second white flag is then carried in a certain direction.

By night : A similar procedure is carried out with white lights

Alternatively a white star rocket in a certain direction of `S' in Morse

followed by `L' or `R' to mean alter curse left or right.

LINE THROWING APPLIANCES

To be carried abroad both passenger and cargo ships engaged in long international voyages. The apparatus is a completely self contained unit and the set of four units normally carried by ships to be placed at strategic positions in the vessel. Each unit can be fired independently as required. The unit consists of a plastic body launching, incorporating the handle trigger assembly, and containing the rocket, igniter and 275 m of ready flaked line. The unit is weather proof being sealed at both ends by transparent polythene caps. This enables the date of manufacture, of the rocket and the igniter to be checked without removal of cap. Full pictorial instructions are printed on both sides of the plastic body and can be readily issued by either right or left handed users. When firing a rocket, for tanker or vessel with inflammable spirit. It may be extremely dangerous to fire a rocket across such vessel, due to the liability of flammable of the tanker and fire a rocket only when it has been ascertained that it is safe to do so. When such a risk of ignition exists, the distressed tanker should fire rocket line to the rescuing vessel and hoists code flag `B' at the mast at day time and use a

red light in the same position by night. In poor visibility by sounding the international code group `GU' on the following signaling apparatus.

a. Signal affirmative Green star signal or the vertical motion of a white flat of the arms or a white light at night etc. means rocket line held.

b. To mean – Negative, slack away, a vast hauling or rocket line is not held etc.
Signal : A red star signal or the horizontal motion of a flag or white light at

night, or the arms extended horizontally.

c. When possible, the coast guard will fire a rocket across the ship with a line attached, such as an 8 mm hamp line. If the crew of a ship fire a rocket ashore first, the coast guard will got hold of this rocket line and attached a stronger line to it. When they signal affirmative, a crew should have on their rocket line in order to get this stronger lien abroad.

As soon as either the stronger line or the shore rocket line is held, signal affirmative and then wait for a similar signal from ashore. As soon as it seen heave it on the line, and a tailed block with an endless line reeve through, will be heaved on board. This is called the whip and may be 12 mm fiber rope, jackstay about 24mm dia manila rope be secured to the becket of the tailed block which may be 230 m long rope. Often with another 135 m which can be secured using a special sleeve which the traveler can pass over.

d. As soon as all gear on board, `Make the' tailed block fast at a convenient

position, to a stronger point, as far away from the breaking sea as possible

with a clear working are around it making sure that the whip does not chafe

on any part of the ship.

Cast off the rocket line and give signal affirmative as soon as this is seen the shore party will set the jackstay tight and haul off the breeches buoy to the ship by means of a traveler pulley. The out haul of the whip is called the weather whip and the in haul being known as the lee whip. While this is being done, the officer in-charge should instruct all hands in the procedure for using the buoy. The weight of the body should be taken partly by the elbows on the buoy itself, the person should normally face the ashore and be prepared to bear off with his feel if crossing reefs or finally surmounting cliffs.

e. If a tally board is not sent out the ship with the tailed block or buoy, the offer in-charge must make sure that each person leaving ship is correctly tailed so that he does not finally leave a ship with people still abroad.

The person in the buoy should sit well down and grasp the steadying line. When he is secure, signal affirmative and the coast guard will haul him shore and then return the buoy in the ship. With regard to inured persons, the way in which they are handled will depended on the state of their injuries and in such cases Neil Robertson stretches may be used.

How to use the Line Throwing Apparatus

1. Remove the front cap attach the free end of line to a strong point in the ship and attached second end which is fire proof end to be attached with the projectile loop.
2. Hold handle horizontally top era, allowing unit to naturally assumed and correct firing angle.
3. Remove safety split pin and squeeze trigger lever. When rocket fibers, hold container until line is paid out, and then pass the jackstay gear such as:

a. Attracted messenger lien 8 mm dia Tail traveler, Breeches buoy.
b. Endless lien 12 mm dia.
c. And a jackstay about 24 mm dia manila rope.

4. Rocket and igniters should be replaced every three years, and apparatus after nine years in service on a ship.
5. The length of the container is 330 mm diameter 190 mm and weight 4.6 kgs . The line has a diameter of 5mm and the force which gives 1 kg and acceleration of one meter per second.

Man Overboard Smoke and Light Marker

It is combined day and night marker, safe to use on oil or petrol covered water. It is designed to be attached to a lifebuoy by means of a lanyard about 3.5 meter in length and when released form its position in the water producing dense orange smoke for a period of 15 minutes and two all round water activated light at candela power for a periods of 2 hours. It is kept o both sides of the navigating bridge in the wooden casing and released by pulling toggle or it can also be connected to a bulk head mounted lifebouy an released manually, if any person fall over board. The weight of the lifebouy should not be less than 4 kgs.

The light marker lifebouy is also similar attachment install separate light, mounted on brackets, an released manually produced a light of 2 candela power for a period of 2 hours, used if any persons fall overhead especially at night close to ship side.

The man over board smoke and light marker is carried in all merchant ships and is mounted in such a position that it can be released form its stowage to fall unobstructed into the sea, or can be easily cast into the sea to give a sea mark by day or light for man overboard casualty. The markers are sited on both bridge wings and on both sides in the after part of the ship. Large ships carry additional markers amidships.

Chapter 9

SERACH AND RECUE HELICOPETRS:

The purpose of helicopter is to provide assistance to ships out at sea to pick up casualty or to carry out rescue operations. These can rescue 10 to 18 survivors depending on the type or to carry out rescue operations. These can rescue 10 to 18 survivors depending on the type of machine. They do not normally operate more than 450 nautical miles both way from its base, though some more distance may be increased depending on type of situation, and have VHF radio and perhaps 2182 KHz R/T fitted with.

Before the helicopter take off from its base, the helicopter pilot must be provided with some the information, by the master of the vessel, such as name of the ship, its color, course . speed and shop should fly colour pendant on its mast at day time and weather condition visibility a distance from the land. And night area of the operation must be well illuminated.

Operation of a helicopter depends on a circumstances of the bad weather conditions and visibility. The master of the vessel in distress must have efficient communication between all parties, are essential so that rescue operation can be carried out in an efficient manner to the distressed victims. The time factor also plays a large part in helicopter, with an effective range of 299 nautical miles one way approximately, the actual range is in fact considerably greater by allowance must be made for hovering over and above the scene of operation. Helicopter use is retracted, as bad weather conditions (wind over 50 knots) sometimes prevents helicopter becoming airborne. There are of course may be other types of helicopter in use. The ranges and passenger capacity may be varying.

Passengers	Range from base
10	100
16	150
18	155
20	195
22	270

The officer in-charge of the ship make sure that before the helicopter approach the ship the WINCHING AREA must be seriously considered such as (1) On the open deck forward or aft (2) On the lifeboat (3) On the life raft an necessary arrangement on the ship to assist winhing operations in order to ensure that the helicopters may operate safety without risk to persons on board or in the helicopter itself should be made

1. The winching area should, as far as practicable, be located on the port side of the ship such that a large portion of the maneuvering zone extends over the ship side and situated where it will enable the pilot to have an abstracted view of the ship.
2. The area selected on the deck having a minimum diameter of 5m should be painted yellow in a circular manner and a letter H painted yellow in the center of the circle.
3. The height of obstacles such as ventilators, small deck houses area companion ways should be remove than 3m height.
4. Side rails and where necessary, a wings stanchions should be lower to deck level.
5. All loose gear rages, cotton waist must be secured/ pick up from the sea..
6. The operating area should be if possible free of heavy weather spray.
7. Deck party should be ready and all passengers should be clear of the operating place.
8. Deck party should be aware that rescue operation is about to take place or taking place.
9. Fire jump should be running and adequate water pressure should be running in the fire hoses of the operating area.
10. Portable foam type extinguisher should be ready.
11. A rescue party, wearing fireman's outfits should be ready.
12. Man overboard rescue boat should be ready.
13. Portable fire extinguisher large axe, wire cutters, torches etc. should be ready.
14. In the case of tankers inter gas system should be ready and the operating area should be vented to the atmosphere, 30 minutes before the operation is due to start.
15. Helicopter will normally approaching the winching area along a flight path on the poet side of the ship and a wind pendant is hoisted in a position where it can be readily seen by the pilot of the helicopter.
16. If winching operation have to be conducted hours of darkness then it will be necessary to illuminate the maneuvering zone the mustering area and the wind pendant and lighting should be not directed at the sea or toward the helicopter.
17. All significant obstruction such a mast, funnel, derricks should be illuminated by flood lights.
18. Head the ship according to the pilots recommendation.
19. If the winching operation cannot be preformed on the deck, then the survivors to be rescued, astern of the vessel in a raft on long painter about 100 to 120 meters or if the helicopter cannot pick up direct from the ship and if the life raft is not available then the survivors to be rescued a beam in a open or totally enclosed lifeboat having top canopy hatch and railing all around to protect the people from failing overboard.
20. Never touch the winch wire until it is earthen with sea water or ship structure as it s carrying static electricity.
21. Never secure the winch wire on deck or allow it to become fouled.

Note : The Pilot and crew of the helicopter are professionals in rescue operation to be carried out either form the ship's deck or from water . The method employed by this helicopter in winching operating are as follows:

i. Lower a crew member form the helicopter to the man if he is helpless.

ii. Lowering a strop slip to a person on the winch wire (if he able to help himself)

iii. Helicopter lifting strop should be use as under

a. Take the strop and put both the head and the arms through the loop and secure the strop under the armpit with the padded point positioned as high as possible across the back.
b. Tighten up the strop by pulling down the toggle as low as possible near the chest.
c. When securing the strop extend one arm and give the thumbs up signal to the which man in the helicopter.

Rescue also can be performed by means of the following :

1. Rescue liter or stretcher
2. Rescue net
3. Rescue basket etc.

Chapter 10

HYPOTHERMIA

Loss of body heat is known as hypothermia. When body temperature dropped down to 35 degree C or 94 degree F, the person is said to be effected by hypothermia. The normal body temperature of a person is 98.6 F or 37.3 C. Hypothermia can develop to a person any climatic condition when exposed to any cold climatic conditions.

Hypothermia can occur

1. Hypothermia can occur at temperature above freezing point an over exposure in cold climatic condition to any person when he is unprepared not recognizing that the has been exposed to cold, is the first step that a person is being effected by hypothermia.
2. Proper dress, safe working practices in cold climatic condition, knowledge of hypothermia and a positive attitude can protect you and your crew members from a hypothermia tragedy.
3. Hypothermia occur when the body loses heat faster than it produces it.
4. The body inner core temperature normally 98.6 F or 37.3 c being to fall, causing failure to vital organs. Symptoms become very sever as body temperature become below 82° F r 38° C, death is likely.
5. Although commonly caused by immersion in cold water, chilling winds, and rain. Thus mariners must be alert while working on deck or in other exposed condition.
6. Cold water can cool the body as much 25 time faster than air, so chilling begins immediately. Even mariners in tropical climates should not dismiss this hazard.

SYMPOTOMS & TREATMENT

In mild hypothermia individuals will shiver and have painfully cold hand and feet nails and that may become numb, and cramp may occur on fingers as well as feet and legs. As the person's condition progresses, the individual will stop shivering, become confused and person any exhibit poor co-ordination such as, speaking difficulties, very cold to the touch pale face, has a weak pulse etc.

Prevent further heat loss through evaporation and from exposure to the wind. Wrap the patient in blankets and/or a casualty bag or large plastic bag and transfer immediately to sheltered area or below decks to a compartment between 15°C to 20°C keeping him horizontal, slightly head down.

Advice on re-warming and decision regarding further treatment should normally be given only by a doctor. If no medical advice is immediately available continue to apply the essential life saving procedures given in paragraph 1 to 6 above . In addition if the rescued person is cold not appears dead or if he (or she) deteriorates and / or the pulse and breathing are lost, warming of the person should be attempted immediately.

Medical authorities degree on the best method of re-warming, but either an `active' or passive method is normally used i.e.

1. `active method' of warming - this is done preferably in a bath of warm water (38° C to 40° C alternatively using heated blankets or sheets (about 45° C, but not hother)
2. `Passive method of warming – cut the persons clothing so that it can be removed with the minimum of disturbance. Then wrap the person in blankets to reduce further heat loss. Do not attempt to warm the person by vigorous actions. Apply heating pads or hot water bottles under the blankets to the person's heat, neck, chest and groin. But never place these a warm objects against the bare skin, as cold skin is easily burned. If active or passive methods of warming are not available then apply body warmth by direct body to body contact with the rescued person. In addition wrap a blanket around both the rescued persons and the person(s) supplying the warmth. In all cases try to monitor the pulse and breathing.

As he drifts into the come state, his pupils dilate and poor health can occur even before the body temperature drops to 31° C, and indeed any consequence of cold weather is likely initially to effect heavy drinker, people with poor circulation and anyone in poor health.

As the condition worsens, the individual will become semi conscious or unconscious. below 82° F or 28° C the victim may appear dead or no apparent breathing or pulse, dilated eyes and cold, bluish gray or pale skin. It is important to assure the patient can be revived, even at this stage and to continue treatment. Obviously the cure for hypothermia is to re-warm the patient . There are right ways and wrong ways to do this. The right way to stop further heat lose and every gradually re-warm the core body temperature and does not allow the further body heat loss. Thus does not obtain warmth.

In case of any person effected by hypothermia in the lifeboat and life raft the person must be covered with the blankets to regain hear or person must be covered with TAP . In case the blanket or TPA is not available some persons must huddle against him and try to impart their own body heat to him. If a hypothermia is brought abroad a ship, it is most important to

warm his toroce before his limbs . Warming the latter will bring a rush of icy blood to the heart causing after drop of perhaps death.

Remember that hypothermia are most susceptible to frost bite and that further 10% of body heat can be lost through the head . Cover the head, ears and nose if they are exposed to extreme cold. The patient must be placed on his back in a situation where further heat lose will not occur. If at all possible find a warm location in the ship, preferably a heated room below deck. Be sure the patient is insulated form a cold floor by blankets or their suitable materials . Carefully remove all wet clothing. Wrap the patient body in blankets clothes or a sleeping bag.

Re-warming the body core should be done by applying dry heat to the head neck, chest and groin. You can use heating pad, hot water bags, or bottles, even objects you can warmed in the galley oven, whatever you too have. Mild heat comfortable to the elbow, wrist is required . Warming the arms and legs can cause a serious reaction called after drop, as the body cools it, shoots of blood around the vital organs or fatal death.

Treatment for the mildly hypothermic individual is that, removing him form exposed situation, providing warm, dry clothing and allowing for plenty of rest. Such an individual should not be given any food or water, or tea, at all until the victim is fully conscious and able to swallow without checking . If a person is conscious, hot milk coffee, tea and cocoa can be given.

If a man is an unconscious situation, where the victim may be suffering form severe hypothermia, it is extremely important to handle him gently. His system is in a very fragile state. Rough handling can cause further stress to the circulatory system, even causing heart attack.. Carry him horizontally if you have help, and handle gently through all stages of the treatment.

a. Move the patient as little as possible.
b. Check for pulse and respiration or carotid pulse for at least for 1 to 2 minutes only.
c. If none is detected, should be initiate CPR (Cardiac pulmonary Resuscitation).

Setrac College of Offshore Training

Fire Prevention & Fire Fighting

Trainee Handout

COURSE OBJECTIVES

1. To prepare the seafarers to work on board in safe environment.
2. Safety of life, which minimizes the loss of men, material and environment.
3. To reduce the risk of fire on board.
4. To maintain the state of readiness, thereby building confidence in responding to emergency situation with cool head.
5. Familiarize to the use of various shipboard organizations to deal in case of fire.
6. Familiarize to the use of various portable fire extinguishers and fixed installation for fire fighting.
7. Familiarize to the use of various life supporting / saving equipment on board.
8. Finally to fight and extinguish fire with minimum damage to man and material.

COURSE TIME TABLE

Period	Day1	Day2	Day3
1 – 0830-1000	**Registration** **Introduction , Safety & Principles** **Theory of Fire (1H) -**Conditions for fires, Properties of flammable materials, Fire hazard and spread of fire	**PRACTICAL TRAINING AT FIRE FIGHTING MOCK-UP** **Fire-fighting Equipment** **Fire-fighting Drills** Small fires Extensive fires Drills in smoke-filled spaces ***PV, KP,KJ***	**Fire Fighting Equipment -**Fire hoses and nozzles, Mobile apparatus, Portable fire extinguishers , Fireman's outfit ; Breathing apparatus - Resuscitation apparatus Fire blankets
2- 1010-1140	**Theory of Fire (1H) -** Classification of fires and appropriate extinguishing agents **Movie (0.5H) -** **Fire Prevention-** Fire prevention principles		**Fire-fighting Methods -** Knowledge of fire safety arrangements, Fire alarms and first actions , Fire fighting
3- 1140-1240	**Fire Prevention-** Ship construction arrangements, Safe practices **Fire Detection Systems & Alarms –** Fire & Smoke Detection, Automatic Fire Alarm		**Ship Fire-fighting Organization-** General emergency alarm, Fire control plans and muster list, Communications, Personnel safety procedures, Periodic shipboard drills, Patrol systems
4- 1240-1340	**Fixed Fire-extinguishing Systems** -Smothering effect systems: carbon dioxide,(CO_2), foams , Inhibitor effect systems: powders , Cooling effect systems: sprinklers, pressure spray,		**Fire-fighting**
5- 1410-1510	**Fixed Fire-extinguishing Systems** - Emergency fire pump (cargo ships), 7.25Chemical		**Review & Assessment**

INDEX

Chapter 1

Introduction to Ship Fire Safety

Fire can be devastating on a ship - particularly on a passenger ship, where large numbers of people may need to be evacuated, or on a ship carrying inflammable cargo, with serious risks to crewmembers or to ports and harbours. On 1 July 2002, a comprehensive new set of requirements for fire protection, fire detection and fire extinction on board ships entered into force as a new revised Chapter II-2 of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended, incorporating technological advances in fire detection and extinction as well as lessons learned from fire incidents over the years. The regulations are designed to ensure that fires are first of all prevented from occurring - for example by making sure that materials such as carpets and wall coverings are strictly controlled to reduce the fire risk; secondly, that any fires are rapidly detected; and thirdly; that any fire is contained and extinguished. Designing ships to ensure easy evacuation routes for crew and passengers are a key element of the chapter.

History of SOLAS fire protection requirements

1914 and 1929 SOLAS Conventions

The first fire protection requirements for international shipping were developed as part of the 1914 SOLAS Convention, which was developed in response to the sinking of the Titanic in 1912. Although the 1914 SOLAS Convention was prevented from coming into force due to World War I, it did contain basic fire safety requirements which were later carried over to the 1929 SOLAS Convention.

1948 and 1960 SOLAS Conventions

After the adoption of the 1929 SOLAS Convention, many lessons were learned about the safety of shipping in general, including fire protection, which led to the adoption of the 1948 SOLAS Convention. In 1934, a fire aboard the passenger ship Morro Castle caused 134 casualties. The investigation of the Morro Castle fire, and the lessons learned from it, played a major part in the development of the non-combustible construction regulations which today form the basis of the fire safety regulations for passengers ships. In addition, many advances in maritime technology were made during World War II and subsequently incorporated into the 1948 SOLAS Convention. As a result, a greater emphasis was placed on fire safety aboard ships and this was demonstrated by the development of three new parts (parts D, E and F) being added to chapter II of the 1948 SOLAS Convention which were exclusively dedicated to fire safety. In addition, the SOLAS 1948 requirements applied to both passenger ships and cargo ships.

The 1948 SOLAS Convention established three methods of construction for passenger ships and basic fire protection requirements for cargo ships. The 1948 SOLAS Convention was eventually updated with the 1960 SOLAS Convention. The most significant change incorporated into the 1960 SOLAS Convention, related to fire safety, was the application of certain passenger ship fire safety requirements to cargo ships

Fire and Flooding are the two potential hazards in ships. Fire fighting needs to be seen in broader sense in terms of fire, fire prevention, fire detection and fire fighting. *In order to successfully put out a fire, you need to use the most suitable type of extinguishing agent—one that will do the job in the least amount of time, cause the least amount of damage and result in the least danger to crew members. The job of picking the proper agent has been made easier by the classification of fire types, or classes, lettered A through D. Within each class are all fires involving materials with similar burning properties and requiring similar extinguishing agents. However, most fuels are found in combinations, and electrical fires always involve some solid fuel. Thus, for firefighting purposes, there are actually seven possible fire classes. Knowledge of these classes is essential to firefighting, as well as knowing the burning characteristics of materials found aboard vessels*

Important Termilogy

BOIL OVER: A phenomenon produced when water falls on oil that is at temperature close to or higher than the boiling temperature of water i.e. 100ºC water gets converted into steam and rises with particles of oil in the form of clouds which gets ignited instantaneously in dangerous manner. Such an occurrence can spread the fire and cause injury to the personnel nearby.

SPOTANEOUS COMBUSTION: The ignition of material brought about by a heat producing (EXOTHERMIC) chemical reaction within the material itself without exposure to an external source of ignition.

LOWER FLAMMABLE LIMIT (LFL): Minimum concentration of Hydrocarbon gas (% by volume) in air to support and propagate combination. It is also referred as Lower Explosive Limit.

UPPER FLAMMABLE LIMIT (UFL): The maximum concentration of Hydrocarbon gas (% by volume) in air above which explosion does not occur.

FLAMMABLE / EXPLOSIVE RANGE: The range of combustible vapours or gas in air within which the vapour and air mixtures is flammable between the UFL and LFL that allows a fire or an explosion to take place.

STATIC ELECTRICITY: The electricity produced on dissimilar material through physical contact and separation.

INERT CONDITION: A condition in which oxygen contained through out the atmosphere of a tank has been reduced to 8% or less by volume by addition of inert gas.

GAS FREE: A tank, compartment or a container is gas free when sufficient air has been introduced in to it to lower the level of any flammable / toxic gases or inert gases to those required for a specific purpose e.g. Hot work, entry etc.

FLAMMABILITY: It is the ability of substance to burn. Vapors given off by a flammable material can burn when mixed with air in the right proportion, in the presence of an ignition source.

FOAM (also referred as "Froth"): An aggregation of bubbles having coherent relation and specific lower gravity than any lightest fuel formed by soapy water is known as Foam.

THRESHOLD LIMIT (TLV): The time-weighted average concentration of a substance to which nearly all workers may be repeatedly exposed for a normal 8 hours working day or 40 working weeks, day after day, without adverse effect.

FLASH POINT: The lowest temperature at which a liquid gives of sufficient gas vapours to form a flammable gas mixture near the surface of the liquid which will flash momentarily when flame is applied, e.g., oils with flashpoints below 23ºC are classified as dangerous highly inflammable, such oils are gasoline, benzenes, etc.

IGNITION POINT / FIRE POINT: This is the temperature at which the volatile vapours given off from a heated oil sample are ignitable by flame application and will burn continuously. The fire point temperature can be anything up to about 40ºC higher than the closed flashpoints temperature for most fuel oils.

AUTO-IGNITION: It is the ignition of a combustible material without initiation by spark or flame when the material has been raised to a temperature at which self-sustaining combustion occur. (Exothermic Chemical Reaction).

BURNING SPEED: Burning Speed or Flame Speed is the speed of rapid propagation of the flame from flammable vapour and air mixture. When flammable vapour and oxygen are present in the right quantity required to oxidize it completely, then the mixture is said to be stochiometric and any ignition will produce the most rapid propagation of flame.

HOT WORK: It is the work involving sources of ignition or temperature sufficiently high to cause ignition of a flammable gas mixture. This includes any work requiring the use of welding, burning or soldering equipment, blow torches, some power driven tools, portable electrical equipment's which is not essentially safe or contain with in an approved explosion proof housing, sand blasting equipment and internal combustion engine.

WATER FOG: A suspension in the atmosphere of very fine droplets of water usually delivered at high pressure through a fog nozzle to use in the fire fighting.

WATER SPRAY: A suspension in the atmosphere of water divided into coarse drops by delivery through a special nozzle for use in fire fighting.

HALON: A halogenated hydrocarbon used in fire fighting, which inhibits flame propagation.

DRY CHEMICAL POWDER: A flame inhibits powder used in fire fighting.

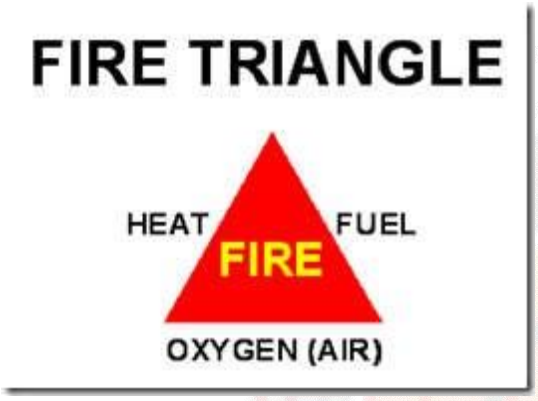
RESUSCITATOR: Equipment to assist or restore the breathing of a man caused by gas or lack of oxygen.

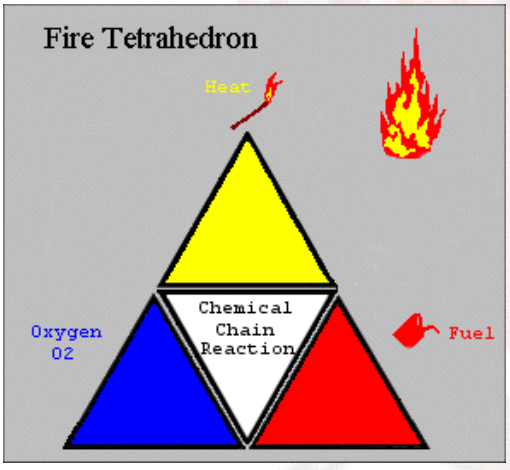
Chapter 2

Theory of Fire

Fire is the result of a chemical reaction of combustible substances with oxygen in presence of heat, which further produces heat, smokes, flame and light. For a fire to take place certain conditions must be met which are illustrated through a triangle or a tetrahedran which we will learn about later.

Controlled fire is used in our day to day lives for useful purposes. Only uncontrolled fire is dangerous which can cause damage to ship's crew and ship. A combination of three elements (air, fuel and heat) causes fire to take place. This can be easily understood by looking at the Fire Triangle.If any one of the element is isolated, then fire cannot take place. Fire is classified depending on the fuel that causes fire. *You may* remember the fire triangle which is composed of heat, fuel and air. These three things are needed to make a fire, remove any one of them and the fire is extinguished.





To move into a slightly more adva ced theory of fires, there is a fourth ingredient necessary for fire, and the "fire tetrahedron" more accurately de onstrates the combustion process. A tetrahedron is a solid figure with four triangular faces. It contains the four things required for combustion; fuel (to vaporize and burn), oxygen (to combine with the fuel vapor), heat (to raise the vapor to its ignition point) and the chain reaction (the chemical reaction among the fuel, oxygen and heat). Remove any of these four and you have no fire.

Class A Fires—Fires of common combustible solids such as wood, paper and plastic are best put out by water, a cooling agent. Foam and certain dry chemicals, which act mainly as smothering or chain-breaking agents, may also be used.

Class B Fires—Fires caused by flammable liquids such as oil, grease, gas and other substances give off large amounts of flammable vapors and require smothering agents to do the job. Dry chemical, foam and carbon dioxide (CC 2) may be used. However, if the fire is being supplied with fuel by an open valve or broken fuel lin , you must first shut down the source of the fuel. This action alone may stop the fire or at least make it easier to put out. In a gas fire, it is important to shut down the source of the fuel. Attempting to put out the fire without shutting down the sources, creates an explosive hazard that is more dangerous than the fire itself. If may be necessary to put out a gas fire before shutting down the fuel supply in order to save a life or reach the supply valve, but these should be the only exceptions.

Combination Class A and B Fires—Water fog and foam may be used to smother fires involving both solid fuels and flammable liquids or gases. These agents also have some cooling effect on the fire. In enclosed spaces, CO2 may also be used. Caution: CO2 robs the air of oxygen and can suffocate a person using CO2 to put out the fire in enclosed spaces.

Class C Fires—For fires involving energized electrical equipment, conductors or appliances, non-conducting extinguishing agents must be used such as CO2, Halon and dry chemical. Note that dry chemical may ruin electronic equipment. Always attempt to remove the source of electricity to remove the chance of shock and the source of the ignition.

Combination Class A and C Fires—Since energized electrical equipment is involved in these fires, non-conducting agents must be used. CO2, Halon, and dry chemicals are best. CO2 reduces the oxygen supply, while the others break the chain reaction. REMEMBER: Always try to de-energize the circuit.

Combination Class B and C Fires—Again, a non-conducting agent is required. Fires involving flammable liquids or gases and electrical equipment may be extinguished with Halon or dry chemical acting as a chain reaction breaker. In enclosed spaces, they may be extinguished with CO2.

Combination Class D Fires—These fires may involve combustible metals such as potassium, sodium, and their alloys, and magnesium, zinc, zirconium, titanium and aluminum. They burn on the metal surface at very high temperature, often with a brilliant flame.

Water should not be used on Class D fires. It may add to the intensity and cause the molten metal to splatter. This, in turn, can extend the fire and inflict serious burns on those near by. Combustible metal fires can be smothered and controlled with special agents known as dry powders. Although many people use the term interchangeably with dry chemicals, the agents are used on entirely different types of fires: dry powders are used only to put out combustible metal fires; dry chemicals may be used on other fires, but not on Class D fires.

Chapter 3

Sources of ignition & Preventive measures

Spontaneous combustion

Dirty waste, rags, sawdust and other rubbish - especially if contaminated with oil - may generate heat spontaneously which may be sufficient to ignite flammable mixtures or may set the rubbish itself on fire. Such waste and rubbish should therefore be properly stored until it can be safely disposed of. Materials in ship's stores, including linen, blankets and similar absorbent materials are also liable to ignite by spontaneous combustion if damp or contaminated by oil. Strict vigilance, careful stowage and suitable ventilation are necessary to guard against such a possibility. If such materials become damp, they should be dried before being stowed away. If oil has soaked into them, they should be cleaned and dried, or destroyed. They should not be stowed in close proximity to oil or paints, or on or near to steam pipes.

Machinery spaces

All personnel should be made fully aware of the precautions necessary to prevent fire in machinery spaces - in particular, the maintenance of clean conditions, the prevention of oil leakage and the removal of all combustible materials from vulnerable positions. Suitable metal containers should be provided for the storage of cotton waste, cleaning rags or similar materials after use. Such containers should be emptied at frequent intervals and the contents safely disposed of. Wood, paints, spirits and tins of oil should not be kept in boiler rooms or machinery spaces including steering gear compartments. All electric wiring should be well maintained and kept clean and dry. The rated load capacity of the wires and fuses should never be exceeded.

Galleys

Galleys and pantries present particular fire risks . Care should be taken in particular to avoid overheating or spilling fat or oil and to ensure that burners or heating plates are shut off when cooking is finished. Extractor flues and ranges etc should always be kept clean. Means to smother fat or cooking oil fires, such as a fire blanket, should be readily available close to stoves. Remote cut-offs and stops should be conspicuously marked and known to galley staff

Chapter 4

Fire Prevention

If total awareness is created to all personnel on Fire Prevention, then there is no need for Fire Detection, Fire Fighting etc. Remember the old saying " Prevention is better than Cure"

Prevention of Class A(General) Fire is by:

- good house Keeping
- taking regular rounds of working premises
- use of fire retardant, fire resistant materials while construction of ships wherever applicable
- keeping working areas under lock & key, when not in use or manned
- denying entry to unauthorized personnel

Prevention of Class B (Oil) Fire is by:

- Proper storage of oil & petro products
- Properly maintained fuel handling systems
- Properly trained personnel
- Avoiding leakage in the fuel system
- No smoking
- Not using naked lights
- operating fuel systems under supervision

Prevention of Class C (Electrical) Fire is by:

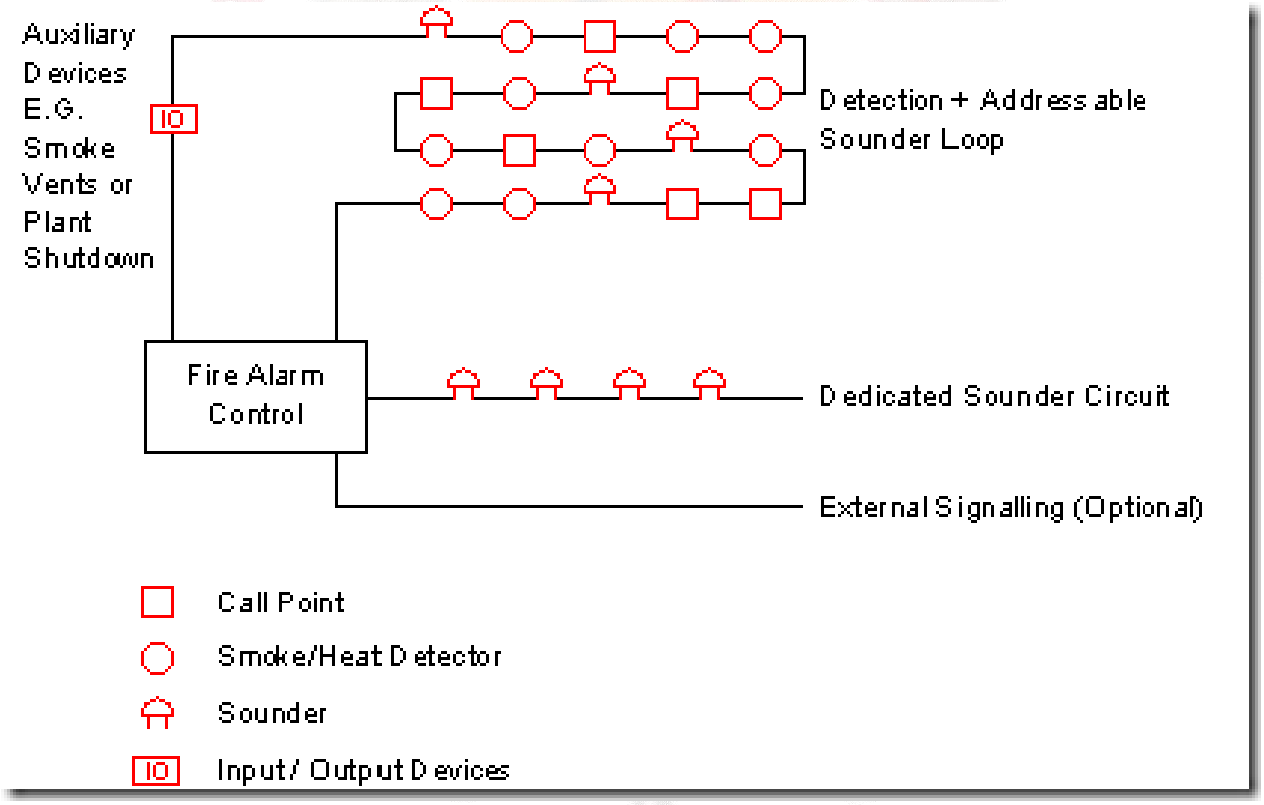
- Properly maintained Electrical equipment
- Ensuring proper electrical insulation
- Avoiding naked wires
- Using weather proof, explosion proof fittings where necessary
- Properly trained personnel
- Switching off electrical equipments when not in use (lights, fans, air conditioners etc.,)
- Avoiding prolonged use or overloading of equipment

Prevention of Class D (Chemical) Fire is by:

- Understanding the characteristics of the chemicals and accordingly standard operating procedures must be implemented for the personnel handling these chemicals
- Fire Detection:
- Manual detection
- Automatic detection (conventional or analog addressable)
- Manual detection is by:
- regular rounds by duty personnel during working and non working hours
- alert and competent ships crew
- observing the running machinery for abnormal noise, abnormal vibration, abnormal working temperatures etc.,
- CCTV – central monitoring through Closed Circuit TV

- Automatic detection is by electrical Fire Alarm Control Panel consisting of:
- Smoke Detectors placed in different parts of ship
- Heat Detectors placed in different parts of ship

Fig : A typical Analogue Addressable Fire Alarm Arrangement:



Safety precautions

Fire aboard a general cargo vessel can be disastrous. Common causes are:

i) faulty electrical appliances/circuitry
ii) overloading of electrical circuitry
iii) careless disposal of cigarette ends
iv) spontaneous combustion of dirty waste/ rags especially if contaminated with oil

v) damp storage of linen/materials
vi) oil spillage/leakage in machinery spaces
vii) galley fires due to overheating of cooking oils
viii) carelessness with hand pressing irons
ix) incorrect methods of drying laundry

The prevention of fire on board ship is of utmost importance. Below is outlined all probable sources of ignition and how to take preventive measures.

Smoking Conspicuous warning notices should be displayed in any part of the ship where smoking is forbidden (permanently or temporarily) and observance of them should be strictly enforced. Ashtrays or other suitable containers should be provided and used at places where smoking is authorised.

Electrical and other fittings

All electrical appliances should be firmly secured and served by permanent connections whenever possible. Flexible leads should be as short as practicable and so arranged as to prevent their being chafed or cut in service.Makeshift plugs, sockets and fuses should not be used. Circuits should not be overloaded since this causes the wires to overheat, destroying insulation and thus resulting in a possible short-circuit which could start a fire. Notices should be displayed warning that approval should be obtained from a esponsible officer to connect any personal electrical appliances to the ship's supply. All portable electrical appliances, lights etc should have insulation readings taken before use, and should be isolated from the mains after use. Electrical equipment which is to be used in any cargo area should be of an approved design.

It is important that all fixed electric heaters are fitted with suitable guards securely attached to the heater and that the guards are maintained in position at all times. Drying clothing on or above the heaters should not be permitted and suitably designed equipment should be supplied, or areas designated. When using drying cabinets or similar appliances, the ventilation apertures should not be obscured by overfilling of the drying space. Any screens or fine mesh covers around the ventilation apertures should be regularly inspected and cleaned, so that they do not become blocked by accumulated fluff from clothing.

The use of portable heaters should be avoided wherever possible. However, if they are required while the ship is in port (as temporary heating during repairs and as additional heating during inclement weather), a protective sheet of a non-combustible material should be provided to stand them on to protect wooden floors or bulkheads, carpets or linoleum. Portable heaters should be provided with suitable guards and should not be positioned close to furniture or other fittings. These heaters should never be used for drying clothes etc.

Personal portable space-heating appliances of any sort should not be used at sea and notices to this effect should be displayed. The construction and installation of electric heaters should always be carried out in accordance with the relevant regulations and instructions or guidance supplied by the manufacturer.

Chapter 5

FIRE DETECTION

The concept of preventing outbreak of fire or reducing the risk of spreading and avoiding the danger from fire to personnel and property is termed as fire prevention. The ultimate aim is to prevent the outbreak of fire. It must be however realized that perfectness is unlikely to be achieved due to either engineering compromise or human error. For example, electrical faults, which could give risk of fire cannot be totally eliminated but can be minimized by good design, construction and installation. Protective measures are included in the ships design such as segregation of accommodation space from cargo space. With this provisions it is important that fire detection is achieved so that the crew has a reasonable chance of extinguishing the fire. Marine fire prevention consists of a combination of active and passive defense, which forms integrated systems. Some common preventive measures are as listed below:

a) All machinery space to be kept clean.

b) Any fuel or oil leak must be attended to immediately.

c) Remote control of various machinery, blowers and fuel quick closing valves must be available operational.

d) It should be possible to operate a fire pump / bilge pump from outside the machinery spaces.

e) Regular patrol should be undertaken in the accommodation spaces.

f) Stores such as paints and mineral oils must be kept out of accommodation spaces in specifically provided lockers.

g) Galley appliances must be switched off when not in use.

h) Special care must be taken when repairs are undertaken to ensure that fire fighting equipments to be made available.

The above list is by no means exhaustive and general awareness must be created to prevent any outbreak of fire on board a ship.Fire detector is device, which actuate on one scientific principle or another to give early warning of any assurance of fire. The detector operates in presence of a fire by reaching to one or more of the three characteristics of fire. i.e. smoke, heat & flame. There are three types of detectors, which are as follows: -

1) Smoke (combustion products) type

2) Flame (Radiation) type

3) Heat type

SMOKE DETECTORS

Smoke is a complex thing to describe because it varies considerably with materials that are burning. Basically it is composed of small particles suspended in air. And these particles have to be detected by

smoke detector. Smoke may consist of gases and water vapour. Smoke detectors are of two types: IONISATION , OPTICAL

IONISATION DETECTOR: It is more sensitive to the smaller particles of smoke. In fact it is most sensitive to the invisible products of combustion that are given off in the early stage of fire which are given off by a clean burning of fire. The heart of this detector is an Ionization chamber in which a radioactive source acts on the atoms of air in the chamber to produce positive or negative ions. Two plates, which are positively or negatively charged, are contained in the chambers. Ions are attracted to plates of positive polarity thereby causing small electric current flows in the external circuit. When smoke particles enter the chamber they become attracted to the ions causing the movement of ions between plates. This results in reduction in current flowing in the external circuit, which is used to initiate an alarm.

OPTICAL DETECTOR: It becomes more sensitive as fire ages and suspend particles grow larger and visible which can be seen by naked eyes. Optical detector would be effective in the early detection of a PVC or rubber fire, which produces dense cloud of smoke immediately. These are further classified as LIGHT OBSERVATION TYPE & LIGHT SCATER TYPE. In **observation type**, a parallel beam of light is directed on to a photoelectric cell so that a current flows all the times. When smoke particles are introduced some of the light is reflected away from the photo cell causing reduced flow of current, which results in activation of alarm.In **light scatter** system; the light source is situated from a photocell so that no current flows in a non-fire condition. When smoke reaches to chamber light is scattered on the photoelectric cell, which then generates the electric current to initiate the alarm.

FLAME DETECTORS:

Most common type of radiation type is the infra red type. It is the special device sensitive to radiation from flame. Only and not the radiation's from other harmless sources. Such as sunlight, bulb and electric sparks. This type of detector is very effective. It does not depend upon smoke or heat from the fire.Ultraviolet detector is used where the maximum reliability and rapid response of flame is required. It is fitted in all craft hangers explosive and other flammable goods.Ultra violates detectors compresses two electrode across which a high voltage is applied. The electrodes are enclosed in a glass envelope, which will pass ultra-violet radiation, and the envelope is filled with an ionized gas.

HEAT DETECTOR

The most obvious effect of the fire is heat, but it is the last effect to make its present felt. Besides causing a rise in temperature, effects of heat are recognized in other ways, which are used in different types of heat detectors.

There are two types:

a) Fixed temperature
b) Rate of rise

Chapter 6

INTRODUCTION TO FIRE FIGHTING

METHODS OF EXTINGUISHING FIRE

a) Starvation: Removing or limiting fuel
b) Smothering: Removing or limiting oxygen (air)
c) Cooling: Limiting or decreasing heat / temperature
d) Inhibitation: Stopping / breaking chemical reaction which is building up heat and rise in temperature (exothermic reaction).

STARVATION Extinction of fire by starvation is removing the fuel / combustible material from the place of fire. This can be achieved by draining of fuel from tank, stopping fuel pumps, closing fuel valve or remote control valve.

SMOTHERING By cutting off the air (which contains oxygen) to the place of fire. This can be achieved by stopping the blower or closing the doors / hatch / porthole and closing the inlet and exhaust air trunking flaps. Fire can be smothered by a rug or a wet blanket. A small metal fire can be fought by sand. For liquid fuel fires, smothering is done by the use of foam. Foam forms a coating on liquid fuel surface and cuts off air. It also does not allow the liquid fuel to form a flammable vapor. It can also be done by forming a cloud of dry chemical powder (Sodium Bicarbonate) from a pressurized container. Powder also has cooling effect and can stop heat produced in the chemical reactions (exothermic i.e., more and more self-producing heat in a chemical reaction). For fuel cargo tanks, inert gas is used as smothering agent.

COOLING If heat can be taken away faster than the heat being produced due to fire, fire will be extinguished by a jet or spray of water to extinguish the fire is normally the best way.

FIRE EXTINGUISHING AGENTS

The most commonly used fire-extinguishing agents are as follows:

1. Water used, as cooling agents.
2. Foam of various types such as high, medium and low expansion types used as cooling and smothering agent.
3. Dry chemical powder used as inhibitor.
4. Carbon dioxide gas, sand, blanketing used as smothering agent, to cover fire with wet blankets is most commonly used for class ‘A’ fires.

USE OF WATER

It has got some advantages and disadvantages as given below:

Advantages

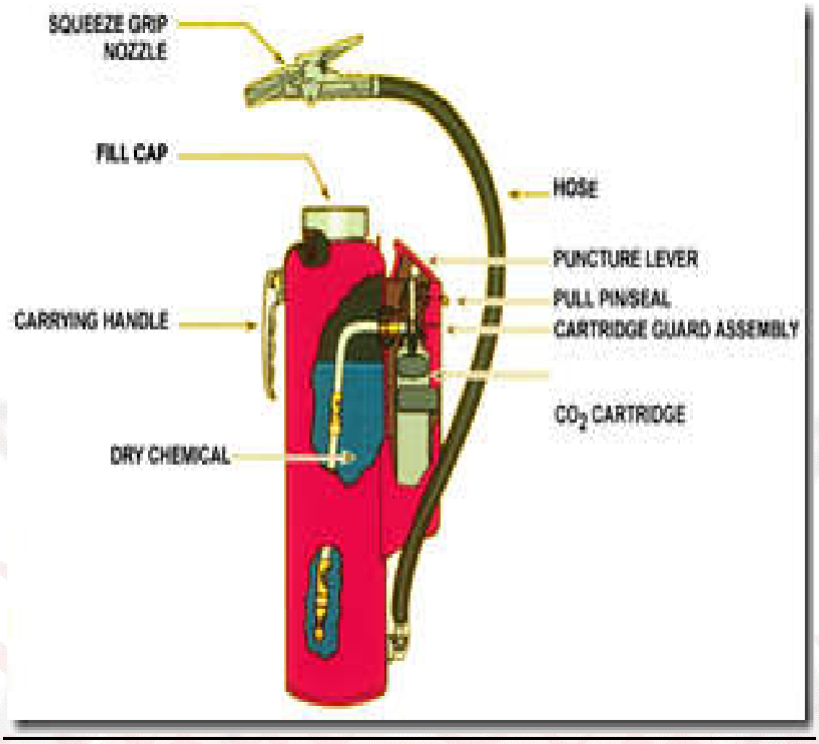
1. Best cooling media
2. Easily available
3. Cheap in cost
4. Water used in the form of steam i.e. best smothering agent

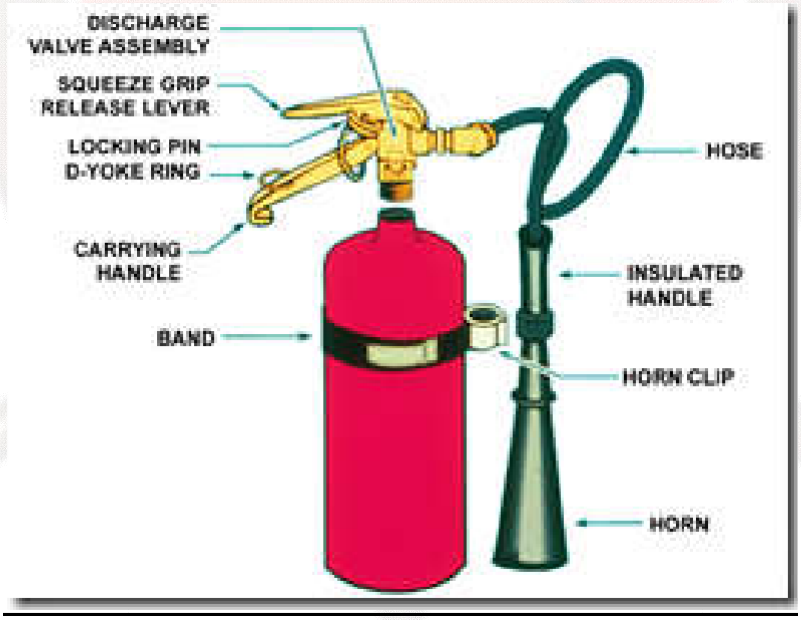
Disadvantages

1. Good conductor of electricity
2. It effects the stability of the ship when used in large quantity
3. It damages cargo, machinery, electric equipment etc.
4. It has the boil over effect causing excessive burning effect on fire fighters.

Fire Extinguishing Agents

Agent	Advantages	Disadvantages
Water	• Always Available • Excellent cooling properties • Provides protection for fire party • Best choice for Class A	• Not to be used on Electrical Fires • Can reduce stability • Can spread Class B fires • Damages/destroys equipment
Foam	• Forms air-tight blanket over burning liquids • Minimal chance of re-flash • Can be used from distance-around corners, from upper decks	• Not to be used on Electrical Fires • Damages/destroys equipment
Dry-Chemical	• Knocks down flames • Fast and effective • 15' range • Rated for Class B and C fires	• Minimal Protection against re-flash • Highly corrosive to electronic equip. • Agent can cake and solidify in container
Carbon Dioxide	• Safe for Class C • Non-corrosive, non damaging to equip. • Minimal chance of re-flash in sealed space • Effective on small Class A & B fires in open spaces	• Displaces oxygen - can kill firefighters • No re-flash protection in open spaces
Halon	• Safe for Class C • Non-corrosive, non damaging to equip. • Minimal chance of re-flash in sealed space • Effective on small Class A & B fires in open spaces	• No re-flash protection in open spaces • In very hot fires, can generate deadly phosgene gas • No longer available after 2000 AD


SQUEEZE GRIP
NOZZLE
FILL CAP
HOSE
PUNCTURE LEVER
PULL PIN/SEAL
CARTRIDGE GUARD ASSEMBLY
CARRYING HANDLE
CO_2 CARTRIDGE
DRY CHEMICAL


DISCHARGE
VALVE ASSEMBLY
SQUEEZE GRIP
RELEASE LEVER
LOCKING PIN
D-YOKE RING
HOSE
CARRYING
HANDLE
INSULATED
HANDLE
BAND
HORN CLIP
HORN

Chapter 7

FIXED FIRE-FIGHTING INSTALLATIONS

When vessels in the past caught fire while at sea, they usually tried to fight the fire by conventional means. Obviously each case must be treated in the light of the circumstances prevailing at the time, with due consideration being given to the facilities available. In the author's view attempts should be made in the case of engine room fires to bring them under control before the injection of a fire-fighting gas medium, for the following reasons:

1. Injection of, say,CO2 gas would immobilise the machinery space and virtually leave the vessel without motive power and at the mercy of the weather.

2. Once injection has taken place, it is unlikely that a second supply of gas could be made available. Therefore, as there is only one chance in most cases for the gas to take effect, this chance should not be wasted in the early stages. This is not to say that there should be any hesitation once it has been decided to use gas. Then speedy injection could be to the benefit of all. Conventional fire-fighting methods in the way of hose/branch lines and foam installations within the machinery space may be the ideal firefighting medium. Breathing apparatus will be needed, so that a plentiful supply of 'full air bottles' will be required; failing this, means of refilling (compressor) air bottles, located outside the machinery space, should be provided. In several cases valuable time has been bought by fighting a fire by conventional means until the air bottles for the self-contained breathing apparatus have run out.Time won in this way can be usefully employed in seeking out a safe anchorage or port having good fire-fighting facilities or clearing away survival craft. Cargo hold and tank space fires may, by their very nature, have to be treated as completely different sorts of fire. Relevant facts as to the available access to the fire area have to be considered, and flooding of a fire area may also be a worthwhile proposition, having due regard to the stability and free surface effects.

Steam Smothering Systems

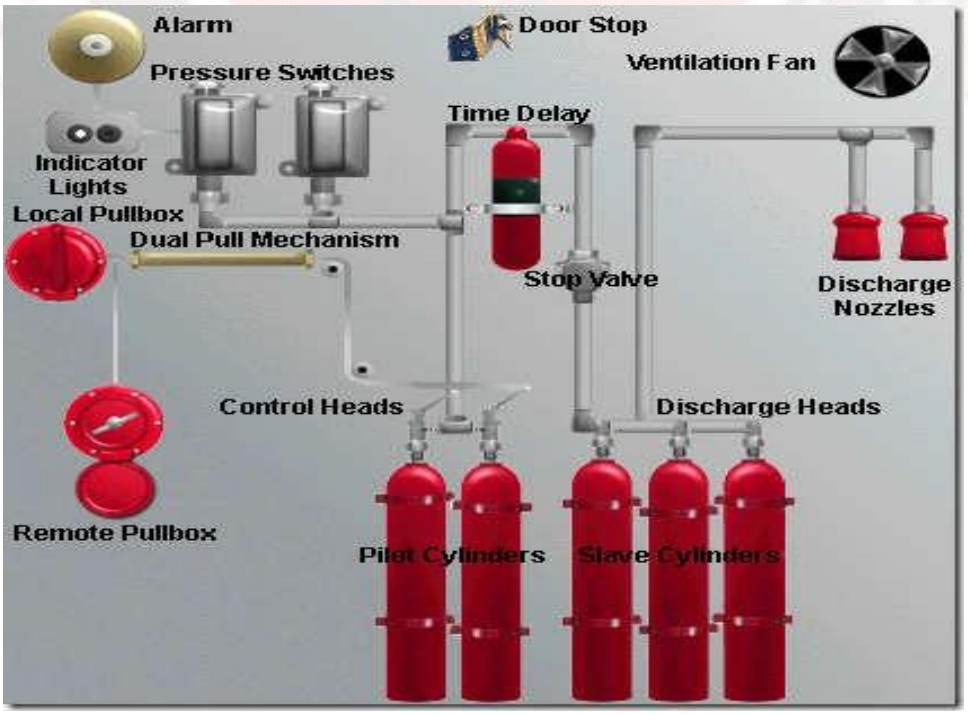
In general the Administration does not permit the use of steam as a fire extinguishing medium in fixed fire extinguishing systems. However, where the use of steam is permitted, it should be used only in restricted areas as an addition to the required fire-fighting medium. The boilers supplying such steam will have an evaporation of at least 0.1 kg of steam per hour for each 0.75m3 of the gross volume of the largest space to be protected. In complying with these requirements the system shall be determined by and to the satisfaction of the Administration.

***Carbon Dioxide* (CO2)**

This is probably the most popular of all the fixed fire-fighting systems employed at sea.The normal design incorporates a fixed bank of CO2 container bottles whose contents can be directed, automatically or by direct

manual operation, into any of the ship's protected spaces . Many systems are used in conjunction with a smoke detector unit, 10 tonnes of liquefied CO2, is mounted on supporting stools, insulated by 150 mm of fire-resistant polyurethane foam, and finished in 1 mm galvanised steel plates. Refrigeration units may be attached to the tank or sited separately, giving the CO2 a normal temperature of _20°C. Two independent units are the norm, working automatically, each being cooled by sea water and operated from external control panels.Alarm systems for each tank cover compressor failure, high pressure inside tank, low level in the tank and leakage through safety valves. the same sampling pipes guarding against smoke being used to inject the CO2 gas via a three-way valve. Fire-fighters should be aware that CO2 is a smothering agent rather than an actual extinguishing one.The purpose of the gas is to deprive the fire of oxygen and by so doing break the fire triangle. Carbon dioxide is heavier than air and is usually injected into the upper levels of cargo holds and machinery spaces, all the oxygen being pushed to the upper levels as the CO2 settles at the bottom of the space. CO2 gas has the following characteristics:

1. It is a non-flammable gas.
2. It is colourless.
3. It is odourless.
4. It is readily available in almost every port of the world.
5. It is comparatively cheap.
6. Systems may incorporate smoke detector units.
7. It may be kept either in 45 kg cylinders or in bulk storage tanks.
8. Normal temperature of liquefied CO2 is _20°C.



FIRE ALARMS:

a) An automatic fire alarm and detection system fitted on board ships, gives fire alarm on bridge and in engine room /control room on sensing fire. The object of fitting fire detectors is to minimize the effects of unwanted fires by sounding alarm, to alert ship's personnel, before the fire has a chance to grow too large or spread too far. They are fitted in accommodation and machinery spaces.

b) Automatic fire detectors operate on various principles. The type that are provided on board ships are generally the one which is stated above.

FIRE ALARM SYSTEMS:

A fire alarm system is designed to give an early warning in case of smoke and fire in building site / ship so that one can extinguish the fire immediately, protect persons and property, records, costly equipment's etc. from being destroyed. It is usually powered with the single-phase AC mains with battery backup up to 48 hrs, and it needed DG backup. Thus being safe (fool proof) for irregular power supply, also cross zoning is eliminated with the help of addressable detectors (a special type of detector in which a 4 bit code is given one for its zone. Third and fourth for the Serial number of detector in that particular circuit) and placing the two detectors in series e.g. the heat sensitive one and the rate of heat rise type. The other major advantage of fire alarm system is its synchronization with real time to record the zone, time, place of the affected area can be printed immediately or logged on an hourly basis thus ensuring proper functioning of the system and is usually coupled to PAS (PUBLIC ADDRESS SYSTEM) for aural message communications. There are two types of fire alarm systems viz, Manual & Automatic. The most common is being automatic type. The main components of fire alarm systems are as follows:

1. Main control panel, usually a separate card (PCB) for each zone.
2. Repeater panel usually in the Main Security Room.
3. Open solenoid valve of a canisters or other extinguishers / sprayers.

4. Manual call stations call select place.
5. Heat sensitive detectors rate of heat rise type or combined.
6. Smoke detectors either optical or ionization type.
7. Hooter / siren
8. Computer
9. Telephone call to residence of higher authorities, nearest fire stations.

Chapter 8

Fighting Accommodation, Galley & Machinery Space Fires

ACCOMMODATION FIRES AT SEA

Generally all major fires originate from either a smaller fire or an explosion. It is unlikely that fires within the accommodation will be caused by an explosion; consequently, speedy and efficient action to deal with the smaller fire will often prevent the larger, more crippling fire developing. Regular training drills,well planned and using all the ship's equipment, are not only reassuring to passengers and crew members but an efficient method of making personnel familiar with the equipment available. Even if a fire is only suspected, the alarm should be raised immediately and crew members should be in no doubt that a false alarm would not result in punishment. Accommodation fires generally occur in Class 'A' combustible material (see Table 15.1); bearing this in mind, the following course of action is recommended :

1. Raise the alarm.

2. Reduce speed. (all types of fire)

3. Close down all mechanical ventilation.

4. Have fire-fighters,working in pairs, investigate and tackle the fire.

5. Isolate electrical 'live' circuits.

6. Surround the fire,attacking it from as many sides as possible with hoses.

7. Close all fire and watertight doors.

8. Approach the fire with the aid of breathing apparatus.

9. Have communications officer standing by to transmit emergency or distress signals.

10. If traffic,weather and sea room will allow bring the wind to a direction that will reduce the draught in the ship.

The order of events will, without doubt, vary with circumstances, and the actions of individuals will be dependent on the location of the fire and the facilities available in the vicinity.The above-mentioned procedure may be elaborated on. *Reduction of speed* is necessary because the speed of the vessel through the water will provide continuous draught for the fire. This will provide oxygen for the fire, not the required starvation.

Closing down all mechanical ventilation will help to stop the passage of heat and smoke throughout the ship. Should heat or smoke be drawn in through passages etc. it may become necessary to evacuate adjoining compartments. gain starvation of the oxygen supply, effectively reducing the spread of heat, smoke and the fire itself, will not be accomplished.

Fire-fighters need to operate in teams of not less than two men because the average person's courage in the face of danger is reduced considerably if he is alone.Two or more men may also be necessary to achieve a success, or at least better efficiency than one.

Isolation of 'live circuits' is necessary because the dangers of water as an electrical conductor are well known, particularly when a strong jet of water is being brought into operation. Isolation of live circuits must be carried out before the fire is attacked with any water branch line, whether operating on jet or spray.

Surrounding the fire and attacking it, rather than operating from one side only, stops the fire being pushed from one region to another. It should not be forgotten that any fire has no less than six sides, and all six sides should be attacked whenever possible.This may only be in the form of boundary cooling of bulkheads, but the heat content and its effect are reduced.

Watertight and fire doors must be closed for any emergency when the hull is threatened. Not only is the passage of heat and smoke restricted but subsequent casualties caused by the passage of fire or explosion can be greatly reduced.This is especially important on passenger vessels. *Breathing apparatus* is essential for tackling accommodation fires, especially if internal fittings such as furniture containing polyurethane foam are present.Toxic fumes from burning upholstery can be extremely hazardous for fire-fighters.Smoke helmets, for this reason, should not be worn, only the self-contained breathing apparatus.

Tackling the fire speedily is essential. Unless early location of the fire is made, fire-fighting may become extremely difficult. Rows of cabins and passageways tend to transmit heat and smoke quickly over a considerable area. Many of the cabins may form smoke traps, disguising the location of the fire to the fire-fighter or rescuer. Initial actions are important, and these will depend on location and type of fire. If it is in a cabin, considerable build-up of heat may have already taken place, and entry could be disastrous if the interior has not been cooled off. This can usually be achieved by breaking open the bottom panel of the door and directing a jet to the deck head.This action will cause a deflection of the water jet and cool the interior of the cabin down, prior to entry by fire fighters behind a protective spray curtain. Indiscriminate smashing of ports and doors, however, should be avoided unless necessary to save life.

GALLEY FIRES AT SEA

The successful extinguishing of a galley fire will be more readily achieved if the location and method of using the available extinguishing agents are known before hand. Freedom of access to these extinguishing agents is essential, and they should at no time be used for any other purpose than that for which they are designed. A ship's galley will normally be equipped with several or all of the following extinguishing agents;

1. Foam extinguishers for oil-fired stoves

2. Dry powder extinguishers for electric stoves.

3. CO2 extinguishers.

4. Fire blanket.

5. Sand and scoop in buckets or containers.

6. Small hose reel and nozzle.

7. Fire box, close to hand, containing hose, spray/jet nozzle, and fire axe.

Speedy and correct use of the above could reduce the risk of a major fire.Lack of thought in tackling the common chip pan fire could result in the whole of the galley area becoming engulfed in flames, with the subsequent risk to catering personnel and to fire-fighters tackling the blaze.The majority of galley fires occur at the cooking stove, or from activities associated with the stove, e.g. lighting oil stoves, smoking when refilling oil reservoir, overheating pans of foodstuffs, especially fats etc. Human error is probably one of the main contributing factors when pans of fat and such like are left unattended, the escalation into a major blaze occurring when water is used as an extinguishing agent.A limited amount of forethought and training may prevent a serious outbreak by covering the open pan with a damp cloth, so cutting off oxygen from the blaze. The destruction of the so-called fire triangle (Figure 15.3) can be readily achieved in all small fires by the elimination of heat, fuel or oxygen. Major fires will respond in a similar manner when one of the three is nullified, but it may take considerably longer than with a minor outbreak. For instance, an oil drip tray turned into a blazing inferno by the direction of a jet of water on to it within the confines of the galley, is almost impossible to control whereas oxygen could easily have been excluded by deflecting foam onto its surface. A clean,well disciplined galley area will reduce the risk of fire. Regular drills and the training of crews, especially catering personnel, in correct firefighting procedure will reduce the risk still further.

MACHINERY SPACE FIRES AT SEA

The engine room of any vessel must be considered an extremely high risk area, containing as it does certain items more susceptible to fire than any others on the ship.The majority of fires within the engine room are oil fires, Class ‘B’ or electrical fires, Class ‘C’.

When an assessment of an outbreak of fire within the machinery space is made, detail as to the type and the extent, together with the location, must be thorough.A minor oil spillage will probably be a localised outbreak capable of being tackled by portable equipment, whereas a larger oil leak, say from a broken fuel pipe, may cause an extensive fire that can only be extinguished by use of a fixed smothering system such as CO2 or foam. Once an outbreak of fire inside the engine room has been discovered, a suggested course of action would be as follows:

1. Raise the alarm, or order somebody else to raise the alarm.

2. Inform the bridge at the earliest opportunity.

3. Investigate and tackle the fire immediately, if practicable.

4. Continue to fight the fire until the emergency party arrives at the scene.

5. Rescue injured persons as soon as practicable.

6. Establish supply of equipment – foam compound etc.

7. Establish communication system, to include the bridge.

8. Attempt to contain the fire and extinguish by conventional means before use of fixed smothering apparatus.

9. Close down all ventilation, using non-essential personnel, once the alarm is raised and the location of the fire is established.

10. Close all watertight and fire doors as soon as possible after the alarm is raised.

The order of events will vary with circumstances, of course, and the recommendations given above must be used only as a guide. The actions taken by the Master, chief engineer, engineering officers etc. will also be dependent on the type of machinery and the geography of the engine room;but any machinery space fire should be tackled after investigation has shown that the approach adopted will contain and possibly extinguish the outbreak. Conventional means of fighting the fire should be continued until supplies of foam compound are consumed or the available breathing air bottle supply runs out.Then, as a last resort,CO2 or the equivalent should be injected in accordance with the fire-fighting plans of the vessel. The actions needed to extinguish an engine room fire should be taken, bearing in mind the limited supplies of conventional fire-fighting equipment on board. At the outset it should be assumed that a time will arrive when conventional fire-fighting methods can no longer be applied.To ensure the minimum amount of delay, therefore, any fixed fire-fighting installation should be made ready for operation at the earliest possible moment after the extent of the fire has been assessed.

Rescue of casualties should be a matter of priority, with due regard to the safety of rescuing personnel. Correct methods of gaining access to a fired area must be employed to prevent the fire spreading. Breathing apparatus should be employed to reduce the possiblility of further casualties. First aid parties should be ready to treat any injury, especially burns. Regular drills will ensure that personnel when attached to an emergency or stretcher party know how to recognise burns and apply burn dressings.Use of the breathing apparatus and stretchers within the confines of a compact engine room is not easy, and crew members should be exercised whenever drills are called to perform demanding tasks throughout the awkward parts of the vessel.The length of a contact line between any two fire-fighters should be tried and tested for adequacy when they are using engine room ladders. Crews should be trained to use a messenger-location guide line when advancing into smoke-filled blind areas, bearing in mind that if the fire is deep-seated, say around the bottom plates, some breathing bottles will only last about 20 minutes.

Establishing efficient communications is one of the most essential requirements of tackling a fire at sea.There must be a link up from firefighters to the support personnel and to the bridge. In order for decisions to be taken, people in authority must be kept fully informed at all times of the situation. The time to withdraw and inject, say CO2, can only be made by someone who is aware of all the facts,

especially those regarding supplies of equipment, condition of personnel, location of fire, and danger of explosion.

Containment of the fire should first be attempted by use of conventional means, and the possibility of using a water spray from above the fire, as with a funnel fiddley construction,must be seriously considered. Not only will this produce a cooling effect before the injection, say, of CO2 but also a steam cloud, causing a blanketing effect over the fire.

Watertight and fire doors should be closed as soon as possible for the safety of the vessel. Engine room personnel should be well aware of emergency and tunnel escape systems.

Summary

On the discovery of the fire, the alarm must be raised, casualties removed from the scene and the fire investigated and tackled with primary equipment. Depending on weather conditions and the location of the fire, the oil supply should be cut off, emergency parties sent to the scene, and boundary cooling should be started with the aid of emergency pumps and emergency generator.

Communications should be established to include the Master.The Con of the vessel should be adjusted to minimise draught for as long as main engine power remains available. Any fixed extinguishing system should be made ready for immediate use, the communications officer told to stand by, in the event of urgency or distress messages becoming necessary for transmission. Ventilation, fire doors and watertight doors should be sealed, and overhead cooling of the fire scene should be carried out if possible. Personnel should be aware of particular hazards regarding smoke density in an already dark area, and the possibility of re-ignition from hot metal surfaces after they have assumed the fire to be out.

Chapter 9

Fire Extinguishing Equipment

INTERNATIONAL SHORE CONNECTION: An international approved coupling is provided on board all ships so that in case of total failure of all pumps on board, sea water under pressure can be supplied by another ship or shore via this connection to the ships fire main to fight the fire. This coupling is normally kept safely on bridge of a ship so that in case of an emergency it is readily available (See diagram of international shore coupling for dimensions and the shape / size).Ships of 500 tons gross tonnage and upwards shall be provided with at least one International shore connection.

Facilities shall be available enabling such a connection to be used on either side of the ship.Standard dimensions of flanges for the international shore connection shall be in accordance to the following table:

DESCRIPTION	DIMENSION
Outside diameter (OD)	178 mm
Inside diameter (ID)	64 mm
Bolt circle diameter (PCD)	132 mm
Slots in flange	4 holes 19 mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery
Flange thickness	14.5 mm minimum
Bolts and nuts	4, each of 16 mm diameter, 50 mm in length

The connection shall be of steel or other suitable material and shall be designed for 1.0 N/mm2 services. The flange shall have a flat face on one side and on the other shall be permanently attached to a coupling that will fit the ship's hydrant and hose. The connection shall be kept aboard the ship together with a gasket of any material suitable for 1.0 N/mm2 services, together with four 16 mm bolts, 50 mm in length, and eight washers.

1. **WATER SPRINKLERS FIRE EXTINGUISHING SYSTEM:** In engine room, cargo holds, accommodation, shipside tanks.

2. **FOAM (low expansion) EXTINGUISHING SYSTEM:** Deck of oil tankers, heli deck and open space)

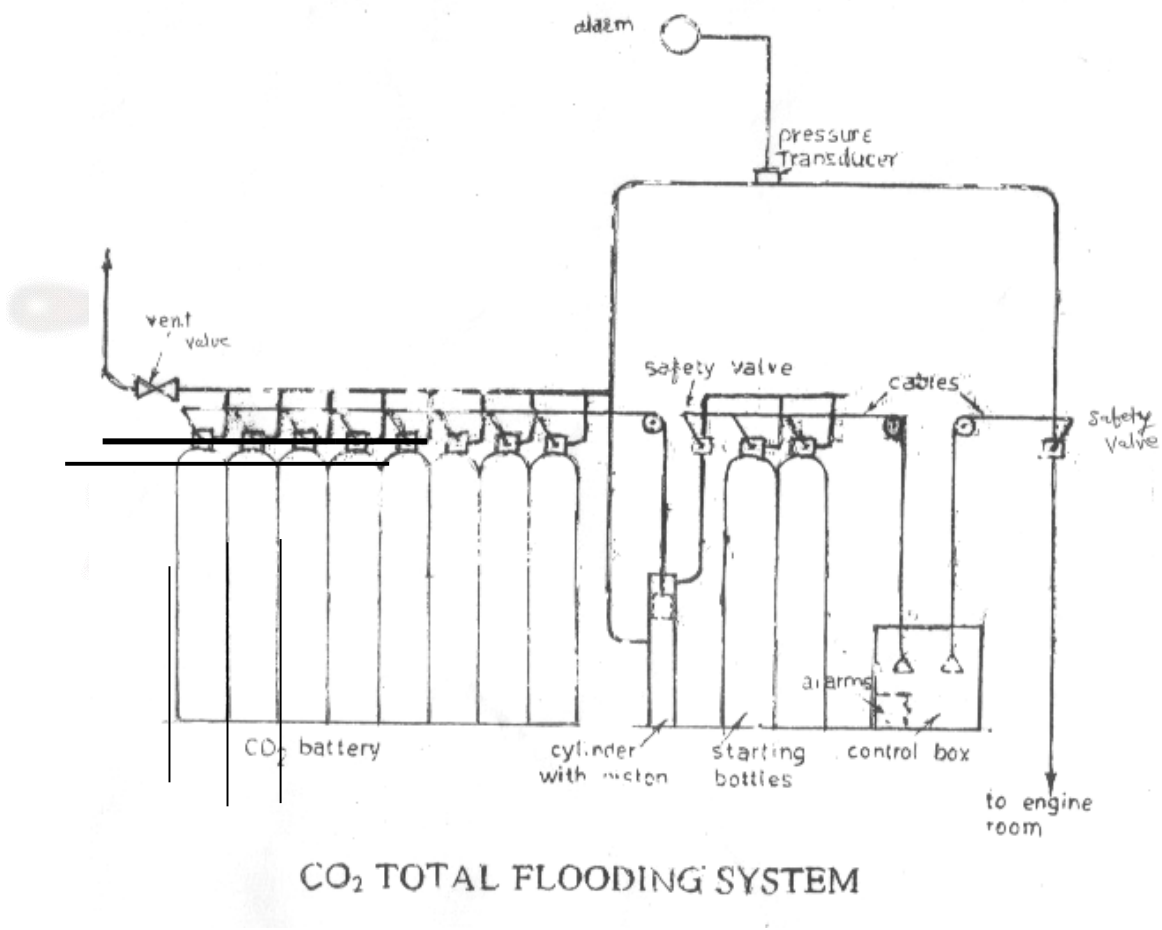
Foam is the most suitable medium for extinguishing fires involving flammable liquids. Extinguishing is achieved by turning a layer of foam on the surface of the liquid preventing fuel vaporizing. After extinguishing the flames the foam blanket should be maintained to allow the surrounding structure to cool below the ignition temperature of the liquid. This system is used for fighting fire in the cargo space, on cargo deck, in the engine room, pump room, paint store etc. This

system has storage tank containing foam concentrate. Foam is drawn from the tank by an ejector and foam solution is then conveyed through permanent pipelines to off take points.

3. **FOAM (high expansion) FIRE EXTINGUISHING SYSTEM:** In engine room, boiler room, cargo holds, pump room and paint store.

4. **DRY CHEMICAL POWDER (D.C.P.) FIRE EXTINGUISHING SYSTEM:** For interrupting the chemical reaction in metals, gas fire, electrical and electronic equipments fire. Used as fixed fire fighting system **especially in gas carriers**.

5. **CARBON DIOXIDE FLOODING SYSTEM:** This is designed to fight fire in the Engine room, Boiler room, Pump room, Control room, and Switch board etc. This system consists of a battery of a large number of carbon dioxide cylinders. The carbon dioxide is piped from the cylinder manifold to suitable point having diffusing nozzles. An alarm is incorporated in the system which when activated gives a warning to the personnel to evacuate the compartment before releasing the carbon dioxide.

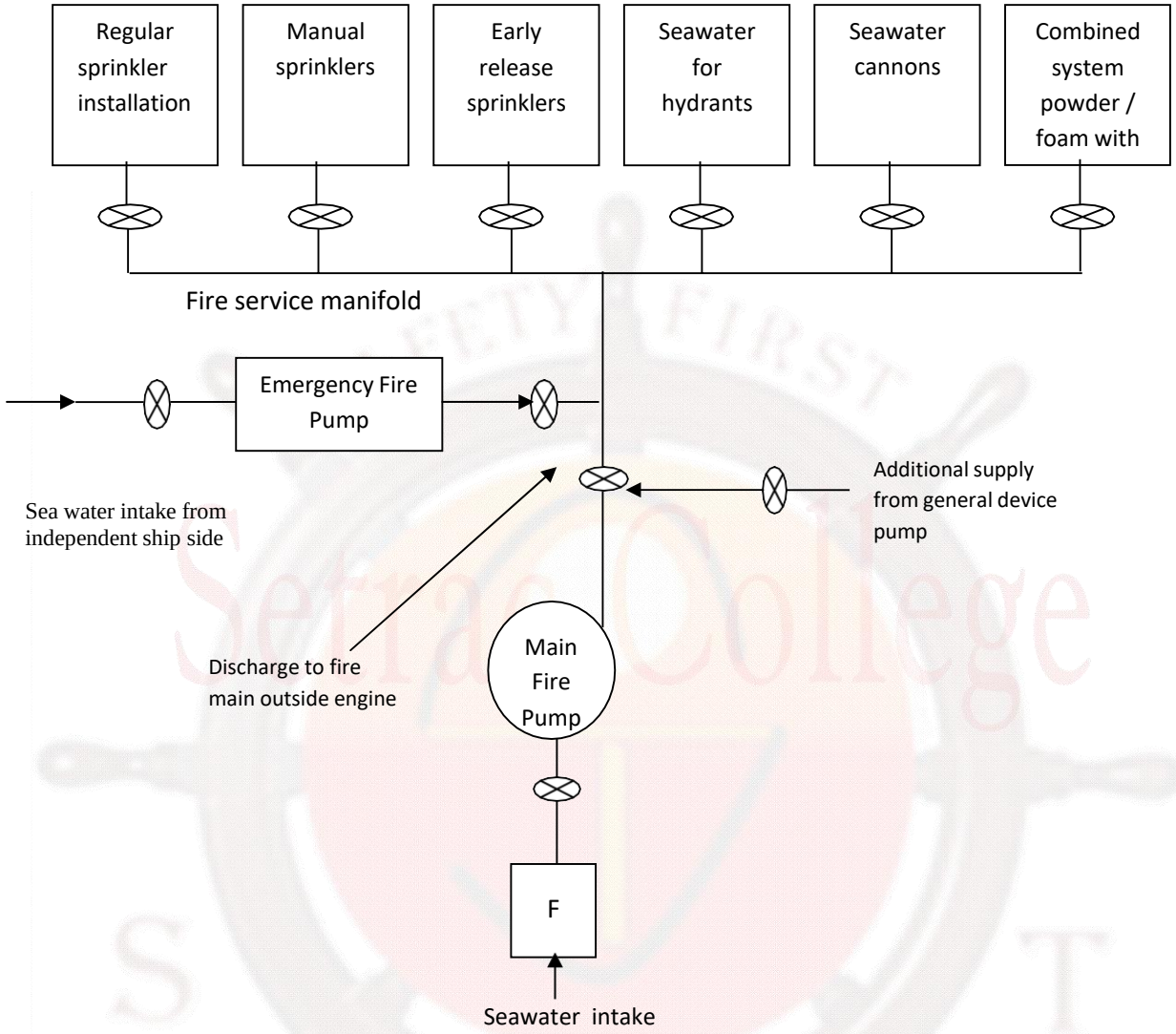


CO_2 TOTAL FLOODING SYSTEM

CO_2 TOTAL FLOODING SYSTEM

6. **FIRE MAIN SYSTEM (HYDRANT SYSTEM):** The discharge of sea water from the fire pump is led through out the ship in a fire main line and fire hydrants are provided on the fire main line at likely spots of fire. Hoses and a nozzle are provided near each fire hydrant to direct water under high pressure on the fire. In this system, water is available under pressure to fight fire at all points in vessel. The emergency fire pump discharge can also be fed in this fire main system via an

isolation valve. The fire pumps are located in engine room and emergency fire pumps are located outside the engine room so that in case of failure of main pump or the power supply, the fire main can be kept under pressure from emergency fire pump.



7. **<u>DRENCHER SYSTEM:</u>** Where as a sprinkler system protects a compartment from fires arising within it, drenches are located on roofs, windows and other opening in external wall to protects the place of fire from outside hazards. And the types of drenchers are as follows: -

a) Roof drenchers

b) Wall or curtain drenchers

c) Window drenchers

8. **<u>WATER SPRINKLER SYSTEM:</u>** It is normally installed in accommodation areas in cabins, alleyways, stairways, medical store, saloon etc. This system is always kept under water pressure. The sprinkle heads at exit points in cabins, saloons etc. are fitted with glass bulb (Quortzoid bulbs) containing high expansion fluid. In case of fire, the glass bulb containing high expansion fluid bursts and allows the water under pressure to fall like a sprinkler with low velocity. An alarm is

activated, which gives the location of fire and it is also indicated on the control panel in bridge and engine room.

TYPES OF SPRINKLER SYSTEM: There are three types of sprinkler system viz. wet/dry and combination of these two systems. Wet installation is used where water is not likely to freeze (anti-ferment are added in the system to prevent icing). The dry system is used where water is likely to freeze. The alternate installation operates on wet principle in summer and dry principle in winter.Main parts of wet sprinkler installation are main valve, NRV (Non-return valve) alarm clock valve, drain valve, pressure gauge, alarm motor union etc.Sprinkler heads are of two types:

1. FUZIABLE SOLDER
2. QUORTZOID BULB

OPERATING TEMPERATURE DEG F°	MAXIMUM ROOM / WORKING TEMPERATURE DEG C°	COLOUR OF BULBS
155	68	RED
175	79	YELLOW
200	93	GREEN
286	141	BLUE
360	182	VIOLET
440 – 500	227 - 260	BLACK

9. **PORTABLE FIRE EXTINGUISHERS:** Also known as first aid fire fighting appliances. These are for immediate use in the early stages of fire. User should not expect to deal with large fires since they have a limited duration of use and capacity. These may be divided into four categories according to the extinguishing agent (media) they contain namely: WATER, FOAM, DRY CHEMICAL POWDER and CARBON DIOXIDE. The capacity of portable extinguisher varies from 9 litres to 13.5 litres. These extinguishers are located in where there is easy access and they can be readily seen. The locations are near to room exit, corridors and stairways.

Fire Extinguisher: Portable extinguishers.

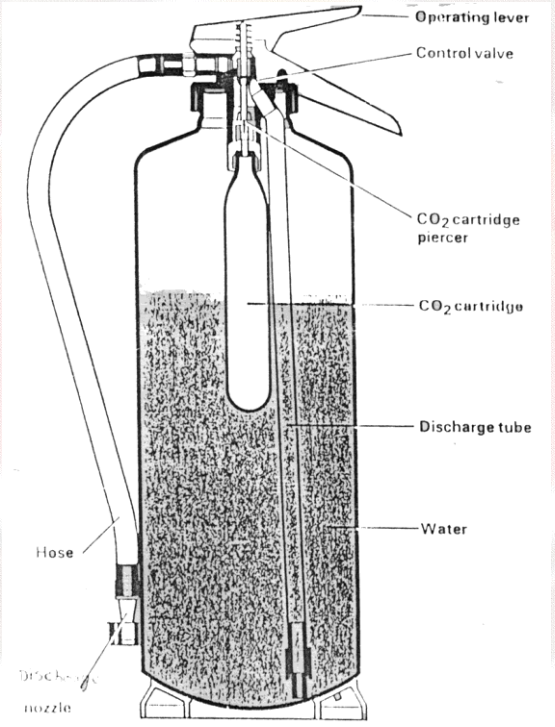
- Liquid contents should not be less than 9 liters and more than 13.5 liters.
- CO_2 type capacity of not less than 4.5 kg of CO_2.
- Halogenerated Hydrocarbon type to contain minimum of 7 Kg. BCF 1211 or BTM 1301.
- Not to exceed 23 Kg. of weight in fully charged condition.
- As far as possible to have uniform methods of operation.
- Extinguishers with pressurized contents, or those containing extinguishing media which will be harmful to personal are not to be used in Accommodation (CO_2 and Halon type).
- To be periodically inspected at intervals not exceeding two years.
- Required numbers to be kept fully charged at all times.
- Spare charges or replacement for every portable extinguisher (100 %).

Required marking on each type of extinguisher:

- Name of manufacturer
- Type of fire for which extinguisher is suitable
- Instructions for operating
- Capacity / weight of extinguishing media
- Marks / level of liquid
- Test pressure
- Year of manufacture
- Temperature ranges over which extinguisher will operate satisfactorily.
- Date last inspected / refilled.

i) 9 LITRE WATER – CO_2 GAS EXTINGUISHER:

It is painted red. Operates for 60 – 90 seconds duration.



9 Ltr WATER Co_2 GAS EXTINGUISHERS

Range: Minimum 4 to 6 meters for at least 30 seconds.

Max. Internal Pressure: 17 bar at 21°C.

Hydraulic Pressure test: upto 24 bar, subsequent test as per regulation / manufacturer advice.

In this fire extinguisher, water is the fire fighting medium. The water is released in the form of a jet by means of gas pressure in the upper part of the container. The pressure is created by the release of carbon dioxide gas (CO_2) from a pressurized gas cartridge within the extinguisher. The gas cartridge is punctured by the plunger with spring release action.

The method of operation: - It is mostly used on carbonaceous solid flammable materials like wood, paper, cloths, ropes etc.

To Operate: - Hold the extinguisher firmly with nozzle pointing towards the fire

1. Remove safety clip
2. Strike hard on striker by hand (plunger will puncture the CO_2 cartidge)
3. Lift the extinguisher on operating position and direct the nozzle towards the base of fire to form a jet.

Note: - Do not use this extinguisher on oil or electrical fire.

ii) 9 LITRE MECHANICAL FOAM EXTINGUISHER (ALSO CALLED LIGHT WATER):

a) It is painted yellow has duration of 60 – 90 seconds and can cover a distance of 4 to 6 meters.

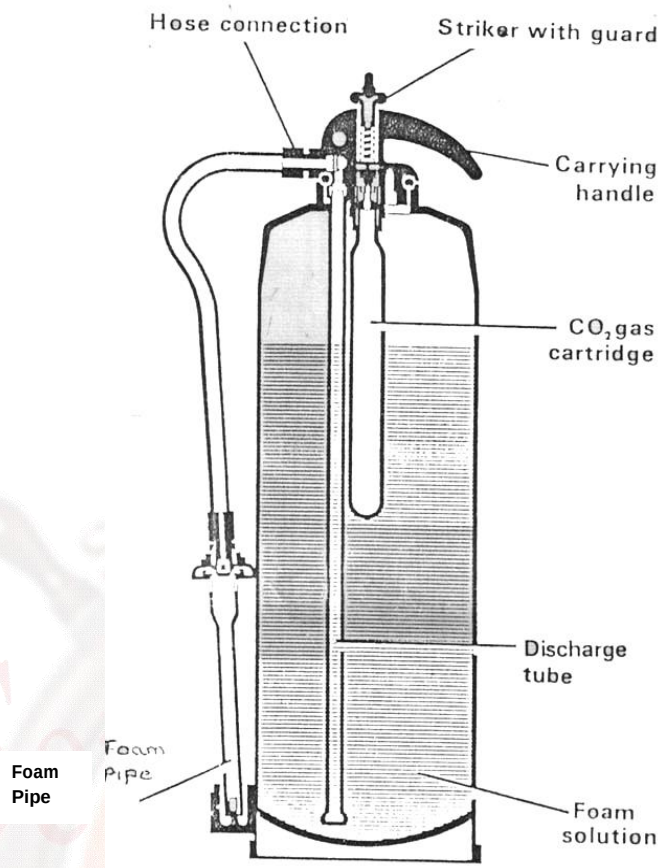
b) In this extinguisher, foam concentration is mixed as a solution in water.

c) A CO_2 gas cartridge (120 gms to 200 gms) is provided, which when pierced provides the pressure to discharge the foam solution. The solution is carried upward through the dip tube due to the gas pressure above it.

d) The solution is aerated at the discharge nozzle to form the foam.

e) The construction of the body and method of operation of this extinguisher is similar to that of a water carbon dioxide type extinguisher and discharge rate is also same as water CO_2 type of extinguisher.

Note: - Foam should not be projected directly on burning fuel. It should be allowed to drift by taking support of vertical structure.



9 Litre – MECHANICAL FOAM EXTINGUISHER (GAS CARTRIDGE TYPE)

Range: Minimum 6 meters for at least 30 seconds. Complete discharge time 90 seconds.

Max. internal pressure: 17 bar at 21°C.

Hydraulic test: Upto 24 bar, subsequent tests as per regulations / manufacturer's advice.

Charge: Protein foam / fluoro protein / AFFF compound solution.

iii) DRY CHEMICAL POWDER EXTINGUISHER (D.C.P.):

a) These extinguishers are used mainly for low Flash Point liquid fires and high-pressure gas fires. They have very little cooling effect.

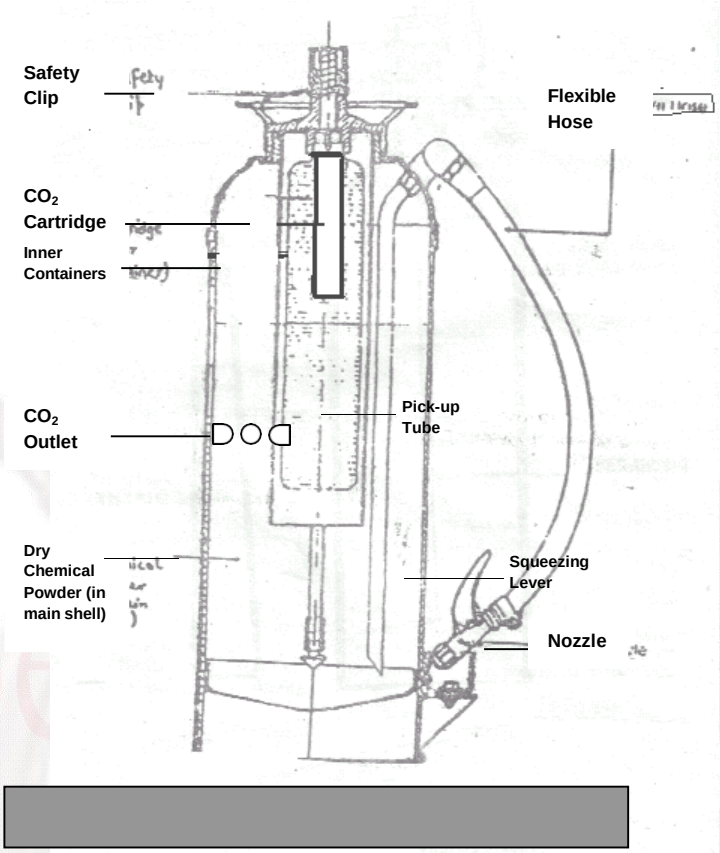
b) Dry chemical powder extinguisher is for tackling petroleum fires, gas fires, electrical equipment fires and surface of textile fiber.

c) Their action is very quick and is noticed for the speed with which they put ut fires.

d) Chemical powders are normally sodium based. When used on fire the powder under goes a chemical reaction. The free radicals, which cause and sustain fire, are put out of action by Dry Chemical powders and thus the fire is extinguished very fast.

e) For special metal (like sodium, magnesium) fires, special dry powders (T.E.C.) containing mixtures of Sodium, Potassium and Barium compounds are used to extinguish fire.

f) Above extinguishers are normally available in 1, 2, 5 and 10 Kg capacities.



iv) <u>5 KG. GAS CARTRIDGE TYPE DRY CHEMICAL POWDER EXTINGUISHER:</u>

a) It is painted blue and is used for extinguishing fire by interruption of chemical reactions.

b) See the figure for the construction of this type of fire extinguisher. The dry chemical powder (5 Kg.) is contained in the main shell of the extinguisher and CO_2 gas is held under pressure in a sealed cartridge. When the extinguisher is operated, the CO_2 cartridge (120 gms) is broken allowing the CO_2 gas escaping to the main shell and push out the powder in the form of fog.

<u>METHODS OF OPERATION</u>

a) Carry the extinguisher to the place of fire and keep it upright. Remove the safety clip and strike the knob located in the piercing mechanism, which in turn breaks the sealing disc of the cartridge.

b) Direct the stream of escaping powder at the base of the flame. For effective result stand about 1.5 to 2.5 meters away and direct the stream near the seat of the fire. Move forward, moving the nozzle rapidly with a sweeping motion. Useful for flight deck and helicopter landing platform, machinery spaces.

c) When using on outdoor fires, always operate the extinguisher from the upwind side of the fire to increase the effective range of the spray and to avoid the spray falling on fire fighter.

v) **<u>CARBON DIOXIDE TYPE FIRE EXTINGUISHER (4.5 Kg.)</u>**:

a) It is painted black and has duration of 12 – 15 seconds.

a) Carbon dioxide (CO_2) is effective as an extinguishing agent primarily because it reduces the oxygen (O_2) content of air to a point where combustion cannot continue (SMOTHERING). CO_2 is non-combustible and does not react with most substances. Being a gas it can penetrate and spread to all areas affected by air.

b) Carbon dioxide fire extinguishers are used for putting out fires on oil, petroleum products, gaseous substances under pressure and on sophisticated electrical and electronic equipment.

c) CO_2 extinguishers should not be used in fires involving chemicals that contain their own oxygen supply (e.g. Gunpowder, TNT, Cellos nitrate and other explosive chemicals which contain free O_2 atoms released during their burning / chemical action). Also for reactive metal like sodium, potassium, magnesium, carbon dioxide is of no use in extinguishing the fire.

d) **Construction:** See the figure in which the main parts of the CO_2 extinguisher are shown CO_2 is retained in the cylinder as liquid under pressure. The cylinder is filled with the charge to about two-third (2/3) by weight of its total water capacity.

METHODS OF OPERATION: Carry the extinguisher to the place of fire, remove the safety pin and operate the discharge device and unscrew the valve. Carbon dioxide is discharged through a high-pressure flexible hose and horn. Direct the jet at the base of fire and sweep across the fire surface. In open space, stand on up wind side and discharge the gas in down wind direction as close as possible to fire. For electrical fire, first switch off the power supply.

Note:

1) Never hold discharge hose or outer end of discharge horn of carbon dioxide extinguisher. Always hold from marked place only to avoid frostbite.

2) Do not lift portable carbon dioxide extinguisher above your height as these gases are heavier than air and will be directly affecting the breathing system of operator if discharge from a height.

10. NONPORTABLE FIRE APPLIANCES:

1. **Mobile Fire Extinguishers** (semi-portable)

a) The weight of the mobile extinguisher is more than 23 Kg.

they are also called as fire engine.

b) These are mounted on wind trolley and kept just outside the

machinery compartments.

2.a Fire Pump

- At least two power operated pumps.
- Each pump should be capable of delivering at least two jets of water simultaneously from any two fire hydrants.
- Discharge capacity is not required to exceed 180 m^3/ hr.
- Capable of maintaining pressure (in bar) at the hydrants for cargo ship 2.7 for 6000 ton and above, 2.5 for 1000 to 6000 ton and 2.1 for under 1000 ton.
- Passenger ship 3.1 for 4000 upward, 2.7 for 1000 to 4000 ton and 2.1 for under 1000 ton.

- Relief valve to be provided if pumps are capable of producing pressure exceeding the design pressure of fire main or other fittings.

2.b **Emergency fire pump:** Independent power and with a separate suction line to be provided. These are used for fire in E/R when main fire pumps are out of action.

- Such pumps have minimum capacity similar to that of main pump (not less than 40%) of the total capacity of all the fire pumps and not less than 25 m^3/hr capacity and capable of maintaining 2.5 bars pressure.
- Total suction head should not exceed 4.5 mtr. In worst condition.
- Diesel driven pump must start with hand cranking at 0ºC.
- Fuel tank capacity for at least 3 hours on full load and reserve for 15 hours.
- Hand cranking or approved type of alternative measure for starting at least 6 starts in 30 minutes and 2 starts in first ten minutes.

3. Fire hoses

Not to exceed 18 mtr for interior use and 27 mtr For exterior use and cargo spaces for the vessel of moulded breadth of 27 mtr or more.

- Made of closely woven flex, canvas or other approved material.
- Provide coupling and other fitting on either end with plain nozzle or dual-purpose nozzle.

Hose dia should not be less than 64 mm if unlined or 45 mm if lined.

- To be positioned near the hydrants.
- Provision of interchangeable hose and nozzle for each hydrant other than those required for machinery spaces one for each 30 mtr ships length or part, thereof but in no case less than five in a ship above 1000 ton.
- One spare hose with coupling and nozzle.

4. Hydrant / Isolating Valve / Drain Valve:

- Located so that hose can be easily attached.
- Number of position of hydrant is such as to supply two jets of water not eliminating from the same Hydrant one of which should be from a single length of hose, may reach any part of the ship normally accessible to the passenger or crew.
- In machinery space at least two hydrants one or port side and other on stbd side.

Isolating valves to separate the suction of fire main within the machinery spaces containing the main fire pumps and the rest of the fire line to be fitted in an easily accessible position out side the machinery space for tanker deck at interval of 10 mtrs.

5. **Nozzles:** 12 mm or 16 mm or 19 mm diameter nozzles to supply quantity of water as required. Jet/spray with shut off facility. One at each Hydrant to be provided.

11. **PERSONNEL EQUIPMENT:**

1. Water resistance protective clothing for protection against burn from radiant heat.
2. Safety shoes and hand gloves made of electrically non-conducting material.

3. Rigid helmet for protection against impacts.

4. Electric safety lamp with a capacity to work for three hours.

5. Axe with an insolated handle.

12. BREATHING APPARATUS:

1. Smoke mask with connection for air supply.
2. Air pumps or bellow for pumping air into the hose.
3. Non-collapsing type hose in sufficient length.
4. Able to reach any part of accommodation and other areas.
5. Cargo and machinery space length 36 mtrs.

13. SELF CONTENT BREATHING APPARATUS:

1. Capable of working 30 minutes and provides with one facemask.
2. Cylinder capacity of at least 1200 liters of free air.
3. Fireproof life line with snap look at least 3 mtrs. Longer than needed to reach any part of the space to be entered from an open space made of copper or galvanized tin wire rope having a breaking strength of 500 kg.
4. Adjustable safety belt or harness made of fabric.
5. Must have a bypass valve.
6. Provided with a pressure gauge with anti-busting orifices in high-pressure air supply system.
7. Maximum weight 16 kg. including lifeline, safety belt and harness.
8. Spares cylinder fully charges of 2400 ltrs of free air.
9. Ships carrying 5 sets or more the total spare capacity of free air are 9600 ltrs. or if charging facility is available spare capacity per cylinder 1200 ltrs. or total 4800 ltrs.
10. Provided with audibly warning device at 20% remaining air.
11. Provided with safety manual.
12. Operating instructions.
13. Marking of the maker and the years of manufacturers.

Chapter 10

PERSONAL EQUIPMENT

FIRE MAN'S OUTFIT

a) To approach seat of fire for fighting and to rescue, adequate protection is required against heat and smoke.

b) Every ship carries fireman's outfit consists of a breathing apparatus water resisting protective clothing, safety shoes and hand gloves, rigid helmet and electric intrinsically safe hand lamp of about three hours duration, an axe with short insulated handle, a strong fire proof line and belt for carrying the auxiliary equipment.

Fire man's outfit requirements: -

1. For the ships 500 – 2500 tons = Two sets
2. For the ships 2500 – 4000 tons = Three sets
3. For the ships 4000 tons and above = Four sets

Easily accessible and ready to use and stored in widely separated position.

c) The breathing apparatus is Compressed Air Breathing Apparatus (CABA) and smoke mask with air pump and sufficient length hose (about 36 mtr). CABA SET or SCBA (SELF CONTAINED BREATHING APPARATUS) consists of a facemask attached by a flexible hose to one or two cylinders containing air and supported on a frame and harness. The two air cylinders last for approximately 30 minutes.

d) The cylinders are connected to a reducing valve, which reduces the pressure to about 4 bars. The air then passes through a DEMAND VALVE, which further reduces the pressure and passes air to the user as he inhales and then closes as he exhales. Automatic valve releases exhaled air from the facemask.

e) When about 10 minutes of air supply remains in the cylinder a warning whistle sound continuously warning the user.

f) The facemask is of module rubber with a series of adjustable rubber straps to secure it to the head of wearer and fitted with quick release arrangements. The vision shield has a good vision and wearer does not have to turn his head constantly.

g) A pressure gauge is provided to indicate the pressure of air in the cylinder.

h) The reflex facemask, to which the demand valve is connected, incorporated an inner mask speech transmitter and fresh air valve together with the microphone communication equipment. The air supply from the demand valve on inhalation first passes across the visor to present mistling and into the inner mask on exhalation. Expired air passes out through the positively closed exhalation valve in the front of the port.

PREPARATION FOR USE OF CABA SET:

a) Fit cylinder buffer into rubber boot at base of the set, so that the valve lies horizontally. Tighten the connector into the cylinder (hand tight only). Place cylinder straps around and fit swing

bolts into forks on cylinder straps and tighten adjusting shoulder straps waist belt to full extent. Then adjust facemask harness straps to their full extent, living the center strap pre-adjusted. b) Switch off demand valve. Positive pressure facility by pressing the red buttons. To prevent damage to the positive pressure mechanism, it is important that the lever is not depressed without the rubber shroud being in position.

e) Checking the function of the BA set open cylinder valve slowly but fully. Hold breath, the unit will get balanced i.e., no audible leak. Continue breathing. It must be possible for the expired air to flow easily out of exhalation valve by breathing deeply several times. Check the function of the supplementary supply by depressing fully the center of the protective cap.

FORCED AIR BREATHING APPARATUS

a) This consists of face mask with an integral speech diaphragm, rubber breathing tube harness assembly with shackle, hemp covered with wire rope life line, signal plate, air hose, non collapsing type and double acting foot operated bellow.

b) Fresh air is drawn up the hose by the wearer's own inspiratory effort. An exhaling valve allows the escape of excess and vitiated air. The apparatus is connected to a set of bellows, which can be foot or hand operated.

1. This bellow should be situated in fresh air with the effort of a second person continuous supply of fresh air for breathing can be provided to the user for his breathing.

DISADVANTAGES OF FORCED AIR BREATHING APPARATUS

a) Constant supply of fresh air is dependent on the second person.

b) Air tubing / hose has to be trailed behind the wearer thus restricting his movement and limiting his area of operation.

c) The air hose may be cut or damaged during operation.

d) The apparatus is bulky and not comfortable, compared to breathing apparatus set (CABA set). Good care is essential to maintain the bellows in good working and unpunctual condition.

LIFE LINE SIGNALS

One pull-fire attainder asks fire fighter if he is OK. Fire fighter replies with one pull means "I AM OK".

Two pull-by fire fighter "Pay out the line, I want to proceed further". The attainder acknowledges by two pulls and pays out more lifelines.

Three pull-by fire fighter or fire attainder "Take slack on life line, I am coming out"; "Taking slack on life line you can come out".

In emergency also three pulls are given in impending danger.

Chapter 12

SHIP's FIRE FIGHTING ORGANISATION

The following information is always available on the bridge:

A) Fire control plan

1) A permanently exhibited plan displaying the fire protection facility on board ship.
2) Drawings giving size of ship E/R and accommodation.
3) Details of emergency escape routes / accesses from different zones of the ship.
4) Details of fixed and portable fire extinguishing equipment available on board including storage of refills.

B) Stability information

1) Details of survival equipment and their storage place.
2) Storage plan.
3) Information on dangerous goods.

C) Communication method available

1) Telephone including sound power telephone
2) Loud hailers
3) Direct speech between bridge and MCR
4) Radio telephone including walkie-talkie.
5) Messengers

D) Method of damage control and containment fires

1) Watertight doors operated directly from bridges.
2) Stopping of ventilation or exhaust fans and closing of dampers.
3) Closing of windows and portholes in accommodation and galley.
4) Steering ship to right direction relative to wind for fighting the fire.
5) Cooling fuel tank boundary bulkheads.

E) Methods of ensuring stability

1) Frequent checking change in GM (Metacentric Height) due to use of water.
2) Pumping and draining of fire fighting water.
3) Shifting of cargo to facilitate fire fighting

4) Moving to shallow water, if necessary

FIRE PARTIES: Organisation of the fire parties are as follows:

- In any emergency on board an Emergency Response Plan (ERP) goes into action. Under ERP a small well-trained team tackles any emergency that may rise. The main feature of ERP is as follows:

It defines a response to an alarm, ensure safety of life, facilitates effective communication, comply with standard procedure, it select team as required for further tackling the emergency and starts training and drill sanctions. The ERP is normally posted at the following locations.

Navigating bridge, engine room, crews accommodation and near muster stations.

TEAM AND THEIR DUTIES: The teams are formed as per pattern given below depending on the total number of personal borne on board a particular ship.

a) Command team

Master over all incharge

3rd Officer	:	Assistant
Radio Officer	:	Communications / Records
Helmsman	:	Steering
E/R Rating	:	Messenger

b) Emergency team I

Chief Officer	:	Leader on Deck
4th Engineer	:	Assistant
Petty Officer	:	As directed
Seaman	:	As directed
ERR	:	As directed
Saloon Crew	:	As directed

c) Emergency Team II

2nd Engineer	:	Leader
2nd Officer	:	Assistant
Petty Officer	:	As directed
Seaman	:	As directed
ERR	:	As directed
Saloon Crew	:	As directed

d) Technical Team

Chief Engineer	:	Leader
3rd Engineer	:	Assistant
Electrical Engineer	:	As directed
ERR	:	As directed

e) Support Team

Catering Officer	:	Leader

Bo'sun	:	Deputy
Seaman	:	As directed
Saloon Crew	:	As directed

f) The command team is responsible for the command and the emergency situations. To initiate search for any person not accounted for. Establishing internal and external communication and maintaining safe navigation and time event record.

g) Emergency team must first report to the command team and prepare equipment as ordered, and report readiness. This team is the first one to tackle emergency.

h) The support team musters at a pre-determined location and advises their readiness to command team and emergency team on walkie-talkie. They provide support to the command team and emergency team in preparing survival craft, breathing apparatus, additional fire fighting equipment, maintain security patrol, boundary cooling and shut-off ventilation.

i) The technical team reports their readiness to command team and give status of machinery and other emergency system and advise if any machinery has to be shut down for safety and attend to fixed fire fighting installation if necessary.

PROCEDURE FOR FIRE FIGHTING

SHIP AT SEA

- Fire alarm initiated continuous ringing on ships bell.
- Crew assembled at fire stations as per muster list.
- Fire party is assembled and prepared for action – as per orders from the bridge / master.
- Ships course and speed altered – as necessary to assist in fighting / containing the fire.
- Fire pumps started and ships fire line activated. Fire hoses with nozzle rigged up.
- Fire fighting initiated.

ADDITIONAL PROCEDURE IN PORT

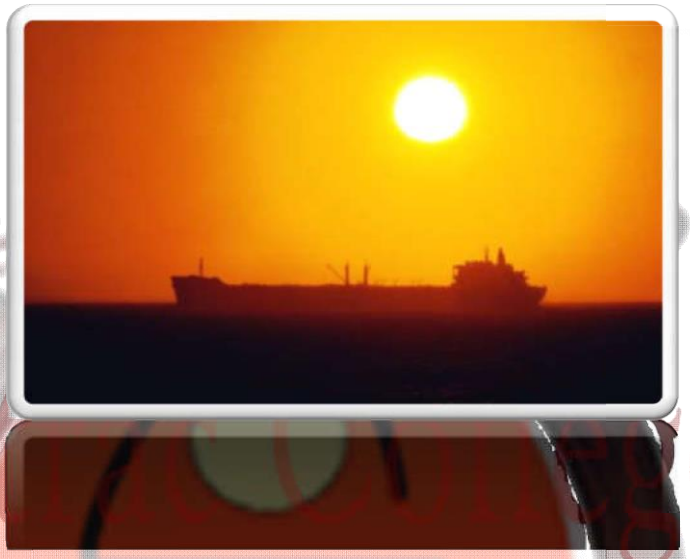
- Call the port fire brigade
- Inform port authority
- Conform that port fire brigade will take charge
- Port authority to inform of hazards to the dock installation.
- Evacuate non-essential personnel.
- Make preparation to leave port, if required on power, or with the help of tugs.

ALARM AND INITIAL RESPONSE

- Irrespective of whether the vessel is at sea, anchor or in port, on hearing emergency alarm, all ship's personnel muster at their emergency station with their life jacket in long sleeve boiler suit, safety shoes and safety helmet.
- The team leaders muster the teams and report is made to the master regarding any missing person or absenteeism.

Setrac College of Offshore Training

Elementary First Aid



Trainee Handout

Course Objectives

This syllabus covers the requirements of the 1995 STCW Convention Chapter VI, Section VI/1, Table A VI/1-3 and META Manual Vol-II, Appendix M-VI/IC. On meeting the minimum standard of competence in elementary first aid, a trainee will be competent to take immediate action upon encountering an accident or medical emergency until the arrival of a person with medical first aid skills of the person in charge of medical care on board.

Day	Day 1	Day2	Day3
Period			
1ST Period - 0830 –1000	General Principles	Resuscitation	Burns and Scalds, and Accidents caused by Electricity
2ND Period - 1010 – 1140	Body Structure and Functions	Bleeding	Rescue and Transport of Casualty
3RD Period - 1140 – 1240	Body Structure and Functions	Management of Shock	Rescue and Transport of Casualty
4TH Period - 1240 - 1340	Unconscious causality	Burns and Scalds, and Accidents caused by Electricity	Feedback & Assessment

INDEX

CHAPTER – 1

PRINCIPLES OF FIRST AID

1. ***Definition.*** *First aid is the immediate assistance given to the injured or ill with the available resources before medical help is available.*

2. **Aim.** The aims of first aid are :-

(a) To save life by removing any danger immediately threatening life.
(b) To prevent further injury and deterioration of the patient's condition.
(c) To relieve pain.

(d) To make medical care available at the earliest.

3. **Qualities of a First Aider.** A good first aider should be :-

(a) A good observer.
(b) Able to act quickly.
(c) Calm and collected.
(d) Able to lead and control the crowd, and take help from on-lookers.
(e) Self confident and able to judge which injuries need to be tackled first.
(f) Able to reassure the apprehensive victim and his/her anxious or nervous relatives by demonstrating competence, expressing sympathy and providing reassurance.

4. **Principles of First Aid.**

(a) Remove the patient to a place of safety.
(b) Loosen clothing around the neck and waist to aid breathing.
(c) Reassure the patient.
(d) Look for the following :-

(i) Is there any failure of breathing? If yes, start artificial respiration.

(ii) Is there any failure of circulation? If yes, start external cardiac massage.

(iii) Is there severe bleeding? If yes, stop bleeding by pressing firmly on the bleeding area with a clean pad for a few minutes or apply pressure on the pressure areas.

(e) Treat shock.
(f) Relieve pain.
(g) Avoid handling the casualty unnecessarily.
(h) Arrange for the safe removal of the casualty to hospital.

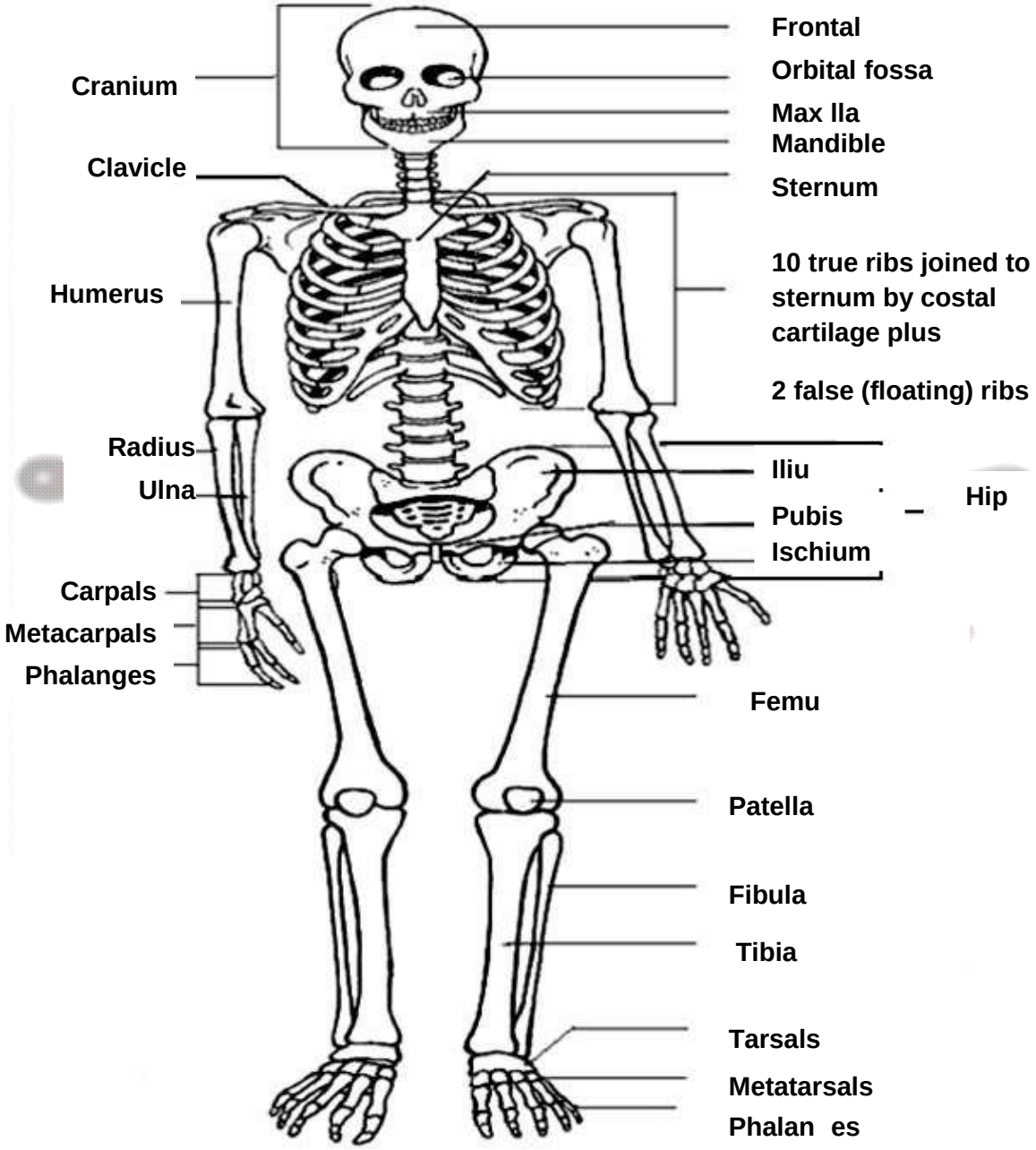
CHAPTER – 2

BODY STRUCTURES AND FUNCTIONS

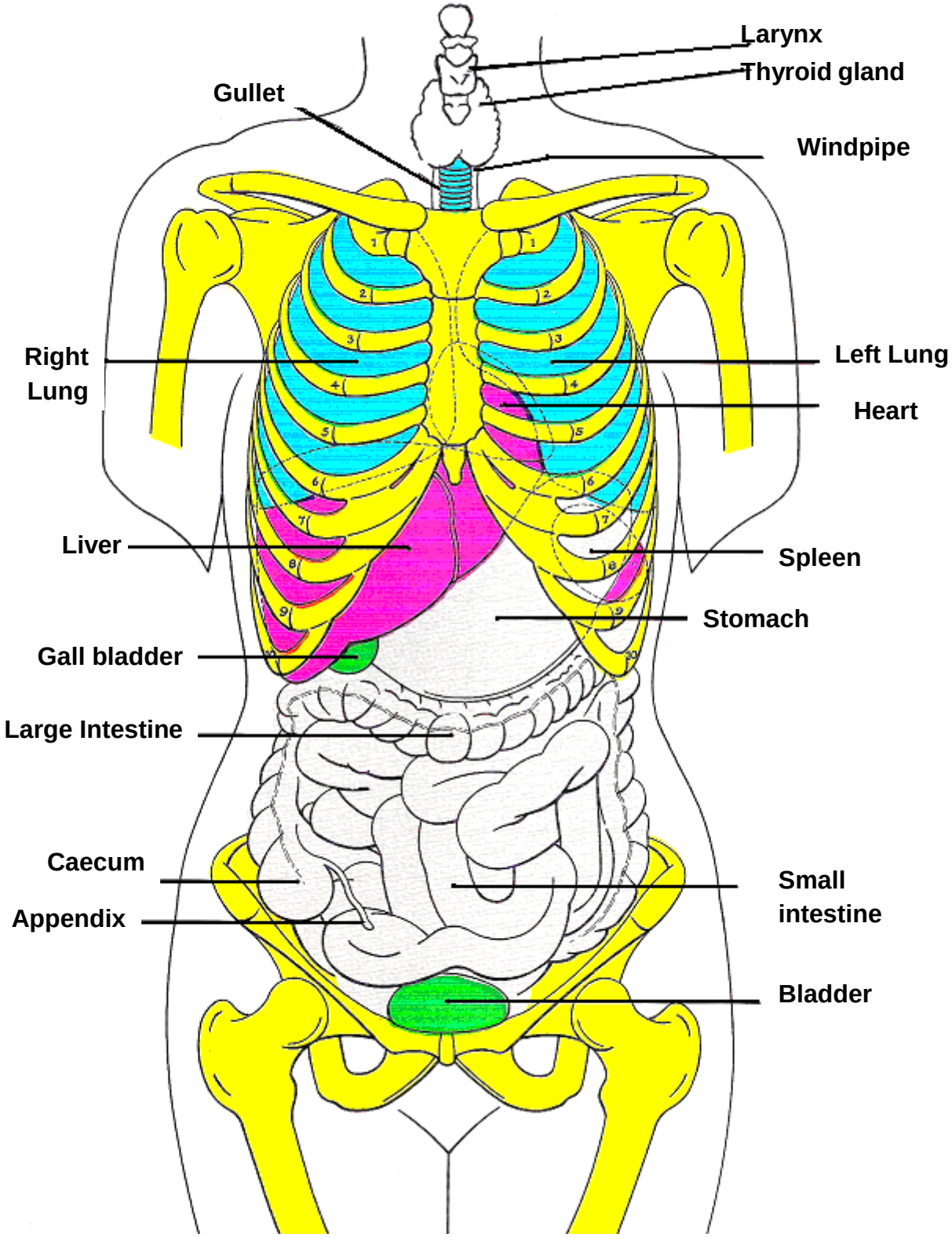
The human body can be compared to a well-oiled machine which is required to perform various functions in co-ordination with other systems. As in a machine, coordinated functioning is essential as no particular system can be said to be more important than another.

Every first aider should be familiar with the various systems of the body and their functioning so that he can understand and treat any abnormalities in an emergency.

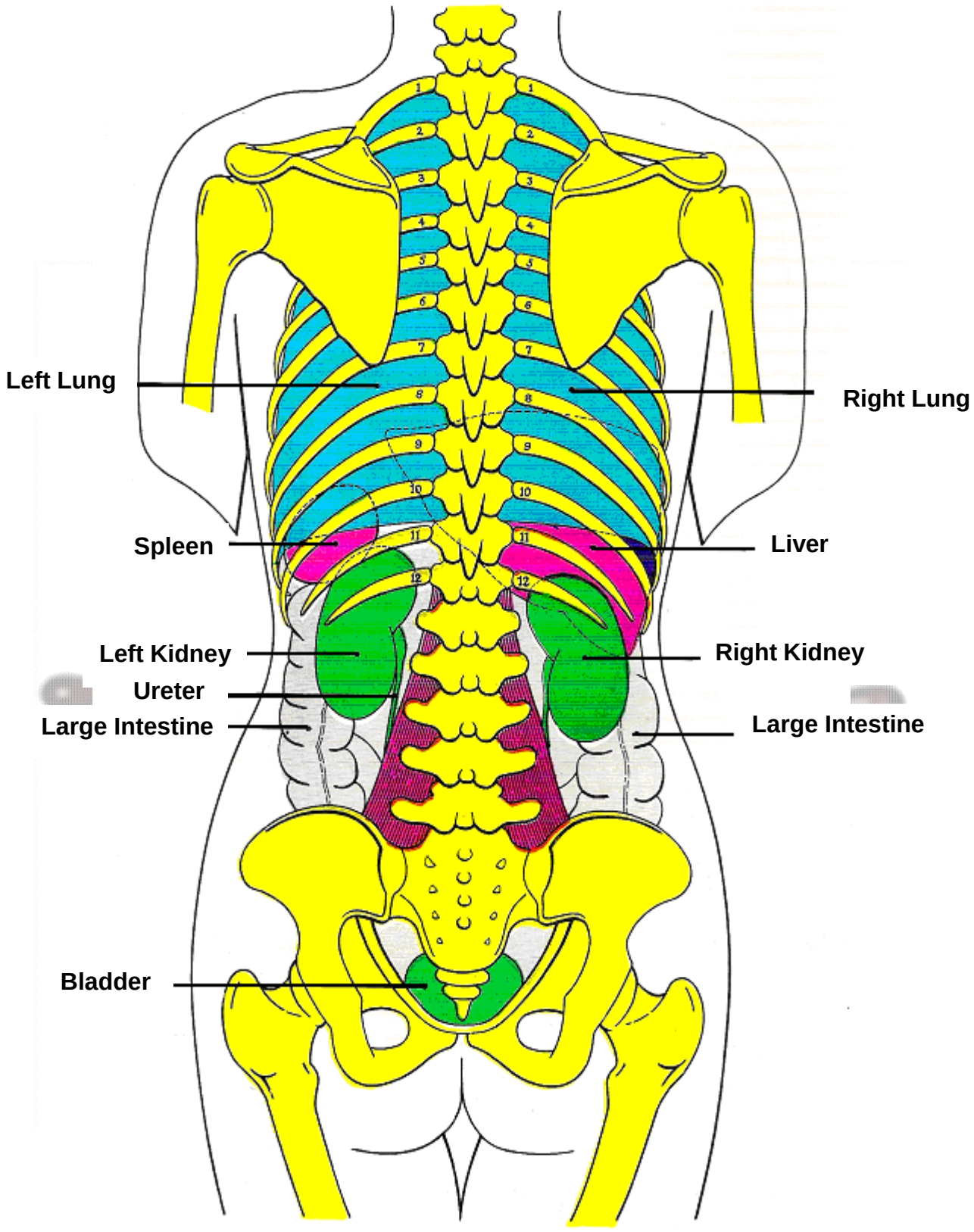
The Skeletal System.



Organs of the Chest and Abdomen (Front).



Organs of Chest & Abdomen (Rear).



Body Frame Work

The human body consists of the head, the trunk and the limbs. The frame work of the body consists of the following :-

Skull. The eight bones of the skull and the fourteen bones of the face are firmly united and incapable of movement. The bone of the lower jaw – the mandible – however, can be moved up and down as well as from side to side.

Back Bone or the Vertebral Column. It is composed of 33 small bones called vertebrae. There are 7 vertebrae in the neck (cervical vertebrae), 12 in the back (thoracic vertebrae), 5 in the loin (Lumbar Vertebrae) and 5 in the rump (sacrum) and 4 fused together in the vestigeal tail (coccyx).

Ribs. There are 12 ribs on each side, attached to the thoracic vertebrae at the back except the lowest two. These ribs are not attached to the breastbone in front. (Floating ribs)

Breast Bone (Sternum). It is a flat bone forming the front of the thoracic cage.

Collar Bone (Clavicle). It extends from the sternum, or breast bone, to the shoulder. Two in number, right clavicle and left clavicle.

Shoulder Blade (Scapula). It is a thin flat bone forming a part of the shoulder girdle. Two in number, right and left shoulder blades.

Upper Limb Bones. There is one long bone in each arm - the humerus and two long bones in each fore arm - the radius and the ulna. The wrist has 8 small bones and the hand has 19 bones.

Hip Bone or Innominate Bone. There are two hip bones attached to the sacrum. Each hip bone is made of 3 bones – iliumi, schium and pubic bone.

Lower Limb Bones. There is one long bone in each thigh - the femur, two long bones in each leg - tibia and fibula, 7 small bones in the ankle and 19 bones in the foot.

The Joints. The various bones in the human body are joined to one another by ligaments. The joints may be movable or immovable. Movements between bones may be only in one plane as in the hinge joints at knee and elbow, in all planes as in the ball and socket joint at the shoulder or there may be just a small degree of movement as in the wrist joint.

Muscles. The bones are covered with muscles. The muscles are attached to the bones and cross over joints, so that when the muscles contract, movement is produced at the joints by bringing the bones together. Since the muscles can be contracted at will, they are called voluntary muscles. They are also called striated muscles because they reveal striations under a microscope. There is another type of muscle called involuntary muscle, which cannot be contracted at will, e.g. muscle in the wall of the bowel, air passages and blood vessels. These are also called smooth muscles because they do not show striations under a microscope. The muscle of the heart is a special type of involuntary muscle known as cardiac muscle.

Skin. The body is covered by skin, under which lies a layer of fat which act as insulation. The skin protects the underlying tissue from mechanical injury as well as from infections. It maintains body temperature & also functions as an excretory organ by the process of sweating. Skin is also the largest sensory organ for touch, pain, pressure.

Body Cavities. Various organs in the body are placed in body cavities like the cranial cavity, thoracic cavity, abdominal cavity and pelvic cavity. The cranial cavity is bounded by the skull bones. Thus the brain inside this cavity is well protected. The thoracic cavity is bounded by the rib cage all around and

the diaphragm below. The rib cage is formed by the vertebral column behind, the ribs on the sides and the sternum in front. The thoracic cavity contains the heart, lungs, trachea and bronchi, the esophagus and the major blood vessels draining into the heart and carrying blood away from it. The thoracic cavity expands during inspiration by flaring out of the ribs and downward movement of the diaphragm. The dominal cavity is bounded by the vertebral column behind and strong voluntary muscles on the sides and front. It contains the stomach, liver, spleen, gall bladder, pancreas, kidneys, small intestine and most of the large intestine.The pelvic cavity is protected by the bones of the sacrum and innominate bones. It contains the urinary bladder, part of the large intestine and the internal reproductive organs. The organ systems in the body serve various physiological functions

Nervous System. The brain is the master organ. It receives information from organs of special sense such as eyes, ears, nose, tongue, & skin. It controls movement, interprets sensation, regulates body activities and generates memory and thought.

Cardio Vascular System. The cardiovascular system is made up of the heart, aorta, superior and inferior vena cava, pulmonary artery, pulmonary veins and the peripheral blood vessels. The heart is of the size and shape of one's closed fist and weighs about 300-350 gms in adults. It has 3 layers, the covering layer called pericardium, middle layer called myocardium and the inner-most layer called endocardium. The heart has 4 chambers. The upper two are called atria and the lower two are called ventricles. There is a valve with three cusps called triscuspid valve between the right atrium and the right ventricle. The valve between the left atrium and the left ventricle has two cusps and is called biscuspid valve or mitral valve. The right atrium receives impure blood from the lower part of the body through inferior vena cava and upper part of the body through the superior vena cava. This blood passes into the right ventricle during the relaxation of the ventricle. From the right ventricle blood is pumped into the lungs through the pulmonary arteries. The blood purified by the lungs returns to the left atrium through pulmonary veins and drains into the left ventricle through the mitral valve during ventricular relaxation. During ventricular contraction the mitral valve closes and blood is pumped into the aorta to be

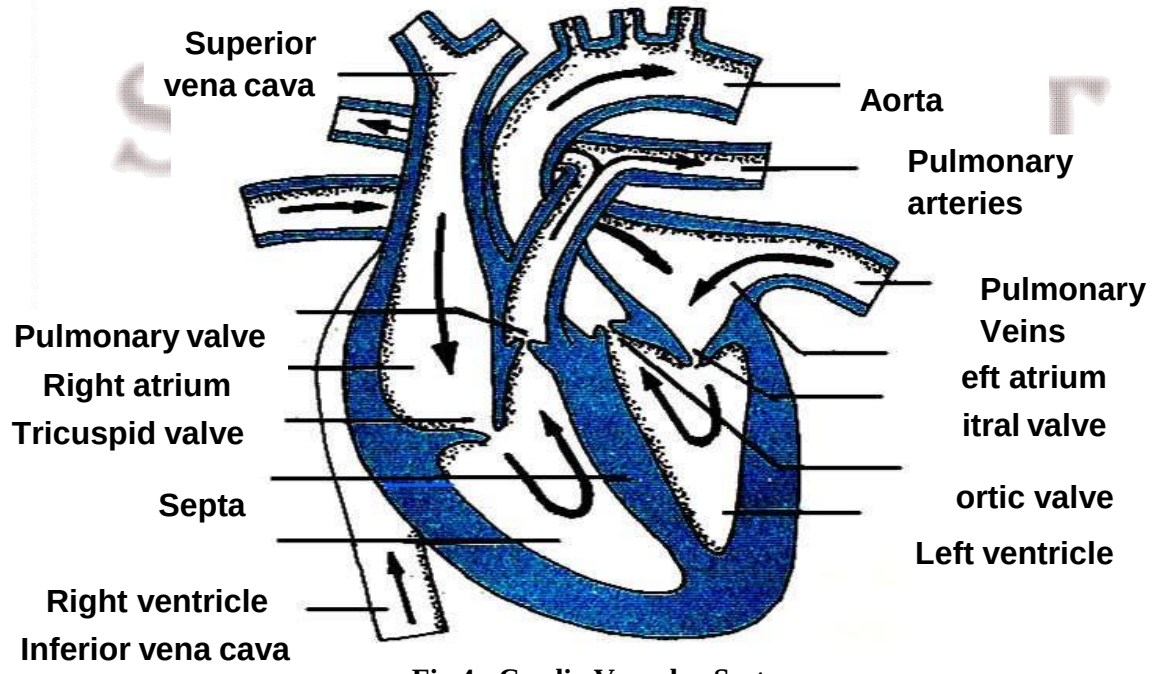


Fig 4 - Cardio Vascular System

circulated to the body through various arteries. The blood flow in the arteries is pulsatile due to rhythmic contractions of the heart. This is felt as pulse at different sites: the side of the neck – the carotid, on the front of wrist – the radial, at the root of the leg – the femoral, on the back of the knee – the popliteal etc.

The normal pulse rate is 70-80 per minute.The pressure generated by the pumping of blood by the heart and the resistance offered by the blood vessels is called blood pressure. It is different during contraction or systole of the heart and relaxation or diastole of the heart and is called systolic and diastolic blood pressure respectively. It is measured by using an instrument called Sphygmomanometer. Normal blood pressure is 120/80 mm of Hg.

Digestive System It is composed of the stomach, the small intestine, the large intestine, the rectum and the glands, which secrete digestive enzymes into the gastro intestinal tract -the salivary glands, liver and pancreas..

Urinary System It consists of the kidneys, ureters, urinary bladder and urethra. It is involved in the removal of chemical waste from the blood and helps to balance water and salt levels of the blood by excreting urine.

Endocrine System It consists of a number of glands which secrete various hormones into the blood stream which help to regulate body activities and functions. The pituitary gland is the master gland which controls the activity of other glands, such as thyroid, parathyroid, adrenal and sex glands or gonads -testis and ovary.

Reproductive System It consists of the gonads, reproductive tract and the hormones needed for sexual reproduction

The Respiratory System The respiratory system is composed of lungs and the respiratory tract consisting of the nose, naso-pharynx, the larynx, the trachea or the wind pipe, the bronchi and bronchioles. The bronchioles finally break into small sacs called alveoli which are surrounded by pulmonary capillaries. Gaseous exchange between the inspired air in the alveoli and the impure blood in the capillaries occurs at this level. . When thorax expands, the lungs expand and air is drawn into the alveolus which is known as inspiration. With collapsing of the thorax to the original size, the air is thrown out, called expiration. The normal respiratory rate is 16-20 per minute in adult.. The ratio of respiratory rate to pulse rate is 1:4.

Immune System. It protects the body from disease causing organisms.

Special Sense Organs. Special sense organs receive all stimuli and transmit them to the brain through nervous system. These organs are :-

(a) Eyes

(b) Ear

(c) Tongue

(d) Nose

(e) Skin

CHAPTER – 3

CASUALTY

1. Immediate Actions in Case of Casualty.

(a) Gain access to the patient in the easiest and the fastest way.

(b) Look after your own safety, do not become the next casualty.

(c) Observe the accident scene and assess the situation.

(d) If necessary remove the casualty from danger or remove danger from casualty.

(e) If necessary direct others to direct traffic, keep by standers at a safe distance, make essential telephone calls, send for help and inform master.

(f) Turn off all engines that may still be running.

(g) Find out whether the casualty is unconscious, conscious, alive or dead.

(h) Identify the disease or condition from which the casualty is suffering.

(i) Give immediate, appropriate and adequate first aid measures to a casualty. Give priority to casualty with severe bleeding, absent pulse or breathing and loss of consciousness.

(j) Should bear in mind that a casualty may have more than one injury and that some casualties will require more urgent attention than others.

(k) If the casualty is in an enclosed space do not enter the enclosed space unless you are a trained member of a rescue team acting under instructions.

(l) The rescue team must not enter unless wearing breathing apparatus which must also be fitted to the casualty as soon as possible

(m) The casualty must be removed quickly to the nearest safe area outside the enclosed space unless his injuries and the likely time of evacuation make some treatment essential before he can be removed.

(n) Arranging without delay for shifting of the casualty to a doctor or to a hospital in such a manner as not to worsen the injury in transit.

(o) Keep a record of the patient, his condition, the incidence and witnesses.

(p) Once a first aider has started the care he should not leave the scene or stop the care until a qualified and responsible person relieves him.

2. **Things to Remember.**

(a) First aider should keep in mind that he is not a doctor.

(b) He should not open wounds which have already been bandaged by some body else.

(c) He should not declare any person dead. Only a doctor is qualified to declare death.

(d) Perform proper transportation techniques.

3. Signs & Symptoms.

(a) **Signs**. These are noted by the first aider's examination such as temperature, pulse, blood pressure , tenderness, respiration, bleeding (type and volume), wounds , foreign bodies, colour of face, swelling , deformity, bruising, reflexes, responses to touch and sound, type of vomitus if any, loss of memory, inability to move limbs, burning, smell of gas and alcohols etc. The normal values of the vital signs are as follows :-

(i)	Temperature	-	98.4 ^{o} F (37 ^{0} C)
(ii)	Pulse Rate	-	70 – 80 /minute
(ii)	Respiratory Rate	-	16 – 20 /minute
(iv)	Blood Pressure	-	120/80 mmHg.

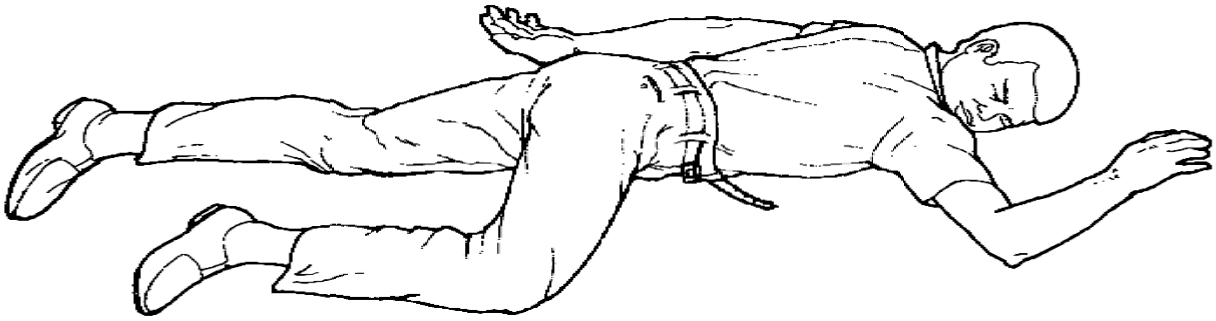
(b) **Symptoms.** These are the sensations experienced by the casualty or obtained by asking him questions directly, viz, is there is pain, loss of normal movement, loss of sensation, feeling of cold, heat, thirst, nausea, dizziness, numbness etc.

CHAPTER - 4

POSITIONING OF CASUALTY

1. The patient is nursed in different positions in different situations. The commonly used positions are described in the succeeding paragraphs.

2. A patient who is unconscious, if breathing and has got heart beat should be nursed in recovery position.



The position for an unconscious patient: turn him face down, head to one side, no pillows should be used under the head. Pull up the leg and arm on the side to which the head is facing, pull up the chin, stretch other arm out, as shown. His clothes should be loosened at the neck and waist, and any artificial teeth removed

Fig 6 - Recovery Position

3. **Advantages of Recovery Position.**

(a) It maintains an open airway

(b) Tongue cannot fall to the back of the throat

(c) Head and neck remain in an extended position so that the air passage remains wide and any vomiting or other secretion from the mouth drain freely.

4. **Recovery Position cannot be used.**

(a) When there are fractures to the upper or lower body

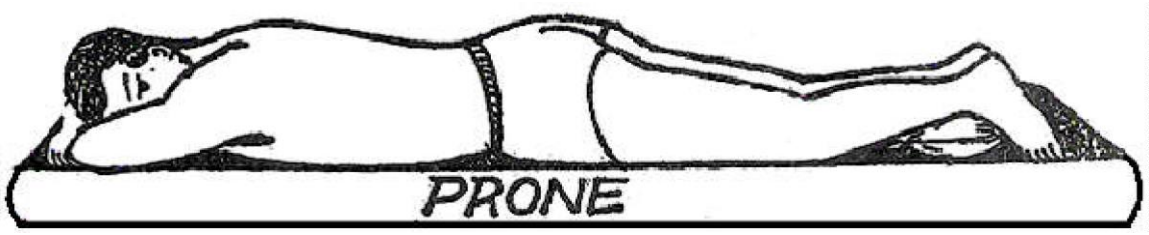
(b) When the casualty is lying in a confined space or if it is not possible to bend the limbs.

Prone Position

5. A patient is placed on his abdomen with head turned to one side. A pillow is placed under the head and the hands are kept on the sides. This position is used for :-

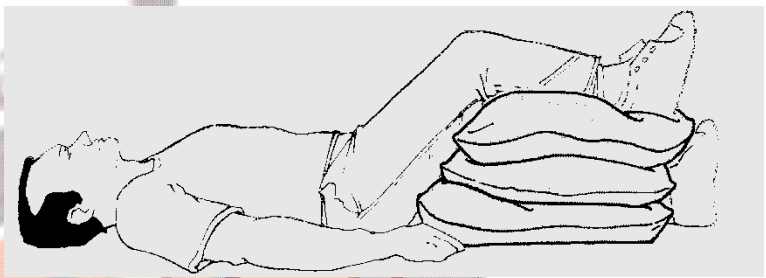
(a) Burns of the back.

(b) Wounds of the back.



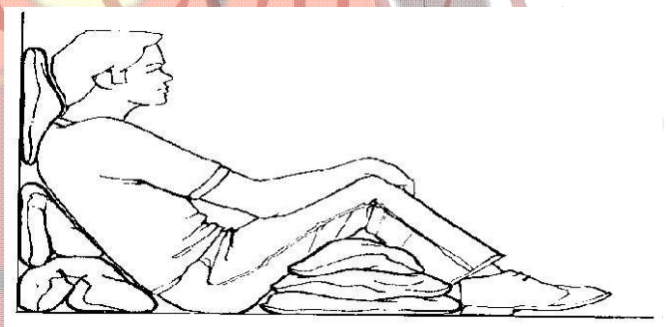
Supine Position with Legs Raised

6. This position is used when a patient is in shock. Lay the casualty on the back and turn the head to one side. Raise the legs with 2 pillows to improve blood supply to the heart. If the victim has a fracture in the lower limb, it should not be elevated unless it is well splinted.



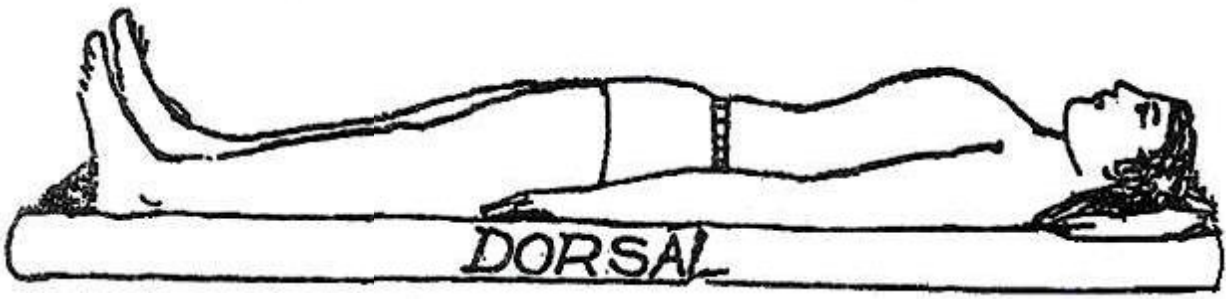
Fowler's Position

7. When a patient is having difficulty in breathing, this position is used. The patient is kept in a sitting position with the help of 3-4 pillows.



Dorsal Recumbent Position

8. The patient is kept on his back. A pillow is placed under the head. The hands are kept on both the sides. It is used for examination of the patient. This position without pillow is used in case of fracture of the spine and also to give CPR.



CHAPTER – 5

UNCONSCIOUS CASUALTY

Definition

1. Unconsciousness is a state of complete loss of consciousness and the casualty is totally unresponsive to any painful stimulus. He is unaware of the surroundings and his body muscles are in a complete state of relaxation.

(a) Unconsciousness is due to interference with the functions of the brain.

(b) Seriousness can be determined by testing the casualty's response to stimuli such as sound or touch or pain.

2. Causes of Unconsciousness.

(a) Brain injuries.
(b) Fits or convulsions.
(c) Syncope or lack of cerebral circulation.
(d) Infection of the coverings of the brain or tissues of brain.
(e) Brain tumors.
(f) Exposure to extreme cold.
(g) Exposure to extreme heat.
(h) Severe infections.
(i) Severe injuries.
(j) Severe burns.
(k) Drug reaction.
(l) Electric shock.
(m) Failure of liver or kidney.
(n) Poisoning with chemical gas or alcohol.
(o) Severe heart attack.
(p) Drowning.
(q) Diabetes or over dose of insulin.
(r) Severe bleeding or fluid loss.

Levels of Responsiveness

3. These are the stages through which person may pass during progression from consciousness to unconsciousness or vice versa.

(a) Stage I - He may respond normally to questions & conversations.
(b) Stage II - He answers direct questions.
(c) Stage III - He responds vaguely to questions.
(d) Stage IV - He obeys commands.
(e) Stage V - He responds to pain only.
(f) Stage VI - He does not respond at all.

4. First Aid Management.

(a) Maintain the airway open.

(b) See that there is a free supply of fresh air and that the air passage is free of any obstruction.

(c) Take the casualty away from harmful gases, if any or if inside a room open doors and windows.

(d) Remove any loose dentures or detached teeth and clear the casualty's mouth of any vomit or blood.

(e) Correct the tongue, which might have fallen back.

(f) Loosen any tight clothing around neck, chest and waist.

(g) Keep the casualty warm but do not over heat him.

(h) Keep back the crowds, they only obstruct.

(i) If breathing has stopped or about to stop, put the person on hard surface in supine position or flat position and start artificial respiration immediately.

(j) Listen to the heart sounds and feel pulse at wrist and neck. Pulse at the neck can be felt by placing the tips of the two fingers of one hand into the groove between the windpipe and the large muscles at the side of the neck.

(k) Check the pupils of the eyes to see if they are dilated or constricted. When the heart stops beating the pupils stay dilated and do not react to light.

(l) Start heart compression at once without wasting time if the heart has stopped, as delay in restoring blood flow will damage the brain and the person can die within 4-5 minutes.

(m) Watch continuously for any changes in the condition of pulse, respiration and level of responsiveness.

(n) If pulse & respiration is restored, then place the person in recovery position.

(o) Turn casualty face down with head to one side. No pillow should be placed under the head. See figure 11.

(p) Do not leave the casualty until he is handed over to medical authorities.

(q) Nothing should be given orally till consciousness returns.

(r) Remove the under lying cause of unconsciousness.

(s) Restore breathing and heart beat.

(t) Control bleeding, if any.

(u) Remove poisons.

(v) Prevent any further injuries to the patient.

(w) Do not treat any unconscious casualty as a minor case.

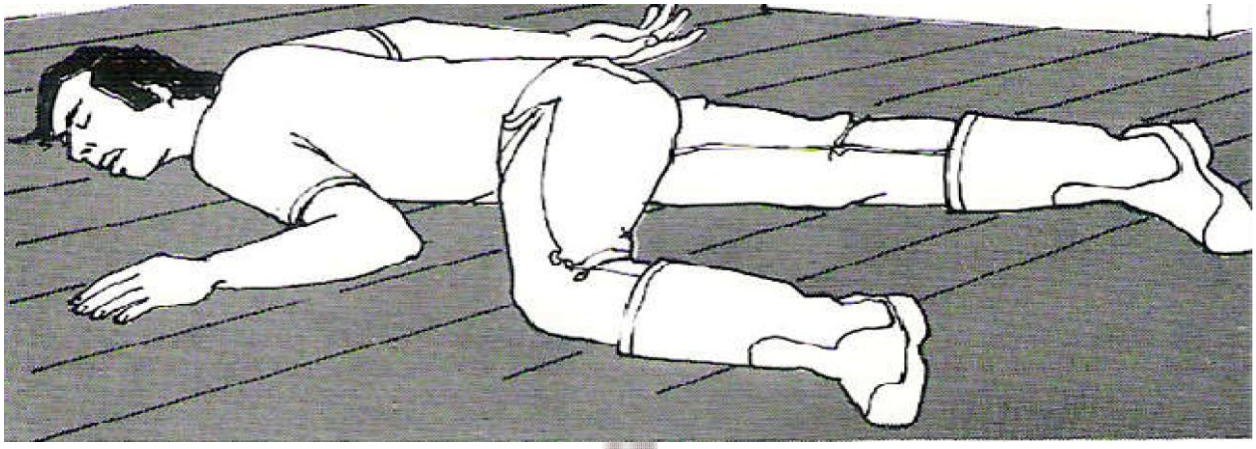


Fig 11 - Unconscious Position

(a) d-Intravenous(if indicated)

(d) Check vital signs (g) Recovery position

(e) Warm clothing (h) Transport on stretcher

CHAPTER – 6

CARDIO PULMONARY RESUSCITATION (CPR)
BASIC LIFE SUPPORT

Introduction

1. Basic life support or CPR is an emergency life saving procedure that consists of recognizing and correcting failure of the respiratory or cardiovascular systems. Any profound disturbance of the airway, breathing or circulation can promptly produce brain death.

2. Basic life support comprises the ABC steps which concerns the airway, breathing and circulation respectively. Its prompt application is indicated in :-

(a) C - Cardiac Compression

(b) B - Breathing or respiratory arrest.

(c) A - Airway obstruction.

3. Basic life support requires no instruments or supplies, and the correct application of the steps for dealing with the above three problems can maintain life until the patient recovers sufficiently to be transported to a hospital, where he can be provided with advanced life support. It must be undertaken with maximum sense of urgency and any inadequacy or absence of breathing or circulation must be determined immediately.

(a) If breathing alone is inadequate or absent all that is necessary is either to open the AIR WAY or to apply ARTIFICIAL RESPIRATION.

(b) If circulation is also absent artificial circulation must be started through HEART COMPRESSION, in combination with artificial respiration.

(c) If breathing stops before the heart stops, enough oxygen will be available in the lungs to maintain life for several minutes. However, if the heart arrest occurs first, delivery of oxygen to the brain ceases immediately.

(d) Brain damage is possible if the brain is deprived of oxygen for 4-6 minutes. Beyond 6 minutes without oxygen, brain damage is very likely.

(e) Once you have started basic life support do not interrupt it for more than 5 seconds for any reason, except when it is necessary to move the patient, even in that case, interruption should not exceed 15 seconds each.

4. C A B of CPR - (Steps)

(a) C for Airway - Compression

(b) A for Breathing - Airway.

(c) B for Circulation - Breathing

Step - C (Heart Compression)

5. In attempting to bring back to life a non breathing person whose heart has stopped beating, heart compression (external cardiac compression) should be applied along with artificial respiration.

6 **Techniques for Heart Compression.** Compression of the sternum produces some artificial ventilation, but not enough for adequate oxygenation of the blood. For this reason, artificial respiration is always required whenever heart compression is used.

(a) Effective heart compression requires sufficient pressure to depress the patient's lower sternum about 4-5 cms (in an adult).

(b) For chest compression to be effective, the patient must be on a firm surface. If he is in a bed, a board or improvised support should be placed under his back. However, chest compression must not be delayed by a search for a firmer support.

(c) Kneel close to the side of the patient and place the heel of one hand over the lower half of the sternum.

(d) Avoid placing the hand over the tip of the breast bone, which extends down over the upper abdomen as pressure on the lower end may tear the liver and lead to severe internal bleeding.

(e) Feel the tip of the sternum and place the heel of the hand about 4 cm from the head end of the patient.

(f) Place the heel of the other hand on top of the first one.

(g) Your fingers must never rest on the patient's ribs during compression, since this increases the possibility of rib fracture.

(h) Rock forward so that your shoulders are almost directly above the patient's chest.

(i) Keep your arms straight and exert adequate pressure almost directly downwards to depress an adult's chest for 4-5 cms. (Lower part of sternum)

(j) Compress the chest 60 times per minute for an adult, as this is enough to maintain blood flow and slow enough to allow the heart to fill with blood.

(k) The compression should be regular, smooth and uninterrupted, compression and relaxation being of equal duration.

(l) Under no circumstances should compression be interrupted for more than five seconds.

7. Heart Compression with Two First Aiders.

(a) It is preferable to have two rescuers because artificial circulation must be combined with artificial respiration.

(b) Two rescuers have to perform compression and mouth to mouth breathing in a 30:2 ratio.

(c) One rescuer performs heart compression while the other remains at the patient's head, keeps it tilted back and continues artificial respiration.

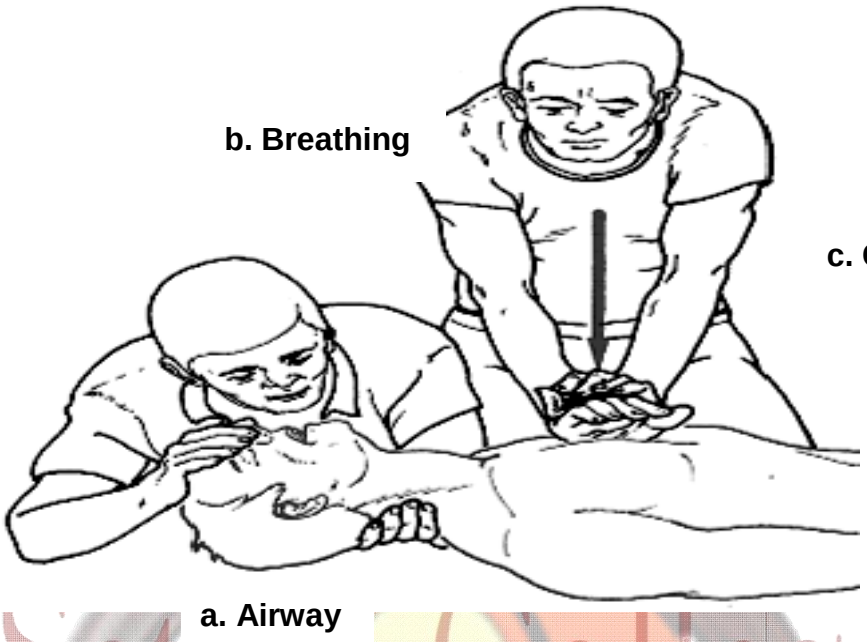


Fig 12 - Heart Compression Two First Aiders

8. **Heart Compression with Single First Aiders.** A single rescuer has to perform both artificial respiration and artificial circulation using 30:2 ratio. Two very quick lung inflation should be delivered after each 30 chest compressions, without waiting for full exhalation of the patient's breath.

(a) A rate of 100 chest compressions per minute must be maintained by a single rescuer in order to achieve 50-60 actual compressions per minute, because of interruptions for the lung inflations.

(b) Single rescuer should give two lung inflation after 30 cardiac compressions (30:2).

Fig 13 - Heart Compression with Single First Aiders

9. Checking Effectiveness of Heart Compression.

(a) Check the reaction of the pupils. If the pupils contract when exposed to light this is a sign that the brain is receiving adequate oxygen and blood.

(b) Carotid (neck pulse) should be felt after 5 cycles of 30:2.

(c) Return of colour of skin.

(d) Return of spontaneous heart beat

10. STEP - A (Airway)

(a) Establish an open airway.

(b) Place the person in the face up position on a hard surface.

(c) Put one hand under the patient's neck & the other hand on the forehead.

(d) Lift the neck with one hand, and apply pressure to the forehead with the other to tilt the head backward.

(e) With airway obstruction, it is possible that there will be no air movement even though the chest and abdomen rise and fall with the patient's attempt to breath. Also, observing chest and abdominal movement is difficult when the patient is fully clothed.

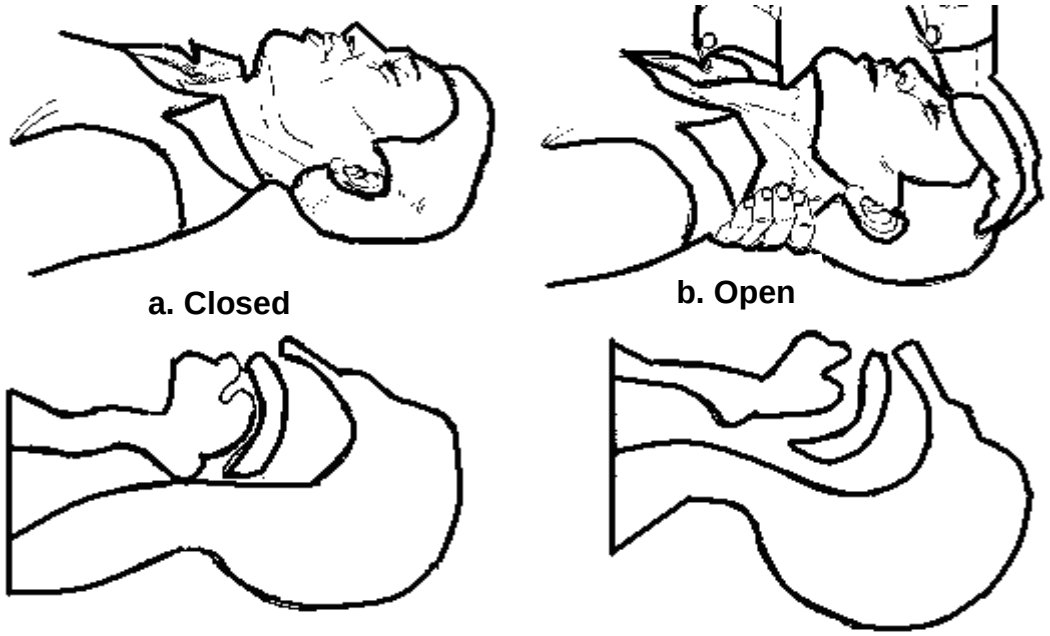


Fig – 14 Steps a Airway

STEP - B (Breathing)

11. If the patient does not resume adequate, spontaneous breathing promptly after his head has been tilted backward, then artificial respiration should be given by the mouth to mouth or mouth to nose method or with other techniques. Regardless of the method used the preservation of an open airway is essential.

12. Mouth to Mouth Respiration

(a) Keep the patient's head at a maximum backward tilt with one hand under neck.

(b) Place the heel of the other hand on the forehead with the thumb and index finger toward the nose.

(c) Pinch together the patient's nostrils with the thumb and index finger to prevent air from escaping.

(d) Continue to exert pressure on the forehead with the palm of the hand to maintain the backward tilt of the head.

(e) Take a deep breath and then form a tight seal with your mouth over and around the patient's mouth.

(f) Blow two quick, full breaths in first without allowing the lungs to deflate fully.

(g) Watch the patient's chest while inflating the lungs. If adequate respiration is taking place, the chest should rise and fall.

(h) Remove your mouth and allow the patient to exhale passively. If you are in the right position, the patient's exhalation will be felt on your cheek.

(i) Take another deep breath, form a tight seal around the patient's mouth, and blow into the mouth again.

(j) Repeat this procedure 10-12 times a minute (once every five seconds) for adults and children over four years of age.

(k) If there is no air exchange and an airway obstruction exists, remove obstruction with fingers and resume artificial respiration.

Mouth to Mouth Respiration using Disposable Flange

13. Due to the knowledge and awareness about transmission of communicable disease like AIDS through saliva and abraded skin one resorts to safer methods of mouth to mouth respiration with a sterile disposable flange as shown in fig 13 to avoid contact with saliva.

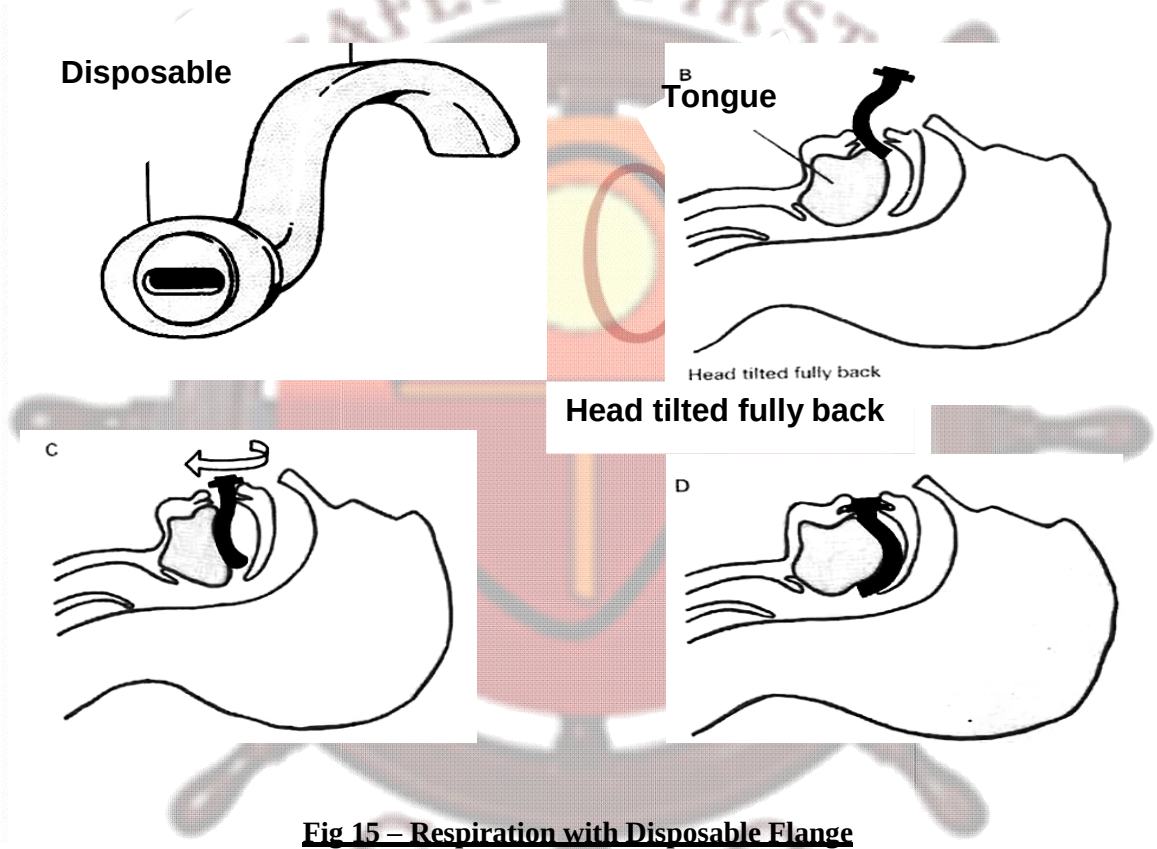


Fig 15 – Respiration with Disposable Flange

Sylvester Method

14. The Sylvester method is an alternative method of artificial respiration. It is particularly recommended for patients who have swallowed poisons.

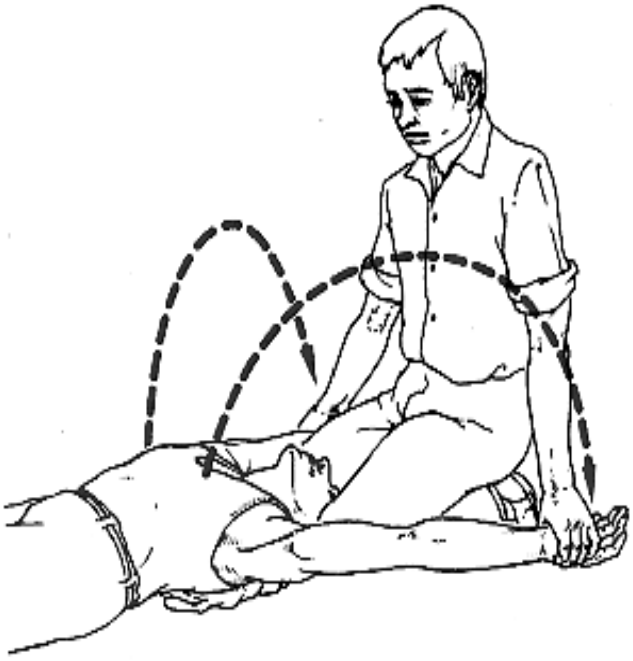
Firm Surface

(a) Lay the patient on his back on a firm surface.

(b) Raise his shoulders on a cushion or folded jacket, or in some other way.

(c) Kneel astride the patient's head. If necessary, turn his head to one side to clear ut the mouth.

(d) Grasp his wrists and cross them over the lower part of his chest.



(e) Rock your body forward and press down on the patient's chest. Release the pressure and with a swooping movement, draw the patient's arms backwards and outwards as far as possible.

(f) Repeat this procedure rhythmically (twelve times per minute) Keep the mouth clear.

Fig 16 - Sylvester Method

CHAPTER – 7

BLEEDING

Introduction

1. The human body contains approximately 5 litres of blood. A healthy adult can lose up to half a litre of blood without harmful effects, but the loss of more than this can be threatening to life.

Definition

2. Bleeding (Haemorrhage) is an escape of blood from the blood vessels or bleeding is a flow of blood from an artery, vein or capillary.

Effects of Bleeding (Haemorrhage)

3. Haemorrhage from major blood vessel of the arms, neck and thigh may occur so rapidly and extensively that death occurs in a few minutes. So haemorrhage must be controlled immediately to prevent excessive loss of blood.

(a) The loss of red blood cells causes a lack of oxygen to the body systems.

(b) A decrease in blood volume causes a decrease in blood pressure.

(c) The heart's pumping rate increases to compensate for reduced blood pressure.

(d) The force of the heart beat is reduced since there is less blood to pump

Types of Bleeding

4. There are three different types of haemorrhage or bleeding :-

(a) Arterial Bleeding.

(i) Blood is bright red in colour

(ii) It spurts at each contraction of heart

(iii) Flow is pulsatile.

(b) **Venous Bleeding.** Bleeding is from the veins, which carries impure blood to heart.

(i) Blood is dark red in colour

(ii) It does not spurt

(iii) Steady flow of blood.

(c) Capillary Bleeding.

(i) Blood is red in colour

(ii) It does not spurt

(iii) Slow but even flow

External and Internal Bleeding

5. Bleeding may occur externally following an injury to the outside of the body or internally from an injury in which blood escapes into tissue spaces or the body cavity.

6. **External Bleeding.** If the bleeding is from the surface of the body it is called external bleeding.

(a) Evidence of major external blood loss.

(b) Symptoms and signs of shock

(i) Casualty complains of thirst

(ii) Blurring of vision

(iii) Fainting and giddiness

(iv) Face and lips become pale

(v) Skin feels cold

(vi) Pulse becomes faster but weaker

(vii) Restlessness and sweating

(viii) Breathing becomes shallow

(ix) Unconsciousness

7. **Internal Bleeding**. If the bleeding is with in the chest skull or abdomen etc., it is called internal bleeding. This can not be seen immediately but later the blood may ooze out through the nose or ear or coughed up from the lungs or vomited from stomach.

(a) History of sufficient injury to cause internal bleeding.

(b) Wounds that have penetrated the skull.

(c) Wounds that have penetrated chest or abdomen.

(d) History or Medical condition, which may cause internal bleeding, like ulcer etc.

(e) Pain and swelling around the affected area.

(f) Signs of shock.

(g) Blood may appear from one of the body orifices as nose, ear, mouth, rectum, urethra, vagina etc.

External Bleeding Management

8. ***First Aid Management****. The aim is to :-*

(a) Control bleeding as soon as possible.

(b) Keep the wound clean and dress it to minimize blood loss and to prevent infection.

9. ***General Management.***

(a) Place the person in such a position that he/she will be least affected by the loss of blood.

(b) Lie the person down and raise his legs in semi flexed position.

(c) Control the bleeding.

(d) Maintain airway.

(e) Prevent the loss of body heat by putting blankets under and over the person.

(f) Keep him at rest, as movement will increase heart action, which causes the blood to flow faster and perhaps interfere with clot formation.

Specific Management of External Bleeding

10. Minor Bleeding.

(a) Wash your hands before dealing with a wound.

(b) If the wound is dirty lightly rinse it with running water if available.

(c) Protect the wound with clean cloth and clean the surrounding skin with soap and water if available and make it dry.

(d) Dress a small wound with a Band-Aid after local disinfection.

(e) Raise and support the injured part unless you suspect an under lying fracture.

(f) If the wound is larger then apply unmedicated dressing or gauze or clean pad and bandage firmly in position.

(g) If in doubt seek medical help.

11. **Major External Bleeding.** There are Four Method to Control External Bleeding.

(a) **Direct Pressure**. Do not waste your time hunting for dressing. Place your hand directly over the wound and apply pressure. Keep applying firm and steady pressure. If the wound is large then squeeze the edges together.

(i) If dressing is available then apply or with a clean cloth apply pressure until bleeding has stopped. This may take 10-30 minutes or longer.

(ii) Tie the bandage firmly enough to control bleeding but not so tight as to cut off circulation.

(iii) Never replace any dressing once it is in place.

(iv) If dressing is soaked with blood place another dressing directly over the blood soaked dressing and hold with in place with firm pressure.

(v) Immobilize or support the injured part.

(b) **Elevation**. Raise the bleeding part of the body above the level of the heart so that the flow of blood will slow down in that part and clotting will speed up.

12. Pressure Points.

(a) Arterial bleeding can be controlled by thumb or finger pressure applied at the pressure points (Figure 18).

(b) Pressure points are the places where arteries are close to the skin.

(c) Pressing the artery against the underlying bone can control flow of blood to the injured part.

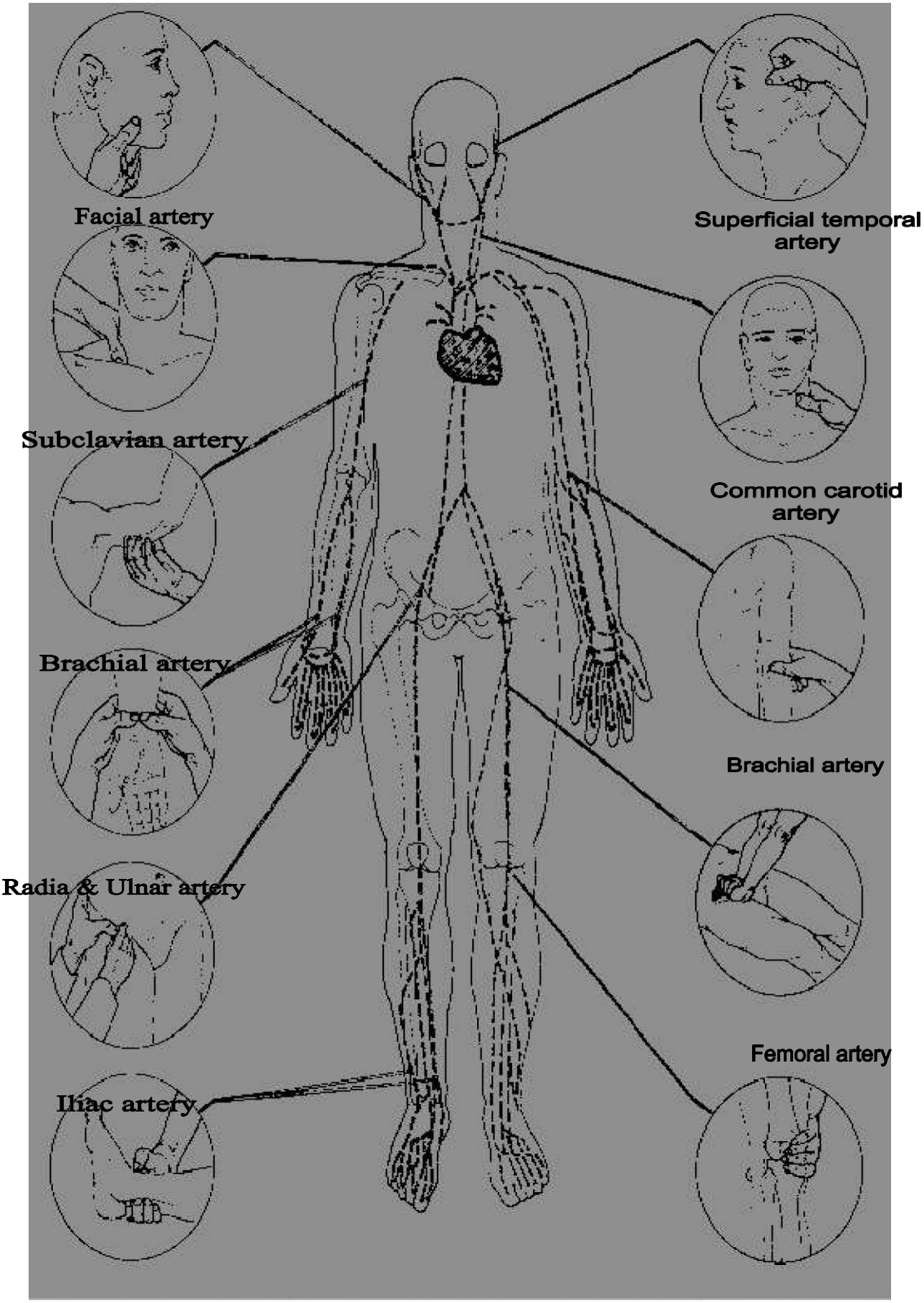


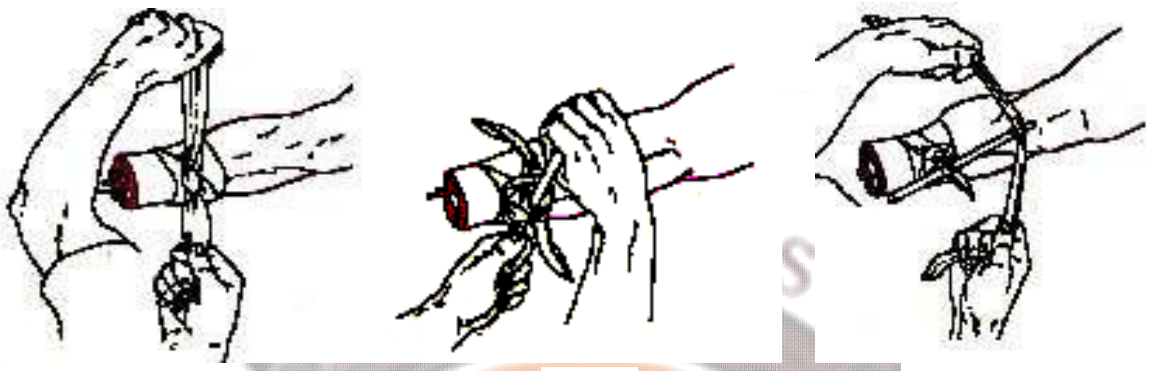
Fig 17 - Pressure Points

13. Applying a Tourniquet.

(a) A tourniquet is a strip of rubber or cloth used to control severe bleeding.

(b) It should be used only for severe life threatening bleeding that can not be controlled by other means.

(c) It can be used only in upper and lower limbs.



a. b. c.

Fig 18 - Applying and Securing a Tourniquet

Internal Bleeding Management

14. First Aid.

(a) Asses the cause of internal bleeding.

(b) Keep the person down with head low and to one side to ensure blood supply to the brain.

(c) If couscous, advise person not to move

(d) If condition allows raise his legs gently to aid return of blood flow to the vital organs

(e) Loosen any constricting articles and clothing around neck chest and waist.

(f) Monitor pulse rate, breathing rate, blood pressure temperature and levels of consciousness.

(g) If breathing rate and pulse rate cannot be monitored start cardio – pulmonary resuscitation

(h) Shift to sick bay and start oxygen imhalation and intravenous fluids with the help of the master of the ship.

(i) Raise foot end of the bed to minimize shock.

(j) Keep monitoring the vital parameters whilst master sends RMA (Radio Medical Advice) and arranges for evacuation of casualty immediately as an emergency stretcher case.

(k) Keep the patient warm.

(l) Do not apply hot water bottles or ice bags to chest or abdomen.

(m) If conscious even do not give anything to eat or drink as he may have to undergo immediate surgery.

CHAPTER – 8

MANAGEMENT OF SHOCK

What is Shock?

1. Shock is a state of inadequate tissue perfusion. In other words, it is a state in which the amount of oxygen and nutrients being delivered to the cells are decreased.
2. Shock is the result of a decrease in the vital functions of various organs of the body that results from a decrease in effective circulating oxygenated blood or fluid in the body as a result of injury or illness.

3 **Effects of Shock.**

(a) It can vary from faintness to complete collapse
(b) Early loss of consciousness that mainly involves the nervous system and that may be fatal
(c) Progressive loss of blood from active circulation which may lead to failure of heart out put and insufficient oxygen to cells that are vital for survival.
(d) Continuous lowering of blood pressure which may lead to kidney and liver failure.

4. Causes of Shock.

(a) Severe or extensive injuries
(b) Severe pain
(c) Heart attack
(d) Bleeding (internal or external bleeding)
(e) Severe burns which leads to loss of body fluids
(f) Electrocution
(g) Exposure to extreme heat and cold
(h) Drugs or allergic reactions
(i) Poisoning from drugs, gases and other chemicals and also from alcohol intoxication
(j) Emotional up set due to good or bad news
(k) Stress and fright
(l) Bites or stings of poisonous snakes or insects

Types of Shock

5. Nervous Shock. Nervous shock is due to strong emotional upset that is fear, pain, good or bad news. It may also result from spinal or head injury resulting in loss of nerve control or loss of control of nervous system.

6. Haemorrhagic Shock. Due to loss of blood from external or internal bleeding or loss of blood/fluid due to wounds, multiple injuries or severe burns, severe vomiting and loose motions.

7. Cardiogenic Shock. Cardiac muscles not pumping effectively due to injury or previous heart attack, the damaged heart muscles no longer imparts sufficient pressure to circulate the blood.

8. Bacterial or Septic Shock. Severe infection, discharge of poisons or toxins into the blood caused by bacteria, toxin causes pooling of blood in capillaries with dilatation of vessels and not enough blood remains available for tissues.

9. Anaphylactic Shock. It is a severe allergic reaction of the body to some drugs or foreign protein to which the person is sensitive. It causes dilatation of blood vessels and loss of blood in the surrounding area.

10. Electric Shock. Due to electrocution or high voltage electric current. If any part of the body comes in contact with a live wire who is exposed and not covered by insulator or with a cable or rail in which current is leaking a person gets an electric shock.

11. Symptoms. These are sensations experienced by casualty or obtained by asking him or observers questions

(a) Casualty is anxious and restless.
(b) Weakness, fainting or giddiness and disorientation
(c) The skin is pale, cold and often moist but later it may develop a bluish, ashen colour.
(d) Shallow, rapid or gasping breathing
(e) Nausea, vomiting and extreme thirst
(f) Unconsciousness
(g) Weak and rapid pulse
(h) Blood pressure falls
(i) Pupils are dilated
(j) Evidence of associated external or internal injury

12. Signs. These are recorded by first aider

(a) Type of bleeding or injury
(b) Recording of vital parameters (temp. pulse resp. and B.P.)
(c) Assessment of levels of consciousness
(d) Color of face
(e) Presence of swelling /bruises /deformities.
(f) Responses to touch / verbal commands
(g) Loss of memory
(h) Palpation of affected systems / injures
(i) Preparation for first aid

First Aid Treatment

13. Conscious Patient.

(a) Reassure and comfort the casualty when conscious.
(b) Remove the causes of shock, this includes controlling bleeding, restoring breathing and relieving severe pain.
(c) Loose any tight clothing to help the circulation and assist breathing.
(d) Keep the patient warm but do not over heat.
(e) Check breathing rate, pulse rate and level of consciousness and evacuate as early as possible.

14. Unconscious Casualty.

(a) Keep the person in recovery position.

(b) If breathing and heart beat stops then, clear and establish an airway, begin mouth to mouth respiration with chest massage.
(c) Administer fluids (intravenous), liquids should not be given by mouth if the patient is unconscious and having any injuries to chest and abdomen.
(d) Remove to hospital immediately.
(e) Transport as stretcher case maintaining the right position.

15. <u>Do Not.</u>

(a) Do not apply a hot water bottle as this will increase the blood flow to the vessels of the skin and take it away from the vital organs.
(b) Do not move the casualty unnecessarily as this will increase shock.
(c) Do not give the casualty any thing by mouth as it will prevent or delay the surgery.
(d) Do not give alcohol.
(e) Do not let the casualty smoke.

CHAPTER – 9

BURNS, SCALDS AND ACCIDENTS CAUSED BY ELECTRICITY

1. Burns and Scalds are dangerous because not only can they cause death, but delayed effects like scarring and deformity can be quite distressing. Hence, prompt and correct treatment of burns and scalds are essential.

(a) Burns are the injuries that result from dry heat like :-

(i) Fire
(ii) Contact with hot metals
(iii) Chemicals → Nitric acid, Sulphuric acid, Ammonia, Caustic soda etc.
(iv) Electricity & Radiation

(b) Scalds are injuries caused by moist heat like boiling water, steam, oil, hot tar and hot liquids. The result of the burns and scalds are same.

(c) **Shock.** Shock develops because plasma leaks out of circulatory system into the burnt area.

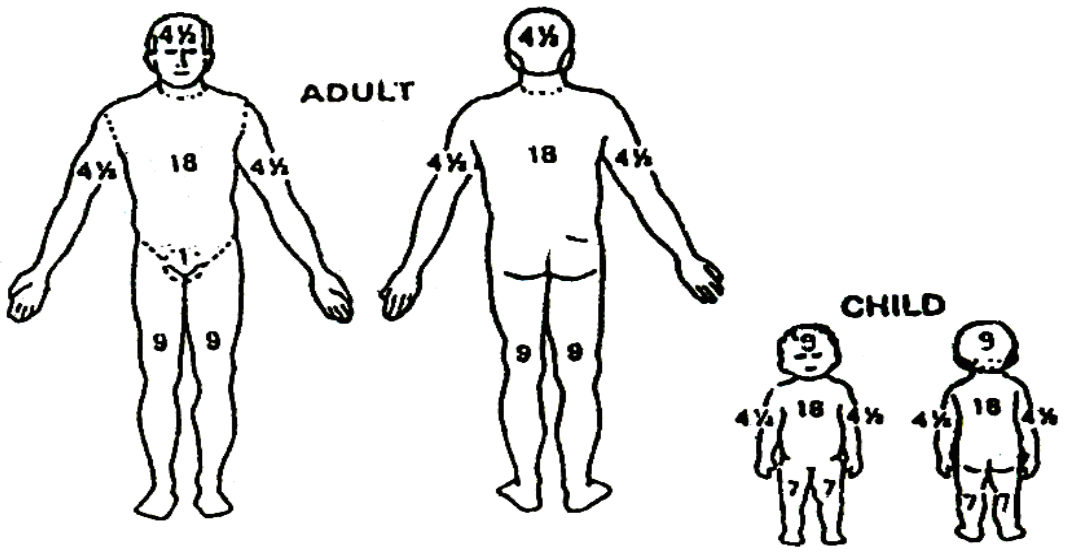
(d) **Infection**. There is big risk of infection with burns because skin is damaged and there is no protection against micro organisms.

2. **Severity of Burns.** Severity of burns can be assessed by the following :-

(a) **Depth of Tissues Involved** :-

Burns → superficial burns (involve skin, epidermis dermis)
Burns → Deep burns → partial thickness burns (skin and deeper tissues)
Deep burns → Full thickness burns. (involves all tissues from skin up to bone.)

(b) **Surface Area of Skin Involved.** Using rule of '9' – Distribution of percentage of burns taking in to consideration the surface area of the body involved in the burn.



(i) Front of face attributed 4 ½ %

(ii) Back of face " 4 ½ %

(iii) Upper arm 4 ½ %

(iv) Under surface of arm 4 ½ %

(v) Upper torso 9 %

(v) Lower torso 9 %

(vi) Upper back 9 %

(vii) Lower back 9 %

(viii) Front of thigh & leg 9%

(ix) Back of thigh & leg 9 %

(x) Crotch 1 %

(c) Calculation is lower in a child

(d) Any burn over 30 % should be hospitalized in priority.

3. First Aid Management.

(c) Put out the fire by pouring in water or wrapping in a blanket or rug. Do not allow the person on fire to run about especially into fresh air.

(d) Immerse the burnt part in cold water, using a bucket, a bowl, a kitchen sink or hold the affected area under running cold water. Keep the part in cold water for 15-20 minutes or until the pain disappears. If that is not possible soak clean cloth in cold water and put it over the burnt area. It needs to be changed frequently. Application of cold water removes residual heat from tissues and prevents further damage.

(e) Cover burnt area with sterile dressing or freshly laundered linen. Avoid exposure to air. In case of burns over face, make the dressing in the shape of a mask, with holes at the level of the nose for breathing.

(f) Remove rings, bracelets, shoes and any other tight fitting article as swelling may develop later on making it difficulty to remove them.

(g) Arrange for immediate transfer to hospital.

(h) Give plenty of fluids to drink, if patient can tolerate.

(i) When large areas are damaged pack ice in a clean towel and apply it to the burnt area during transfer to a hospital.

(j) Do not put oil, lotions or ointments on the burnt area

(k) Do not pull away burnt clothing stuck to the body.

(l) Do not handle or touch the patient than absolutely necessary.

(m) Always check for A, B, C and Level of consciousness.

Chemical Burns

4. In chemical burns the damage continues as long as the chemical remains in contact with skin.

(a) Remove the contaminated clothing carefully after soaking in water. Take care not to contaminate yourself.

(b) Flood the affected area with water thoroughly and systematically for 10-15 minutes. One may use soda bicarbonate solution to wash acid burns and vinegar to wash alkali burns before washing with water antidotes.

(c) Give general care.

Electric Burns

5. Electrical injuries are due to the effect of high tension electric current or atmospheric electricity as in lightening. The heat generated during passage of current through the body causes deep burns at the exit and entrance of the current.

6. In case of DC shock, patient remains stuck to the source of electricity until the current is broken, hence the damage is extensive. In case of AC shock, the damage is less. There may be physical injury when the patient falls down. The electrical current can disturb the respiratory center and the cardiovascular center causing respiratory arrest and cardiac arrest respectively. Damp clothing, damp foot wear and damp ground increase electrical conductivity and make the damage worse. The patient may be in shock. The measures should be taken are :-

(a) Switch off the current and remove the plug from the socket.

(b) If the patient is lying in water keep out of it yourself; as water is an excellent conductor of electricity. For the same reason do not hold the patient under the armpits.

(c) If the patient is in contact with a live wire, the current in which cannot be switched off, separate the wire from the patient using a long wooden stick and while standing on a nonconductor of electricity like a wooden board or a pile of newspapers. Wear rubber gloves, if available.

(d) Give artificial respiration and external cardiac massage, if necessary

(e) Treat shock if present.

(f) Treat burns

(g) Give fluids to drink

(h) Arrange for medical aid.

CHAPTER - 10

RESCUE & TRANSPORTATION OF CASUALTY

1. The removal of a sick or injured person either from the site of an accident or ashore is a matter of importance, since his life may depend on the arrangements made.

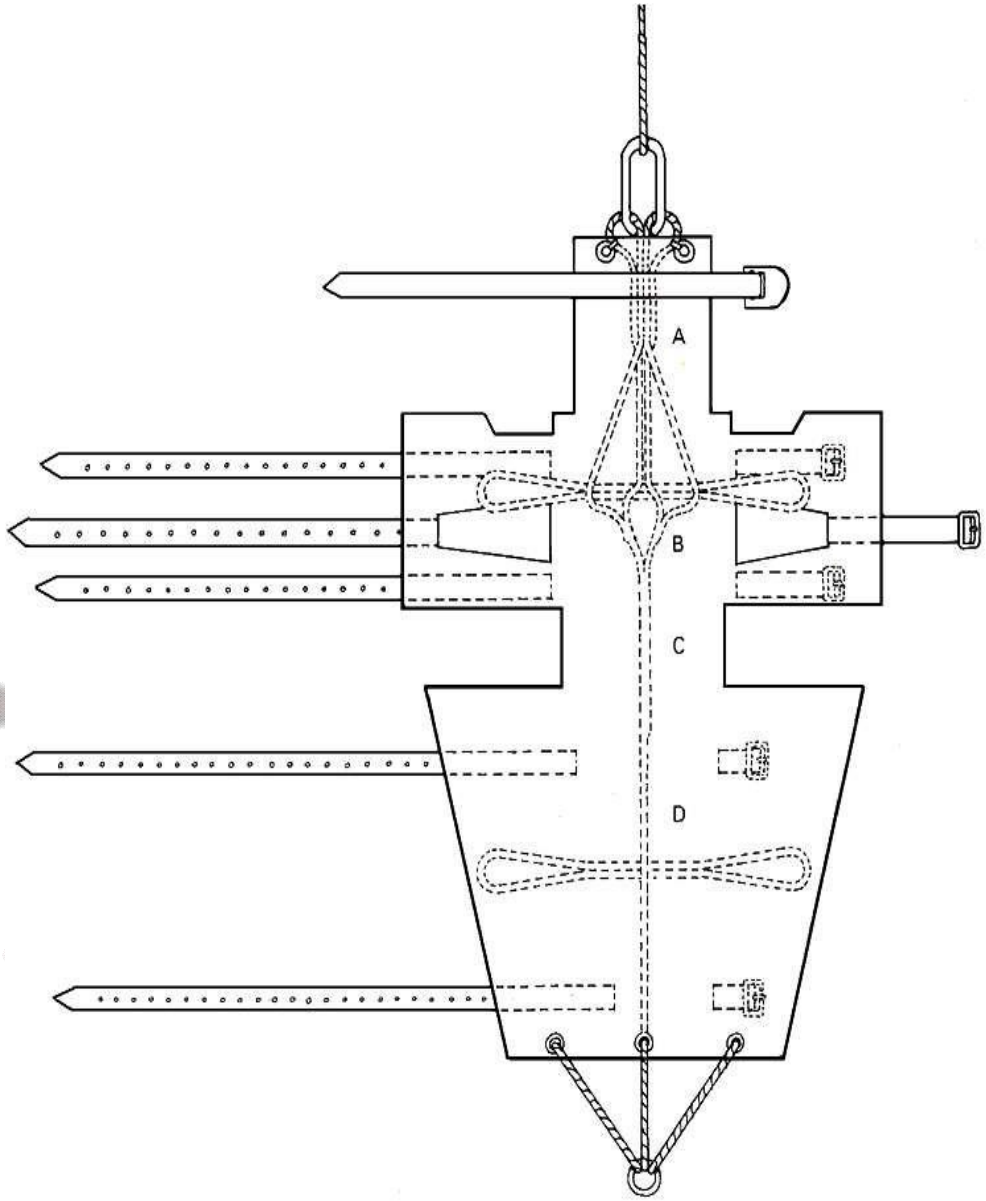
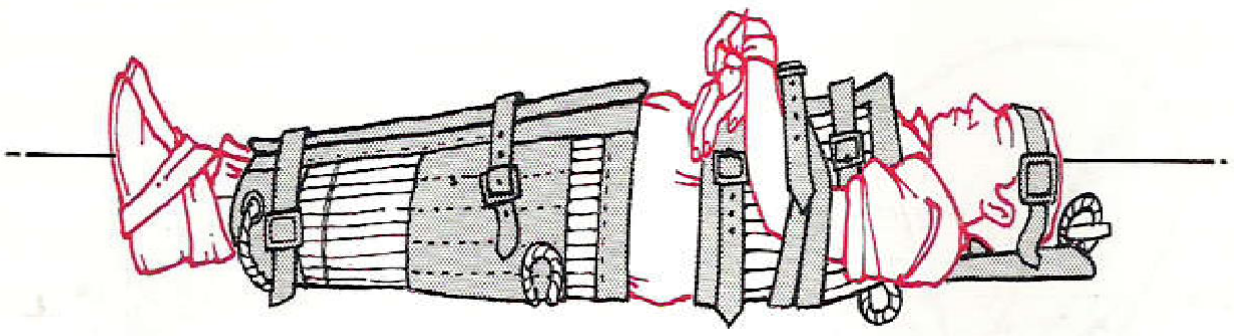


Fig 30 - Neil Robertson Stretcher



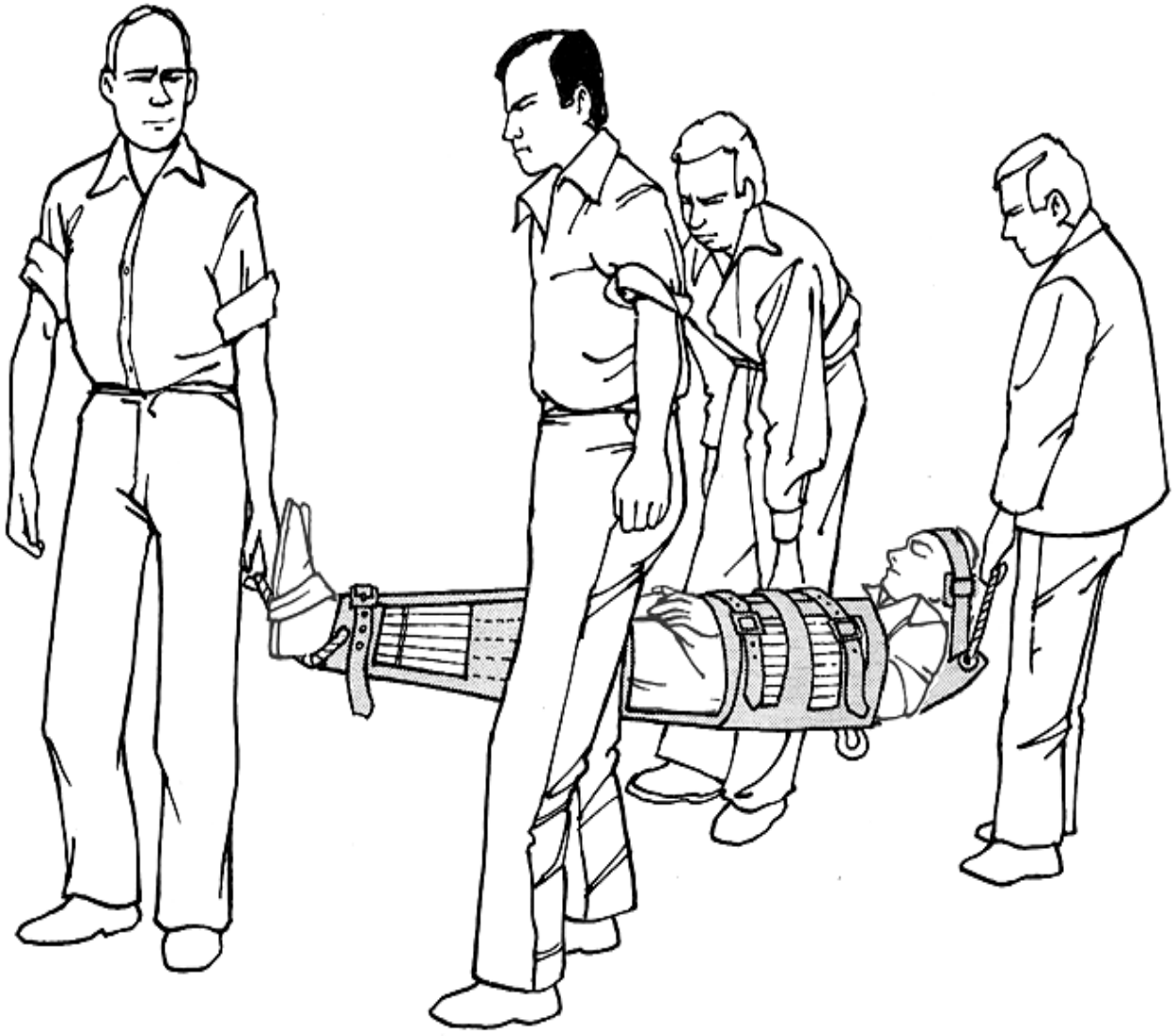
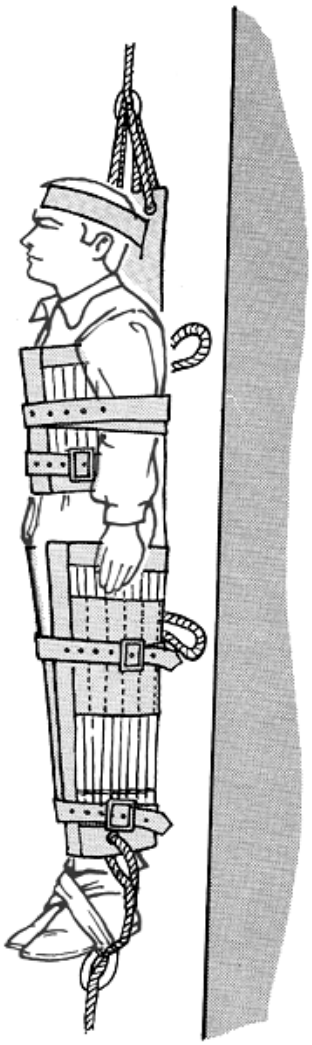


Fig 31 - Carriage Using a Neil Robertson Stretcher by Four Bearers

Hoisting a casualty through a hatch



Moving a casualty vertically. Note: to steady the stretcher, a rope goes through the foot of the stretcher to a seaman below

Fig 32 – Alternate use of Neil Robertson Stretcher

CHAPTER – 11

OTHER TOPICS

Fracture

1. When a bone is broken or cracked it is called fracture

2. Causes.

(a) **Direct Force.** When the bone breaks at the spot where force is applied. e.g., from a severe blow, bullet, by fall or crush by wheel.

(b) **Indirect Force.** When a bone breaks at some distance from spot where the force is applied e.g. Fracture of clavicle due to fall on out stretched hands.

(i) Due to forcible ligament contraction – Fracture of lower leg bone at the ankle after stumbling.

(ii) Due to forcible muscular contraction; - Fracture patella due to sudden contraction of muscular attached to it

(iii) Due to disease of bone which make them weak and easily breakable e.g. Osteomalacia, tuberculosis of bone

3. Types of Fracture.

(a) Simple or Closed fracture. The bone is broken but the skin surface around the damaged bone is intact.

(b) Compound or Open fracture. When there is wound leading to the broken bone or the broken ends of the bone protrudes through the skin. They cause – extensive blood loss, infection

(c) Complicated Closed or open fracture are said to be complicated when there is associated injuries to the blood vessels, nerve, muscles etc.

4. Signs and Symptoms.

(a) Pain

(b) Difficulty in movement

(c) Swelling

(d) Discolouration

(e) Deformity

(f) Shortening of bone

(g) Tenderness

(h) Crepitus (coarse bony grating sound may be heard)

(i) Loss of function

5. General Management.

(a) Pain is due to rubbing of broken ends of bone. Prevent rubbing by immobilisation and handle broken pieces as one

(b) Reassure the patient

(c) Ensure clean airway, treat difficulty in breathing

(d) Stop haemorrhage

(e) Treat shock

(f) Relieve pain

(g) Immobilise fracture by splints & slings

(h) Prevent infection by covering with a clean dressing.

(i) Do not tie knot of bandage over the area of fracture

(j) Do not move injured part unnecessarily

6. **Types of Bandages.**

(a) Roller

(b) Triangular

(c) Suspensory

(d) T Bandage

(e) Crepe

7. **Use of Bandages.**

(a) Holds dressing in position.

(b) Holds the splint in position.

(c) Support limbs or joints.

(d) Restrict movements.

(e) As a sling.

(f) Assist in lifting casualty.

8. **Splints**. These are made up of wood, metal, plastic or Cramer wire. When these are properly applied to a limb, they relieve pain by immobilizing the fractured and prevent further damage. The splint should be long enough to extend beyond the joint at the end of the fractured wound.

9. Types.

(a) Body splinting

(b) Prepared splints

(c) Thomas splint

(d) Improvised / other splints

10. Points to be Remembered While Applying Splints.

(a) Avoid movements.

(b) Movements should be gentle.

(c) Maintain circulation.

(d) Keep comfort of casualty in mind.

(e) Splint should be firm.

(f) Wound should be easily approachable.

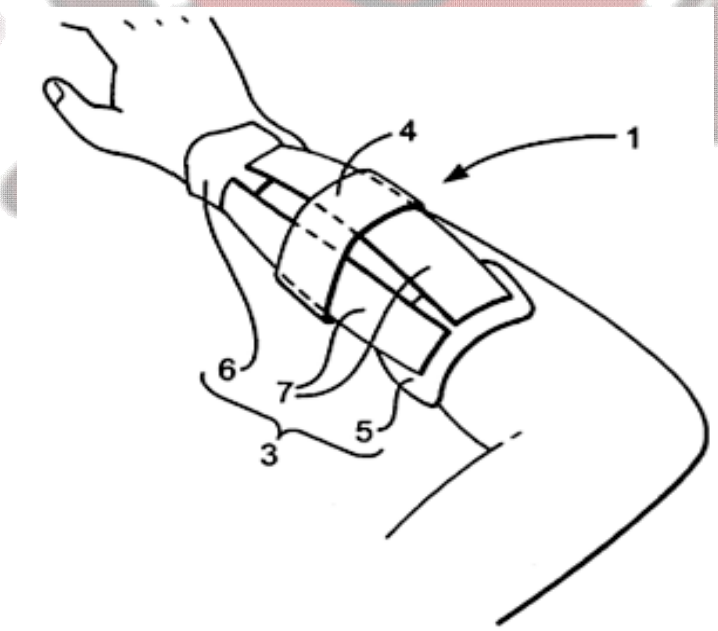


Fig 34 - Simple Fracture

Fig 33 - Bandage for Fracture of the Mandible

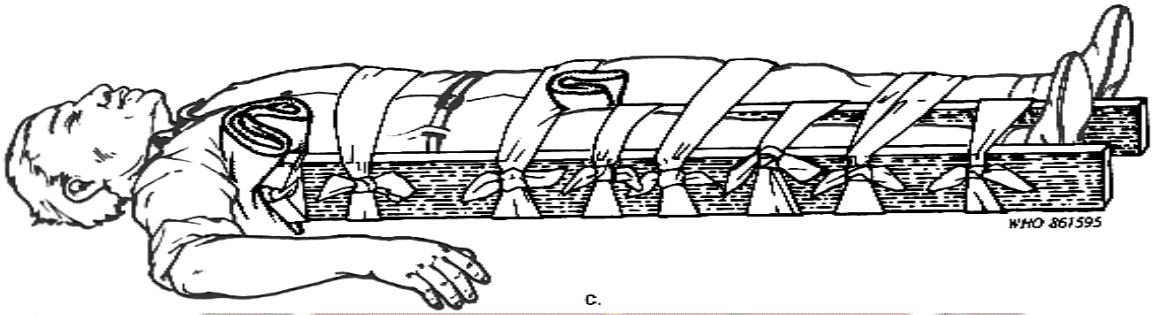


Fig 35 - Casualty with Fracture Pelvis

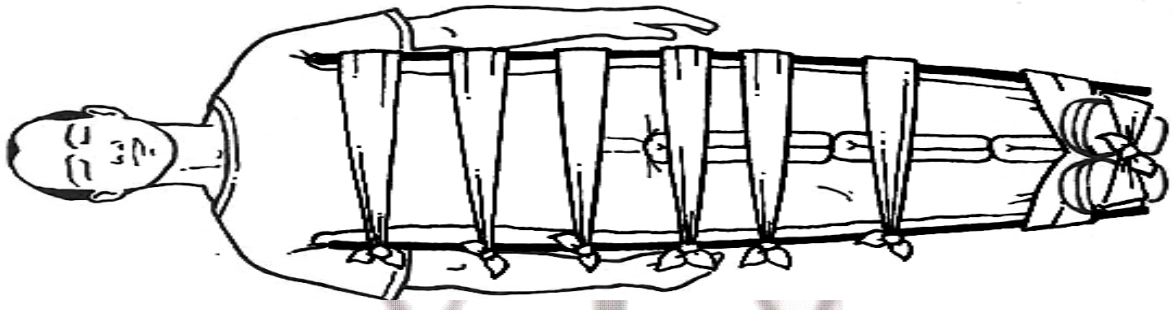


Fig 36 - Casualty with Fracture Femur

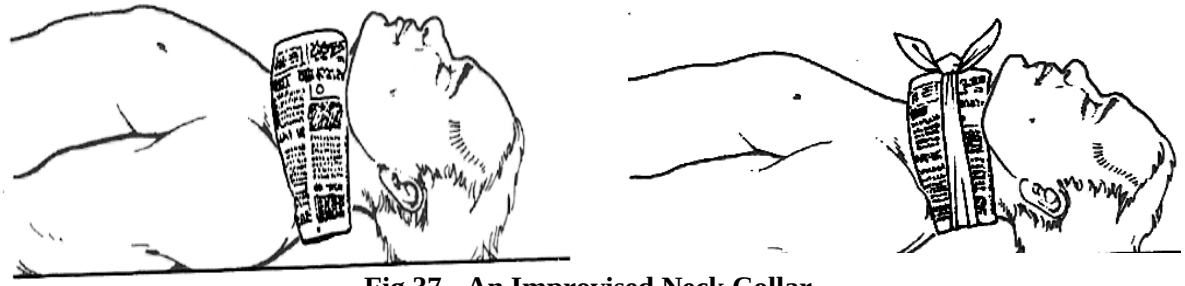


Fig 37 - An Improvised Neck Collar

Cardiac Arrest

11. **Definition.** Cardiac arrest is a sudden stoppage of the heart resulting in an inadequate cerebral circulation which leads to coma within one minute but recovery would be complete if the oxygen deficiency is relieved within 3 minutes. If oxygen deficiency exceeds more than 4-6 minutes severe and permanent brain damage will occur.

12. Causes.

(a) Heart attack and myocardial infarction, Angina Pectoris

(b) Obstruction in the cardiac (heart) circulation

(c) Injury to the heart

(d) Electrolytes imbalance

(e) Lack of oxygen to the heart

(f) Severe drug reaction

(g) Electric shock

(h) Due to an aesthetic drugs

(i) Severe bleeding

13. Sign of Cardiac Arrest.

(a) Absence of pulse in the major arteries like carotid or femoral

(b) The patient will be unconscious

(c) The skin colour will turn into blue

(d) The respiration will stop

(e) Pupils are widely dilated

(f) If the operation is in progress there will be no bleeding or if there is bleeding it will stop

(g) The person will look like dead

14. First Aid Management.

(a) First confirm the diagnosis (unconscious, death like appearance, no pulse and no respiration) and send for help.

(b) Do not waste time and start CPR (Artificial respiration with chest compression)

(c) Follow ABC of respiration

(i) A for Airway clearance

(ii) B for breathing that is assist in breathing by artificial means

(iii) C for Circulation that is maintain circulation by chest compression

(d) Place the person in supine position on a hard board.

(e) Clear the airway of any matters e.g. vomitus secretion or any dentures.

(f) Hyper extend the neck by tilting it backward as far as possible and start artificial respiration (Mouth to Mouth respiration) with chest compressions.

(g) Clear the throat hold the jaw at both mandible joints and place the resuscitation tube and give a strong blow in the Mouth.

(h) Continue chest compressions and Mouth to Mouth respiration at the rate of 5:1 in case of two rescuers.

(i) Periodically check the pulse in the neck for carotid pulse.

(j) Check the pupil; return of pupillary reaction indicates successful efforts.

(k) Continue basic life support and transport the patient to hospital.

Drowning

15. Drowning causes asphyxia by water, entering the lungs or by causing the throat to go into spasm thus constricting the air passage.

16. What Happens in Drowning.

(a) Drowning is a major source of accidental death and can be a result of cold, fatigue, injury, disorientation, intoxication etc.

(b) The drowning victim struggles to inhale air as long as possible but eventually he goes beneath the water where he must exhale air and inhale water.

17. Effects of Drowning.

(a) Airway obstruction

(b) Asphyxia

(c) Congestion of lungs

(d) Injuries to head and neck

(e) Internal injuries

(i) Broken bones

(ii) Soft tissue injuries

(iii) Internal bleeding

(iv) Hypothermia

18. Signs and Symptoms.

(a) General symptoms and signs of asphyxia.

(b) Froth around the casualty's mouth and nostrils.

19. First Aid Treatment.

(a) **Rescuing the Victims** :-

(i) Pull the patient from water using rope, branch, fishing pole, stick, towel, shirt etc. or lie down flat on your stomach and extend your hand or leg.

(ii) Throw him an object that will float with line that is tyre, foam cushions, logs, boards or plastic toys.

(iii) Make sure that your own position is safe.

(iv) Use boat and life jacket if available.

(v) Tow the victim to the shore.

(vi) Do not swim to the person directly, hold him from back.

(b) **Persons Rescued from Drowning.** Forced immersion is the primary hazard to life after surviving the initial impact of; hitting the water. It should be kept in mind that no ocean or lake has a temperature equal to body temperature. Thus in all latitudes anyone in open water will lose heat and heat loss will lower the body temperature. As the internal body temperature falls down or below normal and generalized hypothermia develops there an increasing likelihood of cardiac arrest.

(i) The loss of body heat is one of the greatest hazards to the survival of a person in the sea.

(ii) Those rescued promptly from drowning usually recover spontaneously, if they have not spent too much time in cold water and their body temperature has not been abnormally lowered.

(iii) Treatment for the person who has almost drowned should consist of immediate mouth to mouth artificial respiration and heart compression.

20. Things to Remember.

(a) In fresh water drowning water passes through the lungs into the circulation and may cause dilution of blood. This interferes with Oxygen exchange.

(b) In salt water drowning, salt from the aspirated water causes the loss of large amounts of fluid from the circulation into the lungs, this cause's water accumulation in the lungs and death.

Asphyxia

21. Asphyxia is a condition in which the lungs do not get sufficient supply of air for breathing. If this continues for some minutes, breathing and heart action stops and death occur.

22. Causes.

(a) <u>Conditions Affecting the Air Passage.</u>

(i) <u>Spasm.</u>

(aa) Food going down the wrong way that is into the air passage

(ab) Water getting into air passage as in case of drowning

(ac) Irritant gases getting into the air passage as in carbon monoxide poisoning

(ad) Asthma

(ii) <u>Obstruction.</u>

(aa) Mass of food, vomit or foreign body like artificial teeth in air passage

(ab) Tongue falling back in unconscious person

(ac) Swelling of tissues of the throat as a result of scalds (boiling water) injury, infection, burns, corrosives and stings.

(ad) Drowning

(iii) <u>Compression.</u>

(aa) Tying a rope or scarf tightly around the neck causing strangulation

(ab) Hanging or throtting (applying pressure with fingers on the wind pipe)

(ac) Smothering like overlying an infant and unconscious person lying face downwards on a pillow or plastic bags or sheets covering face completely for sometime.

(ad) Hanging, throttling, strangulation

(b) **Compression of the Chest.** It can be caused by fall of machinery, big beams or pillar or being crushed against the wall or barriers which leads to injury to the lungs and chest wall.

(c) Conditions Affecting Respiratory Mechanism.

(i) Fits, rabies, tetanus

(ii) Nerve disease causing paralysis of chest wall or diaphragm

(d) **Conditions Affecting the Brain or Nerves Which Control Respiration.**

(i) Electrical injuries

(ii) Poisoning

(iii) Paralysis caused by a stroke or injury to the spinal cord

(iv) Drugs (Morphia or barbiturates etc.)

(e) **Conditions Affecting the Amount of Oxygen in the Blood.**

(i) Air containing insufficient Oxygen Gas or smoke filled compartments

(ii) Fire which result into Carbon Mono Oxide gas.

23.23. **Signs and Symptoms.**

(a) Difficulty in breathing. The rate and depth of breathing increases.

(b) Noisy breathing

(c) Veins of the neck becomes swollen

(d) Face, lips, nails, finger and toes turn blue

(e) Pulse gets faster and weaker

(f) Froth may appear at mouth and nostrils

(g) Confusion and disorientation

(h) Unconsciousness

(i) Fits or convulsions

(j) Breathing may stop

24. **Foreign Body Removal**. Heimlich Manoeuver is used to remove a foreign body from the wind pipe/lungs, in case of choking. Figs 40 and 41 indicate the method to be used in a conscious and unconscious casualty respectively.

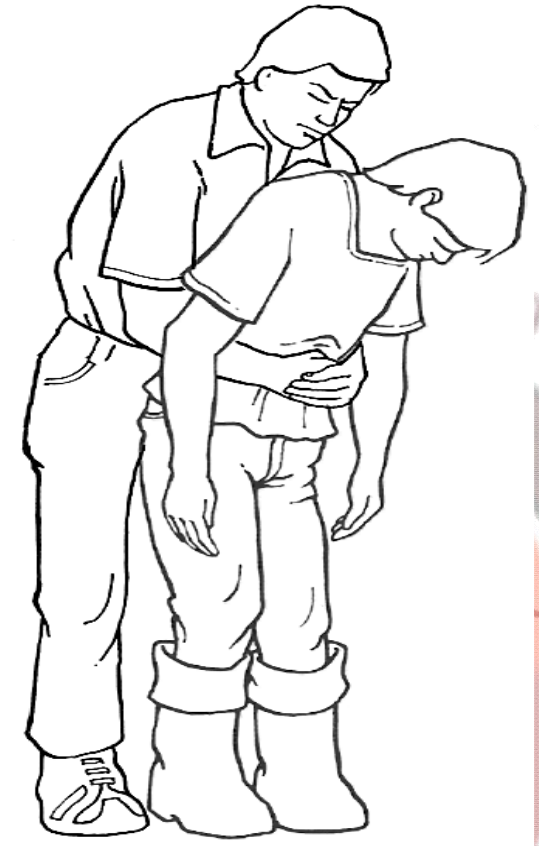


Fig 38 - Conscious Casualty

Heimlich manoeuvre (rescuer standing and victim standing or sitting). Standing behind the victim, wrap your arms around his waist. Grasp your fist with your other hand and place the fist against the victim's abdomen. Press the abdomen with a quick upward thrust.

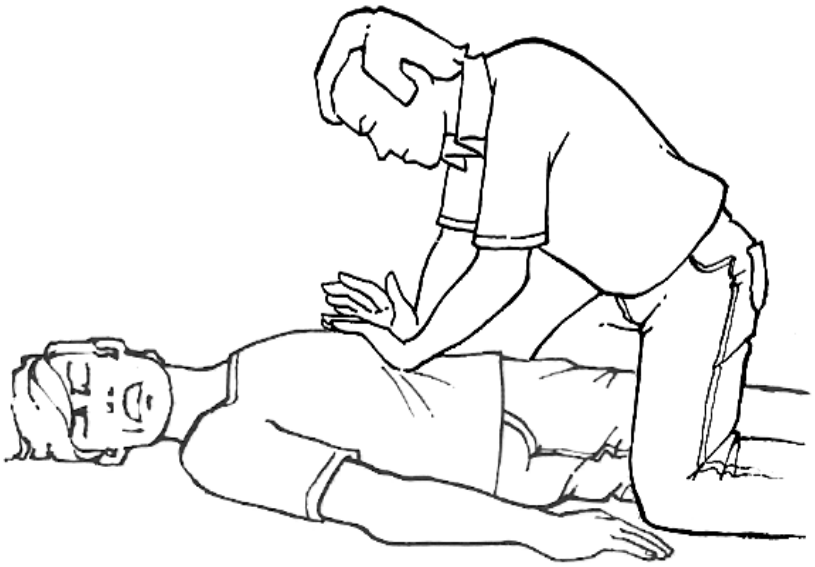


Fig 39 - Unconscious Casualty

Heimlich manoeuvre (rescuer kneeling and victim lying on his back). Kneel astride the victim's hips put one hand on top of the other and place the heel of the bottom hand on the abdomen. Press in with a quick upward thrust Repeat, if necessary.

25. First Aid Treatment.

(a) Remove the person from the cause or cause of asphyxia

(b) Clear and open the airway

(c) If the casualty is not breathing begin artificial respiration or mouth to mouth respiration immediately

(d) When breathing and pulse return, place the casualty in recovery position

(e) Check breathing rate, pulse and levels of consciousness at ten minute intervals.

(f) Start Oxygen if available

(g) Send the casualty to hospital

(h) In case of cardiac arrest then continue CPR