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WORLD MARITIME UNIVERSITY
Malmö, Sweden

**PROPOSAL FOR THE IMPLEMENTATION OF
SEARCH AND RESCUE AND GMDSS IN MYANMAR**

By

YE MYINT TUN

Union of Myanmar

A dissertation submitted to the World Maritime University in partial
fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

in

MSEP

Year of graduation
2000

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

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

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Chapter two indicate the needs of a search and rescue organisation with analysis, together with taking into account the main factors of risk.

Chapter three covers the IMO Conventions and Manuals that are related to Maritime Search and Rescue.

Chapter Four discussed the role of satellite communication in SAR operations. The paper examines the Global Maritime Distress and Safety System and its communications equipment for ships. The Inmarsat system and COSPAS-SARSAT are also included.

Chapter Five focuses on the need for the Search and Rescue and GMDSS in the Union of Myanmar. The implementation of the GMDSS and the importance of complete Coast Stations to be set up for sea area A1 and for A2 is discussed in this chapter. The establishment of Inmarsat SES in MRCC is also discussed. It also discussed on Search and Rescue Communication Practices and Procedures providing information on communication between RCC, CRS, OSC and CSS.

It specifies the SAR organisation in Myanmar. The study include the examination of SAR resources, proposals on institutional frame work, Rescue co-ordination Centre, National and Regional committee, Maritime Rescue co-ordination centre, and for personnel training needs.

Chapter Six covers the conclusion and recommendations for improvement of search and rescue in the Union of Myanmar.

Keywords: Myanmar, Search and Rescue (SAR), MRCC, GMDSS, IAMSAR, INMARSAT

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List of Abbreviations

AES	Aircraft Earth Station
ARCC	Aeronautical Rescue Co-ordination Centre
CES	Coast Earth Station
COSPAS-SARSAT	Space system for search of distress vessels search and rescue Satellite aided tracking
CRS	Coast Radio Station
CSS	Co-ordinate surface search
DF	Direction Finding
DMG	Distress Message Generation
DSC	Digital selective calling
EGC	Enhanced Group Calling
EPIRB	Emergency Position Indication Radio Beacon
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
GRT	Gross Register Tonnage
HEL-H	Helicopter – Heavy
HF	High Frequency
IAMSAR	International Aeronautical and Maritime Search and Rescue manual
ICAO	International Civil Aviation Organisation
IMO	International Maritime Organisation
IMOSAR	IMO Search and Rescue manual
INMARSAT	International Mobile Satellite Organisation
LMES	Land Mobile Earth Station
LUT	Local User Terminal
MSA	Maritime Safety Administration
MCC	Mission Control Centre
MERSAR	Merchant Ship Search and Rescue manual
MF	Medium Frequency
MMTC	Merchant Marine Training Centre

MRG	Medium Range Aircraft
MRSC	Maritime Rescue Sub Centre
MSRR	Maritime Search and Rescue Region
NAVTEX	transmission of maritime safety information
NCS	Net Work Co-ordination Centre
NSRB	National Search and Rescue Board
OSC	On Scene Commander
PLB	Personal Locator Beacon
RB	Rescue Boat
RCC	Rescue Co-ordination Centre
RSC	Rescue Sub Centre
RU	Rescue Unit
SAR	Search and Rescue
SAREX	Search and Rescue Exercise
SCC	Satellite Control Centre
SES	Ship Earth Station
SART	Search and Rescue Transponder
SMC	Search and Rescue Mission Co-ordinator
SRR	Search and Rescue Region
SSB	Single Side Band
STCW	International Convention on Standards of Training, Certification and Watch keeping
STIREP	Situation Report (Search and Rescue)
TRS	Tropical Revolving Storm
UHF	Ultra High Frequency
UNCLOS	United Nation Convention on Law of the Sea
VHF	Very High Frequency
VTS	Vessel Traffic Service
WWNWS	World Wide Navigational Warning Service
XYR	Call Sign of Yangon Radio

CHAPTER ONE

INTRODUCTION

1. Geographical and Maritime Traffic Situation

Geographically Myanmar is the 2nd largest country in the South East Asia peninsula next to Indonesia. It shares a boundary of 5858 km with five neighbours; India, Bangladesh to the North West, China to the North East, Laos and Thailand to the South East. Myanmar lies within latitudes 09° 30' N and 28° 31' N and east longitudes 92° 12' E and 101° 11' E. It has an extreme length from north to south of 2052 km and an extreme width of 937 km. The total area is 6776,577 sq.km. The meridian 97° 30' forms the standard meridian for the country. The southwestern boundary is surrounded by a bay, gulf and sea. They are the Bay of Bengal, Gulf of Martaban and the Andaman Sea. The coastline extends for about 2229 km from the Naaf River (Bordered with Bangladesh) to the Bayint Naung Point (Victoria Point) in the south is long and extended Myanmar territorial waters extend 12 miles from the baselines. (See Figure.1).

Myanmar lies on the strategic sea-lane, which is mostly used by ships trading between India, Bangladesh and the Far East. Part of the country's foreign earnings depends on fisheries and due to the Government open market policy, the fishing industry and seaborne trade are both rapidly increasing.

Myanmar has a continental shelf, which is rich in natural gas and much off shore gas production can be seen in Gulf of Martaban. Due to the development of shipping activities the government needs to place a high priority on the safety of vessels and effective communication to allow the rapid deployment of Search and Rescue teams.

Although search and rescue (SAR) system is secured in the Indian Ocean region according to Fremantle Agreement signed in Australia, it is an obligation of coastal states to implement SAR and Global Maritime Distress and Safety System (GMDSS) in their region by establishing RCCs and RSCs.

Almost all of the ships are now equipped with Global Maritime Distress and Safety System (GMDSS) communication equipment and traditional communication between ship to ship and ship to shore by Morse telegraphy is now totally phased out. This is the principle reason why coastal stations are required to change their traditional communication system to the more adaptable GMDSS communication system. This is also why Myanmar needs to establish new approaches to better communication means and a Search and Rescue system.

The role of the Marine Administration and National Search and Rescue Board has become the key to the effective implementation of Search and Rescue and the GMDSS.

Maritime search and rescue services to assist a person in distress at sea are becoming more necessary and an important matter in the maritime world. Presently there are no specific Search and Rescue services set up in Myanmar, only Myanmar Naval vessels undertaking the responsibility to carry out maritime search and rescue operations at sea.

However, the department of Marine Administration is planning to strengthen its role in Search and Rescue operations by establishing a National Search and Rescue Board, which comprises variable Governmental Departments under the leading role of the Naval Supreme Command. The completeness of the infrastructure and its equipment doesn't mean the achievement of the goal in implementation of SAR and GMDSS in Myanmar. To handle and operate these complex and complicated machines, there is need for special skill. In an effort to meet this requirement the training becomes an important issue to the search and rescue organisations. The author has highlighted necessity of a training programme for personnel of the RCCs and RSCs.

The author has chosen the topic to examine the response available to emergency situations in Myanmar waters and to make necessary proposals for developing and improving the organisation of the SAR system in the future.

2. Background of Maritime Search and Rescue

The first international shipping Safety Convention was developed in 1914 following the loss of the Titanic two years earlier. Its emphasis was not only on preventing shipping accidents but also on improving the chances of survival including radio communication. The conference resulted in the adoption of Safety of Life at Sea, which included regulations on provision of life saving equipment and the safety of navigation.

While accident prevention is a major goal of the International Maritime Organisation, the organisation has also concentrated efforts on developing world wide integrated systems to respond to shipping emergencies. The most significant of these are the International Convention on Maritime Search and Rescue (SAR) and the global Maritime Distress and Safety System (GMDSS).

The 1979 SAR Convention was designed to provide a global system for responding to emergencies and the GMDSS was established to provide it with the efficient communication support it needs. Both the SAR and GMDSS are crucial to the future of maritime safety. When both are fully operational, emergencies at sea will result in a distress call and the response to that call will be immediate and effective.

Although the obligation of ships to go to the assistance of vessels in distress was enshrined both in tradition and international treaties, until the SAR convention was adopted in 1979, there was no international system covering Search and Rescue operations in a uniform manner. In some areas especially in developed countries there was a well-established organisation, which is able to provide assistance promptly and efficiently, but in others there was nothing at all.

Union of Myanmar



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Figure 1

CHAPTER TWO

2. THE PRESENT MARITIME SITUATION IN MYANMAR

Maritime search and rescue services are a part of any Maritime Administration. It is therefore necessary to introduce the function of Maritime Administration in Myanmar for a proper understanding of this dissertation.

2.1 The Maritime Administration

The Maritime Administration in Myanmar is under the auspices of the Ministry of Transport. The Department of Marine Administration (DMA) provides the machinery responsible for the formulating of maritime policy and maritime objectives. One of the objectives is to enforce the regulatory functions laid down in the maritime legislation relating to the registration of ships, maritime casualty investigations, marine personnel, safety of life at sea, safety of navigation and protection of the marine environment. The other objective is to discharge the obligations of the government under international conventions.

2.1.1 Set up of the Department

The DMA is headed by the Director General (DG) who is duly appointed and empowered under the Merchant Shipping Act. He is responsible for the general supervision and co-ordination of the work of the Maritime Administration and is assisted by various administrative and technical staff at the head office and regional offices. Directors and surveyors are appointed to carry out the day-to-day work of the Maritime Administration, to advise the DG in the preparation of rules and regulations relating to maritime affairs.

The DMA is organised into five main divisions;

They are:

1. Administrative Division
2. Engineering Division
3. Nautical Division
4. Planning and Accounting Division
5. Seaman Employment Control Division

The head office is situated in Yangon, which is accessible, by sea and river. One regional office in Mandalay is for the supervision of inland vessels. The six regional offices have been established to execute the function of the Administration to ensure the safety of vessels along the coast and to prevent pollution from ships. These offices are in Sittwe, Patheingyi, Mawlamyine, Dawai, Myeik and Kawthaung.

2.1.2 The functions of the Department of Marine Administration

The Department of Marine Administration carries out the following operational functions:

1. Registration of all types of ships.
2. General Supervision.
3. Survey and certification of ships.
4. Inspecting and detaining of unseaworthy ship.
5. Port State Control.
6. Conducting the examination for the certificate of competency for deck, engine and radio officer (seagoing vessels).
7. Conducting the examination for Serang and engine driver certificate of different grades for inland waterway vessels.
8. Co-ordinate the work of classification societies to whom statutory work has been delegated.
9. Conducting inquiries and investigations into shipping casualties.
10. Approval of various plans of new ships under construction.
11. Adopting and implementing of IMO Conventions.
12. Dealing with removal of wreck matters.
13. Registration, recruit and placing of Seamen including ship officers.

14. Issuing navigational warning to ships.
15. Participating and co-ordinating in Maritime Search and Rescue operation.
16. Participating in combating marine pollution operations.
17. Ensuring the safety of fishing vessels and wooden ships of primitive built.
18. Ensuring safety of inland vessels.
19. Manning of the ship.

The DMA always co-operates with the Myanmar Port Authority, which is under the same Ministry whenever search and rescue is actual.

2.1.3 Role of the Maritime Safety Administration in SAR Activities

The Maritime Administration is the Government body, which provides the state with the service, which enables it to satisfactory and efficiently executes the functions, embodied in the national merchant shipping legislation. The functions include the implementation of the requirements of the International Maritime Conventions and appropriate national rules and regulations adopted under the Merchant Shipping Act. The Department of Maritime Safety Administration (MSA) is the specialised executive body of the Maritime Administration responsible for the implementation of the regulatory functions embodied in the national maritime legislation. The most important functions of the (MSA) are those intended to ensure the safety of life at sea, the safety of navigation and the protection of marine environment. Under the safety aspect MSA have the responsibility for Maritime search and rescue and contingency planning either in a co-ordinating role and a participating role. In both cases the MSA needs to ensure that there is a necessary national contingency plan and organisation to respond to the maritime distress situations in waters of the state.

In this connection the following provide the basis under international Law and the necessary guidelines respectively.

- SOLAS Convention 1974 Reg. 10&15 of Chapter V
- SAR Convention 1979
- IAMSAR

The MSA has the responsibility for giving guidelines and advisory assistance for the establishment of the SAR organisation and contingency planning and to monitor

the action taken by parties involved and recommend or suggest corrective measures whenever necessary.

(Note – “Abstract from Maritime Administration/Maritime Safety Administration by Professor P.V.Vanchiswar”).

2.2 Needs for Search and Rescue in Myanmar

According to its geographical position Myanmar lies on the strategic sealane, which is mostly used by ships trading between India, Bangladesh and the Far East and ships coming into Myanmar. There is a risk involved as maritime transport exists. The risk can be described as the following:

2.2.1 The present traffic activities in Myanmar waters

Myanmar has a long coastline, which extends from the Bay of Bengal to the Andaman Sea (about 2229 km) and there are eight ports for seagoing ships. As mentioned, Myanmar lies on the strategic sealanes and for this reason shipping activities exist on a daily basis.

The vessels bound for India coming from Far East and Malacca Strait seek Coco Island lighthouse, which is owned by the Myanmar Government, as their land fall mark before homing to their destination. Similarly vessels coming down from India and Bangladesh also look for the Coco Island as their landmark for the next alteration of course.

Myanmar has a continental shelf, which is rich in natural gas, and many installations for offshore gas productions can be seen in the Gulf of Martaban. There is a regular shuttle of gas carriers (mostly composite pushing tugs) between off shore platforms and shore-based gas storage. Vessels, which carry these products, bring them into high-populated areas, resulting in a major risk to human life and the environment.

The important shipments and chemicals and other hazardous cargoes other than oil and gas, are off loaded in the Yangon River and in the port of Yangon. The safety of cargo handling in these areas, and the general standards of the ships carrying these products, is low. Therefore, these ships also establish a risk, which can lead to

disastrous effects. So far there is no vessel information or ship reporting system established in the area.

2.2.2 Vessel movement and amount of cargo

With the advent of a market oriented economic policy laid down by the government, the annual production in agriculture, forest manufacturing and fishery products have also increased since 1988-89. Furthermore, the government is trying to upgrade the infrastructure of the country and the process means importing the construction materials by sea. The said changes have led to rapid development in the seaborne trade of Myanmar. The latest statistics show that the volume of cargo handled at Yangon Port by company 1988-1989 and 1996-1997 has gradually increased from 578988 metric tons to 7129015 metric tons.

Before 1989 most of the seaborne trade was controlled by Myanmar Five Stars Line and its chartered ships. Therefore, most of the ships in Yangon and other ports were not foreign ships. By comparing with the fiscal year, 1996-97, an increase from 538 to 714 foreign ships calling at Myanmar Ports can be seen.

Myanmar is endowed with marine resources. However, marine fisheries were not well developed before 1988. Offshore fishery industries have developed since 1988 not only increasing the number of fishing vessels but also the catch of fish and prawns. The number of fishing vessels rose from 250 to 1257 according to the report of DMA in 1997. The Myanmar government has allowed the neighbouring and other interested countries with limitation to use the Myanmar fishing grounds in the EEZ and in territorial waters. In light of this, the activities of various fishing vessels from foreign countries are increasing.

2.2.3 The condition of the weather in Myanmar waters

Normally India, Bangladesh and South East Asia lies under monsoon winds during May to October southwest – westerly, and during November to April the north easterly prevails. The Bay of Bengal is notorious for the origin of the most severe tropical cyclones in the world. The East of India, Bangladesh and Myanmar Coasts are suffered from Cyclones every year. Cyclones hit with devastating force and the coast

of Orrissa and Bangladesh are the worst, to suffer. The Fishing grounds which lay on the west coast of Myanmar are rich in various kinds of fish and this is the reason that the fishing vessels from neighbouring countries destined to these places become stationery. Sometimes tropical cyclones reach their strongest power in the quickest time and arrive within the shortest period of time. Due to the weaknesses in the maritime safety information system in the region it is then too late to get back to the safe places when a warning is received. Many fishing vessels have vanished in the storms. Many Myanmar and Thai fishing vessels are operating in the Bay of Bengal up to the Bangladesh coast and will be affected by the more frequent cyclones and tropical storms along these coastlines. The general water temperature is about 25°C in the Bay of Bengal.

2.2.4 Present Maritime Communication and Safety Information System

Myanmar is a party to the International Convention for the Safety of Life at Sea 1974 as amended and Protocol of 1978. Watch keeping standards of SOLAS 74/78 are applied to merchant vessels, which are trading internationally. As a member of the party to SOLAS the terrestrial means of general radio communication and maritime information service is offered by the Yangon Radio station. As a requirement of the amended SOLAS 74 Yangon Radio station is now installed and operating with VHF-DSC. The other VHF-DSC station is already installed in Myeik City, which is located on the coast of Mergui archipelago. The present VHF-DSC coast radio stations are not sufficient to cover the whole Myanmar coastal area. Myanmar still lacks of shore- based facilities, which is an obligation for the party to implement. Myanmar still needs to develop a NAVTEX service, which is now provided by India in this region.

2.2.5 Risk Assessment

The Serious accidents reported within the Myanmar SAR area are very rare. The distress messages received within the SAR area are mostly from local craft. However, some accidents are not reported even though there is a loss of life because the government authorities involved seem to be far away from the scene of the

accident, are not bothered and radio communications means are not available in small vessels.

The Survival chances are much more positive in tropical seawater. A person who has to abandon a vessel can stay afloat in water for a long time compared with the situation in cold water where hypothermia is a threatening danger.

The negative factors are lack of proper life saving equipment on small fishing vessels. On some occasions they have depended on or grab the nearest floating objects, which are left from their sunken vessel.

The Other matters of the present situation concerning maritime SAR in general are the slow process and sometimes disorder, inconsistent chain of command, lack of co-ordination skills, lack of training of MRCC personnel and lack of required contingency planning. Fishermen are paying their lives in the cyclone seasons and responsible authority should not ignore this. It is their responsibility to have a proper SAR contingency plan ready at hand to save the lives in danger of being lost at sea.

All these factor demanding the proper implementation of search and rescue system and GMDSS in the region individually or in co-operating with other states.

The proper implementation means implementation of government body or organisation and institution of legal system regarding search and rescue and communication into the existing national laws.

CHAPTER THREE

3. THE LEGISLATIVE FRAMEWORK OF MARITIME SEARCH AND RESCUE

3.1 Maritime Safety Legislation in Myanmar

Maritime legislation is aimed at the protection of the public and common interest, inter alia, the aspect of safety of ships, safety of navigation, carriage of goods by sea, control of shipping operations, registration of vessels and protection of the marine environment against pollution.

The objectives of a state as a port state or coastal state are laid down in the maritime legislation. The other basic objectives of Myanmar maritime legislation are to ensure the safety of foreign flag ships calling at Myanmar ports or navigating the coast and to prevent pollution from them. The most important maritime legislation is elaborated in international conventions, legislation, codes, and resolutions.

The Department of Maritime Administration is responsible for any convention and legislation concerning maritime matters. The Myanmar government has ratified the International Convention on Safety of Life at sea 1974 (SOLAS 74). The International Convention on Maritime Search and Rescue, 1979 (SAR 79) has not yet been ratified by Myanmar. It is important to align various governmental undertaking in the field of maritime safety in order to improve safety standards. The Department of Marine Administration needs to ensure that there is a necessary national contingency plan and organization to respond to maritime distress situations in waters adjacent to the country.

3.1.1 Myanmar Code

Most of the maritime legislation of Myanmar has been incorporated into a Myanmar Code Volume VII under the heading of communication and carriers. Therefore, it is easy to consult the actual legislation as it is contained in a single text. The negative side of this is that the passing of new legislation may be delayed because the drafting of a Code requires considerable time and that must be done for each new piece of legislation. The relevant sections for maritime legislation are sub headed C, F and H;

The act includes:

C. Carriers

1. Carrier Acts
2. The Myanmar Carriage of Goods by sea act
3. The Bill of Lading Act

F. River Transport

1. The Inland Steam Vessel Act
2. The Defile Traffic Act
3. The Obstruction in Fairway Act

H. Merchant Shipping

1. Myanmar Merchant Shipping Act
2. Myanmar Registration of Ships Acts
3. Controlling of Ship Act

3.1.2 Myanmar Merchant Shipping Act

The Myanmar Merchant Shipping Act is based upon the British Merchant Shipping Act of 1894. In other words, the Myanmar Merchant Shipping Act was inherited from a combination of the British legal system and International Convention and Codes. These Acts have been revised since 1954 and divided into nine parts and two schedules. Some amendments were added by notification of the President of the Union of Myanmar.

Part I (section 1-4) deals with the introduction and exemptions from these acts.

Part II (section 5-124) concerns with master and seaman, shipping offices, certificate of competence, official logbooks, the employment of crew and other crew affairs.

Part III (section 125-145) deals with passenger ships.

Part IV (section 147-213) deals with unberthed passenger and pilgrim ship.

Part V (section 213A-245M) deals with safety relating to prevention of collision, life saving appliances, loadline and other safety measure.

Part V.A (section 245N-245Q) relates to navigation.

Part VI (section 246-271) lists special shipping inquiries and courts.

Part VII (section 272-279) deals with wreck and salvage.

Part VIII (section 280-288) relates to legal proceeding.

Part IX (section 289-296) deals with supplemental and ship surveyors.

The provisions of these Acts have been laid down to ensure the safety of the ship, the manning of ships with qualified and competent crew, the labor or working conditions of crew and the safety of navigation.

The Myanmar Code and Myanmar Merchant Shipping Act are instruments for the implementation of international conventions, which Myanmar has acceded to, that is: UNCLOS III 1982, SOLAS Convention 74/78, COLREG Convention 1972, LoadLine Convention 1966, MARPOL Convention 73/78, TONNAGE Convention 1969, STCW Convention 1978.

3.2 The Objectives of IMO Conventions

IMO has developed a number of conventions, which are designed to minimize the effects of and accidents at sea and to ensure that immediate assistance can be available to those who need to be rescued.

3.2.1 A requirement of improved life saving equipment on board ships

In July 1988 amendments to SOLAS 74 highlighted the importance of life saving appliances. A completely revised Chapter III on life saving appliances and arrangement was adopted. Many of the technical requirements were transferred to a new International Life Saving Code (LSA Code). Responsible persons have to be sure that life saving equipment is sufficient as well as readily available and easy to use in an emergency.

3.2.2 Efficient communication in case of emergency (Distress Alerts)

Sending out rapid distress alerts is an important factor during an emergency. Carrying radio equipment became mandatory and part of SOLAS since the first version was adopted in 1914, and in the 1974 Convention it appears in Chapter IV (Radio Communication). This chapter deals with radio equipment and communication facilities intended for distress and safety purposes. The 1988 amendment to (SOLAS 74/78) entered into force in February 1992. The Chapter IV of (SOLAS 74/78) was totally revised and as a requirement of this chapter the Global Distress and Safety System (GMDSS) became operational in February 1992. This subject will be discussed later in Chapter IV of this paper.

3.2.3 Survival at Sea

Most people died when their ship sinks not from drowning but from cold, known as hypothermia. People cannot stay long in cold water especially when they are exposed to the sea. Improvements and inventions of new types of life saving equipment has made the chance of surviving in cold water much greater. Many of the improvements are introduced in the revised Chapter III of the SOLAS convention such as thermal protective aids and, totally or partially enclosed lifeboats which are selfrighting.

3.2.4 Search and Rescue Operations

It is in humanity a disgrace to ignore any distress message sent out by a ship that are in facing danger. Parties to the conventions in which most of the countries

incorporate these conventions into their national laws will prosecute those who ignore a distress message under international conventions and the UN Law of the Sea.

3.3 The IMO Conventions related to Maritime Search and Rescue

It is an honorable thing to give assistance to any vessel or person in distress at sea. This is normal practice and traditionally a moral obligation. This obligation was treated with legal status when it was incorporated into international maritime law. All international treaties more or less express their concern with safety of vessels, passengers and crew and it is the responsibility of mariners and maritime search and rescue organizations to render assistance to persons in distress at sea.

3.3.1 The United Nations Convention on the Law of the Sea 1982 (UNCLOS)

Article 98 of the UNCLOS states the obligations for the Flag State concerning search and rescue, which are;

1. Every state shall require the master of a ship flying its flag, in so far as he can do so without serious danger to the ship, the crew or the passengers,
 - a) to render assistance to any person found at sea in danger of being lost.
 - b) to proceed with all possible speed to the rescue of persons in distress, if informed of their need of assistance, in so far as such action may reasonably be expected of him.
 - c) after a collision, to render assistance to the other ship, its crew and its passengers and where possible, to inform the other ship of the name of his own ship, its port of registry and the nearest port at which it will call.
2. Every coastal state shall promote the establishment, operation and maintenance of an adequate and effective search and rescue service regarding safety on and over the sea and, where circumstances so

require, by way of mutual regional arrangements co-operate with neighboring states for this purpose.

3.3.2 The International Convention for the Safety of Life at Sea (SOLAS 74/78)

The SOLAS Convention is the most important of all maritime safety instruments. Safety matters including Search and Rescue operation are mentioned in Chapter V.

The regulation regarding the obligations and procedure of the master of a ship for the search and rescue operations are the following:

Regulation 2 of Chapter V requires;

the master to send danger messages to other vessels in the vicinity and send messages to the first point on the coast regarding dangerous weather or sea conditions or other hazards encountered at sea. Contracting Governments are required to ensure that the danger message is received promptly by all vessels in the vicinity and no communication charges can be made on these danger messages.

Regulations 10 of Chapter V states that

master of the ship at sea, which is in a position to be able to provide assistance on receiving a signal from any sources that persons are in distress at sea, is bound to proceed with all speed to their assistance and specifies the procedures, which must be followed. He should have to give reason when he fails to do so and this must be noted in the ship's logbook why assistance was unreasonable or unnecessary.

Regulation 15 of Chapter V gives basic requirements for governments regarding SAR operations stating that;

Each contracting Government undertaken to ensure that any necessary arrangement for coast watching and for the rescue of persons in distress at sea round its coasts. These requirements should include the establishment, operation and maintenance of such maritime safety facilities as are deemed practicable and necessary having regard to the density of seagoing traffic and the navigational dangers and should, so

far as possible, afford adequate means of locating and rescuing such persons. In addition each Contracting Government undertakes to make available information concerning its existing rescue facilities and the plans for changes there in if any.

An addition to this a new SOLAS regulation V/15 (c) entered into force on 1 July 1997 and states that;

Passenger ships to which Chapter 1 applies, trading on fixed routes, shall have on board a plan for co-operation with appropriate search and rescue services in event of an emergency. The plan shall be developed in co-operation between the ship and search and services and be approved by the Administration. The plan shall include provisions for periodic exercises to be undertaken as agreed by the passenger ship and the search and rescue services concerned to test its effectiveness.

The guidelines for preparing plans for co-operation between passenger ships and SAR services are in accordance with SOLAS regulation V/15(c), and plans for co-operation between search and rescue service and passenger ships on fixed routes are shown in appendix 1.

3.3.3 The International Convention on Salvage 1989

The Article 11 of the Brussels Convention on Assistance and Salvage of 1910 states,

Every master is bound, so far as he can do so without serious danger to his vessel, her crew and her passenger, to render assistance to everybody, even though an enemy found at sea in danger of being lost

In 1989, a new convention was adopted and replaced the Brussels Convention.

Under Article 10 of Convention on Salvage it is stated that;

Every master is bound so far as he can do so without serious danger to its vessel and persons there on, to render assistance to any person in danger of being lost at sea

There is no award for saving lives in ancient maritime law, but under Article 14 of the new convention a special compensation is included to be paid to salvors when there is a threat of damage to the environment caused by the vessel in danger itself or its cargo. In accordance with the salvage conditions, remuneration cannot be

made from persons whose lives are saved at sea, but the operations that have a useful result have the right to a reward.

3.3.4 The International Convention on Maritime Search and Rescue 1979

The International Convention on Maritime Search and Rescue is one of IMO's efforts to save the lives of persons in distress when an accident occurs. To save the lives of persons in distress is the ordinary practice of the seaman. The master of the ship has the obligation to render assistance to the vessels and persons in distress. Besides its parties to the convention have an obligation to establish a Search and Rescue organization and give necessary assistance to the vessels and persons in distress within the areas concerned.

The main purpose of the convention is to facilitate co-operation between governments and between those participating in Search and Rescue (SAR) operations at sea by establishing an international SAR plan.

When IMO was established in 1959, its emphasis was mainly on the International Conference on Safety of Life at Sea. After many improvements had been made the new version of the SOLAS Convention was adopted in 1960 and a number of recommendations required IMO to take appropriate action to improve SAR at sea.

In 1979 a conference convened by IMO in Hamburg adopted the International Convention on Maritime Search and Rescue, which entered into force in 1985.

The SAR Convention was designed to provide the framework for search and rescue operations. It and two associated manuals, namely IMO search and rescue manual (IMOSAR) and Merchantship Search and Rescue manual (MERSAR), together with other resolutions and recommendations adopted at the 1979 conference, were designed to ensure that such operations are conducted with maximum speed and efficiency. However, it should be remembered that effectiveness depends on the action taken by the parties to the convention.

Many states do not have capabilities to become parties to the SAR convention, because the convention imposes considerable obligations on the parties such as setting the shore installations required. By the end of 1997, for example, the SAR convention had been ratified by only 56 countries whose combined merchant fleet represented less than 50% of the world's tonnage. Also many of the world's coastal states had not

accepted the obligations of the convention. It was generally agreed that amending the SAR convention could solve problems with the convention.

It was considered that there were some deficiencies, which were not adaptable to the present SAR convention, and it was decided to pay more attention on the improvements to the two IMO SAR manuals and need to further harmonize the IMO and International Civil Aviation Organization (ICAO)-SAR provisions.

The sub-committee on Radio communications and Search and Rescue (COMSAR) was requested to revise the Convention. A draft text was prepared and was approved by the 68th session of the MSC in May 1997 and was then adopted by the 69th session in May 1998. It is hoped that the revised Convention which entered into force on 1st January 2000 will prove more acceptable to those countries, which have so far failed to ratify the convention. Up to this date 64 countries representing 47.05% of world shipping tonnage have ratified the SAR Convention. (See appendix 2).

The SAR convention is composed of two attachments. The Articles and Annex covering technical details are under Attachment I (Appendix 3) and the resolutions adopted by the conference are under Attachment II (Appendix 4). The technical requirements of the SAR Convention are contained in an Annex, the revised version of which includes five chapters.

3.3.5 The revised SAR Convention

The new amendments of SAR convention entered into force on 1st January 2000. In the revised SAR convention terms and definitions contained in Chapter 1 have been updated and Chapter 2, which deals with organization, has been redrafted to make the responsibilities of Governments clearer.

The new text requires parties to establish basic elements of a search and rescue service, which are defined as;

- a legal framework
- assignment of a responsible authority
- organization of available resources
- communication facilities
- co-ordination and operational functions, and

- processes to improve the service, including planning domestic and international co-operative relationships and training.

The amended Chapter 2 describes how SAR services should be arranged and national capabilities developed. Parties are required to establish rescue co-ordination centers and to operate them on 24 hour basis with staff having a working knowledge of English. Chapter 4 now covers Operating Procedures (previously chapter 5), but incorporates a revised version of the original Chapter 4 on preparatory measures.

3.3.6 IMO Search and Rescue Areas

Following the adoption of the 1979 SAR Convention the MSC divided the world's Oceans into 13 SAR areas, in each of which the countries concerned have delimited SAR regions for which they are responsible.

Provisional SAR plans for all of these areas were completed when plans for the Indian Oceans were finalized at a conference held in Fremantle, Australia. Myanmar has not yet ratified the SAR 1979 Convention. The responsibility for search and rescue in the Bay of Bengal and the Andaman Sea region is undertaken by the Indian government. The Indian government has set up one RCC located at Port Blair on the Andaman Island. This station can offer rescue services for nearly the whole region of the Bay of Bengal and Andaman Sea.

3.3.7 The International Aeronautical and Marine Search and Rescue Manual (IAMSAR)

An important feature of the revision of the SAR convention is the emphasis now being placed on the co-ordination of maritime and aeronautical SAR operations. IMO and the International Civil Aviation Organization (ICAO) have established joint working groups on the harmonization of aeronautical and maritime SAR operations. Its fifth meeting in USA in October 1997 prepared the IAMSAR Manual.

The primary purpose of the manual is to assist states in meeting their own SAR needs and obligations, which they have accepted under the Convention on International Civil Aviation, the SAR Convention and SOLAS Convention. The Manual provides guidelines for a common aviation and maritime approach to organizing and providing a SAR service. It consists of three (3) volumes. Each volume is written with specific SAR system duties in mind and can be used as a stand-alone document or, in conjunction with the other two volumes, as a means to obtain a full view of the SAR system.

The Organization and Management volume deals with the global SAR system concept, establishment and improvement of national and regional SAR systems and co-operation with neighboring states to provide effective and economical SAR services.

The Mission Co-ordination volume assists personal who plan and co-ordinate SAR operations and exercises.

The Mobile Facilities volume is intended to be carried aboard rescue units, civil aircraft and vessels to help with performance of a search, rescue or on-scene co-ordination function and with aspects of SAR that pertain to their own emergencies.

The IAMSAR Manual replaced both the MERSAR and IMOSAR Manuals and the ICAO Search and Rescue Manual.

3.3.8 The Search and Rescue Convention and the GMDSS

The development of SAR plans in all the world's sea areas is important not only to the success of the SAR Convention but also to the implementation of another IMO innovation which has already made a major contribution to shipping safety and has already saved many lives at sea. The SAR Convention has provided a global plan for carrying out SAR operations. What it can not do is to improve communications, which are so important in search and rescue operations. That is where the GMDSS comes in.

The GMDSS was introduced by means of amendments to SOLAS, which were adopted in 1988 and entered into force on 1st February 1992. It became fully operational on 1st February 1999.

The GMDSS is essentially a worldwide network of automated emergency communications for ships at sea. The basic concept is that search and rescue authorities ashore, as well as shipping in the immediate vicinity of the ship in distress, will be rapidly alerted through satellite and terrestrial communication techniques to a distress incident so that they can assist in a coordinated SAR operation with the minimum of delay.

The SAR Convention is designed to provide a response to emergencies and the GMDSS was established to provide the efficient communication support needed.

The function of GMDSS is fully explained in a later Chapter.

CHAPTER FOUR

THE ROLE OF THE GMDSS IN SAR OPERATIONS

4.1 Introduction to Maritime Distress and Alerting System

The Successful Search and Rescue operations cannot be carried out without efficient communication. Soon after the invention of radio by Marconi the use of wireless in maritime communication became important when the first distress call was sent out on 3rd March 1899, requesting for assistance when a freighter rammed the East Goodwin lightship, which was anchored in the Strait of Dover off south-east coast of England.

An important role of communication in Search and Rescue operation was also pointed out by IMO secretary William O'Neal. In his speech he stated that although wireless telegraphy is valuable in saving lives at sea it had limitation in efficient communication and also pointed out that a satellite communication system had an important role in search and rescue operations at sea (IMO News Number 1, 1999). Now the integrated communication system is in place, which should ensure that no ship in distress can disappear without trace and that more lives can be saved at sea.

The advent of modern technology replaced the conventional maritime communication system with the more efficient INMARSAT satellite-based Global Maritime Distress and Safety System (GMDSS), which took effect from 1st February 1999.

The first earliest radio conference was held in Berlin. In the conference all members were invited to consider preliminary studies for the international regulation of radio communications. The Conference decided to install coastal radio stations to receive and transmit telegrams to or from ships at sea, no matter which radio system they used.

In 1906, the first international radiotelegraph was held also in Berlin and adopted a convention modeled on the successful International Telegraph Convention of 1875. In 1914, after the Titanic disaster, the first International Convention for the Safety of Life at Sea (SOLAS) was adopted, Chapter IV of which covered radiotelegraphy. Ships carrying more than 50 passengers were required to be equipped with a radio installation having a range of at least 100 nautical miles and larger passenger ships were required to maintain a continuous radio listening watch. By 1948, a new conference was called to adopt a third version of the SOLAS Convention which requires all passenger ships and cargo ships of 500gt and above to be fitted with a radio installation and introduced radiotelephony and radio direction finding. The radiotelephony allows voice operation and is much more useful than radiotelegraphy. Unlike radiotelegraphy it does not require special training to operate the equipment. The IMO adopted a new SOLAS Convention in 1974 and Chapter IV was further improved. The Chapter IV of the 1974 SOLAS mainly deals with facilities intended for distress and safety purposes. The carriage of VHF radiotelegraphy was made mandatory on all ships of 300 gt and above by the 1981 amendments to SOLAS 1974. The conventional terrestrial radio does have a number of service drawbacks.

These are;

- Reception difficulties
- Uncertainty of the message being received
- The need for specialization, and
- Frequency congestion

Later it was found that satellite communication is the best solution to solve these problems.

4.1.1 The Introduction of a Satellite Communication System

Satellite Communication is superior to conventional radio systems. In the conventional way of radio communication the radio messages travel in straight lines because they do not follow the curve of the Earth's surface, eventually disappearing into space (except on HF). Radio messages sent via a satellite also travel in straight lines, but they can immediately be redirected from the satellite back to Earth, thus extending the range of communications. Urgent and distress messages can be sent

directly to the station equipped to deal with such emergencies via satellites instead of a ship sending out a distress alert and hoping that another ship is near enough to hear. In particular, satellites offered great advantages in alerting and locating ship's in case of distress or emergency, facilitating search and rescue operations, issuing safety and urgency messages, and also together with other functions, such as automatic reporting of ship's positions, position determination, traffic guidance, automatic navigation warnings and weather routing. In addition, satellite communication has the capability of data transmission, which is essential in the operation and administration of ships so that shipowners can send and receive messages to ships by using telex, facsimile and high-speed data transmission in total privacy.

This improvement developed the necessary amendments to SOLAS 1974, especially Chapter IV which are provisions of the GMDSS. The GMDSS was adopted in 1988 and entered into force on 1st February 1992. It became fully operational on 1st February 1999. As mentioned earlier, the SAR Convention provides a global plan for carrying out SAR operations. The GMDSS improves the communications, which are very important for successful SAR operations.

4.2 The Global Maritime Distress and Safety System (GMDSS)

4.2.1 The basic concept of the GMDSS

The basic concept of the GMDSS is that search and rescue authorities ashore as well as shipping in the immediate vicinity of the ship in distress will be rapidly alerted to a distress incident so they can assist in a coordinated search and rescue operation with the minimum of delay. (GMDSS Handbook, 1992, Pg.).

See [figure 2](#).

According to SOLAS, every ship while at sea has to fit GMDSS equipment capable to meet the following requirements,

1. Transmitting ship to shore distress alerts by two separate and independent means each using a different radio communications service.
2. Receiving shore to ship distress alerts.
3. Transmitting and receiving ship to ship distress alert.
4. Transmitting and receiving search and rescue coordinating communications.

5. Transmitting and receiving signal for location.
6. Transmitting and receiving Maritime Safety Information.
7. Transmitting and receiving on scene communications.
8. Transmitting and receiving general radio communications from shore based radio system or net works.
9. Transmitting and receiving bridge-to-bridge communications.

(Calcutt and Tetley - 6)

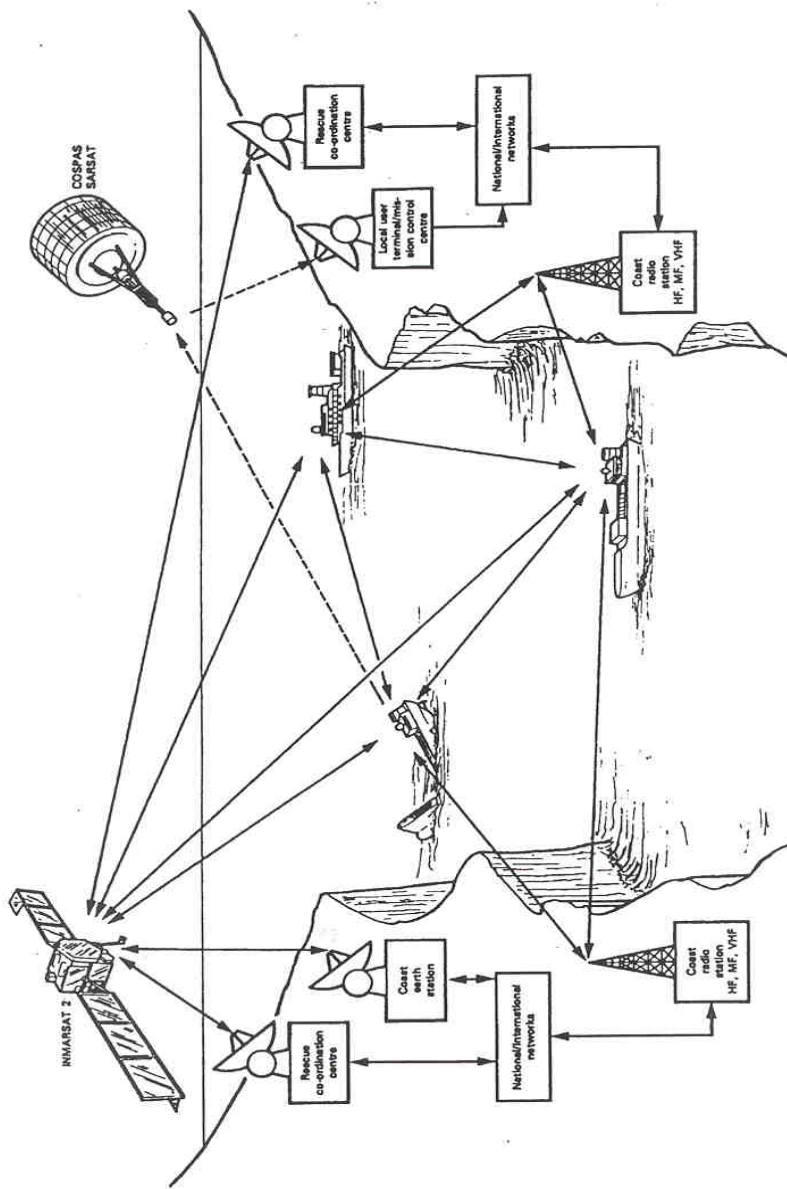
4.2.2 Transitional period and obligations of Governments for implementation of GMDSS

Through the requirements of SOLAS Chapter IV, all passenger vessels and all cargo ships over 300 gross tonnage on international voyages have to fit GMDSS equipment designed to improve the chances of rescue following an accident.

The important current issue or transitional timetables for fitting GMDSS equipment on ships are as follows;

- Between 1st February 1992 and 1st February 1999 existing ships can comply with the existing Chapter IV of SOLAS (GMDSS).
- All ships must carry NAVTEX (transmission of maritime safety information) receiver and satellite EPIRBS (emergency position indicating radio beacons) by 1st August 1993.
- All new vessels completed on or after 1st February 1995 must comply with all applicable GMDSS requirements.
- From 1st February 1999 all passenger ships and all cargo ships of 300 gross tonnage and upward on international voyages must comply with the GMDSS.

(Focus on IMO on Internet, 1999)



General concept of the GMDSS system

Source: GMDSS Handbook, 1992, pg.3

Figure 2

Implementation of the GMDSS requirements is the responsibility of contracting governments to SOLAS. This means the Administrations of individual countries that have ratified the GMDSS requirements into their national law. Also the ship owners are responsible for their ships to meet with GMDSS requirements since they must obtain certificates from their flag state which certify that all certificates issued follow all international regulations.

These requirements force the world merchant fleets to be equipped with the GMDSS equipment and ships on international voyages have become totally dependent on the system.

Regulation IV/5 of the (SOLAS) 1974, as amended in 1988, requires;

Each contracting government to undertake to make available, either individually or in co-operation with other contracting governments, as they deem practical and necessary appropriate shore based facilities for terrestrial and space radio services having due regard to the recommendations of the organizations.

For these reasons implementation of the GMDSS and shore based facilities become one of the national issues to Governments of coastal states if they wish to keep the ships of their nationalities to meet with the standards according to Chapter IV of the SOLAS 74 as amended.

For developing a Master plan of shore based facilities for the GMDSS, the contracting Governments need to consider the following elementary requirements when establishing shore based facilities.

1. the different Sea Areas (A1, A2, A3 and A4)
2. NAVTEX system
3. INMARSAT facilities
4. COSPAS-SARSAT facilities

For the details of the master plan contained in IMO document GMDSS/cir 1 and Resolution.A. (801)(19). (See Appendix 5)

4.2.3 The specification of sea area and equipment requirements for communication within the GMDSS.

The GMDSS equipment requirements vary according to the areas in which the ship operates. It is not necessary for all ships to carry the full range of GMDSS communications equipment. The operational areas are designed as follows;

- Area A1 - Within range of VHF coast stations with continuous DSC alerting available (about 20-30miles)
- Area A2 - Beyond area A1, but within range of MF coastal stations with continuous DSC alerting available (about 100 miles)
- Area A3 - Beyond the first two areas, but within coverage of geostationary maritime communication satellites (in practice this means Inmarsat). This covers the area between roughly 70°N and 70°S.
- Area A4 - The remaining sea areas. The most important of these is the sea around the Poles. Geostationary satellites, which are positioned above the equator, cannot reach this far.

(Focus on IMO February 1999 Pg. 10, IMO web site)

Ship carriage requirements for each sea area can be shown in the following chart

(Table 1)

A different number and system of communications equipment are carried on board the ship according to the nature of the designated sea area. The combination of established systems and new techniques could be seen in typical GMDSS shipboard communications packages for ships trading in any area which are:

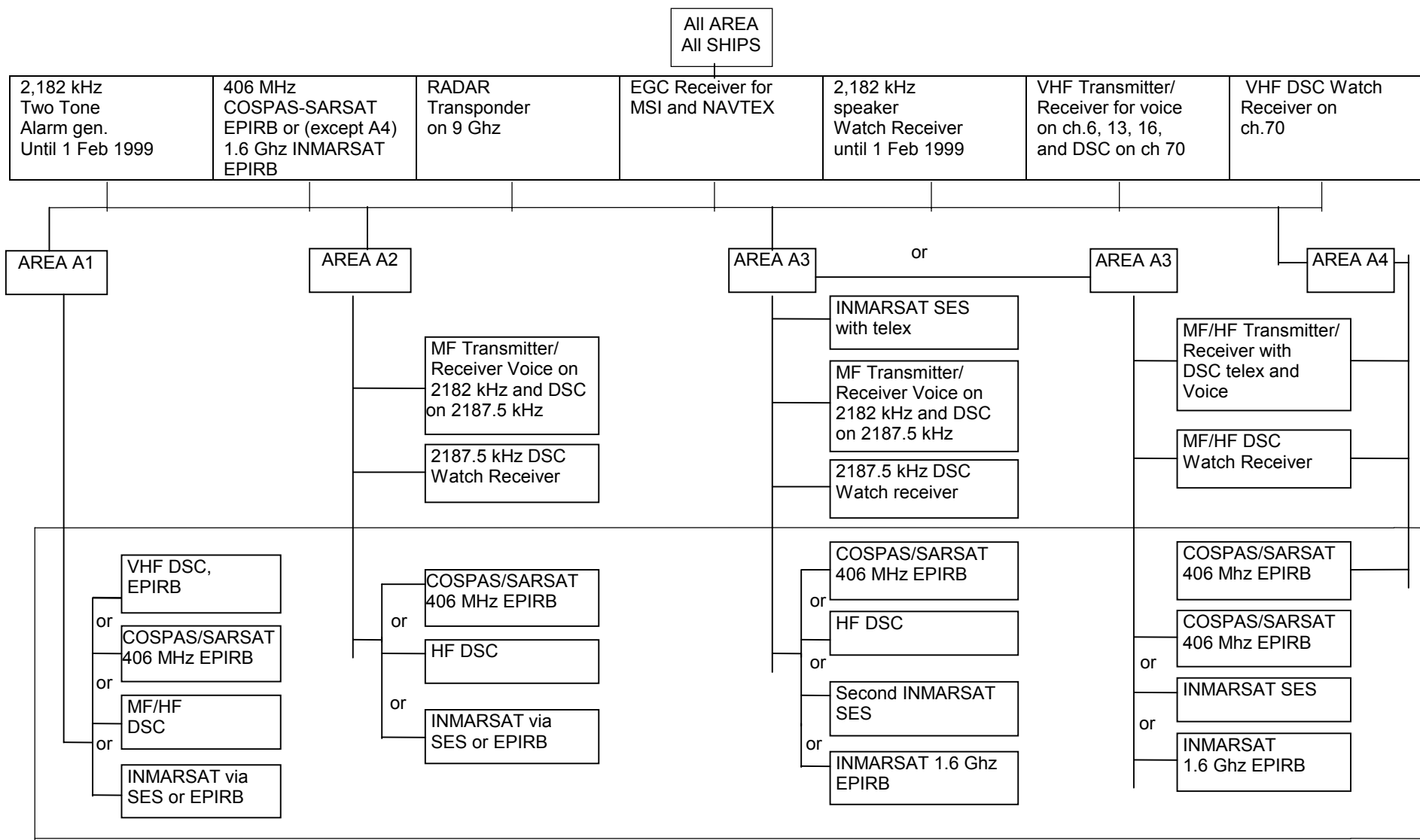
- Satellite Communications equipment: Satellites offered great advantages in alerting and locating ships mere a push button or dialing an abbreviated code together with ship's name and position.
- Digital Selective Calling (DSC): By using DSC, standard prepared message using digital coding message can be sent through a single push button to ships and RCC

and received in form of a print out or visual display unit. DSC distress messages includes information such as the identity of the caller, the nature of distress, and the position of the ship and the time, both of which may be automatically included in the message if the ship has position fixing equipment and a navigation interface.

Distress alerting and safety calling on HF, MF, VHF frequencies are carried out by means of DSC.

- Enhanced Group Calling (EGC): Enhanced group calling is part of the Inmarsat system, which enables messages to be sent to a group of ships, rather than to all ships within range. For example, messages can be sent to ships flying a particular flag, or ships in a given geographical area. It can be sent to one ship or all ships. It has the special capabilities that messages can be sent to ships in the area nearest to a ship in distress or can enable the RCC to select the fastest (or nearest) ships to respond to a distress call. Inmarsat offers two EGC services. The first, called FleetNet, is mainly for commercial purposes. Under FleetNet, the shipowners can send encoded messages to specific ships. The second, called SafetyNet, is the one that is of interest to the GMDSS. It enables ships on the high seas, in areas not covered by NAVTEX, to receive NAVTEX-type information. It can send safety information to ships in a particular area, rather than all ships.
- High Frequency (HF) Service: Not all ships operating in area A3 are equipped with Inmarsat ship earth stations. As an alternative these ships are equipped with HF radio communications system and even Inmarsat equipped ships need HF radio when out of the Inmarsat range. For distress and safety purposes a number of frequencies have been assigned. They are 2,187.5 kHz in MF band, 4,207.5 kHz, 6,312 kHz, 8,414.5 kHz, 12,577 kHz and 16,804.5 kHz in the HF bands. The reason for the large number of frequencies in the HF band is that propagation characteristics vary according to the geographical position and time of day. There the choice of frequency depends on where and when the incident occurs.

Table 1 - Ship carriage requirement for each sea area chart



(Calcutt, D. and Tetly, L., 1994)

SECONDARY ALERTING

- Medium Range (MF) Service: A medium range service is provided using 2,187.5 kHz for DSC and 2,182 kHz for radiotelephony. This is used for SAR coordination functions and on scene communications and 2,174.5 kHz is used for distress and safety traffic by NBDP.
- Short Range Service (VHF): Ships operating within VHF range can use the DSC calling frequency, 156,525 MHz (Channel 70) for distress alerts and safety calls, and 156.8 MHz (Channel 16) for radiotelephone distress and safety traffic.
- Search and Rescue Transponders (SART): A device, which is activated by receiving a radar pulse and send back its own signals, which can be detected by radar from rescue vessels, so that the exact location of vessels or survival craft in distress can be known by day or night. In this connection 3cm radar is used by rescue vessels and the detection range between these devices and ship is normally less than about ten miles.
- Automatic Identification System (AIS): In the future ships will be fitted with this kind of transponder, which is capable of providing and receiving information automatically (ship's name, position etc.) to or from an authority, other ships and other sources. The SAR operations would be improved if its rescue craft were fitted with AIS to quickly determine which ship is closest to a distress situation. During a search all the craft would be tracked and plotted, so there would be more certainty about which areas have been searched. IMO is now planning to require ships to carry a Universal Automatic Identification System, which will be DSC compatible.

4.3 The Inmarsat System

When satellite became crucial in world communications, the IMO decided to establish a maritime satellite system. As a result, the International Maritime Satellite Organisation (INMARSAT) was established in 1976 and became operational in February 1982.

The Inmarsat's most important function is the provision of improved distress and safety communication which could not be provided by terrestrial radio communications.

The Inmarsat is now known as the International Mobile Satellite Organization and is in the process of becoming a privately owned company while retaining its

public sector obligations to the maritime distress and safety system. The main task of Inmarsat is to establish, maintain and operate the satellite system in order to provide mobile communications.

The Inmarsat system has three major components: the space segment provided by Inmarsat, the coast earth stations (CESs) provided by Inmarsat signatories and ship earth stations (SESS).

4.3.1 The Inmarsat Space Segment

The present Inmarsat system utilizes geostationary satellites. It consists of four satellites in geostationary orbit 36,000 km above the equator cover four regions namely:

- Atlantic Ocean Region (East) - AORE
- Atlantic Ocean Region (West) - AORW
- Indian Ocean Region - IOR
- Pacific Ocean Region - POR

From these four positions, satellites virtually cover the globe as far as North and South as 75 degrees. All the satellites, irrespective of their function or nationality, must be rigidly maintained in their pre-arranged orbit. To satisfy both of these requirements an extensive ground control network has been established under the ultimate jurisdiction of Inmarsat. In overall control of the whole network of fix stations, mobile stations and satellites is the Inmarsat Network Control Center (NCC), situated in London. The Inmarsat satellites are controlled by the operations control center (OCC) located at Inmarsat's London headquarters. The (OCC) is connected directly by leased lines to the satellite control centers of the organization; from that satellite capacity is currently leased by its ownship earth stations to the satellites; and to all coast earth stations around the world.

4.3.2 The Coast Earth Stations (CES)

The Coast Earth Station provides the link between the satellite and terrestrial telecommunications network. Currently, all coast earth stations are owned and operated by telecommunications carriers. A typical CES consists of a parabolic antenna about 11m to 14m in diameter, using transmission and receiving signals of 6GHz and 4 GHz respectively to and from satellite. The same antenna or another dedicated antenna is used for L-Band transmission and reception of network control signals. A CES is designated for each Ocean area and services provided are telephone, direct printing telegraph, etc. It also serves as a network co-ordination station (NCS), which assigns communication channels on demand to SES and other CESs and monitors signals transmitted by these stations.

4.3.3 The Ship Earth Stations (SES)

A SES is the shipboard terminal of the INMARSAT system and any INMARSAT equipped ship must have a SES. There are several kinds of ship earth station equipment, which make possible the connection of a ship through the satellite to a CES.

Inmarsat A: The Inmarsat-A SES consists of two parts, a parabolic antenna or dish represents above deck equipment, mounted on a platform and stabilized so that the antenna remains pointed at the satellite while below deck equipment consists of an antenna control unit, computers and display units and electronic equipment used for transmission, reception, access control and signaling, and telephone and telex equipment.

Inmarsat B: The Inmarsat B is an updated version of the Inmarsat A, which provides automatic direct deal telephone, telex and high speed data transmission. It is a digital complement of Inmarsat-A (SES) developed to replace Inmarsat-A (SES) equipment in the future. It is designed to make much better use of satellite power and bandwidth, which has enabled service providers to offer end users much more lower charges than the Inmarsat-A.

Inmarsat C: Inmarsat-C does not provide for voice communications, but it enables telex operations and distress messages to be relayed in the same way. Its omnidirectional antenna has the advantage of not having to be stabilized and its small size and low cost also makes Inmarsat-C ideal for small craft such as yachts and fishing vessels. It has been accepted as an alternative to Inmarsat-A or an HF radio installation for all SOLAS Convention ships operating in GMDSS sea area A3.

Inmarsat E: This was announced in January 1997 and complies with the GMDSS. It combines the position determination of Global Positioning System (GPS) with Inmarsat's own technology thereby greatly increasing the speed at which a distress alert can be delivered since no time is lost waiting for a satellite to appear over the horizon. The system includes float free and hand held (EPIRBS).

Inmarsat M: The Inmarsat M is a mobile communication system operating both maritime and land base, which is much more cost effective and compact than those used in Inmarsat A and B systems. Although smaller and cheaper than SESs using Inmarsat B system, Inmarsat M offer voice communications of a lesser quality but sufficiently good and has the capacity for communications using digital data services at 2.4 kbits/sec, which is slower than Inmarsat B but faster than Inmarsat C. It gives coverage anywhere in the world except the poles. It is currently not accepted for use because it does not comply with the IMO requirements within the GMDSS radionet. However they have a distress alerting button and can be used at sea where the GMDSS compliance is not required or to supplement a ship's GMDSS equipment.

Inmarsat Phone: This is a family mobile satellite communications product and service providing good quality telephone and low speed facsimile services (2.4 kbit) with coverage anywhere in the world except the poles. The hand-held terminals will operate as cellular telephones, where cellular service is available and switch to the satellite system automatically where there is none. The system is expected to begin service in 1999 and to be fully operational by 2000.

From IMO's point of view Inmarsat's important function is the provision of improved distress and safety communication. By using the Inmarsat system a ship can send a distress message and know with certainty it will be received.

4.4 COSPAS-SARSAT System

The COSPAS-SARSAT (COSPAS: Space System for Search of Distress Vessels; SARSAT: Search and Rescue Satellite Aided Tracking) system is a satellite aided (SAR) system designed to locate distress beacons transmitting on the frequencies 121.5 MHz or 406 MHz. COSPAS-SARSAT is a joint international satellite aided search and rescue system established by organizations in Canada, France, the United States and Russia. The carriage of a floatfree satellite EPIRB operating in the 406 MHz in the COSPAS-SARSAT is required on all SOLAS ships unless a ship is provided with an L-band satellite EPIRB operating in sea areas A1, A2, and A3 only.

4.4.1 The basic concept of the System

The basic COSPAS-SARSAT system concept is given in Figure 3. There are at present three types of beacons, namely ELT (airborne), EPIRB (maritime) and PLB (personal locator beacons). These beacons transmit signals that are detected by (COSPAS-SARSAT) polar orbiting spacecraft equipped with suitable receivers.

The signals are relayed to a ground receiving station termed a Local User Terminal (LUT), and then signals are decoded to determine the location of the beacon. An alert is then relayed together with location data via a mission control center (MCC) either to a National Rescue Co-ordination Center (RCC) another MCC or to the appropriate search and rescue authority to initiate SAR activities. The location of the beacon is determined by using the Doppler Shift Method, using the relative motion between the satellite and the beacon. (GMDSS Handbook 1992, Pg.14).

4.4.2 Space Segment

The SAR instrumentation on board the COSPAS and SARSAT spacecraft operates in the following modes:

- Real time transmission mode: 121.5 MHz repeater
- Real time mode: 406.025 MHz data processing and downlink, and
- Global coverage mode: 406.025 MHz stored data transmission

The equipment on board the satellite consists of the following basic sub-assemblies

- 121.5 MHz receiver
- 406.025 MHz receiver/processor and memory unit, and
- 1544.5 MHz transmitter

4.4.3 Local User Terminal (LUT) and Mission Control Center (MCC)

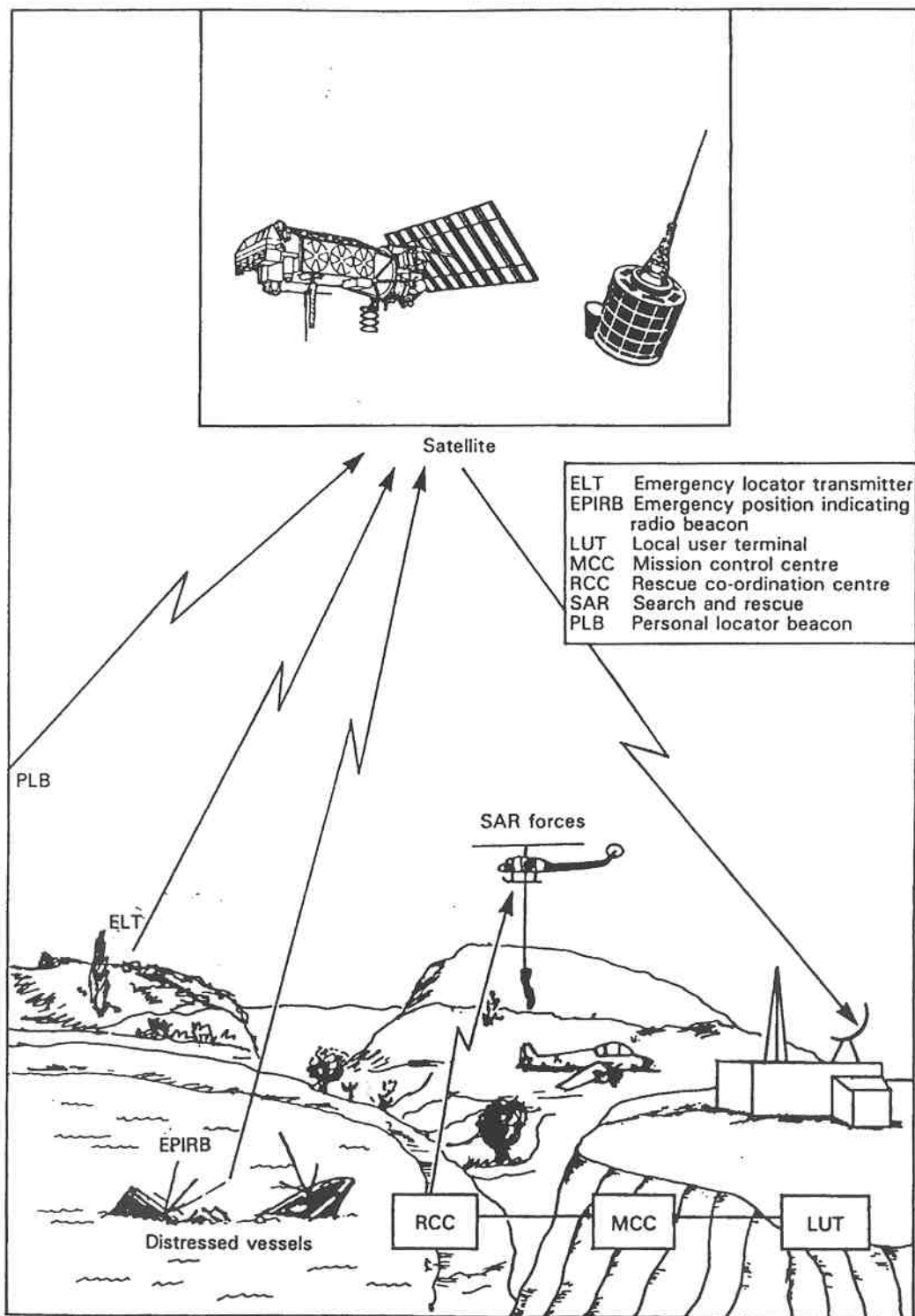
The configuration and capabilities of each LUT vary to meet the specific requirements of countries, but the COSPAS and SARSAT satellite downlink signal formats ensure interpretability between the various satellite and all LUTs meeting (COSPAS-SARSAT) specifications. There are two types of LUTs those, which process 406 MHz only. MCCs have been set up in each country operating at least one LUT. Their main functions are to collect, store and sort the data from LUTs and other MCCs and to provide such data as alert data and system information to the SAR network.

LUT functions are as follows:

- receive distress signals/data from satellite
- process signals/data received during each satellite pass
- locate transmitting distress beacons
- generate (COSPAS-SARSAT) alert data:
 - 121.5 MHz location only
 - 406 MHz: location + beacon identification + additional beacon information

MCC functions are as follows:

- receive alert data from LUTs
- receive alert message from other MCCs
- filter out redundant alert messages
- forward alert messages
 - to nation RCCs
 - to other countries SPOCs
 - to other MCCs
- receive and forward COSPAS-SARSAT system information
 - from to associated LUTs/other MCCs



Basic concept of COSPAS-SARSAT system

Figure 3

CHAPTER FIVE

THE PROPOSAL FOR THE IMPLEMENTATION OF SAR AND GMDSS IN MYANMAR

5.1 The Fundamental requirements in implementation of SAR operations and GMDSS in Myanmar

5.1.1 The situation of Maritime Communication in Myanmar

The SAR convention is designed to provide a response to emergencies and the GMDSS was established to provide it with the efficient communication support needed. Both the GMDSS and SAR are crucial to the future of maritime safety and when both are fully operational any emergency at sea will result in a distress call and the response to that call will be immediate and effective.

The development of the SAR plans in the world's sea areas is important not only to the success of the SAR Convention, but also to implementation of another IMO innovation, which has already made a major contribution to shipping safety and has already saved many lives at sea. This is the Global Maritime Distress and Safety System (GMDSS), which became fully effective from 1 February 1999.

The present maritime communication services in Myanmar are not fully developed yet. It is still on the track to cope with the standard requirements of SAR operations and GMDSS. According to SOLAS74/ChapterIV, Regulation 5 states that,

each contracting governments must undertakes to make available as it deems necessary either individually or in co-operation with other contracting governments, appropriate shore base facilities and terrestrial radio communication services.

For this reason as a signatory to the SOLAS 74 convention, the Myanmar Government established two coast radio stations for SAR and GMDSS purposes. The specification and location of these stations are as follows;

GMDSS RADIO STATIONS

	YANGON	MYEIK
STATION NAME	YANGON RADIO	MYEIK RADIO
CALL SIGN	XYR	XYM
IDENTIFICATION DIGIT	005060100	005060200
POSITION	16.42 N 096.17E	12.43N 098.6E
GMDSS SYSTEM	VHF - (DSC) CH-70 VHF - (RADIOTELEPHONE) CH-16	VHF - (DSC) CH-70 VHF - (RADIOTELEPHONE) CH-16
OPENING DATE	1-2-99	6-5-99

These coast radio stations (CRSs) offer the services only on VHF DSC and their operational range does not fully cover the A1 sea area of Myanmar coastal waters. The selection of the geographical positions of the CRSs is determined and depending upon effective service that can be offered and on vessel traffic density. The XYR Radio station is very close to the capital Yangon, which is the major seaport of Myanmar.

Before the GMDSS came into force on 1st February 1999, international seagoing vessels when entering or leaving Yangon Port or other coastal ports in Myanmar seawater had to contact the XYR radio station to give an ETA and request for a pilot to enter the Port of Yangon. The communication method used at that time was a conventional way of radiotelegraphy using MF, HF frequencies. The schedule radio watch on distress and other emergency calls was kept on 500

kHz and safety and weather information were initially transmitted on this frequency. The initial contact could be made on 500 kHz for general radio communication. The vessels had to report their arrival time at the fairway by using VHF channel 16 as initial call and further report on channel 12 or 06. In the port area vessels in berths and in mid-stream moorings used VHF as the primary source of communication equipment to communicate with the Harbor office for harbor information and berthing arrangement. VHF is the primary source of communication equipment used by foreign vessels calling at Myanmar coastal ports.

The XYR is the only station in Myanmar that transmits and receives all maritime communication messages. When the GMDSS came into force in February 1999, the Myanmar government considered to discontinue the service of radiotelegraphy, which is now still offered by XYR station. It is intended that the service on radio radiotelegraphy will cease when the GMDSS is fully developed in Myanmar. To fulfill this requirement, presently the Myanmar government has set up two VHF DSC coast radio stations in Yangon and Myeik, as mentioned earlier for distress and general radio communications. The services provided by these two radio stations covers only the Yangon port area and Myeik port area.

As a party to SOLAS 74 as amended, the Myanmar government has a desire to set up areas A1 and A2 coast radio station to cover Myanmar waters and adjacent sea areas.

In December 1993, according to (COM37/17) Annex 3 and MSC/468/Rev: 2 Information on Shore Based facilities in the Global Maritime Distress and Safety System (GMDSS), the form was submitted to IMO stating that Myanmar intended to establish sea areas A1, A2 and also intended to equip one or more HF station with HF DSC facilities. In the proposed GMDSS plan submitted to IMO it was mentioned that the latest implementation date was 1995. When it was submitted there was no intention to commission a ship earth station for RCC, which is the major important communication equipment essential in SAR operations. There is no intention or capabilities to offer International NAVTEX, SafetyNet and HF MSI services, which is the obligation to the governments acceding to SOLAS74.

Myanmar does not intend to implement ground facilities in the COSPAS-SARSAT system and to establish a VHF-DF network.

Although GMDSS already came into force on 1st February 1999 Myanmar was unable to follow in accordance with the proposed plan that had been submitted to IMO. There is not a sufficient number of coast stations to provide VHF and MF coverage in the Myanmar coastal area. It is mentioned in Resolution A 801. (19),

Areas not defined by governments as sea areas A1 or A2 will, as appropriate, be designated as sea areas A3 or A4 in accordance with regulations IV/2.14 and IV/2.15 of the 1974 SOLAS convention as amended in 1988. (See Appendix 4).

According to this definition Myanmar is a Sea Area A3 and ships which operate in sea area A3 have to carry HF or Inmarsat equipment in addition to VHF and MF for distress and general radio communications. In Myanmar there is no proper coast radio station equipped with GMDSS system to handle distress and safety messages as well as public correspondence. Any SES in Myanmar waters shall have to contact coast stations, which can provide Inmarsat services. They can communicate with Myanmar through any appropriate coast earth stations, which are connected with (IOR) Inmarsat satellite.

(See Figure 4).

5.1.2 Need of GMDSS in Myanmar

(Conference on Maritime Search and Rescue (SAR) and the GMDSS for Indian Ocean Countries)

According to the conference on maritime Search and Rescue (SAR) and the Global Maritime Distress and Safety System (GMDSS) for the India Ocean countries held in Fremantle, Australia in September 1998, it is stated that some countries had adequate and fully operational shore based facilities, some had prepared plans and were in the process of establishing them, but there were areas in the region where plans for such facilities were yet to be drawn up. It also suggested that a regional approach to the provision of shorebased GMDSS facilities rather than each country working independently to provide a national system, which could duplicate services existing in neighboring countries.

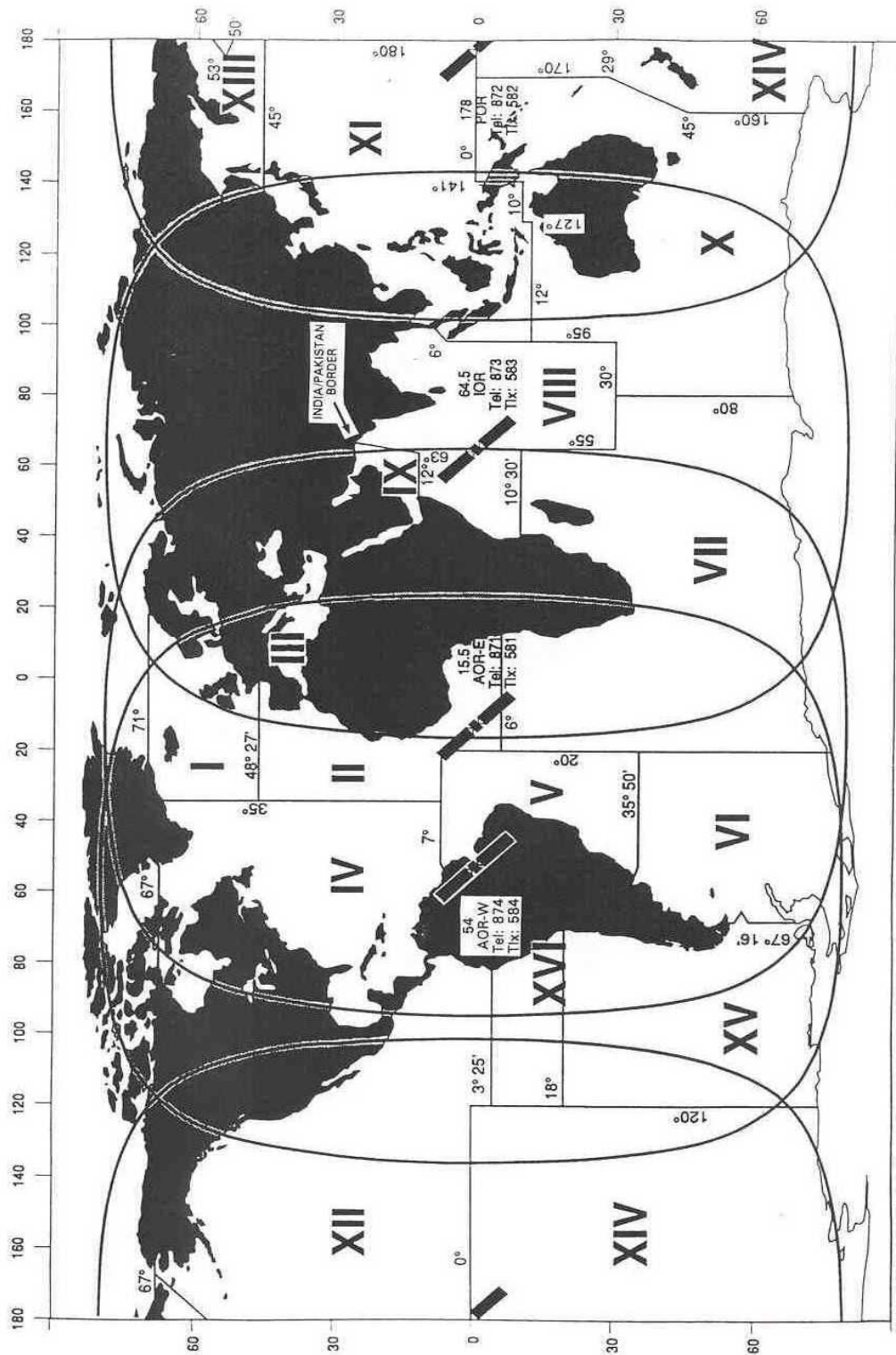
According to the Indian Ocean conference, a number of Administrations in the region had prepared master plans for national maritime radio communication facilities including Myanmar. But the problem are there is inadequate shore based facilities for local fishing fleets and international shipping. The conference acknowledges the need for littoral states in the Indian Ocean to provide shore based facilities for the smooth operation of the GMDSS and the need for countries to take account of the system in planning improvements in their maritime radio communication facilities or SAR organizations and adopt resolution No.3 on the Global Maritime Distress and Safety System (GMDSS). (See Appendix 5).

In Resolution No.3 of the Indian Ocean conference on maritime SAR and GMDSS, the need for shore-based facilities to introduce the system in the Indian Ocean region is considered. It also urges all coastal states in the Indian Ocean region to take account of the GMDSS in any national plans to improve maritime radio communications or their SAR organization and to communicate details of such plans to IMO.

On the other hand, according to the SOLAS convention the contracting governments have to make a choice about the type of communication services they wish to provide for GMDSS ships. In almost every case, the littoral seas will be within Areas A3 until the coastal state concerned decides to establish Areas A1 (VHF with DSC facilities) or Areas A2 (MF with DSC facilities).

In this case, as previously mentioned, Myanmar decided to establish sea Areas A1 and A2. It is observed that with the lack of financial support or necessary funds, Myanmar has no capability to continue to develop the shorebased facilities and equipment require for sea Areas A1 and A2. It is unavoidable that Myanmar has to adopt its sea Area as A3. To meet this area A3 requirement Myanmar also has the intention to establish shorebased facilities (RCC) for HF DSC and Inmarsat.

According to Resolution No (6) of the Indian Ocean Conference the arrangements for the provisional global SAR services are now complete in all thirteen maritime SAR areas into which the Oceans of the world have been divided.



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INMARSAT global coverage showing 0° elevation contours

Figure 4

Although the provisional global SAR plan had been completed the conference encouraged the governments of the coastal states to continue implementation of SAR and GMDSS in their SAR regions.

Myanmar has intention to accede to become party to the International Convention on Maritime Search and Rescue 1979 at the earliest possible time. If Myanmar becomes a party to the SAR Convention, it is obliged to establish Rescue Co-ordination Centers (RCCs). If Myanmar has to set up RCC then RCC need to be provided with (or) should make arrangements to allow them to communicate with ships via both HF DSC and Inmarsat.

It is mentioned in the report on the Indian Ocean Conference that countries do not need to individually establish domestic coast stations or Coast Earth Stations to meet the above obligation. It would be sufficient to conclude agreement with a telecommunications entity in a neighboring country having the necessary facilities to communicate with the sea area.

So Myanmar does not need to establish domestic coast stations or Coast Earth Stations. Myanmar only needs to establish HF DSC, Inmarsat and coast radio stations to cover sea areas A1 and A2 as previously planned.

5.1.3 The GMDSS Master Plan

Before implementing shore structures for GMDSS as per requirement of Regulation 5 /Chapter IV of the SOLAS74 amendments, governments must provide information to IMO about its shore based SAR facilities. The IMO has prepared and published these information to be circulated. This is called the GMDSS Master Plan and SAR managers must ensure that the Master Plan has current information about its facilities and that their RCCs, communication facilities, ships and training institutes have a copy of the plan.

The Master Plan shows for every state in list format and or maps, which of the following services are operational and which are planned

- VHF, MF and digital selective calling (DSC) installations
- Inmarsat, SafetyNet, Navtex and HF narrow band direct printing (NBDDP) services

- Satellite EPIRB registration, MCC and LUT information and
- Which RCCs are using SESs

5.1.4 The required functions of Search and Rescue and GMDSS in Myanmar

The successful Search and Rescue operation is wholly dependent on GMDSS. Therefore it is important that the implementation of the GMDSS should be given first priority. In order to achieve this Myanmar has to pay attention to the following functions in implementation of SAR and GMDSS;

- Before carrying out the implementation of shorebased communication facilities, it is necessary to make amendments in existing Myanmar Communication Acts. Myanmar is still practicing Burma Wireless Law 1937 and this should be supplemented with the 1988 (GMDSS) amendments to SOLAS 74 regarding chapter IV, which entered into force in 1st February 1992.
- Myanmar needs to establish a RCC- Rescue Co-ordination Center to support SAR operations.
- Continue to develop coast radio stations to cover sea areas A1 and A2 in addition to currently operating two VHF DSC coast radio stations.
- When establishing a RCC it is necessary to ensure that the RCC has the capability to communicate shore to ship via both HF DSC and Inmarsat (SES to be fitted in RCC).
- NAVTEX system to be established.
- As a flag state to ensure that ships under its own flag are properly equipped with GMDSS.
- National fishing fleets need to be equipped with proper GMDSS communication equipment.
- To make available an interconnection between RCCs by dedicated landlines, the public switch telephone and telex networks, radio links including the use of the Inmarsat system and the Aeronautical Fixed Telecommunication Network (AFTN) and availability of COSPAS-SARSAT alerts from other RCCs. This

means Myanmar needs to set up co-ordination with neighboring countries which can provide the service of LUT and MCC.

5.1.5 Designated Coast Watch Station

The radio station designated for the maritime radio communication in the Union of Myanmar is the Yangon Radio (XYR). It is situated at Syriam (position Lat16°51.5' N Long 096° 12'. 3E) and about 25 km from Yangon. Yangon radio sends and receives radio messages to and from the maritime mobile services and in addition it also handles general radio communication.

Yangon Radio provides the following services on 24-hour basis:

1. Continuous radiotelegraphy Watch on 500 kHz for the Distress messages.

The Radio Telegraphy service on 500 kHz is now replaced with continuous VHF DSC watch on frequency 156.525 MHz (Channel 70) for distress alerts and safety calls and 156.8 MHz (Channel 16) for radiotelephone distress and safety traffic.

On receiving the message the following actions will be taken as appropriate,

- Report to the defined authorities
- Provide necessary communication for the search and rescue operations
- Relay the distress message to the vessels in the area
- Send /Relay messages when assistance is no longer required.

2. Continuous radiotelephony Watch on 2182 kHz.

On receiving the spoken word “Mayday” distress message from 2182 kHz, same as above procedure.

(RadioTelephony Watch on 2182 kHz is no longer existing after 1st February 1999 as per requirement of Chapter IV/SOLAS 74 Regulation 7).

3. Give medical advice as may be required by vessels calling on 500 kHz and working on 460/515 kHz on radiotelegraphy.

(Medical advice can be obtained by using Inmarsat through associated Rescue Coordinating Centers or Coast Earth Stations, which can be available in the

Indian Ocean Region. Telephone numbers of the RCCs can be instantly available to the SES operator by using Inmarsat -A Maritime Users Guide).

4. Give navigational warnings on every 0518 GMT: 0918 GMT: 1718 GMT. Calling on 500 kHz and working on (460/515) kHz.

(This service was provided according to Regulation 5 Chapter V/SOLAS 74 and Resolution A.617 (15) which stated that each contracting government should undertake to make appropriate maritime mobile service in the bands between 415 kHz and 535 kHz. So contracting governments need to provide Maritime Safety Information services).

5. Give homing signals (Direction Finding) to the vessels on request. Calling on 500 kHz and working on 460/515 kHz.

Myanmar Government should need to consider offering the service of VHF direction finding system. It is mentioned in the master plan submitted to IMO that the Myanmar Government has no intention to offer this service. But it will be helpful to local craft that are going to be equipped with VHF DSC in the future.

6. Broadcasting weather messages for the Bay of Bengal and the Andaman Sea. Calling on 500 kHz and working on 460/515 kHz at 0900 GMT and 1700 GMT.

The local fishing vessels and country crafts are very much assist in search and rescue operations whenever they occur. A few of the government's own local fishing vessels and country craft are equipped with radio communication means. The equipment includes Single Side Band (SSB) in the high frequency (HF) band, 2182 kHz radiotelephony (RT) on the medium frequency (MF) band. They are also equipped with maritime VHF communication equipment. There is a regular communication between the Head Office of the fishery department and fishing vessels. In case of emergency fishing vessels and local seagoing craft can contact Yangon XYR radio station using international safety band frequencies on 2182 kHz and VHF Ch.16. Most of the local vessels trading in the Myanmar Sea lack

radio communication equipment. The Myanmar authority should encourage these local craft to be equipped with appropriate communication equipment for distress alerts in case of emergency.

5.1.6 SAR resources in Myanmar

Upon receiving a distress message by XYR it is immediately reported to,

- Duty Officer, National Search and Rescue Board (NSRB) under the (Ministry of Transport).

Address; Secretariat, Merchant Street.

Phone 951-83453, 951-83454.

- Search and Rescue Commanding Center, Post and Telecommunication Department.

No (256), Bo Aung Kyaw Street.

International Contact Point

Telex 83-21222 Mantel BM

Fax 951-89911, 951-89960/61

Phone 951-89910

- Commanding Officer Myanmar Navy (MRCC) Syriam Naval Base.

Phone 951-95256, 951-88651

Navy Wireless Phone 951-91181

- Commanding Officer Myanmar Air Force (502) Wing.

Mingalardone, ARCC Phone 951-63059

- Department of Marine Administration

Duty Officer

Phone 952-78527, 951-74920

Nautical Surveyor (Safety and Inspection) phone 951-74928

- Myanmar Port Authority

Duty Officer Phone 951-83106

Wireless station phone 951-83122, 951-83101

- Deputy Marine Superintendent (Myanmar Five Star Shipping Line)

Phone 951-95219, 951-95279

Duty Officer Phone 951-95280

- Department of Fishery. Duty Officer Phone 951-77259
- Chief Engineer Overseas Communication Service. Myanmar Post and Telecommunication.

Phone 951-65333, 951-85972, 951-81076

Provide relay communication between the distress vessel and MRCC, ARCC, RSC and OSC if necessary.

5.1.7 Coast Radio Station (Existing and Future Development)

The Yangon Radio (XYR) has handled all the radio communication with the maritime mobile service since it was established in 1965. Particulars of the station are prescribed in the Coast Station list published by International Telecommunication Union. Before GMDSS came into force on 1st February 1999 the communication equipment used was Kokusai TT-1025 (3KW) for transmission, Redifon R5510 for receiving on the MW (medium wave) frequencies and Kokusai Electric TW 5513 (1KW) for transmission, Redifon R5510 for receiving on the SW (short wave) frequencies. This equipment is used for long periods without replacement and back up.

Yangon Radio keeps continuous watch on the international distress frequency on 500 kHz on wireless telegraphy and 2182 kHz on the radiotelephony. However, the watch was valid until 1st February 1999. When a distress message is received the Yangon Radio XYR should report to the designated authorities as defined in paragraph 5.1.6.

After introduction of the GMDSS the Government of Myanmar realized the need for the GMDSS coast station to come abreast with the required standards and safety.

The Ministry of Communication, which is responsible for marine communications is aware of the importance of the GMDSS and had set up a development program to establish the coast station, which can offer GMDSS services according to Chapter IV/SOLAS 74 requirements. The system contains HF, MF, VHF transmitting and receiving with Digital Selective Calling (DSC) and

associated facilities including transmitting of Maritime Safety Information (MSI) and NAVTEX by means of narrow band direct printing.

Attached is the proposed lay out of the GMDSS coast station. (Figure5)

The Government of Myanmar had been used the existing system of alert until 1st February 1999. Although Yangon Radio had already set up two VHF DSC coast radio stations, the implementation of complete GMDSS in Myanmar was far behind schedule, which was targeted for 1995. The Government of Myanmar is now looking for financial resources from donor countries to successfully establish Coast Radio Stations.

5.1.8 Communication between Coast Watch Stations, MRCC, ARCC, RSC

It is important to set up an efficient and well-defined communication system in the SAR activities between different units to carry out SAR operations effectively. In the Union of Myanmar inland telecommunication depends on the landline communication via microwave stations, which are located at all states and divisions except in some remote areas. This system is also available for the communication between the Coast Watch Stations and the Rescue Centers. These landline communications are primarily intended for the public so that lines are always busy. Line congestion during the emergency phases can be avoided by keeping sufficient channels free. Preliminary agreement should be made between the search and rescue organization and the Post and Telecommunication Department to give priority and ensure free channels in case of search and rescue operations. The alternative means of communication can also be used through Navy wireless Communication Network based at Yangon Naval command which can contact all naval bases and warships stationed all over the country. The means of communication used between the coast Radio Station and Rescue Centers are illustrated in the Table2.

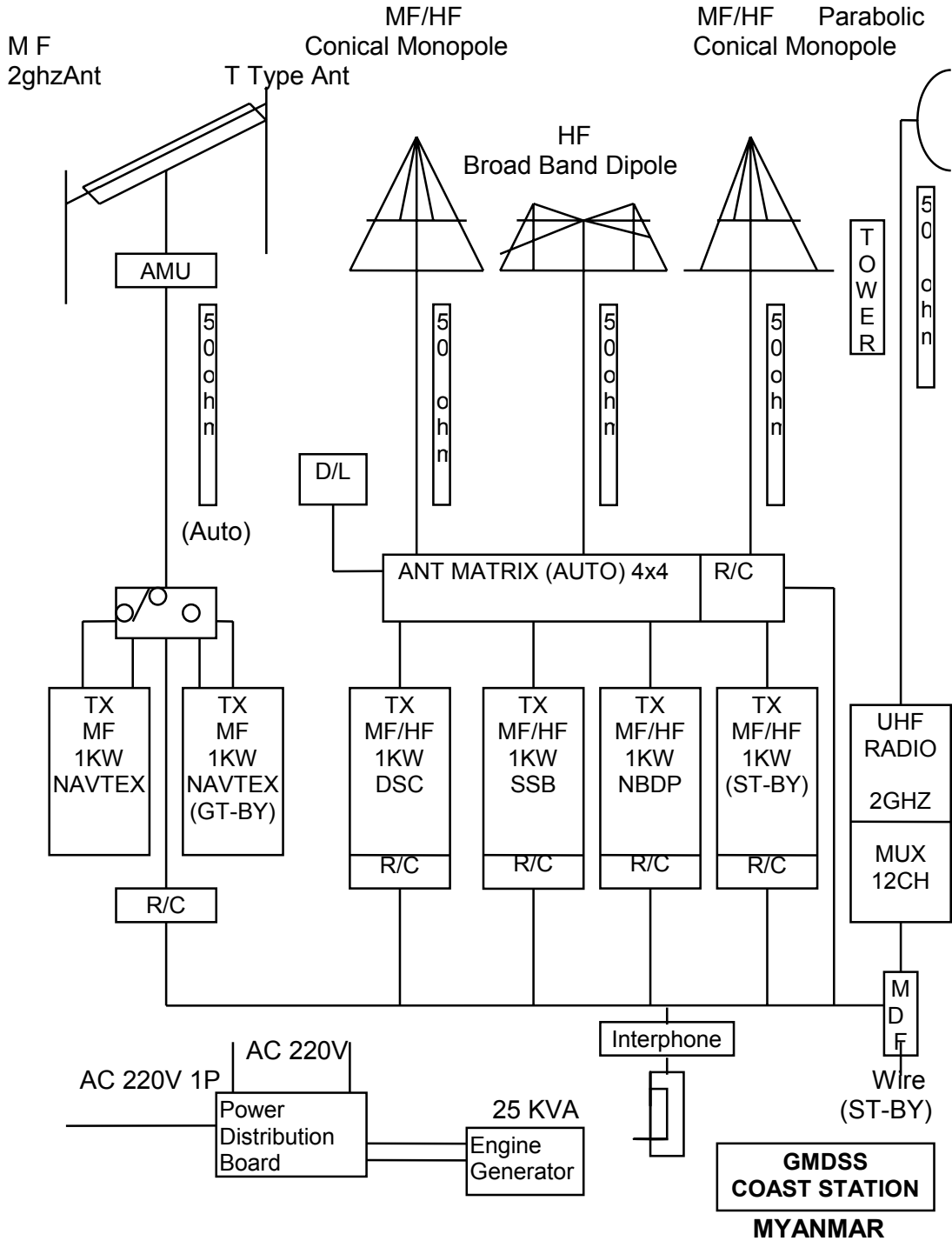
5.1.9 Communication between RCC, RSC, OSC, RU and CSS

The Communications between an alerting post and RCC, RSC or local SAR unit should be fast and reliable. The channels should be checked regularly. These voice or data links could be via dedicated or public telephone, radiotelephone, radiotelegraph or satellite.

The frequency or the frequencies to be used within maritime SAR facilities will depend on the organization of the SAR services in each SRR and whether the RCC/RSC is acting as the main radio communication center or using coast radio station. In each SAR region the communication between the RCC/RSC and the OSC can be through the coast radio station or the Navy Wireless net work, which can call any naval base and naval vessels at locations all over the country.

The communication between the OSC, RU and CSS can be Marine VHF (calling on channel 16 and working on channel 06) for onscene communication. For further communication the MF 2182 kHz can be used and changed to a working frequency designated by the on scene commander. Means of communication between the RCC/RSC and Maritime SAR facilities are illustrated in Table 3.

MF/HF Transmitting Station



Lay out of HF/MF Transmitting Station in the Union of Myanmar

Figure 5

5.1.10 International Coordination

Traditionally, States have independently developed shoreside and ground communication infrastructures to handle distress alerting and SAR Co-ordination of modern communications on a regional or even global basis has become increasingly important to success. With the advent of long range and satellite communications, automatic data alerting and messages, which require international access to databases to decode, this traditional approach is less effective. National stand-alone communications have become

- increasingly expensive
- prone to gaps and redundancies in coverage; and
- inadequate to provide the seamless integration and databases needed to serve the interests of persons, aircraft and vessels in distress.

Most of the communications used among SAR facilities depend upon local arrangements, the structure of SAR services within the SRR and available equipment. Suitable frequency capabilities to communicate with dedicated SRUs or other mobile SAR facilities should be selected from those authorized by the ITU Regulations or ICAO Annex 10 provided and covered in plans or agreements among the parties concerned. This includes an advanced international agreement on what frequencies will be used on scene when units of more than one state jointly respond to a distress situation.

Regarding this India, Bangladesh, Myanmar and Thailand, which are neighboring countries co-ordinate each other to find an agreement of assigned frequencies to be used during SAR operations.

TABLE 2 - MEANS OF COMMUNICATION BETWEEN COAST RADIO STATIONS AND RESCUE CENTERS

	COAST RADIO STATION (XYR)	MRCC YANGON	ARCC YANGON	SRC I CO CO NAVAL BASE	SRC II MYEIK NAVAL BASE	SRC III SITTWE NAVAL BASE
COAST RADIO STATION (XYR)	X	LAND LINE COMMUNICATION	LAND LINE COMMUNICATION	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)
MRCC YANGON	LAND LINE COMMUNICATION	X	LAND LINE COMMUNICATION	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)
ARCC YANGON	LAND LINE COMMUNICATION	LAND LINE COMMUNICATION	X	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)
SRC I CO. CO. NAVAL BASE	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	X	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)
SRC II CO. CO. NAVAL BASE	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	X	LAND LINE COMMUNICATION (Microwave Station)
SRC III CO. CO. NAVAL BASE	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	LAND LINE COMMUNICATION (Microwave Station)	X

TABLE 3 - MEANS OF COMMUNICATION BETWEEN RCC/RSC, OSC, RU, CSS

	RCC/RSC	OSC	RU	CSS
RCC/RSC	LAND LINE COMMUNICATION	VIA COAST RADIO STATION (OR) NAVY WIRELESS NET WORK	VIA COAST RADIO STATION (OR) NAVY WIRELESS NET WORK	VIA COAST RADIO STATION (OR) NAVY WIRELESS NET WORK
OSC	VIA COAST RADIO STATION (OR) NAVY WIRELESS NET WORK	X	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 kHz (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 kHz (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.
RU	VIA RADIO STATION (OR) NAVY WIRELESS NET WORK	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 KHZ (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 kHz (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 kHz (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.
CSS	VIA COAST RADIO STATION (OR) THROUGH OSC	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 KHZ (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 kHz (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.	MARINE VHF CH 16 (CALLING) CH 06 (WORKING) (OR) MF 2182 kHz (CALLING). WORKING FREQUENCY DESIGNATED BY OSC.

5.1.11 Vessel/Aircraft Communications

It is important that a communication system should be made available which is compatible to the designated SAR aircraft and SAR surface units in SAR operations. It is better to make direct communication arrangements between the aircraft and the surface craft without utilizing the Air Traffic Control (ATC) and Coast Radio Station (CRS) which could result in miss-interpretations. Practical difficulties may exist between surface vessels and aircraft when attempting to make communication during search and rescue operations because of different frequency allocation and incompatible equipment.

The frequency bands allocated by ITU for the aeronautical mobile service between aircraft and the ground stations are on HF (3,000 to 30,000 kHz), UHF (MF) (300 MHz to 3,000 MHz) and VHF (30 to 300 MHz) (121.5 MHz) services are normally available at any aeronautical facility where needed to ensure immediate reception of distress calls and 123.1 MHz can be used for on scene communications. The frequencies designated for the Marine Services to communicate with coast radio stations and with each other are MF (405 kHz - 535 kHz) for radiotelegraphy (calling and Distress on 500 kHz) and MF (1605 MHz - 4,000 kHz) for radiotelephony (calling and Distress on 2182 kHz) and VHF 117.975 - 136 MHz (Calling and Distress on 156.8 VHF Channel 16).

It has been mentioned that the vessels are not required to continue to use Morse code; However, WT (Wireless Telegraphy) has been a core part of the maritime mobile service since the early 20th century and will continue to be voluntarily used into the next century. WT service is provided for distress and safety on frequencies 500 kHz and 8364 kHz.

There are many options to select frequencies for the communication between the aeronautical and maritime services when compatible equipment is available. The aeronautical mobile service uses AM for VHF telephony while the maritime mobile service uses FM. The common frequencies utilized are 2182 kHz, 4125 kHz, 3023 and 5680 kHz, 3023 and 5680 kHz, 121.5 MHz AM, 123.1 MHz AM and 156.8 MHz FM (Channel 16). Designated SAR aircraft should be able to use this frequency to communicate with vessels in distress and assisting vessels. It is recommended that aircraft and surface vessels should use the visual signals as

prescribed in the International Code of Signals. Communication between Aircraft and RCC/RSC is available through Air Traffic Control by using normal traffic frequencies.

5.2 Legislation and proposal for institutional framework on SAR

5.2.1 National Legislation

The Search for and rescue of a person in distress at sea on humanitarian grounds with or without the international obligation is a common duty for the every human being.

Although presently not a signatory to the 1979 SAR Convention the Union of Myanmar has always rendered assistance to vessels and persons in distress within its area of jurisdiction. The Myanmar Government pays only a little attention to SAR organizational structure because of the low frequency of accidents, clear navigable waters and little traffic. Myanmar is a signatory to the SOLAS convention and has the obligation to establish a SAR organization under the provisions of Regulation 15 of Chapter V of the SOLAS convention.

The legislation and regulatory system in Myanmar is complex and includes “cabinet decisions” or “Government approved” besides the formal Acts or ordinances stemming from the Parliament and the Government.

There is no proper Search and Rescue legislation to be followed in Myanmar, which is required to be included in national legislation. It is of utmost important that Myanmar needs to implement a legislation system, which can fulfill Search and Rescue activities locally or regionally. When implementing SAR organization it is required that every state should have in place statutes and related provisions that establish a legal foundation for establishing a SAR organization and its resources, policies and procedures. State legislative provisions should be aligned with accepted principles of international law and may serve purposes such as

- recognizing the SAR function as a state responsibility
- implementing IMO and ICAO requirements and standards, and
- designating SAR agencies and their general responsibilities

The Myanmar Government should have to keep as close as possible to this status when implementing national legislation corresponding to search and rescue operations.

Due to the lack of a proper search and rescue organization the cooperation among the different authorities providing the rescue units cannot carry out efficient SAR operations.

The procedure among different authorities reduces the efficiency of the SAR organization due to the fact that different organizations do not have the trained personnel or the facilities to undertake these kinds of action.

The present legal situation with only Government decisions or policies has to be changed to a situation where SAR is fully supported with the appropriate legislation. When drafting the legislation consideration should be given to the basic provisions of the SAR conventions and related SAR instruments.

5.2.2 International Conventions

As earlier mentioned Myanmar is a signatory to the UNCLOS III and the SOLAS 74/78 Convention. Myanmar has deposited the instrument of accession for MARPOL 73/78 for Annex I and Annex II. Myanmar has not yet ratified the 1979 SAR Convention.

5.2.3 Inter-governmental regional co-operation

SAR systems can be established on a national or regional level or both. Either way the process involves the establishment of one or more SRRs, along with capabilities to receive alerts and to co-ordinate and conduct SAR services within each SRR via an RCC. Each SRR needs an RCC, but each state does not necessarily need an SRR if one RCC can be supported by and serve more than one state. However, coastal states are encouraged to set up their own RCC in their SRR.

A regional approach can reduce the cost and improve the coverage and distribution of distress alerts and related services. To meet the provisions of the

conventions in a cost-effective way a good co-operation scheme should be established with all neighboring States.

In this case when carrying out joint search and rescue operations it is to observe that Chapter III of the SAR Convention should be consulted and effectively carried out.

The co-operation should be formalized in governmental agreements concerning aeronautical SAR among India, Bangladesh, Myanmar and Thailand. When a proposal on Regional co-operation is made among neighboring countries, one of the important things to be developed is the interconnection between RCCs which can be provided by dedicated landlines, the public switched telephone and telex networks, radio links including the use of INMARSAT and the Aeronautical Fixed Telecommunication Network (AFTN).

5.3 De-Limitation of the Search and Rescue Region for the Bay of Bengal and the Andaman Sea.

A Search and Rescue Region (SRR) is an area of defined dimensions associated with an RCC within which SAR services are provided. Maritime SRRs are published in the IMO SAR plan and could be similar or different to aeronautical SRRs. The purpose of having an SRR is to clearly define who has primary responsibility for coordinating responses to distress situations in every area of the world and to enable rapid distribution of distress alerts to the proper RCC.

The SAR plan should be based on a framework of multilateral or bilateral negotiations and agreement with the neighboring state or states providing SAR services in adjacent seas and coastal waters to achieve co-operation and mutual support in responding to the distress incidents.

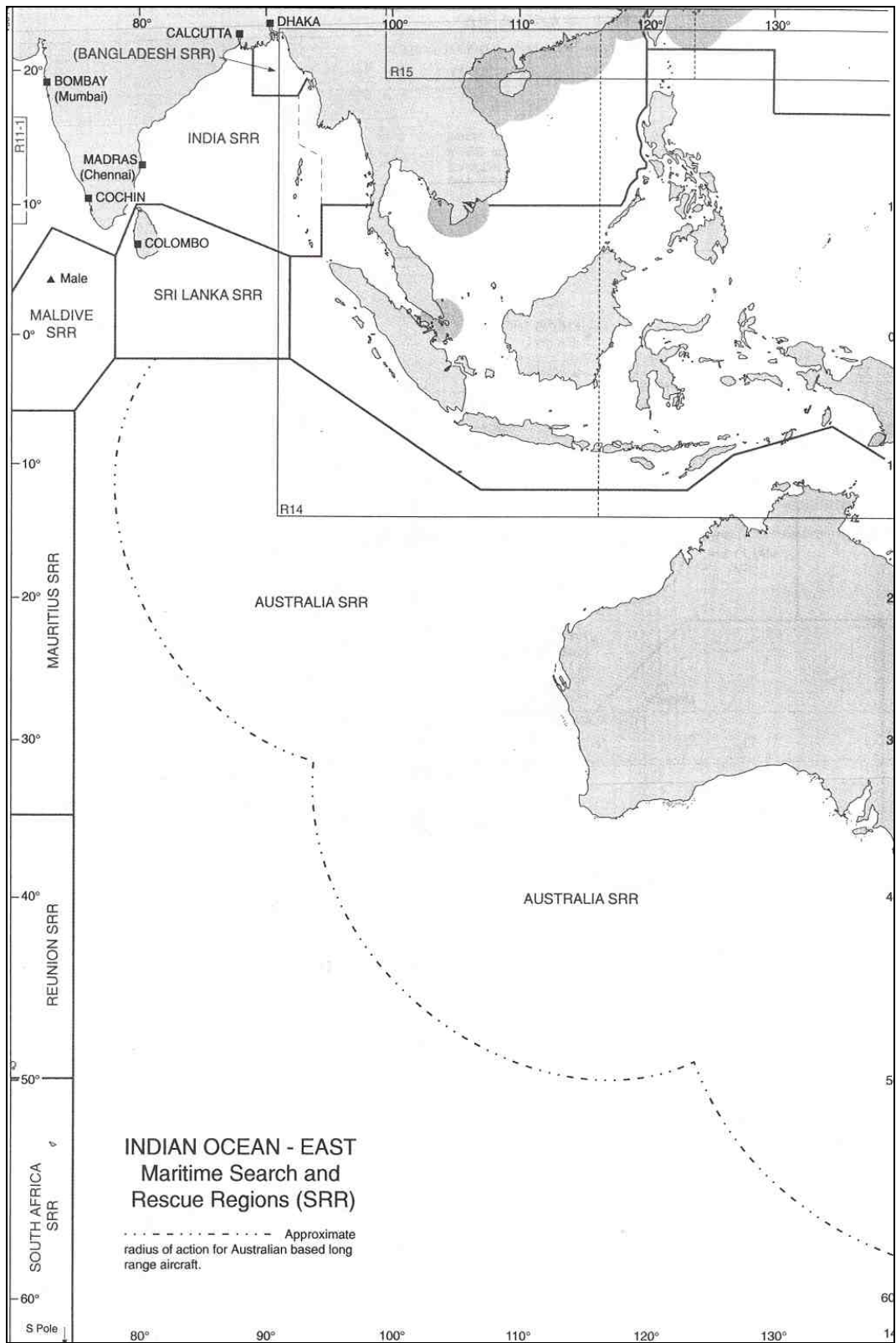
The Union of Myanmar has a sea boundary with Bangladesh and India on the North West Coast, India on the West and South West Coast and Thailand on the South East Coast.

The co-ordinates for the Search and Rescue Region of Union of Myanmar in the Bay of Bengal and the Andaman Sea are as follows;

Co-ordinate	1	Lat.	20° 45' N	<u>Bangladesh</u>
		Long	92° 22' E	Myanmar
Co-ordinate	2	Lat.	20° 00' N	<u>India</u>
		Long	91° 00' E	Myanmar
Co-ordinate	3	Lat.	14° 38' N	<u>India</u>
		Long	91° 00' E	Myanmar
Co-ordinate	4	Lat.	13° 20' N	<u>India</u>
		Long	95° 00' E	Myanmar
Co-ordinate	5	Lat.	09° 33' N	<u>Myanmar</u>
		Long	95° 33' N	Thailand
Co-ordinate	6	Lat.	09° 33' N	<u>Myanmar</u>
		Long	98° 05' E	Thailand

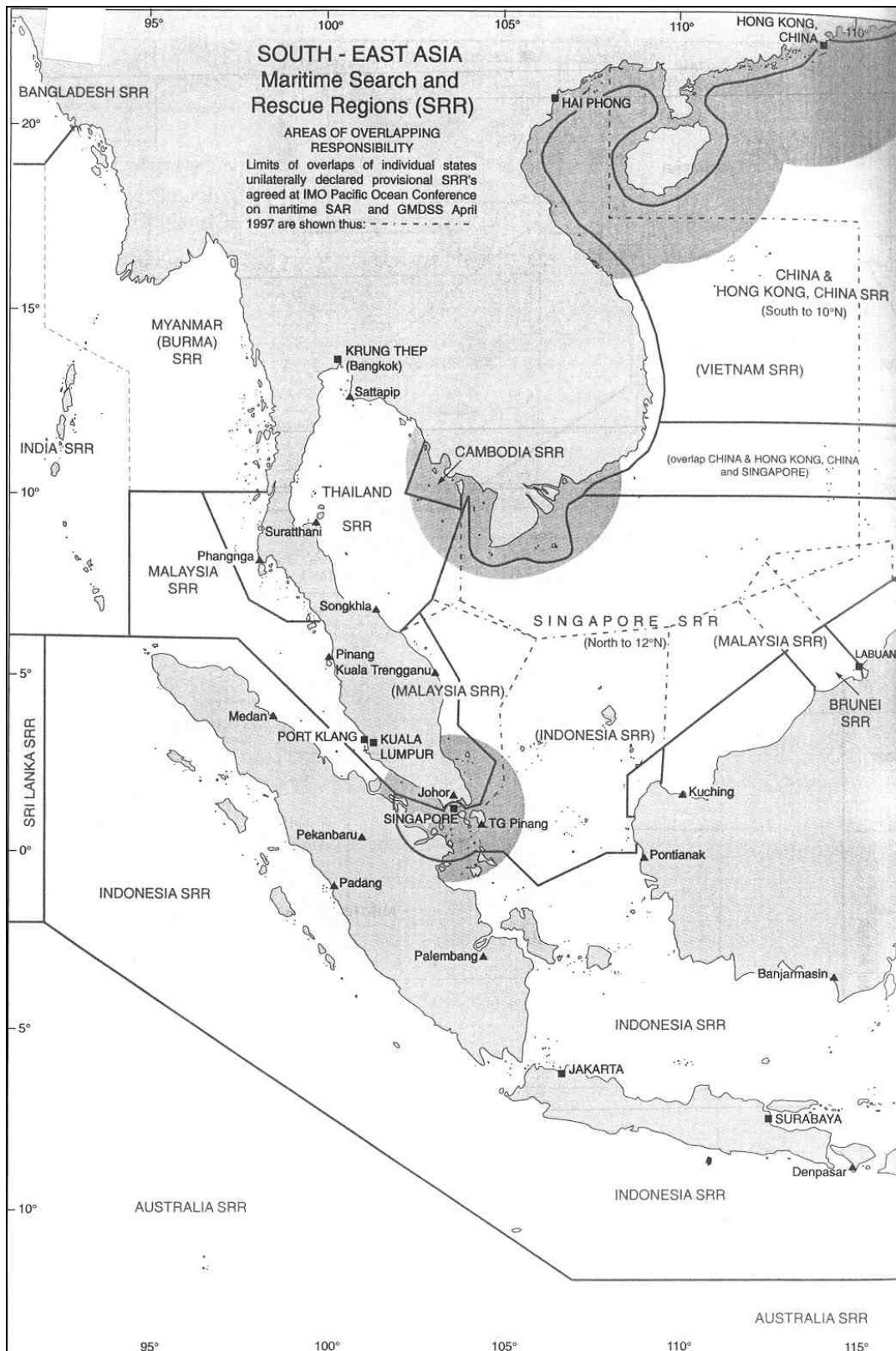
The above mentioned co-ordinates are only provisional unilaterally declared Maritime Search and Rescue boundaries. Myanmar has failed to attend the Indian Ocean Conference on Maritime Search and Rescue and also the GMDSS conference and according to this conference Myanmar need to reach agreement with the neighboring countries regarding delimitation of the SAR. The Conference was unable to reach agreement on the areas of responsibility for SAR purposes of countries in the region which did not attend and without prejudice to the rights of those states, accepted the delineation of provisional areas of responsibility. According to this conference Myanmar has to either approve or accept the limits recommended by the conference or seek bilateral agreements on any desired changes with neighboring states and to submit any amendments agreed to the Secretary-General of IMO. In this case the previously mentioned co-ordinates of SRR are well chosen and it is not necessary to seek further agreement

with neighboring countries. The Secretary General of IMO has to be informed.
(Figure 6 & 6A)



Source: Admiralty List of Radio Signals, Volume 5

Figure 6



Source: Admiralty List of Radio Signals, Volume 5

Figure 6A

5.4 Rescue Co-ordination Center (RCC)

A Rescue Co-ordination Center (RCC) is a unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region. Each SRR must have an RCC. A rescue Co-ordination Center is directly concerned with operational management and it is established for the purpose of directing search and rescue operations, which require:

- a detail plan capability to conduct the basis of the search and rescue operations
- arrangement for centralized information
- trained persons capable of directing and coordinating operations, and
- facilities and equipment for efficient conduct of operations

Each RCC is responsible for preparing a comprehensive plan for the conduct of SAR in its SRR. The plan must cover the whole SRR and be based on agreement between the SAR organization and those who provide facilities or services. The plan, address, telephone and telex number of the RCC and the description of its area of responsibility should be published in national or regional SAR documents. Appropriate parts of the plan should be provided to IMO for circulation to IMO members and interested parties.

The specific requirements of detail plan are given in International Aeronautical and Marine Search and Rescue Manual for Mission Co-ordination. The RCC should be located where it can effectively perform its functions within its area of responsibility. The most suitable place is it should be located close to a well-equipped center such as flight information center, which has the facilities of accommodation and general office equipment.

The staff of an RCC performs administrative and operational duties. The administrative duties are concerned with maintaining the RCC in a continuous state of preparedness. For areas of low SAR activity, these duties may be performed by the RCC chief or on a part time basis by SAR duty officers. The operational duties are concerned with the efficient conduct of a SAR operation or exercise and the responsibility of SAR mission coordinator (SMC).

Details of the equipment required by RCC is given in paragraph 2.3.10 of IAMSAR Chapter 2, which include communication and other equipment, plotting facilities, publications and stationary.

Details of the duties of the RCC chief, his staff and the SMC are given in paragraph 2.3.11 of IAMSAR Chapter 2.

5.4.1 Problems in Establishing a RCC in Myanmar

The designated Maritime Coordination Center (MRCC) and the Air Rescue Coordination Center (ARCC) of Myanmar are centered at Yangon. In Myanmar the search and rescue responsibility and related activity is undertaken by the Myanmar Navy. The Myanmar Navy is designated as the responsible authority for the SAR service. The RCC is not accordingly equipped to standards mentioned in the IAMSAR for effective search and rescue operations. The identification of the problems existing in the RCC can be described as follows;

- The lack of suitable effective communication equipment for direct communications in the maritime frequency bands and via the present available terrestrial communication services.
- The information and instructions in the RCC are out of date and lack relevant maritime information sources or internationally adopted guidelines for maritime SAR.
- Most of the responsible persons in SAR operation have no thorough knowledge about SAR procedures and functions and the staff are not adequately trained to perform duties in connection with maritime SAR.

The lack of communication capabilities put RCC in a difficult situation when communication is establish between the Myanmar Navy, Airforce, fishing department and other participating vessels from different organizations during search and rescue operations.

An effective rescue operation depends on quick response and immediate action for required assistance. It is required that RCC staff should have the full authority to carry out decisions concerning the requisition of appropriate resources in a distress situation along with the ordinary chain of command.

To achieve this the leading ministry in the National SAR Committee should decide upon this delegation of power. The committee could provide support and advise on regulations, budget, and training and allow evaluation of effectiveness. But they should allow the specially trained staff of the maritime RCC to manage on their own.

To develop a well equipped RCC needs financial supporting. The committee should look for other sources and organizations for available funds. Successful search and rescue operations cannot be carried out without an efficient RCC. There will be no efficient RCC without any funds and this is the most important issue to overcome, preceding all other important items related to SAR operations.

In the Union of Myanmar the most suitable body to be assigned overall responsibility of SAR operations is the Myanmar Navy. In this situation the Department of Marine Administration should be closely attached to the Myanmar Navy and give assistance concerning SAR and related IMO conventions such as UNCLOS, SOLAS and MARPOL and other legal matters. The close relation between Myanmar Navy and Department of Marine Administration is the key element for search and rescue operations, safety of life at sea, the safety of navigation and the protection of the marine environment. The staffs employed under Department of Marine Administration and Myanmar Navy possess nautical knowledge and seagoing experience. These staffs can be organized as a natural resource base for future employment as a maritime RCC.

The staffs from the Myanmar Navy and Myanmar Port Authority also share among them an overview of maritime safety matters. In a large-scale maritime distress situation they can participate as well as support teams of experts for dealing with various urgent matters such as cooperation with other government organizations involved and contact with the media.

In crucial matters the Director General of the Department of Marine Administration might support the RCC with additional staff or urgent decision making.

The number of staff to be employed in MRCC depends on normal working hours, workload and amount of other tasks to be performed when an action of urgency is not called for.

5.5 National Search and Rescue Organization

In most marine accidents the search for and identification of the distress signals are more or less essential and require assistance from different sources. Most developed countries have designated rescue organizations with fully equipped and trained persons for SAR operations. They also have voluntary services such as lifeboat associations and private vessels and aircraft which also assist in cases of emergency.

In the Union of Myanmar it is not enough to use the facilities of a designated SAR organization for search and rescue operations. It is necessary to gather resources for search and rescue from the other governmental organizations and to establish combine forces to perform the operations in a more effective way.

One important duty for the National responsible authority for SAR is to achieve an acceptable standard for pre-planning, amount of physical resources and number of trained personnel. As a result, it should prepare a close and good cooperation with other organizations which supply the rescue services with resources.

5.5.1 Proposal for the establishment of the National Search and Rescue Board

The establishment of a National Search and Rescue Board (NSRB) is the responsibility of the Government of the Union of Myanmar. The National Search and Rescue Board should be comprised of persons from the ministerial level of the Government. They include Ministry of Foreign Affairs, Ministry of Defense, Ministry of Transport, Ministry of Communications, Ministry of Interior and Ministry of Social Affairs. The objectives of the National Search and Rescue Board (NSRB) are;

1. to select the appropriate designated organization or the party for the SAR services
2. to set out the National Policy

3. to give guidelines, and
4. to assist the Search and Rescue Organization to execute the functions laid down by the (NSRB).

It is suggested that (NSRB) objectives should also be extended to cover the following recommendations;

- to develop adequate legislation and regulations
- to develop efficient and appropriate communication system
- to coordinate of resources
- to establish training the of RCC staff and personnel involved in SAR missions
- to develop national contingency planning

It can be foreseen that the Department of Marine Administration (DMA) should be given the authority and coordination responsibility for maritime SAR in Myanmar in conjunction with the National Search and Rescue Board, which is proposed to undertake search and rescue activities. With the support of the proper SAR legislation the DMA will be able to make all the urgent decisions and implement the necessary regulations. The DMA has the responsibility for giving guidelines and advisory assistance for the establishment of the SAR organization and contingency planning and to monitor the action taken by parties involved and recommend corrective measures whenever necessary.

The important objective is to get precise agreements from other government departmental authorities for their contribution of resources under the SAR organization and the extent and the nature of assistance. In the agreement for assistance, there must be a clear description of the facilities to be made available by the body concerned, their state of readiness, scope of the assistance to be provided, area within which assistance should be provided, designated official, and the reimbursement of costs incurred.

The following Governmental bodies can participate in SAR operations:

- Department of Marine Administration, Ministry of Transport.
- Civil Aviation Department, Ministry of Transport.
- Myanmar Port Corporation, Ministry of Transport.
- Myanmar Five Star Line, Ministry of Transport.
- Myanmar Fisheries Department, Ministry of livestock and Breeding.

- Private Fishing Vessels.
- Myanmar Customs Department, Ministry of Finance.
- Department of Meteorology and Hydrology, Ministry of Interior.
- Myanmar Oil and Gas Enterprise, Ministry of Energy.
- Myanmar Petroleum Enterprise, Ministry of Energy.
- Post and Telecommunication Department, Ministry of Telecommunication.
- Police Department, Ministry of Interior.
- Fire Department, Ministry of Interior.
- Myanmar Television and Broadcasting Service.

5.5.2 National Committee Objectives to improve SAR services

The committee objectives to improve and support the system by efforts are as follows:

1. Provide a standing national forum for the coordination of administration and operational SAR matters.
2. Provide an interface with other national and international organizations involved with emergency services.
3. Develop plans, policies, and manuals as appropriate aligned with national SAR plan.
4. Promote effective use of all available facilities for SAR.
5. Serve as a cooperative forum to exchange information and develop positions and policies of interest to more than one agency.
6. Promote close cooperation and coordination between civilian and military authorities and organizations for the provision of effective SAR operations.
7. Improve cooperation among aeronautical, maritime and shorebased SAR communities for effective maritime SAR service.
8. Determine ways to enhance the overall effectiveness and efficiency of maritime SAR services.

5.6 Proposed Organizational Structure of Search and Rescue Organization applicable to the Union of Myanmar

The organization applicable to the Union of Myanmar is based on the contribution of assistance from different agencies. The appropriate party designated for the SAR operations is the Myanmar Navy, which has the capabilities and resources to perform this task with the cooperation and assistance of the other Governmental Departments. The supreme authority of the SAR is the National Search and Rescue Board (NSRB) at the ministerial level and the SAR Organization comprises of Tactical Command (Myanmar Navy) MRCC, Tactical Command (Myanmar Air Force) ARCC, Regional Base Commander (SRC), and Rescue Units (RU). The commander of MRCC is the operational commander of all rescue services and is also Search and Rescue Mission Coordinator (SMC). The organizational structure of the Search and Rescue Organization in the Union of Myanmar is given in Figure-7 and the Alerting mechanism of Search and Rescue Operation in Union of Myanmar is given in Figure-7A.

The basic requirements of a SAR organization are the means of alerting, means of detect the ships and aircraft and persons in distress or potential distress and means of affecting their rescue. The Search and Rescue Region is subdivided into three areas and based on the hierarchy of importance.

Rescue Sub Centers (RSC) are strategically selected based on traffic, weather broadcasting coverage, navigational hazards and available facilities. The Maritime

Rescue Coordination Center (MRCC) and the Air Rescue Coordination Center (ARCC) are centered at Yangon. The ARCC is subordinated to the (MRCC) in the SAR operations.

SEARCH AND RESCUE ORGANISATION IN THE UNION OF MYANMAR

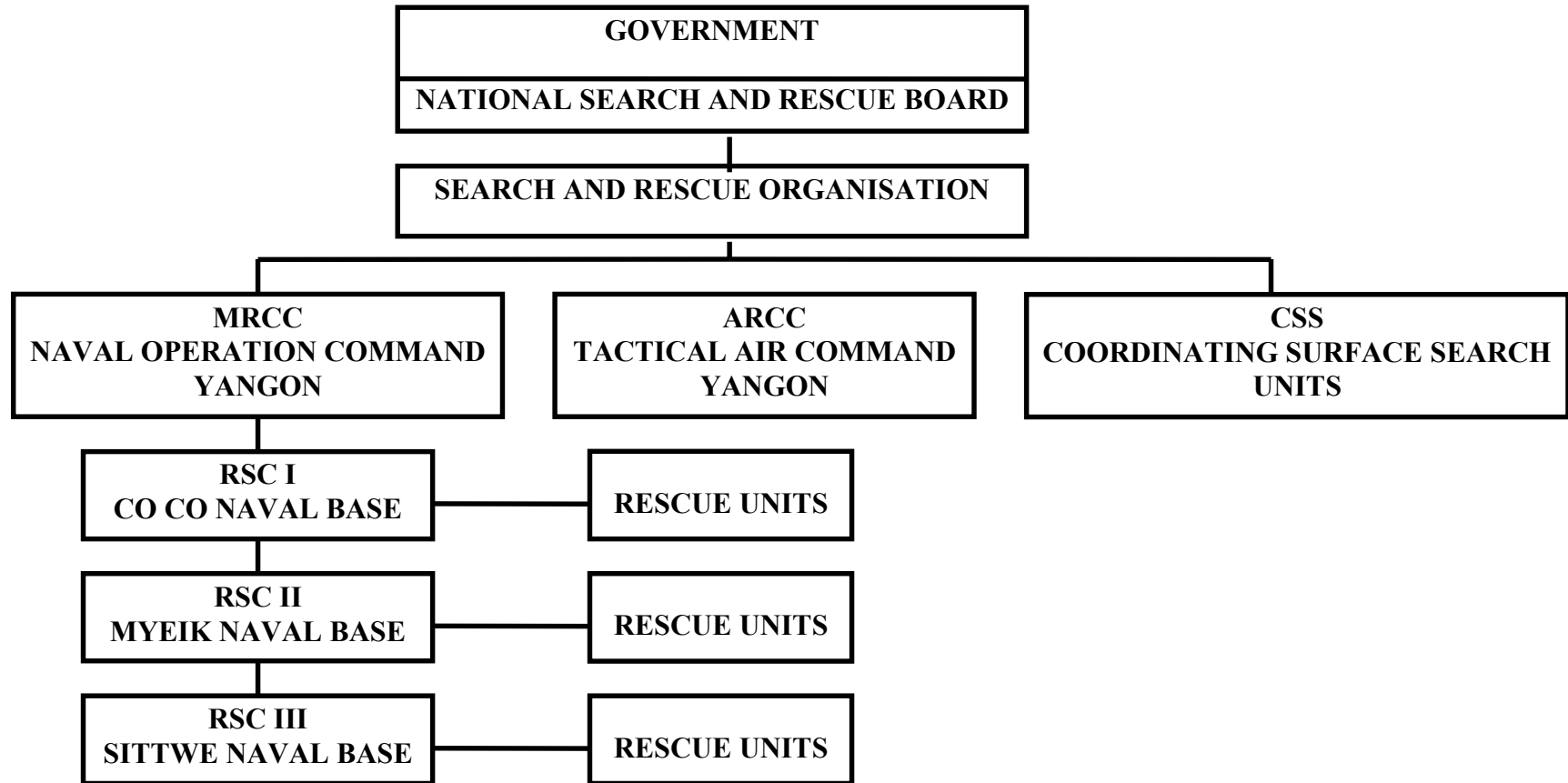


Figure 7

ALERTING MECHANISM OF SEARCH AND RESCUE OPERATION IN UNION OF MYANMAR

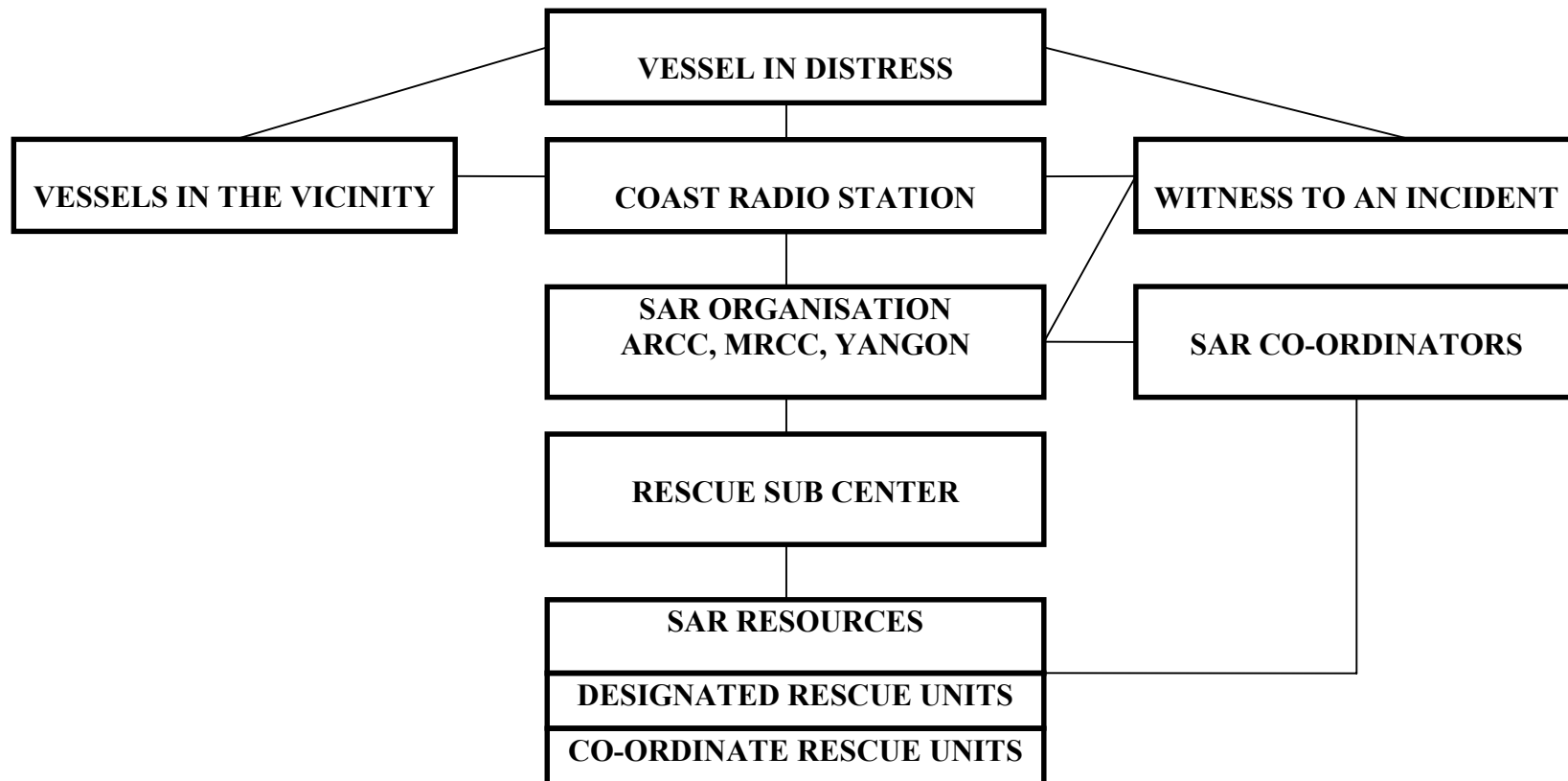


Figure- 7A

5.7 National Master Plan for SAR

As previously mentioned the Maritime Administration is responsible for the implementation and enforcement of the regulatory functions embodied in the national maritime legislation. The most important functions of the (MSA) are those intended to ensure the safety of life at sea, the safety of navigation and the protection of the marine environment. Under the safety aspect MSA has the responsibility for Maritime Search and Rescue and contingency planning can be both in coordinating role and a participating role.

In both cases the MSA needs to ensure that there is a national contingency plan and an organization to respond to the maritime distress situations in the waters of the state.

A SAR Master Plan should be developed so that the existing resources, which are divided among several government bodies, are made available in case of an emergency situation. The master plan, national or regional will not only list the available resources but also the communication and alerting systems and the training programs. The plan should consist of available sea going units, equipment, location, and communication means and telephone numbers.

5.7.1 The structure of the Search and Rescue Organization

Designated Authority - Myanmar Navy - Naval Operation Command (MRCC) Yangon jointly operates with Myanmar Airforce Tactical Air Command (ARCC Mingalardon).

Rescue Sub Centers

Rescue Sub Center I -	<u>Co Co</u> Naval Base (Base Commander) RSC I Rescue Unit
Rescue Sub Center II -	Naval Base <u>Myeik</u> (Base Commander) RSC II Rescue Unit
Rescue Sub Center III -	Naval Base <u>Sittwe</u> (Base Commander) RSC III Rescue Unit

In the event of an emergency the following commanding group will gather and give the necessary advice and assistance to the appropriate RSC base commander. For the joint search and rescue operations with neighboring countries the proposal should be first forwarded to the NSRB for approval and executed by the search and rescue organization.

Commanding Group

Naval Base Commander	MRCC	Myanmar Navy	SMC
Tactical Wing Commander	ARCC	Myanmar Air Force	Member
Nautical Advisor (search and rescue)	Department of Marine Administration		Adviser
Deputy Marine Superintendent	Myanmar Five Star Line		Adviser
Chief Engineer (Maritime Communication)	Post and telecom		Adviser
Chief of Police Forces	Police Department		Adviser

5.7.2 Proposal for the establishment and operation of RCC, RSC

The SRR under the Union of Myanmar's responsibility is subdivided into three areas. They are Area I, Area II and Area III for the RSC Centers. The position location of the RCC and RSC are carefully considered regarding the aeronautical facilities, communication, accommodation and other facilities required for the SAR operations. The MRCC and ARCC are centered in Yangon. The ARCC is provided with medium fixed wing aircraft of 400 nautical mile range with 2 hours on scene searching capacity. The fixed wing aircraft can be rapidly deployed to any RSC on short notice, provided that landing and refueling facilities are available. The RSCs are numbered on the basis of hierarchy of importance. The RSC I is centered on the Co Co Island (Lat. 14° 12' N Long 93° 23' E) which is about 226 nautical miles. South West of Yangon and it is strategically located on the international traffic lanes and is provided with extra long range radar station, air

strip and naval base of the Myanmar Navy. The RSC II is located at Myeik (Lat. 12° 25' N 98° 38' E) and is located North West of the Myeik (Mergui) archipelago and close to the south bound international traffic lane and is provided with landing and refueling facilities. The RSC III is situated at Sittwe (Lat. 20° 06' N Long 92° 50' E) which covers the North-Eastern Part of the Bay of Bengal and is facilitated with the Naval Base and local airport. The RCC and RSC have direct landline communications between them via microwave stations and also with the designated coast radio station Yangon Radio XYR.

The RSC I is located between the RSC II and RSC III and on request can provide back up SAR units to the contiguous RSC II and RSC III regions. The RCC and RSC have sufficient accommodation, plotting facilities and staff. The Naval operation commander is the chief of the RCC (SMC) and the base commander of the RSC is the chief of the RSC. The RCC and RSC have detailed plans for the conduct of SAR in the SRR. This plan covers the whole SRR and sub areas based on the agreements between the coordinated surface search facilities.

These plans address the methods of communicating, the conduct of joint actions, the use of joint facilities, methods for alerting the vessels at sea and aircraft en-route, list of emergency and survival equipment carried by ship and aircraft, methods of interpreting different systems used to specify a geographical position and converting them to a form appropriate to the SAR facilities.

The designated search and rescue units are composed of seagoing naval light cruisers and seagoing patrol vessels equipped with short-range helicopters and supporting fixed wing aircraft. The strategy of the SAR operations is that upon the distress call, responsible RSC shall send rescue units to the scene in conjunction with the fixed wing aircraft before the rescue units and coordinate surface search vessels arrive on the scene. It is also possible to get necessary assistance from the contiguous RSC for the backup assistance.

5.7.3 Coordinate Rescue Units

Coordinate rescue units are the surface vessels which are apart from the designated rescue units. The backbone of coordinate rescue units are the coastal and foreign going vessels from the stateowned shipping companies. Most of these vessels are modern and are equipped with electronic navigation aids, efficient communication systems and are manned by experienced crews. In addition, departmental vessels from the Port Corporation, Myanmar Customs, Myanmar Petroleum Enterprises, Myanmar Oil and Gas Enterprises and Myanmar Fisheries Department can also be used as coordinate surface search units.

5.8 Maritime Rescue Co-ordination Center (MRCC)

By the requirement of the International Convention on Maritime Search and Rescue and ICAO Annex 12 that SAR providers should establish RCC for each SRR. Aeronautical SAR responsibility may be met by means of an aeronautical RCC (ARCC). It is recommended that more benefits will be obtained if ARCC and MRCC are kept separate but still co-ordinate and cooperate under the National Search and Rescue Board. In this way two different modes are created and the highest possible degree of performance and an effective cooperation function can be achieved.

Coastal states with the added responsibility for maritime SAR incidents can meet this with a maritime RCC (MRCC).

5.8.1 MRCC location

As mentioned earlier the RCC at present has a lack of proper equipment and well-trained personnel to perform effectively as a MRCC. Taking into account that availability of staff members which have good nautical and maritime affairs experience it is recommended that the MRCC should be placed under Naval Command Office. The Myanmar Naval command HeadQuarters is located at Syriam Point. The reason to choose the Myanmar Naval command HeadQuarters as RCC is not only for the strategic location but also as it is close to the

Department of Marine Administration and Harbor Office which can offer assistance when an emergency occurs.

When establishing a MRCC there are two basic provisions to be taken into account namely,

- communication capability
- supply of manpower

When considering the communication capability the main objective is the communication with ships. In this respect the implementation of the new SOLAS requirement in Chapter IV concerning ship radio communications equipment and the GMDSS has to be considered.

A MRCC may operate without having a direct communications link with ships in distress or with an onscene commander (OSC), but it should be provided with its own radio communications means. Fast delivery of alert messages to the RCC responsible to respond to a distress alert is crucial for successful rescues. So MRCC should have communication equipment operable on terrestrial and Inmarsat systems.

(The proposal and applicable communication system was mentioned earlier in this chapter).

5.8.2 MRCC Legal Support

A Distress call has priority over all other communications. A Coast radio station needs to pay attention mainly to distress alerts regardless of its commercial main objectives.

The monitoring of distress frequencies has a long standing as the most important task of a coast radio station. As a consequence, the importance of distress monitoring should be reflected in a legal system of the country, whereby the priority of distress calls monitoring, and not only distress communication, is ensured. It is proposed that the existing radio communications networks in the maritime sector should be made available in an emergency by priority regulations.

5.8.3 The Objectives of MRCC

The main objectives of a MRCC may be defined as follows;

- respond to distress calls
- advise to ships in distress situations
- alert of appropriate SAR units and organizations such as police, hospitals etc.
- appoint OSCs
- Cooperate with other MRCCs
- keep records of actions taken in distress cases

5.8.4 Proposal for MRCC

Taking into account the present situation, the mentioned alternatives and the objectives, the proposal for MRCC is to be placed under supervision and staffing by Myanmar Naval Command Post, which is located at Syriam Point in cooperation with the Department of Marine Administration and Myanmar Port Authority. (Syriam Point is located within the Myanmar Port Area).

5.8.5 Maritime Rescue Sub Centers (MRSC)

As mentioned earlier SRR is subdivided into (3) area locations, namely

- Rescue Sub Center I - Co Co Naval Base
- Rescue Sub Center II - Naval Base Myeik
- Rescue Sub Center III - Naval Base Sittwe

These RSCs are under the supervision of the respective Naval Base Commander.

(See paragraph 5.7.2 for location and functions).

The MRSC may have an important role in a distress situation if its staff has a good geographical knowledge of the area of responsibility and a well-established contact net with cooperating organizations and individuals.

5.9 Communication and alerting system

Necessary communications for SAR may include telephones, radios operating on international distress frequencies, long range terrestrial and satellite systems and other equipment, depending upon geography, the capabilities of mobile facilities within the area, and other factors affecting the ability of persons to contact each other.

As mentioned earlier, two (VHF-DSC) Coast Radio Station in Yangon and Myeik are already installed and now functioning. The Government has planned to accomplish the setting up of VHF-DSC and MF-DSC coast stations to cover sea areas A1 and A2 along the Myanmar Coast. The VHF-DSC stations should be established so that some coast stations become part of the Rescue Sub Centers already mentioned.

The other landline and cellular telephone system should be developed between RCC, RSCs and RUs to receive prompt alerts directly and quickly. The land-originated alerts should be done through telephone directly to the MRCC. It is important that the SAR controller can speak directly to a person who might have information, which is vital to the mission on hand.

The development of a landline or cellular telephone system supports the possibility for direct and easy communications between the public and between the different authorities. A national alert number should be established and the public should be informed. This is to ensure that all RSCs should have similar communication capabilities as RCC.

It is essential that all who may be involved with SAR should be provided with communications procedures, frequencies and equipment sufficiently compatible to carry out their duties.

5.10 The proposal for MRCC equipment and staff

This proposal is only an example of a typical MRCC. However, when implementing RCC consideration must be given to existing physical, technical, personal and finance resources.

5.10.1 Layout

- The operation room should be large enough to accommodate staff, communication and office equipment. It should be located centrally and surrounded by auxiliary rooms that can be used by experts who may be called in to advise in major operations and to provide additional space when dealing with more than one case or for other purposes such as staff meetings, debriefings or training sessions and for filing spaces.
- Large-scale wall charts showing assigned SRRs and location of resources and SAR facilities listed in the SAR plan. The Chart or Map should also show areas adjacent to SAR.
- A status board listing the SAR resources showing the current status of all SAR facilities, telephone numbers and other useful information. A computer can be used to call a computer file reflecting the current status of all SAR facilities.
- An action board showing details of search objects, search areas, findings and other relevant information and full chart and map coverage of the SSR and surrounding areas should be provided, including all available large scale charts, aeronautical charts, plans and plotting equipment. Publications, including navigation and pilot books should be supplied.

5.10.2 Equipment

The MRCC should have at least two operator consoles where the following communication systems could be operated;

- Maritime VHF Channel 16 at least two simplex channels for SAR operations and all duplex channels used by Coast Radio Station. A VHF/DSC channel 70 for monitoring and acknowledging of distress calls.
- Maritime MF: All frequencies including 2187.5 MHz with DSC for monitoring and acknowledging of distress calls.
- Aeronautical VHF: 121.5/243 MHz and 123.1 MHz.
- Telephone lines with instant access to the international network, to be used for alerting SRUs or contact with other MRR/ARCC associated CRSs, LUTs terminal in the COSPAS/SARSAT system, CES, meteorological centers, related authorities etc. In addition to telephone lines with published numbers, one telephone line should have unlisted, confidential numbers to ensure the viability of one out going line in situations where there are many incoming telephone calls.
- If the cost incurred is within the reach of the budget a MRCC should be installed with Inmarsat CES or ship earth station (SES). Today the price of GMDSS equipment are becoming lower and is affordable to purchase.
- Tape recorder for documentation of all radio traffic on channel 16, 121.5/243 MHz, SAR operations channels and telephone calls on alert/emergency numbers.

In addition, the MRCC should be supplied with the following equipment.

- Telefax with instant access to the international network
- Telex with instant access to the international network, and
- Computer with the following utilities
 - Calculation of search datum, search areas, search planning etc.
 - Staff administration
 - SAR Log:

5.10.3 MRCC personnel

The minimum requirement of SAR personnel to be appointed in MRCC is as follows,

- 1 MRCC Chief
- 1 Deputy Chief
- 6 SAR mission controllers
- 6 Assistant SAR mission controllers
- 6 Communication Officers

Manpower is calculated on the basis of operational duties 24 hours per day.

The number of personnel required will vary with local requirements, traffic density, seasonal conditions, meteorological conditions and other SRR conditions.

When needed urgently additional staff could be used from the Myanmar Navy, The Department of Marine Administration and Myanmar Port Authority.

The MRCC personnel should be selected from

- Merchant Marine or Navy Deck Officers
- Marine Pilots
- Radio Officers

5.11 Personnel Training Needs

The Training should be centered on three main elements; personnel, communication and hardware (transport/equipment). Even though there is sophisticated and advanced equipment, it cannot be fully utilized without properly trained personnel. Training alone can only provide basic knowledge and skills. Many SAR organizations realized this important matter and many have developed training facilities to meet these needs.

5.11.1 Training Programs

An individual, a group or multiple groups may be trained. Each person should have had previous training to perform individual tasks. RCC and RSC watch standers usually need formal SAR training. According to the IAMSAR Manual the training program should comprise the followings,

- study of the application of SAR procedures, techniques and equipment through lectures, demonstrations, films and SAR manuals and journals;
- assistance in or observing actual operations; and
- exercises in which personnel are trained to co-ordinate individual procedures and techniques in simulated operations.

No SAR training program exists in Myanmar. There are many organizations in other countries that provide training for foreign nationals. In this chapter the author suggests the training program of the National Maritime Administration of Sweden.

The course program could be organized and conducted at the Institute of Marine Technology in Myanmar. The details of the courses can be described as follows.

Master and Crew of SAR

- Basic SAR 2 weeks
- First Aid 1 week

Master of SAR

- On Scene Commander (OSC) 1 week

SAR Coordinators

- Basic MRCC/MRSC course 3 weeks
- Advanced MRCC course 7 weeks
- Refreshment MRCC/MRSC course 2 days every year.

The courses should preferably be offered free of charge to all organizations to support a rapid development of SAR services.

The staff of the MRCC should preferably be trained by a competent MRCC operator before starting work in the MRCC.

5.11.2 Proposed outline for some of the SAR courses (Sweden)

Course outline basic MRCC/MRSC

• SAR organization	2 hours
• Navigation	4 hours
• Communication	4 hours
• Communication, exercises	6 hours
• Search and Rescue, manual and Computerized	16 hours
• SAR games	20 hours
• MRCC/MRSC operational procedures	14 hours
• Review and evaluation	4 hours
• Final test	4 hours
• Navigation	2 hours
• Navigation, exercises	18 hours
• SAR equipment	2 hours
• Safety and survival equipment	4 hours
• Search procedures	8 hours
• SAR exercise	4 hours
	Total 112 hours

Course outline, advanced MRCC/MRSC

• International SAR organization	4 hours
• National SAR organization	6 hours
• Mobile and fixed rescue units	4 hours
• SAR equipment	3 hours
• Communication	4 hours

• Ship reporting systems	2 hours
• National and International Operational procedures	43 hours
• Emergency phases	14 hours
• Interview and interrogation Technique	10 hours
• Documentation	11 hours
• Stress and stress factors	4 hours
• Leadership and moral	9 hours
• Media relations	18 hours
• Search and Rescue “on scene” planning	40 hours
• On scene procedures	33 hours
• Search procedures	11 hours
• Rescue procedures	10 hours
• Cooperating rescue service	8 hours
• Dangerous cargo and hazardous	13 hours
• Medical aspects	4 hours
• SAR games	32 hours
• Study tours	16 hours
• Final test	8 hours
• Evaluation	5 hours
	Total 312 hours

Course outline Basic SAR

Week 1 - Theoretical

• SAR organization	2 hours
• Cooperation with other Rescue services	1 hour
• Mobile and fixed SAR-units	2 hours
• Communication	4 hours
• Operational procedures in MRCC/MRSC	2 hours

• Operational procedures “on scene”	2 hours
• Helicopter assistance	1 hour
• SAR-English	1 hour
• SAR-game	4 hours
• Safety and survival equipment	6 hours
• Dangerous cargo	3 hours
• Stability and Safety Systems on Ferries and cargo vessels	6 hours
• SAR - equipment	6 hours
• Survival exercise	<u>4 hours</u>
	Total 44 hours

Week 2 - Practical

• Search planning and search technique day and night optically and electronically	9 hours
• First aid and hypothermia	8 hours
• Towing as a SAR - Technique	1 hour
• SAR exercise	4 hours
• search	
• homing	
• radar search	
• towing	
• Helicopter rescue	2 hours
• SAR exercises	10 hours
• Coast Guard dangerous cargo Salvage Organization	2 hours
• Evaluation	<u>2 hours</u>
	Total 38 hours

Course outline SAR- OSC

• SAR organization	1 hour
• Cooperation with other rescue	2 hours
• Cooperation with other countries services	1 hour
• Operational procedures, SAR-services MRCC/MRSC	2 hours
• Communication	2 hours
• Operational procedures, OSC	5 hours
• SAR - games	14 hours
• SAR - resources	2 hours
• Leadership	2 hours
• SAR - case study	3 hours
• Evaluation	2 hours
	<hr/>
	Total 36 hours

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

As long as the oceans exist seafarers are facing risks and at anytime there may be a call from any corner of the oceans for help. All coastal states need to be prepared to rendering immediate assistance.

It is the very important duty as required by SOLAS 74 Convention, to secure the above activities and to strengthen maritime safety and a SAR system through a well-planned and coordinated system which will centrally monitor and control all maritime safety and SAR resources. As a party to SOLAS 74 Myanmar is bound to do this.

Indeed, Myanmar is keen to offer this services by coordinating with neighboring countries and put every effort into becoming a party and implement the SAR 79 Convention. Although a SAR organization does not exist today the implementation of the proposals in this paper will put Myanmar in an eminent position to afford a SAR capability.

The implementation of SAR organization will not only benefit the people working at sea but also enable Myanmar to contribute to the SAR efforts of the region and provide assistance to neighboring countries, such as India, Bangladesh and Thailand in search and rescue matters.

According to the Indian Ocean Conference on Maritime Search and Rescue and the GMDSS, the provisional SAR plans for all the world's 13 SAR areas were completed when plans for the Indian Ocean were finalized at a conference held in Fremantle, Western Australia in September 1998.

However, there are requirements for joint collaboration and sharing of information in the region. As one of the members of the Indian Ocean Search Region, Myanmar wishes to establish search and rescue agreements with neighboring states regarding the pooling of facilities, establishment of common procedures, developing of communication channels and exchange of search and rescue information.

Therefore, it will be beneficial to all concerned if information sharing and mutual assistance is developed in the area.

One of the problems in developing countries is the financing of SAR operations.

In the Union of Myanmar the SAR operation should be under the Defense budget and it will not incur substantial extra costs for Naval vessels as they patrol Myanmar's waters on regular routine duties and the same comment applies to fixed wing airforce aircraft. Expenses for the other coordinating surface vessels are covered by their insurance, as a deviation from the route for the reason of giving assistance to another vessel or the persons in distress is justifiable in any kind of insurance policy.

Search and rescue operations not only involved with the Naval personnel but also the personnel from various organizations, especially personnel from the Maritime Administration. Their primary objective is to set up proper national legislative system and to give legislative and technical advice to various departments related with SAR matters.

Successful search and rescue operations are wholly depend on the efficiency of these personnel and training is also major concern in implementation in SAR and GMDSS.

Finally, the author wishes to submit the SAR organization, which is practicable and suited for the Union of Myanmar has to develop as soon as possible so as to fulfil the obligations under the SOLAS 74 and SAR 79 Conventions.

2. Recommendations

It is the primary important that Myanmar needs to accept the delineation of provisional areas of responsibility for the purpose of search and rescue, which was proposed during the Indian Ocean conference on Maritime Search and Rescue and the GMDSS held in Fremantle, Australia in September 1998.

Efficient communication is a key element for SAR operations and without it successful SAR operations cannot be carried out. Myanmar submitted the proposed sea Area as A1 and A2 to IMO. Establishment of facilities in these areas is and obligation on Parties to SOLAS, which states that Parties will “make available” appropriate shore based radio facilities.

The implementation of the GMDSS and establishing of CRS in Myanmar is far behind schedule and the National Search and Rescue Board should take action on this matter as one of the primary importance related to SAR activities and progress of this issue. The Government has to seek the necessary funds from international organizations and from other sources concerning the development of search and rescue facilities in the India Ocean. It should not be overlooked that RCC or RSC may have the communication capability itself to carry out SAR response communications.

The maritime SAR organization should be developed in the following ways,

1. The legislation to be set up to support Maritime Search and Rescue related matters. There is no formalities, ordinances or degrees to support the RCC when requirement units and manpower in emergency cases need to be addressed.
2. There should be allocation of power to call for exercises including personnel from other governments or private organizations.
3. The National master plan/contingency plan should be developed mentioning current available units such as boats, aircraft and equipment. That means utilization of equipment from other governmental organizations such as Myanmar Navy, Myanmar Airforce, and Myanmar Port Authorities in case of emergency.
4. To find agreements in the sub region with neighboring states concerning cooperation in major SAR operations and exercises. The National Search and Rescue board should make operational plans and arrangements for search and rescue cooperation and coordination with responsible authorities of other states.

5. The National Search and Rescue Board should establish procedures of search and rescue services in order to ensure the coordinated use of available facilities and establish close cooperation between participating authorities, which may contribute to improving SAR in areas such as operations, planning, training, exercises and research and development.
6. The head of the SAR organization has the responsibility to ensure that SAR personnel have a high level of competency by establishing an adequate training program in order to obtain an international acceptable standard. It is recommended that the instructors for the training program should be trained either abroad in a country with developed SAR organization or in Myanmar by instructors well known to IMO standards to assist in implementing the program in Myanmar.
7. The basic communications equipment located in MRCC under Naval command should be used solely for SAR purposes.
8. The National Search and Rescue Board should arrange to send representatives to attend seminars and workshop meetings developed by IMO. In this connection it is advisable for Myanmar in consultation with IMO, to participate in the above activities to get the necessary technical assistance and facilities to promote the SAR operations at national and regional levels.
9. The 1979 SAR convention and all relevant International Conventions should be ratified and implemented through the maritime SAR organization.

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Appendix 1

INTERNATIONAL MARITIME
ORGANIZATION



COMSAR 3/9/14
28 November 1997
Original: ENGLISH

SUB-COMMITTEE ON
RADIOCOMMUNICATIONS AND SEARCH
AND RESCUE
3rd session
Agenda item 9.2

MATTERS CONCERNING SEARCH AND RESCUE, INCLUDING THOSE RELATED TO THE 1975 SAR CONFERENCE AND THE INTRODUCTION OF THE GMDSS

Co-operation between passenger ships and SAR services

Note by Denmark, Finland, France, Germany, Iceland, the Netherlands,
Norway, the Russian Federation, Sweden and the United Kingdom

SUMMARY

<i>Executive summary:</i>	Draft guidelines for preparing plans for co-operation between passenger ships and SAR services in accordance with SOLAS regulation V/15(c)
<i>Action to be taken:</i>	Paragraph 7
<i>Related documents:</i>	COMSAR 2/13, MSC 68/23

- 1 On 1 July 1997 the new SOLAS regulation V/15(c) entered into force which requires that

"Passenger ships to which chapter I applies, trading on fixed routes, shall have on board a plan for co-operation with appropriate search and rescue services in event of an emergency. The plan shall be developed in co-operation between the ship and the search and rescue services and be approved by the Administration. The plan shall include provisions for periodic exercises to be undertaken as agreed by the passenger ship and the search and rescue services concerned to test its effectiveness."
- 2 The Sub-Committee, at its second session (COMSAR 2/13, paragraph 12.9) agreed that there is a need to develop guidelines for preparing plans for co-operation between passenger ships and SAR services. At the same time it invited the Maritime Safety Committee to authorise it accordingly; members were requested to consider the matter and to submit comments and proposals on it.
- 3 The Maritime Safety Committee, at its sixty-eighth session (MSC 68/23, paragraph 20.38) authorised the Sub-Committee to develop, on a low priority basis, guidelines for co-operation between passenger ships and SAR services.
- 4 Representatives of Administrations, SAR services and passenger ship operators of almost all north and north-west/northwest European port States (Belgium, Channel Islands, Denmark, Finland, France, Germany, Isle of Man, Ireland, Lithuania, Netherlands, Norway, Poland, Portugal, Spain, the United Kingdom and Sweden) met at Bremen on 10 January and 21 March 1997 and at Plymouth on 15 April 1997 to achieve a necessary general understanding on the harmonized introduction of the plans for co-operation between passenger ships trading on fixed routes between any of their ports and relevant SAR services in the sea areas concerned.

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Appendix 2

INTERNATIONAL MARITIME
ORGANIZATION



IMO

MSC 69/3/1
18 September 1997
Original: ENGLISH

MARITIME SAFETY COMMITTEE

69th session
Agenda item 3

CONSIDERATION AND ADOPTION OF AMENDMENTS TO MANDATORY INSTRUMENTS

Amendments to the 1979 SAR Convention

Note by the Secretariat

SUMMARY

<i>Executive Summary:</i>	The Committee is invited to adopt proposed amendments to the 1979 SAR Convention. The amendments were approved by MSC 68 and circulated by circular letter No. 1993 of 1 September 1997
<i>Action to be Taken:</i>	Paragraph 3
<i>Related documents:</i>	MSC 68/23, annex 2 and circular letter No. 1993 of 1 September 1997

1 The Committee will recall that, at its sixty-eighth session, it approved, with a view to adoption at its sixty-ninth session, proposed amendments to the annex of the 1979 SAR Convention.

2 The proposed amendments have been circulated to all IMO Member Governments and Parties to the 1979 SAR Convention under cover of circular letter No. 1993 of 1 September 1997.

Action requested of the Committee

3 The Committee is invited to consider the proposed amendments, annexed hereto, for adoption in accordance with article III(2)(c) of the 1979 SAR Convention.

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Appendix 3

Attachment I

International Conventions on Maritime Search and Rescue

Annex

Chapter 1 Terms and Definitions

This chapter updates the original chapter 1 of the same name.

Chapter 2 Organisation and Co-ordination

This Chapter deals with the basic structure of a search and rescue organisation. This chapter replaces the 1979 Chapter 2 on organisation. The Chapter has been redrafted to make the responsibilities of Government clearer. It requires Parties, either individually or in co-operation with other states, to establish basic elements of a search and rescue service, to include,

- Legal framework
- Assignment of a responsible authority
- Organisation of available resources
- Communication facilities
- Co-ordination and operational functions
- Processes to improve the service, including planning domestic and international co-operative relationships and training.

Parties should establish search and rescue region within each sea area with the agreements of the Parties concerned. Parties than accept responsibility for providing search and rescue services for a specified area. The Chapter also describes how SAR services should be arranged and national capabilities are developed.

Parties are required to establish rescue co-ordination centres (RCCs) and to operate them on a 24-hour basis with the trained staff who have a working knowledge of English.

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Parties are also required to “ensure the closest practicable co-ordination between maritime and aeronautical services”.

Chapter 3 Co-operation between States

Replaces the original Chapter 3 on Co-operation. It requires Parties to co-ordinate SAR organisations and where necessary, SAR operations with those of neighbouring states. The Chapter states that unless otherwise agreed between the states concerned, a Party should authorise subject to applicable national laws, rules and regulations, immediate entry into or over its territorial sea or territory for rescue units of other Parties solely for the purpose of SAR.

Chapter 4 Preparatory Measures

The chapter says that each RCC and RSC (rescue sub centre) should have up-to-date information on search and rescue facilities and communications in the area and should have detailed plans for conduct of SAR operations. Parties – individually or co-operation with others should be capable of receiving distress alerts on a 24-hour basis. The regulations include procedures to be followed during an emergency and state that SAR activities should be coordinated on scene for the most effective results. The Chapter says that “Search and Rescue operations shall continue when practicable, until all reasonable hope of rescuing survivors has passed”.

Chapter 6 Ship reporting systems

This chapter deals with recommendations on establishing ship-reporting systems for search and rescue purposes. Parties to the convention are encouraged to establish ship-reporting systems so that coast stations can make contact with ships and locate their positions. This enables the interval between the loss of contact

Appendix 3

with a vessel and the initiation of search operations to be reduced. It also helps to permit the rapid location of vessels, which can pass message of require assistance including medical help. The technical requirements of the SAR Convention are contained in an Annex. The Parties to the Convention are required to ensure that arrangements are made for the provision of adequate SAR services in their coastal waters.

Appendix 4

Attachment II

Resolutions adopted by the Conference

Resolution 1. States are urged to co-ordinate all SAR services including those for aeronautical purposes. IMO is invited to continue to work closely with ICAO to harmonise aeronautical and maritime SAR plan procedures.

Resolution 2. It is recommended that States should arrange that participation in such systems should be free of message cost to the ships concerned.

Resolution 3. IMO is invited to develop an internationally agreed format for ship reporting systems.

Resolution 4. The resolution encourages the active use of the MERSAR and IMOSAR manuals.

Resolution 5. The resolution urges the allocation of one frequency for use exclusively for distress and safety purposes in the 4,6, 8, 12 and 16 MHz maritime mobile bands using A3J class of emission for use in all ITU regions, the use of digital selective calling should be permitted on these frequencies.

Resolution 6. IMO is invited to develop global maritime telecommunication system for distress and safety purpose, which will support the SAR plan prescribed in the convention.

Resolution 7. IMO is invited to work closely with the World Meteorological Organisation (WMO) to explore the practicability of harmonisation the areas of maritime meteorological forecasts and warnings with SAR regions.

Resolution 8. States are urged in consultation with and assistance of IMO to support sates requiring technical assistance for training personnel in SAR and for the acquisition of SAR equipment and the development of SAR facilities.

Appendix 5

Ap 3

Resolution A.801(19)

adopted on 23 November 1995
(Agenda item 10)

PROVISION OF RADIO SERVICES FOR THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO that regulation IV/5 of the International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended in 1988, requires each Contracting Government to undertake to make available, either individually or in co-operation with other Contracting Governments, as they may deem practical and necessary, appropriate shore-based facilities for terrestrial and space radio services having due regard to the recommendations of the Organization,

RECALLING FURTHER that the Inmarsat system provides for radiocommunication services, including those for distress and safety, utilizing geostationary satellites in the 1.5 and 1.6 GHz band,

NOTING that the COSPAS-SARSAT system provides for the reception of distress alerts on the frequency 406 MHz utilizing polar orbiting satellites,

NOTING ALSO that regulation IV/5 of the 1974 SOLAS Convention requires the following radio services to be provided:

- a radiocommunication service utilizing geostationary satellites in the maritime mobile satellite service,
- a radiocommunication service utilizing polar orbiting satellites in the mobile satellite service,
- the maritime mobile service in the bands between 156 MHz and 174 MHz,
- the maritime mobile service in the bands between 4,000 kHz and 27,500 kHz, and
- the maritime mobile service in the bands 415 kHz to 535 kHz and 1,605 kHz to 4,000 kHz,

NOTING FURTHER that the provision contained in paragraph 5.1.1 of the annex to the International Convention on Maritime Search and Rescue, 1979, requires that Parties shall ensure that such continuous radio watches as are deemed practicable and necessary are maintained on international distress frequencies,

TAKING INTO ACCOUNT the resolutions of the World Administrative Radio Conference for Mobile Services, 1987, in particular resolution 331(Mob-87) relating to the introduction of provisions for the global maritime distress and safety system (GMDSS) and the continuation of the existing distress and safety provisions, and resolution 322 (Rev.Mob-87) relating to coast stations and coast earth stations assuming watchkeeping responsibilities on certain frequencies in connection with the implementation of distress and safety communications for the GMDSS,

TAKING INTO ACCOUNT ALSO resolution 3, Recommendation on the Early Introduction of the global maritime distress and safety system (GMDSS) Elements, adopted by the 1988 GMDSS Conference,

Resolution A.801(19) – 163

Appendix 6

ANNEX 10
Page 13

Resolution No. 3

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

The 1998 Fremantle Conference on Maritime Search and Rescue (SAR) and the Global Maritime Distress and Safety System (GMDSS),

RECALLING Resolution 6 of the International Conference on Maritime Search and Rescue, 1979, which invited the International Maritime Organization (IMO) to develop a global maritime distress and safety system that would include telecommunication provisions for the effective operation of the search and rescue plan prescribed by the Annex to the International Convention on Maritime Search and Rescue, 1979,

NOTING that IMO has developed a global maritime distress and safety system, by means of amendments to the International Convention for the Safety of Life at Sea (SOLAS), 1974, which entered into force on 1 February 1992 and uses Inmarsat and COSPAS-SARSAT satellite systems as well as digital selective calling, direct-printing and radiotelephone on terrestrial MF and HF frequencies for distress and safety purposes including those for search and rescue,

NOTING FURTHER that the World Administrative Radio Conference for Mobile Telecommunications, 1987, adopted amendments to the Radio Regulations and that the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974, in 1988 adopted amendments to the 1974 SOLAS Convention to introduce the global maritime distress and safety system,

BEING CONCERNED over the high number of false distress alert incidents which undermine the credibility of the GMDSS and unnecessarily overstress the SAR organizations,

CONSIDERING the need for shore-based facilities to introduce the system in the Indian Ocean region,

CONSIDERING ALSO IMO Assembly resolution A.814(19) - Guidelines for the avoidance of false alerts,

1. URGES all coastal States in the Indian Ocean region to take account of the GMDSS in any national plans to improve maritime radiocommunications or their SAR organization and to communicate details of such plans to IMO;
2. INVITES the Maritime Safety Committee of IMO to:
 - (a) consider how to develop a single registration database for GMDSS equipment users which rescue co-ordination centres may readily access to support search and rescue operations;
 - (b) consider further appropriate measures to eliminate false distress alerts;
 - (c) encourage States operating MRCCs associated with Inmarsat coast earth stations to ensure that suitable arrangements are in place to relay Inmarsat distress alerts to all responsible MRCCs within the service area of the respective coast earth stations;
 - (d) encourage States operating MRCCs to establish means of direct communication between all MRCCs in the region/area;

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