SEARCH AND RESCUE

ATP-3.3.9.2 (ATP-10)

NORTH ATLANTIC TREATY ORGANIZATION

NATO STANDARDIZATION AGENCY (NSA)

NATO LETTER OF PROMULGATION

DATE TO BE INSERTED

1. ATP-3.3.9.2 (ATP-10) – **SEARCH AND RESCUE** (**SAR**) is a NATO/PFP UNCLASSIFIED publication. The agreement of nations to use this publication is recorded in STANAG 3552.

2. ATP-3.3.9.2 supersedes ATP-10(D) – Search and Rescue. It will be effective on the NATO Effective Date (NED) of **xx xxxxxxx xxxx**.

3. Due to the evolving NATO command structure, terms and titles used in this document may be subject to change. This will be reflected in future changes.

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Brigadier General, POL(A)
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RECORD OF RESERVATIONS

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GLOSSARY AND ABBREVATONS/ACRONYMS

GLOSSARY

(Note - the following terms and definitions are taken from the IAM SAR Manual)

Aircraft Coordinator (ACO). A person who coordinates the involvement of multiple aircraft in SAR operations.

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 coordination center or rescue sub-center.

Area Control Centre. An air traffic control facility primarily responsible for providing ATC services to IFR aircraft in controlled areas under its jurisdiction.

Awareness Stage. A period during which the SAR system becomes aware of an actual or potential incident.

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.

Commence Search Point (CSP). Point normally specified by the SMC where a SAR facility is to begin its search pattern.

Conclusion Stage. A period during a SAR incident when SAR facilities return to their regular location and prepare for another mission.

Coordinated Search Pattern. Multiunit pattern using vessel(s) and aircraft.

Cospas-Sarsat System. A satellite system designed to detect distress beacons transmitting on the frequencies 121.5 MHz and 406 MHz.

Coverage Factor (C). The ratio of the search effort (Z) to the area searched (A). C = Z/A. For parallel sweep searches, it may be computed as the ratio of sweep width (W) to track spacing (S). C = W/S

Craft. Any air or sea-surface vehicle, or submersible of any kind or size.

Datum. A geographic point, line, or area used as a reference in search planning.

Datum Area. Area in where it is estimated that the search object is most likely to be located.

Datum Line. A line, such as the distressed craft's intended track line or a line of bearing, that defines the center of the area where it is estimated that the search object is most likely to be located.

Dead Reckoning (DR). Determination of position of a craft by adding to the last fix the distance based on the craft's course and speed for a given time.

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.

Direction of Current. Direction *toward* which a current is flowing. Also called "set".

Direction of Waves, Swells, or Seas. Direction *from* which the waves, swells, or seas are moving.

Direction of Wind. Direction *from* which the wind is blowing.

Distress Alerting. The reporting of a distress incident to a unit that can provide or coordinate 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.

Drift. The movement of a search object caused by environmental factors.

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.

False Alert. Distress alert received from any source, including communications equipment intended for alerting, when no distress situation actually exists, and a notification of distress should not have resulted.

Flight Information Center (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 on 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.

Global Navigation Satellite System (GNSS). Worldwide position and time determination system that includes one or more satellite constellations and receivers.

Initial Action Stage. A period during which preliminary action is taken to alert SAR facilities and obtain amplifying information.

Inmarsat. A system of geo-stationary satellites for worldwide mobile communications services, and which support the Global Maritime Distress and Safety System and other emergency communications systems.

Joint Rescue Coordination Centre. An RCC responsible for more than one primary type of SAR services, e.g., both aeronautical and maritime SAR incidents. *Note: the term "JRCC" will not be used for civil SAR purposes solely based on the fact that an RCC is staffed by personnel from, or is sponsored by, more than one organization.*

Last Known Position (LKP). Last witnessed, reported, or computed DR position of a distressed craft.

Leeway (LW). The movement of a search object through water caused by winds blowing against exposed surfaces.

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.

MAYDAY. The international radiotelephony distress signal, repeated three times.

MEDEVAC. Evacuation of a person for medical reasons.

MEDICO. Medical advice. Exchange of medical information and recommended treatment for sick or injured persons where treatment cannot be administered directly by prescribing medical personnel.

Mission Control Centre (MCC). Part of the Cospas-Sarsat system that accepts alert messages from the local user terminal(s) and other mission control centers to distribute to the appropriate rescue coordination centers 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. Telegraphy system for transmission of maritime safety information, navigation and meteorological warnings and urgent information to ships.

On-scene. The search area or the actual distress site.

On-scene Coordinator (OSC). A person designated to coordinate search and rescue operations within a specified search area.

On-scene Endurance. The amount of time a facility may spend at the scene engaged in SAR activities.

Operations Stage. A period during a SAR incident when SAR facilities proceed to the scene, conduct search, rescue survivors, assist distressed craft, provide emergency care for survivors, and deliver survivors to a suitable facility.

Overdue. A situation where a craft has failed to arrive at its intended destination when expected and remains missing.

PAN-PAN. The international radiotelephony urgency signal. When repeated three times, indicates uncertainty or alert, followed by nature of urgency.

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 duringa sortie.

Planning Stage. A period during a SAR incident when an effective plan of operations is developed.

Possibility Area.

(1) The smallest area containing all possible survivor or search object locations.

(2) For a scenario, the possibility area is the smallest area containing all possible survivor or search object locations that are consistent with the facts and assumptions used to form the scenario.

Probability of Containment (POC). The probability that the search object is contained within the boundaries of an area, sub-area, or grid cell.

Probability of Detection (POD). The probability of the search object being detected, assuming it was in the areas that were searched. POD is a function of coverage factor, sensor, search conditions and the accuracy with which the search facility navigates its assigned search pattern. Measures sensor effectiveness under the prevailing search conditions.

Probability of Success (POS). The probability of finding the search object with a particular search. For each sub-area searched, POS = POC x POD. Measures search effectiveness.

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 Coordination Centre (RCC). A unit responsible for promoting efficient organization of SAR services and for coordinating the conduct of SAR operations within a search and rescue region. *Note: The term RCC will be used within this publication to apply to either aeronautical or maritime centres; ARCC or MRCC will be used as the context warrants.* (Recognized RCCs are identified by ICAO and IMO for international purposes.)

Rescue Sub-center (RSC). A unit subordinate to an RCC established to complement the latter according to particular provisions of the responsible authorities. *Note: The term RSC will be used within this publication to apply to either aeronautical or maritimecentres, ARSC or MRSC will be used as the context warrants.*

SafetyNET. Communications service provided via Inmarsat for promulgation of maritime safety information, including shore-to-ship relays of distress alerts and communications for SAR coordination.

Search. An operation, normally coordinated by an RCC or RSC, using available personnel and facilities to find persons in distress when their location is not precisely known.

Search Action Plan. Message, normally developed by the SMC, for passing instructions to SAR facilities and agencies participating in a search.

Search and Rescue Coordinating Communications. Communications necessary for the coordination of facilities participating in a search and rescue operation.

Search and Rescue Coordinator (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 coordinated.

Search and Rescue Data Provider (SDP). A source from which a rescue coordination center may 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 SRUs, used to conduct SAR operations.

Search and Rescue Incident. Any situation requiring notification and alerting of the SAR system and which may require SAR operations.

Search and Rescue Mission Coordinator (SMC). The official temporarily assigned to coordinate response to an actual or apparent distress situation.

Search and Rescue Plan. A general term used to describe documents that may exist at all levels of the national and international SAR structure to describe goals, arrangements, and procedures which support the provision of SAR services

Search and Rescue Point of Contact (SPOC). Rescue coordination centers 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 an RCC, within which SAR services are provided.

Search and Rescue Service. The performance of distress monitoring, communication, coordination and SAR functions, including provision of medical advice, initial medical assistance, or medical evacuation, through the use of public and private resources including cooperating 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-center.

Search and Rescue Unit (SRU). A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of SAR operations.

Search Area. The area, determined by the search planner, that is to be searched. This area may be sub-divided into search sub-areas for the purpose of assigning specific responsibilities to the available search facilities.

Search Effort (Z). A measure of the area a search facility can effectively search within the limits of search speed, endurance, and sweep width. Search effort is computed as the product of search speed (V), search endurance (T), and sweep width (W). $Z = V \times T \times W$

Search Endurance. The amount of “productive” search time available at the scene. This figure is usually taken to be 85% of the on-scene endurance, leaving a 15% allowance for investigating sightings and navigating turns at the ends of search legs.

Search Object. A ship, aircraft, or other craft missing or in distress or survivors or related objects or evidence for which a search is being conducted.

Search Pattern. A trackline or procedure assigned to an SRU for searching a specified area.

Search Speed (V). The speed (or velocity) with which a search facility moves over the ground when searching.

Situation Report (SITREP). Reports, from the OSC to the SMC or the SMC to interested agencies, to keep them informed of on-scene conditions and mission progress.

Surface Picture (SURPIC). A list or graphic display from a ship reporting system of information about vessels in the vicinity of a distress situation that may be called upon to render assistance.

Track Spacing (S). The distance between adjacent parallel search tracks.

Uncertainty Phase. A situation wherein *doubt* exists about 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.

ABBREVIATIONS/ACRONYMS

Abbreviation/Acronym	IAMSAR Manual	Meaning
A	Yes	Search Area
AA		Alerting Authority
A/C	Yes	Aircraft
ACC	Yes	Area Control Centre
ACO	Yes	Aircraft Coordinator
ACP		Allied Communications Publication
AES	Yes	Aeronautical Earth Station
AFN	Yes	Aeronautical Fixed Network
AFS		Aeronautical Fixed Station
AFTN	Yes	Aeronautical Fixed Telecommunications Network
AIM		Airman's Information Manual
AIP	Yes	Aeronautical Information Publication
AIS	Yes	Aeronautical Information Services
AM, am	Yes	Amplitude Modulation
AMS	Yes	Aeronautical Mobile Service
AMS(R)S	Yes	Aeronautical Mobile Satellite (Route) Service
AMSS	Yes	Aeronautical Mobile Satellite Service
ANC	Yes	Air Navigation Commission
ANPs		Air Navigation Plans
ARCC	Yes	Aeronautical Rescue Coordination Centre
ARSC	Yes	Aeronautical Rescue Sub-centre
ASW		Average Surface Wind
ASW		Anti-Submarine Warfare
ATC	Yes	Air Traffic Control
ATCC		Air Traffic Control Centre
ATP		Allied Tactical Publication
ATS	Yes	Air Traffic Service
BC		Bottom Current
C	Yes	Coverage Factor
C		Creeping Line Pattern
CAA		Civil Aviation Authority
CASP		Computer-Aided Search Planning
CC		Compression Chamber
C/C	Yes	Cabin Cruiser
CCIR		International Radio Consultative Committee
CES	Yes	Coast Earth Station
CF		Drift Error Confidence Factor
CHOP		Change Operational Control
CIRM	Yes	Centro Internazionale Radio-medico
CMSS		Commercial Mobile Satellite Services
COMCEN		Communications Centre

Abbreviation/Acronym	IAMSAR Manual	Meaning
COMCHECK		Communications Check
COSPAS	Yes	Comicheskaya Sisttyma Poiska Avariynych Sudov (Space System for Search of Vessels in Distress)
CPA		Closest Point of Approach
CR		Combat Recovery
CRF		Co-ordinator Recovery/Rescue Forces
CR Ops		Combat Recovery Operations
CRS	Yes	Coast Radio Station
CS	Yes	Creeping Line Single Unit
CSAR		Combat Search and Rescue
CSC	Yes	Creeping Line Single Unit Co-ordinated
CSP	Yes	Commence Search Point
CW	Yes	Continuous Wave
D	Yes	Total Drift
d		Surface Drift
D_a		Aeronautical Drift
D_e	Yes	Total Drift Error
d_e		Individual Drift Error
d_{ea}		Aerospace Drift Error
DF	Yes	Direction Finding
DISSUB		Disabled/Distressed Submarine
DMB	Yes	Datum Marker Buoy
DME	Yes	Distance Measuring Equipment
d_p		Parachute Drift
DR	Yes	Dead Reckoning
DR_e		Dead Reckoning Error
DRU	Yes	Desert Rescue Unit
DSAR		Deployed Search and Rescue
DSC	Yes	Digital Selective Calling
DSRV		Deep Submergence Rescue Vehicle
DTG		Date Time Group
e.g.		*exempli gratia;* For Example
E	Yes	Total Probable Error of Position
ECB		Expendable Communications Buoy
EGC	Yes	Enhanced Group Calling
EGS		Escape Gear Ship
ELR	Yes	Extra-long Range Aircraft
ELSS		Emergency Life Support Stores
ELT	Yes	Emergency Locator Transmitter
EMS		Emergency Medical Services
EMT		Emergency Medical Technician
ENID	Yes	Enhanced Identity
EPIRB	Yes	Emergency Position Indicating Radio Beacon

Abbreviation/Acronym	IAMSAR Manual	Meaning
ERFR		Emergency Restrictions of Flying Regulations
ETA	Yes	Estimated Time of Arrival
ETD	Yes	Estimated Time of Departure
ETI		Estimated Time of Intercept
F		Flare Patterns
FIC	Yes	Flight Information Centre
FIR	Yes	Flight Information Region
FIS		Flight Information Service
FIX_e		Navigational Fix Error
FLAR	Yes	Forward Looking Airborne Radar
FLIPs		Flight Information Publications
FLIR	Yes	Forward Looking Infra Red
FM		Flare Multiunit
FM	Yes	Frequency Modulation
FOV	Yes	Field of View
FS		Flare Single-unit
f_s	Yes	Optimal Search Factor
FSS		Flight service Station
f_v	Yes	Velocity Correction Factor
F/V	Yes	Fishing Vessel
f_w	Yes	Weather Correction Factor
f_z	Yes	Effort Factor
GCI		Ground Control Interception
GEOREF		Geographical Reference System
GES	Yes	Ground Earth Station
GHz	Yes	Gigahertz
GLONASS	Yes	Global Orbiting Navigation Satellite System
GMDSS	Yes	Global Maritime Distress and Safety System
GNSS	Yes	Global Navigation Satellite System
GPS	Yes	Global Positioning System
GS	Yes	Ground Speed
gt	Yes	Gross Tons
H		Homing Pattern
HEL-H	Yes	Heavy Helicopter
HEL-L	Yes	Light Helicopter
HEL-M	Yes	Medium Helicopter
HF	Yes	High Frequency
HFDF		High Frequency Direction Finding
HP		High Pressure
HQ	Yes	Headquarters
HS		Homing single-unit
i.e.		That is (Id Est)
IAMSAR	Yes	International Aeronautical and Maritime Search and Rescue

Abbreviation/Acronym	IAMSAR Manual	Meaning
I/B	Yes	Inboard
ICAO	Yes	International Civil Aviation Authority
ICS	Yes	Incident Command System
IFF		Identification, Friend or Foe
IFR	Yes	Instrument Flight Rules
ILS	Yes	Instrument Landing System
IMC	Yes	Instrument Meteorological Conditions
IMO	Yes	International Maritime Organisation
IMSO		International Mobile Satellite Organisation
INMARSAT	Yes	International Maritime Satellite
INS	Yes	Inertial Navigation System
INTERCO	Yes	International Code of Signals
IP	Yes	Initial Position
ITU	Yes	International Telecommunication Union
JRCC	Yes	Joint (Aeronautical and Maritime) Rescue Coordination Centre
JRSC	Yes	Joint Rescue Sub-centre
kHz	Yes	Kilo Hertz
km	Yes	Kilometres
kt	Yes	Knot
I	Yes	Search Sub-area Length
L	Yes	Length
LC		Lake Current
LCB	Yes	Line of Constant Bearing
LES	Yes	Land Earth Station
LKP	Yes	Last Known Position
LOP	Yes	Line of Position
Loran	Yes	Long-range Aid to Navigation
LRG	Yes	Long Range Aircraft
LSB	Yes	Lower Side-band
LSC		Long Shore Currents
LUT	Yes	Local User Terminal
LW	Yes	Leeway
m	Yes	Metres
MCC	Yes	Mission Control Centre
MCW	Yes	Modulated Carrier Wave
MEDEVAC	Yes	Medical Evacuation
MEDICO	Yes	Medical Advice, Usually by Radio
MF	Yes	Medium Frequency
MHN		Moving Havens
MHz	Yes	Megahertz
MMSI	Yes	Maritime Mobile Service Identity
MOA		Military Operating Area
MOSUB		Mother Submarine

Abbreviation/Acronym	IAMSAR Manual	Meaning
MPA		Maritime Patrol Aircraft
MRCC	Yes	Maritime Rescue Co-ordination Centre
MRG	Yes	Medium Range Aircraft
MRS		Master Radio Station
MRSC	Yes	Maritime Rescue Sub-centre
MRU	Yes	Mountain Rescue Unit
MSC		Major Subordinate Commander
MSGCORRM		Message Correction
MSI	Yes	Maritime Safety Information
MSS		Mobile Satellite Services
MSS		Marine Sound Signals
MTTSI	Yes	Minimum Time to Scene Intercept
M/V	Yes	Merchant Vessel
n	Yes	Number of Required Track Spacings
N	Yes	Number of SAR Facilities
NA		National Authority
NATO		North Atlantic Treaty Organisation
NBDP	Yes	Narrow Band Direct Printing
NI		Non-Integrated
NM	Yes	Nautical Mile
NOK		Next of Kin
NOTAM	Yes	Notice to Airmen
NVG	Yes	Night Vision Goggles
O		Contour Pattern
O/B	Yes	Outboard
OCA		Oceanic Control Area
OM		Contour Multi-Unit
OPCON		Operational Control
O/S	Yes	On-scene
OS	Yes	Contour Single-Unit
OSC	Yes	On-scene Coordinator
OSC		On Scene Commander
OSE		Officer Scheduling Exercise
OSV	Yes	Offshore Supply Vessel
P		Parallel Patterns
PANS		Procedures for Air navigation Services
PB		Patrol Boat
P/C	Yes	Pleasure Craft
Pd		Drift Compensated Parallelogram Pattern
PIW	Yes	Person in Water
PLB	Yes	Personal Locator Beacon
PM		Parallel Track Multiunit
PMC		Parallel Multiunit Circle
PMN		Parallel Track Multiunit Non-return

Abbreviation/Acronym	IAMSAR Manual	Meaning
PMR		Parallel Track Multiunit Return
POA		Probability of Area (synonymous with POC)
POB	Yes	Persons on Board
POC	Yes	Probability of Containment (synonymous with POA)
POD	Yes	Probability of Detection
PR		Personnel Recovery
POS	Yes	Probability of Success
POS_c	Yes	Cumulative Probability of Success
PRU	Yes	Parachute Rescue Unit
PS	Yes	Parallel Track Single-Unit
PSL		Parallel Track Single-Unit LORAN
PSS		Parallel Track Single-Unit Spiral
R	Yes	Search Radius
R&D	Yes	Research and Development
RATT		Radio Teletype
RANP	Yes	Regional Air Navigation Plan
RB	Yes	Rescue Boat
RC	Yes	River Current
RCC	Yes	Rescue Co-ordination Centre
RDA		Restricted and Danger Areas
RDF		Radio Direction Finder
RESCAP		Rescue Combat Air Patrol
RESCORT		Rescue Escort
RF	Yes	Radio Frequency
RGS		Rescue/Recovery Gear Ship
RNAV		Area Navigation System (ICAO Term)
R_o	Yes	Optimal Search Radius
ROV		Remotely Operated Vehicle
RSC	Yes	Rescue Sub-centre
R/T	Yes	Radio Telephony
RTT	Yes	Radio Teletype
RV	Yes	Rescue Vessel
S		Square Pattern
S	Yes	Track Spacing
SA		Support Authority
SAR	Yes	Search and Rescue
SARIR		Search and Rescue Incident Report
SAROPS		Search and Rescue Operations
SARREQ		Search and Rescue Request
SARSAT	Yes	SAR Satellite
SARSIT		Search and Rescue Situation Summary Report
SART	Yes	Search and Rescue Transponder
SATCOM		Satellite Communications

Abbreviation/Acronym	IAMSAR Manual	Meaning
SC	Yes	SAR Co-ordinator
SC	Yes	Sea Current
SDP	Yes	SAR Data Provider
SES	Yes	Ship Earth Station
SEAD		Suppression of Enemy Air Defences
SIC		Subject Indicator Codes
SIF		Selective Identification
SITREP	Yes	Situation Report
SL		Sea Level
SLAR		Side-looking Airborne Radar
SMERAT		Submarine Escape and Rescue Assistance Team
SOA	Yes	Speed of Advance
SOLAS	Yes	Safety of Life at Sea
SPAG		SUBSUNK Parachute Assistance Group
SPOC	Yes	Search and Rescue Point of Contact
SRG	Yes	Short-range Aircraft
SRR	Yes	Search and Rescue Region
SRS	Yes	Search and Rescue Sub-region
SRS		Submarine Rescue Submersible
SRU	Yes	Search and Rescue Unit
SS	Yes	Expanding Square Search
SS		Submarine
S/S	Yes	Steamship
SSB	Yes	Single Sided Band
SSBN		Sub Surface (Ballistic) (Nuclear)
SSN		Sub Surface (Nuclear)
SSRA		Submarine Search and Rescue Authority
SSRZ		Submarine Search and Rescue Zone
SU	Yes	Search Unit
SUBLOOK		Initial Search for Submarine
SUBMISS		Code Name for Missing Submarine
SUBOPAUTH		Submarine Operating Authority
SUBSUNK		Full Scale Search for Submarine
SUC		Surf Current
SURPIC	Yes	Surface Picture
S/V	Yes	Sailing Vessel
SVR		Surface Vessel Radar
SWC		Swell/Wave Currents
T	Yes	Search Time Available
T	Yes	True Course
T		Trackline Pattern
TACAN		Tactical Air Navigation
TAS	Yes	True Airspeed

Abbreviation/Acronym	IAMSAR Manual	Meaning
TC	Yes	Tidal Current
TCA	Yes	Time of Closest Approach
TELEX	Yes	Teletype
TFR	Yes	Temporary Flight Restriction
TLX	Yes	Teletype
TMN		Trackline Multi-Unit Non-Return
TMR		Trackline Multi-Unit Return
TPL		Telephone Private Lines
TRACON		Terminal Radar Approach Control
TSN	Yes	Trackline Single-Unit Non-Return
TSR	Yes	Trackline Single-Unit Return
T/V	Yes	Tank Vessel
TWC	Yes	Total Water Current
U	Yes	Windspeed
UCG		Underwater Communications Guard
UHF	Yes	Ultra High Frequency
UIR	Yes	Upper Information Region
ULR	Yes	Ultra Long-range Aircraft
UMIB		Urgent marine Information Broadcast
USB	Yes	Upper Side band
UTC	Yes	Co-ordinated Universal Time
UTM	Yes	Universal Transverse Mercator Grid
UWT		Underwater Telephone
v	Yes	Speed of Search Object
V	Yes	SAR Facility Ground Speed
V		Sector Pattern
VDSD		Visual Distress Signalling Devices
VFR	Yes	Visual Flight Rules
VHF	Yes	Very High Frequency
VLR	Yes	Very Long-range Aircraft
VMC	Yes	Visual Meteorological Conditions
VOR	Yes	VHF Omni-directional Radio Ranging
VORTAC		VHF Omni-directional Range Station/Tactical Air Navigation
VS	Yes	Sector Single-Unit
VSR		Sector Single-Unit Radar
w	Yes	Search sub-area width
W	Yes	Sweep Width
WC	Yes	Wind Current
WMO	Yes	World Meteorological Organization
W/T		Wireless Telegraphy/Radio Telegraph
W_u	Yes	Uncorrected Sweep Width
WWNWS		World Wide Navigation Warning System
X	Yes	Initial Position Error

Abbreviation/Acronym	IAMSAR Manual	Meaning
XCVR		Transceiver
XSB		Barrier Single Unit
Y	Yes	SAR Facility Position Error
Z	Yes	Search Effort (V x T x W)
Z_t	Yes	Total Available Search Effort

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CHAPTER 1

SEARCH AND RESCUE POLICY

POLICY

101. Responsibilities. All NATO nations are signatories to the International Civil Aviation Organization (ICAO) Convention on International Civil Aviation, 1947 (Chicago Convention) and the International Maritime Organization (IMO) International Convention on Maritime SAR of 1979 (Hamburg Convention). Therefore, under these Conventions, all NATO nations have agreed to adhere to overall policies, procedures and minimum standards in SAR for the needs of maritime and aviation safety. NATO SAR policy is entirely compatible with the Chicago Convention, Hamburg Convention and the IAMSAR Manual. SAR provisions of the Chicago Convention are contained in Annex 12 of that Convention. Civil SAR authorities typically refer to these two international SAR conventions as Annex 12 and the Maritime SAR Convention. The operational aspects of this responsibility are discharged by delegation to nations, with each nation being responsible for SAR within an area or number of areas that are called Search and Rescue Regions (SRRs). It is recommended that the delineation of SRRs should, as far as practicable, coincide with those of the corresponding Flight Information Regions (FIRs). It is further recommended that, wherever practicable, the delineation of air and maritime SRRs be coincident. The delineation of SRRs is determined on the basis of technical and operational considerations and is not normally related to boundaries between states.

102. Application of ATP-3.3.9.2. This Publication has been accepted as meeting the needs of the NATO nations. It supplements the principles and procedures set forth in ICAO and IMO Conventions, Annexes and SAR manual. The International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual, produced jointly by ICAO and IMO in line with the Chicago Convention and the Hamburg Convention, provides a global framework for SAR and for this reason it forms an excellent basis for SAR planning. The IAMSAR Manual was developed specifically to foster cooperation between neighbouring states and between aeronautical and maritime authorities. Member states of NATO whose SRRs are adjacent to the SRRs of states which are not members of NATO shall endeavour to organise collaboration between SAR services, basing their actions on the procedures laid down in the IAMSAR Manual. **Therefore, it is intended that this document should be used in conjunction with the IAMSAR Manual**. The IAMSAR Manual is a three-volume set with each volume written with specific SAR system duties (organization and management, mission coordination, and mobile facilities) in mind. Volume 1 can be used as a standalone document or, in conjunction with the other two volumes, as a means to attain a full view of the SAR system.

103. SAR in Peace. There is no requirement for NATO to maintain an SAR organisation in parallel to those established to comply with ICAO or IMO requirements. In times of peace, NATO SAR services remain a national responsibility operated to meet ICAO, IMO and NATO requirements. In many cases NATO requirements for SAR may exceed those of ICAO and IMO; thus the facilities provided within SRRs are often well in excess of those shown in the ICAO and IMO documents for the region. SAR facilities provided by nations, though usually military and military operated, may also be civil and civil operated.

104. SAR in Crisis or War. In times of crisis or war, the existing SAR organisation will be continued wherever possible; however, greater regard will be paid to NATO requirements. Planning for crisis and/or war will take into account the specific guidance contained in ATP 49 (Use of Helicopters in Land Operations) ATP-62 (ATP-3.3.9.1) Combat Search and Rescue (CSAR) and Annex A to this Chapter.

105. Naval Commanders. Commanders of NATO naval forces are also charged with maintaining SAR plans for their forces. Such plans are to provide, both in peace and in war, for appropriate liaison with national SAR authorities and NATO Rescue Coordination Centers (RCCs) in order to provide mutual assistance in SAR operations.

NATO SAR DOCTRINE

106. Objective of ATP-3.3.9.2. The objective of ATP-3.3.9.2 is to standardise SAR operational procedures within NATO. It ensures co-ordination between the SAR facilities of forces operated by NATO nations, within the areas of national responsibility established in accordance with the provisions of ICAO and IMO conventions. SAR operational co-ordination and search planning are detailed in IAMSAR Manual Volume II, and operational aspects for mobile response facilities are discussed in Volume III.

107. Operational Procedures. All participants have agreed to implement the SAR operational procedures laid down in this document, which are based on the following broad principles:

a. Areas of Responsibility. The national areas of responsibility for maritime SAR, where defined by ICAO or IMO, shall be adhered to. Inside a nation's SRR, the closest practicable co-ordination shall be ensured between maritime and aeronautical services in order to provide the most effective and efficient SAR services.

b. RCCs. For any given SAR operation concerning aircraft in distress a single RCC shall be responsible for all search and rescue activities. This principle should similarly apply in marine incidents where a Maritime RCC (MRCC) will be designated the responsible RCC. In other than aircraft or civil marine incidents, the appropriate authority may call upon one or more RCCs (Aeronautical RCC (ARCC) and/or maritime MRCCs) to assist the operation. A rescue operation in the immediate vicinity of an airfield or aircraft carrier does not normally come under the responsibility of an RCC, but the relevant RCC must be duly informed of all activities that shall be taking place.

c. SAR Facilities. For any given SAR operation, any nation or RCC shall, on request by the responsible RCC or responsible command or civil authority, make available SAR facilities from those at its disposal.

d. Co-operation Between Nations. Each NATO country should take measures to ensure that, in the event of a SAR operation near a frontier, the competent authorities, when notified by their RCC, shall allow search teams and SAR aircraft of neighbouring countries to cross the frontier in order to conduct their mission. Additionally, in order to facilitate the conduct of SAR missions, the SAR aircraft of one country may, in agreement with the appropriate RCC, land without prior diplomatic clearance at airfields designated in advance by other countries and at NATO airfields.

e. Costs. Where, during a SAR operation, a military airfield covered by sub-para 108d provides refuelling for SAR aircraft belonging to one of the other states, the cost of providing facilities to military and primary SAR aircraft will be in accordance with current procedure. The cost of facilities for civilian aircraft using military airfields, or for military and primary SAR aircraft using civil airfields, will be arranged by agreement between the nations concerned.

f. Liaison between RCCs. RCCs will maintain a continuous liaison with adjacent RCCs so that communications are frequently exercised and adequate records of the capabilities and resources of each are kept up to date. Visits and exchanges are encouraged.

SAR DURING COMBAT, CRISIS, ANTI-TERRORIST, HUMANITARIAN AND NON-WARFIGHTING MILITARY OPERATIONS

BACKGROUND

1. Risks and Threats. The increasingly expeditionary nature of modern military operations, and the utility of armed forces for a wide spectrum of activities, can lead to asymmetric dangers and higher vulnerability for isolated military personnel. NATO personnel are susceptible to a range of isolation risks throughout the entire spectrum of military operations, from peacetime exercises to deployed high-intensity warfare. Operational experience has highlighted the changed operational environment, the increased vulnerability of personnel and the political pressure invested in their recovery should they become isolated.

PERSONNEL RECOVERY (PR)

2. Requirement. Personnel who serve with a nation's armed forces, or other Government agencies, are frequently exposed to potentially hazardous situations during the course of their duties in both peace and war. NATO has a duty to reduce, wherever possible, the risk to their lives and welfare. The term used to describe the recovery of personnel across the spectrum of military operations is PR.

3. Definition. PR is the aggregation of military, civil and political efforts to obtain the release or recovery of personnel from uncertain or hostile environments and denied areas whether they are captured, missing or isolated.

4. Scope. PR comprises SAR Operations (SAR Ops), Combat Recover Operations (CR Ops), associated Survival, Escape/Evasion, Resistance and Extraction (SERE) procedures and Care After Recovery (CAR). SAR Ops and CR Ops comprise the following elements:

a. SAR Ops. SAR Ops cover the use of aircraft, surface craft, submarines, specialised rescue teams and equipment to search for, and rescue, personnel in distress. NATO SAR Ops, which would normally be conducted iaw ATP-3.3.9.2 Chapters 1 –7, are subdivided into SAR and DSAR as follows:

(1) SAR. SAR is normally related to distress situations where local SAR capability is deemed sufficient to meet NATO requirements, and no additional provision is deemed necessary.

(2) DSAR. DSAR describes the recovery of personnel in distress during deployed operations or exercises where no threat is posed by hostile interference. DSAR is normally related to deployed operations or exercises where local SAR capability is insufficient to meet NATO requirements and additional capability needs to be deployed. If it is impractical to deploy dedicated SAR assets, in-theatre assets such as rescue hoist-equipped military support or maritime helicopters might be required to provide a DSAR capability.

b. CR Ops. CR Ops is a generic term for operations in uncertain or hostile environments. It is subdivided into CR, CSAR and SOF Recovery Ops as follows:

(1) CR. Details are in ATP 49 (Use of Helicopters in Land Operations)

(2) CSAR. Details are in ATP 62 (ATP-3.3.9.1) (CSAR).

(3) SOF Recoveries. Unconventional SOF recoveries are related primarily to unusual isolation events a such as hostage situation. SOF will utilize their own procedures for these operations.

5. Scope and Scale. Varied situations and threat scenarios mean that the scope and scale of PR operations will vary widely. Due to the risk to the recovery forces in a threat environment, detailed intelligence, careful planning and co-ordination, risk analysis and rapid, reliable and secure means of communication are essential if success is to be achieved. Standardized procedures will enable joint operations to take place.

6. Environment. NATO PR operations may be undertaken both within and beyond the NATO AOR, by day or night, in all weather conditions, and over land and water. All component commanders must be prepared to contribute to a PR operation. Assets may be earmarked for specific missions or situations; they may be either pre-positioned or maintained at a high degree of readiness.

CHAPTER 2

CONCEPTS OF SEARCH AND RESCUE

201. Function. The primary function of SAR is to save lives. Military SAR effort is directed principally towards, but is not restricted to, the rescue of military personnel of the Allied Nations. SAR assistance is also provided for civil aviation and maritime distress and is made available, subject to military requirements and operational practicability, in instances of maritime and general civil distress. Additionally, some nations have parallel civil SAR assets, which can respond to military SAR incidents.

202. Scope. This manual deals with operations based upon the doctrine of search and rescue which has evolved to date and, together with the IAMSAR Manual, it presents the techniques and procedures on which further expansion of the doctrine may be based. It is intended to serve as a guide to all operational commands that may be assigned responsibility for search and rescue operations. It provides information for all those who may be confronted with SAR issues and should be used in conjunction with the IAMSAR Manual.

203. SAR Assets. SAR is a service furnished by those units detailed to such duties. It may involve the use of aircraft, surface craft, submarines, specialized rescue teams and equipment to rescue persons in distress on land or at sea, provide for their initial medical or other needs, and deliver them to a place of safety.

204. Command. To avoid duplication and waste of effort, SAR Command relationships, responsibilities and functions must be clearly stated. SAR procedures are to be standardized on the lines set forth in this manual. Their most effective application can be accomplished only through a trained organization capable of planning an operation and then co-ordinating and directing available SAR resources.

205. SAR Operations. An SAR operation covers the whole process of measures aimed at searching for and rescuing persons in distress. Normally, SAR operations are co-ordinated and directed by an RCC (taking, as a minimum standard, the general provisions and details of implementation adopted by member countries of ICAO and IMO). In this context it is emphasised that a rescue operation conducted by local forces in the immediate vicinity of an airfield or ship is regarded as a local rescue and not a full SAR operation. (See also Chapter 3 Annex A)..

CHAPTER 3

ORGANIZATION

RESPONSIBILITIES

301. National SAR Organizations. SAR is a national responsibility and, as such, the organization for SAR differs slightly in each nation. No attempt is made to describe national organizations in detail in this publication. It is the responsibility of each commander to ensure that the SAR organization in his area is well known to all those are likely to be involved in planning, directing, co-ordinating and conducting SAR operations. Broadly, organization is achieved by forming an RCC, making necessary SAR facilities available to the centre, training assigned personnel in all aspects of SAR, and establishing co-operative arrangements to make use of all available SAR resources.

302. SAR Responsibilities. The assignment of SAR responsibility in no way affects the fundamental responsibility of any individual or unit, which has knowledge of persons in distress, to initiate rescue action. However, independent action must be reported without delay to the appropriate authority. In case of an aircraft or maritime incident, the report should be made to the appropriate ARCC or MRCC respectively.

REGIONS OF RESPONSIBILITY

303. SAR Regions (SRRs). Aeronautical SRRs are defined by the most recent Regional Air Navigation Plans (RANPs) of ICAO. They are allocated to member countries of NATO and to countries that fall within the area of NATO activity. Maritime SRRs are published in the IMO Maritime Global SAR Plan and are also provided in various nautical publications for carriage on board merchant ships and other vessels.

304. Rescue Coordination Centres (RCCs). Responsibilities of RCCs and Rescue Sub-centres (RSCs) are discussed in detail in the IAMSAR Manual (Volume II). Within each SRR, there is an RCC (Aeronautical RCC (ARCC), Maritime RCC (MRCC), or Joint Aeronautical and Maritime RCC (JRCC)) responsible for ensuring the efficient organisation of SAR operations within its region. Normally, MRCCs should be collocated with ARCCs, utilising common accommodation and facilities; however, when the demands from interests other than aviation are numerous and varied, it is recognised that a collocated Air and Maritime RCC might not be appropriate. Instead, one or more RSCs may be set up, under an RCC, in order to co-ordinate and control more efficiently SAR facilities and/or incidents in particular sectors. SAR Co-ordination Posts (CPs) may also be set up; these are of lesser importance and, acting under the overall co-ordination of an RCC or RSC, are intended to handle operations in a local sector only. Broad requirements for RCC, RSC and CP organizations are provided at Annex A and detailed information on NATO RCCs is provided at Annex B. (It should be noted that 'CP' is not an established term in the civil SAR system).

NON-INTEGRATED FORCES

305. Definition. In addition to their responsibilities under the ICAO and IMO organization, many NATO nations operate forces trained in SAR procedures but not committed to SAR operations. Such forces might, either on a permanent or temporary basis, operate within the designated ICAO and/or IMO SRRs and they are known as Non-Integrated (NI) SAR forces. One example is naval shipping.

306. NI SAR Force's Responsibilities. NI forces undertaking SAR operations must:

a. Alert the appropriate RCC. When NI forces undertake SAR operations on their own account (as is frequently the case with naval forces), the RCC responsible for the SRR is to be informed. Distress calls are received over a wide area and, unless the RCC is made aware of the independent action being taken, unnecessary alerting of other SAR facilities could occur.

b. Appoint a RCC liaison officer if conducting a major SAR operation. For any major SAR operation the RCC should normally co-ordinate all available facilities. In such cases it is useful to have a liaison officer from the NI force attached to the RCC.

307. Communications With NI Forces Any NI force commander who has doubts about the safety of assets under his control, or wishing to assist in an SAR operation, should contact the RCC coordinating the SAR operation either to request search action or to offer assistance. Any message addressed to an RCC requesting or offering assistance must be acknowledged and followed as quickly as possible by a definite reply. An RCC may request assistance from a NI force based and/or operating either inside or outside its SRR. An acknowledgement and a definite reply must be given.

308. Operational Co-ordination With NI Forces. Normally, co-ordination between the RCC and NI forces would be effected by electronic means such as example telephone, voice radio, and signal. However, for major operations, liaison officers should be appointed at the earliest opportunity and the normal procedure is as follows:

a. The RCC and the NI Headquarters authority agree on the NI force to be brought into action and, if necessary, on the airfield(s) or other sites to be used as temporary base(s).

b. A liaison officer, who will be the direct representative of the commander of the NI force, shall then be sent to the RCC concerned.

c. The liaison officer's mission will be to assist the RCC in overall co-ordination, transmit its instructions and supply all pertinent information to enable the NI force to operate effectively.

d. The RCC should also appoint a liaison officer to the NI force. Appointment of liaison officers at both the RCC and the NI force location is recommended in cases where there are likely to be language difficulties.

e. In allocating search areas, the co-ordinating RCC is to take into account asset capabilities and the equipment available to the persons in distress. The RCC should, where operational efficiency and airspace reservations allow, allocate search forces of the same nationality as that of the person(s) in distress to the area in which they are most likely to be located.

f. The NI force, taking into consideration the instructions and information passed to it by the RCC, will be responsible for planning its own searches within any area allotted to it. However, it should be noted that many RCCs are fully capable of providing a search action plan to include search areas, search patterns, track spacing and commence search points. This could be particularly helpful in maritime incidents where search objects drift. The direct control of the NI force is the responsibility of the liaison officer appointed to the RCC or, if one has not been appointed, its own commander.

FACILITIES

309. Provision. The term ‘facilities’ embraces all air, surface or sub-surface units designated or co-opted for SAR purposes. Each nation is responsible for providing adequate facilities in support of its own operations and in accordance with the standards decreed by ICAO or IMO. In so doing each nation is to take into account the inherent search and rescue capabilities of the forces assigned.

310. Extent of Facilities. Despite the importance of SAR, relatively few facilities are designated specifically for SAR operations; often facilities and equipment designed primarily for other operational purposes are used. Thus in order to maintain maximum effectiveness all persons charged with SAR responsibility must be familiar with the capabilities, limitations and recommended tactical employment of the units and equipment placed at their disposal. In addition, it is incumbent of all who may engage in SAR operations to be familiar with the various devices used as aids to survivor location and rescue.

311. Aircraft. The ability of some aircraft to reach the location of a distress incident quickly and to conduct searches rapidly over a wide area makes them the preferred means for location. The altitude at which they can fly enhances radar detection and radio reception. Aircraft can also be employed to drop supplies and survival equipment to enable survivors to maintain life until rescued. Helicopters, flying boats and amphibious type aircraft have the additional capability of recovering survivors.

312. Surface Vessels. For SAR purposes surface craft may be divided into two classifications: rescue vessels and rescue boats:

a. Rescue Vessels. Rescue vessels possess inherent seagoing qualities, long range and reasonable speed. They are unable to cover large areas as rapidly as aircraft; consequently, they are employed primarily for rescue rather than search. Their value in SAR operations is greatly enhanced when they are operated in conjunction with aircraft. Merchant vessels fall within the rescue vessel classification but destroyers and frigates are likely to be of more value as SAR assets at sea because of their sea-keeping qualities, manoeuvrability,,medical personnel/facilities and speed.

b. Rescue Boats. Rescue boats, though used primarily for rescue, can also be used for search operations either independently or in conjunction with aircraft. Such boats are specially designed and equipped for rescue work and, because of their high speed, are ideal for short-range offshore rescue.

313. Submarines. Submarines are well adapted for use in rescue work under a variety of conditions. However, the position of submarines in rescue work, either as a rescue facility or as the object of the rescue, merits special consideration; this is dealt with in Chapter 6 of this Publication and also ATP 57, “The Submarine Rescue Manual”.

314. Land Rescue Teams. The term Land Rescue Team can comprise mountain, desert, jungle, parachute, or other specialized rescue teams. Ground search is in most cases slow and difficult but in many conditions of terrain or weather it is the only effective means available. Notwithstanding the capabilities of helicopters, the eventual rescue of survivors may only be possible by land rescue units. The operational employment of these teams, their capabilities and search techniques are described in national documents.

EQUIPMENT

315. SAR Equipment. SAR equipment can be divided into two classes: that designed to enable the rescue facilities to discharge the tasks for which they are established (examples: search aids, climbing equipment for mountain rescue teams), and that suitable for giving prompt assistance at the scene of the incident. The equipment of each rescue unit is to be suitable for the region.

316. Provision of SAR Equipment. Provision of SAR equipment is a national responsibility and therefore may be provided to many differing standards throughout NATO. However, interoperability is an objective of the alliance and can be critical to the success of search and rescue operations. Accordingly, a list of minimum survival equipment to be carried in aircraft is shown at Annex C. The IAMSAR Manual Volume II discusses aspects of supplies and survival equipment for assistance at the scene at Chapter 6. Details of the Horse Collar/Rescue Strop type helicopter hoisting gear, which is specific to military aircraft, are at Annex D.

317. Research and Development. Devices used in search and rescue are subject to constant research and development, and it is incumbent on all personnel assigned to SAR to keep their knowledge up to date.

RESCUE CO-ORDINATION CENTRES, RESCUE SUB-CENTRES AND CO-ORDINATION POSTS

RESPONSIBILITIES

1. Coordination of Incidents. Each ARCC is responsible for coordination of all aeronautical SAR operations within its SRR. When the MRCC is not collocated with the ARCC, the MRCC is responsible for the coordination of all maritime SAR operations within its maritime SRR. Either may assist with coordinating SAR operations on land or in coastal areas. When RSCs and CPs are also established within a region, the RCC should delegate to them the authority to co-ordinate SAR operations, whilst retaining overall responsibility.

2. Search and Rescue Mission Coordinator (SMC). An SMC is a designated person, usually in an RCC or RSC, who manages a specific SAR operation. Any SAR mission involving an RCC should have an SMC designated either on a case-by-case basis or in accordance with standing procedures. Among other responsibilities, the SMC typically designates the on-scene coordinator (OSC), and as necessary, the aircraft coordinator (ACO) to manage SAR operations at the scene. It should be noted that the IAMSAR Manual Volume II was written specifically for SMCs and other RCC staff.

3. On-scene Coordinator (OSC). An OSC is designated by the SMC to manage SAR operations at the scene. Selection criteria are based on the capability of the facility and its staff and the length of time the OSC can stay in the search area. The OSC is typically the person in charge of a specialized search and rescue unit (SRU), an aircraft or a ship. Until an OSC is designated, the first facility arriving at the scene should assume the duties of an OSC.

4. Aircraft Coordinator (ACO). The ACO is located in a facility with the capability to coordinate the involvement of multiple aircraft in SAR operations, while maintaining flight safety. Generally, the ACO is designated by and responsible to the SMC; however, the ACO and OSC must work in close consultation with each other.

5. Aim. The facilities available to the RCC should be used in a manner that will ensure the recovery of survivors in the best condition and as rapidly as possible. The saving of human lives is of prime importance and should have priority over any other mission in peacetime.

COMMUNICATIONS

6. Each RCC shall have means of immediate communication (e.g. direct line telephone, Fax or teletype, direct R/T circuit or, when these cannot be made available, telephone or teletype via a switchboard) with:

a. The associated air traffic control services.

b. RSCs in its own region.

c. Radio control, direction finding and radar stations.

d. Authorities responsible for the alerting of surface vessels, where appropriate.

e. Appropriate COSPAS-SARSAT Mission Control Centre (MCC).

7. Each RCC or RSC shall have means of rapid and reliable communication (that is telephone, teletype, fax, R/T radio direct or indirect or, when these cannot be made available, W/T) with:

a. RCCs or RSCs of adjacent regions.

b. Assigned rescue units.

c. Military and/or naval authorities in a position to supply supplementary SAR facilities.

d. NI SAR facilities.

e. OSC and ACO, if assigned

f. Coordination Posts (CPs).

g. A main (continuous watch) meteorological office.

h. Non-specialized facilities (e.g. Police).

6. CPs Every CP shall have rapid and reliable means of communication with:

a. All facilities placed at its disposal.

b. Military and/or naval, and civilian authorities in its sector.

c. The coordinating RCC or RSC.

9. It may be appropriate to set up communication networks to provide easy links between RCCs and RSCs of any geographical area that contains several SRRs.

10. Standardized formats are to be used for information, request and reply messages between neighbouring RCCs and/or RSCs in order to obviate delay or ambiguity caused by language difficulties. Appropriate signal instructions, coding and decoding publications etc., should also be held. Internationally established SAR operations messages are laid down in the IAMSAR Manual Volume II at Chapter 2, with formatted examples provided in Appendix B (Message Formats) and Appendix I (SITREPs). Appendix I also contains the 'Code of Standard Phrases for Use Between RCCs and RSCs'. NATO formats are provided in Chapter 5 of this Publication.

OTHER FACILITIES

11. Each RCC or RSC shall have under direct operational control all specialized SAR facilities in its region or sector. Normally there will also be within each SRR semi-specialized facilities. Arrangements should be with the commands concerned to enable the RCC or RSC to call upon such units as necessary. RCCs and RSCs should also be granted authority to call for assistance from all other facilities, military and civil, which may be available within the region and military units temporarily based in, or in transit through, the region.

12. Each RCC and RSC may call upon appropriate air, naval or land facilities to carry out the operation for which it is responsible:

a. Specialized Facilities. Those which are permanently assigned to SAR organizations; in general they maintain one or more alert tours of duty.

b. Semi-Specialized Facilities. Those that, owing to their material capabilities and training, are normally able to participate in a SAR operation in accordance with the arrangements made between their own commands and the RCCs.

c. Additional Facilities. Those that can participate in a SAR operation when available and which have been indicated by their commands to the RCC of the area where they are situated.

d. Occasional Facilities. Those facilities situated in the SAR area, or in transit through that area, which are temporarily placed at the disposal of the RCC or RSC to take part in a SAR operation.

PLANS, RECORDS AND REPORTS

13. Every RCC and RSC should prepare in advance detailed plans of operation for the conduct of SAR operations in its region or sector. Up-to-date and accurate information regarding all rescue facilities and the methods of alerting them should also be maintained. These plans should be amended according to changing conditions and incident experience.

14. Operations boards and cards or other index systems must be maintained and readily available for use in an emergency. These are to contain all information of value to the RCC (e.g. facility serviceability boards, names and telephone numbers of contacts, pilots and details of past but un-destroyed aircraft crashes and shipwrecks, liferaft and parachute drift tables).

15. Large wall displays of appropriate charts and plotting tables are to be provided. Each RCC and RSC must hold general and detailed maps and charts that provide complete coverage of its area of responsibility. Each RCC and RSC must also possess maps and charts covering the neighbouring areas.

16. Each RCC that has coordinated all or part of an SAR operation should, at the end of each day, prepare a short summary of operations carried out and the activity planned for the next day. This report (SARSITSUM) should be sent by signal to national SAR authorities, collaborating RCCs and all SAR services concerned in the operations. It should not be transmitted until after the operational orders for the next day's activities have been transmitted.

17. At the termination of any SAR operation, units and/or RCCs that have taken part are to forward reports to their controlling authority in accordance with national instructions. Where the operation has embraced the forces of more than one nation, copies of reports by associated or informed RCCs and/or other SAR units are to be sent by the national authorities concerned to the national authority of the controlling RCC. The national authority of the controlling RCC should, after study of the operation, make known its conclusions to all those authorities that forwarded reports. A similar procedure is to be followed where operations are conducted in conjunction with NI forces.

PROVISION OF PERSONNEL

18. Taking account of the importance of the SAR organization, the nature of the area (e.g. maritime, desert, inhabited or uninhabited), and the density of air and maritime traffic, each nation is to judge the appropriate number of SAR trained personnel to be provided. However, the minimum number must be such that a SAR operation can be initiated and carried out without delay by competent and responsible personnel.

19. All SAR personnel must be fully qualified in their respective tasks before given SAR responsibilities. Those personnel responsible for controlling or co-ordinating SAR operations must have full knowledge of all SAR resources (military and civil) available in their region and must also be capable of directing and co-ordinating the facilities of their region in collaboration with those of adjacent regions.

TRAINING

20. Alert and training exercises are to be conducted at regular intervals in order to improve the efficiency of personnel and to maintain them at a high standard of readiness.

21. Meetings at national, command and RCC level, of personnel from one or several SRRs will promote efficient collaboration. Such meetings are essential to the achievement of the common task. Exchanges of SAR officers of different nationalities should also be considered during allied exercises. Participation in joint/combined exercises should also be considered.

DETAILS OF NATO RESCUE CO-ORDINATION CENTRES

RESCUE COORDINATION CENTRES – BELGIUM

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
BRUSSELS (5054N 00429E) 5105N 00233E – 5107N 00200E – 5130N 00200E – 5122N 00322E – Along the borders between Belgium and the Netherlands, Belgium and Germany, Luxembourg and Germany, Luxembourg and France, and Belgium and France to 5105N 00233E	EBMIYCYX	Civilian: Brussels 02 751 4615 02 752 4477 02 752 4452 02 752 4444 Military: BEMILCOM 9 2623 4477 9 2623 4452 9 2623 4444 Facsimile: Civil: Brussels 02 752 4201 Military: BEMILCOM 9 2623 4201	NIHIL	UHF – 243.0 VHF – 121.5 123.1

RESCUE COORDINATION CENTRES – BULGARIA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES - CANADA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TRENTON 70°00'N 080°00'W, 64°00'N 080°00'W, 62°00'N 070°00'W, 46°42'N 070°00'W, westerly along the Canada - United States border to the Alberta - British Columbia border, north along the Alberta - British Columbia border to 60°00'N 120°00'W, westerly to 60°00'N 124°00'W, north along the Yukon - North West Territory border to the Beaufort Sea, westerly along the coast to the Canada - Alaska border, north along 141°00'W to the North Pole, south to 82°00'N 060°00'W, 78°00'N 075°00'W, 76°00'N 076°00'W, 74°00'N 068°18'W, 73°00'N 067°00'W, 70°00'N 063°00'W and west to 70°00'N 080°00'W.	CYTRYCY	Civilian: 613 392 2811 Local 3870 or 3875 Military: DSN/CSN: 827 3870/3875 Facsimile: 613 965 7190	06-62282 Inmarsat C 431 699 928 431 699 929	VHF (AM) – 123.1 MHz VHF (FM) – Ch 82A (157.125MHz) VHF (FM) – Ch 16 (156.8MHz)
HALIFAX 64°00'N 080°00'W, 70°00'N 080°00'W, 70°00'N 063°00'W, 65°30'N 058°39'W, 58°30'N 050°00'W, 58°30'N 030°00'W, 45°00'N 030°00'W, 45°00'N 053°00'W, 43°36'N 060°00'W, 41°52'N 067°00'W, 44°30'N 067°00'W, north to the Canada - United States border, westerly along the Canada - United States border to the 70th meridian, north along the 70th meridian to 62°00'N 070°00'W and north west to 64°00'N 080°00'W.	CYHZYCY	Civilian: 902 427 2100 Military: DSN/CSN: 447 2100 Facsimile: 902 427 2114	Inmarsat B 584 33 169 9943	E-mail: hxdutyop@sarnet.dnd.ca

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
VICTORIA 54°42.5'N 130°36.5'W, along the Alaska - Canada border to the Beaufort Sea, east along the shoreline to the Yukon - North West Territory border, south along the Yukon - North West Territory border to 60°00'N, east along 60°00'N to the British Columbia - Alberta border, south along the British Columbia - Alberta border to the Canada - United States border, west along the Canada - United States border to 48°30'N 124°45'W, 48°30'N 125°00'W, 48°20'N 128°00'W, 48o°20'N 145°00'W, 54°40'N 140°00'W, 54°40'N 136°00'W, 54°00'N 136°00'W, 54°13'N 134°57'W, 54°39.45'N 132°41'W and 54°42.5'N 130°36.5'W.	CYVRYCY	Civilian: 250 363 2333 250 666 301/4302 Military: DSN/CSN: 255 2333 Facsimile: 250 363 2944	Through Vancouver Coast Guard Radio Station: 043-52586	

RESCUE COORDINATION CENTRES – CZECH REPUBLIC

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
PRAHA The aeronautical SRR comprises the Czech FIR.	LKPRYCYX	+420 220 372 450 +420 220 374 452 +420 220 372 750 +420 973 212 900 Facsimile +420 220 372 701 +420 973 212 891		VHF - 121.5 MHz

RESCUE COORDINATION CENTRES – DENMARK

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
KARUP 5504.00N 00818.00E - 5510.03N 00733.09E - 5530.40N 00545.00E - 5515.00N 00509.00E - 5524.15N 00445.00E - 5546.21N 00415.00E - 5555.09N 00321.00E - 5605.12N 00315.00E - 5635.30N 00502.00E - 5710.30N 00656.12E - 5729.54N 00759.00E - 5737.06N 00827.30E - 5741.48N 00853.18E - 5759.19N 00923.00E - 5815.41N 01001.48E - 5830.00N 01030.00E - Along the FIR border to - 5520.12N 01239.42E - 5455N 01251E - 5427N 01200E - Along the Denmark/Germany border in the Baltic Sea and on land to 5504.00N 00818.00E.	EKMCYCYX	Civilian: +45 9710 1550 Ext 5630/ 5631 Alert Communications Only: +45 9710 1866 Military: Karup Centre Ext 5630/ 5631 Facsimile: +45 9962 4954 **MRCC AARHUS** Civilian: +45 8943 3099 Alert Communications Only: +45 8613 3580 Facsimile: +45 8943 3230	5 56 44 85	UHF: 317.5 – 282.8 * 252.8 – 243.0 VHF: 121.5 – 123.1 * HF/SSB: 3.651 kHz * 4.703 kHz 3.023 kHz 5.680 kHz (* - ON REQUEST) or any freq between 3MHz and 30MHz MF DSC 2187.5 KHz MF 2182 KHz VHF DSC CH 70 (156.525 MHz) VHF CH 16 (156.800 MHz) C/S RESCUE AARHUS VIA ASSOCIATED CRS "LYNGBY RADIO" Naval Communicationcenter

RESCUE COORDINATION CENTRES – ESTONIA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – FRANCE

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
CINQ MARS LA PILE Western Limit: 5107N 00200E – 5100N 00128E – 5040N 00128E – 5000N 00015W – 5000N 00200W – 4850N 00800W – 4500N 00800W – 4420N 00400W – 4335N 00147W. Southern Limits of the Departments: Vendeé, Maine et Loire, Indre et Loire, Indre, Cher. Eastern Limits of the Departments: Cher, Loiret, Sein et Marne, Aisne. Northern Limit: The border with Belgium.	LFXOYCYX	02 47 96 43 81 Facsimile: 02 47 96 34 80		VHF: 121.5 123.1 119.7 UHF: 243.0 282.8
DRACHENBRONN Western Limits of the Departments: Ardennes, Marnes, Yonne, Nièvre. Southern Limits of the Departments: Nièvre, Saône et Loire, Jura. Eastern Limits: The border with Switzerland and Germany. Northern Limits: The border with Belgium, Luxembourg and Germany.	LFXAYCYZ	03 88 94 53 79 Facsimile: 03 88 94 50 40		VHF: 121.5 123.1 119.7 UHF: 243.0 282.8

MONT DE MARSAN Western Limit: 4321N 00147W - 4335N 00147W Northern Limits of the Departments: Charente Maritime, Deux Sèvres, Vienne, Haute Vienne, Creuse. Eastern Limits of the Departments: Creuse, Corrèze, Lot, Aveyron, Tarn. Southern Limits of the Departments: The Border with Spain.	LFBWYCYX	05 58 45 09 93 Facsimile: 05 58 45 09 93		VHF: 121.5 123.1 119.7 UHF: 243.0 282.8
LYON MONT VERDUN Western Limits of the Departments: Allier, Puy de Dôme, Cantal, Lozère, Gard, Hérault, Aude, Pyrénées Orientales. Northern Limits of the Departments: Allier, Loire, Rhône, Ain. Eastern Limit: The border with Italy and Switzerland. Southern Limit: 4345N 00739E – 4310N 00945E – 4120N 00945E – 4120N 00820E – 3900N 00800E – 3900N 00440E – 4200N 00440E – then along the border with Spain.	LFXVYCYX	04 78 62 95 15		VHF: 121.5 123.1 119.7 UHF: 243.0 282.8

RESCUE COORDINATION CENTRES – GERMANY

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
MÜNSTER 95157N 00739E) 5322N 00700E,German/Netherlands border, German/Belgium border, German/French border, German/Swiss border, German/Austrian border, German/Czechoslovakian border, German/Polish border, south of the coastline, along the former inner-German border to the River Elbe, south of the River Elbe to the coastline, south of the coastline to 5322N 00700E	ETRAYCYX	Civilian: Münster 0251 135757 Military: Münster-LTKdo Ext 1368	89968 "Attn SAR Münster" Telefax: 0251 135759	VHF: 123.1 c/s "Rescue Münster" 24 hrs
GLÜCKSBURG (5450N 00932E) German/Netherlands border – 5340N 00630E – 5500N 00630E – 5500N 00800E – German/Danish border – 5427N 01200E – 5455N 01251E – 5455N 01422E – 5355N 01413E – along the coastline – 5358N 01055E – south to the River Elbe, along the River Elbe to the North Sea, along the coastline to 5322N 00700E	EDCAYC	Civilian: Glücksburg 04631 6013 Or 666 457/475/476 Military: Glücksburg Ext 475/476	022762 Telefax: 04631 666554	c/s "Glücksburg Rescue" VHF: 121.5 123.1 156.8 UHF: 243.0 282.8 HF: 3.121 kHz 5.680 6.697 24 hrs

RESCUE COORDINATION CENTRES – GREECE

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
ATHENS 3605N 03000E – 3330N 03000E – 3400N 02710E – 3400N 02410E – 3630N 01900E – 4025N 01900E – then along the lines determining the Northern and Eastern frontiers of Greece and the Western frontier of Turkey to 3605N 03000E	LGGGYCYX	01 413 1619; 01 411 6389; 01 411 6379; 01 411 2500; 01 412 0772 Facsimile: 01 417 8101; 01 422 4417 01 413 2398		

RESCUE COORDINATION CENTRES – HUNGARY

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – ITALY

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
POGGIO-RENATICO 4538N 01340E - 4538N 01330E - 4518N 01300E - 4510N 01300E - 4432N 0132E - 4330N 01430E - 4324N 01440E - 4120N 00945E - 4120N 00945E - 4322N 01444E - 4223N 01614E - 4108N 01852E - 4045N 01900E - 3630N 01900E - 3630N 1130E - 3730N 01130E - 3900N 00800E - 4100N 00800E - 4120N 00820E - 4120N 00945E - 4310N 00945E - 4346N 00730E - then along Italy's northern border to 4538N 01340E	LIPWYCYC Military: AEROSOCC ORSO POGGIO RENATICO	Civilian: 0039-0532-825570 0039-0532-828334 0039-0532-828327 Military: Poggio Renatico		VHF: 121.5, 123.1 UHF: 243.0, 282.8 VHF/M: 156.8 HF: 5685 kHz (day) 6720 kHz (day) 3150 kHz (night) 3110 kHz (night)

RESCUE COORDINATION CENTRES – LATVIA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – LITHUANIA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – NETHERLANDS

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
IJMUIDEN The aeronautical SRR comprises the Amsterdam FIR. The maritime SRR comprises the Netherlands continental shelf area. For practical planning purposes the SRR of RCC Ijmuiden is bounded by the following coordinates: 5546N 00322E – 5500N 00500E – 5500N 00630E – 5540N 00630E – then along the coast to 5123N 00321E – 5130N 00200E – 5256N 00310E – 5223N 00246E Several bi-lateral agreements between the Netherlands, Belgium and Germany hold details regarding responsibilities and coordination in border areas.	EHYMYC	Operations: Phone: +31 9000 111 Fax: +31 255 546599 Administration: Phone: +31 255 546546 Fax: +31 255 546548	Operations: 44 71088 Answer Back: KUSTW NL	VHF: Mar Ch 16 (Voice) Ch 70 (DSC) MF: 2182 kHz (Voice) 2187.5 kHz (DSC) Freqs available by prior arrangement: VHF(FM): Ch 67, 73, 97H VHF(AM): 123.1 UHF: 282.8 HF: 3023 kHz; 3450kHz 5680 kHz; 6550kHz

RESCUE COORDINATION CENTRES – NORWAY

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
NORTHERN NORWAY, BODO 00E/W from 6500N to 8200N, 03000E from Norwegian border to 8200N, then along the borders with Russia, Finland and Sweden to 6500N	ENBOYCYV	+47 755 21267 +47 755 24575 Facsimile: +47 755 24200	56 64293	VHF: 123.1
SOUTHERN NORWAY – STAVANGER From 6500N along Norwegian/Swedish border, then along continental shelf border to 6200N, then 00E/W to 6500N	ENZVYCYV	+47 5151 7000 +47 5164 6061 Facsimile: +47 5165 2334	56 33163	VHF(AM): 123.1 UHF: 282.8 (Stavanger Area) HF: 5680 kHz; 3023kHz for SAR (All freqs from 2-30MHz on request.)

RESCUE COORDINATION CENTRES – POLAND

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – PORTUGAL

Name and Lateral SRR Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
LISBON Mouth of River Minho – 4200N 01000W – 4300N 01300W – 4200N 01500W – 3630N 01500W – 3410N 01748W. Then along an arc of a circle 100 nm radius centred on 3303.54N 01621.15W – 3215N 01437W 3558N 01200W – 3558N 00723W – Mouth of River Guadiana along Spanish/Portugese border to mouth of River Minho	LPAMYCYX	351 1 441 6581 351 1 441 6527 Facsimile: 351 1 441 6159 Military: IVSN – 515 1940	12861 CCOMFAP	VHF(AM): 121.5*; 123.5 VHF(FM): 156.8 UHF: 243.0*; 282.8 HF: 2182; 3023; 5680; 8992* * - Continuously monitored
LAJES – SANTA MARIA 4500N 04000W – 4500N 01300W – 4300N 01300W – 4200N 01500W – 3630N 01500W – 3410N 01748W – along an arc of a circle 100 nm radius centred on 3303.45N 01621.15W – 3139N 01725W – 3000N 02000W – 3000N 02500W – 2400N 02500W – 1700N 03730W – 2218N 04000W – 4500N 04000W	LPLAYYCYX	Military: Terceira Island Lajes (Air Base 4) 095 53686 Facsimile: 095 53006	82454 RCC LAJ P	HF: 5688 kHz

RESCUE COORDINATION CENTRES – ROMANIA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – SLOVAKIA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – SLOVENIA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
TBD	TBD	TBD	TBD	TBD

RESCUE COORDINATION CENTRES – SPAIN

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
MADRID 4500N 01300W – 4500N 00800W – 4420N 00400W – 4335N 00147W – 4323N 00147W – along the border with France to 4242N 00004W – 3944N 00106W – 3550N 00206W – 3550N 00723W – along the border with Portugal to the North Western end on the Atlantic Coast – 4200N 01000W – 4300N 01300W – 4500N 01300W	LECMYC	0034 (9) 1 677 2021 Facsimile: 0034 (9) 1 677 2027		HF(USB): 6720 VHF(AM): 123.1 UHF: 282.8
PALMA 4242N 00004W – Spanish/French border – 4226N 00310E – 4225N 00314E – 4200N 00440E – 3900N 00440E – 3820N 00345E – 3615N 00130W – 3550N 00206W – 3944N 00106W – 4242N 00004W	LECPYC	0034 (9) 71 491152 Facsimile: 0034(9) 71 491158		HF(USB): 6720 VHF(AM): 123.1 UHF: 282.8
CANARIAS 3000N 02500W – 3000N 02000W – 3139N 01725 W then along the arc of a circle 100 nm radius centred on 3303.54N 01621.15W to 3128N 01545W – 3000N 01230W – 2740N 01310W – 2470N 00840W – 2600N 00840W – along the DAKAR FIR boundary to 2047.1N 01704W – 1900N 01900W – 2400N 02500W – 3000N 02500W	GCCCYC	0034 (9) 28 574646 Facsimile: 0034 (9) 28 575220		HF (USB): 6720 VHF(AM): 123.1 UHF: 282.8

RESCUE COORDINATION CENTRES – TURKEY

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
ANKARA 4200N 02810E – 4207N 02900E – 4215N 03000E – 4215N 04000E – 4130N 04133E – then along the eastern frontier of Turkey with Georgia, Armenia, Nakhicbevan, Iran, Iraq and Syria to 3555N 03540E – 3605N 03000E – the following the ISTANBUL/ATHENS FIR boundary and the frontier between Turkey, Greece and Bulgaria to 4200N 02810E		+90 312 4183836 or + 90 312 4022566 Facsimile: Civilian: 90 312 232 0823 Military: 90 312 425 0813		

RESCUE COORDINATION CENTRES – UNITED KINGDOM

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
KINLOSS (5739N 00334W) 6100N 03000W – 6100N 00000E – 6000N 00000E – 5700N 00500E – 5500N 00500E – 5130N 00200E – 5107N 00200E – 5100N 00128E – 5040N 00128E – 5000N 00015W – 5000N 00200W – 4850N 00800W – 4500N 00800W – 4500N 03000W – 6100N 03000W **Excluding** the SHANNON SRR: 5355N 00530W – 5220N 00530W – 5100N 00800W – 5100N 01500W – 5400N 01500W – 5434N 01000W – 5445N 00900W – 5520N 00815W – 5525N 00720W – 5520N 00655W – 5425N 00810W – 5355N 00530W	EGQKYC	Civilian: +44 (0) 1343 836000 +44 (0) 1343 836001 Facsimile: +44 (0) 1309 678308 +44 (0) 1309 678309 Military: RAF Kinloss Ext 6000/6001/6002/6003/6006 Facsimile: RAF Kinloss Ext 6208/6209	75193	Full HF Coverage. Continuous monitoring of 5.680 (D); 3.023 (N)

RESCUE COORDINATION CENTRES – USA

Name and SRR Lateral Limits	ICAO Indicator	Telephone	Telex	Radio Comm Freq
NORFOLK From the U.S. – Canada border south to 44° 30′N, 067° 00′ W; 41° 52′ N, 067°00′W; 43° 36′ N, 060° 00′ W; 45° 00′ N, 053° 00′ W; 45° 00´ N, 040° 00´ W; 18° 00′ N, 040° 00′ W; 18° 00´N, 048 00´W; 19° 00´N, 048° 00´W; 19° 00´N, 063° 30´W; 17° 00´N, 063° 30´W; 16° 00´N, 062° 20´W; 16° 00´N, 065° 30´W; 15° 41´ N, 067° 04´W; 16° 00′ N, 068° 00′ W; 19° 00′ N, 68° 00′ W; 20° 25′ N, 70° 00′ W; 20° 25′N, 071° 40′W; 20° 25′N, 073° 00′W; 20° 25′N, 070° 00′W; 20° 25′N, 073° 00′W; 21° 30′N, 075° 00′W to Cay Santo Domingo; Cay Lobos; Quinchos Cay to 23° 40′N, 080° 30′W; 24° 00′N, 080° 30′W; 24° 00′N, 086° 35′W; 25° 41′ 56.52” N, 088° 23′ 05.54” W; 25° 41′ 56.52” N, 088° 23′ 05.54” W; 25° 46′ 52.00” N, 090° 29′ 41.00” W; 25° 42′ 13.05” N, 091° 05′ 24.89” W; 25° 59′ 48.28” N, 093° 26′ 42.19” W; 26° 00′ 30.00” N, 095° 39′ 26.00” W; 26° 00′ 31.00” N, 096° 48′ 29.00” W then westward to U.S. – Mexico border at 25° 58′ 30.57” N, 096° 55′ 27.37” W	-	Civilian: 757 398 6231 Facsimile: 757 398 6392 Inmarsat: 430370680	127775	No comms frequencies monitored by RCC – access to HF, MF and VHF frequencies **on request** through US Coast Guard Communications Area Master Station Atlantic.

ALAMEDA From North Pole south along 168° 58′ 37” W meridian to 65° 30′N, 168° 58′ 37”W, southwestward connecting 64° 07′ 50” N, 172° 00′ 00” W; 60° 11′ 39” N, 179° 46′ 49”W; 59° 58′ 22” N, 179° 40′ 55” W; 53° 43′ 42” N, 170° 18′ 31” E; 51° 11′ 22” N, 167° 26′ 52” E; 51° 12′ 17” N, 167° 15′ 35” E; 50° 58′ 39” N, 167° 00′ 00” E; 52° 30´ N, 165°E; 17°N, 165°E; 17°N, 130°E; 06°N, 130°E; 06°N, 132°E; 03° 30′N, 132°E; 03 30′N, 141°E; 00°N, 141°E; 00° N, 160° E; 03° 30′N, 160° 00′E; 03° 30′N, 180° 00′; 05° 00′S, 180° 00′; 05° 00′S, 160° 00′W; 05° 00′S, 157° 00′W; 05° 00′S, 120° 00′W; 03° 24′S, 120° 00′W; 03° 24′S, 095° 00′W; 01° 28′N, 095° 00′W; 01° 28′N, 078° 48.45′W; then northwestward along the line following the 200 mile exclusive economic zones of Costa Rica, Nicaragua, El Salvador, and Guatemala and Mexico to 30° 32′ 31.20” N, 121° 51′ 58.37” W; 31° 07′ 58.00” N, 118° 36′ 18.00” W; 31° 07′ 58.00” N, 118° 36′ 18.00” W; 32° 37′ 37.00” N, 117° 49′ 31.00” W; 32° 37′ 37.00” N, 117° 49′ 31.00” W; 32° 35′ 22.11” N, 117° 27′ 49.42” W then north along the U.S. coast to 48° 30′ N 124° 45′W; 48° 30′ N 125° 00 ′W, 48° 20′ N 128° 00′ W, 48° 20′ N 145° 00′ W, 54° 40′ N 140°00 ′W, 54° 40 ′N 136° 00′ W, 54° 00′ N 136° 00′ W, 54° 13′ N 134° 57′ W, 54° 39′ 27” N 132° 41′ W, 54° 42′ 30″ N 130° 36′ 30″ W, northerly along the national boundary to the Beaufort Sea, and thence north to the North Pole.	-	Civilian: 510 437 3701 Military: AUTOVON 730 3821 Facsimile: 510 437 3017	712343 AAB CGALDA	No comms frequencies monitored by RCC – access to HF, MF and VHF frequencies **on request** through US Coast Guard Communications Area Master Station Pacific.

LANGLEY Continental USA	KLFIYCY	Civilian: 757 764 8112 Military: AUTOVON 574 8112 Facsimile: 757 764 8128	-	Nil

MINIMUM SURVIVAL EQUIPMENT TO BE CARRIED IN AIRCRAFT

1. NATO aircraft, or their aircrew, should carry sufficient items from the following list to enhance survival and location by day, night or in adverse weather conditions:

a. Emergency Locator Transmitter (see IAM SAR Manual Chapter 2).

b. Personal Locator Beacon (see IAM SAR Manual Chapter 2).

c. Pyrotechnic Signalling Device (see IAM SAR Manual Appendix A).

d. Dye Marker (see IAM SAR Manual Appendix A).

e. Battery-powered Distress Light (see IAM SAR Manual Chapter 2).

f. Signalling Mirror (see IAM SAR Manual Appendix A).

g. Whistle.

h. First-aid Kit.

i. Drinkable water or water purification tablets.

HORSE COLLAR/RESCUE STROP TYPE HELICOPTER HOISTING GEAR

1. The rescue strop is to be sufficiently strong to bear as a minimum the weight of a survivor carrying full aircrew clothing and accoutrements after immersion in water. It should be sufficiently long to fit around the chest of a survivor under similar conditions.

2. The rescue strop should be a bright colour to enhance conspicuity during rescue.

3. To inform the untrained user a pictorial sequence of donning instructions shall be displayed on the rescue strop.

4. Strop design or operating procedures shall prevent a survivor from slipping through the rescue strop during winching.

5. The rescue strop is to be bouyant for maritime operations.

CHAPTER 4

COMMAND, CONTROL AND SEARCH PLANNING

RESPONSIBILITIES

401. National and RCC Responsibilities.

a. ICAO. Under the provisions of ICAO Annex 12 (on which the NATO SAR organization is based) responsibility for an aircraft in distress within a FIR rests with the national authority responsible for the region: these national responsibilities are discharged through the medium of the appropriate ARCC. The RCC in question will initiate SAR action as appropriate on all requests for aeronautical distress assistance.

b. IMO. Under the provisions of IMO, responsibility for a maritime SRR rests with the national authority responsible for the region; these national responsibilities are discharged through the medium of the appropriate maritime RCC. The maritime RCC in question will initiate SAR action as appropriate on all requests for maritime distress assistance.

c. National/NATO. The national SAR authorities of the NATO nations are authorised to correspond directly among themselves in all matters relating to common SAR questions arising out of the need for collaborative procedures to meet NATO requirements, as defined in this manual and for the purpose of obtaining and maintaining information on the SAR facilities of neighbouring SRRs. Commanders of NATO formations may also correspond with other NATO commanders and national authorities concerned with SAR.

402. Commanders. Although definite responsibilities for SAR are assigned to RCCs, such assignment does not relieve any commander of the responsibility to engage in SAR operations on his own initiative as circumstances dictate, reporting to and co-ordinating such action with the appropriate RCC or SAR authority as soon as possible. Additionally, any command having knowledge of the transmission of a distress message by one of its units, whether or not it is a genuine message, must immediately inform the nearest RCC and keep it informed of developments in order prevent the mounting of an untimely SAR operation.

403. SAR Units. All SAR units shall operate as directed by the RCC, or command in accordance with the plan of operations developed by the RCC, or as directed by the OSC. Upon notification the SAR unit should:

a. Act as required in the notification.

b. Report its current operations to the operational commander.

c. Co-ordinate its activities with other craft assigned to the mission.

Because air, surface and sub-surface craft may be called upon at any time to participate in an SAR operation, all unit personnel should be familiar with general SAR procedures.

404. Individual Responsibilities. Nothing in these instructions is to be interpreted as contrary to the principle that any person seeing or having knowledge of an incident should immediately take all possible action to effect a rescue.

OPERATIONAL CONTROL

405. Control of Units. Operational control of all units committed to SAR operations will be exercised by the RCC, either directly or by delegation. The RCC, OSC or other force commanders must, in order to carry out the assignment:

a. Have full knowledge of all the facilities at their disposal.

b. Receive prompt reports concerning the incident.

c. Determine the types of facilities to be employed.

d. Be kept informed of the progress of all rescue attempts.

Operational control of an NI force will remain with commander of the NI force unless formally transferred to the RCC or OSC. Where possible co-ordination should be effected through liaison officers.

406. Liaison. The RCC is also responsible for passing information on search aircraft to the air traffic control services unit serving the FIR in which the aircraft are operating, so that action can be taken to warn other aircraft of their presence. The RCC will, when necessary, request a reservation of airspace for SAR purposes. When an emergency incident is concluded, the RCC or other authority in control shall take steps to terminate the operation and to inform any authority, centre or service which it may have activated or notified.

407. Communications. Operational control is effected through special radio facilities (R/T and W/T) to allow direct communication:

a. By RCC, OSC and other force commanders with the search aircraft, marine and ground units.

b. Among search units themselves.

408. On-scene Commander (OSC). An OSC, usually designated by an RCC in its role as SAR mission coordinator (SMC), manages SAR operations at the scene. The OSC is usually the person best qualified or the most capable unit among those available. The IAMSAR Manual Volume 3 has a section written specifically for OSC operational matters. OSC functions include the following:

a. Coordination of operations of all SAR facilities on-scene.

b. Receiving the search action plan or rescue plan from the SMC or, if appropriate, planning the search or rescue operation.

c. Modifying the search action or rescue action plan as the situation on-scene dictates and keeping the SMC advised accordingly.

d. Coordinate on-scene communications.

e. Monitoring the performance of other participating facilities.

f. Ensuring that operations are conducted safely, paying particular attention to maintaining safe separations among all facilities.

g. Making periodic situation reports (SITREPs) to the SMC.

409. Aircraft Coordinator (ACO). An SMC or OSC may also be assisted by an aircraft coordinator (ACO) who coordinates the involvement of multiple aircraft in SAR operations.

410. Operational Authority of OSCs and ACOs. OSCs and ACOs have the full operational authority of the SMC, and together coordinate all SAR facilities on scene. The parent agency retains operational control of a facility en route to and from the scene. If an agency must withdraw a facility from a mission, it should advise the SMC as early as possible to permit suitable replacements to be dispatched to maintain adequate on-scene resources. The IAMSAR Manual Volume II Chapter 1 and Volume III provide more information about the interactions between SMCs, OSCs and ACOs.

411. Search Planning. Search planning and evaluation techniques are outlined in the IAMSAR Manual Volume 2 Chapter 4 with supporting information in the Appendices, particularly Appendix K (Determining the Datum), Appendix L (Search Planning and Evaluation Worksheets) and Appendix N (Tables and Graphs). However, to meet specific NATO military SAR requirements, the following aspects are amplified at Annex A:

a. Aero Space Drift (including Parachute Drift).

b. Search altitudes.

c. Electronic sensor sweep widths.

SEARCH PLANNING AND EVALUATION

GENERAL

1. Search planning and evaluation techniques are outlined in the IAMSAR Manual Volume 2 Chapter 4 with supporting information in the Appendices, particularly Appendix K (Determining the Datum), Appendix L (Search Planning and Evaluation Worksheets) and Appendix N (Tables and Graphs). However, to meet specific NATO military SAR requirements, following aspects are amplified in the this Annex:

   a. Aero Space Drift (including Parachute Drift).

   b. Search altitudes.

   c. Electronic sensor sweep widths.

2. Aero Space Drift.

   a. Aircraft/Parachute Glide Displacement ($d_{a/p}$). The maximum ground distance that an aircraft could cover during descent should be determined if the position and altitude of an aircraft engine failure are known and crew bailout is doubtful. Some parachutes also have significant glide ratios and these need to be considered based on the parachute opening position and altitude. Aircraft glide ratio and rate of descent should be obtained from the parent agency or aircraft performance manual. Similarly, parachute glide ratio and rate of descent should be obtained from the parent agency or the parachute's manufacturer. The RCC can then determine maximum ground distance covered during descent and establish the possible area of impact after adjusting for wind as shown in the IAMSAR Manual. A circle is constructed around the corrected last known position, using maximum no-wind glide distance as the radius. The enclosed area will be the maximum possible area for the aircraft datum.

   b. Parachute Drift (d_p) For Parachutes With Zero Glide Ratio). Parachute drift for parachutes with zero glide ratio are solely dependent on the average winds aloft encountered during descent. The IAMSAR Manual provides a method for computing average winds aloft as well as a table of parachute descent rates at various altitudes.

      (1) Most US military parachutes automatically deploy at 14,000 feet, while Canadian Defence force parachutes deploy at 16,400 feet. European military aircraft have barostats set at 10,000 feet. Some aircraft that operate regularly over mountains set automatic opening devices for 2,000 feet above the highest mountain peak in the operating area. The parent agency should be contacted to determine specific parachute characteristics.

(2) For situations necessitating descent, such as engine failure, calculations should make allowance for loss of altitude before bailout. Parent agency policy on minimum engine restart altitude should be determined and the assumption made that the crew stayed in the aircraft to that altitude before bailout. If high-performance military aircraft were known to be out of control (spin, mid-air collision, etc) prior to bailout, the minimum safe bailout altitude should be obtained from the parent agency and used for computations if the actual bailout altitude is unknown. If parachute opening altitude is not available, RCCs should use the information in paragraph 2 (1) above or bailout altitude if known.

(3) Winds aloft are usually given in true headings, representing the direction winds blow from. Data on average winds aloft between parachute opening altitude and the surface should be obtained. If wind information is available only for certain altitudes, a vector solution is used to obtain an average as shown in the IAMSAR Manual. The solution assumes the wind is constant above and below a reported wind to a point midway between it and the next altitude for which a wind report is available. The IAMSAR Manual shows a sample vector solution to a winds-aloft problem.

(4) If the parachute opens over land, adjustments for the terrain height should be made. The table of parachute descent data in the IAMSAR Manual would be entered with terrain altitude and interpolated for the average wind velocity. The difference between the two values is the drift distance.

3. Maritime Drift. The IAMSAR Manual provides extensive instructions, worksheets, tables and graphs for computing Maritime Drift.

4. Probable Errors of Position. The IAMSAR Manual provides tables of probable errors of positions (also known as navigational fix errors) for most situations and means of navigation. In addition to this information, Table 4-A-1 below provides probable position errors for positions determined by a direction finding network.

Table 4-A-1 - Navigational Fix Errors by Class of Fix

CLASS OF FIX	FIX ERROR
A	20 nm
B	40 nm
C	60 nm

5. Search Altitude. For small search objects, such as persons and life rafts, lower search altitudes are preferred. It is not possible to prescribe a “best” height for all conditions, but in many situations the highest reasonable search height above ground or sea level is considered to be 1,500ft (450m) for a day search and 2000ft (600m) for a night search. However, the search height employed will also depend on the type and speed of the aircraft used and on the presence of cloud, haze, turbulence, etc. A search height of 500ft (150m) or less in visual meteorological conditions may be suitable for a helicopter or a slow aircraft, but it is usually impracticable for jet aircraft. Electronic searches, furthermore, may be carried out from very high altitudes. Tables 4-A-2 and 4-A-3 therefore serve only as a guide for adaptation to local circumstances. Crews must always be prepared to modify search plans if conditions on-scene are significantly different from planning parameters. Such a change of plan should be advised to the controlling RCC.

Table 4-A-2 - Search Heights

LEVEL	SEARCH TARGET ON LAND	SEARCH TARGET ON WATER
500ft (150m)	-	In life-jacket without dye marker
500 - 800ft (150 - 240m)	On level terrain with heavy vegetation	
500 - 1000ft (150 - 300m)	In mountainous terrain (selection based on turbulence and amount of vegetation)	In life-raft without dye marker or signalling equipment
800 - 1000ft (240 - 300m)	On level terrain with little or no vegetation	-
2000 - 3000ft (600 - 900m)	Night search	Night search

Table 4-A-3 - Recommended Visual Search Altitudes

SEARCH TARGET	TERRAIN	RECOMMENDED ALTITUDES (ft)
Person, cars, light aircraft crashes	Moderate	200 to 500
Trucks, large aircraft	Moderate	400 to 1000
Persons, one person liferafts, surfboards, light aircraft crashes	Water or flat terrain	200 to 500
Small to medium sized boats, liferafts, trucks, aircraft	Water or flat terrain	1000 to 3000
Distress signals	Night-all Terrain	1500 to 2000

6. Effective Sweep Width. Effective sweep width (W) is the width of the swath centred on the Search and Rescue Unit (SRU) track where the probability of detecting a search object outside of the sweep width is equal to the probability of missing a search object inside that distance. It is a measure of detection capability based on search object characteristics, sensor characteristics, weather and other factors. Sweep width is less than twice the maximum detection range, which is the farthest range at which the search object can be detected. It is usually expressed in yards for underwater and ground searches, and in nautical miles for other types of searches. Daylight visual sweep widths are determined by choosing an uncorrected sweep width based on the type of search object and SRU altitude and correcting it for environmental conditions, speed and fatigue as described in the IAMSAR Manual. Sweep width varies with the type of sensor. Visual searching is used most often, although electronic sensor searches can be far more efficient and should be considered when it is known, or even suspected, that the distressed craft or persons may be more readily detected by electronic or other non visual means. However, most non-visual sensors cannot recognize or classify detected objects to determine whether they are the object of the search. Other factors affecting sweep width are:

a. Crew Fatigue. Degradation of detection performance during a search can be significant. The sweep widths are adjusted for a normal amount of crew fatigue. If search crews are excessively fatigued, sweep widths should be reduced by 10% (multiply by 0.9).

b. Target Characteristics. The target size, shape, distance from the SRU, colour contrast and brightness contrast, movement and duration of exposure to an observer must be considered.

c. Meteorological Visibility. The maximum range at which large unlit objects such as land masses can be seen constitutes meteorological visibility. Reduced visibility results in reduced detectability and sweep width.

d. Terrain/Sea Conditions. Normally, the more level the terrain, the more effective the search by airborne assets can be. Trees, rock outcroppings and other surface irregularities decrease search effectiveness, as will whitecaps, wind streaks, foam streaks, breaking seas, swell systems, salt spray and sun reflections over water. Overwater sweep width decreases as wind speed and significant wave height increase.

e. Cloud Cover. Visual sweep widths may be reduced 10 to 20 percent by cloud cover above the SRU due to reduced surface illumination.

f. Search Speed. At low altitudes, higher speed causes blurring of targets at close ranges and decreases exposure time to the observer. At altitudes above 500 feet, search speed of traditional SRUs has no significant influence on overwater sweep widths. The increase in area searched more than compensates for the small reduction in sweep width at high search speeds.

7. Visual Distress Signalling Devices (VDSDs). When estimating sweep widths for VDSDs, such as pyrotechnics, dye markers, tracer bullets or signal mirrors, use either twice the range at which survivors can be expected to detect the SRU or the value given in Tables 4-A-4 to 4-A-5, whichever is smaller. The effectiveness of daylight aids can be marginal due to the difficulty in achieving target contrast in a sunlit environment. Estimated sweep widths for various daylight detection aids are given in Tables 4-A-10 and 4-A-14. Hand held orange smoke detectability varies by type of SRU, and also by time on task for surface SRUs. Estimated sweep widths for hand-held orange smoke are given in Table 4-A-11 for winds 10 knots or less. For winds over 10 knots the smoke tends to dissipate and sweep width degrades to less than 2 nautical miles. If it is known, or suspected, that survivors can make a night signal, night visual searches should be conducted; the availability of Night Vision Goggles to SRUs will also affect this decision.

a. Time of Day. Cloud cover, wind and obscurations to visibility have less detrimental effects on night detection aids. Even a flashlight may be seen. On clear nights, pyrotechnics have been sighted in excess of 40 nautical miles. Sweep width should be based on the most likely VDSD to be used and limited to slightly less than twice the estimated range at which survivors can detect the SRU. Estimated sweep widths for night detection aids are given in Table 4-A-6 to 4-A-8. Hand held red flare detectability varies by type of SRU and also by time on task for surface SRUs. Estimated sweep widths for hand held red flares are given in Table 4-A-7. Life ring and life jacket strobe light detectability varies by type of SRU and time on task and also by wind speed for surface SRUs. Estimated sweep widths for life ring/life jacket white strobes (50,000 peak candlepower) are given in Table 4-A-8.

b. Position of the Sun. The sun’s position relative to the SRU and the target can significantly influence target appearance. Detectability, however, is not necessarily better or worse in any particular direction relative to the sun.

Table 4-A-4 Visual Sweep Width Estimated for Daylight Detection Aids

DEVICE	ESTIMATED SWEEP WIDTH (NM)	SRU TYPE
Red/orange balloon	0.5	Air or surface
Orange flight suit	0.5	Air
Red hand flare (500 candlepower) Day/night flare	0.5	Air or surface
Red pen gun flare	0.5	Air or surface
Red reflective paulin	0.75	Air or surface
Tracer bullets	2.0	Air or surface
Green dye marker*	2.0	Air or surface
Red/orange flag (waving)	2.0	Air
(3ft x 3ft)	2.5	Air or surface
Sun signal mirror	5.0	Air or surface
White parachute	5.0	Air or surface
Red meteor (star) or parachute flare (10,000 candlepower)*	6.0	Air or surface

*Greatly reduced in heavy seas

Table 4-A-5 Visual Sweep Width Estimates for Hand Held Orange Smoke

SRU Type	TIME ON TASK (HR) <3	≥3
Small boat (41' UTB)	4.6	2.8
Vessel (90' WPB)	6.9	5.0
Air*	7.7	

*Sweep width based on test results involving helicopters only

Table 4-A-6 Visual Sweep Width Estimates for Night Detection Aids

DEVICE	ESTIMATED SWEEP WIDTH (NM)	SRU TYPE
Strobe (2,000 candlepower peak)	0.5	Air or surface
Cyalume personnel marker light	1.0	Air or surface
Electric flashing SOS lantern or hand flashlight*	3.0	Air or surface
Tracer bullets	4.0	Air or surface
Red Very signals	8.0	Air or surface
Aircraft marine markers	8.0	Air or surface
Red pen gun flare	8.0	Air or surface
Red meteor (star) or parachute flare (10,000 candlepower)	10.0 or twice limit of survivor/SRU visibility	Air or surface

*These estimates were derived from test data collected only on surface searches

Table 4-A-7 Visual Sweep Width Estimates for Hand Held Red Flare (500 Candlepower)

SRU Type	TIME ON TASK (HR) <3	≥3
Small boat (41' UTB)	10.7	10.2
Vessel (90' WPB)	13.0	12.6
Air*	15.4	

*Sweep width based on test results involving helicopters only

Table 4-A-8 Visual Sweep Width Estimates for Life Jacket/Helmet Mounted White Strobe (50,000 peak candlepower)

SRU Type	TIME ON TASK (HR) <3			≥3		
	WIND SPEED (KTS) <10	10-15>	15*	<10	10-15>	15*
Surface	3.9	2.6	1.3	2.1	1.1	0.5
SRU TYPE	TIME ON TASK (HR) <1			>1		
Air**	4.4			3.9		

* Values for this category were extrapolated from test data
** Based on test results with helicopters only

8. Electronic Sensors. The capabilities of electronic search aids vary according to the design characteristics of each specific type of equipment. Presently, the most widely used electronic search aids are radar and thermal imaging systems. The following examples of radar and thermal imaging equipment performance are intended merely to be a generic guide to the possible detection capability of such systems; manufacturer's data and approved operator manuals must be consulted to determine the most suitable mode of employment for specific electronic sensors.

a. Forward-Looking Airborne Radar (FLAR). Tables 4-A-9 and 4-A-10 are provided as examples. Sweep widths for small targets in Sea State 3 or higher decrease rapidly to zero. Detection range is more often limited by either clutter or signal-to-noise ratio than by horizon distance.

Table 4-A-9 Sweep Width for FLAR (AN/APS - 133, AN/APN 125)

TARGET TYPE	DOUGLAS SEA STATE	SWEEP WIDTH (nm) RADAR SYSTEM	
		AN/APS - 133 MAP - 1 and MAP - 2	AN/APN - 125 SEARCH 1 and SEARCH 2
		Modes	Modes
Small, 20 feet or less, fibreglass boats, without radar reflector or engine/metal equipment	0 to 1	7	4
	2	2	2
Small, 20 feet or less, fibreglass boats, with radar reflector or engine/metal equipment	0 to 1	8	6
	2	3	3
Medium to large vessels, 40 feet or over, with significant amounts of reflective material	0 to 1	40	40
	2 to 3	4	4
Metal targets longer than 1000 feet	0 to 1	>50	>50
	2 to 3	16	16

Table 4-A-10 Sweep Widths for FLAR (AN/APS - 127)

TARGET TYPE	RANGE SCALE (NM)	SEARCH ALTITUDES (FT)	SIGNIFICANT WAVES (FT)	SWEEP WIDTH (NM)
6 to 10 person life rafts	10	500 to 4500	<2	5.4
			2 to 5	1.8
			>5	nil
24 to 43 foot boats	10	500 to 1000	<2	12.8
			2 to 5	10.8
			6 to 10*	6.3
			>10*	3.1
		1100 to 2400*	<2	11.2
			2 to 5	9.2
			6 to 10	4.7
			>10	2.3
		2500 to 5000	<2	8.5
			2 to 5	7.2
			6 to 10*	3.5
			>10*	1.5
6 to 10 person life rafts	20	500 to 4500	<2	7.0
			2 to 5*	1.8
			>6*	nil
24 to 30 foot boats	20	5000 to 4000	<2	14.1
			2 to 5*	7.0
			6 to 10*	4.9
			>10*	2.4
31 to 43 foot boats	20	500 to 4000	<2	24.9
			2 to 5*	15.3
			6 to 10*	7.0
			>10*	3.5

*Values for this category were extrapolated from test data

b. Side-Looking Airborne Radar (SLAR). The results of tests conducted using the AN/APS - 94 D SLAR are given at Table 4-A-11 as an example of capability.

Table 4-A-11 Sweep Widths for SLAR

TARGET TYPE	SWEEP WIDTH DOUGLAS SEA STATE 0 TO 1	SWEEP WIDTH DOUGLAS SEA STATE 2
Small, 20 feet or less, fibreglass or wooden boats, without radar reflector or engine/metal equipment	16	<6
Small, 20 feet or less, fibreglass or wooden boats, with radar reflector or engine/metal equipment	21	6
Liferafts, 4 to 10 person without radar reflectors	12	<5
Targets, 40 to 100 feet, with significant metal equipment	47	24
Metal targets longer than 100 feet	57	54

c. Infrared (IR) Sweep Widths. Recommended search altitudes and SW information for use with IR are given at Table 4-A-12 and 4-A-13.

Table 4-A-12 Recommended Search Altitudes, IR

TARGET TYPE	RECOMMENDED ALTITUDE - FEET	PREFERRED ALTITUDE FEET
People in water	200 to 500	None determined
Vessels and Liferafts	500 to 1500	1000

Table 4-A-13 Recommended Sweep Widths, IR

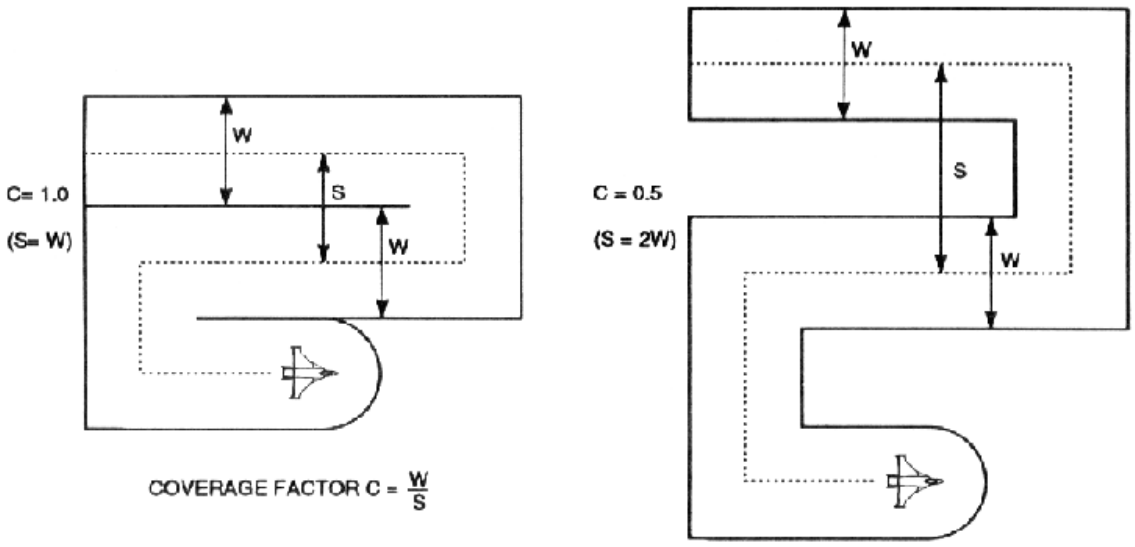
TARGET TYPE	SWEEP WIDTH DOUGLAS SEA STATE 0 TO 1	SWEEP WIDTH DOUGLAS SEA STATE 2
People in water	0.3 nm	0
Small Boats and Liferafts	1.5 nm	0.5 nm

9. Coverage Factor (C). Coverage Factor (C) is a measure of how thoroughly an area was searched. It is used as an entering argument when calculating POD. In SAR action messages, the assigned track spacing should be consistent with the desired coverage. The relationship between sweep width and track spacing is:

$$\text{Coverage Factor (C)} = \frac{\text{Sweep Width (W)}}{\text{Track Spacing (S)}}$$

Sweep width and track spacing are measured in the same units (nautical miles or yards), and C is dimensionless. Higher coverage factors indicate more thorough coverage. Coverage factors of 0.5 and 1.0 are compared in Figure 4-A-14. If coverage cannot be compromised, then additional SRUs should be found, the area decreased, the time increased, or SRU speed increased. However, increasing search speed may decrease sweep width, and hence coverage, when the SRUs are aircraft so care must be taken when considering this option.

Figure 4-A-14 Coverage Factors



10. Probability of Detection. Probability of Detection (POD) is the probability that the search object will be detected provided it is in the area searched. It is a function of coverage and the total number of searches in an area and describes the effectiveness of a single search or the cumulative effectiveness of multiple searches. For any search of an area, the RCC may specify a desired POD and determine the coverage factor accordingly, or if there are constraints on C, the RCC may have to settle for an attainable POD. Maritime search POD can be determined using the POD vs. Coverage graphs in the IAMSAR Manual.

11. Probability of Containment (POC): POC for a search area is the probability that the search object was there during the search. The POC for a circle centred on datum with a radius equal to the total probable error of position is 50%--which is the definition of probable error.

12. Probability of Success (POS): The probability of success is the true measure of search effectiveness in that it measures the probability that the search object will be or should have been found by a given amount of searching. POS is the joint probability of the search object being the search area and the probability of detecting it (POD) if it is there. Thus

$$POS = POD \times POC.$$

The search planner is often faced with making decisions on whether to cover more area with the available search facilities, which will increase POC but decrease coverage and POD, or cover less area with increased coverage and POD at the expense of POC. The best search plan is the one that achieves the optimal balance between these two competing alternatives by maximizing their product—the POS. The IAMSAR Manual provides methods and optimal search factor graphs to aid the search planner in finding the best balance between coverage and POC.

CHAPTER 5

COMMUNICATIONS

GENERAL

501. Object. The object of Search and Rescue Communications is to make possible the conduct of SAR operations. The communications must allow:

a. The rapid transmission of distress messages from aircraft, surface and sub-surface craft.

b. The rapid communication of such information to the units responsible for organizing and effecting rescue.

c. Co-ordination of the operation of the various SAR facilities.

d. Communications between control agencies (eg GCI stations, radar stations) and SAR facilities.

502. Organisation. Two types of communication organization are possible:

a. SAR Organization. The SAR organization used when an aircraft or surface craft is faced with an emergency. This comprises the types of communication designed to meet the objects described in Para 501.

b. SUBMISS/SUBSUNK Organization. The SUBMISS/SUBSUNK organization used when a submarine does not surface within the given time limit. This forms the subject of special instructions for maritime zone commanders; ACP 176 give the principles of the organization of these communications.

503. Frequencies. A number of frequencies for the communications described below are given in ICAO, IMO and NATO documents. A list of these frequencies and their use is at Annex A.

EMERGENCY/DISTRESS

504. Distress Frequencies. A number of internationally agreed frequencies are reserved for calls by units in difficulty or in distress. These frequencies are generally only used when a distress call cannot be passed on the frequency in use or when an essential facility, such as a fixer service, is only available on the distress frequency. The frequencies are:

500 kHz*	MF
8364 kHz	HF
121.5 MHz	VHF AM
156.525 MHz**	VHF AM
156.8 MHz	VHF FM
243.0 MHz	UHF
406 MHz	UHF
1544-1545 MHz	UHF Space to Earth
1645.6-1646.5 MHz	UHF Earth to Space

* 500 kHz is not used in Denmark. **156.525 MHz will be monitored after 1 Jan 05

The distress frequencies are also used for communications between units taking part in a search and the survivors. The VHF and UHF frequencies, on which homing aids operate, must only be used for communications between search units when absolutely necessary. Survivors may also use visual methods of communication. Such methods are listed in Annex B.

SATELLITE DETECTION

505. Detection of Distress Frequencies. Currently, the COSPAS/SARSAT satellite system detects emergency distress signals on the following frequencies:

a. 121.5 MHz to an accuracy of 20 km.

b. 243 MHz to an accuracy of 20 km (SARSAT Only).

c. 406-406.1 MHz to an accuracy of 5 km.

Signals are retransmitted to RCCs. It should be noted that, in 2007, the COSPAS/SARSAT consortium plans to cease monitoring 121.5 mHz and 243 mHz. Satellite detection and location facilities on these frequencies will no longer be available.

SCENE OF SEARCH

506. Frequency Allocation. To enable direct communication between units taking part in a SAR operation international frequencies are allotted as follows:

3023 kHz	HF
5680 kHz	HF
8364 kHz	HF
123.1 MHz	VHF AM
156.3 MHz	VHF FM
282.8 MHz	UHF

507. Alternative Scene of Search Communications. When radio communications are either not possible or unavailable, units taking part in SAR operations should use the visual signals described at Annex C. The following should be noted:

a. Frequencies 5680 and 3023 kHz are common user frequencies and, as such, could be subject to interference.

b. When military units only are employed in a SAR operation the channels are normally stated in the communication orders of the theatre or Naval force. ACP-176 gives the appropriate directives.

c. Direct communication with merchant shipping is sometimes impossible because of equipment incompatibilities in which case messages may have to be relayed via an RCC, MRCC or coastal radio station. In most instances, however, a point of contact should be possible on MF or HF maritime distress frequencies or on the HF or VHF maritime scene of search frequencies.

d. Frequency 252.8 MHz has been allocated to NATO forces for search and rescue training purposes.

RCC COMMUNICATIONS

508. Provision of Communications Equipment. To enable an RCC to fulfil its command and control functions certain special communications must be provided as follows:

a. From the RCC to its assigned SAR units' facilities and to neighbouring RCCs. These comprise both landline and radio communications.

b. From the RCC to other organizations which can be expected to assist in a SAR operation such as air bases not directly assigned for SAR duties, Army and Naval units, Civil Police, etc.

c. An RCC, for alerting purposes, shall be able to communicate rapidly with a neighbouring RCC in the event of a SAR incident and be able to maintain continuous communication with the neighbouring RCCs for the duration of the SAR incident.

d. The Alert shall be initiated by the quickest and most appropriate means available, and should be recorded at both RCCs.

e. The Continued Communications shall be through the most appropriate means available which have been prepared for this purpose (teletype, radio telephony, direct phone etc).

CALLSIGNS FOR SAR CRAFT

509. Allocation of Callsigns. Callsigns for assigned SAR craft will consist of the prefix RESCUE followed by the normal SAR callsign. In the case of helicopters and boats the prefix will be RESCUE HELICOPTER/BOAT as appropriate. During multinational SAR efforts, aircraft of NATO nations should identify their nationality on initial contact with the On-Scene Commander. When SAR aircraft are co-operating with non-NATO forces, or intending to land on a non-NATO airfield during SAR operations, the ICAO prefix ‘SS’ plus the appropriate RCC callsign will be used (Annex D to ICAO Chapter 6).

LIST OF FREQUENCIES - INTERNATIONAL AND NATO COMBINED

Frequency	Mode	Use
500 kHz	A1A-A2A-H2A	International Distress and Calling
2182 kHz	A3E-H3E-J3E	International Distress and Calling
121.5 MHz	A3E	International Aeronautical Emergency
156.8 MHz (Channel 16)	G3E	International Maritime Distress Safety and Calling
243.0 MHz	A3E	International Combined Distress/Survival Craft stations and stations/equipments used for survival purposes
277.8 MHz		Submarine SAR reporting net
406 MHz	16K0G1D	COSPAS/SARSAT Alerting
3023 kHz	A1A-A3E-J3E-R3E	International Scene of Search Primary Night
5680 kHz	A1A-H3E-J3E-R3E	International Scene of Search Primary Day
8364 kHz	A1A-A2A-A3A	International Intercom Survival Craft and SAR units
123.1 MHz	A3E	NATO/International Combined Scene of Search
282.8 MHz	A3E	NATO Combined Scene of Search
252.8 MHz	A3E	NATO Combined SAR Training
156.3 MHz	G3E	Scene of Search (Intercom SAR units)
4340 kHz	A1A	NATO Combined Submarine Distress

Notes: All Simplex Operations

A1A- Telegraphy Double Side Band (DSB) Modulated, Single Channel.

A2A- Telegraphy DSB Modulated, Single Channel.

H2A- Telegraphy Single Side Band (SSB) Modulated, Full Carrier, Single Channel.

A3E- Telephony DSB Modulated, Single Channel.

H3E- Telephony SSB Modulated, Full Carrier, Single Channel.

R3E- Telephony SSB Modulated, Reduced Carrier, Single Channel.

J3E- Telephony SSB Modulated, Suppressed Carrier, Single Channel.

G3E- Telephony Phase Modulated, Single Channel.

1G1D- Phase Modulated. Single Channel containing quantized or digital information without the use of a Modulating Sub-carrier.

INTER -RCC COMMUNICATIONS AND METHODS OF USE

1. General Considerations. Communications between neighbouring RCCs are required to enable agencies to inform, alert and assist each other. Inter-RCC communications are not frequently needed, but when they are, the need is usually urgent and unforeseen. These communications vary greatly in duration. Some consist of one single alert or information message, others of a series of messages over several days. The special nature of SAR communications demands a rapid, reliable and continuous means of transmission. However, if these were to be reserved exclusively for SAR communications, they could remain unused for long periods. The problem is addressed by dividing SAR communications into two categories:

a. Alert Communications. The alert communications are short-term emergency communications which must be established by the quickest means and which must be immediately available with the highest priority. If necessary, the initial alert communications enable continuous SAR communications networks to be activated.

b. Continuous SAR Communications. The continuous communications required during a whole SAR operation of unknown duration can be established subsequently, by other facilities that were not immediately available.

These two types of communications can be established by a single means if a permanent system links two RCCs directly.

2. Alert Communications. The term ‘alert communications’ means quick and reliable means of communication designed for linking RCCs within a period of time not exceeding five minutes. These means of communication can be:

a. Direct telephone lines linking RCCs.

b. Relayed telephone lines using if need be several circuits, but which can be operated and made available at any time for SAR purposes.

c. Teletypes, radio teletypes, radio voice or W/T facilities that are not necessarily part of the SAR organisation, but which can be made available and used at any time for SAR purposes.

3. Continuous SAR Communications. Continuous SAR communications must be available to SAR agencies without limitations on duration of use. The capability must exist to activate them and provide two-way communication within 20 minutes of the alert message or of a request from the RCC concerned. These facilities can be:

a. Direct telephone lines linking neighbouring RCCs.

b. Teletype, radio teletypes, radio voice or radio telegraphy facilities.

Radio facilities are built up in regional, international and inter-SAR networks. Each inter-SAR network includes several non-permanent, semi-permanent or permanent stations, and is normally controlled by a permanent controlling station. Some stations can belong to several networks. Non-integrated forces and other commands can, under operational or exercise conditions, be integrated into the radio network upon request to the controlling station or the controlling RCC. The controlling stations must be able to activate any non-permanent stations or all the stations of their network within 20 minutes of a request made by its RCC or any other RCC of the network, or of an adjacent network. The controlling stations of the adjacent network must also be able to communicate within 20 minutes, either directly or through a common relay station.

4. Operational Messages. Irrespective of the means of transmission used in alert or continuous SAR communications, any communication between RCCs must be transmitted as a message and have a date/time group and a reference number. These messages must be recorded when received or sent, and must be acknowledged.

5. Wording of Messages. When RCCs are of one nationality or speak the same language, alert messages will be written in the common language. Messages transmitted on the continuous SAR communications unit will also be worded in the language common to both RCCs using SAR message formats. Between RCCs that use different languages, irrespective of the means of transmission, messages will be worded and prepared in agreed formats. In case of absolute need, the blanks could be filled in any other national language of the RCC originator. In such a case the following recommendations are made:

a. Use concise and unambiguous terms and, as far as possible, use verbs in the infinitive.

b. Write the names of places as they are spelt in the international directories, and not in the special spelling they occasionally have in foreign countries.

c. The writer of the message must bear in mind that he must facilitate the translator’s task as much as he can.

6. Testing Communications between neighbouring RCCs and RSCs are to be tested at frequent intervals and also, where appropriate, with the fixed installations of non-integrated forces.

STANDARD MESSAGE FORMATS FOR COMMUNICATIONS BETWEEN SAR CONTROL UNITS

1. The aim of standardizing initial messages between RCCs of co-operating nations is to avoid any mistake in interpretation which might arise from the use of terms which are too general or which are not strictly suitable for SAR operations. The standardized format is derived from APP-11. Civil aeronautical and maritime SAR authorities rely upon the message formats detailed in the IAMSAR Manual, Volumes II and III. IAMSAR Manual Volume II, Appendix I, provides the international SITREP format and examples, as well as the "Code of Standard Phrases for Use Between RCCs and RSCs" which is useful if language may be a problem. Aircraft and vessels can find similar guidance in IAMSAR Manual Volume III, Appendix D, regarding SITREP format.

2. Standard messages are generally exchanged between the RCCs (or RSCs) shortly before a SAR operation or at its outset. Once a phase of initial contact is over, the RCCs may continue the traffic without adhering to the pre-established set forms.

3. Rules for the Preparation of Messages. The texts of all messages must be preceded by the prefix SARREQ, SARIR or SARSIT in accordance with their contents as follows:

a. SARREQ: Messages requesting forces to participate in a SAR mission.

b. SARIR: Messages used to report any SAR incident.

c. SARIR: Reply messages.

d. SARSIT: Messages used to report SAR OPS.

e. MSGCORRN: Messages sent to correct messages.

It should be noted that the civil SAR system does not have specific formatted messages comparable to the five types noted above in this paragraph. The IAMSAR Manual SITREP format is the primary type of message, other than plain text in the early stages of a distress. New information and changes are typically provided by sequentially numbered SITREPs. After the SMC has developed a search action plan for accomplishment by the OSC and SAR facilities on-scene, it is provided to them in a search action message as discussed in IAMSAR Manual Volume II, Section 5.13.

4. The message forms given in Appendix 1 to this Annex include items from which the originator chooses those suitable. Each of the items used must be preceded, in the text of the message, by its individual code number in the NATO language.

SERIAL 213: SEARCH AND RESCUE REQUEST

MESSAGE NAME : SEARCH AND RESCUE REQUEST
IDENTIFIER : SARREQ
RELATED DOCUMENT : APP-11
PURPOSE : THE SARREQ IS USED TO REQUEST FORCES TO PARTICIPATE IN A SEARCH AND RESCUE MISSION.
USERS : MAY BE INITIATED BY ANY RCC REQUIRING ADDITIONAL ASSETS. MAY ALSO BE USED TO TASK ORGANIC ASSETS.

MESSAGE TEXT FORMAT :

SEG	OCC	SET ID	SET FORMAT NAME	REMARKS
	(C)	EXER	EXERCISE IDENTIFICATION	EXER Set and OPER Set are not to be used in the same message.
	(C)	OPER	OPERATION CODEWORD	However, if the message pertains to a planned exercise or operation, the appropriate identifying set must be used.
	(M)	MSGID	MESSAGE IDENTIFIER	This set is used to identify the message.
R	(O)	REF	REFERENCE	This set is used to provide a reference or references.
	(O)	CANX	MESSAGE CANCELLATION WITH NEW INFORMATION PROVIDED	This set is used if a facility wants to cancel a message and provide new information.
	(C)	SEAINCDT	SEA INCIDENT INFORMATION	At least one of the incident sets must be used.
	(C)	SUBINCDT	SUBMARINE INCIDENT INFORMATION	
	(C)	ACINCDT	AIRCRAFT INCIDENT INFORMATION	
	(C)	GNDINCDT	GROUND INCIDENT INFORMATION	
	(O)	MET	METEOROLOGICAL INFORMATION	This set is used to provide general information on weather conditions.

SEG	OCC	SET ID	SET FORMAT NAME	REMARKS
[	(M)	REQUEST	REQUEST IDENTIFICATION	This set is used to identify the support requested and the requesting command.
[	(M)	TIMESPEC	MISSION TIMEFRAME	This set is used to give details of the mission timeframe.
[	(O)	CPMA	CONTROL POINT MARKER	This set is used to indicate control point marker(s).
[	(O)	FYFCE	FRIENDLY FORCES	This set is used to indicate friendly forces involved.
[	(O)	FYPOS	FRIENDLY FORCES POSITION	This set is used to indicate the position of friendly forces.
[	(O)	ISR	IDENTIFICATION SAFETY RANGE	This set is used to provide the identification safety range.
[	(O)	RDVU	RENDEZVOUS INFORMATION	This set is used to provide information about the rendezvous.
[	(O)	IFF	IFF OR SIF SETTING	This set is used to provide the IFF setting(s) for other units.
[	(O)	TYCON	TYPE OF CONTROL	This set is used to provide type of control.
[	(O)	EMCON	EMISSION CONTROL PLAN	This set is used to provide the emission control plan.
[	(O)	COMMS	COMMUNICATIONS	This set is used to provide information about communications.
[	(O)	CODES	CODES, CRYPTO AND AUTHENTICATION	This set is used to provide crypto handling information.

Note: SEAINCDT:(M) IF SETS SUBINCDT, ACINCDT, OR GNDINCDT ARE NOT USED.
SUBINCDT:(M) IF SETS SEAINCDT, ACINCET, OR GNDINCDT ARE NOT USED.
ACINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR GNDINCDT ARE NOT USED.
GNDINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR ACINCDT ARE NOT USED.

EXAMPLE OF SARREQ

1. (NU) **Format**

	(C)	EXER	EXERCISE IDENTIFICATION
	(C)	OPER	OPERATION CODEWORD
	(M)	MSGID	MESSAGE IDENTIFIER
R	(O)	REF	REFERENCE
R	(O)	CANX	MESSAGE CANCELLATION WITH NEW INFORMATION PROVIDED
	(C)	SEAINCDT	SEA INCIDENT INFORMATION
	(C)	SUBINCDT	SUBMARINE INCIDENT INFORMATION
	(C)	ACINCDT	AIRCRAFT INCIDENT INFORMATION
	(C)	GNDINCDT	GROUND INCIDENT INFORMATION
	(C)	MET	METEOROLOGICAL INFORMATION
	(M)	REQUEST	REQUEST IDENTIFICATION
	(M)	TIMESPEC	MISSION TIMEFRAME

(NU) **Format**

[	(O)	CPMA	CONTROL POINT MARKER
[	(O)	FYFCE	FRIENDLY FORCES
[	(O)	FYPOS	FRIENDLY FORCES POSITION
[	(O)	ISR	IDENTIFICATION SAFETY RANGE
[	(O)	RDVU	RENDEZVOUS INFORMATION
[	(O)	IFF	IFF OR SIF SETTING
[	(O)	TYCON	TYPE OF CONTROL
[	(O)	EMCON	EMISSION CONTROL
[	(O)	COMMS	COMMUNICATIONS
[	(O)	CODES	CODES, CRYPTO AND AUTHENTICATION

Note: SEAINCDT:(M) IF SETS SUBINCDT, ACINCDT, OR GNDINCDT ARE NOT USED.
SUBINCDT:(M) IF SETS SEAINCDT, ACINCET, OR GNDINCDT ARE NOT USED.
ACINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR GNDINCDT ARE NOT USED.
GNDINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR ACINCDT ARE NOT USED.

2. (NU) **Example**

NATO (CLASSIFICATION)
SIC KJM
EXER/DISPLAY DETERMINATION 89/BLUE FORCE//
MSGID/SARREQ/RCC SOUTH/23002/DEC//
REF/A/SARIR/CTG7.1/220045ZDEC89/-NOTAL//
SEAINCDT/USS STARK/230100Z/4526N12335W/35KM/EE/
PRINI 45/GREY/POB:204/QLF:ACT//
AMPN/MISSILE HIT:25 KIA,56 WIA,42 MIA.//

MET/FL190/330T/35KTS/2000M/F/LGT/8/AS/BASE:180/TOP:230/
10C/935/10M/150T/7//
REQUEST/RCC SOUTH/1002/ACTYP:HH53/3//
TIMESPEC/TFRM:SAR/302200Z/312200Z//
AMPN/SHUTTLE TO NAV HOSPITAL AT NAPLES//
FYFCE/TU502.1.2/1/DE//
FYPOS/SPRUANCE/235HESSEN25//
ISR/5NM/005T/5KTS//
EMCON/CHARLIE/230001Z/240001Z//

SERIAL 214: SEARCH AND RESCUE INCIDENT

MESSAGE NAME : SEARCH AND RESCUE INCIDENT REPORT
IDENTIFIER : SARIR
RELATED DOCUMENT : APP-11
PURPOSE : THE SARIR IS USED TO REPORT ANY SITUATION WHICH MAY REQUIRE A SEARCH AND RESCUE EFFORT.
USERS : ANY FACILITY DETECTING THE NEED TO INITIATE A SAR EFFORT.

MESSAGE TEXT FORMAT :

SEG	OCC	SET ID	SET FORMAT NAME	REMARKS
	(C)	EXER	EXERCISE IDENTIFICATION	EXER Set and OPER Set are not to be used in the same message.
	(C)	OPER	OPERATION CODEWORD	However, if the message pertains to a planned exercise or operation, the appropriate identifying set must be used.
	(M)	MSGID	MESSAGE IDENTIFIER	This set is used to identify the message.
R	(O)	REF	REFERENCE	This set is used to provide a reference or references.
	(O)	CANX	MESSAGE CANCELLATION WITH NEW INFORMATION PROVIDED	This set is used if a facility wants to cancel a message and provide new information.
	(C)	SEAINCDT	SEA INCIDENT INFORMATION	At least one of the incident sets must be used.
	(C)	SUBINCDT	SUBMARINE INCIDENT INFORMATION	
	(C)	ACINCDT	AIRCRAFT INCIDENT INFORMATION	
	(C)	GNDINCDT	GROUND INCIDENT INFORMATION	
	(O)	MILACT	MILITARY ACTIVITY DATA	This set is used to report any military activity which might affect the SAR effort.

SEG	OCC	SET ID	SET FORMAT NAME	REMARKS
	(O)	MET	METEOROLOGICAL INFORMATION	This set is used to provide general information on weather conditions.
	(O)	AREATYP	DESIGNATED AREA	This set is used to report the type of area for the SAR
	(O)	SARSTAT	SEARCH AND RESCUE STATUS INFORMATION	This set is used to report information on the status of SAR incidents.
	(O)	AVAIL-SAR	AVAILABLE SEARCH AND RESCUE ASSETS	This set is used by the originator to indicate if any organic assets are available to assist or support the SAR effort.
	(O)	GENTEXT	PERSONAL ID	This set is used to provide downed aircrew authentication data eg military identification card number, personal questions, etc.
	(O)	AKNLDG	ACKNOWLEDGE	This set is used to provide acknowledgement instructions.

Note: SEAINCDT:(M) IF SETS SUBINCDT, ACINCDT, OR GNDINCDT ARE NOT USED.
SUBINCDT:(M) IF SETS SEAINCDT, ACINCET, OR GNDINCDT ARE NOT USED.
ACINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR GNDINCDT ARE NOT USED.
GNDINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR ACINCDT ARE NOT USED.

EXAMPLE OF SARIR

1. (NU) **Format**

	(C)	EXER	EXERCISE IDENTIFICATION
	(C)	OPER	OPERATION CODEWORD
	(M)	MSGID	MESSAGE IDENTIFIER
R	(O)	REF	REFERENCE
R	(O)	CANX	MESSAGE CANCELLATION WITH NEW INFORMATION PROVIDED
	(C)	SEAINCDT	SEA INCIDENT INFORMATION
	(C)	SUBINCDT	SUBMARINE INCIDENT INFORMATION
	(C)	ACINCDT	AIRCRAFT INCIDENT INFORMATION

(C)	GNDINCDT	GROUND INCIDENT INFORMATION
(M)	SARAR	SEARCH AND RESCUE ASSISTANCE REQUIREMENT
(O)	ENACT	ENEMY ACTIVITY DATA
(O)	MET	METEOROLOGICAL INFORMATION
(O)	AREATYP	DESIGNATED AREA INFORMATION
(O)	SARSTAT	SEARCH AND RESCUE STATUS INFORMATION
(O)	AVAILSAR	AVAILABLE SEARCH AND RESCUE ASSETS
(O)	GENTEXT	PERSONAL ID
(O)	AKNLDG	ACKNOWLEDGE

Note: SEAINCDT:(M) IF SETS SUBINCDT, ACINCDT, OR GNDINCDT ARE NOT USED.
SUBINCDT:(M) IF SETS SEAINCDT, ACINCET, OR GNDINCDT ARE NOT USED.
ACINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR GNDINCDT ARE NOT USED.
GNDINCDT:(M) IF SETS SEAINCDT, SUBINCDT, OR ACINCDT ARE NOT USED.

2. (NU) **Example Using an Air Incident**

NATO (Classification)
SIC KJM
EXER/SOLID SHIELD 88//
MSGID/SARIR/62FW/0130012/JAN//
ACINCDT/F4E/301230Z/1637N12020E/EE/005/GINGER
32/GREEN/CAM:WDL/78035/UNK/POB:2/QLF:ACT/1/K1A/1/EVAD//
SARAR/YES//
AMPN/AIRCRAFT LOST NEAR COASTLINE. REQUEST NAVAL
SUPPORT//
SARSTAT/ORBITG//
AKNLDG/YES//
RMKWS/LOST CONTACT WITH AIRCRAFT PRIOR TO GOING FEET
WET.//

3. (NU) **Example Using a Sea Incident**

NATO (Classification)
SIC KJM
OPER/CAT SCAN 88//
MSGID/SARIR/CTG7.2/1909002/SEP//
SEAINCDT/USS GEO WASHINGTON/182005Z/4027N12027E/
3.5NM/AA/BONGO 55/GREY/POB:900/QLF:EST//
AMPN/EXPLOSIONS AND FIRES, AT LEAST 250 KIA, 400 WIA, AND
500 MIA.//SARAR/YES//
AKNLDG/YES//

SERIAL 215: SAR SITUATION SUMMARY REPORT

MESSAGE NAME : SEARCH AND RESCUE SITUATION SUMMARY REPORT
IDENTIFIER : SARSIT
RELATED DOCUMENT : APP-11
PURPOSE : THE SARSIT IS USED TO SUMMARIZE SEARCH AND RESCUE OPERATIONS.
USERS CONDUCTING : THE SARSIT IS SENT FROM AGENCIES AND/OR SUPPORTING SAR OPERATIONS.

MESSAGE TEXT FORMAT :

SEG	OCC	SET ID	SET FORMAT NAME	REMARKS
	(C)	EXER	EXERCISE IDENTIFICATION	EXER Set and OPER Set are not to be used in the same message.
	(C)	OPER	OPERATION CODEWORD	However, if the message pertains to a planned exercise or operation, the appropriate identifying set must be used.
	(M)	MSGID	MESSAGE IDENTIFIER	This set is used to identify the message.
R	(O)	REF	REFERENCE	This set is used to provide a reference or references.
	(M)	PERIOD	PERIOD OF TIME	This set is used to indicate the effective time period.
	(M)	8SARMSN	SEARCH AND RESCUE MISSION INFORMATION	This set is used to report a specific unit's mission in respect to SAR.
R	(O)	SEAINCDT	SEA INCIDENT INFORMATION	This set is used to summarize sea incidents.
R	(O)	SUBINCDT	SUBMARINE INCIDENT INFORMATION	This set is used to summarize submarine incidents.
R	(O)	ACINCDT	AIRCRAFT INCIDENT INFORMATION	This set is used to summarize aircraft incidents.
R	(C)	GNDINCDT	GROUND INCIDENT INFORMATION	This set is used to summarize ground incidents.

SEG	OCC	SET ID	SET FORMAT NAME	REMARKS
	(O)	8ENACT	ENEMY ACTIVITY DATA	This set is used to summarize enemy activity which might have affect or will affect any continuing SAR effort.
	(O)	8-WEATHER	WEATHER INFORMATION	This set is used to provide general information on weather conditions.
	(O)	8MSNLOC	AIR MISSION LOCATION INFORMATION	This set is used to define the SAR mission area(s).
	(O)	8CONTROL	AIR MISSION CONTROL AGENCY INFORMATION	This set is used to provide control agency information.
	(O)	8TIME-AMP	TIME AMPLIFICATION	This set is used to define the type and time of the SAR activity.
	(O)	8SARUNIT	SEARCH AND RESCUE UNIT DESIGNATION	This set is used to define the unit activity in the SAR area.
	(O)	8SAR-DATA	SEARCH AND RESCUE MISSION DATA	This set is used to summarize unit SAR results.

EXAMPLE OF SARSIT

1. (NU) **Format**

	(C)	EXER	EXERCISE IDENTIFICATION
	(C)	OPER	OPERATION CODEWORD
	(M)	MSGID	MESSAGE IDENTIFIER
R	(O)	REF	REFERENCE
	(M)	PERIOD	PERIOD OF TIME
	(M)	8SARMSN	SEARCH AND RESCUE MISSION INFORMATION
R	(O)	SEAINCDT	SEA INCIDENT INFORMATION
R	(O)	SUBINCDT	SUBMARINE INCIDENT INFORMATION
R	(O)	ACINCDT	AIRCRAFT INCIDENT INFORMATION
R	(O)	GNDINCDT	GROUND INCIDENT INFORMATION
	(O)	8ENACT	ENEMY ACTIVITY DATA
	(O)	8WEATHER	WEATHER INFORMATION
	(O)	8MSNLOC	AIR MISSION LOCATION INFORMATION
	(O)	8CONTROL	AIR MISSION CONTROL AGENCY INFORMATION
	(O)	8TIMEAMP	TIME AMPLIFICATION
	(O)	8SARUNIT	SEARCH AND RESCUE UNIT DESIGNATOR
	(O)	8SARDATA	SEARCH AND RESCUE MISSION DATA

2. (NU) **Example**

NATO (Classification)
SIC KJM
EXER/DEEP FISH 85//
MSGID/SARSIT/CINCHAN/15002/DEC//
REF/A/SARREQ/CINCLANT/132300ZDEC85//
REF/B/SARIR/CTG50.1/132000ZDEC85//
PERIOD/140800Z/141700Z//
8SARMSN
/MSNNO/SAROBJ /STATUS /SPTNO /TASKUNIT /SER
//LL12345 /DIABLO /INITIAT /MSS999 /5 STROMO
/MSS999/DIABLO /INITIAT /LL12345 /VMS 99//
SUBINCDT/SSBN/131255Z/345N12723W/EE/US/200.5M/
359-5/POB:305//
8ENACT
/MSNNO/ACTTYP /ACTLOC /TIME/ENUNIT
//LL12345 /BLOCK /3450N12759W /140600Z /DEC
/MSS999/DELAY /3456N12757W /140602Z /FFGC//
8WEATHER
/MSNNO/WEATHER /VIS /BASE /WD /WNDSPD /PK--GUST
/SS/CMNT
/LL12345/CLR/7NM/200/135T/5KTS/10KTS/1
/MSS999/CLR/7NM/200/135T/5KTS/10KTS/1//
8NSNLOC
/MSNO/LOCTYP/LOCN/ALTITUDE/CMNT
/LL12345/PUPNT/3545N12723W/001/CREW ON SURFACE
/MSS999/RDZPT/3545N12723W/100//
8CONTROL
/MSNNO/CONT/CALLSIGN/PRIFRQ/SECFRQ/REPIN
/LL12345/CORD/SUNBEAM 49/349.2/292.4/POINT XRAY
/MSS999/CORD/HIGHSTAR 20/322.5/321.5/POINT XRAY//
8TIMEAMP
/MSNNO/ACTTYP/TMEDES/TIME/ACTTYP/TMEDES/TIME/CMNT
/LL 12345/ORBITG/ONSNTM/140500Z/SAR/TOT/140600Z
/MSS999/ORBITG/ONSNTM/1405000Z/CAP/TOT/140550Z//
8SARUNIT
/MSNNO/CALLSIGN/ACTTYP/PRIFRQ/SECFRQ/CMNT
/LL12345/OTTO 41/SAR/349.2/297.1
/MSS999/DARE 11/CAP/325.4/349.2//
8SARDATA
/MSNNO/TASKUNIT/TYPAC/DUR/SR/REC/CMNT
/LL12345/5 STROMO/SH2F/4.5/4/12//

SUPPLEMENTARY INTERNATIONAL Q CODES FOR SAR

SIGNAL	SIGNIFICANCE	
	Question or Interrogatory form	**Answer, Information or advice form**
QKK Quebec Kilo Kilo	I am ending search I await instructions	Having ended your search ..... 1. Begin search again in same area 2. Carry out a search between longitudes ... and latitudes ..... 3. Return to base and consider your mission as completed
QKL Quebec Kilo Lima	Have you made radio contact with: 1. The survivors? 2. A ship (or a given ship)? 3. ... (designation)?	I have made radio contact on ... Hz(MHz) with: .....

CHAPTER 6

SEARCH AND RESCUE INSTRUCTIONS - SUNKEN SUBMARINE

INTRODUCTION

601. Guidance for Use. This publication contains information to enable operational commanders to assemble the forces and equipment needed to locate a Disabled Submarine (DISSUB) on the seabed and establish communications with it. Guidance is also given to units engaged in the search for the DISSUB and in particular to the On Scene Commander (OSC). It should be used in conjunction with ATP 57 (The Submarine Rescue Manual) which deals in more detail with the recovery of escapers and rescue of survivors. The treatment of pressure related injuries suffered by the DISSUB's crew are also covered in that publication.

602. Purpose. The purpose of this chapter is to:

a. Standardize submarine SAR operational procedures for the localisation of a sunken submarine.

b. Provide basic information to all those who may be confronted with a submarine SAR problem.

c. Serve as a guide for all operational commanders responsible for submarine SAR operations.

603. Aim. The aim of the submarine SAR organisation is to save life by ensuring the earliest possible localisation of the DISSUB and the recovery of the crew. Due to the relatively limited amount of equipment immediately available to cope with a submarine disaster, offers of assistance are likely to be received from many nations and much of it will be needed to ensure that as many lives as possible are saved. Naturally this will complicate the problems of assembling all suitable units and equipment to the scene of the accident. Therefore while SAR is in principle a national responsibility it is for the sake of simplicity and speed of response that the SAR organisation will be the same in war as in peace, whether it be in a NATO exercise/operation or not. This is achieved by providing a procedure for the prompt alerting of forces to take part in the search while other vessels prepare more specifically for the recovery and treatment of survivors. This procedure is applicable to any submarine SAR operation whether the DISSUB is assigned to NATO or not.

DEFINITIONS

604. Arrival Report. A signal transmitted by a submarine immediately upon its arrival in port. This signal may be required by the SUBOPAUTH.

605. Authorities. Authority and C2 definitions are as follows:

a. Alerting Authority (AA). The Commander who has operational control of the distressed submarine (SUBOPAUTH) is responsible for initiating Submarine Safety COMCHECK Procedure and Operation SUBLOOK/SUBMISS/SUBSUNK.

b. Submarine Search and Rescue Authority (SSRA). The Naval Authority responsible for the planning and conduct of search, escape and rescue operations within the relevant SRR as defined in Annex B to Chapter 3.

Note: Bearing in mind the area within which the DISSUB was operating, the nature of the operation/exercise and the wishes of the national authority, the responsibilities of the SSRA may be passed to or from the relevant national/NATO authorities. However, experience has shown that such changes can lead to confusion.

c. National Authority (NA). The Naval Authority with the same nationality as the submarine, exercising operational command of the submarine.

d. Support Authority (SA). Any authority who provides assistance for the National authority and/or the submarine search and rescue authority.

e. On Scene Commander (OSC). The Commander of the unit which first reaches the vicinity of an accident or datum is to act as OSC. In the event that the first unit on the scene is an aircraft, the aircraft Commander will retain control of SAR operations until the arrival of a surface unit Commander to assume the duties of OSC. In all other cases, in order to maintain continuity of Command, the Officer who subsequently may arrive on the scene is not to assume Command by reason of seniority unless or until:

(1) Ordered to do so by the SSRA, or

(2) In his judgement, a change of Command is essential.

(3) The OSC will be nominated or confirmed by the SSRA.

f. Co-ordinator Recovery/Rescue Forces (CRF). The Officer with responsibility for co-ordinating and controlling the recovery of escapers and/or the rescue of the crew from the DISSUB. The most appropriate vessel by virtue of equipment carried and personnel borne will be nominated as CRF by the SSRA. The CRF is subordinate to the OSC.

g. Rescue Co-ordination Centre (RCC) (see Para 304). RCCs control considerable assets, and have sophisticated command, control and communication facilities.

h. Submarine Operating Authority (SUBOPAUTH). The Naval authority responsible for the safe routeing of a submarine under his OPCON and for the initiation of SUBNOTES. It means communication is urgently required with a particular submarine. Any unit establishing contact with the submarine is to inform the originator immediately. (Format at Annex B).

606. Terminology. Definitions for the following terms, when used in relation to submarine SAR, are shown in table 6 -1 below:

Table 6 - 1 Submarine SAR Terminology

TERM	DEFINITION
COMCHECK	The signal originated by SUBOPAUTH when the safety of a submarine is in doubt.
Datum	Last known position of DISSUB. Used as the starting point for all search plans. It will be updated and marked when true position is known.
Deep Submergence Rescue Vehicle (DSRV) (See Note 1)	A manned submersible operated by the US Navy capable of conducting underwater rescue of personnel from suitably equipped submarines. Operates a shuttle service between MOSUB(s) and the DISSUB. It can also operate from specifically configured surface support ships (ASRs).
Distressed Submarine (DISSUB)	A submarine disabled on the seabed in which live personnel remain on board.
Diving Signal	A signal transmitted by a submarine before it dives, indicating the date and time of dive, date and time of completion, position and reason for diving. (Annex B Para 643).
Emergency Life Support Stores (ELSS)	Items of stores for use by the personnel in the DISSUB to enable them to survive whilst awaiting rescue. Stores include such items as carbon dioxide absorbent, oxygen candles and medical stores for emergency treatment of casualties.
Escape	Any method by which a man leaves a DISSUB and makes his way to the surface without direct assistance from outside agencies. A man who makes an escape is known as an 'escapee'.
Escape Gear Ship (EGS)	Any ship nominated by the SSRA to carry medical stores and equipment to facilitate the recovery and treatment of escapers on reaching the surface.
Expendable Communications Buoy (ECB)	A communications buoy which can be fired by a DISSUB from a submerged signal ejector. When on the surface it operates on a predetermined UHF frequency and when released in the emergency mode transmits an emergency DF beacon on 243 (or 406 MHz) which can access a satellite.
Mother Submarine (MOSUB) (See Note 2)	The submarine used to carry the DSRV to the scene of the submarine accident and from which the DSRV operates. Certain USN Type 688 SSNs, the UK's VANGUARD Class SSBNs and one of the French REDOUBTABLE Class SSBNs are capable of being fitted out for the MOSUB role and operating with the USN's DSRVs.

Moving Havens (MHN)	The Moving Haven (MHN) is the normal method by which submarines are routed. In peacetime SUBOPAUTHs are requested to restrict the size of the MHN to the minimum to meet the submarine's operational requirements. The standard MHN is an area 20 miles ahead, 30 miles behind, and 5 miles on either side of the submarine DR position. The MHN should be reduced in size in restricted waters. In peacetime, the shape of an MHN may be varied to suit the operational requirements. The size of the MHN is stated in the SUBNOTE.
On Scene Commander (OSC)	Responsible for the conduct of the search with the assets allocated by the SSRA. The OSC will also carry out the peripheral activities required after the DISSUB has been located leaving the CRF free to concentrate on saving lives.
Personal Locator Beacons (PLB)	Small radio transmitters in a container capable of withstanding pressure equivalent to the maximum escape depth of the DISSUB. PLBs are worn by escapers (through not normally carried by all) and when switched on transmit an emergency DF beacon on 243 MHz (or 406 MHz which can access a satellite).
Recovery	The process of retrieving an escapee from the water, and his subsequent treatment/management. It can also be used to describe the process of rescuing a man to the safety of a MOSUB or mother ship.
Rescue	The method of saving life after a submarine disaster in which survivors are transferred from the DISSUB to a MOSUB or surface mother ship (MOSHIP) by a rescue submersible or bell. A man who is rescued from a DISSUB is known as a 'rescuee'.
Rescue/Recovery Gear Ship (RGS).	The ship(s) nominated by the SSRA to carry stores and equipment which may be needed to sustain the DISSUB's crew while they wait in the submarine before being rescued or they have to make their escape. In addition they also carry equipment and medical stores needed to assist in the recovery and treatment of escapers or rescuees. Rescue submersibles and ROVs would be carried by RGSs.
Remotely Operated Vehicle (ROV).	An unmanned underwater vehicle normally powered and controlled via an umbilical from a surface vessel from which it is launched and recovered. ROVs can be used for damage assessment of the DISSUB and, if fitted with a suitable claw, can also post watertight `Pods' (specially designed to carry Emergency Life Support Stores (ELSS) into the submarine via an escape tower.

SMASHEX	The Codeword of an exercise which may be executed to test any or all of the procedures and practices required in a submarine disaster. SMASHEX may exercise specific parts of the SUBLOOK/SUBMISS/SUBSUNK sequence as follows: SMASHEX ZERO - equates to COMCHECK SMASHEX ONE - equates to SUBLOOK SMASHEX TWO - equates to SUBMISS SMASHEX THREE - equates to SUBSUNK
SUBCHECK Report	The signal transmitted by a submarine at specified intervals to ensure the SUBOPAUTH of her continued safety. No other signal received from a submarine may replace a SUBCHECK REPORT. Non-receipt of other anticipated signals should not normally give rise to undue concern although in such circumstances it may be appropriate to initiate a SUBMARINE SAFETY COMCHECK.
SUBCHECK Report Interval	The time interval between consecutive SUBCHECK reports. The allowed interval is at the discretion of the SUBOPAUTH. It is measured from: a. ETD as promulgated in the SUBNOTE; or b. Time of diving as stated in the Diving Signal, or c. DTG of the last SUBCHECK Report; whichever is the latest.
SUBLOOK	The Codeword of the procedures initiated by the SUBOPAUTH when the safety of a submarine is in doubt, or by a SUBOPAUTH when a Surfacing Signal, Arrival Report or SUBCHECK Report from a submarine under his operational control becomes one hour overdue. (Annex B Para 651a).
Submarine Escape and Rescue Assistance Team (SMERAT)	A UK team of escape and rescue experts augmented by medical specialists who are available to provide advice and assistance to the SSRA, OSC and CRF. Selected members of the SMERAT are trained water entry parachutists to provide a method of rapid deployment if required. (See SPAG).
Submarine Launched One-way Tactical (SLOT) Buoy	A communications buoy which can be fired by a DISSUB from a submerged signal ejector. When on the surface they operate on one of a number of predetermined VHF frequency (compatible with `Jezebel' Passive Sonobuoy monitoring channels) and though normally used to pass operational data could be used by the DISSUB.
Submarine Rescue Chamber (or Bell)	A bell that can mate with the NATO common rescue seat but in addition has to be fitted with special securing arrangements. Capable of rescuing up to 6 survivors at a time. Also known as the McCann Bell.

Submarine Rescue Submersible	Any submersible craft which may be used for the recovery of men from a DISSUB eg the USN's DSRV. (For full details of NATO Submarine Rescue Submersibles, see ATP 57).
Submarine Search and Rescue Zone (SSRZ)	The Submarine Search and Rescue Zone (SSRZ) is the area allocated to the submarine since the time of the last SUBCHECK (or similar) report, plus a margin for error.
SUBMISS (Format at Annex B)	SUBMISS is: a. The Codeword of the signal originated by the SUBOPAUTH when a Surfacing signal, SUBCHECK Report or an Arrival Report of a submarine is six hours overdue, or for one-compartment submarines three hours overdue. (These periods are not obligatory and will depend on the situation - see Para 651). b. The Codeword of an operation which will be executed in order to initiate a fully co-ordinated search for a submarine which is believed to be missing.
SUBNOTE	Submarines are routed in peace and in war by means of Subnotes, which are issued by the SUBOPAUTH and accurately define the route that the centre of the Submarine moving haven will follow.
SUBSUNK (Format Annex B)	SUBSUNK is: a. The Codeword of the signal originated by any unit or authority who has positive information that a submarine has sunk or by the OSC when the DISSUB has been located. b. The Codeword of the signal originated by the SUBOPAUTH on receipt of signal detailed in sub-paragraph a. above. c. The Codeword of an operation which will be executed in order to initiate a fully co-ordinated search for a submarine which is known to have sunk.
SUBSUNK Parachute Assistance Group (SPAG)	A UK team of escape and rescue experts, augmented by medical specialists, available at short notice to parachute into the water to pick up escapers and give first aid medical treatment before the arrival of surface recovery/rescue ships. Normally, they drop from an aircraft (eg C130) which also carries liferafts, recovery craft and medical stores to assist in the operation. If surface vessels are already on the scene the team can provide them with expert advice and assistance.

Surfacing Signal	A signal transmitted by a submarine to indicate the completion of a dived period as covered by a Diving Signal. Alternatively it concludes a passage or a leg of a passage as required by the SUBNOTE and thereby cancels any extant Diving Signal or concludes any preceding series of SUBCHECK reports.
Survivor	The term survivor is only to be used for personnel who have been recovered from the DISSUB and, in the opinion of a medical expert, are deemed likely to live.
SURFACING ZERO TIME	The time at which the SUBOPAUTH must have received the SUBCHECK Report or Surfacing Signal or Arrival Report from a Submarine. SURFACING ZERO TIME also designates the time to execute: a. SUBMARINE SAFETY COMCHECK (at SURFACING ZERO TIME). b. SUBLOOK (at SURFACING ZERO TIME plus one hour). c. SUBMISS (at SURFACING ZERO TIME plus six hours, or for one-compartment submarines three hours).
Underwater Communications Guard	This duty should be assumed automatically by the first ship or submarine arriving in the area and capable of communicating with or intercepting messages from a sunken submarine. A suitably fitted helicopter may temporarily assume this duty until the arrival of the first Underwater Telephone (UWT) fitted ship or submarine.

Notes:

1. The USN DSRV is due to pay off in 2006.
2. The MOSUB role will continue to be available for any rescue vehicle to conduct underwater transfers of rescuees.

RESPONSIBILITIES

607. Responsibilities for Submarine SAR Operations. Responsibilities for submarine search and rescue operations are assumed as follows:

a. Alerting Authority (AA). The AA is responsible for initiating SUBLOOK/SUBMISS/SUBSUNK. If the position of the distressed submarine is unknown, the Alerting Authority will advise the SSRA and the OSC on the extent of the Submarine Search and Rescue Zone (SSRZ) and, if possible, the most likely position of the submarine.

b. Submarine Search and Rescue Authority (SSRA). On receipt of a SUBLOOK, SUBMISS or SUBSUNK signal nominating him, the SSRA will assume his responsibilities. He is to:

(1) Nominate or confirm the OSC and other search units and is to establish or confirm the search datum.

(2) Call upon one or more RCCs to assist with all means available.

(3) On request by the National Authority (NA), co-ordinate the logistic support for the submarine SAR operation.

(4) Be responsible for the overall conduct of the search including provision of search forces. He is also to co-ordinate, subject to overriding NA approval of financial outlay, the makeup of the rescue force.

(5) Keep all appropriate involved authorities, including the NA, SAs, OSC, MODs/CHODs informed of the progress of the operation and any requirements for additional support.

(6) Co-ordinate release of information to the media with the NA.

c. National Authority (NA). The NA is responsible for National Administration, National Operations outside the immediate search area and for arranging National and NATO support to the SSRA. He is to be represented by specialist liaison officers qualified in submarine operations (preferably by a Commanding Officer and an Engineering Officer of the same class as the distressed submarine), public relations, diving and underwater medicine, and escape/rescue at:

(1) The headquarters of the SSRA.

(2) The scene of the accident, or, prior to location, with the OSC.

(3) Any recompression therapy centre by underwater/diving medical specialists.

By reason of financial responsibility he or other authorities of that nation will initiate the request to other nations for logistic submarine SAR support (submarine rescue submersibles, commercial submersibles, diving equipment, subsunk stores, etc) may delegate the co-ordination of support to the SSRA conducting the SAR operation.

d. Support Authority. In submarine accidents requiring additional facilities, other commands shall make available to the NA and/or SSRA all requested assistance, if applicable.

e. OSC. OSC, in addition to the responsibilities laid down in Para 617 will fulfil the following requirements:

(1) Assume responsibility for the submarine SAR Operation at the scene of the accident.

(2) Send Situation Reports (sitreps) which serve not only to keep his own forces, the SSRA and NA informed on the progress of the search, but also facilitate dissemination of information to the press. These sitreps will be sent by the OSC on arrival at the datum and at three-hourly intervals thereafter.

SUBNOTES FOR SUBMARINE DIVING, SURFACING SIGNALS AND SUBCHECK REPORTS

608. Sailing and Routing of Submarines. Submarines are routed in peace and in war by means of SUBNOTEs. Full instructions on the use of SUBNOTEs are given in APP-11 and ATP-1. The SUBNOTE is to indicate details, when applicable, of the time at which the SUBOPAUTH will change. The new SUBOPAUTH is invariably to be ordered to acknowledge receipt of the SUBNOTE; such acknowledgement infers acceptance of the responsibilities of Alerting Authority and hence that the safety instructions in the SUBNOTE for the period under the new SUBOPAUTH OPCON are acceptable to him.

609. Subject Indicator Codes (SIC). The SIC LGQ is to be used for all SUBNOTEs, DIVING and SURFACING Signals and SUBCHECK Reports. In exercises, the appropriate NO-PLAY SIC, A-N, is to precede LGQ.

610. General Instructions for Diving Signals. Except when operating in accordance with a SUBNOTE (Para 633, 641) a Diving Signal is always to be made before a submarine dives, whether an attendant vessel is present or not, and she is not to dive until this signal has been cleared. One Diving Signal may cover a series of dives in any specific exercise. Format for the Diving Signal is at Annex B.

611. General Instructions for Surfacing Signals. A Surfacing Signal is transmitted by a submarine to indicate the completion of a dived period as covered by a Diving Signal or SUBNOTE. The Surfacing Signal must be transmitted in sufficient time to ensure its receipt by the SUBOPAUTH prior to the expiry of the Diving Signal or Surfacing Zero time given in the SUBNOTE.

612. General Instructions for SUBCHECK Reports. In order that they can be assured of the continued safety of submarines under their control, SUBOPAUTHs will instruct submarines to make SUBCHECK Reports at intervals specified in SUBNOTEs or EXERCISE ORDERs. SUBCHECK Reports may be waived at the discretion of the SUBOPAUTH with national approval. (See also Para 624).

613. The SUBCHECK Report Interval. The SUBCHECK Report Interval is at the discretion of the SUBOPAUTH with national approval and will depend on the type of exercise or passage, and of the operational state of the submarine and the state of training of the crew. All submarines are to make SUBCHECK Reports within the ordered Interval whether they dive or not. (See also Para 625).

614. Safety in Exercises. In advanced exercises the Officer Scheduling the Exercise (OSE) may, with the prior approval of national SUBOPAUTHS, waive requirements for Diving or Surfacing Signals and SUBCHECK Reports. This information must be included in the Exercise Operation Order in the Annex Applicable to Submarine Safety Rules.

OPERATION SUBLOOK/SUBMISS/SUBSUNK AND SUBMARINE SAFETY COMCHECK PROCEDURE

615. Circumstances Indicating the Possibility of a Submarine Disaster. A submarine disaster must be considered a possibility under any of the following circumstances:

a. A submarine fails to surface or communicate promptly following a positive or possible accident reported by any source.

b. Contact with a submerged submarine has been lost by participating units for a period of two hours, when such loss of contact has not been planned or anticipated as part of the exercise or operation.

c. There is reason to believe that a submarine has suffered some form of breakdown and requires assistance.

d. A SUBCHECK Report, Surfacing Signal or an Arrival Report is overdue.

616. Indication of a Submarine Accident. Initial indication of a submarine accident may be given by one of the following:

a. A submarine may be observed to sink or be suspected sunk, eg as a result of a collision.

b. Escapers may be sighted.

c. The sighting of wreckage, diesel fuel or air bubbles on the surface in an area where a submarine is known to have been operating.

d. The sighting of red grenades or flares. The unexpected sighting of smoke candles or grenades (of any colour) or a patch of fluorescent green dye on the surface may also be evidence that a submarine accident has occurred.

e. A SUBCHECK Report, Surfacing signal or an Arrival Report overdue.

f. Sighting or interception of radio signal of a Submarine Indicator Buoy or receipt of SAR satellite alert.

g. Emergency HF or UHF transmission from a submarine prior to sinking or if sunk from a Communications Buoy, an Expendable Communications Buoy (Para 614) or Personal Locator Beacons (Para 618).

h. Interception of a distress message from a submarine, on Underwater Telephone (UWT) or a transmission of a sonar pinger.

i. Failure of a submarine to surface when ordered during specific exercises with anti-submarine forces.

617. Submarine Safety COMCHECK Procedure. A Submarine Safety COMCHECK is to be initiated when:

a. A submarine's SUBCHECK Report, Surfacing Signal or Arrival Report is due. (Format at Annex B).

b. A SUBOPAUTH requiring urgent communication with a submarine, or in any doubt as to its safety, may initiate a Submarine Safety COMCHECK at any time. This is not a forewarning that a SUBLOOK/SUBMISS/SUBSUNK operation will soon be initiated. In most cases time must be allowed for the submarine's ordered broadcast reception interval to pass before escalation is considered.

c. The SUBOPAUTH initiating Submarine Safety COMCHECK is to inform the submarine by every available means of its initiation.

618. SUBLOOK/SUBMISS/SUBSUNK - Purpose.

a. SUBLOOK. SUBLOOK is intended for use when the safety of a submarine is in doubt. SUBLOOK is to be declared as soon as such doubt arises and, in any event when a submarine's SUBCHECK Report, Surfacing Signal or Arrival Report is 1 hour overdue. An initial search is made of the submarine's Exercise Area or Moving Haven, by ships in company with the submarine and/or submarines, Maritime Patrol Aircraft (MPA) and helicopters which might be in close proximity. No other ships, submarines or aircraft are to divert to join the search until ordered to do so by the authority conducting SUBLOOK. The SUBLOOK Signal will alert other nations and appropriate RCC to the possibility of a submarine accident and will normally state the time at which it is intended to escalate to SUBMISS should SUBLOOK fail to establish the safety of the submarine. During the SUBLOOK Phase the SUBOPAUTH will:

(1) Initiate a Communication Search for delayed signals.

(2) Send a signal to the submarine advising it that SUBLOOK has been initiated for it.

(3) Alert all units operating in the vicinity to submarine's expected position. Nothing should inhibit authorities from initiating SUBMISS or SUBSUNK, without the preliminary SUBLOOK, if circumstances so dictate. Although five hours (or two hours for single-compartment submarines) is the normal maximum for the SUBLOOK phase, this may be extended by the responsible authority (eg in the case of submarines on passage to distant waters). If possible, the expected time of escalation to SUBMISS should be included in the SUBLOOK Signals.

b. SUBMISS. SUBMISS is intended for use when:

(1) The initial search (SUBLOOK) has failed to establish the safety of the submarine, or

(2) A SUBCHECK Report, Surfacing Signal or Arrival Report is six hours overdue or three hours for one-compartment submarines.

(3) Circumstances indicate the need for an immediate full-scale search for a submarine. It may be appropriate to declare SUBMISS or even SUBSUNK without first declaring SUBLOOK for a preliminary search. The release of the SUBMISS Signal will initiate a full-scale co-ordinated search which will continue until the submarine or survivors are located. At the same time preparations are to be made for a rescue operation.

c. SUBSUNK. SUBSUNK is intended for use when a submarine is known to have sunk. The signal will initiate full-scale search and rescue operation if this has not already been initiated by declaration of SUBMISS.

GENERAL INSTRUCTIONS TO THE ON-SCENE COMMANDER AND INDIVIDUAL UNITS OF THE SEARCH FORCE

619. Command of the Search Force. The SSRA is overall responsible for the conduct of search and recovery forces. However the OSC is in command of all forces at the scene of the accident and the choice of the right unit for this task is important. The following points are also relevant:

a. The SSRA should nominate (or confirm) the OSC as soon as possible. The OSC has to inform all concerned as soon as he assumes the responsibilities of OSC. The ship of the OSC is to be marked by a large red flag at the mast head by day and by an all-round flashing red light at the mast head by night.

b. The OSC should establish a datum position Search Area based on the datum and send a SITREP to the SSRA and the rest of the Search Force.

c. Whenever possible specialists sent to the scene of the accident should be embarked in the OSC's ship or as detailed by the OSC. (eg Medical staff and submarine escape and rescue experts would be needed in the Rescue Gear Ships (RGS) and Escape Gear Ships (EGS)).

d. The OSC should take appropriate actions in accordance with the check-off list CHARLIE of Annex A.

620. SUBLOOK - Action by Ships and Submarines. On receipt of SUBLOOK, ships and submarines should take the following action:

a. Ships in company with the submarine concerned attempt to contact the submarine by all available means. They should also initiate a visual search in the area with available naval and air assets as ordered by OCE or OSC.

b. Submarines in company should surface, make a Surfacing Signal and act as ordered by the OSC.

c. Other ships and submarines take no action until ordered to do so by the SSRA. Units more than 4 hours steaming from the Search Area/Datum are unlikely to be ordered to join the search unless the incident escalates to SUBMISS.

621. SUBMISS/SUBSUNK - Action by Units Available at Datum within 24 hours. Ships and submarines at sea or in harbour and able to reach the Datum within 24 hours (if not otherwise ordered by national authorities) are to take the following action:

a. Suspend all exercises immediately.

b. Proceed at full speed to the Datum, reporting in accordance with Para 658.

c. Ships exercising with non-stricken dived submarines are to initiate surfacing procedures for these submarines immediately. Ships are to remain in the vicinity until all submarines involved in the exercise are safely on the surface. Additionally, ships are to inform the submarines of the emergency before proceeding.

d. Submarines are to transmit a Surfacing Signal (if appropriate).

622. SUBMISS/SUBSUNK - Units Available at Datum within 72 hours. Ships and submarines at sea or in harbour, and able to reach the Datum within 72 hours but unable to reach it within 24 hours, are to take the following action (if not otherwise ordered by national authorities):

a. Come to immediate notice for full power, and continue with their programme.

b. If appropriate, report to the SSRA the estimated time of being ready to proceed. Local message should be passed by hand when possible.

c. Signal requirements for any additional personnel required for a Submarine SAR operation. They are to take no other action unless ordered by the SSRA.

623. Details of Ships in Search Force. The SSRA requires information to assist him in the organization of the search. All ships proceeding to the search area are to report by PRIORITY signal addressed to the SSRA (who will pass to the OSC details of those units who will be joining the Search Force) the following information:

a. Position, course and speed, and ETA Datum.

b. Estimated fuel (percent) remaining on arrival Datum.

c. Helicopter details as follows:

(1) Helo(s) embarked.

(2) Helo and deck operating clearance.

(3) Helo controllers on board.

d. Medical Officer on board.

e. Submarine Officers and Diving Officers on board.

f. Any additional equipment fitted or any defects or shortages particularly to Sonar and communications which affect the ship's capabilities in a submarine SAR operation, including Air Portable UWT and earliest launch time of UWT fitted aircraft.

g. Time at which control of the air search could be taken over.

Note: It is important to keep the communication circuit as clear as possible particularly at the start of a SUBMISS/SUBSUNK operation and, therefore, the signal is to be kept brief. Paragraphs which are NIL may be omitted.

624. Action Check Off Lists. Comprehensive check off lists for SSRA, OSC and individual units are at Annex A. These are repeated in ATP 57 for easy reference during the recovery/rescue phase.

CONDUCT OF THE SEARCH

625. Guidance for OSC and other Units. This section aims to provide details of the likely situation at sea in a submarine SAR operation, some of the problems likely to be encountered and guidance on the conduct of the search.

Note: Annex A includes check-off lists for the OSC and individual units of the Search Force.

626. Degree of Urgency. THE EARLIEST POSSIBLE LOCATION OF THE DISSUB IS OF PARAMOUNT IMPORTANCE TO THE SAVING OF THE MAXIMUM NUMBER OF LIVES.

627. Conducting the Search. The OSC is to conduct a search of the area detailed by the SSRA, using the forces allocated him by that authority. The OSC is to transmit SITREPS both to the authorities ashore, and to his own force. These should be sent on arrival at the datum and 3 hourly thereafter.

628. RCC Contact. To assist the RCC with co-ordination of shore-based air assets, the OSC is to report the following to the RCC at suitable intervals:

a. Weather and situation in the Search Area.

b. Any use being made of aircraft in the Search Area.

c. Availability of ships with flight decks and ability to refuel helicopters.

629. Provision of Specialist Advice. During the early stages of the operation, the SSRA will be co-ordinating the transfer of experts in the area of Submarine Escape and Rescue, Submarine Medicine, Diving and Recompression to the Search Force to advise the OSC, and later the CRF. A comprehensive two-way brief should be given as soon as the specialist advisers arrive on board. All concerned must be made fully aware that they are part of a life-saving operation in which seconds may be vital to the escapers' survival. As well as operational aspects, the brief should address possible problems, especially those after the recovery of escapers, any advice or requirements that the visiting specialists may have, and also the geography and domestic arrangements on board the ship be it the OSC or CRF.

630. Provision of Advice for Specialist Personnel. It is essential that a ship's officer be detailed as the Escape and Rescue Specialists's "right-hand-man". He should be familiar with the ship's capabilities and layout, especially her communications fit. He should have no other responsibilities that might take him away from this duty from the time the advisers arrive on board.

631. Methods Used by the Submarine Crew to Indicate Position. The crew of a stricken submarine that is unable to surface may be able to indicate her position by one of the following methods:

a. Releasing one or two indicator buoys.

b. Firing Submarine Launched One Way Transmission (SLOT) buoys which transmit on VHF JEZEBEL Channels 25, 27, 29 or 31.

c. Firing an expendable communications buoy (ECB) which will transmit a SARBE DF beacon on a frequency of 243.0 MHz or 406.0 MHz.

d. Firing yellow or white smoke candles or red or green grenades. The smoke candles may have fluorescent dye containers attached, which produce patches of green dye in the water, and may also carry a Message Carrier.

e. Transmitting her name in plain language and SST on UWT.

f. Transmitting on sonar or echo sounder.

g. Hull tapping.

h. Releasing fuel or lubricating oil.

i. Transmitting on UWT, maybe using the DISSUB bleeper if ships are thought to be close by.

j. Switching on navigation or other underwater lights.

Note: If power supplies are available, the DISSUB will try to transmit continuously. If power supplies are not available, the DISSUB crew will concentrate on using the Emergency UWT during sonar silence periods (Para 694), or at any other time when the Senior Survivor thinks they may attract the attention of the Search Force. Additional information on DISSUB means of communication and other technical data are contained in the national sections of ATP 57.

632. Use of Smoke Candles. Unless the submarine's crew is certain that she has been observed to sink, they will know that searching surface ships are not likely to arrive in the vicinity until after her Surfacing Signal is overdue. Under this condition, it is possible that a submarine will fire smoke candles, if able to do so, in order to:

a. Attract the attention of aircraft.

b. Attract the attention of any surface vessels that may be heard in the vicinity.

633. Reserved Smoke Candles. The submarine's crew will probably reserve a proportion of smoke candles for discharge in the following circumstances:.

a. In answer to the signal charges dropped by searching ships.

b. Shortly before escape has to be started (on account of physiological conditions inside the submarine) in the hope that they will be seen by any aircraft or surface ship.

Note: If HP air supplies are limited, the DISSUB may be able to operate the Submerged Signal Ejector a few times.

634. Appearance of Survivors on the Surface. It is possible that the crew may have escaped before the arrival of the search force. They will probably be wearing brightly coloured submarine escape and survival suits and may be showing lights. Escapers may also blow whistles to attract attention and may be carrying PLBs which transmit on 243 MHz or 406 MHz to assist location.

635. The Datum Position. If the position of the submarine is unknown, it is essential that a Datum Position for the search should be established. This should normally be the last known position of the submarine. If surface ships are operating with the submarine when the accident occurs, the Senior Officer of this force is responsible for establishing a Datum Position. If no surface ships are present when the accident occurs, the responsibility for defining the Datum Position lies with the SSRA.

636. Datum Position Marking. It is essential that the Datum Position is positively marked and accurately fixed at the earliest possible moment. The presence of a local reference point is of considerable help to aircraft and to those vessels with limited navigational aids. When the depth of water permits, one of the searching ships (preferably a less capable search platform) should be anchored in the Datum Position. If this is not possible, a Dan Buoy with a radar reflector should be laid. If fitted, the ship marking the Datum Position is to utilise a vertical search-light and IFF Mode 3 to advertise her role.

637. Datum Ship - Use of Submarines. A submarine may be employed as the datum ship if no surface ship can be spared from the Search Force and the weather and the depth of water allow.

638. Promulgation of Datum Position. In all cases the position of the Datum, and how it is being marked, should be promulgated as soon as possible together with an indication of the accuracy of the fix.

639. Initial Calling of the DISSUB. Having marked the Datum position, the first ship capable should carry out a periodic listening watch on sonar and attempt to establish communication by UWT. A visual or active sonar search should not prejudice this initial action.

640. Management of Search Forces. If the exact position of the submarine is not known, and the area to be searched is large, the OSC should divide his forces into groups and decentralise the tactical command of each group. If the area of probability is small (for example, if the submarine has been seen to sink) it will probably be better to keep the force concentrated. If there is a large number of surface assets, it may be advantageous to establish a holding area in which ships wait until they are allocated tasks. This will prevent overcrowding of the Datum at the start of the operation.

641. Priority of Types of Search. The priorities for types of search should be visual (and ESM), passive sonar, active sonar. The following should be noted when conducting visual or active sonar searches:

a. Visual. The main requirement is to cover the whole area as soon as possible in order to sight an Indicator Buoy, smoke candles, other visual indications of the submarine's position, or indeed survivors in the water. For this reason aircraft provide an invaluable method of searching the area.

b. Active Sonar. Not all units will be capable of this type of search. Depending on the equipment available and the prevailing climatic and bathymetric conditions, the success of this type of search against a bottomed, zero-Doppler target is by no means assured.

Note: If the DISSUB has managed to deploy a communications beacon in some form (eg an Indicator Buoy), then the use of units with sophisticated Communication Direction Finding Equipment may well enable the Search Area to be refined. (Frequencies will be given in ATP 57 or must be obtained from the NA).

642. Use of Surface Assets.

The employment of surface assets on particular types of search will depend on the following factors:

a. The size of the area to be searched.

b. The thoroughness of the air/visual search.

c. Number of units available.

d. The capabilities and limitations of individual assets.

e. Navigational facilities in the area.

643. Search Profiles. There are two basic alternatives for the search profile: Line Abreast or Area. The choice of profile will depend on many variables, but some points for consideration by the OSC are given in Paras 661-684.

644. Line Abreast Search. This appears to provide the best means of covering an area quickly, and can be used for all three search types (ie visual, passive sonar and active sonar). The Search Force should be split into groups before the line becomes too unwieldy and the following points should be noted:

a. Command, control and communication within the Force and Groups is straightforward, and co-ordination of UWT calls, grenade signals and sonar silence is easily achieved.

b. This search is more likely to ensure complete coverage of a given area than an area search.

c. Unless sonar-fitted helicopters are available for lengthy periods, they will not add markedly to the sonar swept path.

d. After investigating a contact, a unit might experience difficulty in catching up and rejoining the line. This problem can be alleviated in shallow waters if MCMVs are designated as 'pouncers', tasked specifically to investigate contacts and kept in the rear.

e. The speed of the search will not necessarily be the optimum speed for all ships.

f. If navigation facilities are limited, a line abreast search will probably leave fewer gaps than an area search.

645. Area Search. This will normally involve the allocation of boxes or sectors to units of the Search Force. The following points should be noted:

a. This search is simple for the OSC to order.

b. Newly arrived units can be deployed to their allocated areas and start searching without delay.

c. The size of a ship's allocated area can be adjusted to suit best her capabilities.

d. Units can investigate their own contacts without disrupting the overall search.

e. A sonar-fitted helicopter can be profitably allocated to assist a ship, even for a short time.

f. Ships can search at their optimum speed.

g. Navigation may prove difficult, and care must be taken to avoid leaving gaps.

h. Command and Control is less straightforward than it is for the Line Abreast Search; however, aircraft can be used to relay messages.

646. Guidance on Speed and the Use of Medium Range Sonar. As the speed of ships in the search increases:

a. The size of the area covered in a given time increases.

b. The probability of missing a sonar contact increases.

c. The distance travelled between sonar silence periods increases; consequently, the probability of a submarine being heard decreases.

d. Self-induced noise increases.

Experience has shown that the maximum Visual Search speed should be 20 knots, and that the maximum Sonar Search speed should be 15 knots.

647. Guidance on Ship Separation. As the distance between ships in a line abreast search increases:

a. The swept path increases but;

b. The likelihood of missing a sonar contact increases and;

c. The probability of a submarine being heard decreases.

Experience has shown that the maximum distance apart for a Visual or Passive Search should be 3 miles, and for an Active Sonar Search normal rules for stationing ASW units should be used.

648. Employment of Aircraft. Aircraft are the ideal platforms for carrying out a rapid visual search of the Area and localisation of distress beacons using ESM. In addition, helicopters can be very useful when employed as 'pouncers' to extend the swept path of individual ships, or to investigate sighting reports. The tasking of MPA under the control of the appropriate RCC should include:

a. Visual, radar and radio watch.

b. Dropping of grenades in a 7 charge pattern as follows:

3 charges at 5 second intervals
30 second pause
1 charge
30 second pause
3 charges at 5 second intervals

This pattern is to be dropped in the last known position of the submarine. Upon hearing this signal the submarine will surface if able, and communicate with the aircraft on 277.8 MHz (Submarine SAR reporting net). If the submarine is unable to surface it will fire a smoke candle (or grenade) to indicate its position. If the aircraft does not establish contact with the submarine within 30 minutes, then another identical pattern of charges is to be dropped in the submarine's predicted position, and repeated every 30 minutes whilst a search is carried out until contact is made, or until the OSC assumes co-ordinating responsibilities. MPA may also provide a valuable communications relay platform.

Note: Smoke Floats. The smoke candles fired by submarines are easily confused with smoke floats dropped by aircraft. Therefore aircrews should avoid dropping smoke floats unless absolutely essential. If smoke floats are dropped, a report is to be signalled by the aircraft giving the position of release and the expected burn time. This report should be relayed to all ships and Authorities involved in the Search Operation.

649. Employment of Mine Countermeasures Vessels (MCMVs). MCMVs should be used to identify MRS contacts in shallow water. The search characteristics, capabilities and recommended employment of MCMVs in SUBLOOK/SUBMISS/SUBSUNK are as follows:

a. Minesweepers. Minesweepers carry no equipment of use in finding stricken submarines on the seabed, but they do have the ability to bottom sweep as a last resort. They should normally be used for visual search operations or for marking the datum.

b. Minehunters. Minehunters are equipped with a very high frequency short-range sonar which gives a detailed visual display of the seabed. Where the seabed is uncluttered they can proceed at up to 6 knots searching a 400 yard swept path; however, they normally operate at a slower speed. A minehunter's sonar normally operates to a depth of 70 metres, but with some restriction of capability it can be used to 100 metres. Minehunters carry divers capable of diving to 55 metres. Some MCMVs (eg UK HUNT Class MCMV) also carry a Remote Control Mine Disposal System (RCMDS), which is a seabed-following vehicle that incorporates an underwater TV camera and searchlight with a proven operating depth of 70 metres. The RCMDS's manoeuvrability is limited, but it can sometimes be used to identify contacts of submarine size on the seabed. Minehunters also can be used to mark the position of seabed contacts with extreme accuracy (within one metre); however, the surface mark is small and may be difficult to see in high sea states. After the primary visual search, the best employment for these ships is searching relatively small areas (typically one mile square) around a reasonably accurate datum. They are also useful for classifying or identifying contacts found by other means. Finally, minehunters may be used to lay homing beacons adjacent to the DISSUB. Frequencies of such beacons should be compatible with sonar systems fitted in any rescue submersibles/Remotely Operated Vehicles likely to be operating in its vicinity.

650. Employment of Submarines. The search characteristics, capabilities and recommended employment of submarines in SUBLOOK/SUBMISS/SUBSUNK are as follows:

a. Submarines employed in SUBLOOK/SUBMISS/SUBSUNK Operations are to fly a yellow flag.

b. Submarines in the Search Force are not to dive unless ordered by the OSC. If such a dive is considered necessary, an anti-submarine vessel is to be specifically detailed to act as consort. The submarine should be ordered to dive for short periods and use her UWT and main sonar suite to search an area preferably away from the surface ships' search. A separate Diving Signal should be made for each dive by a searching submarine.

c. Where the OSC is submarine-based, (ie before being relieved by a more capable unit), the OSC vessel may dive again having sent a Diving Signal for an appropriate period, but should normally remain at periscope depth in constant communications while conducting the search.

d. The following factors may affect the OSC's decision on the employment of submarines:

(1) Submarines on the surface are inefficient ASW units. When dived they are very capable listening platforms, but are difficult to incorporate into the search due to their slow speed of advance and their need for a surface consort.

(2) In poor sonar conditions, a submerged submarine will probably have an advantage over surface vessels particularly when listening for under-water transmissions. The permission of the SSRA and National Authority should be sought before using submarines in this role.

(3) The normal hazards involved in combined dived submarine and surface ship operations.

(4) The depth of water and the presence of wrecks.

e. Submarines should normally be employed as follows:

(1) Visual search.

(2) Underwater Communications Guard Ship.

(3) Datum ship if no surface ship is available.

(4) As direct UWT link when the DISSUB has been found.

(5) Dived listening platform to obtain bearings and mark ranges of underwater transmissions from the sunken submarine.

651. Special Distinguishing Signals Used During Submarine SAR Operations. A summary of the distinguishing signals used and their special significance during SUBLOOK/SUBMISS/SUBSUNK is at Annex D.

652. Overboard Waste Jettison. Waste items are not to be jettisoned overboard during the search for escapers. Floating waste items can lead to misleading sighting reports from aircraft and ships.

653. Bilge Pumping. Bilges are not to be pumped overboard during the search unless absolutely essential; such pumping can lead to misleading reports of oil slicks. If it is deemed essential to pump bilges overboard, the OSC is to be informed at once.

654. Firing of Single Charges During Search. In order to keep the stricken submarine informed of the presence and movements of surface ships, and indicate to her that distress signals will be seen, the Search Force is to fire a single grenade every 10 minutes. If the Search Force is split into several groups, the OSC must decide whether more than one ship should fire the charges; if it is decided that the spread of forces merits more than one unit firing single charges, the OSC must co-ordinate the firings to avoid confusion and interference.

655. Underwater Communications Guard. This duty should be assumed automatically by the first ship or submarine arriving in the area and capable of communicating with, or intercepting messages from a sunken submarine. Subsequently the OSC is to detail the most suitable ship available and, as the search develops, a Guard Ship should be detailed for each searching Group. A helicopter fitted with UWT may temporarily assume the duty of Underwater Communications Guard until the arrival of the first UWT-fitted ship or submarine.

656. Use of UWT. No ship, submarine or helicopter of the Search Force is to transmit any underwater signal unless:

a. Suspected UWT Communications have been received from what appears to be the DISSUB.

b. The initial call is being made (Para 676).

The time of all calls on UWT made by searching ships is to be logged so that subsequent reports of interception of UWT messages can be evaluated.

657. Sonar Silence Periods. To give the DISSUB the best chance of being heard, all units of the Search Force in the probability area are to stop all sonar transmissions from minute 00 to minute 05, and minute 30 to minute 35 of every hour. If possible, ships and submarines are to stop engines during these periods. However, if the prevailing conditions make this impracticable, the OSC should order units to slow to below cavitation inception speed during these periods. The OSC may allow Sonar Silence Periods to be broken if:

a. Navigational constraints make slow speed impracticable.

b. The effectiveness of the sonar search over a particular area is jeopardised at a critical stage.

Units in contact with an object on the seabed are also to maintain the silence periods, unless conditions are so bad and the contact so faint that it is unlikely to be lost if transmissions are ceased. Other units in the vicinity are to be informed.

658. Actions on Hearing Transmissions from the DISSUB. The ship, submarine or helicopter hearing UWT, sonar, echo sounder transmissions or hull tapping is to:

a. Initiate the signal for sonar silence by any available method. The visual signal during submarine SAR operations is:

(1) By day - Ships fly two black pennants and fire a green Very light. Submarines fire a green grenade. Helicopters fire a green Very light.

(2) By night - As by day, less the pennants.

b. Answer the call herself if capable.

(1) Assume the duties of Underwater Communications Guard, if capable, keeping the OSC informed.

(2) Ships in the vicinity are to reduce to slow speed and maintain sonar silence while the signal for silence is in force.

The following terminology should be noted:

a. 'In Communication With'. The expression ' in communication with' is not to be employed unless the DISSUB has answered a call or has replied to a specific underwater morse or voice signal, originally transmitted by one of the Search Force.

b. 'Heard'. The term 'heard' is to be used to describe the receipt of any unusual transmissions which do not in themselves comprise a call, answer to a call or indefinite signal.

659. Actions on Sighting a Submarine Indicator Buoy. The sighting of a Submarine Indicator Buoy may well be the first indication of a submarine accident. Consequently, on sighting such a buoy, the following actions are to be taken:

a. Report sighting by the fastest means available.

b. If possible, report the number of the buoy to enable its source to be identified by the SUBOPAUTH.

It is possible for Submarine Indicator Buoys to break adrift accidentally, from a non-stricken submarine, without the knowledge of the crew. Normally, Submarine Indicator Buoys are attached by galvanised steel-wire rope or a modern-man made fibre equivalent. The length of the line differs between submarine classes; details may be available in ATP 57 but may need to be sought from the NA. If a buoy is sighted making way in very deep water, a non-stricken submarine is probably towing it with the crew unaware. If the buoy is adrift, it might have broken away after being deliberately released following an accident. Establishing the status of a buoy may be problematic; however, its physical state, whether or not it is still transmitting, and any relative movement will help in evaluating whether or not there has been a submarine accident. It is vital that the wire should not be broken. Under no circumstances should a boat be attached to the buoy, nor turns taken on the wire once it has been established that the buoy is not adrift. Divers should on no account to use the Indicator Buoy wire to pull themselves down to the DISSUB.

Note: Full details of the Submarine Indicator buoys carried by each class of submarine is given in ATP 57 including details of their radio transmission frequencies.

660. Actions When the Submarine Has Been Located. With the location of the DISSUB, the Search phase of the operation is complete and Recovery and/or Rescue should follow without delay. However, it is possible that the DISSUB will be located prior to the arrival of the Recovery or Rescue Forces. The Search Force may well find escapers in the water; in this eventuality the OSC should follow the guidance on the treatment of casualties given in ATP 57, as far as is possible, with facilities at hand

661. Marking the Submarine's Position. It is important to maintain knowledge of the DISSUB's position, particularly in a tideway, in rough conditions or at night. Its position should therefore be marked by a Dan Buoy or by anchoring a ship within sonar contact range (but at least 50 yds from the DISSUB) as soon as possible. However, this should not be allowed to interfere with the early recovery of escapers. Care should be taken not to foul the submarine with an anchor or cable, either at the time of letting go, or subsequently if the ship swings.

662. Communications with the DISSUB (See Annex C). As soon as possible after the DISSUB has been found communications should be established using:

a. Marine Sound Signals (MSS). MSS or equivalent under water signal charges are to be fired to indicate the presence of surface vessels. This is not essential if good two-way UWT communications have been established with the DISSUB (both escape compartments if appropriate).

b. UWT. Communications should be established with the DISSUB on UWT if possible, and the OSC is to nominate a unit as UWT Link as soon as this had been done. Other units in the vicinity should keep a listening watch. Full use should be made of any recording facilities that are available.

Because of the importance of the UWT link between the DISSUB and the Search Force, ships should ensure that their most experienced operators are available for this task.

When communications are being attempted with the DISSUB, other units in the area should be warned to stop unnecessary noise and manoeuvring.

663. Situation Reports (SITREPs). To ensure that search and recovery forces at sea receive appropriate support from shore authorities, the OSC should send frequent, but brief, SITREPS to the SSRA. From these, the SSRA should compile a composite signal to keep other interested authorities informed. It is particularly important to pass any information about casualties and survivors as soon as it is available to enable the Next of Kin (NOK) to be informed at the earliest opportunity.

ASSEMBLY OF RECOVERY AND RESCUE FORCES, EQUIPMENT AND SPECIALIST ADVISERS

References: Annex 6A and ATP 57.

664. Composition. Recovery Forces comprise the Escape Gear Ships with specialist escape and medical advisers on board. They also carry equipment to assist in the recovery and treatment of escapers once they are on the surface. Rescue Forces comprise Rescue Gear Ships which carry the ROVs or submersibles for ELSS re-supply, and Submarine Rescue Submersibles to rescue survivors. The Rescue Force may include a MOSUB and DSRV. Surface Rescue Gear Ships may also carry equipment to assist in the decompression of the DISSUB and other items of salvage stores needed to right a heavily listing submarine on the seabed.

665. Priority for Assembly of Forces. At the same time as he is initiating the search, the SSRA must assemble the Recovery and Rescue Forces because direct escape from the DISSUB might be necessary to preserve life. Deteriorating conditions in the DISSUB may force the crew to escape at any time after the accident; however, escape carries the risk of decompression illness which requires therapeutic recompression and this may affect large numbers of escapers. It is therefore imperative that all available compression chambers, and their associated operating personnel, should be assembled and made available to the Recovery Force regardless of whether or not the DISSUB has yet been located. Medical equipment set aside for the treatment of escapers should also be taken to the scene of the accident. Normally, the assembly of the Rescue Force does not demand the same degree of urgency, because it cannot be used until the DISSUB has been located and the situation on board ascertained. Nevertheless, it should be assembled promptly. Full details of all actions to be taken in preparation for receiving and treating survivors from a stricken submarine sinking are provided in ATP 57.

THE DISSUB

666. Submarine Sinking - Causes. Submarines are designed to be neutrally buoyant when their main ballast tanks (exterior to the pressure hull) are full of water. This allows them to dive and operate safely under water. Even if all electrical and propulsive power is lost a submarine crew should be able to blow water out of main ballast tanks, and other compensating tanks, to give the submarine positive buoyancy to return it to the surface.

However, if a large quantity of water floods into the pressure hull of a submarine, for example following a catastrophic accident or failure of a sea water system that cannot be isolated, it is possible that the submarine's crew would be unable to compensate for its increased mass and it will sink to the seabed. It must therefore be assumed that a sunken submarine is unable to return to the surface without outside assistance and it will have one or more of its internal compartments flooded.

667. Rescue Options for the DISSUB Crew. If a submarine sinks below its collapse depth, it will implode and there will be no survivors. Assuming that the submarine sinks to the seabed without imploding, the options available to the crew will depend on the DISSUB's depth as follows:

a. Deeper than Maximum Escape Depth. Rescue may be conducted dependent upon:

(1) The DISSUB being fitted with a NATO DSRV mating seat (submarine details in ATP 57).

(2) The DISSUB being shallower than maximum mating depth of available rescue submersibles (capabilities of rescue submersibles in ATP 57).

(3) The air purification capacity on board the DISSUB being capable of maintaining air purity within safe limits whilst awaiting arrival of Rescue Forces. Posting Emergency Life Support Stores (ELSS) in pressure tight pods through the Escape Tower could enhance the availability of breathable air, but the procedure might be limited by the depth capability of the escape tower.

(4) Internal bulkheads being able to withstand the sea pressure.

b. Less than Maximum Escape Depth. Rescue remains the safest means of recovering the DISSUB crew. However, if conditions in the submarine are deteriorating, and the crew cannot risk waiting for rescue forces to arrive, they may have to take the decision to make an escape. Escape and rescue experts on the surface may provide give advice; however, the decision to escape rests with the senior survivor in the DISSUB.

668. Rescue - Advantages Over Escape. The advantage of rescue over escape is that the DISSUB's crew are transferred to a MOSHIP or MOSUB without being exposed to a change in pressure. In certain circumstances it is possible to transfer men who have been `saturated' at pressure to a facility for slow decompression to atmospheric pressure. Not all rescue systems are capable of achieving this and surface decompression techniques may have to be used with their inherent risks.

669. Rescue - Disadvantages Over Escape. The disadvantage of using rescue submersibles is that it may take several days for them, and their MOSHIPs or MOSUBs to arrive at the scene of the accident. Consequently, most submarine operating nations, particularly those whose submarines spend a large proportion of their operating cycle in waters where escape would be possible, continue to fit appropriate escape systems.

670. Escape - Methods. There are two main methods of escape:

a. Tower Escape. One or more men in turn, dressed in an escape and survival suit, climb into a small escape tower. Once the lower hatch has been shut, the tower is rapidly flooded and pressurised while the escaper is kept supplied with air to breath and to inflate the buoyancy of his suit. Once the tower is fully pressurised, the upper hatch opens and the escaper makes a rapid ascent to the surface. This method has been proved safe to a depth of 183 m (600 ft).

b. Compartment or Rush Escape. Some submarines, particularly those with a single compartment pressure hull, utilise this method of escape. The whole escape compartment is flooded and pressurised; an escape hatch is then opened and each man in rapid succession makes an ascent to the surface. Submarines fitted with a tower escape system can revert, if necessary, to the rush escape method. This is similar to the compartment escape except that it is only used if accident damage has caused the escape compartment to flood uncontrollably. The disadvantage of this system is that, in water deeper than 30 m, casualties can be caused by prolonged time under pressure and the number is likely to increase with depth. The likely maximum depth from which a safe compartment (or rush) escape can be made is 70 m when only one or two escapers may survive.

671. Decompression Illness. Whichever method of escape is used, there is a risk of escapers suffering from Decompression Illness (DCI). Additionally, if escapers have no practical experience of the system and they attempt to hold their breath on the way to the surface, they are liable to suffer a pulmonary barotrauma. In either case, immediate recompression is the treatment is urgently required, hence the urgent need to move compression chambers to the vicinity of the DISSUB.

672. Submarine Escape Capsules. Some submarines are fitted with an escape capsule into which can accommodate the whole of, or a proportion of, the crew. Once released it floats to the surface.

673. Crew Conditions Inside the DISSUB. Conditions inside the DISSUB will depend on the severity of the accident that caused the submarine to sink, and the crews ability to isolate any leaks. It is imperative to keep the pressure in the submarine as near to atmospheric as possible; increased pressure will adversely affect the crew's performance and reduce their chances of survival, particularly if there are no compression facilities on the surface.

674. Emergency Life Support Stores. The DISSUB crew will take every step to reduce their consumption of oxygen and production of carbon dioxide in order to prolong the period they can afford to wait for rescue. The posting of Emergency Life Support Stores (ELSS) using pressure tight pods (if fitted) would further increase the waiting time. Nevertheless, crew morale is likely to be low. Every effort must be made to keep the DISSUB crew informed about the rescue effort.

675. Medical Treatment. Rescue and Recovery Forces require sufficient compression chambers to treat all those likely to be recovered alive from the DISSUB. Diving and submarine medical experts are needed to make initial diagnosis of escapers and rescuees, and to supervise therapeutic decompression treatment. In addition, survivors may also be suffering from the following conditions:

a. Hypothermia and its effects.

b. The consequences of breathing a contaminated atmosphere.

c. Conventional injuries.

d. Radiation injuries.

Detailed advice on medical issues is given in ATP 57.

CHECK-OFF LISTS

CHECK-OFF LIST ALFA: SSRA, OPERATION SUBLOOK SEARCH PHASE

1. Initiate SUBLOOK Implementing Signal to Surface Forces in the vicinity of the Search Area, nominating OSC. (Annex B).

2. Establish availability of Air and Surface assets for search from RCC.

3. Request Air Search through Rescue Co-ordination Centre (RCC).

4. Establish location of expert personnel with appropriate Authorities (ATP 57).

5. Nominate units to transport personnel to the search area.

6. Request RCC to initiate a NOTAM/NAVWARN.

7. Pass to OSC (when known) details of those units who will be joining the Search Force.

One Hour After Initiation of SUBLOOK:

8. Order surface forces and submarines within 4 hours steaming to the Search Area/Datum to join the search force.

9. Initiate a SITREP to MOD of DISSUB nation, the SUBOPAUTH and any other appropriate authorities. Include actions taken and when it is intended to escalate to SUBMISS.

CHECK-OFF LIST BRAVO: SSRA, OPERATION SUBMISS SEARCH PHASE

1. Initiate SUBMISS implementing signal.

2. Nominate OSC.

3. Order all suitable assets immediately available to close the datum with all despatch, and search as ordered by OSC.

4. Request Air Search through RCC and appropriate military authorities.

5. Bring all suitable vessels in harbour to immediate notice for sea if they are available, and sail them as required.

6. Establish location of expert personnel with appropriate authorities (ATP 57).

7. Nominate units to transport personnel to the search area, and initiate the transfer.

8. Re-distribute local manpower and equipment (eg helicopters) to make up any shortfalls in units of the search force.

9. Assemble additional personnel to augment units ashore and afloat involved in the search.

10. Check with the SUBOPAUTHs that all other submarines in the area have surfaced and surfacing signals have been received.

11. Consider implementing MINIMIZE.

12. Request the RCC to initiate a NOTAM/NAVWARN.

Note: Actions in paragraphs 4, 6, 7 and 12 may well have been completed if SUBLOOK preceded the initiation of SUBMISS.

CHECK-OFF LIST CHARLIE: OSC SEARCH PHASE

Prior to arrival at the Datum/Search Area

1. Inform all concerned of assumption of role of OSC.

2. Establish a Search Area plan based on Datum position.

3. Take duties of Surface Raid Reporting Control Ship, Sub-Surface Raid Reporting Control Ship and Electronic Warfare Control Ship.

4. Initiate a time check.

5. Fly red flag at masthead, (all-round flashing red light by night).

6. Implement SAR COMPLAN.

7. Order Air Search of Area, ensuring aircrews are briefed on signalling and the use of smoke floats.

8. Establish priorities for type of search.

9. Consider employment of special assets, eg aircraft, MCMs and submarines.

10. Prepare to receive specialist advisers, possibly by parachute.

11. Nominate Escape and Rescue Expert's liaison officer (ATP 57).

On Arrival at the Datum/Search Area:

12. Implement Search Plan.

13. Transmit SITREP to SSRA and the rest of the Search Force. Implement bring-up system to ensure further SITREPs are sent 3-hourly thereafter.

14. Mark the Datum position and promulgate the position, how it is being marked and an indication of the accuracy.

15. Order suitable unit to make Initial Call to DISSUB.

16. Detail Underwater Communications Guard.

17. Institute Sonar Silence periods.

18. Instigate waste jettison and bilge pumping ban.

19. Co-ordinate 10 minute firings of single charges.

20. Take appropriate individual ship actions (Annex A - Check-off list DELTA).

21. Nominate units to recover and treat escapers (ATP 57).

On Location of the DISSUB:

22. Initiate SUBSUNK.

23. Mark the DISSUB's position.

24. Order the firing of 6 explosive charges.

25. If appropriate, nominate a new unit as Underwater Communications Guard as soon as communications have been established with the DISSUB.

26. Prepare to hand over responsibility for the recovery of the DISSUB's crew to CRF (ATP 57).

CHECK-OFF LIST DELTA: INDIVIDUAL UNITS OF THE SEARCH FORCE

SUBLOOK

1. Initial actions according to location.

2. Ships in company attempt to contact the submarine by all available means.

SUBMISS/SUBSUNK

3. Initial actions according to location.

Units Proceeding to the Datum:

4. Suspend all exercises.

5. Surface any submarines in company, leaving at least one ship to brief them.

6. Submarines send a Surfacing Signal.

7. Submarines fly a yellow flag.

8. Proceed to the Datum at full speed.

9. Render status report.

10. Be prepared to take on OSC duties.

11. Implement waste jettisoning and bilge pumping ban in the vicinity of the Search Area.

12. Change frequency to SAR COMPLAN as ordered by OSC.

13. Prepare helicopters for flying.

14. Prepare Dan Buoys.

15. Prepare explosive charges and boats.

16. Prepare diving equipment.

17. Post extra lookouts.

18. Brief OOWs, lookouts, aircrew on visual indications of a DISSUB’s position.

19. Brief OOW and aircrew on sparing the use of smoke markers.

20. Brief OOW and Sonar Operators on underwater communications, sonar silence periods and reactions on detection of the DISSUB.

21. Ensure most experienced UWT operators are available for communicating with DISSUB on UWT.

22. Make physical and personnel preparations for reception of escapers (ATP 57).

23. Submarines prepare for recompression if so fitted.

24. Independent helicopters report ETA at the Datum to the OSC.

25. Helicopters prepare for special tasks.

CHECK-OFF LIST ECHO: SSRA, OPERATION SUBLOOK - ASSEMBLY OF RECOVERY AND RESCUE FORCES

1. Nominate Escape Gear Ship(s) and detail equipment/advisers to be carried.

2. Request NA and other nations to instigate recall of specialist advisers.

3. Discuss with NA and other nations the deployment of specialists.

4. Warn appropriate authorities to provide air transport as required.

5. Check for available compression chambers.

6. Discuss with appropriate authorities the employment and deployment of submersibles, including the DSRV. The use of civilian assets should also be considered.

CHECK-OFF LIST FOXTROT: SSRA, OPERATION SUBMISS - ASSEMBLY OF RECOVERY AND RESCUE FORCES

1. Call out portable compression chambers and operators.

2. Sail Escape Gear Ships as soon as compression chambers and other stores needed for the treatment of escapers are embarked.

3. Augment Escape Gear Ships with compression chamber operators.

4. Call up helicopter support.

5. Request National Authority and other nations to call out specialist advisers.

6. Consult appropriate authorities regarding provision of rescue submersibles.

7. Call out SMER Emergency Life Support Stores.

8. Request NA to warn the DSRV. (The DSRV is called out at SUBSUNK).

9. Consider additional medical support.

CHECK-OFF LIST GOLF: ESCAPE GEAR SHIPS - RECOVERY PHASE

1. Embark portable compression chamber(s) and operators.

2. Place Compression Chamber (CC) in hangar if possible.

3. Keep flight deck clear.

4. Appoint Ships Recovery Co-ordinator.

5. Appoint an Escape and Rescue Specialist's Assistant (normally a junior officer).

6. Conduct a brief between Ship and visiting Escape, Rescue and Medical specialists.

7. Brief visiting specialists/press on layout of ship and domestics.

Before Arrival at the Datum

8. Carry out appropriate individual ship actions (Annex A, Check-off list DELTA).

9. Ascertain numbers on board the DISSUB if not included in the SUBMISS/SUBSUNK signal.

10. Non specialist Medical officers read 'SUBSUNK Notes for Medical Officers' (ATP 57).

11. Select and prepare receiving, treatment and observation areas for medical 'TRIAGE'. (ATP 57).

12. Set up Escape and Rescue Specialists position in the Operations room.

13. Prepare evacuation sites.

14. Appoint Recovery Boats Crews.

15. Appoint non-medical guides, messengers, observers and log-keepers.

16. Appoint experienced UWT operators.

17. Close up CC operators, check out all systems.

18. Brief Recovery Boats Crews (ATP 57).

19. Brief all involved in reception of escapers (ATP 57).

20. Brief Ships Company.

On Arrival at the Datum:

21. Ascertain conditions in the DISSUB from OSC or from DISSUB itself.

22. Log all information from the DISSUB.

23. Call the DISSUB on UWT at least every 15 minutes.

24. When ready to receive escapers send SSS on UWT or make the 12 charge signal.

On Arrival of Escapers on the Surface:

25. Recover escapers from water, horizontally if possible.

26. Leave senior medical specialist to concentrate solely on triage.

27. Follow correct compression chamber operating procedures.

28. Keep all escapers under observation.

FORMATS FOR SUBLOOK, SUBMISS AND SUBSUNK SIGNALS AND SMER ASSISTANCE REQUEST/ANSWERS

1. The following formats are to be used as applicable:

a. Diving Signal

PRIORITY

FM: NAME OF SUBMARINE

TO: SUBOPAUTH (Always)
Appointed Maritime Commander (if command delegated).

INFO: PREVIOUS AND/OR NEXT SUBOPAUTH

SSRA

SENIOR OFFICER COMMANDING SHIPS IN COMPANY/EXERCISING WITH SUBMARINE

APPOINTED MARITIME COMMANDER (if command not delegated).

NATO CONFIDENTIAL

SIC LGQ

1. DIVING AT (Date and Zone Time) .....ZULU UNTIL (Date and Zone Time) .....ZULU IN ACCORDANCE WITH (WPP)..... AMENDED TO CHANGE.....OR IN AREA (LAT/LONG).....FOR (exercise).....

2. SUBCHECK REPORT INTERVAL (optional-only if on Subcheck).

All figures quoted in the text are to be spelt out in full; lettered abbreviations should also be spelt out using the phonetic alphabets.

b. COMCHECK

FLASH:

FM: AA

TO: NAME OF SUBMARINE (Normally by separate signal)

NA

AIG 5652

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE

SEARCH ASSETS.

SUBOPAUTH DESIGNATED IN SUBNOTE AS HOLDING NOK

NATO UNCLASSIFIED

SIC LGS/SIJ

1. SUBMARINE SAFETY COMCHECK. NAME OF SUBMARINE, INTERNATIONAL CALLSIGN (IN WORDS).

c. SUBLOOK

(1) The AA is to originate a signal in the following form:

FLASH

FM AA

TO AIG 5652

NAME OF SUBMARINE

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE SEARCH ASSETS (IF APPROPRIATE)

NATIONAL AUTHORITY DESIGNATED IN SUBNOTE AS HOLDING NOK

ADDITIONAL NATIONAL AUTHORITIES (IF APPROPRIATE).

NATO UNCLASSIFIED

SIC LHA

1. SUBLOOK

2. NAME OF SUBMARINE, INTERNATIONAL CALLSIGN, INDICATOR BUOY NUMBERS ....FWD....AFT

3. REASON AND AREA

EG (A) SUBCHECK REPORT OVERDUE AT ....ON PASSAGE...TO...

OR (B) CONTACT LOST SINCE....DURING EXERCISE....IN AREA....

4. SSRA IS....

5. IS/IS NOT DSRV CAPABLE

6. INTEND TO ESCALATE TO SUBMISS AT ....

(2) On receipt of a SUBLOOK signal from AA the designated SSRA is to initiate search operations and originate a signal in the following form:

FLASH

FM SSRA

TO AIG 5652

OTHER AIGS (IF APPROPRIATE)

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE SEARCH ASSETS (IF APPROPRIATE)

ADDITIONAL NATIONAL AUTHORITIES (IF APPROPRIATE)

SHIPS AS APPROPRIATE

AIR BASES AS APPROPRIATE

NATO UNCLASSIFIED

SIC LHA

CARRY OUT OPERATION SUBLOOK

NAME OF SUBMARINE/INTERNATIONAL CALLSIGN INDICATOR BUOY

NUMBER ...FWD ...AFT

REF ATP-3.3.9.2 CHAP 6

1. THE FOLLOWING FORCES .... ARE TO PROCEED WITH ALL DESPATCH AND SEARCH ...

2. R/V FOR PARTICIPATING FORCES

3. DUTIES AND LOCATIONS OF AUTHORITIES INVOLVED

4. AIR SEARCH DETAILS

d. SUBMISS/SUBSUNK

(1) The AA is to originate a signal in the following form:

FLASH

FM AA

TO AIG 5652

NAME OF SUBMARINE

NATIONAL AUTHORITY DESIGNATED IN SUBNOTE AS HOLDING NOK

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE

SEARCH ASSETS (IF APPROPRIATE)

ADDITIONAL NATIONAL AUTHORITIES

NATO UNCLASSIFIED

SIC LHA/LHN

1. SUBMISS/SUBSUNK

2. NAME OF SUBMARINE AND INTERNATIONAL CALLSIGN

3. LAST KNOWN POSITION ...AT .../ESTIMATED POSITION.....AT.....(OBSERVED TO SINK IN POSITION...)

4. SSRA IS ....

5. SUBMARINE INDICATOR BUOY NUMBERS FWD AFT ...)(IF FITTED)

6. IS/IS NOT DSRV CAPABLE

(2) Any unit or Authority aware that a submarine has sunk or the OSC when the DISSUB has been located, is to originate a signal in the following form.

FLASH

FM ...

TO AIG 5652

APPROPRIATE AREA COMMANDER(S)

APPROPRIATE SUBOPAUTH(S)

NATO UNCLASSIFIED

SIC LHA

SUBSUNK
1. NAME OF SUBMARINE (IF KNOWN)
2. OBSERVED TO SINK IN POSITION .....AT.....(or LOCATED SUBMARINE SUNK IN POSITION.....AT.....)

(3). On receipt of a SUBMISS or SUBSUNK signal from the AA or any unit/authority reporting the sinking of a submarine, the designated SSRA is to initiate or continue search operations by originating a signal in the following form (including as much information as possible to minimise the need for follow on traffic):

FLASH

FM SSRA

TO AIG 5652

OTHER AIGS AS APPROPRIATE

SHIPS AS APPROPRIATE

OTHER NATIONAL AUTHORITIES

ADJACENT MARITIME COMMANDERS

NATO UNCLASSIFIED

SIC LHA/LHN

CARRY OUT OPERATION SUBMISS/SUBSUNK
NAME OF SUBMARINE/INTERNATIONAL CALLSIGN (INDICATOR BUOYS FWD....AFT....)

REF: ATP-3.3.9.2 CHAP 6

1. SHIPS: PROCEED/PROCEEDING WITH ALL DESPATCH TO START SEARCH

2. DATUM POSITION FOR SEARCH ... DEPTH (IN METRES), POSITION TO BE MARKED BY ...

3. INITIAL AREA TO BE SEARCHED BY

(1) SHIPS
(2) AIRCRAFT

4. OSC IS ...

5. RENDEZVOUS AIR FORCES (IF NOT THE SAME AS THE DATUM)

6. DUTIES/LOCATION OF AUTHORITIES INVOLVED\

7. (NAMES OF SHIPS) EMBARK:
SUBMISS STORES.
RECOMPRESSION CHAMBERS.
MEDICAL OFFICERS.
NATIONAL LIAISON OFFICERS.
MEDIA ETC.

e. Request for SMER Assistance

A nation requesting SMER assistance should use the following format:

IMMEDIATE

FM NATION

TO NATION(S) AND AIG 5652

INFO SSRA
OSC

SIC LHA/LHN

REQUEST FOR SMER ASSISTANCE
REF:ATP-3.3.9.2 CH 6

1. SUBMARINE (NAME) MISSING/SUNK IN (APPROXIMATE) POSITION ...

2. NA IS ...

3. SSRA IS ...

4. OSC IS ...

5. NATIONS ARE REQUESTED TO REPORT TO SSRA INFO NA THE READINESS STATUS OF THE FOLLOWING:

A. COMMERCIAL SUBMERSIBLES (STANAG 1238)

B. RECOMPRESSION CHAMBERS
1. Fitted in Ships
2. Portable

C. LIFE/MEDICAL SUPPORT STORES

D. RESCUE CHAMBERS

E. PERSONNEL
1. SUBSINK Parachute Assist Group
2. Other Assisting Personnel
3. Diving/Medical Personnel

F. OTHER

f. National SMER Assistance Available

IMMEDIATE

FM NATION

TO NATION REQUESTING SMER ASSISTANCE

INFO SSRA

SIC LHA/LHN

READINESS STATUS OF SMER ASSETS
REF: ATP-3.3.9.2 CHAP 6 ANNEX B

1. SUBMARINE RESCUE SUBMERSIBLES
   A. LOCATION B. AVAILABILITY C. ETA
   D. MEANS OF TRANSPORT

2. SUITABLE COMMERCIAL SUBMERSIBLES
   A. TO D. (as above)

3. SUBMARINE RESCUE CHAMBERS
   A. TO D. (as above)

4. SHIPBORNE COMPRESSION CHAMBERS
   A. TO D. (as above)

5. PORTABLE COMPRESSION CHAMBERS ASHORE
   A. TO D. (as above)

6. MEDICAL LIFE SUPPORT STORES
   A. TO D. (as above)

7. SUBMARINE ESCAPE/RESCUE EXPERTS
   A. TO D. (as above)

8. SUBMARINE/DIVING MEDICAL EXPERTS
   A. TO D. (as above)

9. OTHER INFORMATION

Delete unused paragraphs.

Note: Nations possessing vital submarine rescue assets eg Submarine Rescue Submersibles (US, UK, Sweden & Italy) should signal their availability/status automatically when receiving an SMER alert message.

COMMUNICATIONS

1. The provisions of this Annex may cover all phases of the operation, particularly the search, recovery and rescue phases.

Above Water Communications

2. Standard NATO communication procedures should be used for Submarine SAR Operations (see also Chapter 7). Examples of some of the signals used during these operations are given in Annex B.

3. Callsigns. If ships are already operating together when an SAR operation is mounted, existing callsigns are to be introduced as soon as practicable on both voice and Morse circuits for all inter-ship and ship-shore communications.

4. Addressees. Addressees of submarine SAR signals are set out in Annex B.

5. Signal Precedence. FLASH is mandatory for the signals initiating SUBLOOK, SUBMISS or SUBSUNK, and for signals ordering any of the operations to be carried out. Other signals concerning the operation should not normally be given a precedence higher than IMMEDIATE.

6. Signal Contents. The word SUBLOOK, SUBMISS or SUBSUNK is to be included in the text of all signals relating to Submarine SAR operations.

7. Traffic Levels. Experience has shown that submarine SAR operations can generate a large amount of signal traffic. It may be highly desirable for the appropriate Maritime Commander to implement MINIMIZE. In addition, as some units may not have on-line communications facilities, traffic addressed to such ships must be kept to a minimum.

8. Major savings of time and resources (both shore and afloat) can be made by utilising voice circuits, especially to single addressees. In addition to the various military nets that are available, commercial channels such as MARISAT or Link Calls (Radphone Calls) may be used.

9. Traffic levels can also be reduced by sensible use of a policy of reporting by exception. The SSRA should consider this whenever issuing a blanket request for information.

Underwater Communications

10. UWT communications may be difficult depending on conditions. Any ship in UWT communication with the DISSUB should ensure that her most experienced operators are available in order that no information from the DISSUB is needlessly lost. When communications are being attempted other units in the area should be warned to stop all unnecessary noise.

11. Callsigns. Throughout the operation, SUBMISS/SUBSUNK ship and submarine names should be used on UWT.

12. To assist in overcoming problems caused by background noise, high sea states etc, a three letter UWT code has been devised to be used only when communicating with a DISSUB. Note that the meanings may differ from those used for normal submarine exercises. Certain key signals may also be made using charges or by hull tapping.

SUBMISS/SUBSUNK UNDERWATER TELEPHONE, EXPLOSIVE CHARGE AND HULL TAP CODE

Notes:

1. Meanings in the table below may differ from those used for normal submarine exercises. This code is only to be used in submarine SAR operations but not all submarines will have access to the 3 letter groups below.

2. Ships and Submarines names are to be used as callsigns but may be dispensed with if no confusion exists.

3. If there are survivors both forward and aft in the DISSUB the message should be the appropriate word, or 3-letter group should be added to the DISSUB's name.

4. If possible signals should be acknowledged by repeating them back.

5. Some aircraft do not carry charges but drop buoys (SUS Mk 84) which transmit a 2 tone sound like a siren that can be picked up on UWT. On hearing this signal the DISSUB should fire a candle to indicate her position.

Table 8C.1

SIGNAL UWT	CHARGE/ TAPS	MEANING FROM SURFACE/SUBMERSIBLE	MEANING FROM DISSUB
Alpha, Alpha, Alpha		After escape compartment	After escape compartment
Bravo, Bravo, Bravo,	1 charge every 10 minutes	We are searching for you Fire a smoke candle to indicate your position	
Charlie, Charlie, Charlie,			First survivor making escape now
Delta, Delta, Delta		How many CO2 canisters left ?	Numbers of CO2 canisters left is (Number) (eg Delta, Delta, Two Six)
Echo, Echo, Echo,	6 Charges	You have been found. Attempt to communicate by UWT. If unable to do so, fire a smoke candle with message carrier giving full details of the conditions in submarine and your intentions	

SIGNAL UWT	CHARGE/ TAPS	MEANING FROM SURFACE/SUBMERSIBLE	MEANING FROM DISSUB
Foxtrot, Foxtrot, Foxtrot,		Forward escape compartment	Forward escape compartment
Golf, Golf, Golf,	3 Taps followed after a short pause by 3 more	Intend to pod post Emergency Life Support Stores (ELSS). Attempt to communicate by UWT. If unable to do so, fire a smoke candle with message carrier stating ELSS needed	ELSS requirements are (give details)
Hotel, Hotel, Hotel,	3 Taps	FLOOD tower, OPEN upper hatch, I am keeping clear	
India, India, India,	4 Taps		Tower flooded, hatch open ready to receive pod or bag
Juliet, Juliet, Juliet,	5 Taps	Pod in bag, hatch clear to shut	
Kilo, Kilo, Kilo,	8 Taps (in 4 pairs)	Submersible sealed in position. Submarine to open hatch cavity drain valves to equalise pressure and drain hatch cavity	Draining hatch cavity
Lima, Lima, Lima,	6 Taps (in 3 pairs)	OPEN tower upper hatch, SHUT hatch cavity drain valves	Tower upper hatch open, hatch cavity drain valves shut
Mike, Mike, Mike,	4 Taps (in 2 pairs)	Unsealing	Tower upper hatch shut and clipped, ready for you to unseal
November, November, November,		Report present atmospheric conditions in DISSUB	Atmospheric readings are: (Give oxygen, CO2 and pressure)
Oscar, Oscar, Oscar,		How many Oxygen candles left?	Number of oxygen candles left is (Number) (eg Oscar, Oscar, Oscar One Eight)
Papa, Papa, Papa,		Report number of survivors in your end of DISSUB	Number of survivors at this end of DISSUB is (Number) (eg Oscar, Oscar, Oscar Two Five)

SIGNAL UWT	CHARGE/ TAPS	MEANING FROM SURFACE/SUBMERSIBLE	MEANING FROM DISSUB
Quebec, Quebec, Quebec,	9 Charges	Commencing submersible rescue operations. You should wait.	Intend waiting for rescue
Romeo, Romeo, Romeo,		Message received	Message received
Sierra, Sierra, Sierra,	12 Charges	Standing by on the surface. You should carry out escape. A rescue operation will not be attempted	Intend commencing escape at (Time) (eg Sierra, Sierra, Sierra One Seven Zero Zero)
Tango, Tango, Tango,		Report estimate of latest time escape must start	Estimate escape must start at (Time) (eg Tango, Tango, Tango One Nine Five Zero)
Victor, Victor, Victor,		How many injured survivors require urgent medical treatment?	Number injured survivors requiring urgent medical treatment is (Number) (eg Victor, Victor, Victor One Zero)
Whiskey, Whiskey, Whiskey	15 Charges	It is intended to carry out a submersible rescue but you are not to delay escape beyond the limits laid down in your escape instructions	
X-Ray, X-Ray, X-Ray,	Series of rapid taps	Carrying out emergency breakaway. SHUT upper hatch	Upper hatch shut

CHECK OFF LIST: SPECIAL DISTINGUISHING SIGNALS USED DURING SUBMARINE SAR OPERATIONS

SIGNAL	SHOWN BY	SIGNIFICANCE
Large red flag at mast head by day	On-Scene Commander (OSC)	Indicates OSC during operation SUBLOOK/SUBMISS/SUBSUNK
All-round flashing red light at mast head at night	OSC	Indicates OSC during operation SUBLOOK/SUBMISS/SUBSUNK
Yellow flag by day	All submarines	Submarine taking part in search
Two black pennants by day and green Very light	Anti-submarine vessels	Possible message can be heard. Units in vicinity to maintain sonar silence
Green Very light by night	Anti-submarine vessels	Possible underwater message. Units in vicinity to maintain sonar silence
Green grenade by day or night	Searching submarines	Possible underwater message. Units in vicinity to maintain sonar silence
Green Very light by day or night		Possible underwater message. Units in vicinity to maintain sonar silence
Two white rockets by night	Searching ships	Fired by first ship to sight survivors in water
Vertical searchlight	Datum ship	Datum position
IFF Mode 3	Datum ship	Indicates Datum position
IFF Mode 3	Searching Aircraft	I am over Indicator Buoy or survivors

NATIONAL CONTACT AUTHORITIES

CAN

Headquarters Maritime Command
FMO Halifax NS
B3K 2XO
(Attn SSO Submarine)
Tel: 1-902 426-4618 (Commercial)
447-2516 (AUTOVON)

Signal Address: MARCOMHQ HALIFAX//SSO SUBS//
Copy to: MOC HALIFAX. MARCOMOPS HALIFAX
//DCOS OPS//

DNK

Admiral Danish Fleet
Box 483
6100 Aarhus C
Tel: 86123099 Ext 5101
‘ Fax: 86161140
Telex: + 55 64485 (MRCC Aarhus)

Signal Address: ADMDAN FLEET

FRA

Etat Major de la Marine
Centre d’Operations Maritimes
2 rue Royale
75200 Paris Naval
Tel: (1) 260.33.30 Ext 21485

Signal Address: MARINE PARIS

DEU

Commander-in-Chief German Fleet
D-2392 Gluecksburg
Germany
Tel: 04631-511

Signal Address: CINC GER FLEET

GRC

Hellenic Navy General Staff A3-111
(Stratopedon Papagou)
Holargos
Athens
Greece
Tel: 6443 282

Signal Address: HNGS/A3-111

ITA

Ministero Difesa Marina
3 Rep POA
Lungotevere delle Navi,
00189, Roma
Italy
Tel: 6-3666000
Fax: 6-32002940

Signal Address: MARISTAT-ROME ITALY

NLD

Commander-in-Chief, RNLN
Den Haag
The Netherlands
Tel: 070-316 2025

Signal Address: CINCRNLN

NOR

Chief of Defence Norway
Huseby Oslo Mil
Oslo 1
Norway
Tel: 02-1766

Signal Address: CHOD NORWAY
Copy to: COMNAVSONOR
COMNAVON
COMTRAINSUBS

PRT

Estado Major Da Armada
Praca Do Comercio
1188 Lisboa codex
Tel: 368965

Signal Address: MAIORMAR

ESP

Ministerio de Defensa
Estado Mayor de la Armada
Division de Tactica
c/Montalban, 2
Madrid
Tel: 2326473

Signal Address: AJEMA

TUR

Genelkurmay Baskanligi
Kom.Kont. D. Bsk.ligi
Ankara
Turkey
Tel: +90 312 4183836 or +90 312 4022566

TUR

Deniz Kuvvetleri Komutanligi
Harekat Merkezi
Ankara
Turkey
Tel: 417-6250 Ext 2293 or 2793

Signal Address: CINCTURNAV/ANKARA

GBR

Directorate of Joint Commitments
Ministry of Defence
Whitehall
London SW1A 2HB
Tel: 020-7218-7249
Fax: 020-7218-7857

Signal Address: MODUK

USA

Office of the Chief of Naval Operations
Director Deep Submergence Systems Division
Washington DC 20350
USA
Tel: (703) 697 2040 (or 2041)

Signal Address: CNO WASHINGTON DC//02/23//

CHAPTER 7

RESCUE INSTRUCTIONS - DIVING ACCIDENT

GENERAL

701. Medical Advice and Assistance. Divers may suffer many illnesses and injuries, although there are very few accidents that cannot be treated successfully provided the appropriate facilities and skills are available. In all diving accidents, specialized medical assistance and advice must be summoned without delay.

702. Rescue Operations for Diving Accidents. A rescue operation, which is conducted as a result of a diving accident at sea, will involve the transportation of personnel and equipment, emergency management and/or the evacuation of a casualty.

TRANSPORTATION

703. Methods. Diving accidents generally occur in coastal waters and require medical assistance at short notice. In most cases, rescue of the casualty by helicopter or transportation of medical assistance should be requested; however, assistance from a surface vessel equipped to conduct therapeutic recompression or equipped with other medical facilities should also be considered if appropriate. If suitable helicopters and/or vessels are not available, the casualty should be brought ashore and taken to medical assistance or recompression facilities by the most expeditious means.

704. Choice of Method. The choice between helicopter and surface vessel rescue depends upon various factors; for example:

a. Helicopter capability.

b. Weather conditions and sea state.

c. Distance to be covered.

d. Condition of the casualty, etc.

A helicopter landing will only be attempted ashore or on a platform equipped for this purpose, therefore, in most cases a helicopter rescue hoist has to be used. A special stretcher will normally be lowered by the helicopter for the evacuation of a diving casualty.

EMERGENCY MANAGEMENT

705. First Aid. In addition to standard first aid measures the following measures specific to diving accidents should be taken:

a. 100% oxygen breathing by mask.

b. Hydration

More detailed instructions are contained in ADivP-1.

706. Recompression Therapy. Recompression therapy can best be conducted in a hyperbaric chamber capable of conducting an oxygen treatment table, of holding two or more people and fitted with an inner and outer compartment. Where there is no alternative and the diver remains conscious, a one-man chamber may also be used for the treatment of decompression illnesses. This chamber needs to be conveyed to the location of a multi-personnel chamber as quickly as possible after recompression has started (see para 709).

EVACUATION

707. Recompression. When recompression therapy is required, but not available at the scene of the accident, the diver should be evacuated to a recompression facility as quickly as possible.

708. Evacuation Requirements. Preferably, a person adequately trained in the medical aspects of diving accidents should accompany a diving casualty. Detailed written information concerning the casualty, his diving history and the accident must travel with him. Helicopters used to evacuate a diving casualty who is not being treated in a recompression chamber should, wherever possible, fly at altitudes not exceeding 1000 ft (300 m).

709. Portable Recompression Chambers. To avoid aggravating the patient's condition, evacuation by helicopter of a patient being treated in a hyperbaric chamber should only be attempted if the helicopter is capable of accommodating the chamber internally. During the flight, the hyperbaric chamber is to be attended constantly and sufficient compressed breathing gas must be available for adequate ventilation of the chamber.

710. Signal In the event of a diving accident calling for immediate medical assistance and/or evacuation of a casualty, a signal to the appropriate address in ADivP-1 (Para 0222) is to be made in the following format:

a. Precedence: Immediate

b. Classification: Unclassified

c. Action:

(1) National Local Area Commander.

(2) Authority responsible for treatment of diving casualties in the area.

(3) Authorities responsible for SAR when designated in NATO exercise orders.

(4) RCC concerned.

d. Information:

(1) National CinC of the Navy to which the diving casualty belongs.

(2) OCE (for NATO Exercises).

e. Text:

SIC ....

Diving accident.

Paragraph 1: Nationality and name of vessel or unit involved in the accident in position (latitude and longitude) at (zone time).

Paragraph 2: Details of accident and symptoms of casualty.

Paragraph 3: Assistance required.

Paragraph 4: Any other facts or requirements.

711. Notification The authority responsible for the treatment of diving casualties in the area will advise the national area commander immediately about the specific action to be taken (for information to the authority responsible for search and rescue operations when designated) and should activate the facility capable of giving therapeutic recompression or medical assistance situated nearest to the diving accident.