ORGANIZATION AND MANAGEMENT

Volume I

ORGANIZATION AND MANAGEMENT

2008 Edition

IAMSAR MANUAL
International Aeronautical and Maritime Search and Rescue Manual

ELECTRONIC EDITION

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INTERNATIONAL
MARITIME
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IAMSAR Manual

INTERNATIONAL AERONAUTICAL AND MARITIME SEARCH AND RESCUE MANUAL
Volume I
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Foreword

The primary purpose of the three volumes of the *International Aeronautical and Maritime Search and Rescue Manual* (IAMSAR Manual) is to assist States in meeting their own search and rescue (SAR) needs, and the obligations they accepted under the Convention on International Civil Aviation, the International Convention on Maritime Search and Rescue and the International Convention for the Safety of Life at Sea (SOLAS). These volumes provide guidelines for a common aviation and maritime approach to organizing and providing SAR services. States are encouraged to develop and improve their SAR services, co-operate with neighbouring States and to consider their SAR services to be part of a global system.

Each volume of the IAMSAR Manual 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 Manuals, as a means to attain a full view of the SAR system.

The *Organization and Management* volume (volume I) discusses the global SAR system concept, establishment and improvement of national and regional SAR systems and co-operation with neighbouring States to provide effective and economical SAR services;

The *Mission Co-ordination* volume (volume II) assists personnel who plan and co-ordinate SAR operations and exercises; and

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

Organization and Management Manual

Chapter 1 presents an overview of the SAR concept, including what is involved in providing SAR services, and why such services are required and beneficial. The SAR system is examined from a global, regional and national perspective.

Chapter 2 introduces some of the key components of the SAR system. These include communications, rescue co-ordination centres and sub-centres, operational and support facilities and the on-scene co-ordinator.

Chapter 3 considers the use of training, qualification, and certification processes to develop professionally competent SAR personnel. A number of aspects of training and of exercises used for training, are examined in detail.

Chapter 4 describes the communications needs of the SAR organization for reception of distress alerts and for supporting effective co-ordination among the various components of the SAR system.

Chapter 5 provides an overall management perspective of the SAR system.

Chapter 6 discusses the necessary factors and recommends some techniques for creating an organizational environment that fosters improvement of services.

This Manual is published jointly by the International Civil Aviation Organization and the International Maritime Organization. It has been updated from earlier editions by including the amendments that were adopted by the seventy-fourth session of the IMO Maritime Safety Committee in June 2001 (which entered into force on 1 July 2002), by the seventy-fifth session in May 2002 (which entered into force on 1 July 2003), by the seventy-seventh session in June 2003 (which entered into force on 1 July 2004), by the seventy-eighth session in May 2004 (which entered into force on 1 July 2005), by the eightieth session in May 2005 (which entered into force on 1 June 2006), by the eighty-first session in May 2006 (which entered into force on 1 June 2007) and by the eighty-third session in October 2007 (which apply as from 1 June 2008).

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2007 amendment: highlighted text applies as from 1 June 2008

Abbreviations and Acronyms

A/C	aircraft
ACC	area control centre
ACO	aircraft co-ordinator
AES	aeronautical earth station
AFN	aeronautical fixed network
AFTN	aeronautical fixed telecommunications network
AIP	Aeronautical Information Publication
AIS	aeronautical information services
AM	amplitude modulation
AMS	aeronautical mobile service
AMS(R)S	aeronautical mobile satellite (route) service
AMSS	aeronautical mobile satellite service
Amver	automated mutual-assistance vessel rescue
ANC	Air Navigation Commission
ARCC	aeronautical rescue co-ordination centre
ARSC	aeronautical rescue sub-centre
ATC	air traffic control
ATN	aeronautical telecommunications network
ATS	air traffic services
CES	coast earth station
Cospas	Space System for Search of Vessels in Distress
CRS	coast radio station
C/S	call sign
CW	continuous wave
DF	direction finding
DME	distance measuring equipment
DRU	desert rescue unit
DSC	digital selective calling
ELT	emergency locator transmitter
EPIRB	emergency position-indicating radio beacon
FIC	flight information centre
FIR	flight information region
FM	frequency modulation
GES	ground earth station
GHz	gigahertz
GLONASS	Global Orbiting Navigation Satellite System
GMDSS	Global Maritime Distress and Safety System
GNSS	Global Navigation Satellite Systems
GPS	global positioning system
HF	high frequency

ICAO	International Civil Aviation Organization
IFR	instrument flight rules
ILS	instrument landing system
IMC	instrument meteorological conditions
IMO	International Maritime Organization
IMSO	International Mobile Satellite Organization
Inmarsat	Satellite communication service provider for the GMDSS
INS	inertial navigation system
ITU	International Telecommunication Union
JRCC	joint (aeronautical and maritime) rescue co-ordination centre
kHz	kilohertz
LES	land earth station
LUT	local user terminal
MCC	mission control centre
MF	medium frequency
MHz	megahertz
MMSI	maritime mobile service identity
MRCC	maritime rescue co-ordination centre
MRO	mass rescue operation
MRSC	maritime rescue sub-centre
MRU	mountain rescue unit
MSI	maritime safety information
NBDP	narrow-band direct printing
NM	nautical mile
NOTAM	notice to airmen
OSC	on-scene co-ordinator
OSV	offshore supply vessel
PLB	personal locator beacon
PRU	parachute rescue unit
R&D	research and development
RANP	regional air navigation plan
RCC	rescue co-ordination centre
RF	radio frequency
RSC	rescue sub-centre
RTG	radio telegraphy
SAR	search and rescue
Sarsat	Search and Rescue Satellite-Aided Tracking
SART	search and rescue radar transponder
SC	SAR co-ordinator

SCC .... SAR Co-ordinating Committee

SDP .... SAR data provider

SES .... ship earth station

SITREP .... situation report

SMC .... SAR mission co-ordinator

SOLAS .... International Convention for the Safety of Life at Sea

SPOC .... SAR point of contact

SRR .... search and rescue region

SRS .... search and rescue sub-region

SRU .... search and rescue unit

TLX .... telex

UHF .... ultra-high frequency

UIR .... upper flight information region

USAR .... urban search and rescue

UTC .... co-ordinated universal time

VFR .... visual flight rules

VHF .... very-high frequency

VMC .... visual meteorological conditions

VOR .... VHF omnidirectional radio range

WMO .... World Meteorological Organization

Glossary

Aircraft co-ordinator (ACO)	A person or team who co-ordinates the involvement of multiple aircraft in SAR operations in support of the SAR mission co-ordinator and on-scene co-ordinator.
Alert phase	A situation wherein apprehension exists as to the safety of an aircraft or marine vessel and of the persons on board.
Alerting post	Any facility intended to serve as an intermediary between a person reporting an emergency and a rescue co-ordination centre or rescue sub-centre.
Amver	A world-wide ship reporting system for search and rescue.
Area control centre (ACC)	An air traffic control facility primarily responsible for providing ATC services to IFR aircraft in controlled areas under its jurisdiction.
Captain	Master of a ship or pilot-in-command of an aircraft, commanding officer of a warship or an operator of any other vessel.
Coast earth station (CES)	Maritime name for an Inmarsat shore-based station linking ship earth stations with terrestrial communications networks.
Cospas–Sarsat system	A satellite system designed to detect distress beacons transmitting on the frequencies 121.5 MHz and 406 MHz.
Craft	Any air or sea-surface vehicle, or submersible of any kind or size.
Digital Selective Calling (DSC)	A technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations.
Direction finding (DF)	Homing on signals to pinpoint a position.
Distress alerting	The reporting of a distress incident to a unit which can provide or co-ordinate assistance.
Distress phase	A situation wherein there is reasonable certainty that a vessel or other craft, including an aircraft or a person, is threatened by grave and imminent danger and requires immediate assistance.
Ditching	The forced landing of an aircraft on water.
Emergency locator transmitter (ELT)	Aeronautical radio distress beacon for alerting and transmitting homing signals.
Emergency phase	A generic term meaning, as the case may be, uncertainty phase, alert phase or distress phase.
Emergency position-indicating radio beacon (EPIRB)	A device, usually carried aboard maritime craft, that transmits a signal that alerts search and rescue authorities and enables rescue units to locate the scene of the distress.
Flight information centre (FIC)	A unit established to provide flight information and alerting services.
General communications	Operational and public correspondence, traffic other than distress, urgency and safety messages, transmitted or received by radio.

Global Maritime Distress and Safety System (GMDSS)	A global communications service based upon automated systems, both satellite-based and terrestrial, to provide distress alerting and promulgation of maritime safety information for mariners.
Global positioning system (GPS)	A specific satellite-based system used in conjunction with mobile equipment to determine the precise position of the mobile equipment.
Inmarsat	A system of geostationary satellites for world-wide mobile communications services and which support the Global Maritime Distress and Safety System and other emergency communications systems.
Joint rescue co-ordination centre (JRCC)	A rescue co-ordination centre responsible for both aeronautical and maritime search and rescue incidents.
Local user terminal (LUT)	An earth receiving station that receives beacon signals relayed by Cospas–Sarsat satellites, processes them to determine the location of the beacons and forwards the signals.
Mass rescue operation (MRO)	Search and rescue services characterized by the need for immediate response to large numbers of persons in distress, such that the capabilities normally available to search and rescue authorities are inadequate.
Mission control centre (MCC)	Part of the Cospas–Sarsat system that accepts alert messages from the local user terminal(s) and other mission control centres to distribute to the appropriate rescue co-ordination centres or other search and rescue points of contact.
NAVAREA	One of 16 areas into which the world's oceans are divided by the International Maritime Organization for dissemination of navigation and meteorological warnings.
NAVTEX	The system for the broadcast and automatic reception of maritime safety information by means of narrow-band direct-printing telegraphy.
On-scene co-ordinator (OSC)	A person designated to co-ordinate search and rescue operations within a specified area.
Personal locator beacon (PLB)	Personal radio distress beacon for alerting and transmitting homing signals.
Pilot-in-command	The pilot responsible for the operation and safety of the aircraft during flight time.
Rescue	An operation to retrieve persons in distress, provide for their initial medical or other needs and deliver them to a place of safety.
Rescue co-ordination centre (RCC)	A unit responsible for promoting efficient organization of search and rescue services and for co-ordinating the conduct of search and rescue operations within a search and rescue region. *Note*: The term *RCC* will be used within this Manual to apply to either aeronautical or maritime centres; *ARCC* or *MRCC* will be used as the context warrants.
Rescue sub-centre (RSC)	A unit subordinate to a rescue co-ordination centre established to complement the latter according to particular provisions of the responsible authorities. *Note*: The term *RSC* will be used within this Manual except where it applies only to aeronautical or maritime; *ARSC* or *MRSC* will then be used.

SafetyNET	A service of Inmarsat enhanced group call (EGC) system specifically designed for promulgation of maritime safety information (MSI) as a part of the Global Maritime Distress and Safety System (GMDSS).
Search	An operation, normally co-ordinated by a rescue co-ordination centre or rescue sub-centre, using available personnel and facilities to locate persons in distress.
Search and rescue co-ordinating communications	Communications necessary for the co-ordination of facilities participating in a search and rescue operation.
Search and rescue co-ordinator (SC)	One or more persons or agencies within an Administration with overall responsibility for establishing and providing SAR services and ensuring that planning for those services is properly co-ordinated.
Search and rescue data provider (SDP)	A source for a rescue co-ordination centre to contact to obtain data to support search and rescue operations, including emergency information from communications equipment registration databases, ship reporting systems and environmental data systems (e.g., weather or sea current).
Search and rescue facility	Any mobile resource, including designated search and rescue units, used to conduct search and rescue operations.
Search and rescue mission co-ordinator (SMC)	The official temporarily assigned to co-ordinate response to an actual or apparent distress situation.
Search and rescue plan	A general term used to describe documents which exist at all levels of the national and international search and rescue structure to describe goals, arrangements and procedures which support the provision of search and rescue services.
Search and rescue point of contact (SPOC)	Rescue co-ordination centres and other established and recognized national points of contact which can accept responsibility to receive Cospas–Sarsat alert data to enable the rescue of persons in distress.
Search and rescue region (SRR)	An area of defined dimensions, associated with a rescue co-ordination centre, within which search and rescue services are provided.
Search and rescue service	The performance of distress monitoring, communication, co-ordination and search and rescue functions, including provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources, including co-operating aircraft, vessels and other craft and installations.
Search and rescue sub-region (SRS)	A specified area within a search and rescue region associated with a rescue sub-centre.
Search and rescue unit (SRU)	A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations.
Search object	A ship, aircraft, or other craft missing or in distress or survivors or related search objects or evidence for which a search is being conducted.
Uncertainty phase	A situation wherein doubt exists as to the safety of an aircraft or a marine vessel, and of the persons on board.

Unnecessary SAR alert (UNSAR)	A message sent by an RCC to the appropriate authorities as a follow-up when the SAR system is unnecessarily activated by a false alert.
Vessel	A maritime craft.

Chapter 1

General System Concept

1.1 Establishing Services

1.1.1 Every State recognizes the great importance of saving lives and the need to be directly involved in rendering aeronautical and maritime search and rescue (SAR) services to persons in distress. This Manual provides a manager's perspective on supporting SAR services under the framework of SAR initiatives sponsored by the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), two agencies of the United Nations devoted to aeronautical and maritime transportation safety, respectively.

1.1.2 With a focus on the humanitarian nature of their work, member States of ICAO and IMO co-operate to develop and sponsor vital standards and recommendations, to provide other types of assistance to States to help prevent and cope with distress situations and to facilitate international co-operation and co-ordination on a daily basis.

1.1.3 ICAO and IMO jointly developed this Manual to foster co-operation between themselves, between neighbouring States, and between aeronautical and maritime authorities. The goal of the Manual is to assist State authorities to economically establish effective SAR services, to promote harmonization of aeronautical and maritime SAR services, and to ensure that persons in distress will be assisted without regard to their locations, nationality, or circumstances. State authorities are encouraged to promote, where possible, harmonization of aeronautical and maritime SAR services.

1.1.4 This Manual will assist those responsible for establishing, managing, and supporting SAR services to understand the:

- functions and importance of SAR services;
- relationships between global, regional, and national aspects of SAR;
- components and support infrastructure essential for SAR;
- training needed to co-ordinate, conduct, and support SAR operations;
- communications functions and requirements for SAR; and
- basic principles of managing and improving SAR services to ensure success.

1.1.5 This Volume is one of three developed by ICAO and IMO as the *International Aeronautical and Maritime Search and Rescue Manual*. The others are the *International Search and Rescue Manual for Mission Co-ordination* and the *International Search and Rescue Manual for Mobile Facilities*. This volume attempts to ensure that managers understand the basic concepts and principles involved in SAR, and to provide practical information and guidance to help managers establish and support SAR services.

1.2 Benefits of Services

1.2.1 Besides reduction of loss of life and suffering by providing rescue services, a State's concern and involvement with SAR may offer other advantages, such as the following.

(a) A safer and more secure environment for aviation and maritime related industries, commerce, recreation, and travel. Increased safety may promote use and enjoyment of aviation and maritime environments, tourism and economic development. This is especially true when the SAR system is associated with programmes aimed at preventing or reducing the effects of mishaps, sometimes referred to as "Preventive SAR."

(b) Availability of SAR resources often provides the initial response and relief capabilities critical to saving lives in early stages of natural and man-made disasters. Therefore, SAR services are sometimes made an integral part of any local, national or regional emergency management system.

(c) Well performed SAR operations can provide positive publicity about situations which may otherwise be viewed negatively. However, the opposite is also true; a poor response or ineffective response to a major accident or disaster can also result in world-wide publicity and adversely affect sensitive industries such as tourism and transportation.

(d) SAR provides an excellent means for promoting co-operation and communication among States and between organizations at local, national, and international levels, because it is a relatively non-controversial and humanitarian mission. Co-operation in this area can lead to co-operation in other areas as well and can be used as a leadership tool for promoting good working relationships.

(e) The value of property which can be saved in association with SAR activities can be high and provide additional justification for SAR services.

1.3 Legal Basis for Services

1.3.1 As Party to the International Convention for the Safety of Life at Sea (SOLAS), the International Convention on Maritime Search and Rescue, or the Convention on International Civil Aviation, a Party undertakes to provide certain aeronautical and/or maritime SAR co-ordination and services. Reference to Search and Rescue is also contained in the UN Convention on Law of the Sea, 1982. This Convention includes a general statement at Article 98, paragraph 2, dealing with search and rescue:

'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 water and, where circumstances so require, by way of mutual regional arrangements, co-operate with neighbouring States for this purpose.'

The international community expects these commitments to be fulfilled by all State parties.

1.3.2 These services can be provided by States individually establishing effective national SAR organizations, or by establishing a SAR organization jointly with one or more other States. The role of agreements and plans in establishing SAR services will be discussed throughout this Manual.

1.3.3 Appendix M provides an overview of the relevant articles, annexes and chapters of the International Convention on Maritime Search and Rescue and the Convention on International Civil Aviation.

1.3.4 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.

1.3.5 SAR managers should seek legal advice on how domestic and international laws pertain to SAR policies and procedures.

1.3.6 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;

– designating SAR agencies and their general responsibilities; and

– defining the jurisdiction and legal authority of the RCC in accordance with relevant standards of ICAO and IMO.

1.3.7 Legislation may also be used to promote sound design, construction, maintenance and operation of aircraft, vessels and other craft.

1.3.8 International law addresses concerns for saving lives and concerns for sovereignty. Neighbouring States should seek practical means to balance these concerns for situations where entry of foreign SAR facilities into territorial waters or territory may be necessary or appropriate.

1.3.9 Sample legislation is provided in appendix A.

1.4 Basic System Functions

1.4.1 Any SAR system should be structured to perform the following functions effectively:

– receive, acknowledge, and relay notifications of distress;

– co-ordinate SAR response; and

– conduct SAR operations.

1.4.2 Chapter 2 discusses the primary SAR system components available or necessary to carry out the above functions and chapter 4 elaborates on the communications component. Portions of chapters 2 and 5 review the staffing required to perform basic SAR system functions and their needs, and chapter 3 discusses how SAR personnel can achieve an effective level of professionalism in their work.

1.4.3 SAR services include not only finding persons in distress and removing them from danger, but also providing for initial medical or other needs and delivering survivors to a place of safety.

1.5 **System Management and Support**

1.5.1 The SAR system cannot be organized and effective without management and support. Chapters 5 and 6 attempt to ensure that SAR system managers understand:

– the fundamentals of the system they are managing;

– their own basic responsibilities and functions;

– key types of SAR plans and planning processes; and

– how to begin with available resources and economically improve the system.

1.5.2 To ensure success, the involved parties must be committed to providing the best possible SAR services with available resources. This commitment should also be reflected in national legislation designating agencies responsible for SAR.

1.5.3 Agencies or persons may be designated as *SAR Co-ordinators (SCs)*, and given oversight responsibilities within the national SAR organization. Besides SCs, others will be involved in managing and supporting various aspects of the SAR organization and system. "SC" is simply an optional designation which may be used to highlight the fact that co-ordination is important at the management level, in addition to the co-ordination centre and on-scene levels, of the SAR system.

1.5.4 States can assign SAR responsibilities as they choose. For illustration, some States assign SCs from departments or ministries responsible for maritime or aeronautical safety or for implementation of the Conventions of IMO or ICAO. Alternatives may include assigning the Minister of Transport who often has overall responsibility for both aeronautical and maritime safety or assigning SCs for each of these areas. When States co-operate to form a regional SAR system, each State may wish to assign an SC to oversee its portion of the system. States with several organizations involved in providing SAR services may have several entities doing what could be referred to as SC functions.

1.5.5 SCs seldom control all of the resources available for SAR operations. Therefore, they may arrange agreements with military and other agencies or organizations for use of resources.

1.5.6 Close co-operation between various civilian and military organizations is essential. One way to handle this is through National SAR Co-ordinating Committees which is further discussed in chapter 6. Legislation could provide for use of military and other public resources to support SAR.

1.5.7 Resources will be needed to gather performance data and review, analyze and recommend improvements in the SAR system and its operation. But even before a new system is started, a needs and capabilities analysis should be conducted. Chapters 5 and 6 will help with these efforts.

1.5.8 Commitments of various agencies and States to support the SAR system are often documented in a variety of plans, agreements, memoranda of understanding, etc., which evolve over time in a hierarchical fashion at the local, national and regional levels. Such instruments are discussed in detail in various other places in this Manual. Great care should be exercised in drafting such documents, so that they support SAR rather than unrelated concerns and remain consistent with higher level instruments and with international law.

1.5.9 Almost every State can satisfy its SAR needs cost-effectively by using all available resources, not just dedicated or specially designated resources; typical sources are discussed in chapter 2. Government, industry and general population sources tend to desire to support the SAR organization, but SAR managers need to take the initiative to make arrangements for them to do so. With a few exceptions, SAR resources are multi-mission facilities, that is, they perform SAR functions in addition to other missions.

1.5.10 Advanced planning, training, and some specialized equipment can often economically improve the quality of SAR services performed by alternative existing resources. This may reduce or eliminate the need for specially designated SAR units (SRUs) for some States.

1.5.11   When necessary, a rescue co-ordination centre (RCC) with an associated search and rescue region (SRR), and perhaps a rescue sub-centre (RSC) with one or more associated search and rescue sub-regions (SRSs), should be established. All RCCs and RSCs must satisfy certain minimum requirements. Provision of these and other facilities for SAR is discussed further in chapter 2.

1.5.12   The general levels and functions of the SAR system are shown in Figure 1-1.

General Levels	General Functions
SAR Co-ordination	Management
SAR Mission Co-ordination	Mission Planning
On-scene Co-ordination	Operational Oversight

Figure 1-1 – *Co-ordination structure*

1.6   The Global Concept

1.6.1   Understanding national SAR efforts as an integral part of a world-wide SAR system affects the overall approach a State will take to establish, provide and improve SAR services. Briefly, the goal of ICAO and IMO is to provide an effective world-wide system, so that wherever people sail or fly, SAR services will be available if needed.

1.6.2   In most areas of the world, *the fastest, most effective and practical way to achieve this goal is to develop regional systems associated with each ocean area and continent*. This differs from the approach whereby every State independently establishes a complete stand-alone SAR system with geographic areas of responsibility acceptable to their neighbouring States, the collection of which will comprise the global system. However, the regional approach does require the States associated with an ocean or land area to collaborate and co-operate to develop and operate the regional system.

1.6.3   A basic, practical, and humanitarian characteristic of the global aspect of SAR is that it eliminates the need for each State to provide SAR services for its own citizens wherever they travel world-wide. Instead, the globe is divided into SRRs, each with associated SAR services which assist anyone in distress within the SRR without regard to nationality or circumstances.

1.7   National and Regional Systems

1.7.1   SAR systems can be established on a national or regional level, or both. Either way, the process involves 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. This is especially true in ocean areas. In such cases, each State may establish an RSC. Chapter 2 will further discuss the establishment of SRRs.

1.7.2   A regional approach can reduce cost and improve distribution of distress alerts, coverage and services. For example, it is usually less operationally complex, and more economical and effective, for States within a region to share the use and support of long-range terrestrial and satellite communications facilities and communications registration databases to support SAR. States can sometimes support each other with SRUs to reduce the total number of units needed for adequate coverage and readiness. Training and other types of resources can be shared to everyone's benefit. Nevertheless, participation in a regional system may not be the best approach for every State.

1.7.3   Establishment of national or regional SAR systems is typically based on development of multilateral national or regional plans, agreements, etc. (further discussed in other portions of this volume), to suit the desires and needs of the States involved. These documents may discuss establishment of RSCs, equivalent arrangements in lieu of establishing SRRs, etc., but usually provide for:

–   effective use of all available resources for SAR;

–   delineation of SRRs;

–   description of relationships between the parties;

       –   discussion of how higher level conventions, plans, agreements, etc., will be implemented and supported.

1.7.4   The basic requirements for developing an effective SAR system include:

       –   legislative establishment of the SAR service(s);

       –   arrangements for use of all available resources, and provision of others if necessary;

       –   establishing geographic areas of responsibility with associated RCCs and RSCs;

       –   staffing, training, and other personnel support to manage and operate the system;

       –   adequate and functioning communications capabilities; and

       –   agreements, plans and related documents, to achieve goals and define working relationships.

1.8   SAR and the 1949 Geneva Conventions and their Additional Protocols

1.8.1   In times of armed conflict, SAR services will normally continue to be provided in accordance with the Second Geneva Convention of 1949 (Geneva Convention for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea, of 12 August 1949) and Additional Protocol I to the Conventions.

    (a)   The SAR services recognized by their Administrations are afforded protection for their humanitarian missions so far as operational requirements permit. Such protection applies to coastal rescue craft, their personnel and fixed coastal SAR installations, including RCCs and RSCs as far as these centres are located in coastal areas and are used exclusively to co-ordinate search and rescue operations. SAR personnel should be informed about their Administration's status regarding, and views on, implementation of the Second Geneva Convention and its Additional Protocol I.

    (b)   Chapter XIV of the International Code of Signals illustrates the different means of identification which shall be used to provide effective protection for rescue craft.

    (c)   The above-mentioned coastal installations should, in time of armed conflict, display the distinctive emblem (red cross or red crescent), according to regulations issued by their competent authorities.

    (d)   It is recommended that Parties to a conflict notify the other Parties with the name, description and locations (or area of activity) of their above-mentioned rescue craft and coastal installations in the area they are located.

Chapter 2

System Components

2.1 SAR as a System

2.1.1 The SAR system, like any other system, has individual components that must work together to provide the overall service. Development of a SAR system typically involves establishment of one or more SRRs, along with capabilities to receive alerts and to co-ordinate and provide SAR services within each SRR. Each SRR is associated with an RCC. For aeronautical purposes, SRRs often coincide with flight information regions (FIRs). The goal of ICAO and IMO conventions relating to SAR is to establish a global SAR system. Operationally, the global SAR system relies upon States to establish their national SAR systems and then integrate provision of their services with other States for world-wide coverage.

2.1.2 Every SRR has unique transportation, climate, topography and physical characteristics. These factors create a different set of problems for SAR operations in each SRR. Such factors influence the choice and composition of the services, facilities, equipment and staffing required by each SAR service. The primary system components are:

– communications throughout the SRR and with external SAR services;

– an RCC for the co-ordination of SAR services;

– if necessary, one or more RSCs to support an RCC within its SRR;

– SAR facilities, including SRUs with specialized equipment and trained personnel, as well as other resources which can be used to conduct SAR operations;

– on-scene co-ordinator (OSC) assigned, as necessary, for co-ordinating the on-scene activities of all participating facilities; and

– support facilities that provide services in support of SAR operations.

2.2 Communications

2.2.1 Good communications are essential. They should promptly provide the RCC with alerting information permitting the RCC to dispatch SRUs and other resources to search areas without delay and to maintain two-way contact with the persons in distress. Chapter 4 summarizes the general communications capability and equipment the RCC should have. The SAR organization is alerted to an actual or potential distress situation directly or by means of alerting posts. Alerting posts are facilities that relay distress alerts to RCCs or RSCs. The information collected by alerting posts and other reporting sources should be forwarded immediately to the RCC or RSC, which decides on the type of response. The RCC or RSC may have the communications capability itself or may rely upon other facilities to forward alerts and to carry out SAR response communications. Figure 2-1 outlines the general SAR communications system.
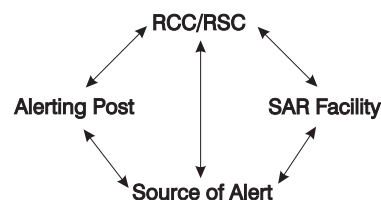

Figure 2-1 – *General SAR system communications*

2.2.2   The main functions of a SAR communications system are:

–   receipt of alerts from equipment used by persons in distress;

–   exchange of information with persons in distress, and among the SAR mission co-ordinator (SMC), OSC and SAR facilities for co-ordination of responses to SAR incidents; and

–   direction finding (DF) and homing which allow SRUs to be dispatched to the vicinity of the distress and to home on signals from equipment used by survivors

Alerting Posts

2.2.3   Alerting posts include any facility involved in receiving information about an apparent distress situation and relaying it to an RCC or RSC. They include facilities such as air traffic services (ATS) units or coast radio stations (CRSs). Communications may or may not be the primary purpose for the alerting post, but the post must be able to forward the distress information to the RCC. Chapter 4 discusses alerting posts in more detail.

2.2.4   The ability of an RCC to act quickly and effectively when an emergency occurs depends largely on the information forwarded to it by alerting posts. If alerting posts are used, the RCC or RSC should ensure that the alerting post is well qualified to carry out its responsibilities. It is essential that communications between an alerting post and the RCC, RSC or local SRU are by fast and reliable means. Such channels should be checked regularly and could be established by voice or data communications via direct or public telephone, radiotelephone, radiotelegraph or other means. Ideally, data alerts should be automatically routed to the responsible RCC or RSC over communication links which help preserve the distress priority.

Locating

2.2.5   Locating capabilities enable the responding SAR facilities to minimize the search time and to get to the actual position of distress for rescue. There are basic international requirements for the types of equipment that must be carried by ships and aircraft.

(a)   Most civil aircraft operating over ocean areas and remote land areas, and many other aircraft, are required to carry an emergency locator transmitter (ELT). Designated SAR aircraft must be able to home onto ELT 121.5 MHz signals from ELTs used for locating a distress scene and survivors.

(b)   Ships and some other craft are required to carry emergency position-indicating radio beacons (EPIRBs) capable of transmitting signals. The purpose of the EPIRB signals is to indicate that a distress exists and to facilitate the location of survivors in SAR operations. Merchant vessels and survival craft have additional requirements which are discussed in chapter 4.

2.2.6   Having a very precise search object position is useful but does not eliminate the need for SRU homing capabilities. This is especially true if the SRU does not have precise navigation equipment or if operations take place at night or in other low-visibility conditions.

2.2.7   Due to the importance of position information for SAR operations, various suitable means should be provided within an SRR to determine positions. These may include DF stations, surveillance systems for aircraft and vessel traffic service systems. If there is any way to confirm the position reported in an alert, it would be prudent to do so, especially with initial EPIRB and ELT alerts via Cospas–Sarsat which provide both a true and an image position.

SAR Co-ordination

2.2.8   Communications among SAR facilities will depend on local agreements and the organization of the SAR services in the SRR and on the equipment available. Communications with mobile facilities may be handled directly by the RCC or RSC or via capable associated alerting posts. Communications with alerting posts or other elements of the SAR system, including international communications among RCCs, should be reliable and, ideally, either be dedicated or preserve message priority or pre-emptive handling. RCCs normally assign a SAR Mission Co-ordinator (SMC) to handle a SAR incident. The SMC may specify pre-planned communications channels for co-ordination with the OSC and for communications among facilities on-scene.

2.2.9 Communications to and from RCCs and RSCs should be as timely and reliable as possible and sufficient to handle the total diversity and volume of needs for the worst potential scenarios. Specific details are provided in the *International Aeronautical and Maritime Search and Rescue Manual for Mission Co-ordination*.

2.2.10 SAR personnel should have national authority for their RCCs and RSCs to directly respond to requests for assistance from craft in distress, or from other RCCs or RSCs. Except in rare cases, related communications for such requests should be routed directly to the RCC or RSC rather than via diplomatic channels.

On-Scene

2.2.11 On-scene channels are used between SRUs and the OSC. The SMC should specify an on-scene communications channel for use by all SRUs based on the equipment carried by the SRUs. If an on-scene radio frequency is required for communications between air and surface facilities involved in a SAR operation, distress and on-scene frequencies may be used. Designated SAR aircraft operating in maritime areas should be equipped with a frequency for communicating with vessels during SAR operations.

2.2.12 Administrations should encourage voluntary fitting of air band radio equipment, especially on marine SAR units and government vessels, but also on SOLAS ships operating in areas where working with aircraft not fitted with maritime band radio equipment is known to be a possibility.

2.2.13 SAR co-ordinators should consider the possible need for communications between aircraft and surface units within their SAR Regions, and ensure that this need can be met even for aircraft that cannot communicate directly on maritime frequencies. Typically, the RCC should be able to provide a communication link between the aircraft and surface units with their own equipment or by making other arrangements. SAR and government vessels should be encouraged to fit equipment to be able to communicate directly on aeronautical frequencies. Passenger ships subject to the SOLAS Convention are required to have this capability.

2.3 Rescue Co-ordination Centres

2.3.1 The RCC is an operational facility responsible for promoting efficient organization of SAR services and for co-ordinating the conduct of SAR operations within an SRR. An RCC co-ordinates, but does not necessarily provide, SAR facilities throughout the internationally recognized SRR described in either the Regional Air Navigation Plans (RANPs) of ICAO or the Global SAR Plan of IMO. Aeronautical SAR responsibility may be met by means of an aeronautical RCC (ARCC). Coastal States with the added responsibility for maritime SAR incidents can meet this with a maritime RCC (MRCC). When practicable, States should consider combining their SAR resources into a joint RCC (JRCC), responsible for both aeronautical and maritime SAR incidents or co-locating their maritime and aeronautical RCCs.

Note: The term RCC *will be used within this Manual to apply to either aeronautical or maritime centres;* ARCC *or* MRCC *will be used as the context warrants.*

2.3.2 SAR managers should ensure that the RCC is familiar with the capabilities of all of the facilities available for SAR in its SRR. Collectively, these facilities are the means by which the RCC conducts its operations. Some of these facilities will be immediately suitable for use; others may have to be enhanced by changing organizational relationships or supplying extra equipment and training. If the facilities available in certain parts of an SRR cannot provide adequate assistance, arrangements should be made to provide additional facilities.

2.3.3 Co-operative arrangements among States could make it unnecessary for some States to have an RCC. RSCs (discussed later in this chapter) may be established under an RCC of the State concerned, under an RCC operated by another State or under an RCC operated by more than one State.

2.3.4 JRCCs can be established at minimal cost by combining aeronautical and maritime RCCs. Staffing would be determined by the responsible agencies and could include joint staffing by more than one agency. This co-operation could help in developing better capabilities and plans to assist both aircraft and ships in distress. Benefits include:

– fewer facilities to establish or maintain;

– reduced cost;

– less complexity for alerting posts in forwarding distress alerts; and

– better co-ordination and sharing of SAR expertise.

A coastal State may have a MRCC but not be able to be provided with an ARCC. In such a case, the SAR manager should arrange a suitable organizational relationship to provide the MRCC with aeronautical advice. Advice may be available from aeronautical facilities close to hand, such as an aerodrome tower, an ARCC, a flight information centre (FIC), or an area control centre (ACC).

2.3.5   Properly established, the JRCC may improve SAR service performance in most areas. The RCC chief operates the JRCC so that neither the aeronautical nor maritime community receives special attention at the expense of the other.

Purpose and Requirements

2.3.6   ICAO's Annex 12 and the International Convention on Maritime Search and Rescue require that SAR providers establish an RCC for each SRR. The following sections detail some minimum requirements for these centres. More information on specific RCC and RSC requirements is provided in the *International Aeronautical and Maritime Search and Rescue Manual* for *Mission Co-ordination.*

2.3.7   The RCC must have certain basic capabilities before it is recognized as having responsibility for an SRR by listing in the ICAO RANP or the IMO Global SAR Plan. Additional or improved capabilities may be added as ability and resources permit. A fully capable RCC may be viewed as having two sets of capabilities, "required" and "desired." Figure 2-2 outlines these capabilities.

Required	Desired
24-hour availability	Wall chart depicting SRR, SRSs, and neighbouring
Trained persons	SRRs, SAR resources
Persons with a working knowledge of the English language	Computer resources
Charts which apply to the SRR (aeronautical, nautical, topographic and hydrographic)	Databases
Means of plotting	
Ability to receive distress alerts, e.g., from MCCs, CESs, etc.	
Immediate communications with:	
associated ATS units	
associated RSCs	
DF and position-fixing stations	
associated CRSs	
Rapid and reliable communications with:	
Parent agencies of SRUs	
adjacent RCCs	
designated meteorological offices	
employed SRUs	
alerting posts	
Plans of operation	

Figure 2-2 – *Capabilities of a fully capable RCC*

Facilities and Equipment

2.3.8   An RCC should be located where it can effectively perform its functions within its SRR. The RCC may use accommodations at an existing suitable facility. Often agencies responsible for communications, defence, law enforcement, air and marine services or other primary missions have an operations centre which can be readily adapted for use also as an RCC. These centres, while not dedicated only to SAR, may act as RCCs in addition to their other functions as long as the centres and their staff meet the SAR requirements. Co-ordination skills used for other purposes are similar to those used to manage a SAR mission. This arrangement makes use of existing equipment and trained, experienced staff. However, additional personnel or space may be needed depending on the expected number and complexity of SAR operations. Also, the RCC may be located close to a well-equipped centre such as a flight information centre (FIC) or area control

centre (ACC) so that additional communications facilities can be kept to a minimum. In addition to communications facilities and general office equipment, a desk, plotting space, charts showing the RCC's area of responsibility and adjacent areas and filing space are needed. Use of various technologies may improve the RCC performance and affect the staffing and training requirements.

2.3.9   When a JRCC cannot be established, ARCCs and MRCCs may still be able to provide mutual communications and staff support. Direct and close co-operation among RCCs should also minimize costs, enhance co-ordination and ensure the efficient use of resources.

2.3.10   The equipment of an RCC will be determined by the expected demands to be made on the RCC, and the extent of functions it should perform.

 (a) *Communications.* Communications needs can sometimes be met by ATS channels, public services, or installation of an Inmarsat earth station. Reliable dedicated lines which can preserve message priority are preferred. In addition to telephone lines with published numbers, one telephone line should have an unlisted, confidential number to ensure the availability of one out-going line in situations where there are many incoming telephone calls. Use of the ICAO Aeronautical Fixed Telecommunications Network (AFTN) or digital Aeronautical Fixed Network (AFN) can meet some communications needs and preserve message priority. All voice equipment, including telephones, should be attached to a multi-channel tape recorder, preferably with a time recording. This allows the RCC to review verbal information. Arrangements can be made with the public telephone administration to ensure that calls from originators who do not wish to cover the charges are passed without delay to the RCC on a collect or pre-paid reply basis. Such arrangements should be widely publicized to encourage outside sources to provide information on missing or distressed craft. Chapter 4 summarizes the communications capability and equipment the RCC and RSC should have.

 (b) *Information.* Ready access to operational information will help the SMC take immediate and appropriate action in an emergency. Much of this information derives from the RCC plan of operations and SAR databases. Use of large-scale wall charts showing assigned SRRs and locations of resources along with a SAR facility status board or computer file reflecting the current status of all SAR facilities, telephone numbers, and other useful information, is practical. The chart or map should also show areas adjacent to the SRR. The map could display, by means of coloured pins or other symbols, information of interest.

 (c) *Plotting facilities.* The RCC and RSC should have a stock of maritime and aeronautical maps and charts, plotting equipment, and other information necessary for their use.

 (d) *Publications and supplies.* The publications and supplies to be available at the RCC will vary, but should include:

  – SAR publications of ICAO, IMO, the national and neighbouring SAR authorities;

  – relevant State documents, e.g., Air Navigation Regulations and Notices to Mariners and, if considered necessary, those of adjacent States;

  – communications publications;

  – aeronautical information publications (AIPs);

  – indexes of names, addresses, telephone and facsimile numbers; and

  – relevant checklists and forms.

Staffing

2.3.11   RCCs perform administrative and operational duties. Administrative duties, including planning, co-operation with providers of facilities, exercises and case studies, are concerned with maintaining the RCC in a continuous state of preparedness. In areas of low SAR activity the administrative duties are of high importance since they are the best way to keep the staff in readiness for SAR cases. The administrative duties should be shared so that more than one person is capable of performing these duties. Effective administrative actions help to ensure proficient SAR operations. SAR operations are the responsibility of the SMC and this responsibility may be met by the RCC chief or by other properly trained staff of the RCC. Personnel from services or organizations providing facilities can be used as part of the RCC team if they are duly trained and qualified. They will normally serve in support of expert functions such as firefighting, or air or marine safety. The RCC must be prepared to undertake and continue operational duties 24 hours per day. This level of readiness requires that multiple persons be trained and qualified to assume SMC duties.

 (a) *RCC Chief.* The RCC chief may be a person who also performs other functions. Whenever an RCC is established in conjunction with an ATS unit or similar operations centre, responsibilities for the RCC are

often placed on the chief of that facility. In such instances, another person should be appointed to handle day-to-day management of the RCC. The RCC chief must make appropriate preparations, plans, and arrangements as well as oversee, if not delegated, the daily operations of the RCC, to ensure that when an incident occurs the SAR operation can be promptly performed.

(b) *RCC Staff.* The RCC staff consists of personnel who are trained and capable of planning and co-ordinating SAR operations. If the RCC staff has duties besides SAR, the additional functions should be considered when determining the staffing needs. The number of personnel required will vary with local requirements, traffic density, seasonal conditions, meteorological conditions and other SRR conditions. An RCC must be in a constant state of operational readiness. Where the RCC does not maintain continuous staffing, or only has one trained and capable RCC person on duty, provision must be made for stand-by RCC staff to be mobilized rapidly.

(c) *SAR Mission Co-ordinator.* An SMC should be designated for each specific SAR operation, and adequate numbers of personnel qualified to perform the SMC function must be readily available on a 24-hour basis. This is a temporary function which may be performed by the RCC chief or a designated SAR duty officer, assisted by as many staff as may be required. A SAR operation may continue over a prolonged period of time. The SMC is in charge of a SAR operation until a rescue has been effected or until it has become apparent that further efforts would be of no avail. The RCC plan of operations should give the SMC the freedom to employ any facility, to request additional ones and to accept or reject any suggestions made during the operation. The SMC is responsible for planning the search and co-ordinating the transit of SRUs to the scene. SCs are not normally involved in the conduct of the SAR operation. (Duties of the SMC are discussed further in the *International Aeronautical and Maritime Search and Rescue Manual* for *Mission Co-ordination*.) The number of persons to be available for assignment as SMC will depend on:

- possible need to co-ordinate operations from a location other than the RCC, e.g., from available communications facilities;

- expected frequency of SAR incidents, including the possibility of more than one incident occurring simultaneously;

- size of the area and prevailing conditions (e.g., climate or topography); and

- need to allow for vacation, training courses, illness, relief and travel.

Training, Qualification, and Certification

2.3.12 Training and experience are crucial to proper SAR response.

(a) RCC chiefs, SMCs, and RCC staff need specific training in watchstanding, co-ordination of assorted resources, search planning, and rescue planning. SAR managers have the responsibility to ensure that the overall training programme is effective. It will normally be the responsibility of the RCC chief to ensure that all SAR service personnel reach and maintain the required level of competence.

(b) Training in itself can provide only basic knowledge and skills. Qualification and certification processes are used to ensure that sufficient experience, maturity and judgement are gained. During a qualification process, the individual must, by demonstration of abilities, show mental and physical competence to perform as part of a team. Certification is official recognition by the organization that it trusts the individual to use those abilities. Chapter 3 provides additional information on these and related topics.

Plans of Operation

2.3.13 Each RCC is responsible for preparing comprehensive plans for the conduct of SAR in its SRR and for co-ordinated actions within adjacent SRRs. These plans must cover the whole SRR and be based on agreements between the SAR service and the providers of facilities or other support for SAR operations. Plans are intended to be valuable aids for time-critical search planning and SAR co-ordination processes. Each RCC and RSC should develop plans that:

- meet the requirements of applicable international SAR manuals;

- cover all the emergency scenarios likely to occur within the SRR;

- are reviewed and updated regularly; and

- are in a convenient form for quick and easy use.

2.3.14   The plans of operation set out the details for the conduct of SAR at operational levels. The *International Aeronautical and Maritime Search and Rescue Manual for Mission Co-ordination* contains an outline of plans of operation.

Search and Rescue Regions

2.3.15   An SRR is an area of defined dimensions associated with an RCC within which SAR services are provided. ICAO RANPs depict aeronautical SRRs for most of the world. States have agreed to accept SAR responsibility for an area which is composed of one or more aeronautical SRRs. 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 co-ordinating responses to distress situations in every area of the world and to enable rapid distribution of distress alerts to the proper RCC. A State may have separate aeronautical and maritime SRRs, or separate SRRs in different ocean/sea areas; otherwise, a single SRR (with SRSs, if necessary) will usually suffice.

(a)   *Factors Affecting SRR Size and Shape*. When establishing or amending an SRR, States should try to create the most efficient system possible, bearing in mind that each SRR is part of a global system. Leading factors to consider should include:

–   size and shape of the area of responsibility;

–   air and shipping traffic density and pattern;

–   availability, distribution, readiness and mobility of SAR resources;

–   reliability of the communications network, and

–   which State is fully capable, qualified, and willing to assume responsibility.

(b)   Aeronautical SRRs often are aligned with FIRs for specific reasons.

–   The ATS unit providing flight information service for an FIR is the central point for collecting and forwarding information about aircraft emergencies and co-ordinates SAR aircraft and other air traffic operating within the FIR.

–   Simplified notification, co-ordination and liaison between the RCC and the ATS unit.

–   Savings often result from sharing RCC and ATS staff, facilities, and communications networks.

(c)   Upper flight information regions (UIRs) sometimes exist above a system of FIRs. UIRs generally are NOT used to define aeronautical SRRs for three reasons.

–   Searches are generally conducted at low altitudes and must be co-ordinated with other traffic in the FIR.

–   ATS communications facilities useful for SAR, particularly air–ground facilities, are adapted to the FIR rather than to the UIR.

–   Territorial divisions of authority for local agencies used in SAR operations generally correspond to those of the FIRs.

(d)   Experience shows that in most areas there are operational advantages in harmonizing aeronautical and maritime SRRs. Doing so minimizes confusion over which authority is to be alerted when a distress situation arises at and over a specific geographic position. In order to enhance the efficiency of SAR services, neighbouring States should seek to agree on the limits of their SRRs which could enhance co-ordination and avoid duplication of efforts. To make them easier to use, SRR limits should, if possible, be straight lines running north to south or east to west between well-defined geographic points. Such regions should be contiguous and as far as practicable not overlap.

(e)   The delimitation of SRRs is not related to and shall not prejudice the delimitation of any boundary between States. An SRR is established solely to ensure that primary responsibility for co-ordinating SAR services for that geographic area is assumed by some State. SRR limits should not be viewed as barriers to assisting persons in distress. Any facility within a SAR organization should respond to all distress situations whenever and wherever it is capable of doing so. In this respect, co-operation between States, their RCCs and their SAR services should be as close as possible.

(f)   An SRR is established by agreement among States. States should propose establishing or amending SRR limits when this would result in the provision of more efficient or effective SAR services. The States concerned should agree among themselves, formally or informally, on the lines separating their SRRs

and then inform IMO or the applicable ICAO regional office, depending on whether the SRRs are maritime or aeronautical. After due process, the information will then be published in the IMO SAR plan or the applicable ICAO RANP. Sometimes SRR limits can be tentatively decided at an IMO SAR workshop or an ICAO regional air navigation meeting, subject to later approval.

2.4 Rescue Sub-Centres

2.4.1 There may be situations where an RCC is not able to exercise direct and effective control over SAR facilities in an area within its SRR. The establishment of an RSC with its SRS may be appropriate. Examples of such situations include:

- where the communications facilities in a portion of an SRR are not adequate for close co-ordination between the RCC and SAR facilities;
- where the SRR encompasses a number of States or territorial divisions of a State in which, for political or administrative reasons, local facilities can only be directed and controlled through designated local authorities; and
- where local control of SAR operations will be more effective.

2.4.2 In such situations, the RCC may delegate some or all of its responsibility to an RSC, including communications, search planning and arrangements for SAR facilities. An RSC may be as capable as an RCC. The more complicated the Administration or the poorer the communications, the greater the authority that should be delegated to the RSC. Its requirements in personnel, equipment and accommodations will then be similar to those of the RCC. However, RSCs typically have fewer responsibilities and capabilities than their associated RCC and their requirements in personnel, equipment and accommodations are usually smaller.

2.4.3 An aeronautical RSC (ARSC) can be established for aeronautical SAR incidents, and a maritime RSC (MRSC) for maritime SAR incidents.

Note: The term RSC *will be used within this Manual except where it applies only to aeronautical or maritime; then* ARSC *or* MRSC *will be used.*

2.5 SAR Facilities

2.5.1 SAR facilities include designated SRUs and other resources which can be used to conduct or support SAR operations. An SRU is a unit composed of trained personnel and provided with equipment suitable for the expeditious and efficient conduct of search and rescue. An SRU can be an air, maritime, or land-based facility. Facilities selected as SRUs should be able to reach the scene of distress quickly and, in particular, be suitable for one or more of the following operations:

- providing assistance to prevent or reduce the severity of accidents and the hardship of survivors, e.g., escorting an aircraft, standing by a sinking vessel;
- conducting a search;
- delivering supplies and survival equipment to the scene;
- rescuing survivors;
- providing food, medical or other initial needs of survivors; and
- delivering the survivors to a place of safety.

2.5.2 The equipment needed by SRUs may be grouped as shown.

(a) *Communications.* An SRU must have rapid and reliable means to communicate by voice or message with the SMC, the OSC if assigned, other SRUs, and the distressed persons. Chapter 4 has more information on SRU communications requirements.

(b) *Mobility.* The effectiveness of a SAR service depends on the number, speed, location, and efficiency of the aircraft, vessels and land vehicles available.

(c) *Supplies and Survival Equipment.* Supplies and survival equipment are carried by air and maritime SAR facilities to give aid to survivors and to facilitate their rescue. The type and number to be carried depend on the circumstances on-scene. Maritime facilities and helicopters generally can deliver this equipment directly to survivors. Fixed-wing aircraft can deliver supplies to survivors if suitable landing areas exist nearby or if the supplies can be dropped at the scene. The packing of supplies and survival

equipment should be adapted to the manner of delivery. Containers and packages of supplies and survival equipment should be strong, of a highly visible colour, waterproof and buoyant. The general nature of their contents should be clearly indicated in print in English and two or more other languages or using self-explanatory symbols, and may also be indicated by colour-coded streamers and pictograms as discussed in appendix B. Supplies and survival equipment requirements must be adapted to the circumstances of the SRR in which they are used.

(d) *Other Equipment.* Every SRU should have at its disposal maps, charts, plotting equipment, and information relevant to the SRR(s) in which it is likely to operate.

Designated Search and Rescue Units

2.5.3 States may wish to designate specific facilities as SRUs. These designated SRUs may be under the direct jurisdiction of the SAR service or other State authorities or may belong to non-Governmental or voluntary organizations. In the latter situation, agreements between the SAR service and these organizations should be developed. SRUs need not be dedicated solely to SAR operations, but should have the training and equipment necessary for proficient operations.

Specialized SAR Units

2.5.4 Specialized SRUs are teams with specialized training and equipment created for specific rescue scenarios; e. g., mountain or desert rescue. Agreements should be developed between the SAR service and these organizations for timely provision of their services.

Other Search and Rescue Facilities

2.5.5 In establishing a SAR service, States can use – to the fullest extent – existing facilities established for tasks not connected with SAR. Existing facilities often may be suitable for SAR operations with minimal modifications, added equipment or additional crew training. Examples include: teaching look-out scanning techniques to volunteers and auxiliary organizations; installing radiotelephone equipment on fishing vessels, yachts and other small craft; and using isolated stations as alerting posts. By providing training, installing some low-cost equipment and integrating all facilities into the SAR system, an efficient SAR service can be set up with limited need for dedicated SRUs.

2.6 On-scene Co-ordinator and Aircraft Co-ordinator

2.6.1 When two or more SAR facilities are working together on the same mission, it is usually advantageous if one person is assigned to co-ordinate the activities of all participating facilities. The SMC designates this OSC, who may be the person in charge of an SRU, ship, or aircraft participating in a search, or someone at another nearby facility able to handle OSC duties. The person in charge of the first SAR resource to arrive at the scene will normally assume the function of OSC until the SMC directs that the OSC function be transferred. Conceivably, the OSC may have to assume SMC duties and actually plan the search if the OSC becomes aware of a distress situation directly and communications cannot be established with an RCC. The OSC should be the most capable person available, taking into consideration SAR training, communications capabilities and the length of time that the facility on which the OSC is aboard can stay in the search area. Frequent changes in the OSC should be avoided. When appropriate, an aircraft co-ordinator (ACO) may also be designated to assist with on-scene co-ordination of SAR aircraft.

2.6.2 Responsible authorities should find ways for information, training and exercising the ACO function, both for those who act as ACOs and for those who co-operate closely with ACOs.

Aircraft co-ordinator (ACO) joint training

2.6.3 The SAR management should provide ACO training between SRU crews from different organizations that might act as ACOs. The ACO training should improve understanding of the ACO role and increase confidence amongst the participating SRUs.

2.6.4 ACO training can consist of:

– Lessons from real life SAR missions;

– Legal documents;

– Duties of co-operating organizations;

–   Performance characteristics of SRUs;

–   Typical cases and methods;

–   SMC - ACO role-playing; and

–   Paper exercises.

2.7   Support Facilities

2.7.1   Support facilities enable the operational response resources (e.g., the RCC and SRUs) to provide the SAR services. Without the supporting resources, the operational resources cannot sustain effective operations. There is a wide range of support facilities and services, which include the following:

Training facilities	Facility maintenance
Communications facilities	Management functions
Navigation systems	Research and development
SAR data providers (SDPs)	Planning
Medical assistance	Exercises
Aircraft landing fields	Refuelling services
Voluntary services (e.g., Red Cross)	Critical incident stress counsellors

Computer Resources

2.7.2   A SAR organization can benefit from use of computers by either possessing the capability, or in many instances, knowing where and how to gain computer services and database support from other organizations, including support for specialized functions such as developing a search plan. Chapter 4 provides specific information on other sources of data. Additional information may be found in paragraph 1.11 of Volume II, *Mission Co-ordination*.

2.7.3   Large amounts of computing and data storage capability can be obtained at a relatively low cost. Modern software packages make development of helpful forms, calculations, databases and some communications reasonably easy and inexpensive. Many such aids can be developed locally and do not require any specialized expertise. A basic low-cost personal computer can assist the RCC in its daily administrative functions and also be used for search planning. More sophisticated computers can provide rapid analysis and forecasts of search effectiveness, environmental data, and other search planning aids.

2.7.4   Databases can perform a number of useful functions. Most databases hold detailed information which can be quickly accessed, used and also consolidated into reports. SAR managers can use this for SAR system management support, including budget efforts and the RCC can use it for search planning. Environmental databases, including weather and maritime currents, are maintained by numerous academic, oceanographic, military, scientific and meteorological organizations which may make them available for search planning. The SAR system has a growing global network of SAR data providers (SDPs) available to States. The International Telecommunication Union has information for identifying mobile radio stations which transmit distress alerts. Cospas–Sarsat also maintains registration databases with basic SAR information. These databases rely upon States to submit timely and correct information. Other databases include Inmarsat numbers, call signs, maritime mobile service identity (MMSI) numbers and shipping registers. When such databases are implemented, the data should be made readily available on a 24-hour basis to any RCC in receipt of a distress alert.

2.7.5   The SAR system greatly benefits from using all available facilities. Appendix C provides a list of possible sources for SAR assistance.