NATIONAL
SEARCH AND RESCUE
MANUAL

(NATIONAL SAR MANUAL)

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NATIONAL SEARCH AND RESCUE MANUAL

FOREWORD

1. This *National Search and Rescue Manual*, *B–GA–209–001/FP–001 – DFO 5449*, is issued under the joint authority of the Deputy Minister of National Defence, the Chief of Defence Staff, and the Commissioner, Canadian Coast Guard. The purpose of the publication is to assist personnel of all federal departments and agencies involved in Search and Rescue (SAR) to meet the SAR objectives of the Canadian Government.

2. This manual presents federal SAR policy and describes the federal SAR organization and the interdepartmental structure established to provide effective SAR. It presents the common procedures, techniques, and terminology which have been developed to enhance the effectiveness of operations conducted by any combination of SAR forces.

3. Amendments of this publication shall be co-ordinated through the Department of National Defence/Canadian Coast Guard (DND/CCG) and will be issued under the joint authority of the DND/CCG. Suggested changes shall be forwarded to:

Chief of Air Staff/D Air FE 3
National Defence Headquarters
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or to:

Director, Search and Rescue
Canadian Coast Guard
Centennial Towers
200 Kent Street, 5th Floor
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4. This edition of the *National SAR Manual* is effective upon receipt and supersedes previous versions.

5. In order to conform to international phraseology, the terms “aeronautical, maritime and ground SAR” have replaced the previous “marine, air and land SAR”. Also, many French abbreviations have been replaced by their international equivalent, such as SAR, SRR, RCC and MRSC (see List of abbreviations).

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ABBREVIATIONS

NOTE: The abbreviations are listed alphabetically in the first column, with the French equivalent in brackets. Bold characters indicate that the abbreviation is the same in both languages.

1 CAD (1 DAC)	1 Canadian Air Division
A3 TSR (A3 Disp Op Tpt/SAR)	A3 Transport and SAR Readiness
ACC	area control centre
AOC (COA)	air operations centre
AGL	above ground level
AMVER	Automated Mutual Assistance Vessel Rescue System
ASCC	Air Standardization Co-ordinating Committee
ATC	air traffic control
BC	bottom current
C	coverage factor
CANSARP	Canadian Search and Rescue Planning Program
CAS	co-ordinator aeronautical search
CAS (CEMFA)	Chief of Air Staff
CASARA (ACRSA)	Civil Air Search and Rescue Association (also see SERABEC)
CASP	Computer Assisted Search Planning system (United States Coast Guard)
CCG (GCC)	Canadian Coast Guard

CCGA (GCAC)	Canadian Coast Guard Auxiliary
CF (FC)	Canadian Forces
CFB (BFC)	Canadian Forces Base
CFS (SFC)	Canadian Forces Station
CFSRS (RRSFC)	Canadian Forces Supplementary Radio System
*CGFO (OFG*C)	*Coast Guard Fleet Order*
CMCC	Canadian Mission Control Centre
OA (LO)	*Oceans Act*
COSPAS	"Kosmicheskaya Sistyema Poiska Avariyny Sudov" (Russian for: Space system search for distressed vessels.)
CPI (IPC)	crash position indicator
*CSA (LMM*C)	*Canada Shipping Act*
CSAD	Canadian Search Area Definition
CSS	co-ordinator surface search
CVTS (—)	Co-operative Vessel Traffic Services
CW	continuous wave
D	total drift
d_a	aerospace trajectory
D	Air FE 3 (DEF Air 3) Directorate of Air Force Employment 3
d_e	individual drift error

D_e	total drift error
$d_{e\ minimax}$	minimax drift error
DF	direction finder
DFO (MPO)	Department of Fisheries and Oceans
DG (DG)	Director General
DMB	datum marker buoy
DND (MDN)	Department of National Defence
d_p	parachute drift
DR (—)	dead reaconing
d_s	sinking drift
DSC (ASN)	digital selective calling
E	total probable error
ECAREG CANADA	Eastern Canada Traffic Zone Regulations
EGC (AGA)	enhanced group call
ELT	emergency locator transmitter
EPIRB (RLS)	emergency position-indicating radio beacon
ETA (HPA)	estimated time of arrival
ETD (HPD)	estimated time of departure
f_f	crew fatigue correction factor
FLIR	forward-looking infra-red

FM	frequency modulated
f_s	optimal search factor
FSS	flight service station
f_v	search aircraft speed correction factor
f_w	weather condition correction factor
GEOREF	geographic reference system
GHz	gigahertz
GMDSS (SMDSM)	Global Maritime Distress and Safety System
GPS	Global Positioning System
GRS (SRG)	General Radio Service
GRT (TJB)	gross register ton or tonnage
HF	high frequencies (3 to 30 MHz)
HQ (QG)	headquarters
ICAO (OACI)	International Civil Aviation Organization
ICSAR (CIRES)	Interdepartmental Committee on Search and Rescue
IMO (OMI)	International Maritime Organization
Inmarsat	International Mobile Satellite Organization
IRB (ESC)	inshore rescue boat
JETS	Joint Enroute Terminal System
kHz	kilohertz

LC	lake current
LKP	last known position
LM SAR (—)	Lead Minister for Search and Rescue
Loran	LOng RAnge Navigation
LSC	long shore current
LUT	local user terminal (satellite tracking station)
LW	leeway
M	nautical mile
MAJAID (CATAIR)	major aeronautical disaster
MANOT	missing aircraft notice
MARB (—)	maritime assistance request broadcast
MARLANT [FMAR (A)]	Maritime Forces Atlantic
MARPAC [FMAR (P)]	Maritime Forces Pacific
MCC	mission control centre
MCTS (SCTM)	Marine Communications and Traffic Services
MCTSO (OSCTM)	Marine Communications and Traffic Services Officer
MCW	modulated continuous wave
medevac	medical evacuation
MF	medium frequencies (300 to 3000 kHz)
MHz	megahertz

MRSC	maritime rescue sub-centre
MSI	maritime safety information
MVFR	Mountain Visual Flight Rules
N/A (s/o)	not applicable
NATO (OTAN)	North Atlantic Treaty Organization
NBDP (IDBE)	narrow-band direct-printing telegraphy
NDHQ (QGDN)	National Defence Headquarters
NDOC (CODN)	National Defence Operations Centre
NIF (FNI)	new search and rescue initiatives fund
NOCL	notice of crash/casualty location
NOK (—)	next-of-kin
NORAD	North American Air Defence
NORDREG CANADA	Arctic Canada Traffic System
NOTAM	notice to airmen
NSM (*MSN*)	*National Search and Rescue Manual*
NSP (PNRS)	National Search and Rescue Program
NSS (SNRS)	National Search and Rescue Secretariat
NVGs (—)	night vision goggles
OBS (BSN)	Office of Boating Safety
OIC (—)	Officer in Charge

OSC	on-scene commander
PEP	Provincial Emergency Program (volunteer organization in British Columbia)
PIW	person in water
PLB	personal locator beacon
POB	persons on board
POC	probability of containment
POD	probability of detection
Radar	RAdio Detection And Ranging
RC	river current
RCAF (ARC)	Royal Canadian Air Force
RCC	rescue co-ordination centre
RCMP (GRC)	Royal Canadian Mounted Police
RD (DR)	Regional Director
RSER (SSIE)	Rescue, Safety and Environmental Response
RSMS (RRSM)	Regional Supervisor, Maritime Search and Rescue
S	track spacing
SAR	search and rescue
SAREX	search and rescue exercise
SARSAT	Search and Rescue Satellite-Aided Tracking

SARSUM (—)	search and rescue summary
SART	search and rescue (radar) transponder
SAR Tech (SAR Tec)	Search and Rescue Technician
SC	sea current
SERABEC	“Sauvetage et recherches aériens du Québec” (also see CASARA)
SICOFAA	“Sistema de Cooperation Fuerzas Aereas Americanas” (Spanish for: System of co-operation among the American Air Forces.)
SITREP	situation report
SKAD	survival kit air droppable
SLDMB	self-locating datum marker buoy
SM (—)	searchmaster
SMC	search and rescue mission co-ordinator
SOLAS	*International Convention of the Safety of Life at Sea, 1974*
SOPs (IPO)	standard operating procedures
SRR	search and rescue region
SRU	search and rescue unit
SURPIC	surface picture
TC	tidal current

TSB (BST)	Transport Safety Board—working title for the Canadian Transportation Accident Investigation Safety Board (CTAISB)
TWC	total water current
U	wind speed in knots
UHF	ultra high frequencies (300 to 3000 MHz)
UNSAR	unnecessary search and rescue alert
US (—)	United States
USAF	United States Air Force
USCG	United States Coast Guard
UTC	Co-ordinated Universal Time
VFR	visual flight rules
VHF	very high frequencies (30 to 300 MHz)
VTS (STM)	vessel traffic services
W	sweep width
WC	wind driven current
$\mathbf{W_u}$	uncorrected sweep width
X	initial position error
Y	search and rescue facility position error

GLOSSARY

NOTE: The terms are listed alphabetically in bold characters in the first column. The French equivalent is indicated between quotation marks in italics, at the end of the definition.

Aeromedical evacuation — A Canadian Forces (CF) term meaning the medical evacuation by CF aircraft of service personnel from one facility to another.

"évacuation aéromédicale"

Aeronautical incident — A search and rescue incident involving an aircraft.

"incident aéronautique"

Casualty staging area — An intermediate forward location where a large number of survivors can be treated prior to evacuation to appropriate medical facilities.

"aire de rassemblement des blessés"

Combat support squadron — A Canadian Forces (CF) squadron established to provide search and rescue service and other support to specified CF formations.

"escadron de support au combat"

Confirmed SARSAT position —

a. a 121.5/243.0 MHz SARSAT position which has been confirmed either by

- at least two different satellite passes, or
- one satellite pass with another outside source such as an aircraft report, or

b. a 406 MHz SARSAT location for an operationally coded distress beacon.

"position SARSAT confirmée"

Co-ordinated SAR system — The combined facilities, equipment and procedures established in each search and rescue region to provide the response to search and rescue incidents.

"système SAR coordonné"

Co-ordinator surface search (CSS)

A vessel, other than a search and rescue unit, designated to co-ordinate surface search and rescue operations within a specified search area.

"coordonnateur des recherches en surface"

COSPAS–SARSAT

International organization which operates one of the satellite distress beacon alerting systems.

"COSPAS–SARSAT"

DATUM

The most probable position of a search object, corrected for drift, at any specific time.

"point de repère ou DATUM"

Datum marker buoy (DMB)

Droppable floating beacon used to determine actual sea current, or to serve as location reference.

"bouée-repère électronique"

Disabled

A situation wherein a vessel or aircraft afloat and not in distress or potential of distress, has lost all means of propulsion, steering or control to such a degree as to be incapable of proceeding to safety without assistance.

"désemparé"

Distress

A search and rescue incident where there is a reasonable certainty that one or more individuals are threatened by grave and imminent danger and require immediate assistance.

"détresse"

Distress beacon

A generic term used to describe any emergency locator transmitter (ELT), emergency position-indicating radio beacon (EPIRB) or personal locator beacon (PLB).

"balise de détresse"

Ditching

The forced landing of an aircraft on water.

"amerissage forcé"

Duckbutt

An airborne standby posture carried out by Canadian Forces aircraft to provide navigation or other assistance to aircraft duringa specific operation.
“duckbutt”

Forward operations base

A base, located as close as possible to an incident site, which is capable of handling large aircraft and has sufficient facilities (with augmentation, if necessary) to support a major aeronautical disaster operation.
“base avancée des opérations”

Ground search and rescue incident

Any incident not otherwise classified as an aeronautical or maritime incident and involving missing persons or persons in distress.
“incident de recherche et sauvetage au sol”

Humanitarian Incident

A Humanitarian Incident is a search and rescue (SAR) incident (not aeronautical or Maritime) that requires a response by the SAR System
“incident humanitaire”

Major aeronautical disaster

(MAJAID)

An aircraft incident occurring in Canada which, because of the number of people involved, requires augmentation of established
search and rescue resources.
“catastrophe aéronautique”

Major search and rescue operations

- Aeronautical and maritime search and rescue incidents where primary maritime and/or primary aeronautical search and rescue units are tasked on an incident for more than four calendar days;
- Incidents which the search and rescue region commander assesses as being potentially sensitive; or
- Special cases, as directed by the National Defense Headquarters.

“opérations majeures de recherche et sauvetage”

Maritime incident

A Maritime incident is a search and rescue (SAR) incident on the water involving a vessel or person(s) from a vessel, including the medical evacuation (medevac) of persons(s) from a vessel.

MI Distress – A person or persons are threatened by grave and imminent danger and require immediate assistance.

M3 Situation resolved in the uncertainly phase-such as:

- a disabled vessel in no immediate danger, or
- a disoriented or lost vessel in no immediate danger, or
- other related incident involving a vessel with no person on board.

"incident maritime"

Medical evacuation (medevac) —critical

The critical evacuation of injured or stranded persons from isolated areas or the recovery of sick or critically injured persons from vessels at sea.
"évacuation médicale critique"

Medical evacuation (medevac) —routine

The routine medical evacuation of patients or vital medical resources from one medical facility to another (aeronautical or maritime ambulance service).
"évacuation médicale de routine"

NAVTEX

Telegraphy system for transmission of maritime safety information, navigation and meteorological warnings and urgent information to ships.
"NAVTEX"

On-scene commander (OSC)

The commander of a search and rescue unit designated to co-ordinate search and rescue operations within a specified Search area.
"commandant sur place"

Other search and rescue

Resources other than primary or secondary which participate in search and rescue activities when required. This includes civilian agencies, volunteers and partially Federal Government funded resources such as the Canadian Coast Guard Auxiliary and the Civil Air Search and Rescue Association.
"ressources de recherche et sauvetage—autres"

Primary search and rescue resources	Federal search and rescue (SAR) aircraft and vessels, including those multi-tasked to SAR, established and equipped specifically for SAR with SAR trained crews aboard. Primary SAR resources are under the direct operational control of the Search and Rescue Region Commander for SAR taskings. *“ressources primaires de recherche et sauvetage”*
Ramp (or strip) alert	An increased standby posture maintained by Canadian Forces search and rescue forces during periods of increased Air Defence or other notable activity. *“alerte « aire de trafic » ou « piste d’envol »”*
Rescue co-ordination	The function of integrating the efforts of search and rescue (SAR) facilities and resources to achieve concerted and harmonized resolution of SAR incidents in an effective and efficient manner. *“coordination des opérations de sauvetage”*
Rescue co-ordination centre (RCC)	A unit responsible for promoting efficient organization of search and rescue (SAR) services and for co-ordinating the conduct of SAR operations within an associated Search and Rescue Region. *“centre de coordination de sauvetage”*
Rescue sub-centre (RSC)	A unit subordinate to a rescue co-ordination centre established to complement the latter within a specific area within a Search and Rescue Region. *“centre secondaire de sauvetage maritime”*
Search and rescue (SAR)	Search and Rescue comprises the search for, and provision of aid to, persons, ships or other craft which are, or are feared to be, in distress or imminent danger. *“recherche et sauvetage”*
Search and rescue incident	A reported situation which requires a response from the search and rescue system. The rescue co-ordination centre (RCC) will assign an incident number whenever, as judged by the RCC, a response is made to the reported incident. *“incident de recherche et sauvetage”*

Search and rescue mission co-ordinator (SMC)	The official temporarily assigned to co-ordinate response to an actual or apparent distress situation. *“coordonnateur de mission de recherche et sauvetage”*
Search and rescue region (SRR)	An area of defined dimensions associated with a rescue co-ordination centre within which search and rescue services are provided. *“région de recherche et sauvetage”*
Search and rescue region commander	The person designated by the Chief of Defence Staff and authorized by the *Canada Shipping Act* as being responsible for search and rescue operations within a Search and Rescue Region. *“commandant d’une région de recherche et sauvetage”*
Search and rescue resource	A resource capable of responding to a search and rescue incident. *“ressource de recherche et sauvetage”*
Search and rescue response	An action required to resolve a situation, such as: • the tasking of search and rescue units (singular or multiple); • acting as search and rescue mission co-ordinator, the issuance of any “All Stations” communications (e.g. distress, urgency or marine assistance request broadcasts, etc.); • extensive monitoring (when situation dictates) involving one half hour of working time; or • investigations involving one half hour working time, to determine if a search and rescue incident is occurring. *“intervention de recherche et sauvetage”*
Search and rescue unit (SRU)	A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of search and rescue operations. *“unité de recherche et sauvetage”*

Searchmaster (SM)	An individual who has been appointed by a Search and Rescue Region Commander to co-ordinate and direct a specific search and rescue operation. *“chef des opérations de recherche”*
Secondary search and rescue resources	All resources of the Federal government that are not Primary search and rescue (SAR) but which may be tasked to aid in the resolution of a SAR incident. *“ressources de recherche et sauvetage secondaires”*
Self-locating datum marker buoy (SLDMB)	A datum marker buoy that determines its own position and includes the position information in the transmission of the beacon signal. These beacons usually transmit through satellite services. *“bouée-repère électronique émettant sa propre position”*
Unknown incident	An incident which commences as a search and rescue incident of unknown type and the source of which is untraced. *“incident de source inconnue”*
Unnecessary search and rescue alert (UNSAR) message	A message sent by a rescue co-ordination centre to the appropriate authorities as a follow-up when the SAR system is unnecessarily activated by a false alert. *“message d’alerte inutile de recherche et sauvetage”*
Vessel	Any displacement or non-displacement vehicle that uses water as a means of navigation. *“bateau”*

CHAPTER 1—INTRODUCTION

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INTRODUCTION

GENERAL

1.1 **NSP**—In 1986, the Government of Canada directed the establishment of a National Search and Rescue Program (NSP). The NSP is a co-operative effort by federal, provincial and municipal governments along with other search and rescue (SAR) organizations. The objective of the NSP is to save lives by enhancing SAR prevention and provide effective and affordable SAR services in Canada's SAR areas of responsibility.

1.2 **Jurisdiction**—Membership in the National Search and Rescue Program does not in any way change existing jurisdictions, responsibilities or authorities, nor require the mandatory expenditure of resources. Membership does, however, provide a structure and process to produce effective, efficient and economical use of resources.

1.3 **NSP Components**—The National Search and Rescue Program is characterized by the three complementary components of aeronautical, maritime and ground SAR. Each component is broken down into two sub-components: SAR operations and SAR prevention.

NATIONAL SAR OBJECTIVE

1.4 **Objective**—The national search and rescue (SAR) objective is to prevent loss of life and injury through search and rescue alerting, responding and aiding activities using public and private resources. Where possible and when directly related thereto, reasonable efforts will be made to minimize damage to or loss of property. Through prevention measures focused on owners and operators most commonly involved in SAR incidents, the National Search and Rescue Program will attempt to reduce the number and severity of SAR incidents.

1.5 **Area of Responsibility**—The Canadian federal area of responsibility is as defined under International Civil Aviation Organization agreements for aeronautical SAR and as defined under International Maritime Organisation agreements for maritime SAR. The Canadian waters of the Great Lakes and the St. Lawrence River system are also part of the Canadian federal SAR area of responsibility.

INTERNATIONAL SAR TREATIES, CONVENTIONS AND AGREEMENTS

1.6 Participation—Canada participates in a number of international organizations such as the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), and has agreed to adopt search and rescue (SAR) standards and practices in accordance with the *Convention on International Civil Aviation*, the *International Convention on Maritime Search and Rescue*, and the *International Convention for the Safety of Life at Sea (SOLAS).* Standardization is also achieved by membership in international military organizations such as the North Atlantic Treaty Organization (NATO) and the Air Standardization Co-ordinating Committee. Similarly, the Canadian Coast Guard seeks standardization of maritime SAR procedures through IMO forums such as the Maritime Safety Committee and the Radiocommunications and Search and Rescue Sub-Committee. Finally, agreements between Canadian and American SAR agencies enhance co-ordination and mutual support operations adjacent to the common border.

NATIONAL SAR PROGRAM MANAGEMENT OVERVIEW

1.7 General—Within the federal system, the focus on search and rescue (SAR) as a distinct integrated activity is maintained through the Interdepartmental Committee on Search and Rescue and the National Search and Rescue Secretariat. Although numerous federal, provincial, municipal, commercial and volunteer groups contribute to the National Search and Rescue Program, this manual will focus on the federal responsibility for aeronautical and maritime SAR activity.

1.8 Lead Minister—To establish a single spokesperson for the government on overall search and rescue (SAR) matters, the Prime Minister, in December 1976, identified the Minister of National Defence as the Lead Minister for SAR (LM–SAR) and spokesperson for the government on SAR. This was reconfirmed in 1982 and again in 1986 by Cabinet.

1.9 ICSAR— The Interdepartmental Committee on Search and Rescue (ICSAR) is made up of senior federal officials representing departments and central agencies involved in the National Search and Rescue Program. This Committee is the primary forum for the development of advice for the Lead Minister. ICSAR is responsible for identifying search and rescue (SAR) requirements and advising the government on how best to respond to these requirements. ICSAR exists to provide interdepartmental co-ordination and advice to the Ministers in the areas of SAR policy, planning, resources, and effectiveness.

1.10 ICSAR Composition—The Interdepartmental Committee on Search and Rescue (ICSAR) is chaired by the Executive Director of the National Search and Rescue Secretariat and consists of members from the Department of National Defence; the Department of Fisheries and Oceans (Canadian Coast Guard); Transport Canada (Aviation); Environment Canada (Atmospheric Environmental Services); the Royal Canadian Mounted Police; and Heritage Canada (Parks Canada). Additional ICSAR representatives include the Department of Natural Resources; Department of Indian Affairs and Northern Development; Emergency Preparedness Canada; Treasury Board; and the Privy Council Office.

1.11 **NSS**—The National Search and Rescue Secretariat (NSS) is an independent body outside the line authorities of search and rescue (SAR) delivery departments and it plays a central managerial support role of the overall SAR objectives of departments. The role of the NSS is to enhance the provision of effective, efficient and economical SAR services in Canada by facilitating the development of the National Search and Rescue Program (NSP). This includes facilitating the co-operation, communication and co-ordination among NSP members in the development of policy, resource planning, research and development, analysis and review. The Executive Director of the NSS has been designated the Chair of the Interdepartmental Committee on Search and Rescue (ICSAR). He is responsible to the Lead Minister for SAR. Operational departments deliver SAR service and, via ICSAR and/or departmental lines of communication, advise the lead Minister in areas of SAR policy, planning, resources and effectiveness. This management process allows the Lead Minister to receive the advice of the departments and the independent advice of the NSS (if there is not consensus) with which to make program recommendations to Cabinet. The SAR delivery departments thus retain full control of SAR operations and execute their components of the NSP.

AERONAUTICAL AND MARITIME SAR SERVICE

1.12 **Joint CCG and DND Activity**—The Department of National Defence and the Canadian Coast Guard support the National Search and Rescue Program through two areas of activity related to the aeronautical and maritime search and rescue (SAR) services:

.1 SAR operations, aimed at detection, response and rescue; and

.2 SAR prevention, aimed at reducing the number and severity of SAR incidents through education and the enforcement of relevant regulations.

NATIONAL DEFENCE SAR RESPONSIBILITIES

1.13 **DND Responsibilities—General**—The primary responsibility for the provision of aeronautical search and rescue (SAR) services and effective operation of the co-ordinated aeronautical and maritime SAR system is assigned to the Department of National Defence. The provision of assistance to aircraft in distress through a federal aeronautical SAR service arises out of Canada's signatory status to the *1944 Convention on International Civil Aviation*, Article 25. As well, on June 18, 1947, the Cabinet authorized the Royal Canadian Air Force (RCAF) to establish facilities and equipment to meet this commitment. In 1951, the Cabinet further delegated responsibility for maritime SAR co-ordination to the RCAF.

1.14 **CAS Responsibilities**—The Chief of Air Staff is responsible for:

.1 strategic Department of National Defence (DND) search and rescue (SAR) policy and unit allocation;

.2 liaison with the National Search and Rescue Secretariat;

.3 the provision of a DND Interdepartmental Committee on Search and Rescue representative responsible for departmental SAR policy co-ordination; and

.4 liaison with other SAR operating departments and agencies, nationally and internationally.

1.15 **1 CAD Responsibilities**—The 1 Canadian Air Division is responsible for:

.1 operational command of all aeronautical search and rescue assets;

.2 the establishment and manning of the rescue co-ordination centres and the SARSAT Canadian Mission Control Centre;

.3 the provision of ground search parties in support of aeronautical and maritime incidents; and

.4 the interface between the Civil Air Search and Rescue Association and the Department of National Defence at the operational level.

1.16 **Commander MARLANT Responsibilities**—The Commander Maritime Forces Atlantic, as Commander of the Halifax Search and Rescue Region (SRR), is accountable for the co-ordination, control and conduct of search and rescue operations in the Halifax SRR.

1.17 **Commander 1 CAD Responsibilities**—The Commander, 1 Canadian Air Division, as Commander of the Trenton Search and Rescue Region (SRR), is accountable for the co-ordination, control and conduct of search and rescue operations in the Trenton SRR.

1.18 **Commander MARPAC Responsibilities**—The Commander, Maritime Forces Pacific, as Commander of the Victoria Search and Rescue Region (SRR), is accountable for the co-ordination, control and conduct of search and rescue operations in the Victoria SRR.

1.19 **DND SAR Activities** – The search and rescue (SAR) activities of the Department of National Defence are:

.1 the efficient operation of the aeronautical and maritime components of the co-ordinated SAR system;

.2 the provision and operation of the rescue co-ordination centres and other SAR facilities in conjunction with the Canadian Coast Guard (CCG);

.3 the co-ordination, control, and conduct of aeronautical SAR operations within the Canadian area of responsibility and between Canada and the United States in accordance with existing agreements;

.4 the provision of SAR aircraft in response to SAR incidents within the Canadian area of responsibility;

.5 the setting of priorities pertaining to the allocation of search and rescue units (SRUs) to SAR operations;

.6 the provision of ground SAR and humanitarian assistance, as a complementary tasking;

.7 the formulation and promulgation of SAR policy (in collaboration with the Interdepartmental Committee on Search and Rescue);

.8 the establishment of operating standards and the provision of SAR training for the co-ordinated SAR system in collaboration (when appropriate) with CCG authorities;

.9 the evaluation of SAR equipment and procedures in collaboration (when appropriate) with CCG authorities;

.10 the review of SAR services, facilities and SRUs in collaboration (when appropriate) with CCG;

.11 co-ordination of the Civil Air Search and Rescue Association training and operational activity; and

.12 the efficient operation of the Canadian components of the SARSAT system.

1.20 **DND Basic SAR Tasks**—The Department of National Defence has the following basic search and rescue (SAR) tasks:

.1 to co-ordinate, control and conduct SAR operations in relation to aeronautical SAR incidents within the Canadian area of responsibility;

.2 to provide search and rescue units (SRUs) in support of the prosecution of maritime SAR operations and to exercise ultimate authority in the allocation of all SRUs during a SAR incident;

.3 to conduct ground searches in relation to aeronautical and maritime SAR incidents; and

.4 to provide the resources to operate the Canadian components of the SARSAT system.

1.21 **DND Complementary SAR Tasks**—The Department of National Defence has the following complementary search and rescue (SAR) tasks:

.1 To provide search and rescue units when and where available, to assist in the prosecution of ground SAR and humanitarian incidents which occur within provincial or municipal areas of responsibility; and

.2 to support Transport Canada (Aviation) and the Canadian Coast Guard in SAR prevention through participation in related educational programs and by advising the appropriate agencies of areas of concern identified in SAR operations.

FISHERIES AND OCEANS SAR RESPONSIBILITIES

1.22 **DFO Responsibilities—General**—The responsibility for the provision of the maritime component of the federal search and rescue program rests with the Department of Fisheries and Oceans (DFO) and the Canadian Coast Guard. This responsibility is assigned to DFO through the *Oceans Act* (Annex 1B).

1.23 **DFO Responsibilities—History**—In 1948, Canada signed the *Convention for the Safety of Life at Sea (SOLAS)*, wherein, under Chapter 5, Regulation 15, each contracting state is required to undertake and ensure necessary arrangements for coast watching and for the rescue of persons in distress at sea. In 1958, Canada became a signatory to the *Convention on the High Seas*, wherein, under Article 12 (2), every coastal state is required to maintain an adequate and effective search and rescue service regarding safety on and over the sea. These responsibilities are further reflected and amplified in subsequent Cabinet decisions, and legislation such as the

Canada Shipping Act (Annex 1A) and now the *Oceans Act.* The *International Convention on Maritime SAR, 1979*, further defines these responsibilities.

1.24 **CCG Responsibilities—**The Canadian Coast Guard has primary responsibility for the provision of the maritime component of the federal search and rescue program and for all matters relating to pleasure craft safety, including the regulation of the construction, inspection, equipment and operation of pleasure craft.

1.25 **CCG SAR Activities—**The search and rescue (SAR) activities of the Canadian Coast Guard (CCG) are:

.1 the provision of and participation in the maritime component of the rescue co-ordination centres (RCCs) as well as the provision, operation and equipping of the maritime rescue sub-centres (MRSCs) and other SAR facilities in co-operation with the Department of National Defence (DND);

.2 in collaboration with DND, the co-ordination, control and conduct of maritime SAR operations within the Canadian area of responsibility;

.3 the provision of maritime advice and assistance to DND in the co-ordination of aeronautical SAR and other emergencies which may require the use of maritime units;

.4 the provision of maritime search and rescue units (SRUs) in response to SAR incidents within the Canadian area of responsibility, the activities of which SRUs are co-ordinated by RCCs and MRSCs;

.5 the provision of humanitarian assistance (as a secondary task) when such is deemed best provided by CCG SRUs;

.6 formulation and promulgation of SAR policy (in collaboration with the Interdepartmental Committee on Search and Rescue);

.7 establishment of levels of service, performance and operating standards;

.8 the provision of maritime SAR training for the co-ordinated SAR system in collaboration (when appropriate) with DND;

.9 the organization, co-ordination and administration of Canadian Coast Guard Auxiliary activities;

.10 the evaluation of SAR services, equipment and procedures, in collaboration with DND;

.11 the review of SAR services and and facilities and of SRUs, in collaboration with DND; and

.12 the provision of maritime emergency communications and alerting services.

1.26 **CCG Basic SAR Tasks**—The Canadian Coast Guard has the following basic search and rescue (SAR) tasks:

.1 to detect maritime incidents and, in collaboration with the Department of National Defence, to co-ordinate, control and conduct SAR operations in maritime SAR incidents within the Canadian area of responsibility;

.2 to provide maritime units and communications in support of the prosecution of aeronautical SAR operations where applicable; and

.3 to co-ordinate, control and conduct SAR Loss-Of-Life prevention programs to reduce the number and severity of maritime SAR incidents.

1.27 **CCG Complementary SAR Task**—The complementary search and rescue task of the Canadian Coast Guard is to provide search and rescue units, when and where available, to assist in the prosecution of humanitarian incidents.

TRANSPORT CANADA SAR RESPONSIBILITIES

1.28 **Transport Canada (Aviation)**—Transport Canada (Aviation) has primary responsibility for the provision of the aeronautical search and rescue (SAR) prevention program, under the authority of the *Aeronautics Act*. This responsibility is met through education programs, regulation and enforcement and is executed in close consultation with the Department of National Defence SAR authorities in an effort to optimize program priorities and effectiveness. Co-ordination is effected through the Interdepartmental Committee on Search and Rescue.

1.29 **Transport Canada (Aviation) SAR Tasks**—Transport Canada (Aviation) has the following search and rescue (SAR) tasks:

.1 to provide means and methods in respect to civil aircraft in distress in the Canadian area of responsibility to achieve efficiency in alerting the appropriate rescue co-ordination centre and in locating the distressed aircraft;

.2 to provide specialized departmental resources and expertise as a functional part of the SAR program; and

.3 to co-ordinate, control and conduct a SAR prevention program designed to reduce the number and severity of aeronautical SAR incidents.

OTHER FEDERAL GOVERNMENT DEPARTMENT RESOURCES

1.30 Aircraft and vessels of all departments of the federal government are considered secondary search and rescue units and will respond to calls for assistance whenever possible.

ANNEX 1A— EXCERPTS FROM THE *CANADA SHIPPING ACT*

ANSWERING DISTRESS SIGNAL

384. (1) The master of a Canadian ship at sea, on receiving a signal from any source that a ship or aircraft or survival craft thereof is in distress, shall proceed with all speed to the assistance of the persons in distress informing them if possible that he is doing so, but if he is unable or, in the special circumstances of the case, considers it unreasonable or unnecessary to proceed to their assistance, he shall enter in the official log-book the reason for failing to proceed to the assistance of those persons.

SHIPS REQUISITIONED

(2) The master of any ship in distress may, after consultation, in so far as possible, with the masters of the ships that answer his distress signal, requisition one or more of those ships that he considers best able to render assistance, and it is the duty of the master of any Canadian ship that is so requisitioned to comply with the requisition by continuing to proceed with all speed to the assistance of the ship in distress.

RELEASE FROM OBLIGATION

(3) The master of a ship shall be released from the obligation imposed by subsection (1) when he learns that one or more ships other than his own have been requisitioned and are complying with the requisition.

FURTHER RELEASE

(4) The master of a ship shall be released from the obligation imposed by subsection (1), and, if his ship has been requisitioned, from the obligation imposed by subsection (2), if he is informed by the persons in the ship in distress or by the master of another ship that he has reached those persons that assistance is no longer necessary.

OFFENCE AND PENALTY

(5) If the master of a Canadian ship contravenes this section he is guilty of an indictable offence and liable to a fine not exceeding five hundred dollars or to imprisonment for a term not exceeding one year.

RIGHT TO SALVAGE

(6) Nothing in this section affects the provisions of section 451 and compliance by the master of a ship with this section does not affect his right, or the right of any other person to salvage.

MINISTER MAY DESIGNATE RESCUE CO-ORDINATORS

385. (1) The Minister may designate persons, to be known as rescue co-ordinators, to organize search and rescue operations in Canadian waters and on the high seas off the coasts of Canada.

POWER OF RESCUE CO-ORDINATORS

(2) On being informed that a vessel or aircraft or survival craft thereof is in distress or is missing in Canadian waters or on the high seas off any of the coasts of Canada under circumstances that indicate it may be in distress, a rescue co-ordinator may:

(*a*) order all vessels within an area specified by him to report their positions to him;

(*b*) order any vessel to take part in a search for that vessel, aircraft or survival craft or to otherwise render assistance; and

(*c*) give such other orders as he deems necessary to carry out search and rescue operations for that vessel, aircraft or survival craft.

PENALTY

(3) Every master or person in charge of a vessel in Canadian waters or a Canadian vessel on the high seas off the coasts of Canada who fails to comply with an order given by a rescue co-ordinator or a person acting under his direction is guilty of an offence and liable on summary conviction to a fine not exceeding five hundred dollars or to imprisonment for a term not exceeding six months or both.

DEFENCE

(4) No master or person in charge of a vessel shall be convicted of an offence under subsection (3) if he establishes that compliance with an order of a rescue co-ordinator or person acting under the direction thereof would have exposed his vessel or tow or persons on board it to serious danger.

AIRCRAFT TREATED AS IF SHIP OR VESSEL

449. (1) The law, statutory and other, including the provisions of this Part, relating to wrecks, to the salvage of life or property and to the duty or obligation to render assistance to ships or vessels in distress applies to aircraft on or over the sea or tidal waters and on and over the Great Lakes, as it applies to ships or vessels.

(2) The owner of an aircraft is entitled to a reasonable reward for salvage services rendered by the aircraft to any property or persons in any case where the owner of the aircraft would be so entitled had it been a ship or vessel.

(3) The Governor in Council may make modifications of and exemptions from the provisions of the law, statutory and other, in its application to aircraft, to such extent and in such manner as appears necessary or expedient.

ASSISTANCE

451. (1) The master or person in charge of a vessel shall, so far as he can do so without serious danger to his own vessel, its crew and passengers, if any, render assistance to every person, even if that person is a subject of a foreign state at war with Her Majesty, who is found at sea and in danger of being lost, and if he fails to do so he is liable to a fine not exceeding one thousand dollars.

SALVAGE NOT AFFECTED

(2) Compliance with subsection (1) by the master or person in charge of a vessel does not affect his right or the right of any other person to salvage.

Royal Ascent Granted March 26, 1987

ANNEX 1B— EXCERPTS FROM THE *OCEANS ACT*

INTERPRETATION

2. In this Act,

"Department" means the Department of Fisheries and Oceans;

"Minister" means the Minister of Fisheries and Oceans.

COAST GUARD SERVICES

41. (1) As the Minister responsible for coast guard services, the powers, duties and functions of the Minister extend to and include all matters over which Parliament has jurisdiction, not assigned by law to any other department, board or agency of the Government of Canada, relating to

(*a*) services for the safe, economical and efficient movement of ships in Canadian waters through the provision of

(i) aids to navigation systems and services,

(ii) marine communications and traffic management services,

(iii) ice breaking and ice management services, and

(iv) channel maintenance;

(*b*) the marine component of the federal search and rescue program;

(*c*) pleasure craft safety, including the regulation of the construction, inspection, equipment and operation of pleasure craft;

(*d*) marine pollution prevention and response; and

(*e*) the support of departments, boards and agencies of the Government of Canada through the provision of ships, aircraft and other marine services.

AMENDMENTS TO THE *CANADA SHIPPING ACT* BY THE *OCEANS ACT*

95. The definitions "Department" and "Minister" in section 2 of the *Canada Shipping Act* are replaced by the following:

> "Department" means, in section 385, the Department of Fisheries and Oceans;
>
> "Minister" means, in section 385, the Minister of Fisheries and Oceans.

Royal Assent granted 18th December, 1996.

CHAPTER 2—SAR AGREEMENTS

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SAR AGREEMENTS

GENERAL

2.1 Canadian search and rescue (SAR) procedures should be compatible with those used by nations participating in the International Maritime Organization, the International Civil Aviation Organization, the North Atlantic Treaty Organization, the Air Standardization and Coordination Committee, and the System of Co-operation Among the American Air Forces (SICOFAA). This requires a high degree of liaison and the acceptance of mutual agreements, terminology and standards. It is essential, therefore, that close co-operation be maintained between Canadian SAR authorities and those of other nations.

VISITS BETWEEN CANADA AND THE UNITED STATES

2.2 To ensure smooth co-ordination in cross-border search and rescue (SAR) operations, periodic liaison visits are required between SAR personnel from Canada and the United States. Visits by personnel of Canadian search and rescue units (SRUs) to adjacent United States Coast Guard and United States Air Force installations may be made on the approval of the commander responsible for the particular SRU concerned. For Department of National Defence personnel, an itinerary of the proposed trip shall be sent to the Canadian Defence Liaison Staff in Washington; a visit clearance from Canadian Defence Liaison Staff in Washington is not required (Telephone conversation between the Staff Officer Search and Rescue 2, the Canadian Defence Liaison Staff in Washington and the Department of Movements, October 95). Canadian Coast Guard personnel shall travel in accordance with guidelines provided in the *Treasury Board Security Policy*. Details including reports of such visits shall be passed to the appropriate headquarters.

JOINT AREAS OF SAR RESPONSIBILITY— CANADA/UNITED STATES

2.3 The following paragraphs outline the working arrangements for search and rescue (SAR) operations in Canadian territory where Canadian and United States (US) search and rescue units (SRUs) are operating together.

2.4 When a SAR incident occurs in Canadian territory, involving a US aircraft other than military, US SAR forces may be permitted to provide SRUs they consider necessary, but the appropriate Canadian rescue co-ordination centre (RCC) will be responsible for the search. United States Air Force (USAF) or US Coast Guard SAR forces will inform the Canadian RCC of action taken or proposed, but all decisions and activity shall be under the control of, and subject to, ratification by the Canadian RCC.

2.5 When an emergency incident occurs involving a US military aircraft in Canadian territory (for which search participation may become necessary), USAF forces may be permitted to take any action that is necessary, consulting with the appropriate Canadian RCC as soon as possible. Under such conditions, a USAF Searchmaster (SM) will be designated as well as a Canadian Assistant SM to act as liaison between US and local Canadian authorities. The US SM will report details to the appropriate Canadian RCC and the RCC will be kept informed of developments. However, the search and rescue region commander may assume control of any search that arises in his area. This power normally will only be exercised when Canadian Forces (CF) search aircraft are participating or when, in his opinion, the CF are better qualified to conduct the search. When a USAF SRU gains knowledge of an incident involving a US military aircraft in Canadian territory, immediate notification will be given to the appropriate Canadian RCC giving:

.1 full information on flight plan;

.2 action taken or being taken;

.3 safety and environment risk assessment; and

.4 future plans.

2.6 Canadian and US SRUs will provide mutual assistance when such assistance is requested and is available. A listing of Canadian/US SAR agreements is provided at Annex 2. Copies of these agreements are held at NDHQ/Directorate of Air Force Employment 3.

CUSTOMS AND IMMIGRATION BILATERAL AGREEMENT— SAR AIRCRAFT

2.7 Customs and Immigration authorities in Canada and the United States (US) have approved the following procedures to be employed between rescue co-ordination centres (RCCs) and Customs and Immigration officers in dealing with search and rescue (SAR) aircraft of either Canada or the US crossing the international boundary while engaged in SAR operations:

.1 when US aircraft are to be employed on a SAR operation in Canada, the RCC in charge of the search shall obtain from US authorities the number of aircraft participating and the identification markings of the aircraft. This information, along with the additional information of the territory to be searched and the possible duration of the stay of the US aircraft shall be relayed to the Collector of Customs and the appropriate immigration official for the area involved;

.2 when Canadian aircraft are to be employed on a SAR operation in the US, the particular Canadian RCC that is dispatching the aircraft shall pass all pertinent details to the US RCC in charge of the search, and in addition, shall inform the appropriate Canadian Collector of Customs and the immigration official of the intended operations giving the following details:

.1 the territory to be searched;

.2 the possible duration of the stay of the aircraft;

.3 the identification markings of each aircraft; and

.4 the number of persons comprising the crew of each aircraft;

.3 should an unscheduled landing be made by US aircraft while employed on a SAR mission in Canada, the RCC in charge of the operation shall notify the appropriate Collector of Customs and the immigration officials of:

.1 the name of the airport at which the aircraft landed;

.2 the identification of the aircraft; and

.3 the duration of the stay if known;

NOTE: Should any merchandise, carried in the aircraft in question from one country to the other in the course of SAR operations, remain in the latter country on conclusion of an operation, it will be subject to customs treatment normally accorded to import merchandise.

.4 at Canadian locations where there is no immigration service available, the local customs official shall be notified and requested to inform the appropriate immigration official.

INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974

2.8 The 1974 *International Convention on the Safety of Life at Sea (SOLAS)* has the objective of promoting safety of life at sea by the contracting governments, through adoption and pursuance of common laws and regulations and all other steps which may be necessary to ensure, from the point of view of safety of life, that a ship is fit for the service for which it is intended. Each contracting government also undertakes to ensure that necessary arrangements are made for coast watching and for the rescue of the persons in distress at sea and around its coasts. Canada is a signatory to the 1974 *SOLAS Convention* and has accepted the obligation to establish the facilities required for coast watching and rescuing persons in distress at sea, along its coasts and off-shore areas for which it has accepted the responsibility.

INTERNATIONAL CONVENTION ON MARITIME SEARCH AND RESCUE, 1979

2.9 The main purpose of the *International Convention on Maritime Search and Rescue, 1979,* is to facilitate co-operation between governments and to facilitate co-operation between those participating in search and rescue (SAR) operations at sea. In this regard the International Maritime Organization (IMO) has established an International SAR Plan and published the *IMO Search and Rescue Manual (IMOSAR Manual)* to assist governments. The *International Convention on Maritime Search and Rescue, 1979,* has been in effect since June 22, 1985.

ANNEX 2—SAR AGREEMENTS

Canada is a signatory to, or member of, the following agreements or organizations:

INTERNATIONAL

- International Civil Aviation Organization (ICAO)
- North Atlantic Treaty Organization (NATO)
- Air Standardization Co-ordinating Committee (ASCC)
- International Maritime Organization (IMO)
- *Convention on International Civil Aviation*
- *International Convention on Maritime Search and Rescue*
- *International Convention for the Safety of Life at Sea (SOLAS)*

CANADA/UNITED STATES

DATE	AUTHORITIES	AGREEMENT
31.09.49	Canada/United States	Search and rescue (SAR) operations along the common boundary outlining customs procedures.
27.04.72	Maritime Forces Pacific (MARPAC)/ 17th District United States Coast Guard (USCG)	Provide for mutual assistance, delineating responsibility and control.
02.02.73	MARPAC/USCG Pacific	Authority for agreements between MARPAC and 13th and 17th Districts USCG.

18.05.73	MARPAC/13th District USCG	Provide for mutual assistance, delineating responsibility and control.
24.03.95	Department of National Defence, Canadian Coast Guard, USCG and United States Air Force	Memorandum of Understanding defining the respective operational and administrative responsibilities of the respective agencies in conducting SAR activities.

DOMESTIC

DATE	AUTHORITIES	AGREEMENT
27.04.87	Department of National Defence (DND)/Transport Canada	Search and rescue training.
30.04.94	DND/Transport Canada	Joint sponsorship and cost-sharing of the Civil Air Search and Rescue Association (CASARA).

NOTE: Each search and rescue region will have regional agreements between local agencies and authorities as necessary to facilitate the co-ordination and conduct of regional SAR operations. Each rescue co-ordination centre and maritime rescue sub-centre will maintain copies of their relevent agreements.

CHAPTER 3—
TERMS OF REFERENCE—CANADIAN SAR SYSTEM

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TERMS OF REFERENCE—CANADIAN SAR SYSTEM CO-ORDINATION OF SAR

3.1 As summarized in Cabinet Directives, the Department of National Defense (DND) has overall responsibility for the efficient operation of the co-ordinated aeronautical and maritime search and rescue (SAR) system. The statutory authority for the co-ordination of maritime SAR response is assigned to the Minister of Fisheries and Oceans by the *Oceans Ac*t. Under this authority the military search and rescue region (SRR) commanders have been designated as rescue co-ordinators. Within the rescue co-ordination centres (RCCs), the co-ordination and control of aeronautical and maritime rescue operations are conducted by both DND and Coast Guard personnel respectively. RCC personnel function together as a team to ensure that response to distress incidents is co-ordinated effectively. Maritime rescue sub-centres (MRSCs) are established for the purpose of co-ordinating, conducting and controlling response to maritime SAR incidents within local areas of the SRR, maximizing the use of local knowledge and resources in providing an effective response. MRSCs keep parent RCCs fully informed of their activity and transfer control of an incident to the parent RCC in accordance with established criteria.

SEARCH AND RESCUE REGIONS

3.2 In accordance with International Maritime Organization (IMO) and International Civil Aviation Organization (ICAO) agreements to provide search and rescue (SAR) services in Canada and adjacent ocean areas, the country has been divided into three search and rescue regions (SRRs) for maritime and aeronautical SAR co-ordination. The international boundaries are in accordance with ICAO and IMO agreements (SRR boundaries are outlined in Annex 3A).

3.3 Rescue co-ordination centres at Victoria, Trenton and Halifax co-ordinate aeronautical and maritime SAR operations. Maritime rescue sub-centres (MRSCs) are established at Québec City (Québec), and St. John’s (Newfoundland). MRSC areas of responsibility are outlined in Annex 3B.

TERMS OF REFERENCE—NATIONAL DEFENCE SAR STAFF

3.4 **Directorate Air Requirement**s—The Directorate Air Requirements staff is responsible to the Chief of the Air Staff for the:

.1 co-ordination of equipment procurement and other requirements of the Department of National Defence (DND) search and rescue (SAR) system;

.2 co-ordination of all DND inputs to the New SAR Initiatives Fund (NIF); and

.3 monitoring of research and development for potential improvements in DND SAR equipment.

3.5 **D Air FE 3**—The Directorate of Air Force Employment 3 staff is responsible to the Chief of the Air Staff for the:

.1 development and promulgation of Department of National Defence (DND) search and rescue (SAR) policy in accordance with ministerial direction;

.2 processing of ministerial or other inquiries regarding DND aspects of the Canadian SAR program;

.3 liaison with the Canadian Coast Guard, the National Search and Rescue Secretariat and other agencies involved in the National SAR Program;

.4 provision of information to other National Defence Headquarters staffs on matters concerning SAR;

.5 provision of staff support to the DND Interdepartmental Committee on Search and Rescue representative;

.6 co-ordination of DND participation in the COSPAS–SARSAT program;

.7 provision of Canadian representation for SAR policy matters at SICOFAA and the International Civil Aviation Organization; and

.8 monitoring of major SAR operations and submitting the recommendations for their reduction.

3.6 **A3 TSR**—The A3 Transport and SAR Readiness staff is responsible to the Commander, 1 Canadian Air Division, for the:

.1 preparation and publishing of the Department of National Defence (DND) search and rescue (SAR) operational procedures in accordance with current policy;

.2 administration, standardization and determination of readiness levels of DND SAR formations;

.3 ensuring of operational readiness and the performing of regular evaluation of DND SAR formations;

.4 Civil Air Search and Rescue Association (CASARA) liaison and co-ordination of CASARA activities;

.5 provision of staff support to the Trenton Search and Rescue Region Commander;

.6 provision of operational support to the rescue co-ordination centres;

.7 processing of ministerial or other inquiries related to operational SAR matters;

.8 liaison with the North Atlantic Treaty Organization and the Air Standardization Co-ordinating Committee; and

.9 Office of Primary Interest duties regarding the Major Aeronautical Disaster Operation Plan.

TERMS OF REFERENCE—COAST GUARD SAR STAFF

3.7 **Director SAR**—The Director, Search and Rescue (SAR), through the Director General, Rescue, Safety and Environmental Response, is designated, on behalf of the Commissioner, as the senior officer responsible for the exercise of functional authority and direction in relation to maritime SAR program activities in the Canadian Coast Guard (CCG). The authority and direction noted includes the following:

.1 CCG SAR policy, levels of service, resource allocation, operating and performance standards;

.2 the provision of support to the Interdepartmental Committee on Search and Rescue concerning maritime SAR policy, standards, procedures, planning, resources and program effectiveness;

.3 the interface with and co-ordination of the Canadian Coast Guard Auxiliary—commonly called the Auxiliary—and management of all aspects of the partnership; and

.4 the liaison with the National Search and Rescue Secretariat.

The Director SAR is the national spokesperson for the maritime SAR Program.

3.8 **CCG HQ**—The Canadian Coast Guard (CCG) Headquarters search and rescue (SAR) staff shall be responsible to the Director SAR for the:

.1 development, approval by appropriate authority, and promulgation of CCG SAR policy, levels of service and performance and operating standards;

.2 processing of ministerial or other inquiries regarding CCG aspects of the National Search and Rescue Program (NSP);

.3 co-ordination of equipment procurement and other requirements of the maritime SAR system;

.4 provision of information to other CCG HQ staff on matters concerning maritime SAR;

.5 office of primary interest duties regarding primary maritime SAR craft types, under the Limited Fleet Type Structure;

.6 provision of staff assistance to the Interdepartmental Committee on Search and Rescue on maritime SAR interests;

.7 liaison with the Department of National Defence and other agencies involved in the NSP;

.8 conducting and monitoring of research and development for potential improvements in CCG SAR equipment and procedures;

.9 maintenance of international maritime SAR liaison through the International Maritime Organization and other international bodies;

.10 ensure the development and maintenance of training criteria and plans for personnel involved in maritime SAR;

.11 liaison with and administration of the Canadian Coast Guard Auxiliary and its activities;

.12 co-ordination of all CCG inputs to the New SAR Initiatives Fund; and

.13 provision of technical and maritime expertise.

3.9 **Director OBS**—The Director, Office of Boating Safety (OBS), through the Director General, Rescue, Safety and Environmental Response, is designated on behalf of the Commissioner as the senior officer responsible for the exercise of functional authority and direction in relation to recreational boating safety and search and rescue (SAR) Loss-Of-Life prevention activities. The authority and direction noted includes the following:

.1 OBS policy and resource allocation;

.2 regulatory authority for all recreational boating safety on all Canadian waters and safety equipment specific to recreational boats, notably personal flotation devices; and

.3 SAR Loss-Of-Life

.1 courtesy examinations,

.2 demonstrations and lectures, and

.3 awareness campaigns.

3.10 **Director MCTS**—The Director, Marine Communications and Traffic Services, is responsible to the Commissioner, Canadian Coast Guard for the provision of adequate telecommunications and electronic facilities to support the detection of search and rescue incidents and co-ordination of distress communications in the Canadian area of responsibility.

3.11 **RDs CCG**—The Regional Directors (RDs), Canadian Coast Guard (CCG), are designated, on behalf of the Commissioner, as the senior officers responsible to effect, on a regional basis, in collaboration with the search and rescue region commander, implementation of those CCG policies, standards and objectives designed to provide an effective search and rescue (SAR) service to the maritime community. RDs CCG are functionally responsible to the Commissioner and line responsible to the regional directors general, Department of Fisheries and Oceans to ensure, on a daily basis, the adequate provision and disposition of resources within their respective regions in support of SAR operations.

3.12 **Superintendent RSER**—The Superintendent, Rescue, Safety and Environmental Response (RSER), shall be responsible for planning, organizing, and directing the activities of the Canadian Coast Guard (CCG) Maritime Search and Rescue (SAR) Program, and managing and co-ordinating the activities of the Canadian Coast Guard Auxiliary for the assigned geographical area of responsibility. The Superintendent RSER shall be responsible to the:

.1 SRR commander through the Regional Director (RD) CCG for:

.1 providing expert maritime advice in matters of CCG policy and procedures concerning maritime SAR,

.2 ensuring that qualified maritime SAR controllers are selected and appointed in collaboration with the Regional Supervisor, Maritime SAR (RSMS), and the Officer in Charge (OIC) of the appropriate rescue co-ordination centre (RCC),

.3 selecting and appointing a qualified RSMS,

.4 ensuring provision of the RCC/maritime rescue sub-centre (MRSC) equipment for which CCG is responsible,

.5 ensuring adequate deployment of CCG search and rescue units against current levels of SAR activity and trends.

.2 RD CCG for:

.1 implementing CCG SAR policy and ensuring that CCG SAR procedures are followed,

.2 developing regional plans to ensure that CCG SAR levels of service, performance and operating standards are met,

.3 planning and conducting the SAR program,

.4 planning and monitoring, in conjunction with Operations, the CG maritime SAR coverage,

.5 maintaining liaison with the appropriate branches of CCG to ensure the best possible level of support to the SAR program,

.6 evaluating effectiveness of SAR programs through training exercises, and determining the resource requirements,

.7 developing and maintaining public information and relations programs,

.8 establishing and maintaining liaison with relevant departments of federal and provincial governments and other groups, public or private, involved in maritime SAR and safety,

.9 ensuring that operationally ready maritime SRUs are available for tasking by the RCC/MRSC,

.10 developing and maintaining liaison at an operational level with neighbouring foreign maritime SAR related agencies engaged in maritime SAR co-ordination, and

.11 delivering the Regional component of the CCG SAR Loss-Of-Life Prevention Program.

TERMS OF REFERENCE—SEARCH AND RESCUE REGION

3.13 SRR Commander—Rescue Co-ordinator—The Search and Rescue Region (SRR) Commander shall be responsible to the Chief of the Defense Staff for:

.1 initiating and co-ordinating search and rescue (SAR) operations, and authorizing the reduction of minor SAR operations (those operations not classed as major SAR operations under Chapter 5);

.2 recommending the reduction of major SAR operations;

.3 carrying out the duties of rescue co-ordinator pursuant to section 385 (2) of the *Canada Shipping Act*;

.4 formally appointing searchmasters as required;

.5 approving the use of search and rescue units for humanitarian incidents; and

.6 establishing channels of communication to allow the expeditious flow of information between the SRR Commander and the Officer in Charge of the rescue co-ordination centre.

3.14 Senior Military Officer—The Senior Military Officer is a senior military officer assigned specific duties and responsibilities by the Search and Rescue Region Commander in respect to the co-ordinated search and rescue system.

TERMS OF REFERENCE—RESCUE CO-ORDINATION CENTRE

3.15 General—A rescue co-ordination centre (RCC) is an agency established within each search and rescue region for the purpose of co-ordinating, controlling, and conducting aeronautical and maritime search and rescue (SAR) operations. In addition, RCCs will co-ordinate search and rescue units response for humanitarian incidents in accordance with national policy and regional directives. For this it requires:

> **Note: Any exceptions to the controller qualification requirements stated in this chapter must be approved by 1CAD/A3 SAR and the appropriate SRR Commander. The Manager SAR/CCG must be consulted for exceptions to Maritime Controllers qualifications.**

.1 trained staff, capable of controlling, co-ordinating and conducting operations;

.2 a detailed plan formulating the basis of SAR operations as outlined in Annex 3C;

.3 specific plans to meet the SAR demands of the region;

.4 communications equipment which will ensure a timely alerting procedure and provide an efficient network for monitoring and working SAR traffic; and

.5 facilities and equipment for the efficient co-ordination and control of operations.

3.16 **OIC RCC**—The Officer in Charge (OIC) of a rescue co-ordination centre (RCC) shall be a qualified aeronautical search and rescue (SAR) pilot or navigator. Qualifications shall include the successful completion of the Searchmaster course and applicable unit on-job-training. Qualifications should also include the successful completion of the RCC/Maritime Rescue Sub-Centre (MRSC) Controller course. The OIC RCC is responsible to the:

.1 Search and Rescue Region (SRR) Commander for:

.1 the co-ordination, control and conduct of SAR operations within the RCC's area of responsibility,

.2 ensuring the effective operation of the co-ordinated SAR system,

.3 the operational status of RCC communications and other equipment and ensuring that appropriate authorities are notified of any deficiencies,

.4 advising on the adequacy and deployment of search and rescue units (SRUs) to meet operational requirements,

.5 recommending search reduction,

.6 certifying senior controllers in collaboration with the RCC Regional Supervisor, Maritime Search and Rescue (RSMS) and collaborating with RSMS (RCC/MRSC) on the certification of maritime controllers,

.7 liaison with the RSMS on the day-to-day operation and deployment of SRUs and on the participation and performance of the staff in the operation of the RCC/MRSC,

.8 liaison with the Superintendent, Rescue, Safety and Environmental Response or his delegate on the operations interface between RCCs and MRSCs, and on the deployment of Canadian Coast Guard (CCG) SRUs,

.9 establishing and maintaining liaison with relevant departments of federal and provincial governments and other groups, public or private, concerning SAR matters,

.10 co-ordination of SAR training exercises which involve more than one agency (when appropriate),

.11 co-ordinating the RCC input to SAR educational programs, displays and visits within the SRR,

.12 approving all public information releases on aeronautical SAR services and all RCC/MRSC co-ordinated SAR incidents (see Chapter 4, Press Releases),

.13 providing staff assistance in SAR matters,

.14 the collection of SAR incident statistical information.

NOTE: When deemed necessary, the OIC RCC may assume control of any incident.

.2 Commander 1 Canadian Air Division, through the A3 Transport and SAR Readiness for:

.1 supervising Department of National Defence (DND) RCC personnel and ensuring they are adequately trained to standard and kept informed of current policy and procedures,

.2 all DND administrative matters pertaining to the RCC,

NOTE: Administrative procedures which affect or concern both DND and CCG should be published under the joint authority of the OIC RCC and the RSMS.

.3 preparation of reports, returns and records,

.4 reporting the status of DND SRUs and SAR operations.

3.17 **Deputy OIC RCC**—The deputy Officer in Charge (OIC) of a rescue co-ordination centre (RCC) shall be a qualified search and rescue Air Operations officer. The duties of the Deputy OIC RCC shall include:

.1 act as OIC RCC in his/her absence; and

.2 fulfilment of duties as duty aeronautical controller, when so employed.

3.18 **RSMS RCC** (for RSMS MRSC, see 3.24)—The Regional Supervisor, Maritime Search and Rescue (RSMS), is the senior Canadian Coast Guard (CCG) officer assigned to a rescue co-ordination centre (RCC) to ensure the continuing effectiveness of the maritime search and rescue (SAR) system within the SRR except for those areas assigned to maritime rescue sub-centres (MRSCs) (see 3.23). The RSMS RCC shall be responsible to the:

.1 Search And Rescue Region (SRR) Commander through the Officer in Charge (OIC) of the RCC, for the following:

.1 the co-ordination, control and conduct of maritime SAR operations within the RSMS RCC's area of responsibility,

.2 ensuring the effectiveness of SAR co-ordination and control duties performed by the CCG component of the RCC,

.3 providing expert advice on maritime SAR operations and their co-ordination for appropriate areas of the SRR,

.4 providing the maritime expertise necessary to evaluate the adequacy and deployment of search and rescue units (SRUs) to meet maritime SAR requirements,

.5 the operational status of CCG communications and other equipment within the RCC and ensuring that appropriate CCG authorities are notified of any deficiencies or breakdowns of CCG equipment and communications networks,

.6 making recommendations to the OIC RCC on the selection and appointment of Senior Controllers,

.7 liaison with the OIC RCC on the day-to-day operation and deployment of SRUs and on the participation and performance of staff in the operations of the RCC,

.8 ensuring that all relevant information pertaining to CCG SAR co-ordination and control activities in the RCC are duly recorded in the official log books and files designated,

.9 in collaboration with the OIC RCC, ensuring that all relevant SAR statistical data are recorded,

.10 prepare, in concert with the OIC RCC, the recommendation for search reduction of maritime SAR operations.

.2 Superintendent, Rescue, Safety and Environmental Response, for the following:

.1 supervising RCC CCG personnel and ensuring they are adequately trained to standard and kept informed of current policy and procedures,

.2 monitoring the operations of maritime search and rescue units (SRUs) and prosecution of maritime SAR incidents within all areas of the SRR except those specifically assigned to the MRSC, making recommendations designed to achieve improved effectiveness and efficiency,

.3 making recommendations on the optimum deployment of maritime SRUs for SAR purposes, taking into account the cyclical nature of certain maritime activities,

.4 the efficient management, administration, supervision, training and effective performance of the CCG component of the RCC,

.5 all CCG administrative matters pertaining to the RCC including the collection of maritime SAR incident statistical information and program management information,

.6 co-ordinating the RCC maritime SAR input into SAR education programs, displays and visits within the CCG Region, and

.7 reporting on the general effectiveness of CCG participation in RCC activities and on purely CCG matters.

NOTE: Administrative procedures which affect or concern both Department of National Defence (DND) and CCG should be published under the joint authority of the OIC RCC and the RSMS.

3.19 Senior Controller, RCC—The Senior Controller of a rescue co-ordination centre (RCC) is an experienced and qualified controller appointed by the Officer in Charge (OIC) of the RCC. Qualifications will include successful completion of RCC/Maritime Rescue Sub-Centre (MRSC) Controller course, Searchmaster course, Fundamental Maritime Search and Rescue (SAR) course (or applicable United States Coast Guard Maritime SAR course), and any unit upgrade on-job-training programmes which are applicable. Senior Controllers shall be responsible to the OIC RCC/Regional Supervisor, Maritime Search and Rescue, (RSMS) for all incidents for the following;

.1 assigning of priorities pertaining to the allocation of search and rescue units in response to search and rescue (SAR) incidents;

.2 when deemed necessary, transferring or assuming control of a particular SAR incident;

NOTE: Assuming or transferring control of an incident is to be considered a formal action and is to be completed in conjunction with formal communications procedures (see Chapter 9; Reports on Searches).

.3 ensuring that the MRSC is kept informed of the progress of incidents initially controlled by an MRSC;

.4 advising the OIC and/or RSMS of significant incidents in accordance with local procedure;

.5 approving requests from MRSC to charter civilian resources if the accounting base of the RCC will be held responsible for payment; and

.6 monitoring incidents handled by the MRSCs and advising the OIC of significant developments.

3.20 **Aeronautical Controller, RCC**—The duty Aeronautical Controller of a rescue co-ordination centre (RCC) shall be a qualified Aeronautical search and rescue (SAR) pilot or navigator. Qualifications shall include successful completion of RCC/Maritime Rescue Sub-Centre (MRSC) Controller course, Searchmaster course, and applicable unit on-job-training. The Aeronautical Controller is responsible to the Officer in Charge (OIC) of the RCC through the Senior Controller for the following:

.1 planning, co-ordinating, controlling and directing the response to aeronautical SAR incidents;

.2 tasking primary aeronautical search and rescue units (SRUs) and initiating requests for secondary aeronautical and other SRUs, as appropriate;

.3 appointing an on-scene commander and/or a co-ordinator aeronautical search when appropriate and, where necessary, recommending the appointment of a searchmaster (SM);

.4 tasking and co-ordinating aircraft in support of maritime incidents;

.5 assisting the maritime controller or SM as necessary, particularly in relation to the tasking and employment of aeronautical SRUs in a maritime incident;

.6 ensuring that all releases to the press or other public agencies are approved by the OIC in accordance with Chapter 4 (Press Releases) and standard operating procedures; and

.7 recommending search reduction; and

.8 performing other duties as may be assigned by the Senior Controller and by the OIC RCC.

3.21 **Maritime Controller, RCC**—The duty maritime controller of a rescue co-ordination centre (RCC) shall be a qualified ships' navigation officer. Qualifications shall include successful completion of the RCC/Maritime Rescue Sub-Centre (MRSC) Controller course, Fundamental

Maritime Search and Rescue course and applicable unit on-job-training. The Maritime Controller is responsible to the Office in charge (OIC) of the RCC through the Senior Controller and to the Regional Supervisor, Maritime Search and Rescue (RSMS) of the RCC when applicable for the following;

.1 planning, co-ordinating, controlling and directing the response to maritime search and rescue incidents;

.2 tasking primary and secondary maritime search and rescue units (SRUs) and initiating requests for other units, as required;

.3 appointing an on-scene commander or co-ordinator surface search when appropriate and, where necessary, recommending the appointment of a searchmaster;

.4 tasking and co-ordinating maritime SRUs in support of aeronautical incidents;

.5 recommending search reduction;

.6 ensuring that all releases to the press or other public agencies are approved by the OIC in accordance with Chapter 4 (Press Releases) and standard operating procedures; and

.7 performing other duties as may be assigned by the Senior Controller and by the RSMS.

3.22 **Assistant Aeronautical Controller, RCC**—The assistant Aeronautical Controller of a rescue co-ordination centre (RCC) shall be responsible to the Officer in Charge of the RCC through the Aeronautical Controller for the following:

.1 assisting the duty controllers in search and rescue (SAR) operations;

.2 ensuring that the duty controllers are kept aware of any actions taken by him in conjunction with SAR operations;

.3 other duties as may be assigned; and

.4 ensuring the daily log is updated with pertinent data in a neat, timely, and accurate manner.

TERMS OF REFERENCE—MARITIME RESCUE SUB-CENTRE

3.23 **General**—In Canada, maritime rescue sub-centres (MRSCs) are established to enhance maritime search and rescue (SAR) co-ordination through improved communications and local knowledge. MRSCs thus expedite the initiation of appropriate action and allow a timely response to SAR incidents within their areas of responsibility. The responsibilities of an MRSC are similar to those of a rescue co-ordination centre (RCC), but on a smaller scale. MRSCs carry out SAR co-ordination functions under the authority of the Search and Rescue Region Commanders through the RCC, including co-ordinating responses to humanitarian incidents in accordance with national and regional policies. MRSCs must also keep informed their Regional Director, Canadian Coast Guard. MRSCs normally control maritime SAR incidents which occur within their area of responsibility.

> **NOTE:** The tasking and co-ordination of Department of National Defence aircraft must be performed by the RCC Aeronautical Controller.

3.24 **RSMS MRSC**—The Regional Supervisor, Maritime Search and Rescue (RSMS), of a Maritime Rescue Sub-Centre (MRSC) is the senior Canadian Coast Guard (CCG) officer assigned to an MRSC to ensure the continuing effectiveness of the maritime search and rescue (SAR) system within the area assigned to an MRSC. The RSMS shall be responsible to the:

.1 Search and Rescue Region (SRR) Commander through the Officer in Charge (OIC) of the parent rescue co-ordination centre (RCC) for the following:

.1 the co-ordination, control and conduct of maritime SAR operations within the RSMS MRSC's area of responsibility,

.2 ensuring the effectiveness of SAR co-ordination and control duties performed by MRSC personnel,

.3 providing expert advice on maritime SAR operations and their co-ordination for the appropriate areas of the SRR,

.4 providing the maritime expertise necessary to evaluate the adequacy and deployment of search and rescue units (SRUs) to meet maritime SAR requirements,

.5 the operational status of CCG communications and other equipment within the MRSC, and ensuring that appropriate CCG authorities are notified of any deficiencies or breakdowns of CCG equipment and communications networks,

.6 liaison with the OIC of the parent RCC on the day-to-day operations interface between the MRSC and RCC,

.7 liaison with the OIC of the parent RCC on the day-to-day operation and deployment of Department of National Defence SRUs,

.8 ensuring that all relevant information pertaining to CCG SAR co-ordination and control activities in the MRSC are duly recorded in official log books and files designated,

.9 in collaboration with the OIC RCC, ensuring that all relevant SAR statistical data are recorded,

.10 ensuring that all releases to the press or other public agencies are approved by the OIC RCC in accordance with Chapter 4 (press releases) and standard operating procedures, and

.11 during SAR operations, prepare in concert with the OIC RCC the recommendation for search reduction.

.2 Superintendent, Rescue, Safety and Environmental Response for:

.1 supervising MRSC personnel and ensuring they are adequately trained to standard and kept informed of current policy and procedures,

.2 monitoring the operations of SRUs and prosecution of maritime SAR incidents within the MRSC's area of responsibility and making recommendations designed to achieve improved effectiveness and efficiency,

.3 making recommendations on the optimum deployment of maritime SRUs for SAR purposes within the MRSC's area of responsibility, taking into account the cyclical nature of certain maritime activities,

.4 the efficient management, administration, supervision, training and effective performance of the MRSC,

.5 all CCG administrative matters pertaining to the MRSC including program management information,

.6 co-ordinating the MRSC maritime SAR input into SAR education programs, displays and visits within the CCG Region,

.7 reporting on the general effectiveness of MRSC activities and on purely CCG matters,

.8 in collaboration with the parent RCC, ensuring that all relevant SAR statistical data are recorded.

3.25 **Maritime Controller, MRSC**—The maritime controller of a maritime rescue sub-centre (MRSC) shall be responsible to the Officer in Charge (OIC) of the rescue co-ordination centre (RCC) through the senior controller and through the Regional Supervisor, Maritime Search and Rescue (RSMS) of the MRSC when applicable for the following:

.1 planning, co-ordinating, controlling and directing the response to maritime search and rescue (SAR) incidents;

.2 tasking primary and secondary search and rescue units (SRUs) maritime resources and initiating requests for other units, as required;

.3 appointing an on-scene commander or co-ordinator surface search as necessary, and recommending the appointment of a searchmaster (SM);

.4 tasking and co-ordinating maritime SRUs in support of aeronautical incidents;

.5 ensuring the RCC is kept fully informed of all MRSC SAR activities and recommending that the RCC assume control of particular incidents (see note);

> **NOTE:** Assuming or transferring control of an incident is to be considered a formal action and is to be completed in conjunction with formal communications procedures (see Chapter 8, Reports on Searches).

.6 providing local expertise and assistance to the parent RCC or the SM, when any of these have taken over control of the response to a particular SAR incident;

.7 recommending search reduction;

.8 ensuring that all releases to the press or other public agencies are approved by the OIC RCC in accordance with Chapter 4 (Press releases) and standard operating procedures; and

.9 performing other duties as may be assigned by the Senior Controller and by the RSMS.

TERMS OF REFERENCE—CANADIAN MISSION CONTROL CENTRE

3.26 **General**—The Canadian Mission Control Centre (CMCC) is co-located with the rescue co-ordination centre (RCC) in Trenton and is the focal point for the receipt of distress beacon messages from national and international sources in accordance with procedures prescribed in national agreements and the COSPAS–SARSAT documentation. This data is then redistributed using procedures as required in accordance with the above documents. For this it requires:

.1 trained staff, capable of controlling, co-ordinating and conducting operations;

.2 detailed procedures and computer software for the collection and dissemination of distress data; and

.3 communications equipment which will ensure a timely alerting procedure to RCCs and foreign Mission Control Centres.

3.27 **OIC CMCC**—The Officer in Charge (OIC) of the Canadian Mission Control Centre (CMCC) is also the OIC of the rescue co-ordination centre (RCC) in Trenton and shall be responsible to the Commander, 1 Canadian Air Division through A3 Transport and SAR Readiness for:

.1 ensuring the effective operation of the Canadian SARSAT ground segment, including local user terminals (LUTs), the CMCC and the related communications interfaces;

.2 advising on policy and operational matters which may affect the Canadian SARSAT ground segment;

.3 establishing and maintaining liaison with relevant departments of federal and provincial governments and other groups public or private concerning COSPAS–SARSAT matters;

.4 acting as the point of contact for Canada with regard to operational level matters pursuant to the COSPAS–SARSAT system;

.5 provision of trained staff and material supplies to support operations 24 hours a day, 7 days a week;

.6 distributing operational search and rescue (SAR) data to Canadian RCCs, provincial points of contact for SAR and other Mission Control Centres in accordance with national and international agreements;

.7 providing data analysis to support Canadian RCCs on specific cases;

.8 serving as a member of the Canadian delegation to COSPAS–SARSAT international meetings;

.9 monitoring the performance of the LUTs and initiating corrective action as required; and

.10 identifying problems in the space segment and relaying the information to appropriate technical authorities.

3.28 **Operations Officer CMCC**—The operations officer of the Canadian Mission Control Centre (CMCC) is an experienced and highly qualified CMCC duty controller appointed by, and responsible to the Officer in Charge of the rescue co-ordination centre (RCC)/CMCC for various duties including:

.1 the general operations of the CMCC;

.2 documentation of operational procedures for the CMCC and associated systems;

.3 ensuring operational records are properly maintained; and

.4 ensuring the timely distribution of distress data to Canadian RCCs, provincial points of contact for search and rescue and other Mission Control Centres in accordance with established national and international procedures.

3.29 **Duty Operator, CMCC**—The duty operator of the Canadian Mission Control Centre (CMCC) shall be an Air Operations Officer appointed by the Officer in Charge (OIC) of the rescue co-ordination centre (RCC)/CMCC in Trenton, after successful completion of the CMCC Duty Operator course and applicable unit on-job-training. The CMCC duty operator shall be responsible to the OIC RCC/CMCC Trenton through the CMCC operations officer for the routine operation of the CMCC and for other duties to include:

.1 monitoring the status of the local user terminals, CMCC communications and satellite tracking schedule and taking corrective actions as applicable; and

.2 ensuring operational distress beacon information is distributed to the RCCs, provincial points of contact for search and rescue and other Mission Control Centres in a timely manner.

3.30 **Systems Officer, CMCC**—The systems officer of the Canadian Mission Control Centre (CMCC) is an experienced and qualified Air Force Communications and Electronics Engineer officer and shall be responsible to the Officer in Charge of the rescue co-ordination centre/CMCC for various duties including:

.1 ensuring all software/hardware systems within the Canadian SARSAT ground segment are in operational order;

.2 recording and reporting any unscheduled downtime of the Canadian ground segment;

.3 managing a database to record any problems, deficiencies, or proposed changes to the Canadian ground segment; and

.4 co-ordinating research and development projects for upgrading the equipment in the CMCC.

TERMS OF REFERENCE—ALERTING POST

3.31 **General**—In Canada, St. John's Maritime Rescue Sub-Centre (MRSC) has been designated as an alerting post for notification of maritime search and rescue (SAR) incidents originating seaward of the MRSC's area of responsibility adjacent to the Newfoundland and Labrador coasts.

3.32 As an alerting post, the responsibility of MRSC St. John's is to receive initial SAR incident reports and forward them verbatim with comments or additional information to the parent rescue co-ordination centre (RCC) for action. This procedure:

.1 eliminates the need of Canadian Coast Guard Maritime Communications and Traffic Services (MCTS) Centres determining the relative location of an incident in relation to area of responsibility boundaries, which would otherwise be required to facilitate determining the address for SAR alerts, i.e. RCC or MRSC;

.2 allows the MRSC the opportunity of determining whether an incident is in its area of responsibility and if so, the opportunity to initiate response action immediately, prior to alerting RCC, or if the incident is outside the MRSC's area of responsibility, initiating appropriate action and passing the information to RCC Halifax, together with any input from the MRSC relative local knowledge of maritime activity taking place adjacent to the MRSC area;

.3 simplifies SAR reporting procedures for Newfoundland and Labrador MCTS Centres, which will normally report all initial SAR alerts to the MRSC only; and

.4 allows the St. John's MRSC to be aware of SAR demands and activity in the Search and Rescue Region waters adjacent to the MRSC's area of responsibility boundaries.

TERMS OF REFERENCE—
SEARCHMASTER/SAR MISSION CO-ORDINATOR

3.33 In the Canadian context, the responsibilities of a Searchmaster are the same as those established for a search and rescue mission co-ordinator under the International Civil Aviation Organization and the International Maritime Organization.

3.34 **SM/SMC**—When considered necessary, a qualified searchmaster (SM)/search and rescue mission co-ordinator (SMC) shall be formally appointed by and be responsible to the search and rescue region commander through the Officer in Charge of the rescue co-ordination centre (RCC) for the efficient conduct of a specific search and rescue (SAR) operation (this may include aeronautical or maritime controllers). Qualifications shall include successful completion of the Searchmaster course and satisfactory performance in the position of Assistant SM during an actual search or a squadron SAR exercise. Upon being recommended by a SM and with the concurrence of the unit Commanding Officer, an Assistant SM may be upgraded to SM status. The requirement to perform as an Assistant SM does not apply to maritime controllers appointed to act as SM within an RCC for a maritime case.

3.35 The SM/SMC is responsible for:

.1 the planning, co-ordination, control and conduct of SAR operations;

.2 when required, completing the necessary arrangements to establish search headquarters at a location other than the RCC;

.3 tasking primary aeronautical and/or maritime search and rescue units (SRUs) and requesting secondary and/or other SRUs as necessary;

.4 liaise with meteorological services at the advanced base, as required to support the search;

.5 where appropriate ensuring that a properly equipped ground search party is available;

.6 ensuring that all releases to the press or other public agencies are approved by the Officer in Charge (OIC) in accordance with Chapter 4 (press releases) and standard operating procedures;

.7 advising appropriate authorities when the search object is found; and

.8 if the search object is not found, recommending search reduction through the OIC RCC to the Search and Rescue Region Commander.

3.36 **Assistant SM**—On operations requiring the appointment of a searchmaster (SM), one or more qualified assistant SMs may also be appointed. They shall assist in the conduct of the search operation, as directed by the SM. Normally a Maritime Controller should be included as one of the assistant SMs during an aeronautical search where a portion of the aircraft's route occurs over water and normally an Aeronautical Controller/qualified aircrew should be included as one of the assistant SMs on any maritime search that involves aircraft.

3.37 **Detachment Commander**—The Detachment Commander is normally a senior military officer assigned from the primary unit tasked. The Detachment Commander is responsible to the Searchmaster for all administrative and disciplinary matters.

TERMS OF REFERENCE— ON-SCENE COMMANDER/ CO-ORDINATOR SURFACE SEARCH/ CO-ORDINATOR AERONAUTICAL SEARCH

3.38 The resolution of a search and rescue (SAR) incident (aeronautical or maritime) commences with the receipt of the initial alert and continues with the effective co-ordination of search and rescue unit (SRU) activity. The rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) may designate an on-scene commander (OSC) or a co-ordinator surface search (CSS) to enhance co-ordination.

3.39 Whenever there is more than one SRU (primary or secondary) engaged in an operation, one SRU should be designated to co-ordinate the operation at the scene. The SRUs engaged may be either aeronautical or maritime or a combination of both. Since the crews of SRUs will be experienced and trained in SAR operations, one of these will normally be designated as OSC. If primary SRUs, either vessels or aircraft, are not available and only secondary maritime SRUs are engaged, then one of these should assume the duty of CSS.

3.40 It will be the responsibility of the OSC or CSS to:

.1 carry out the plan for the conduct of the operation as directed by the RCC/MRSC/searchmaster (SM);

.2 recommend modifications to the search plan to the RCC/MRSC/SM as facilities and on-scene conditions dictate and if unable to communicate with the RCC/MRSC/SM, carry out those modifications notifying RCC as soon as able;

.3 monitor weather and sea conditions and report on these at regular intervals to the RCC/MRSC/SM;

.4 maintain communications with the RCC/MRSC/SM and the SRUs on scene;

.5 maintain a detailed record of the operation, including on-scene arrival and departure times of SRUs, areas searched, track spacing used, sightings and leads reported, actions taken and results obtained;

.6 issue regular situation reports to the RCC/MRSC/SM which should include, but not be limited to, weather and sea conditions, the results of search to date, any actions taken, and any future plans or recommendations; and

.7 advise the RCC/MRSC/SM to release units when their assistance is no longer required.

3.41 **Co-ordinator Aeronautical Search**—Whenever more than one aircraft is engaged in a search where a vessel is on-scene commander (OSC)/co-ordinator surface search (CSS), then one of these aircraft should be designated to co-ordinate the aeronautical portion of the search as directed by the rescue co-ordination centre (RCC)/searchmaster (SM) and maintain communication/liaison as the primary point of contact between the OSC/CSS, RCC and the aircraft on scene. The designated aircraft should co-ordinate aircraft hourly check-ins, give updated search information as it is relayed from RCC or OSC/CSS, update RCC/SM on changing weather or search information, and provide updated navigational data to other aircraft as required. The designated aircraft will also be responsible for co-ordinating OSC/CSS and RCC requests for aircraft support within the search area.

ANNEX 3A— SEARCH AND RESCUE REGION BOUNDARIES

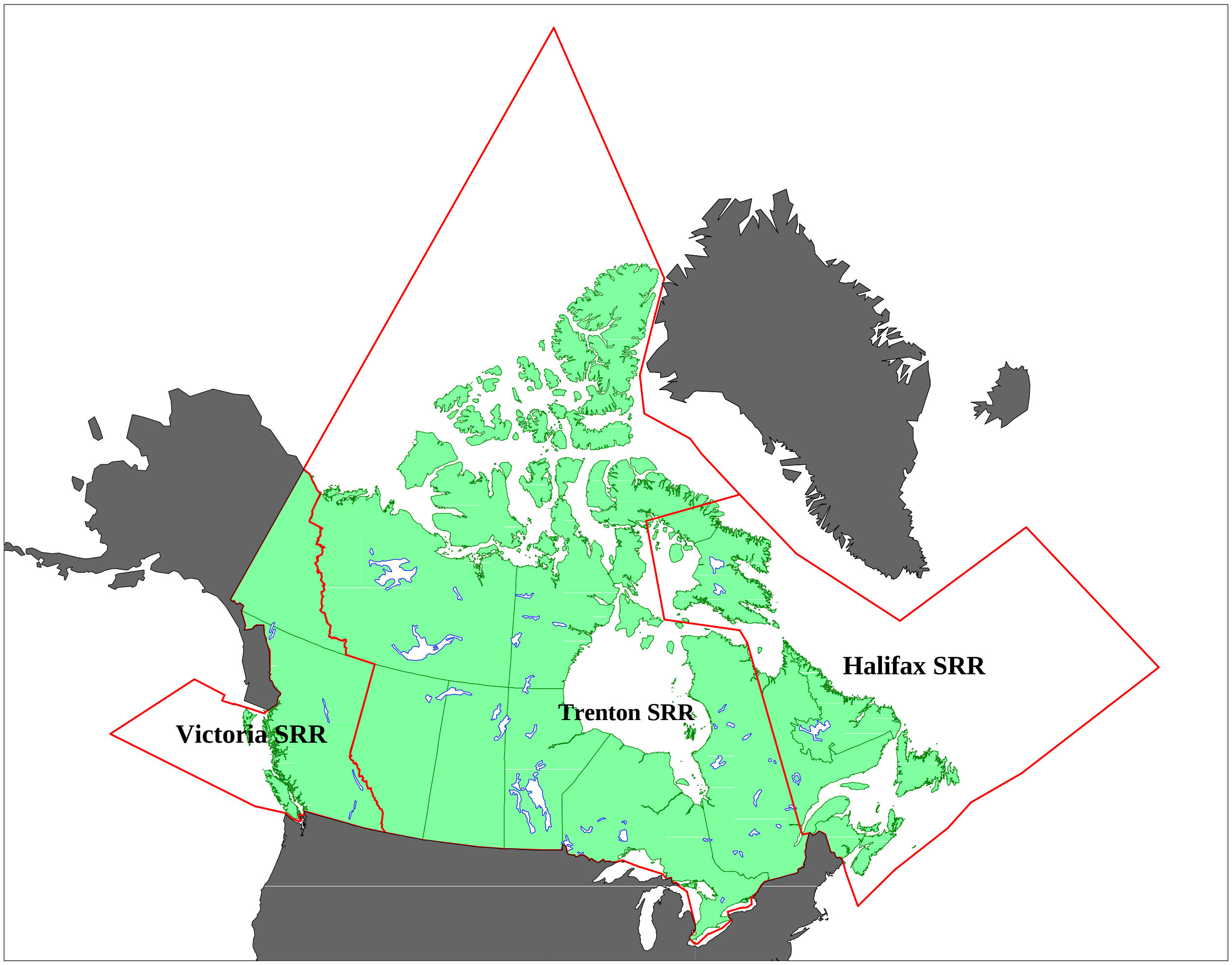

FIGURE 3A–1 SEARCH AND RESCUE REGIONS

VICTORIA SRR

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, 48°20'N 145°00'W, 5440'N 140°00'W, 5440'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.

TRENTON SRR

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.

HALIFAX SRR

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.

ANNEX 3B—
MARITIME RESCUE SUB-CENTRE OPERATIONAL BOUNDARIES

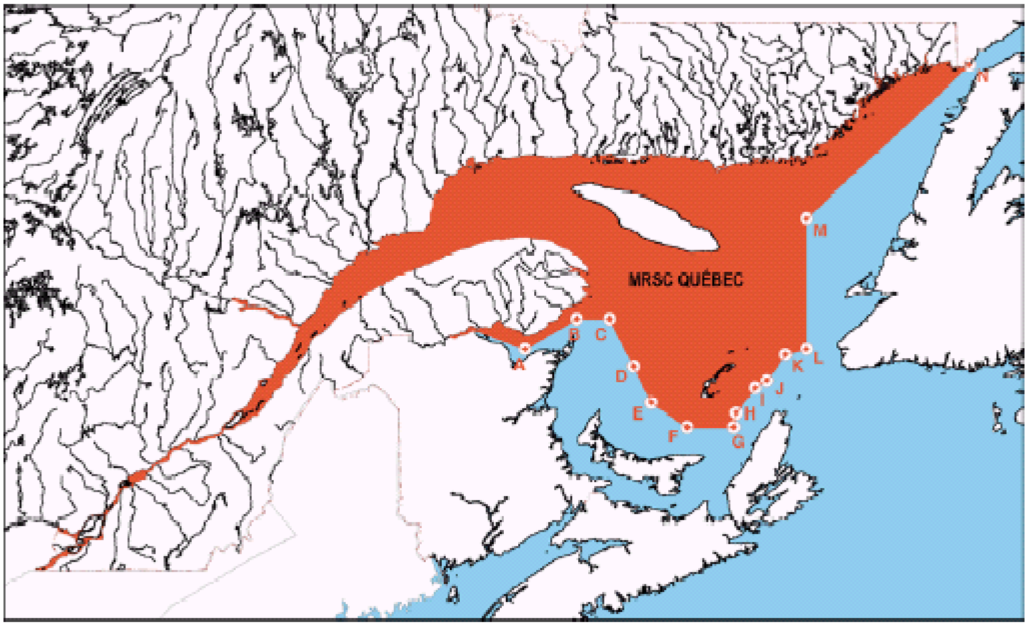

FIGURE 3B-1 MRSC QUÉBEC OPERATIONAL BOUNDARIES

	Latitude		Longitude			Latitude		Longitude	
A	47° 50′ 00″	N	65° 25′ 00″	W	H	47° 00′ 35″	N	61° 21′ 05″	W
B	48° 13′ 14″	N	64°25′ 22″	W	I	47° 19′ 46″	N	60° 59′ 34″	W
C	48° 13′ 14″	N	63° 47′ 33″	W	J	47° 25′ 24″	N	60° 45′ 49″	W
D	47° 36′ 21″	N	63° 19′ 56″	W	K	47° 45′ 40″	N	60° 24′ 17″	W
E	47° 08′ 23″	N	62° 59′ 14″	W	L	47° 50′ 00″	N	60° 00′ 00″	W
F	46° 50′ 24″	N	62° 18′ 03″	W	M	49° 30′ 00″	N	60° 00′ 00″	W
G	46° 50′ 24″	N	61° 24′ 01″	W	N	51° 27′ 00″	N	56° 52′ 00″	W

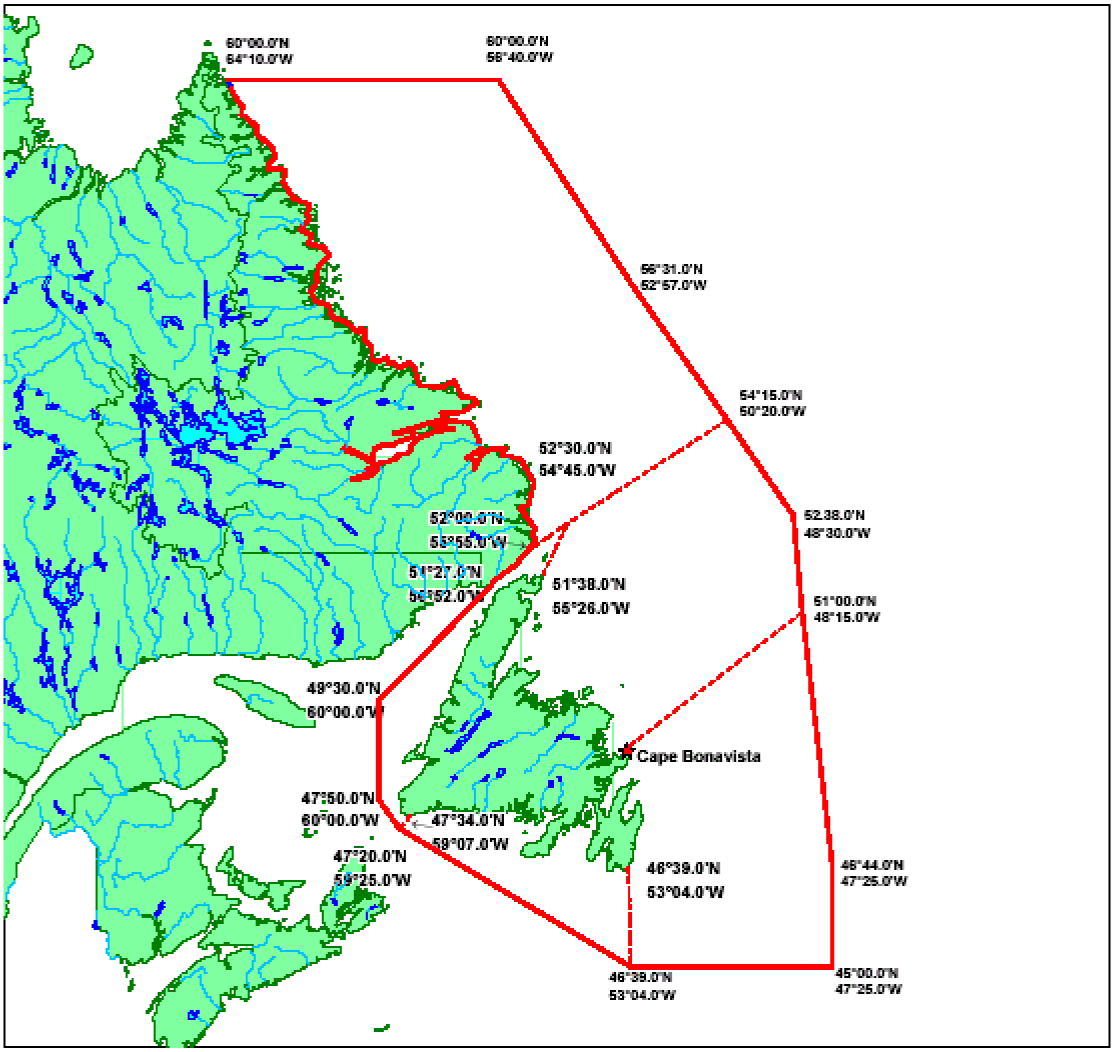

FIGURE 3B-2 MRSC ST. JOHN'S BOUNDARIES

ANNEX 3C— RCC/MRSC SAR STANDARD OPERATING PROCEDURES

1. Each rescue co-ordination centre (RCC) is responsible for preparing a comprehensive document detailing the standard operating procedures (SOPs) for the conduct of search and rescue in its search and rescue region. Local amplification of national policy and procedures must be included where necessary. Maritime rescue sub-centres must also have SOPs for the conduct of operations in their area, approved by RCC(s).

2. The standard operating procedures must set out the details for the conduct of search and rescue at the operational levels. It should state precisely which agencies are responsible for activating the facilities, and the methods of communicating with them. It should also indicate by whom, and to what extent, any of these facilities can be requested to participate in an operation, so that no party will be in doubt as to its authority.

3. The standard operating procedures (SOPs) must be brought up to date whenever a change in conditions or experience in actual operations and exercises makes this necessary or advisable. The SOPs should be published regionally and the information therein should be made available to any interested parties.

4. The following are examples of what could be included in standard operating procedures .

a. **General information—**

(1) conduct of joint operations with adjacent rescue co-ordination centres (RCCs)/maritime rescue sub-centres (MRSCs), including:

- notification of emergencies between RCCs,
- joint use of facilities and resources, and
- co-ordination of search and rescue (SAR) operations,

(2) any special provisions for redeployment of equipment and resources to expedite access to the area of the operation or to avoid or overcome difficulties caused by meteorological disturbances, communication failures, major disaster (both aeronautical and maritime), etc.;

(3) methods of alerting mobile units (e.g. vessels at sea, aircraft, ground search parties), including broadcast information;

(4) methods of obtaining ship and aircraft position information from various sources;

(5) procedures for assisting aircraft which must ditch and to arrange rendez-vous with suitable and available surface craft;

(6) procedures for underwater SAR relating to offshore exploration activities including contacts, phone numbers, etc., of agencies having suitable equipment;

(7) details of agreements of mutual assistance with various other organizations and agencies, such as:

- Police forces,
- local, provincial emergency planning departments,
- Marine Communications and Traffic Services,
- Civil Air Search and Rescue Association (CASARA), Canadian Coast Guard Auxiliary (CCGA), Provincial Emergency Program,
- crash/casualty investigations,
- private industry aircraft and vessel operations,
- organizations involved in operations peculiar to the search and rescue region (SRR) (e.g., oil and gas, sealing, herring roe, aquaculture),
- medical facilities,
- other federal government departments and agencies; and

(8) procedures for assisting disoriented vessels.

b. **Personnel**—The responsibilities, duties, authority and limitations of personnel assigned to SAR operations and involved in the SRR command structure (i.e. Department of National Defence and Canadian Coast Guard).

c. **Resources**—The description of the available resources, including but not limited to:

(1) MRSCs,

(2) alerting posts,

(3) primary search and rescue units (SRUs), including

- Inshore Rescue Boats,

(4) secondary SRUs,

(5) CCGA, and

(6) CASARA.

d. **Communications**—Contingency plans such as to address relocation in the event of emergency evacuation, communications problems, etc..

e. **Information**—Methods of obtaining essential information and accessing data bases.

f. **Training and Standards**—

(1) establishment of unit training program;

(2) arrangements for SAR personnel liaison/familiarization visits to other SAR authorities and agencies; and

(3) records of the periodic reviews of case files to ensure that established procedures are followed.

5. The above lists are by no means exclusive and any additional information, practices and procedures that it is felt would improve the conduct of search and rescue operations within the search and rescue region should be included by the rescue co-ordination centre/maritime rescue sub-centre.

CHAPTER 4— POLICY AND OPERATIONAL DIRECTIVES

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POLICY AND OPERATIONAL DIRECTIVES

GENERAL

4.1 The following policy directives amplify the broad policy set forth in Cabinet Directives. Other policy directives which amplify and pertain to the conduct of search and rescue operations may be found within departmental publications.

SEARCH AND RESCUE UNITS

4.2 As per chapter 1, the Department of National Defence (DND) and the Canadian Coast Guard (CCG) are required to provide primary search and rescue units (SRUs).

4.3 In addition to primary search and rescue units (SRUs), CCG provides CCG units multi-tasked to the search and rescue (SAR) program. When tasked to SAR, these units are subject to the same standards of operation and procedures that apply to primary CCG SRUs including state of readiness and pre-positioning deployment in anticipation of SAR related demand.

4.4 Search and rescue region (SRR) commanders may utilize all primary and secondary SRUs available in providing SAR services. In instances where a commander's SRUs are considered to be inadequate for a specific task, he may request assistance from any suitable source. These may include:

.1 the primary SRUs of neighbouring SRRs which may be available and are requested through the appropriate rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC);

.2 DND secondary SRUs, which may be tasked through 1 Canadian Air Division/Air Operations Centre or National Defence Headquarters/National Defence Operations Centre;

.3 CCG units not assigned to SAR; which may be tasked through the appropriate CCG responsibility manager;

.4 other federal government departments units; and

.5 maritime or aeronautical units which may be tasked under the *Canada Shipping Act* by the RCC controller, acting for the SRR commander.

> **NOTE:** RCCs/MRSCs may charter required units in accordance with 4.24 through 4.28. Any MRSC arranged charter which will be costed against the RCC's accounting base must be approved by the Senior Controller.

SAR CO-ORDINATION

4.5 The Department of National Defence (DND) provides rescue co-ordination centres (RCCs) staffed by both DND and Canadian Coast Guard (CCG) personnel on a 24 hours a day, 7 days a week basis. In addition, CCG provides two maritime rescue sub-centres (MRSCs) manned by CCG personnel also on a 24 hours a day, 7 days a week basis. The RCCs and MRSCs will respond to all incidents until such time as the incident is resolved or until the incident can be passed to the appropriate authority.

STATE OF READINESS— AERONAUTICAL SEARCH AND RESCUE UNITS

4.6 The state of readiness requirement for primary aeronautical search and rescue units (SRUs) is shown in Annex 4A.

4.7 When the standby search and rescue (SAR) aircraft is deployed on a SAR operation the minimum state of readiness for that type of aircraft as described in Annex 4A is waived for the applicable squadron until the aircraft returns to home base. However, should another incident occur which requires the urgent deployment of additional SRUs, the commanding officer of the squadron concerned shall make every effort to provide the necessary aircraft and crews. Approval from the search and rescue region (SRR) commander must be obtained for any other planned degradation of the minimum state of readiness.

4.8 Commanders of SRRs may realign SAR standby periods so that they coincide with periods of greatest SAR activity, particularly during summer months. When this occurs, units must continue to provide 30 minute SAR standby on each aircraft type for a minimum of 40 hours per week. Standby posture beyond 40 hours per week will require 1 Canadian Air Division approval.

STATE OF READINESS— MARITIME SEARCH AND RESCUE UNITS

4.9 The state of readiness requirement for maritime search and rescue units (SRUs) is as follows:

.1 **Primary SRUs and CCG Units Multi-Tasked to SAR**—Canadian Coast Guard (CCG) primary SRUs and CCG units multi-tasked to the Search And Rescue (SAR) Program, when fully operational, shall be capable of responding to SAR tasking immediately or shall otherwise maintain a 30 minute standby posture;

.2 **Other SRUs**—Chartered vessels shall be on similar standby unless specified otherwise in their charter-party agreements; and

.3 the commanding officer of the SRU referred to in .1 and .2 above shall inform the appropriate rescue co-ordination centre/maritime rescue sub-centre of any change in the unit's state of readiness as may be caused by a reduction in its efficiency or capability. In order to preserve the availability of SAR capability as much as possible, the affected SRU may continue SAR activities upon initial approval by the Superintendent, Rescue, Safety and Environmental Response. However, if the unit is expected to remain affected over a prolonged period, the retention of the unit on SAR duties shall be subject to approval by the Director SAR, CCG.

SECONDARY SEARCH AND RESCUE UNITS

4.10 Secondary search and rescue units (SRUs) are all units of the Federal government that are not specifically dedicated to search and rescue (SAR). While secondary SRUs do not maintain a SAR standby posture, they may be tasked to aid in the resolution of a SAR incident.

CANADIAN FORCES SAR TECHNICIANS

4.11 The role of search and rescue technicians (SAR Techs) in search and rescue (SAR) and non-SAR operations is to save lives and reduce human suffering. This is accomplished by:

.1 accessing the site to determine the situation;

.2 initiating and maintaining medical treatment;

.3 sustaining the survivors by the provision of food, water and shelter; and

.4 evacuating survivors.

NOTE: SAR Techs shall not dive for salvage or body recovery operations.

4.12 The method of accessing the distress site rests with the aircraft commander and the SAR Tech team leader. It may be achieved by one of the following:

.1 parachute;

.2 hoist;

.3 Lock Rope Descent device;

.4 free entry;

.5 Compressed Air Breathing Apparatus;

.6 over land; or

.7 over water.

4.13 Operational deployment of the SAR Tech team for SAR or non-SAR incidents shall normally be preceded by authorization from the searchmaster or the rescue co-ordination centre to ensure that it is the most effective method of resolving the situation.

4.14 With regard to safety, the SAR Tech team shall not be deployed without the complete concurrence of the SAR Tech team leader and of the aircraft commander.

4.15 Procedures pertaining to operational deployment of SAR Techs are detailed in *CFACM 60-2605*.

CANADIAN FORCES GROUND SEARCH PARTIES

4.16 Ground search parties are primary search and rescue units. They can be used to search small high probability areas which cannot be effectively covered by other means. They may also be used to aid in the rescue of survivors which have been located but cannot be evacuated by other means. The parties are made up of a minimum of ten volunteer service personnel who have experience in bush lore and outdoor activities. The locations of Canadian Forces (CF) ground search parties are shown in Annex 4B.

4.17 The organization of ground search parties is the responsibility of the Base, Wing or Squadron Commander. They are responsible to the regional rescue co-ordination centre (RCC) through the normal chain of command and during operational functions, are at the disposal of the RCC or of the searchmaster. Under normal circumstances ground search parties shall be equipped and ready to leave their unit within two hours of being alerted by the RCC. When CF ground search parties are tasked by other agencies they shall obtain approval from the parent RCC.

4.18 Equipment requirements and operating procedures for ground search parties are detailed in Annex 4E.

> **NOTE:** Civilian ground search teams may be available through the Royal Canadian Mounted Police, through provincial police forces or through provincial emergency response organizations.

USE OF CIVILIAN ASSOCIATIONS

4.19 When tasking a civilian association the rescue co-ordination centre/maritime rescue sub-centre must ensure that it is clearly understood by the civilians that the tasking is in fact a request and that the civilians are not obligated to comply with this request.

4.20 **CCGA—**The Canadian Coast Guard Auxiliary (CCGA) associations have contractual agreements to provide members/vessels to augment existing Canadian Coast Guard (CCG) search and rescue units in search and rescue (SAR) operations and to assist the CCG in SAR Loss-Of-Life prevention activities. Tasking of Auxiliary units is to be considered in the absence of more appropriate SAR facilities or when it is perceived that by utilizing Auxiliary units the SAR objectives can be achieved more quickly.

4.21 **CASARA—**The Canadian Forces assists in the training of Civil Air Search and Rescue Association (CASARA) volunteers and the operational evaluation of certified members on a regular basis. CASARA members may be tasked for distress beacon homing missions, as spotters on military flights, or to provide fully manned civilian search aircraft as considered appropriate by the rescue co-ordination centre (RCC)/Searchmaster (SM). Under the CASARA agreement, Transport Canada remains responsible for training sessions relating to safe flying practices.

> **NOTE:** CASARA invoices (Annex 4F) shall be certified and paid by the SM/SM staff at search headquarters prior to CASARA members leaving the search. Other invoices shall be certified by the RCC and submitted to the section of the base associated with the RCC for

payment. Where possible, invoices shall be reimbursed with minimum delay owing to the personal expenses incurred by CASARA members.

USE OF CIVILIAN VOLUNTEERS

4.22 **Other Volunteers**—When civilian aircraft, vehicle, or maritime vessel operators volunteer to assist in a search, but their assistance is considered not essential to the search, the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or searchmaster may permit them to participate under his direction on the understanding that no reimbursement of expenses will be made. When tasking a civilian volunteer, the RCC/MRSC or searchmaster must ensure that it is clearly understood by these civilians that the tasking is in fact a request and that these civilians are not obligated to comply with this request.

4.23 **Spotters** —Trained Civil Air Search and Rescue Association or Canadian Forces spotters shall be used when required. When trained spotters are unavailable, other civilians may be used if they are essential to the conduct of the search. Civilians volunteering their services in this capacity shall be advised that there will be no remuneration for their services. However, the searchmaster is authorized to provide in-flight lunches for volunteer civilian spotters and to reimburse them for out-of-pocket expenses incurred due to their volunteer services (i.e. lodging and meals necessitated by an overnight stay as the result of an aircraft diversion). Invoices shall be utilized.

HIRING OF CIVILIAN PERSONNEL AND SERVICES

4.24 When the the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or the searchmaster considers that the assistance of civilian services is required, these services may be employed, at pay/charter rates, on the authority of the search and rescue region commander or his delegated representative. These services include the hiring of civilian aircraft, boats, vehicles and personnel (guides, trackers, etc.) that are essential to the successful completion of a search and rescue (SAR) distress operation.

4.25 Before recommending the hiring of civilian personnel services, the RCC/MRSCor the searchmaster shall determine that the rates quoted are fair and reasonable and include charges for all services rendered.

4.26 Invoices charged to the Department of National Defence shall be certified by the RCC/MRSC or the searchmaster in accordance with 4.25, and submitted to the accounting section of the base serving the RCC for certification and payment action.

4.27 When necessary, SAR personnel may be carried by chartered civilian units. This carriage will normally be limited to the transport of personnel to and from the scene of the incident.

4.28 Once hired, the responsibility to adhere to normal safe operating procedures remains with the operator.

COSPAS–SARSAT

4.29 Canada participates in the COSPAS–SARSAT system which employs satellites to detect and locate emergency radio signals on 121.5 Megahertz (MHz), 243 MHz and 406 MHz. The satellites receive the distress signals and relay the information to local user terminals located at Edmonton, Churchill and Goose Bay. The signal data is then automatically sent to the Canadian Mission Control Centre, at 8 Wing Trenton, where computer analysis is used to determine the approximate location of the emitted signal. The rescue co-ordination centre responsible receives the information and dispatches search and rescue units as required.

DISTRESS BEACONS

4.30 The response to Emergency Locator Transmitter (ELT) and Emergency Position Indicating Radio Beacon (EPIRB) signals falls within the Department of National Defence/Canadian Coast Guard (CCG) mandate. The resolution of Personal Locator Beacons (PLB) does not fall within this mandate and the appropriate authority will be sought to resolve the incident. Normally, the Canadian Mission Control Centre will disseminate PLB data for resolution to a provincial/territorial point of contact for search and rescue. Since November 1997, the National Search and Rescue Secretariat maintains the national beacon registry. All types of distress beacons reside on this new database.

TASKING OF SEARCH AND RESCUE UNITS ON NON-SAR INCIDENTS

4.31 Search and rescue (SAR) controllers do not have the authority to task search and rescue units (SRUs) for non-SAR incidents.

4.32 Requests made to the SAR controller for tasking of primary SRUs to other than SAR functions shall be referred to the appropriate authority within the Department of National Defence (DND) or the Canadian Coast Guard (CCG) as appropriate. Normally, formal tasking approval of DND SRUs for non-SAR incidents shall be in accordance with the procedures outlined in *B-*

GS-055-000/AG001, Provision of Services to Non Defence Agencies. Tasking of CCG SRUs in this instance shall be in accordance with Regional procedures.

SALVAGE OF CIVILIAN PROPERTY

4.33 Search and rescue units (SRUs) may be utilized to salvage civilian property providing no commercial means are available and appropriate approval has been obtained by the requesting persons or agencies.

4.34 Salvage operations will not be performed if they jeopardize operations, disrupt training, or unduly hazard search and rescue (SAR) personnel or equipment.

4.35 When a request is made to use Canadian Forces SAR aircraft for the salvage of civilian aircraft, full details of the commitment will be obtained and its feasibility assessed by the 1 Canadian Air Division, in conjunction with the applicable rescue co-ordination centre (RCC).

4.36 SRUs shall comply with the *Policy For Provision Of Towing Assistance By Vessels Engaged In Search And Rescue Operations* (Annex 7A).

4.37 When a request is made to use Canadian Coast Guard SRUs for maritime salvage, full details of the commitment shall be obtained. Based on this, the Superintendent, Rescue, Safety and Environmental Response, in consultation with the RCC/maritime rescue sub-centre (MRSC), will decide whether to undertake the mission.

4.38 In non-life threatening situations, and if requested, the RCC/MRSC will aid in arranging assistance from the private sector, as stated in Annex 7A.

CLASSIFICATION OF SAR INCIDENTS

4.39 For the purpose of reporting and statistical data, search and rescue (SAR) incidents are to be classified in accordance with Annex 4C. Classification of incidents is based on a post-incident dispassionate assessment of what actually occurred, not the perceived level of distress during the incident.

4.40 Records of SAR incidents are kept and these are an important instrument in the management of the Canadian SAR System. For the SAR data to reflect accurate information, it is important that all rescue co-ordination centres/maritime rescue sub-centres use the same guidelines for reporting.

HUMANITARIAN INCIDENTS

4.41 Department of National Defence and Canadian Coast Guard search and rescue units may be tasked for humanitarian incidents when properly requested and approved by the Officer in Charge of the rescue co-ordination centre or the superintendent, Rescue, Safety and Environmental Response as appropriate, and when not employed in an aeronautical or maritime search and rescue incident. Procedures pertaining to such tasking are detailed in Chapter 5.

MISSING DIVERS/SWIMMERS

4.42 In incidents where the search object is a diver or swimmer, the vehicle or platform from which the diver entered the water should be recorded but the vehicle or platform does not determine the incident classification. All such cases are to be classified as humanitarian incidents. Provincial and/or local authorities are to be advised by the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) of a diving incident, and the RCC/MRSC will assist when requested. If for any reason the proper civil authorities cannot be advised, the RCC/MRSC controller is to take appropriate action as detailed in Chapter 5, Diving Accidents, until civil control is assumed.

NOTIFICATION OF NEXT-OF-KIN

4.43 A rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or Searchmaster (SM) must ensure that the immediate next-of-kin (NOK) of persons involved in a search and rescue (SAR) incident have been notified prior to the release of names to the press. Notification of NOK shall be accomplished as follows:

.1 for Department of National Defence personnel, the RCC shall notify the Commanding Officer of the casualties' parent unit;

.2 for Canadian Coast Guard personnel, contact the Superintendent, Rescue, Safety and Environmental Response;

.3 for casualties resulting from a SAR incident involving a commercial aircraft or maritime craft, the RCC/MRSC shall request that the operating company notify NOK;

.4 for casualties resulting from a SAR incident involving a privately owned aircraft or maritime craft, the RCC/MRSC shall request the federal, provincial, or municipal police, as applicable, notify NOK;

.5 In instances where the SM has established regular contact with the NOK to keep them informed of search development, notification of the NOK concerning casualties may be made by the SM if he considers it the most appropriate method of conveying the news; and

.6 In instances where foreign nationals are involved, the RCC shall inform the National Defense Operations Centre to advise the appropriate embassy if required.

PRESS RELEASES

4.44 Whenever possible all public information releases to the news media concerning search and rescue (SAR) operations should be made through the Department of National Defense (DND) Public Affairs. Unless otherwise directed by the search and rescue region commander, releases will be authorized by the Officer in Charge (OIC) of the rescue co-ordination centre (RCC) or his representative.

4.45 Squadron Commanders, vessel/aircraft captains, or other Canadian Coast Guard/DND personnel participating in or questioned regarding a SAR operation shall not make public releases or grant public interviews without first obtaining clearance to do so from the RCC, searchmaster (SM), or designated Public Affairs officer. If such clearance is obtained, Annex 4D should be consulted for guidance as to content of press/media releases.

4.46 The Regional Supervisor, Maritime Search and Rescue (RSMS) of an RCC may develop press releases for maritime incidents. However, approval of the OIC RCC must be obtained prior to actual release of the information.

4.47 The RSMS of a maritime rescue sub-centre (MRSC) may develop press releases for incidents which are solely controlled by the MRSC; however, approval of the OIC RCC must be obtained prior to actual release. Press releases on incidents for which the RCC has assumed control from an MRSC shall originate through the OIC RCC, senior controller, or, if applicable, the SM. Prior to issuance of a press release in these cases, a copy of the contents shall be forwarded to the MRSC for near-simultaneous transmittal to news media. All releases from RCCs shall be in accordance with current DND directives.

ACCESS TO INFORMATION/PRIVACY ACT LEGISLATION

4.48 All records, logs and report created during the resolution of an incident are accessible to the public and are controlled by the Department of National Defense (DND). Information requested to DND will forwarded to the Maritime Forces Pacific, the Maritime Forces Atlantic or the 1 Canadian Air Division Privacy and Access to Information section, for onward transmission to the appropriate rescue co-ordination centre (RCC). If the information request is of a factual nature and does not impinge on the privacy of other individuals then the Officer in Charge (OIC) of the RCC may authorize the release of that information. If the documents to be released contain any information that is contrary to the tenants of the Access to Information Act of the Privacy Act, this information must be severed in accordance with the applicable section of the aforementioned Act. Consult the local Access to Information experts if in doubt as to what portion should be severed.

4.49 To expedite investigations by Coroner Boards of Inquiry, Transportation Safety Board of Canada (TSB) members or local police, the OIC RCC is authorized to release copies of pertinent documents and tape transcripts to these authorities.

> **NOTE:** Tapes or original documents are not to be released to other than DND, Canadian Coast Guard, or TSB personnel unless ordered by the National Defense Headquarters or a court of law.

SEARCH FOR SURVIVORS

4.50 The Canadian search and rescue (SAR) system is responsible to search for survivors of SAR incidents and the fact that a survivor is not located at the scene when an aircraft or vessel is found does not alter this obligation. A search will continue until the rescue co-ordination centre/maritime rescue sub-centre/searchmaster is convinced that there is no longer any hope of finding survivors in the search area, that every reasonable effort has been expended and that all leads have been exhausted. The search and rescue region commander concerned is to retain his responsibility to conduct search operations, but co-operation by Royal Canadian Mounted Police, provincial police, or other appropriate agencies should be sought if required.

4.51 Reduction/re-opening of searches is covered in chapter 5.

MAJOR AERONAUTICAL AND MARITIME DISASTERS

4.52 The Department of National Defense is responsible for preparing the response to a major aeronautical disaster (MAJAID) within Canada's area of responsibility. The specific details of the response are found in *AOC 210.* Once the scope of the distress is determined, the rescue co-ordination centre will contact the Air Operations Centre (AOC) and request that the MAJAID plan be implemented. The decision to implement the MAJAID plan shall be made on the authority of the Commander, 1 Canadian Air Division (1 CAD). AOC will initiate the MAJAID Implementation Order to alert all key Headquarters and Operations personnel. The Commander 1 CAD then assumes responsibility as Mission Commander and a MAJAID command post is activated.

4.53 8 Wing Trenton shall prepare a CC130 with a MAJAID kit for response to the incident regardless of search and rescue region (SRR). Response to a MAJAID shall be limited to contingency planning until a MAJAID has been declared.

4.54 The response to a major maritime disaster shall be in accordance with contingency plans published by each SRR commander. These plans are to be developed in accordance with Annex 7B, Major Maritime Disaster SAR Contingency Plan.

MILITARY SUBMARINE/SUBMERSIBLE

4.55 The overall responsibility for search and rescue (SAR) in the event of a lost Canadian submarine remains with the search and rescue region commander. The formulation of plans and the control of SAR operations in a Submiss-Subsunk operation is the function of the Commander, Maritime Forces Atlantic (MARLANT)/Maritime Forces Pacific (MARPAC). In the event of a lost United States Navy submarine, the responsibility for overall co-ordination of SAR activities rests with the United States Navy Submarine Operating Authority.

4.56 Detailed instructions covering submarine disaster SAR operations are contained in the North Atlantic Treaty Organization publication *ATP-10(D)* and operational orders issued by the Commander, MARLANT and the Commander, MARPAC.

NUCLEAR EMERGENCY RESPONSE

4.57 Rescue co-ordination centres will action nuclear emergency responses in accordance with the instructions contained in *B-GS-138-001/FP-001—CF Nuclear Emergency Response directives*.

4.58 A nuclear emergency response may range from incidents involving military nuclear weapons or civilian reactors to incidents involving civilian aircraft or vessels carrying industrial or medical isotopes.

UNLAWFUL INTERFERENCE OF VESSELS OR AIRCRAFT (HIJACKING/PIRACY)

4.59 When a rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) is notified by any source of an actual or suspected hijacking, they shall immediately notify the Air Operations Centre (AOC), the Air Traffic Control, the other RCCs and the Royal Canadian Mounted Police (RCMP) as appropriate. The RCC within whose boundaries the incident exists shall declare an alert phase as detailed in Chapter 6. The RCC shall maintain communications with the alerting agency and AOC and provide the latter with expert advice and recommendations pertaining to the SAR response.

4.60 When a RCC/MRSC is notified by any source of an actual or suspected act of piracy, they shall immediately notify the Regional Supervisor, Maritime Search and Rescue, the Superintendent, Rescue, Safety and Environmental Response, and the RCMP The RCC/MRSC within whose boundaries the incident exists shall declare an alert phase as detailed in Chapter 7.

HOAXES

4.61 Hoaxes and unnecessary search and rescue alerts (UNSARs) are a serious drain on search and rescue units and shall be reported to local authorities.

METEOROLOGY

4.62 The provision of meteorological support to search and rescue operations is the responsibility of the Canadian Forces Weather Service.

ROYAL FAMILY/GOVERNOR GENERAL/PRIME MINISTER FLIGHTS

4.63 For Royal family, Governor General and Prime Minister flights, the appropriate search and rescue (SAR) authorities shall be notified by the National Defence Operations Centre and the following posture shall be maintained by SAR aircraft:

.1 **Domestic and Oceanic**—normal standby posture (30 minutes during working hours and other times 2 hours); and

.2 **North of 60°N**—Winnipeg CC130 to maintain 30 minutes standby while the VIP aircraft is airborne and north of 60 N.

DUCKBUTT

4.64 The Canadian Forces have periodic requirements for search and rescue aircraft to orbit certain positions or fly along specified routes in support of military operations. This airborne escort service is called "Duckbutt".

LEGAL RESPONSIBILITIES

4.65 The Crown will indemnify, according to Treasury Board policy, rescue co-ordination centre/maritime rescue sub-centre personnel and the servants of the Crown if they were acting within the scope of their employment and not acting maliciously or dishonestly.

4.66 If legal action is commenced against an employee, member of the Department of National Defence or other servant of the Crown, they may apply through the chain of command for legal representation at public expense. Where the Department of Justice is notified that there is a divergence of interest as between the employee and the Crown as employer, arrangements will be made to provide for separate representation of the employee by an outside lawyer.

4.67 If an employee is summoned to give evidence at a Coroner's Inquest, Board of Inquiry or other body engaged in the investigation of a search and rescue related misadventure, he should request legal advice through his immediate supervisor. Canadian Forces Members should comply with *Queen's Regulations & Orders 19.55*.

4.68 Where Canadian Coast Guard personnel are subpoenaed to testify during formal search and rescue (SAR) investigations, in recognition of the Department of National Defence (DND) overall responsibility in SAR co-ordination, a DND SAR expert will be tasked to provide advice. Depending on the nature of the inquiry there may also be a requirement for a DND legal representative to be present.

4.69 In the case of investigations into incidents having maritime implications, the appropriate Canadian Coast Guard search and rescue expert shall also be in attendance to give advice.

ANNEX 4A— STATE OF READINESS FOR PRIMARY SAR AIRCRAFT

1. The minimum state of readiness for each rescue squadron shall be one search and rescue (SAR) aircraft of each type, on 30 minutes standby during work hours and on 2 hours standby during quiet hours and statutory holidays as follows:

103 Search and Rescue Squadron, Gander, Newfoundland	LABRADOR Helicopter
413 Transport and Rescue Squadron, Greenwood, Nova Scotia	HERCULES Aircraft LABRADOR Helicopter
424 Transport and Rescue Squadron, Trenton, Ontario	HERCULES Aircraft LABRADOR Helicopter
435 Transport and Rescue Squadron, Winnipeg, Manitoba	HERCULES Aircraft
442 Transport and Rescue Squadron, Comox, British Columbia	BUFFALO Aircraft LABRADOR Helicopter

NOTE: Work hours are as defined by the search and rescue region (SRR) commander, in accordance with 4.8.

2. The SRR commander has operational control of primary SAR standby aircraft and is the approving authority for states of readiness. Canadian Forces aircraft not on standby are subject to recall to meet SAR requirements.

3. Unless otherwise directed, the normal state of readiness for a ramp or strip alert will be one dedicated SAR aircraft and crew capable of becoming airborne within 30 minutes.

ANNEX 4B— CANADIAN FORCES GROUND SEARCH PARTIES LOCATIONS

Location	Personnel (Minimum/Maximum)
Canadian Forces Base (CFB) Bagotville, Québec	10/30
CFB Cold Lake, Alberta	10/30
CFB Gander, Newfoundland	10/20
CFB Goose Bay, Labrador	10/20
CFB Moosejaw, Saskatchewan	10/30
CFB Winnipeg, Manitoba	10/30
Canadian Forces Northern Area, Yellowknife	10/15

ANNEX 4C—CLASSIFICATION OF SAR INCIDENTS

AERONAUTICAL INCIDENTS

An aeronautical incident is a search and rescue (SAR) incident involving an aircraft.

Category	Definition
A1	**Distress**—A person or persons (in relation to an aircraft) are threatened by grave and imminent danger and require immediate assistance.
A1P	**Previously unreported A1 incident**—An aeronautical incident that has been resolved but would have required a response had the SAR system been alerted at the time of the incident.
A2	**Potential Distress**—The potential exists for an A1 incident if timely action is not taken; i.e., an immediate response is required to stabilize a situation in order to prevent distress.
A3	**Situation Resolved In The Uncertainty Phase.**
A4	**Known Aeronautical Related False Alarm or Hoax**—such as: • a false or inadvertent emergency locator transmitter activation.

MARITIME INCIDENTS

A maritime incident is a search and rescue (SAR) incident involving a vessel or a person, including the medical evacuation (medevac) of person(s) from a vessel.

Category	Definition
M1	**Distress**—A vessel or a person is threatened by grave and imminent danger and requires immediate assistance.
M1P	**Previously Unreported M1 Incident—**A maritime incident that has been resolved, but would have required a response had the SAR system been alerted at the time of the incident.
M2	**Potential Distress—**The potential exists for an M1 incident if timely action is not taken; i.e., immediate response is required to stabilize a situation in order to prevent distress.
M3	**Situation Resolved In The Uncertainty Phas**e—such as: • a disabled vessel in no immediate danger; or • a disoriented or lost vessel in no immediate danger. • other related incident involving a vessel with no person on board.
M4	**Known Maritime Related False Alarm or Hoa**x—such as: • a located overdue vessel that is in no difficulty but that had failed to advise of a change of plans or had failed to report; • the investigation of a maritime related sighting that proved false (does not include unlocated flares); or • an emergency position-indicating radio beacon false alarm (accidental or otherwise).

NOTE: Maritime medivacs should normally be classified in categories 1 or 2.

HUMANITARIAN INCIDENTS

A humanitarian incident is a search and rescue (SAR) incident (not aeronautical or maritime) which requires a response by the SAR system.

Category	Definition
H1	**Distress**—A person or persons are threatened by grave or imminent danger (not maritime or aeronautical related) and require immediate assistance, such as: • a critical medical evacuation on land; • a suicide or suicide attempt; • a missing diver from a vessel or from land; • a swimmer in difficulty; • a missing person; or • the response to a natural disaster.
H2	**Potential Distress**—The potential exists for an H1 incident if timely action is not taken, i.e., a situation such as in an H1 incident but with a lesser degree of urgency and where timely action must be taken to ensure that the situation does not become critical.
H3	**Situation where assistance is required, however no distress exists**—such as: • on scene evaluation indicates no distress or potential; or • body recovery.
H4	**False Alarm or Hoax.**

NOTE 1: Normally, an incident number will only by assigned to a humanitarian incident when federal SAR system units are used.

NOTE 2: Humanitarian incidents now encompass the incidents formally classified as civil assistance.

UNKNOWN INCIDENTS

An unknown incident is an incident which commences as a search and rescue incident of an unknown type and the source of which is untraced.

Category	Definition
U4	**Unknown**—such as : • a false alarm for an unlocated emergency locator transmitter or emergency position-indicating radio beacon; • a false alarm for a flare of unlocated origin; or • a hoax.

ANNEX 4D— RELEASE OF INFORMATION TO THE PUBLIC

1. In conducting search and rescue operations, occasions arise when Canadian Coast Guard and Department of National Defence personnel are subjected to requests for information from the media/public. This is especially true when a search and rescue unit [aircraft, vessel, or other headquarters (HQ)] is geographically distant from the rescue co-ordination centre (RCC), maritime rescue sub-centre (MRSC) or Searchmaster (SM) HQ. It is prudent to respond to these requests rather than give the impression of being unaware or unresponsive. Once clearance is obtained from the RCC, SM, or designated Public Affairs Officer the facts given in an interview should be limited to the following:

a. number of units engaged in the search;

b. number of crew aboard the search unit;

c. number of hours the unit has been engaged in the search;

d. the area searched, and search results of the individual search unit;

e. weather conditions;

f. search unit's capabilities; and

g. items of general interest, readiness to carry on with the search, etc.

2. Personal opinions on the conduct of a particular search and rescue operation or on departmental policy should not be offered. Questions regarding topics other than those in paragraph 1 above shall be referred to the rescue co-ordination centre, Searchmaster or Department of National Defence Public Affairs Officer.

ANNEX 4E—GROUND SEARCH PARTIES

EQUIPMENT AND PROCEDURES

1. **General—**The equipment and procedures to be used by ground search parties are set forth in the following paragraphs.

2. **Equipment—**Equipment specified in *CFS-2*, *Canadian Forces Scale of Issue*, items B22-096, B13-040 and B41-002, and unit entitlements for vehicles, communications, and photographic equipment shall be issued and utilized to equip personnel of authorized ground search parties. This equipment shall be maintained and stored on a constant alert status. The base commander of each unit shall ensure that adequate space is made available for the storage of ground search equipment. Each member of the party is responsible for the maintenance of his equipment. Other equipment shall be held in the ground search section and shall be the responsibility of the search and rescue officer or party leader.

3. **Ground Search Procedures—**Ground search parties are normally utilized either to conduct a search covering a small area of ground or to aid in the evacuation of personnel and equipment from crashes or during emergency incidents.

4. **Ground Search Patterns—**Normally search patterns will conform to either the parallel sweep or contour type of search. Variations and modifications of these basic patterns may be required because of local terrain factors. The two most common patterns are:

   a. **Parallel Sweep—**This is the most common type of ground search pattern. It is normally accomplished by forming up a number of people in a straight line evenly spaced apart. The distance between them will vary depending on the terrain and the object of the search. Everyone must be able to see everything between themselves and the persons on each side. The persons on each end of the line are known as flankers and they are responsible for the guidance and control of the search line. In commencing to search an area, the number one flanker usually tries to follow a natural boundary of some type or a predetermined compass course. During the first leg of the search, the party moves on the number one flanker, advancing in the abreast formation. The number two flanker should blaze or mark a trail so that when the party comes to the end of the first leg they can pivot about the number two flanker and proceed in the opposite direction on the second leg. The party will now move on the number two flanker who is searching along his blazed trail. The number one flanker will now be blazing a trail to follow on the third leg. This method is continued until the search area is completely covered; and

b. **Contour Search**—This type of search is a modification of the parallel sweep and is conducted in hilly or mountainous terrain. The search party commences searching at the highest point and a parallel sweep is carried out encircling the hill or terrain.

SEARCH CONTROL AND INCIDENT PROXIMITY SIGNS

5. The control of a search party is difficult to maintain. The most experienced personnel should be assigned as flankers with other experienced personnel strategically placed along the line of search to assist in party control. To keep control and ensure full coverage of an area, parties should not consist of more than ten people.

6. The party must proceed slowly and all members must maintain their correct spacing. Each person should maintain their distance from the person on their directing flank and also try to remain in line. Continuous contact is essential. It is a common fault for most to try to proceed too fast and as a result, the control of the search party is lost and full coverage is not ensured.

7. All members of the search party should be instructed to watch for the object of the search and any sign which may indicate the proximity of the object of the search:

a. broken or disturbed trees or underbush;

b. presence of smoke;

c. pieces of clothing or wreckage;

d. drops of oil or fuel;

e. odour caused by decomposition;

f. presence of scavengers;

g. unusual sounds; and

h. unusually disturbed areas.

GROUND SEARCH BRIEFING

8. The following points shall be included during the briefing of a ground search party before it sets out on a search operation or rescue mission:

a. full details of the missing aircraft or persons;

b. the type of terrain the party will encounter if known;

c. map references of the area and routes to be followed to the search area of the crash site;

d. aerial support which will be provided;

e. special equipment that is to be carried;

f. equipment that will be supply dropped;

g. action to be taken on locating the missing object or on arrival at the crash site; and

h. communications procedures and use of ground-air signals.

MANDATORY EQUIPMENT AND RESCUE OPERATION PROCEDURES

9. The leader of the ground search party shall ensure that each member of the ground party is adequately equipped for the operation and that the following items are carried:

a. large scale maps of the area;

b. photographs of the surrounding terrain if available;

c. at least one transmitter and receiver with spare batteries capable of operating on 5 717 kilohertz (kHz) or at least one of the on-scene working frequencies listed in Chapter 8;

d. a copy of the ground/air visual code; and

e. a list giving the number, rank, and name of each member of the party.

10. Each member of the ground search party shall be completely equipped with proper clothing and footgear. Each member shall carry a knife, a whistle, a package of matches, and a compass. They shall carry sleeping bags, rations, signalling panels, flashlight, and signal flares if the party is to remain out overnight.

11. Unless personnel are themselves familiar with the terrain in which an operation is being conducted, search parties shall include, if available, at least one competent guide who is familiar with the area. The searchmaster or rescue co-ordination centre shall arrange the rate of remuneration with the guide prior to the departure of the party.

12. Normally, single file is the best method of advancing through bush. If the party must spread out in order to find a trail or crash site, continuous contact shall be maintained between all members of the party. One effective method is to number the members consecutively and then the leader can give command, "NUMBER", to verify all are present.

13. The greatest care shall be taken that the party remains together. Should it be necessary to divide the party, each section shall be in the charge of a competent leader. If a member of a party is unable to continue, he shall not be sent back alone. If a party or any member of it becomes lost, the international distress signal of firing three shots should be used. The recognized acknowledgement is one shot. If no firearms are carried, the distress signal should be given by whistle or three loud sounds by any valuable means.

14. Search parties shall not travel at night unless the nature of the emergency warrants such action.

15. On locating a crash site, the ground search party shall determine the number of survivors and deceased persons and inform the covering aircraft or search centre. If all persons who were aboard the missing aircraft are not immediately accounted for, the search shall continue in the event that someone has left the crash site or parachuted.

16. The leader of a ground search party shall ensure that no person, whether military or civilian, removes or interferes with an aircraft or wreckage, or disturbs or removes corpses until authorized by the searchmaster or the rescue co-ordination centre.

17. Identification of deceased personnel is usually made from wallets, identification tags, watches, etc. When possible, two persons should be present when these are being gathered. Valuables and money shall be inventoried and turned over to the rescue co-ordination centre, the searchmaster or the police, and a receipt obtained.

18. When stretcher cases are to be transported any distance overland, a minimum of six persons shall be provided for each stretcher case. When available, an additional six persons shall be provided to spell off the original group and assist in clearing a trail.

19. Ground search personnel operating watercraft shall observe all water safety regulations. Suitable life preservers shall be worn by all personnel using any type of maritime craft or raft.

CO-OPERATION BETWEEN AIRCRAFT AND GROUND SEARCH PARTIES

20. In many instances, aircraft can be of great assistance to ground search parties in locating the scene of a crash. Leaders of search parties and aircraft crews shall be briefed on the method of communication and the operation plan to be used. This briefing shall include a planned communication schedule and an alternative schedule in the event of poor weather or aircraft unserviceability.

21. Ground parties shall ensure that the following information is communicated to the supporting aircraft:

a. the number of days' food supplies on hand;

b. the progress made;

c. the estimated time of reaching the next objective; and

d. the requirement for food or other equipment.

22. A narrative report covering all aspects and phases of the ground search and rescue operation, including comments on equipment and recommendations for the approval of techniques, shall be submitted by the ground search party leader to the rescue co-ordination centre or searchmaster for inclusion in the search operation final report.

ANNEX 4F—CASARA EXPENSE CLAIM

CLAIM # ____________ CASE / TASK NUMBER: ____________

AC TYPE / REG: ____________

NAME: ____________ PROV / TERR: ____________ ZONE: ____

ADDRESS: ____________ REASON: ____________

____________ POSTAL CODE: ____________

PART 1 - TRAVEL

PLACE - DATE / TIME	KM / MODE	RATE	TOTAL
DEPART: ARRIVE:			
DEPART: ARRIVE:			
DEPART: ARRIVE:			
DEPART: ARRIVE:			
DEPART: ARRIVE:			
		SUB TOTAL	

PART 2 - ACCOMMODATION/MEALS

DATE	ACCOMMODATION	COST	B	L	D	DAILY TOTAL
					SUB TOTAL	

PART 3 - AIRCRAFT FP_______ x HP_______ = _______ /HR

DATE	TIME	RATE	AMOUNT
		SUB TOTAL	

PART 4 - ADMINISTRATIVE

DATE	PARTICULARS	COST
	SUB TOTAL	
	TOTAL	

NOTE: RECEIPTS REQUIRED FOR COMMERCIAL TRAVEL
ACCOMMODATION - MEALS - AVGAS - ADMIN EXPENSE

OFFICE USE ONLY	
DATE RECEIVED:	
CHEQUE #	CODE:
VERIFIED:	
FIN CODE:	

I CERTIFY THAT ALL EXPENSES CLAIMED WERE ACTUALLY INCURRED ON AUTHORIZED CASARA ACTIVITIES AND ARE IN ACCORDANCE WITH CASARA FINANCIAL POLICIES

SIGNATURE: ____________ DATE: ____________

APPROVED BY: ____________

DISTRIBUTION: WHITE - TREAS/RCC PINK -
YELLOW - NAT'L OFFICE GOLD - MEMBER

CHAPTER 5—
SAR OPERATIONAL PROCEDURES—GENERAL

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SAR OPERATIONAL PROCEDURES—GENERAL

JURISDICTION OF RESCUE CO-ORDINATION CENTRES/ MARITIME RESCUE SUB-CENTRES

5.1 Any rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) which is notified of the existence of an emergency and is not aware of the involvement of any other competent authority shall initiate suitable action. If the emergency is not related to an aeronautical or maritime incident the appropriate authority shall be advised as soon as possible. If the emergency has arisen as a result of an aeronautical or maritime incident then the RCC/MRSC responsible for initiating action shall be designated as described in the following sections.

DESIGNATION OF THE RCC/MRSC RESPONSIBLE FOR SAR ACTION

5.2 Any rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) which is notified of the existence of a search and rescue (SAR) emergency and is not aware of the involvement of another RCC/MRSC shall initiate suitable action. If the incident is outside the boundaries of that RCC/MRSC, the appropriate RCC shall be advised as soon as possible, while appropriate action is continued. When more than one RCC/MRSC become involved in a case, action shall be taken to designate one of them responsible for the overall conduct of the search.

5.3 Unless otherwise decided by common agreement of those concerned, the following applies:

.1 The position of the aircraft or vessel is known—

.1 When the position of the aircraft or vessel in distress is known, the responsibility for initiation of a SAR operation will be that of the RCC or MRSC in whose area the aircraft, ship or other craft is located.

.2 When the RCC or MRSC recognizes that the aircraft or vessel is continuing its flight or voyage and may leave the search and rescue region (SRR) for which it is responsible, it should:

a. alert the RCCs associated with the planned or intended route of the aircraft, ship or other craft, and pass on all information;

b. continue co-ordination of the SAR operation until it has been notified by an adjacent RCC or MRSC that the aircraft, ship or other craft has entered its SRR and that it is assuming responsibility; and

c. remain ready to assist until informed that this is no longer required.

.2 The position of the aircraft or vessel not known—

.1 When the position of the aircraft or vessel in distress is unknown, the RCC or MRSC shall assume responsibility for the SAR operation and consult adjacent RCCs along the route of the aircraft, ship or other craft as to which centre will assume primary responsibility.

.2 Unless otherwise decided by common agreement of the RCCs or MRSCs concerned, the RCC or MRSC to assume responsibility should be the centre responsible for the region:

a. in which the aircraft or vessel was, according to its last reported position;

b. to which the aircraft or vessel was proceeding if the last reported position was at the boundary of two SRRs; and

c. to which the aircraft or vessel was destined if it was not equipped with suitable two-way radio communication or not under obligation to maintain radio communication.

SEARCH PLANNING

5.4 The information contained in this chapter is based on accepted International Civil Aviation Organization/International Maritime Organization procedures. In addition, specific Canadian search procedures such as the Canadian Search Area Definition and Mountain Visual Flight Rules methods of search planning are included. As well, the Canadian Coast Guard has developed Canadian inshore search planning procedures and a computer assisted method of calculating drift, the Canadian Search and Rescue Planning Program CANSARP.

SEARCH PLANNING SEQUENCE

5.5 There are normally five sequential events in the development of a search plan. They are:

.1 estimating the datum—determining the position of the emergency and in maritime cases determining the effect of wind and current on the survivors;

.2 **determining the size of the search area**—allowing for errors in position estimates, navigation errors of search units and drift variables;

.3 **selecting appropriate search patterns**—considering size of area, type of terrain and capabilities of search units;

.4 **determining the desired area coverage**—considering factors affecting the probability of detection, track spacing and number of sweeps; and

.5 **developing an optimum and attainable search plan**—considering the number of search units available and other limiting factors and circumstances.

5.6 The search planning sequence may be carried out completely by the rescue co-ordination centre/maritime rescue sub-centre controller or may be initiated by the controller and continued by the searchmaster (SM). Since more than one person may be involved in the planning process, a record shall be kept of all assumptions and factors which affected the development of the plan. This record of assumptions and factors is especially critical on extended searches where new information may cause the controller or SM to re-evaluate the assumptions made during the initial planning phase. The record is also critical for legal purposes where the conduct of a search may be called into question. It is important that throughout the process all participating agencies are included in the communications net and kept advised of the search action plan. On-scene commanders also have search planning responsibilities (Chapter 3).

SEARCH PLANNING METHODS

5.7 The degree of search planning can range from the simple tasking of a search and rescue unit on an electronic search to the complicated co-ordination of a week-long search using many aeronautical and/or maritime units. The planning can be carried out manually or by one of the several computer programs available. The search planner may have to deal with more than one method regardless of whether the search is happening in the maritime or inland environment.

5.8 The manual methods include the Minimax computation for maritime search areas (Chapter 7), primarily from the United States *National Search and Rescue Manual*, and the Canadian developed Canadian Search Area Definition (CSAD) and Mountain Visual Flight Rules (MVFR) methods (Chapter 6) for aeronautical searches. Each method is thoroughly discussed at the indicated section of this manual.

5.9 Each rescue co-ordination centre (RCC) and maritime rescue sub-centre has the Canadian Search and Rescue Planning Program CANSARP for calculating drift plots and conducting search planning and effort allocation. In all maritime searches CANSARP should be used as the primary means for search planning.

5.10 Another computerized search planning program, called Computer Assisted Search Planning (CASP), is also available through United States Coast Guard (USCG) RCCs in Norfolk and Seattle. The CASP uses simulation methods and is most efficient in cases where information concerning the incident position is vague. For Canadian users, access to CASP is achieved by having RCC contact a USCG RCC.

5.11 **Maritime Search Planning Forms**—Forms and worksheets for several of the search planning steps have been devised by various search and rescue co-ordinators to aid in the planning process when it must be done manually. Examples of these are provided in Annex 7C and their use may be considered to avoid overlooking pertinent data and to establish a logical sequence for the planning computations.

SAR INCIDENT LOCATION

5.12 At the initiation of search planning, the planner may know a reported position, the proposed track or only the general area of the search object. This knowledge is used to determine the object's most probable position, which is then corrected for drift if necessary. When searching for an aircraft on land, the result is a datum which will remain stationary throughout the search. For an object in the water, the result is a moving datum from which continually moving search areas may be derived. In both cases the object is to determine an area which has the greatest chance of including the most probable position of the search object.

5.13 In the computation of the search and rescue incident location the planner must collect, weigh and review information from all practical sources. These might include:

.1 airfields where an aircraft might have attempted to land;

.2 possible vessel docking areas;

.3 military or civil radar services, i.e. the Terminal Radar and Control System (TRACS) or the Joint Enroute/Terminal System (JETS);

.4 aviation or maritime authorities along the route;

.5 Marine Communications and Traffic Services;

.6 Department of National Defence high frequency (HF) and Canadian Coast Guard very high frequency (VHF) direction finder nets;

.7 owner/operator/next-of-kin to:

.1 obtain information on the crew and the aircraft/vessel operating characteristics, relating these to the enroute weather and terrain,

.2 assess the ability of the crew to survive and the type of assistance likely from survivors,

.8 Atmospheric Environment Services offices for weather information which may have influenced the intended voyage.

5.14 **Possible Area**—This area is the region bounded by the object's limit of endurance in all possible directions from the last known position (LKP) of the search object. It approximates a circle centred on the LKP with the radius being expressed in terms of distance. The basic methodology may be applied to both aeronautical and maritime cases. Normally, it will be impractical to search this wide area, but it should be determined so that the planner will be aware of all possibilities.

5.15 **Probability Area (Aeronautical)**—In the absence of information to the contrary, it may be assumed that the most probable area within which a missing aircraft will be found is that along the intended track from the last known position to intended destination and within a reasonable distance either side of track. The study of Canadian data which led to the Canadian Search Area Definition and Mountain Visual Flight Rules methods confirmed this assumption for aircraft cases. It also determined that definitive area sizes could be established in relation to probability of whereabouts values of an incident location for various track length groupings.

5.16 **Probability Area (Maritime)**—In maritime cases the probability area consists of an increasing area about a periodically repositioned datum. The area is determined using the offshore or inshore search area methods described in the following paragraphs.

5.17 Adjustment of the probability area may be necessary for a variety of reasons, including:

.1 the initial search of a determined probability area has proven unsuccessful;

.2 information becomes available which suggests a deviation from the intended route may have occurred. This might include:

.1 adverse weather differing from that expected by the crew,

.2 unserviceable or unreliable navigation aids en route,

.3 advice on preferred routes from qualified witnesses,

.4 reliable sighting reports,

.3 the effect of drift in the case of maritime incidents.

Methods for adjusting the probability area are discussed in the following paragraphs.

DATUM

5.18 The first step in either maritime or inland search planning is to determine a starting reference point or datum. In an aeronautical case this is simply establishing the last known position, that is, the last position for which there is indisputable evidence of the search object's location. For maritime cases the most probable position must then be corrected with computed drift forces to obtain datum for a specific time.

5.19 If a datum point cannot be determined, it may be necessary to use a datum line, that is, an intended track, or even a datum area. Examples of the latter would be an aircraft which intended to operate in a known training area or a fishing boat which may have gone to particular fishing grounds. In general, the planner should attempt to limit the size of datum lines and areas as much as possible by using communications checks and whatever other evidence may be available.

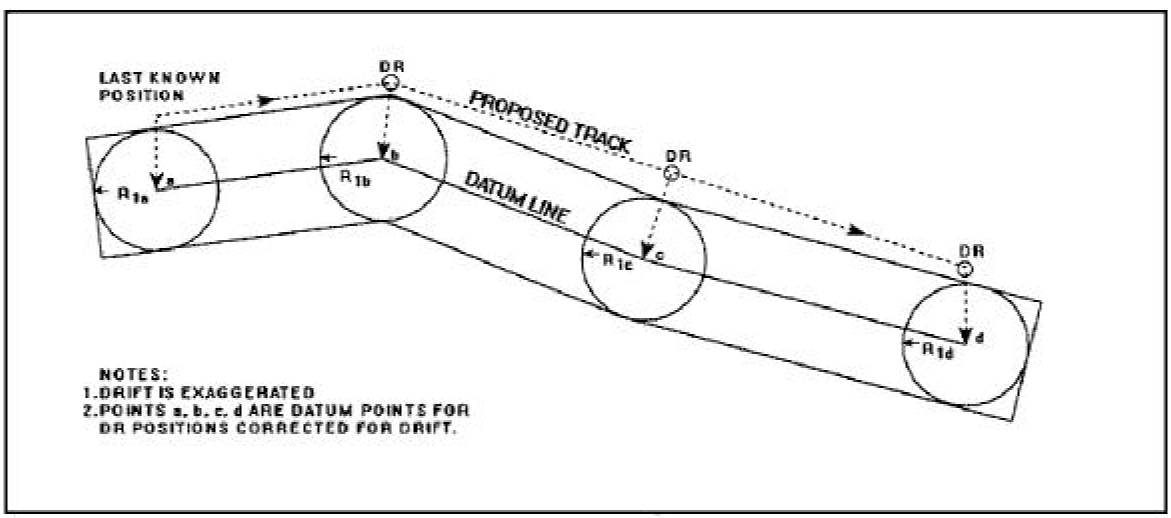

FIGURE 5–1 DATUM LINE

5.20 **Datum Line**—In some cases the intended track of a vessel may be known. In such cases, dead reckoning (DR) positions should be established at the beginning and end of track, and along track as required (usually one for each 24 hours along track). Each DR is used to develop a datum point for a common time, for example the mid-search time. These are analysed for possible errors and the resultant search radii are tangentially joined to construct a search area along the intended track (Figure 5–1).

5.21 **Datum Area**—If the last known position is actually a vicinity rather than a position, for example a particular fishing grounds, it will be necessary to determine a datum area. Using the vessel endurance, normal cruising speed, and drift forces, an area of possibility is determined. This area will normally be much too large to search effectively, the search planner will therefore be required to do extensive detective work to determine a reasonable search area.

DRIFT FORCES

5.22 In all searches where the search object is believed to be in the water it will be necessary to re-compute datum periodically to account for drift or new information by determining the various forces that cause the search object to move in and with the water. The periods at which datum must be re-computed will vary according to this expected drift in specific cases. In some aeronautical cases it may also be necessary to compute drift to determine the impact point. The forces that must be considered may include:

.1 aerospace trajectory (d_a) - aircraft only; (Annex 6)

.2 parachute drift (d_p) - aircraft only; (Annex 6)

.3 sinking drift (d_s);

.4 leeway (LW); (Chapter 7)

.5 wind driven current (WC); (Chapter 7)

.6 sea current (SC); (Chapter 7)

.7 tidal current (TC); (Chapter 7)

.8 lake current (LC); (Chapter 7)

.9 river current (RC); (Chapter 7)

.10 bottom current (BC); (Chapter 7) and

.11 long shore current (LSC) (Chapter 7).

The method required to plot each of the drift forces mentioned above is the subject of their respective chapters. While the list may seem overwhelming, some are rarely used. Typically one drift force might be used for aircraft incidents over land, three for surface water incidents, and none for ground incidents.

PLOTTING DRIFT FORCES

5.23 In each case where more than one drift force is present, the forces must be added vectorially to determine the total drift (D). The methods of calculating each of the drift forces which can effect search objects, and how to compute a D estimate are explained in Chapters 6 (aeronautical) and 7 (maritime).

AREA COVERAGE

5.24 Search area coverage involves the systematic search of defined areas to ensure the optimum probability of detection of the search object. The many factors that influence detection capability during a search can be reduced to four mathematical expressions, these being:

.1 track Spacing (S);

.2 Probability of Detection (POD);

.3 sweep Width (W); and

.4 Coverage factor (C).

These expressions are measurements, S being a measure of search effort, POD being a measure of search effect, whether desired or attained, W being a measure of detection capability and C being a measure of search quality.

5.25 **Track Spacing**—The distance between adjacent search tracks, whether these are by simultaneous sweeps of several units or successive sweeps of a single unit, is known as track spacing (S). It should be apparent that the smaller S is, the higher will be the likelihood of detecting any object which is within the area searched. It must be remembered, however, that decreasing S increases the time for any given search unit to cover the search area, or alternatively requires more units to complete the search in the same time. The object of the search planner will be to achieve an optimum value for S, one that will permit expecting target detection to be within the constraints of time and unit availability.

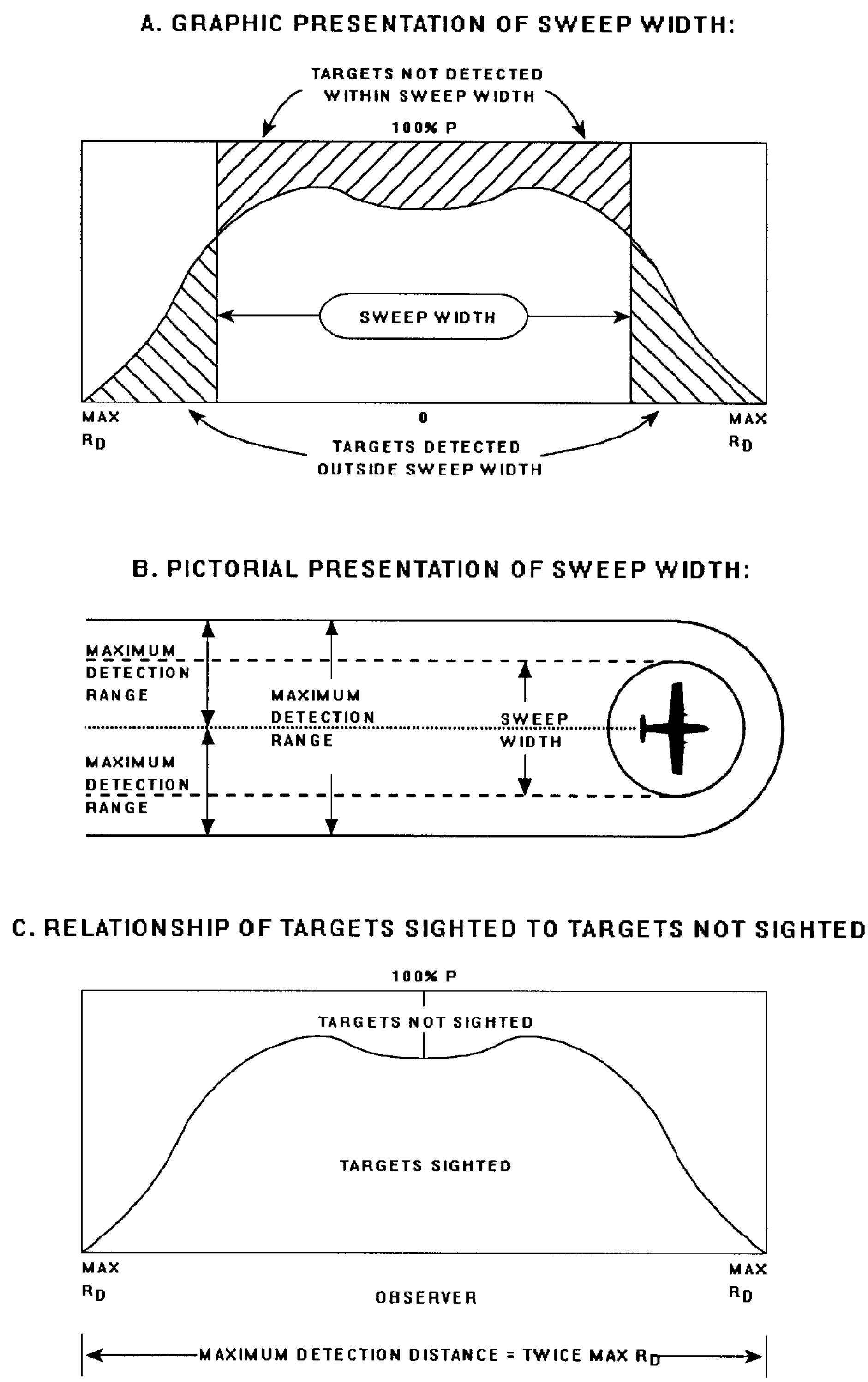

FIGURE 5–2 PROBABILITY OF DETECTION

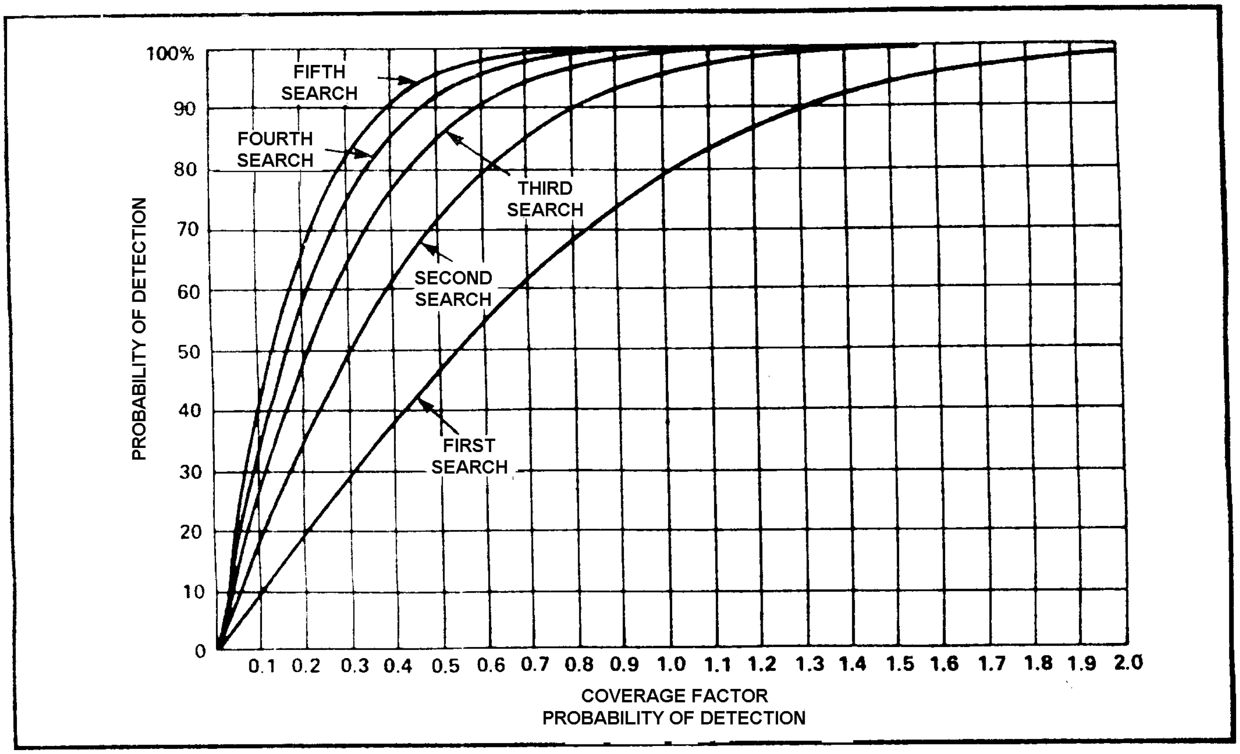

FIGURE 5–3 COVERAGE FACTOR VS PROBABILITY OF DETECTION

5.26 **Probability of Detection**—Usually expressed as a percentage, the probability of detection (POD) refers to the odds of detecting the target. An observer can be expected, under normal conditions, to sight most of the targets in close range, fewer targets at greater range and no targets at all beyond the maximum detection range. A typical curve for search craft spotters is depicted in Figure 5–2. It has been shown in field experiments that the curve is not a straight line, that is, there is not a constant rate of decrease as the range increases. To make optimum use of this concept, sweep widths have been developed to achieve particular PODs.

5.27 As track spacing (S) and sweep width (W) control the coverage factor (C), so C controls the POD. The POD is determined using the graph shown in Figure 5–3. The curves on this graph provide POD when C is given, for a single search of an area, and for up to four repeated searches in the same area. When repeated searches of the same area are completed, the POD is determined by entering the Figure 5–3 with the average C for all those searches, using the appropriate curve. While this is not strictly accurate, it is sufficiently so for manual calculations given the basic level of accuracy of the graphs. Due to the lack of Canadian W tables, Figure 5–3 cannot be used for determining the POD of inland searches.

5.28 **Sweep Width**—Sweep width (W) is a mathematically expressed measure of detection capability based on target characteristics, weather and other variables. W is obtained by choosing a value less than the maximum detection range so that scattered targets that may be detected beyond W are equal in number to those which may be missed within W. This concept is expressed graphically in Figure 5–2. Thus, W will always be less than the maximum detection range. The W concept is applicable for any type of search, including electronic or aural searches. Tables have been developed to provide W for various types of searches and are discussed in paragraphs 5.30 through 5.40.

5.29 The computation of sweep width depends on the search methods being used by search units. These can be divided into the following general headings, which are further discussed in Chapters 6 and 7:

.1 visual search;

.2 electronic search; and

.3 miscellaneous search methods.

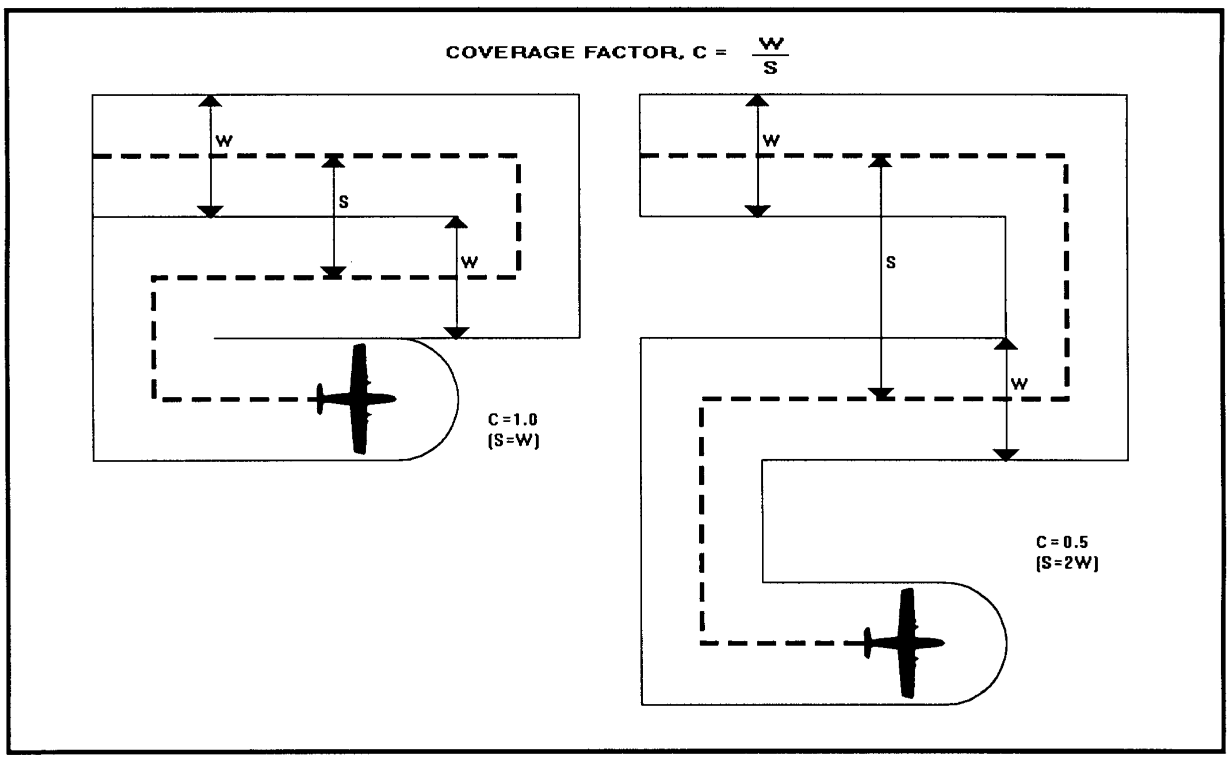

FIGURE 5–4 COVERAGE FACTOR

5.30 **Coverage Factor**—Coverage factor (C) is a measure of search effectiveness or quality. C depends on the relation between sweep width (W) and track spacing (S), and is expressed:

$$C = \frac{W}{S}$$

Figure 5–4 demonstrates the difference between a C of 1.0 and one of 0.5. In the case of inland searches, the probability of detection varies according to the changing terrain and vegetation within a given search area. Canadian visual W tables have not been developed for inland searches and therefore C for these searches cannot be determined.

SEARCH PATTERNS

5.31 **Visual Search Pattern Types**—There are six main groups of visual search patterns:

.1 track crawl;

.2 parallel track;

.3 creeping line;

.4 expanding square;

.5 sector; and

.6 contour.

A description of these common search patterns is found in Annex 5A. United States search and rescue authorities often further differentiate these search patterns by whether individual or multiple units are used or whether there is co-ordination between aeronautical and surface units.

5.32 **Electronic Search Patterns for Distress Beacons**—Normally, search and rescue units will have a rough position of where a distress beacon is located as a consequence of the COSPAS–SARSAT system. The following general procedures are used to precisely locate the distress beacon. These patterns are used during the initial search phase and apply to emergency locator transmitters (ELTs), ejectable crash position indicators (CPIs), personal locator beacons (PLBs) or emergency position indicating radio beacons (EPIRBs). The procedures for locating all of these beacons are the same. Of note, most military ELTs operate on 243.0 MHz, and civil ELTs operate on 121.5 MHz. Some ELTs, however, operate simultaneously on both frequencies and 406 MHz ELTs are also manufactured.

> **NOTE:** Some PLBs and most EPIRBs transmit a 406 MHz signal which is received by the COSPAS–SARSAT system which, in turn, relays a position to the Canadian Mission Control Centre. EPIRBs which meet Canadian regulatory specifications emit a homing signal on 121.5 MHz. EPIRBs and PLBs capable of transmitting only on 406 MHz can be located by using 406 MHz capable homing equipment.

5.33 While in theory distress beacon signals should extend to line of sight range, they may be affected by a number of factors such as terrain shielding, transmitter strength and receiver sensitivity. Figure 5–5 shows the ranges that may be expected under various conditions.

5.34 Because of the limited operating life of most distress beacon batteries, it is essential that search planning be premised on saturating the high probability areas as soon as possible. An electronic search should be conducted during the first 24 hours after a search object is missing. For the remainder of the search, a listening watch on the appropriate frequencies shall be maintained.

5.35 The standard visual search patterns are applicable to electronic searches with the following modifications:

.1 effective electronic search can be carried out under all weather conditions at normal cruise speed;

.2 track spacing (S) should be 60 nautical miles (M) at 20,000 feet and 30 M at 10,000 feet with the spacing reduced by one half over mountainous terrain; and

.3 the beacon's location and orientation on the ground can cause erroneous "on top" indications—caution should be used on all homing with a second procedure carried out if doubt exists.

Normally, a parallel track or creeping line should be employed for distress beacon searches. Maximum S should be used for the initial rapid sweep of the area, followed by a further sweep of the area at right angles to the first, followed by a further sweep stepped over one-half the S (Figure 5–6). In mountainous areas, the search should be arranged to cut the ridge lines at right angles if at all possible.

5.36 Often distress beacon reports are received from pilots of other than search and rescue aircraft. In Canada, anyone hearing a distress beacon signal is required to advise the nearest Air Traffic Control Unit, Flight Service Station or rescue co-ordination centre, stating the position where the signal was first and last heard and the strength of the signal. With this information the search planner can arrive at a rough estimate of the most appropriate search area. Several methods of working out the solution are described at Annex 5B.

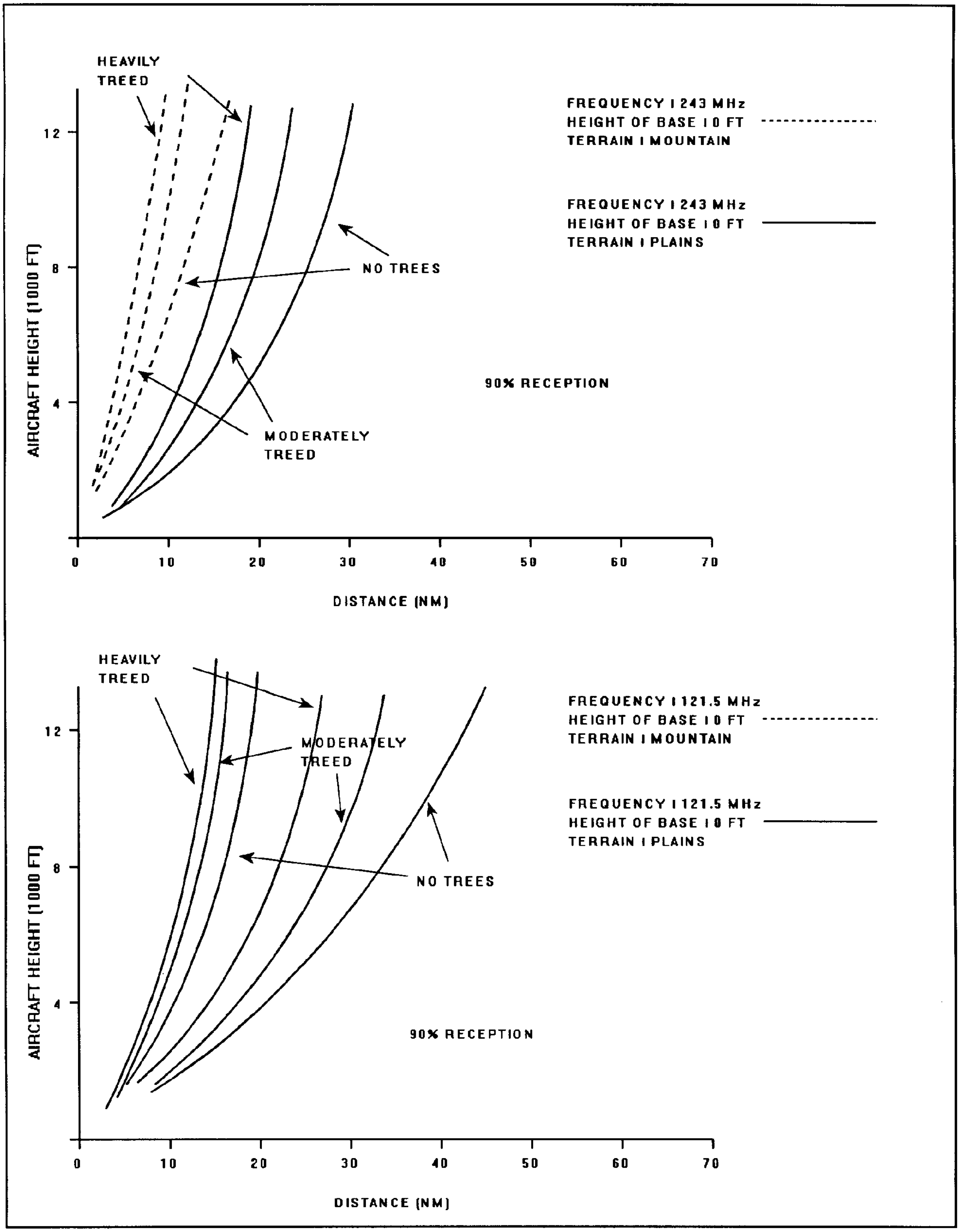

FIGURE 5–5 ELT DETECTION DISTANCE

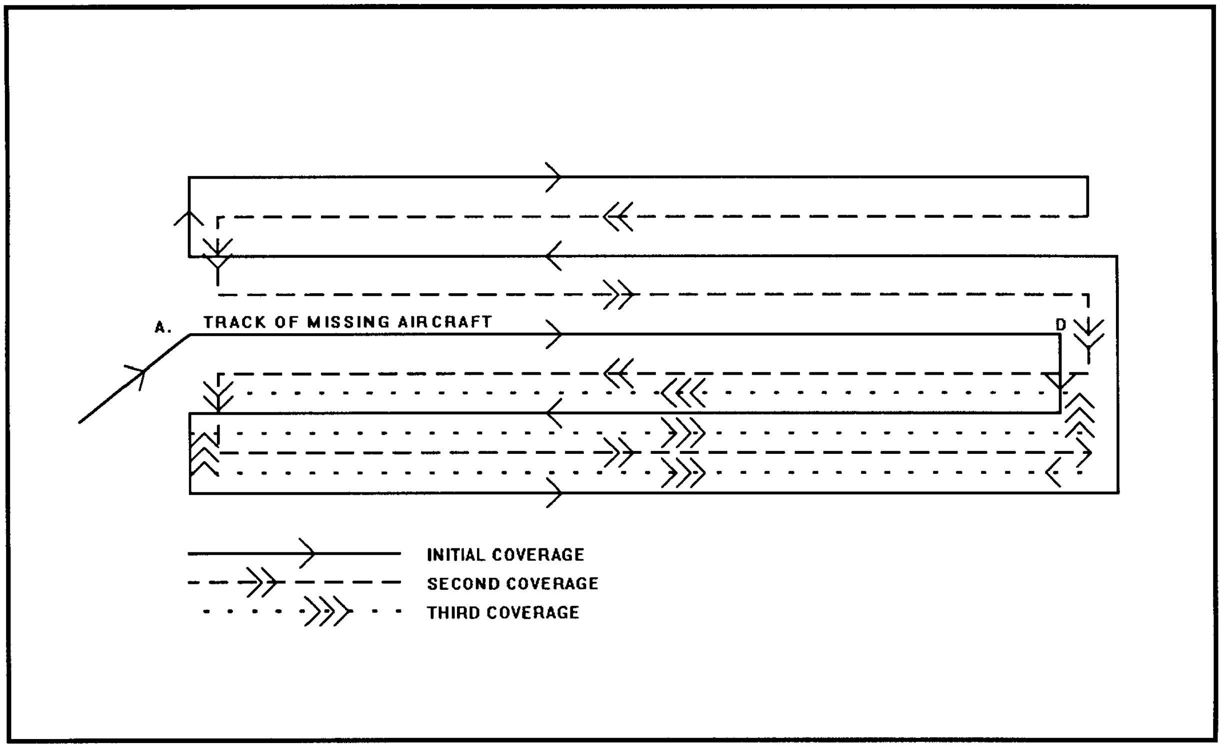

FIGURE 5–6 ELT SEARCH PATTERNS

5.37 **Night Search Patterns**—Patterns to be used for flare assisted night searches depend on the sort of equipment being used, and are described in the particular search and rescue unit's standard operating procedures. For searches involving night vision goggles, refer to 7.69.

BASIC SEARCH PLAN

5.38 **General**—A search outline is required in almost every mission. While it may be very abbreviated for a single search unit, or very complex for a large number of units, many lives may depend on its careful development by the search planner. When a search unit is tasked, four things are of vital importance to its commander:

.1 an adequate briefing on the search object;

.2 description of search area;

.3 optimum search pattern; and

.4 optimum track spacing.

This information should be considered the minimum, but other information may be added when applicable or available.

5.39 When developing a search plan the planner must carefully weigh the limitations of time, terrain, weather, search object detectability, available search units and their capabilities, size and location of search area, search unit staging locations, safety factors, and the particular probability of detection desired under the circumstances.

5.40 The search planner develops his optimum search plan on the assumption that an adequate number of suitable search units will be available to conduct the search. Once these requirements are known, he should make every effort to obtain the required units. If all the desired units are not available, then compromises or alternative units must be considered to enable development of an attainable plan.

5.41 Time is of paramount importance, since the survivors of an incident may be ill-equipped to deal with their new environment. While thorough search planning and good search conditions are the optimum, the searchmaster should exercise his judgment in initiating a search with the information and search units immediately at hand, increasing the effort when more information and units become available.

5.42 **Search Concentration**—The likelihood of survivors decreases with time, making it imperative that the search planner complete a maximum search effort at the outset of the search. Usually, a large area will be involved, compounding the problem. Adherence to the following principles has proven successful in the past:

.1 define an area large enough to encompass the survivors;

.2 use a track spacing equal to the sweep width (coverage factor equal to 1.0);

.3 select a time frame to complete the search;

.4 determine the number of aircraft and/or vessel hours needed to complete the search in the allotted time;

.5 dispatch sufficient search units to complete one search of the area within the allotted time;

.6 if unsuccessful, expand and repeat the search; and

.7 avoid re-orienting the search or reassigning search units unnecessarily.

In any search, re-orientation of the search area once a particular search has commenced is both difficult and wasteful. Thus, planning should be thorough and then adhered to. The temptation to reassign units for every new lead or sighting report should be resisted. Rather, additional units should be dispatched to check out such possibilities.

5.43 **Search Sequence**—There is no single sequence of search types or patterns which will be suitable for all searches. Figure 5–7 shows a representative search sequence, in this case where a large area is to be searched and search units are limited. Night searches should be considered when terrain is suitable and when there is a likelihood that survivors might have night or electronic signalling capability.

5.44 In all cases, search planners will be expected to use their judgment and the available units to establish a sensible and attainable search sequence, based on the type of target or signalling device expected and the environmental conditions encountered.

Search	Type	Period	Target	Preferred Aircraft	Track/ Speed	Spacing	Altitude
1 and initial	trackline	day/ night	communication wreckage, electronic beacons	jet	300/600	50	10 000–40,000
2	electronic	day/ night	electronic beacons	jet	300/600	50	10 000–40 000
3	visual (aids)	night	fires, flares, torch, etc.	turbo-prop	150/300	20	1500–3000
4	visual (aids)	day	mirrors, dye	prop	130/190	10	1500–2000
5	visual (rafts)	day	rafts	prop, helo	100/180	3.1	300–1500
6	visual (wreckage)	day	wreckage	prop, helo	75/130	0.3	200–500
All aircraft to keep radar search.							
NOTE: Initial, electronic and visual (aids) searches could take place simultaneously at night and visual (aids)/(rafts)/(wreckage) searches could take place during the ensuing daylight hours; six searches being completed by the end of a 24 or 36 hour period.							

FIGURE 5–7 SEARCH SEQUENCE

5.45 **Search Area and Time**—To aid in the computation of the area and time involved in sequential coverage of various search areas, a series of nomographs and tables have been developed and are attached in Annex 5C.

SAR BRIEFINGS/TASKINGS

5.46 **Aircrew**—The initial briefing to the first crews participating in a search operation shall normally be given by the rescue co-ordination centre (RCC) via telephone/fax. The briefing shall cover all the items detailed in either of the SAR Briefing/Tasking Form for Aircraft shown in Annexes 9G to 9I, and any additional information items considered pertinent to the case. When search headquarters have been set up and a searchmaster (SM) appointed, it is the responsibility of the SM to ensure that all search crews are adequately briefed prior to each sortie. The appropriate SAR Briefing/Tasking Form shall be filled out by the SM and made available to each search unit commander prior to each mission.

5.47 When possible, the briefing shall commence with a comprehensive description of the weather situation and forecast given by a meteorologist or qualified meteorological technician. If such personnel are not available, then the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or the SM shall provide as detailed a weather picture as is possible.

5.48 The SRU commander shall only accept the proposed mission if, in the commander's judgement, the SRU's equipment and crew capability will permit completion of the task with safety. To ensure secondary aeronautical SRU commanders fully understand the scope of the mission, search and rescue (SAR) controllers shall provide each commander with a detailed briefing covering all the items of the SAR Briefing/Tasking Form for Aircraft—Secondary Search and Rescue Units shown in Annex 9I.

5.49 SRUs are obligated to maintain regular communications with the RCC/MRSC/SM and this should be emphasized to secondary SRUs. SRUs should also be instructed to contact the RCC/MRSC before departure and upon arrival. SAR controllers shall employ all means to verify the status of the SRU if a communications check-in is missed. This could include the dispatch of another SRU if consecutive check-ins are missed. The SAR controller should also not hesitate to task a primary fixed wing SRU to provide top cover for a secondary helicopter SRU if the controller feels the secondary SRU may require assistance (i.e., communications).

5.50 Secondary SRUs will be tasked through normal tasking procedures; however, in emergency situations where this procedure would not be practicable, the request for assistance may be made directly to the SRU commander. In these cases, the SRU commander or the requesting SAR official shall, as soon as possible, take steps to report through regular channels the action being taken and the circumstances which made a direct approach necessary.

5.51 **Maritime Crew**—Briefing for commanding officers of maritime SRUs should cover all details concerning the SAR object and other relevant information as described in the SAR Briefing/Tasking Form for Vessels (Annex 9J)

5.52 **Other Agencies**—The RCC/MRSC is responsible to ensure that all other organizations participating in the search operations have all of the necessary details for the briefing of their crews.

5.53 **Press/NOK**—The RCC/MRSC or SM or his representative must ensure the press and next-of-kin are kept informed of the situation. A good rapport with these groups is important.

AIR DEFENCE, AIR TRAFFIC CONTROL AND MARINE COMMUNICATIONS AND TRAFFIC SERVICES SUPPORT

5.54 Numerous radar sites located across Canada are used to record the progress of aircraft and vessel movements. These modern radar systems have a capability to assist in locating aircraft or vessels in distress and search planners should make full use of this capability.

5.55 Military radar sites of the North American Aerospace Defence Command (NORAD) may provide valuable information which could help locate distressed aircraft which transit through the area coverage of the defence radar. Rescue co-ordination centres (RCCs)/searchmasters can be provided specific recorded radar information from NORAD sites by contacting appropriate military authorities. RCCs shall maintain a current list of contacts within NORAD to ensure timely provision of such information when required.

5.56 Recorded radar or voice information from civilian and military Air Traffic Control (ATC) installations may also be used to assist in responding to an aeronautical distress incident. In addition, some air traffic control radar facilities have the capability to direct search and rescue (SAR) aircraft to the scene of a suspected aeronautical distress. When it is believed that ATC information can assist in SAR operations, the Wing's Operations Officer of Canadian Forces bases, or the Transport Canada regional manager of Air Traffic Services, should be contacted as soon as possible.

5.57 In addition, Air Traffic Control should be requested to issue notices to airmen (NOTAM) about the search areas in order to provide added safety for search crews.

5.58 Marine Communications and Traffic Services Centres within the search and rescue region may also be able to provide RCCs/maritime rescue sub-centres with real-time radar information concerning incidents and/or traffic within the limits of a traffic zone.

METEOROLOGICAL SUPPORT

5.59 **SAR Operations**—The provision of meteorological support to search and rescue (SAR) operations is the responsibility of the Canadian Forces Weather Service. The rescue co-ordination centre (RCC)/searchmaster (SM) will co-ordinate with the Canadian Forces Weather Service to arrange for the meteorological services to be provided at a deployed search base.

5.60 In the initial planning of a search and rescue (SAR) operation, the RCC/marine rescue sub-centre(MRSC)/SM shall have available comprehensive information on the past, prevailing, and forecast meteorological conditions in the search area, and the prevailing and forecast conditions en route from and returning to the base from which the search is being conducted. Most of the Canadian Forces Weather Offices are equipped to receive satellite photos via fax. These pictures are available for the visual and infra-red frequencies and may be of assistance to search planners. In the case of maritime SAR, forecast and prevailing ice conditions should also be obtained. This information shall be obtained from the Canadian Forces Weather Office/Canadian Forces Forecast Centre/Canadian Forces Meteorological and Oceanographic Centre designated by the Senior Staff Officer, Meteorology. For subsequent operations, the required meteorological information shall be obtained in accordance with the arrangements made by the Senior Staff Officer, Meteorology or his delegate. MRSCs and CANSARP will normally obtain past, prevailing, and forecast meteorological information directly from their established points of contact with Atmospheric Environment Services.

SATELLITE, AERIAL AND INFRA-RED PHOTOGRAPHY

5.61 If the use of air or infra-red photography may aid the conduct of a search, a request for its use shall be forwarded by priority message to the National Defence Operations Centre (NDOC).

5.62 Space-based, multi-spectrum detection systems may be capable of assisting in detecting the search object. A request for this service may be forwarded by priority message to the North American Air Defence (NORAD), through NDOC.

DIVING AND UNDERWATER SEARCH OPERATIONS

5.63 Suspension or continuation of a search may depend on underwater detection and recovery measures to locate a missing aircraft or maritime craft to establish the fate of its occupants. However, if identification of floating wreckage or an accumulation of evidence which clearly established the fate of the aircraft or vessel and its occupants is possible without recourse to underwater search, then there is no responsibility for the SAR system to co-ordinate or participate in underwater detection or recovery action.

5.64 Assistance may be rendered when requested by a competent provincial or federal authority; however, nothing in this article should be construed as committing the SAR system to undertake or to continue underwater search when such action is considered by the search and rescue region (SRR) commander to be impractical.

5.65 When required, the SMC/SM may co-ordinate diving operations using units of the Department of National Defence (DND), the Department of Fisheries and Oceans/Canadian Coast Guard (CCG), the Royal Canadian Mounted Police, or any provincial or federal agency that is prepared to assist and can provide suitable equipment and qualified personnel. Commercial facilities may be engaged on authority of the SRR commander if suitable government facilities are not available, and underwater investigation is deemed necessary to the expeditious conduct of the search. Should the use of DND units and capability be required, direct communications should be effected with the Maritime Forces Atlantic or the Maritime Forces Pacific Headquarters, as appropriate.

5.66 The decision to continue an underwater search will be as a result of consultation between the SMC/SM and the appropriate diving advisor/supervisor or commanding officer (if aboard a CCG vessel).

5.67 Despite the above considerations, it is provincial authorities that have jurisdiction in the matter of drowned persons. Therefore, any participation in recovery must be with the cognizance and consent of the provincial authorities concerned.

5.68 The CF and the CCG have specific diving procedures:

.1 SAR Technician diving procedures are contained in *CFACM-2605*; and,

.2 CCG diving procedures are contained in the CCG Fleet Safety Manual.

LOCATION OF SEARCH OBJECT—SAR CREW PROCEDURES

5.69 When a missing aircraft or vessel is located, it shall be inspected carefully to verify that it is the object sought and the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or the searchmaster (SM) shall be advised immediately. A report of the sighting shall be passed to search headquarters without delay. If positive identification cannot be made, a statement to this effect shall be included in the report.

5.70 When a search and rescue unit (SRU) has located the search object, it should attempt to indicate to the search object, by any means, that it has been sighted. The position of the object of search shall be carefully plotted and a notice of crash/casualty location (NOCL) message, shall be dispatched to the RCC/MRSC or the SM. If possible, the SRU should remain visible to the search object in order to contribute to the survivors' mental well-being.

5.71 If unable to do the rescue, the search crew shall scrutinize the area carefully with a view to assisting those who will be required to effect rescue or conduct investigations. If possible, several photographs of the scene and surrounding area shall be taken. Any open stretches of land on which aircraft could conceivably be landed or SAR Technicians dropped, or any lakes or rivers on which an aircraft could land, should be examined, and any information which may assist in rescue operations shall be reported.

5.72 Crews locating survivors in a liferaft shall be particularly careful not to lose sight of the raft. In normal circumstances, search aircraft should remain in the vicinity of the raft until relieved, or until prudent limit of fuel endurance. If possible, the location shall be marked by smoke floats, sea markers, or datum marker buoys.

5.73 Crews of search aircraft finding survivors in obvious need of food, water, or first aid equipment, shall, at the captain's discretion, drop the necessary supplies and equipment carried on the search aircraft for that purpose. If the aircraft locating the object of the search is not carrying the special supply drop equipment designed for dropping to survivors of a distress incident, then the captain shall immediately notify the RCC/MRSC or SM of his position and request that a unit carrying the necessary equipment be dispatched or diverted to the scene.

5.74 Kits containing narcotics shall not be provided to survivors of a distress incident unless accompanied by personnel trained in the administration of narcotics.

5.75 Search crews shall watch for signal messages from survivors. Any such signal noted shall be relayed immediately to the RCC/MRSC or SM.

5.76 Many newer generation aircraft include components which when damaged in an accident may release hazardous material into the environment (carbon fibres, hydrazine, etc.). It is imperative that responding units and personnel are adequately protected in these circumstances and that the RCC contact the 1 Canadian Air Division Chief Health Services for directions in handling dangerous materials at a crash site.

NOTICE OF CRASH/CASUALTY LOCATION

5.77 The purpose of the notice of crash/casualty location (NOCL) message is to advise the rescue co-ordination centre/maritime rescue sub-centre or the searchmaster of the location of an aircraft crash or maritime casualty and to provide pertinent details to enable appropriate rescue decisions. The format is designed to ensure an orderly and complete transfer of information and to provide some protection for sensitive information. The contents of the NOCL are listed in Annex 5D.

RESTRICTING ACCESS TO A RESCUE SITE

5.78 In the event that press or private aircraft are interfering with rescue operations or jeopardizing flight safety, the rescue area can be immediately restricted to search and rescue operations by advising the Transport Canada Air Operations Centre in Ottawa, at (613) 992-6853.

PHOTOGRAPHY OF THE SEARCH OBJECT

5.79 When the search object has been located, it shall be photographed if possible from the height and distance at which it was first spotted and at the various heights and distances normally used in search. The rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC)/searchmaster shall be notified immediately that photographs have been taken. Either negatives or developed photos shall be forwarded to RCC/MRSC by the most expeditious means for a possible press release. Photographs so taken shall also form a photographic library at search and rescue units and shall be used in training crews and spotters and briefing them during future searches. Copies of photographs considered useful for briefing and training purposes shall be forwarded to the National Defence Headquarters/J3 Operations and to the Director, Search and Rescue, Canadian Coast Guard, as applicable.

5.80 When possible, photographs shall be taken at incident sites showing the crash/wreckage location, equipment in use, and any other pertinent details that would assist authorities in conducting an investigation of the incident. These photographs will normally be taken by search and rescue personnel. Every bit of wreckage which would appear worthwhile to the investigators should be photographed. The location and position at which the photographs were taken should be marked on a grid or chart and this information retained. Bodies should not be photographed, but if it is necessary to take a picture of an area with a body in it, the body should be covered if possible.

RELEASE OF PHOTOGRAPHS

5.81 **Photos for Casualty Investigation**—Search and rescue incident photographs may be provided to the Transport Safety Board, the Coroner and the Royal Canadian Mounted Police, who shall request these through the rescue co-ordination centre when it appears that an investigation will take place. Requests from media sources for the release of photographs should be directed to Department of National Defence Public Affairs.

TRANSPORT OF BODIES/CORONER/ TRANSPORT SAFETY BOARD REPRESENTATIVES

5.82 During a search operation, authority to transport the coroner, the coroner's representatives or local authorities to a crash site is vested in the searchmaster or the rescue co-ordination centre Duty Aeronautical Controller. After the suspension of the search, only National Defence Headquarters (NDHQ)/J3 Operations (J3 Ops) holds that authority. Similarly, authority to transport representatives of the Transport Safety Board (TSB) for any situation must be obtained from NDHQ/J3 Ops. Hoisting of coroner, the coroner's representatives, local authorities or representatives of the TSB is not authorized. Bodies can be removed once approved by the coroner.

CRASH SITE

5.83 When the subject of the aeronautical search has been found, the rescue co-ordination centre (RCC) shall inform the appropriate Transport Safety Board Regional Office and confirm the requirements for guarding the wreckage pending the arrival of the accident investigation team. The RCC or searchmaster shall ensure that, when necessary, guards are mounted to prevent the disturbance of wreckage or any marks made by the aircraft in landing and the guard is maintained until relieved by the civil authorities. The aircraft wreckage should not be disturbed except to assist in the recovery of survivors.

REDUCTION OF MAJOR SAR OPERATIONS

5.84 While numerous search and rescue (SAR) incidents occur daily, many are of a minor nature, and are resolved in a relatively short period of time. There are, however, some incidents which develop into major SAR operations and, as such, require the employment of considerable federal units. Because of the potential for public reaction when a search object cannot be found, authority to withdraw units in unsuccessful major SAR operations has been vested in the National Defence Headquarters (NDHQ). Searchmasters (SMs) shall ensure that the situation reports (SITREPs) are completed in enough detail to enable NDHQ staff to process reduction requests. The format for SAR reduction requests is provided in Annex 5E.

> **NOTE:** Minor searches are those which do not meet the following criteria. Minor searches may be reduced by the Officer in Charge (OIC) of the rescue co-ordination centre (RCC) on the authority of the search and rescue region (SRR) commander.

5.85 Major SAR operations, for the purpose of this section, are those which meet the following criteria:

.1 aeronautical and maritime SAR incidents where primary maritime and/or primary aeronautical search and rescue units (SRUs) are tasked on an incident for more than four calendar days;

.2 incidents which the SRR commander assesses as being potentially sensitive; or

.3 special cases, as directed by NDHQ.

5.86 When the object of a major SAR operation has not been located after the search area has been adequately covered, and the SM considers there is no likelihood that survivors will be recovered, a search reduction should be recommended. In the case of maritime incidents, such recommendation shall be made under the advice of the regional supervisor, maritime SAR (RSMS). Next-of-kin (NOK) should be made aware that search reduction is being sought. If the SRR commander agrees with the search reduction, NDHQ approval shall be obtained by submitting a priority message in the format of Annex 5E. The request for a maritime SAR reduction at NDHQ shall be evaluated by NDHQ in consultation with Canadian Coast Guard (CCG) Headquarters (HQ) SAR staff. Immediately after the SRR Commander decides to request reduction, the OIC RCC should advise NDHQ by telephone, and the RSMS shall similarly advise CCG HQ in case of maritime incidents. To ensure adequate time to action the request, the reduction request message must reach NDHQ at least one working day prior to the proposed reduction date.

5.87 A delay in reduction after all reasonable steps have been taken would likely result in a needless waste of SRUs. It is therefore important that NDHQ staff officers are armed with full and accurate supporting data prior to presenting the request for approval. To this end, the request message must summarize search activities, outline the reasons for recommending reductions, and resolve any apparent anomalies. NDHQ must also be advised of any local factors which might provoke controversy. The reduction request should be based on the completion of a specified search plan as detailed in the message.

5.88 An authorization for reduction shall not prevent the SM from prolonging the search, should a change in circumstances so demand. In this case, the National Defence Operations Centre shall be advised as soon as it is practicable. For cases involving maritime units, the Director SAR, shall also be advised at the CCG HQ.

5.89 When approval of a search reduction has been obtained, the NOK, if known, shall be advised immediately and the circumstances explained fully. This shall include a frank explanation that the RCC/maritime rescue sub-centre (MRSC)/SM is convinced that there is no longer any hope of finding survivors in the search area, that every reasonable effort has been expended and that all leads have been exhausted. The RCC/MRSC/SM shall state that aircraft/vessels in the area will be asked to keep a lookout, but that, while it may be possible to hold a SAR exercise in the search area at some future date, there will be no further formal search activity. The NOK shall be informed that although the incident will remain open, further search activity is not planned unless new evidence indicates a strong likelihood of locating survivors. In particular, NOK shall not be left with any perception that search activity might resume because of climatological changes such as melting snow, changes in foliage or changes in sea-ice conditions.

5.90 After notification of NOK, the following information may be passed to news media and as required, members of the public:

.1 the full scale search for the (<u>type aircraft/vessel</u>) missing in (<u>area</u>) since (<u>date</u>) has been reduced;

.2 a total of (<u>number</u>) government and civilian aircraft/vessels have flown/steamed (<u>number</u>) hours and covered (<u>number</u>) square kilometres;

.3 the aircraft/vessel was owned by (<u>name</u>) and was (<u>describe mission</u>) at the time of its loss. Aboard were (<u>names and hometowns of persons on board</u>);

.4 the aircraft/vessel was/was not equipped with an electronic locating device and survival gear (if applicable); and

.5 further search activity is not planned unless new evidence indicates a strong likelihood of locating survivors.

REOPENING OF SEARCHES

5.91 Searches may be reopened on the authority of the search and rescue region commander without reference to the National Defence Headquarters when new evidence indicates a strong likelihood of locating survivors. Changes in climatic conditions which might make wreckage more visible at a later date would not constitute grounds for reopening a general search since, if there was any hope of discovering survivors, the search would not have been reduced.

5.92 Requests for reopening searches which do not meet the criteria of the previous paragraph are to be referred to the National Defence Operations Centre for the Deputy Chief of the Defence Staff decision.

5.93 When searches are reopened, normal daily situation reports (SITREPs) shall recommence.

MARKING OF WRECKAGE

5.94 The CF will be responsible for the marking of the wreckage of military aircraft that have not been removed from the crash site. Transport Canada will be responsible for marking the wreckage of civil aircraft that have not been removed.

5.95 Military wreckage will be marked by metal plaques manufactured locally by the search and rescue squadrons. The plaques will bear the words:

THIS CRASH HAS BEEN REPORTED
CET ÉCRASEMENT A ÉTÉ SIGNALÉ

They are to be screwed or bolted firmly to the wreckage or a nearby tree.

5.96 If the wreckage was not marked during either the search or investigation phases, the plaques may be placed during ground party or SAR Technicians jump training exercises. Priority should be given to marking wreckage likely to be encountered by hunters or prospectors.

HUMANITARIAN INCIDENTS— MEDICAL EVACUATIONS AND GROUND SAR

5.97 Medevacs—There are two types of humanitarian assistance that fall under the heading of medical evacuations (medevacs). These types are:

.1 medevac (critical)—the critical evacuation of injured or stranded persons from isolated areas or the recovery of sick or critically injured persons from vessels at sea; and

.2 medevac (routine)—the routine medevac of patients or vital medical resources from one medical facility to another (aeronautical or maritime ambulance service).

5.98 Ground SAR—Ground search and rescue (SAR) is an integral part of the National Search and Rescue Program. Hence, Department of National Defence primary search and rescue units may be tasked, when available, for ground SAR and humanitarian missions such as a search for missing persons.

5.99 DND—On behalf of the search and rescue region commander, the Officer in Charge (OIC) of the rescue co-ordination centre (RCC) shall consider requests from non-defence agencies and decide what units are best suited for the mission. The OIC RCC shall determine if tasking of Canadian Forces SAR resources falls within the guidelines of the National Search and Rescue Program an inform the appropriate LFA when SAR resources are tasked. The OIC of RCCs will be responsible for co-ordinating Canadian Forces (CF) aeronautical and civilian aeronautical resource participation in humanitarian and ground search and rescue missions. Cost recovery actions for CF aeronautical search resources are the responsibility of the Commander of the 1 Canadian Air Division, in accordance with the *CF Provision of Services Manual*.

5.100 DFO—Canadian Coast Guard search and rescue units (SRUs) and facilities may also be tasked for ground search and rescue (SAR) and humanitarian incidents. Controllers receiving requests for such assistance from federal, provincial or territorial health or emergency planning authorities in the approved format (as detailed in local procedures) shall, as soon as practicable, forward the request to the regional supervisor, maritime SAR (RSMS).

5.101 CCG SRUs are neither equipped nor intended for use in some types of ground SAR and humanitarian incidents. Nonetheless, if satisfied that certain specific conditions have been met, the RSMS shall advise the appropriate CCG regional authority of the request. These conditions are :

.1 other appropriate units are not readily available;

.2 CCG units are suitable and available for the mission at hand; and

.3 the request is from and approved by a recognized federal or provincial authority.

5.102 Should the request be approved and CCG SRUs be selected as the appropriate vehicle for reacting to the request, the approval and unit requirements shall be transmitted to the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) originating the request. If the Officer in Charge of the RCC or RSMS is of the opinion that the tasking of the required units would hamper the maritime response capability in the Region, the use of the CCG primary SRUs may be denied or deferred. Any such denial or deferral shall be immediately forwarded to the appropriate regional authority/manager or his delegate in order that other arrangements may be made.

NOTE: For purposes of the *National SAR Manual (NSM),* RCCs/MRSCs shall consider the Superintendent, Rescue, Safety and Environmental Response to be the final authority respecting the utilization of primary CCG SRUs for ground SAR and humanitarian incidents.

5.103 The Director SAR, CCG, shall be kept informed of any ground SAR or humanitarian incident involving CCG primary SRUs. The RCC/MRSC shall be informed as soon as is practicable by the RSMS if the request is not approved or if secondary SRUs are to be used. In the latter instance RCC/MRSC shall also be advised when the mission is complete or CCG SRUs are no longer involved.

DIVING ACCIDENTS

5.104 Diving accidents are normally the responsibility of local authorities (see Chapter 4, Missing divers/swimmers). It may be necessary, however, for a controller to ensure that appropriate action is taken until the responsible authority can take charge of the incident.

5.105 In all serious diving accidents, and when in doubt, specialized medical assistance must be arranged without delay. Therapeutic recompression can best be conducted in a compression chamber capable of holding two or more people and fitted with an inner and outer compartment. A one-man chamber can be used for emergency treatment of decompression sickness but, on such occasions, this chamber must be conveyed to the site of a multi- personnel chamber by the quickest means after therapeutic treatment has started.

5.106 Preferably, a diving casualty should be accompanied by a person adequately trained in the medical aspects of diving accidents. In all cases, detailed written information concerning patient and accident must travel with the casualty.

5.107 Diving accidents occurring in coastal waters and remote areas usually require medical assistance on short notice. Therefore, rescue of the casualty by helicopter or transportation of medical assistance will be asked for in most cases. Assistance by a surface vessel equipped for therapeutic recompression or with medical facilities is also possible. Where suitable helicopters or surface vessels are not available, the requirement may be to get the casualty ashore by boat and transport him to medical assistance or recompression facilities by road.

5.108 The choice between helicopter and surface vessel depends on various factors such as:

.1 helicopter capability;

.2 weather conditions and sea state;

.3 distance to be covered; and

.4 condition of the casualty.

5.109 A helicopter landing will only be attempted 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 not being treated in a recompression chamber.

5.110 Evacuation by helicopter of a patient being treated in a recompression chamber should only be attempted if the helicopter is capable of accommodating the recompression chamber.

5.111 During the flight, the recompression chamber is to be attended constantly and sufficient breathing gas must be available for adequate ventilation of the chamber.

5.112 Helicopters evacuating a diving casualty not being treated in a recompression chamber, should preferably fly at altitudes not exceeding 300 feet above ground level.

ANNEX 5A—VISUAL SEARCH PATTERNS

1. **Track Crawl Pattern**—The track crawl pattern is usually employed as the initial search action, and is based on the assumption that the search object will be close to its intended track, or that there will be survivors capable of signalling when they hear or see the search unit. Some common track crawl patterns are shown in Figure 5A–1. Track crawl patterns can be used on electronic or visual searches.

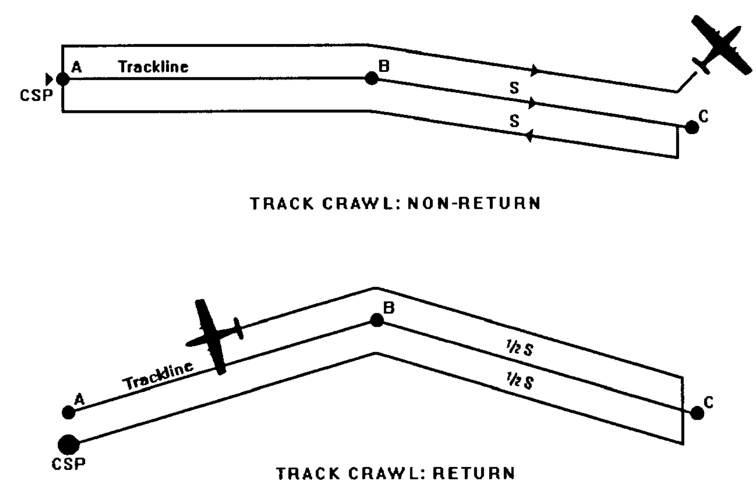

FIGURE 5A–1 TRACK CRAWL PATTERN

2. **Creeping Line and Parallel Track Patterns**—There are two types of patterns which require successive search legs advancing across a search area. They are Creeping Line or Parallel Track patterns. Both are employed to provide uniform coverage over areas where only the approximate position of the target can be estimated. Such patterns are called Creeping Line when the legs are parallel to the shortest side of the search area.

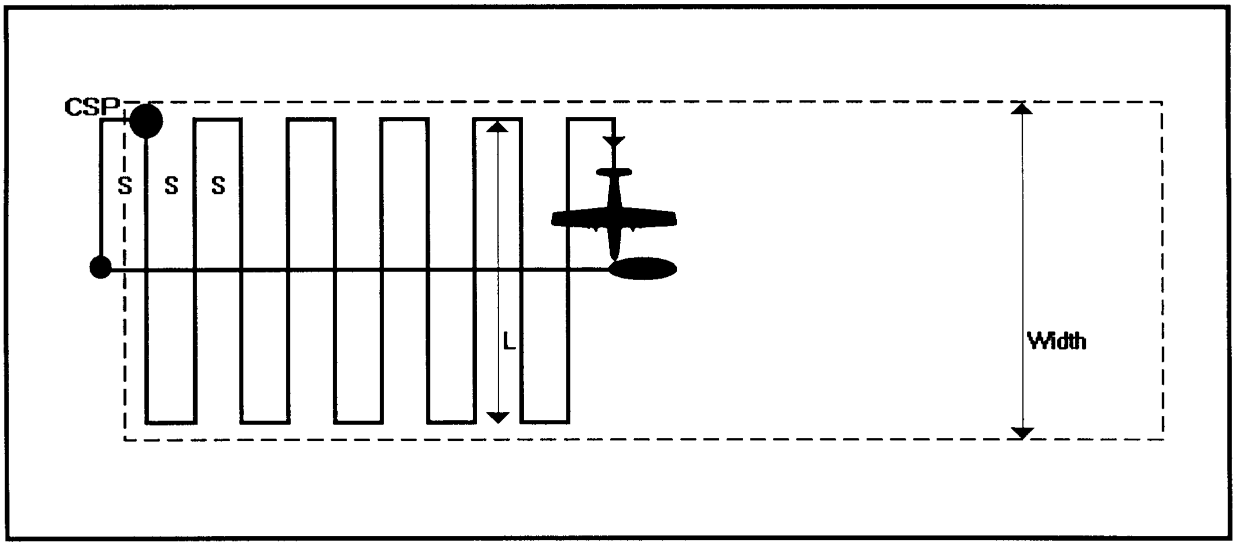

FIGURE 5A–2 CREEPING LINE PATTERN

Creeping Line patterns are suitable for rapid advancement along a given track or drift line.

3. A Parallel Track differs from a Creeping Line in that the legs are parallel to the longest side of the search area.

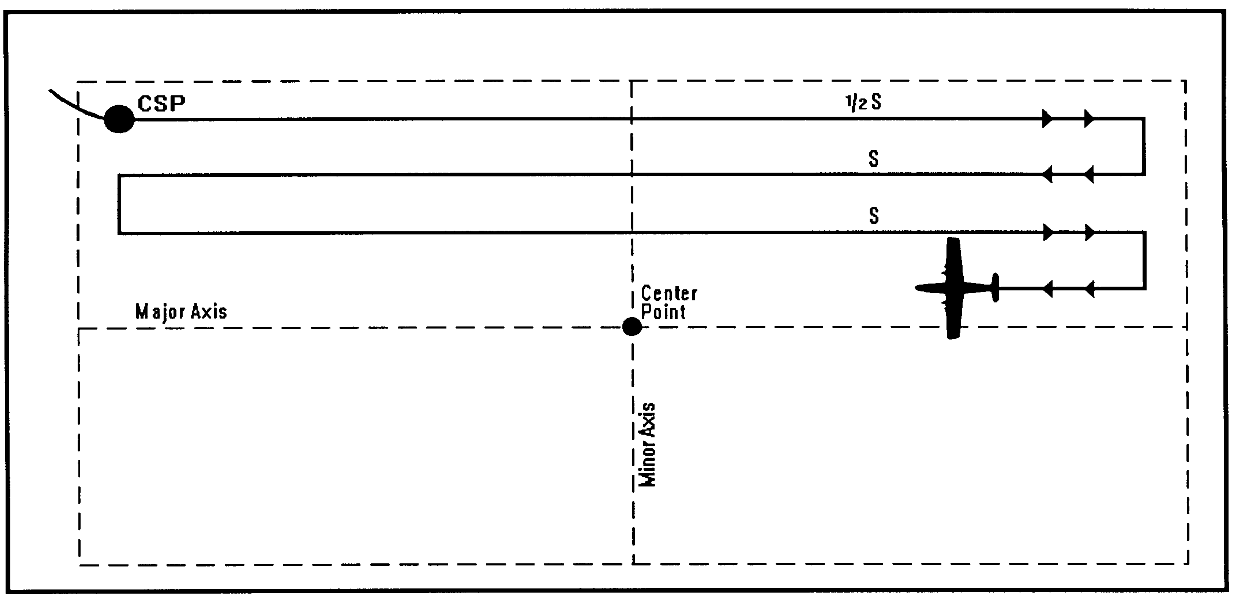

FIGURE 5A–3 SINGLE UNIT PARALLEL TRACK

Parallel track patterns are more suitable for large areas since there are fewer turns and navigation is normally more accurate.

4. **Expanding Square Pattern**—An expanding square search pattern is used when the location of the search object is known with reasonable accuracy, usually within an area of about 100 square miles. It is a pattern which requires precise navigation to avoid gaps in coverage. Figure 5A–4 shows an example of a square search pattern.

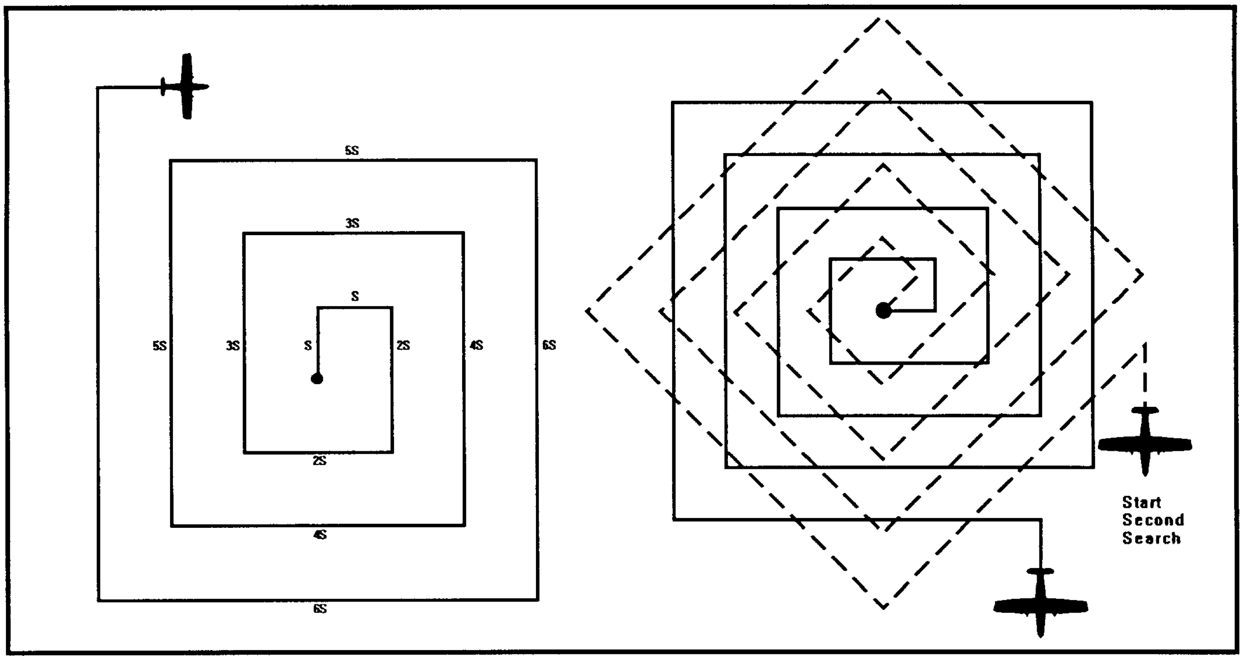

FIGURE 5A–4 EXPANDING SQUARE

5. If second coverage of an area is desired, the tracks should be angled at 45 degrees to the first coverage. If the search object is believed to be moving, the square pattern may be adjusted to a rectangular one, with the longer legs parallel to the suspected track line. This would normally only be considered for very slow moving objects.

6. **Sector Pattern**—This pattern is used when datum is established with a high degree of confidence, the search area is not extensive and the search object is difficult to detect. A navigation aid such as a datum marker buoy or a smoke marker can be used at the centre of the pattern to achieve very accurate navigation. The chief advantage of a sector search is that track spacing at the centre of the search is very small, resulting in a greater probability of detection in the area of greatest probability of whereabouts.

7. Figure 5A–5 shows an example of a sector search, including the orientation of the second search. Normally, sector search patterns should not have a radius greater than 10 nautical miles (M) for aircraft or 5 M for vessels; another type of pattern should be used for search areas any larger than 300 square miles. Usually a six sector pattern is used, simplifying the navigation in that each turn is 120 degrees to the right. If a second pattern is required, it is commenced 30 degrees off the first.

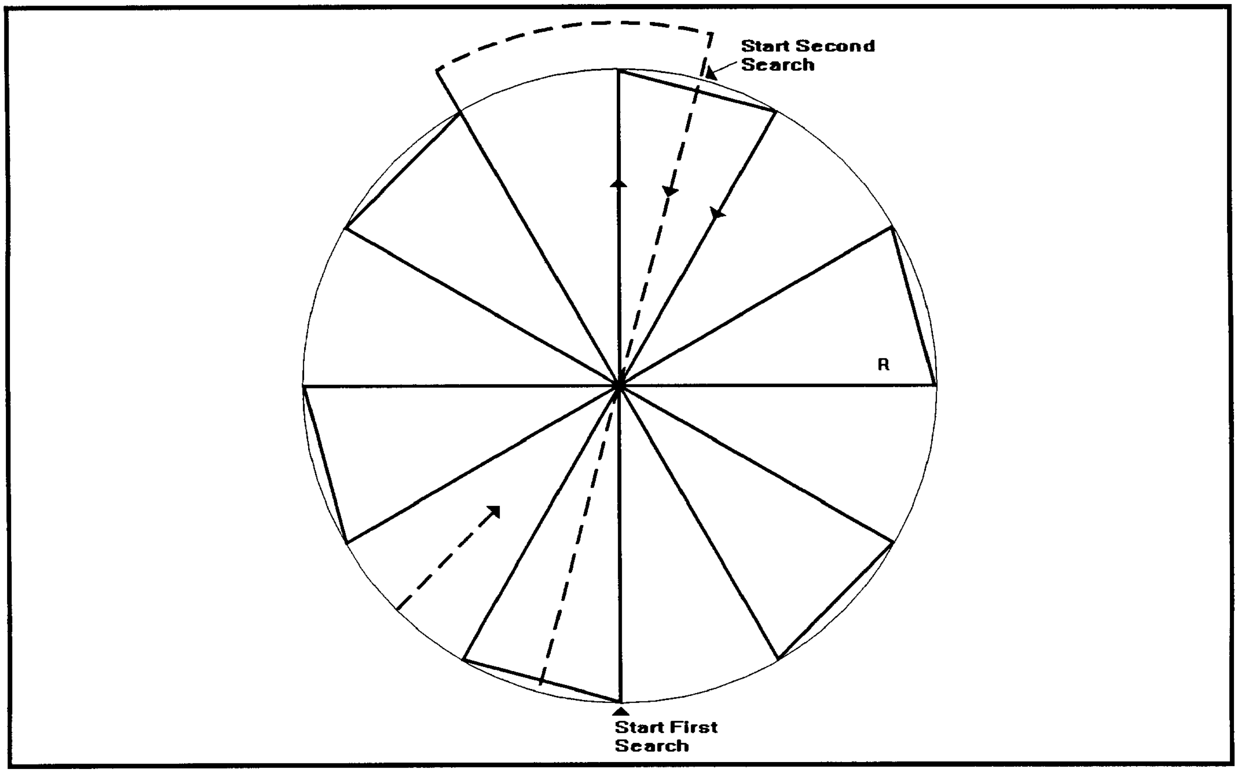

FIGURE 5A–5 SECTOR SEARCH

8. **Contour Search**—In much of the terrain in Canada this is the only suitable search pattern. It is also a hazardous search procedure, and can only be assigned when the following conditions are met:

a. the aircraft used must be suitable, i.e.: highly manoeuvrable, low speed and small turning radius with adequate power reserve;

b. the crew must be experienced in mountainous terrain, well briefed and in possession of suitable maps; and

c. only one aircraft may be assigned to an area for contour search, multi-unit contour searches being conducted only by ground search teams.

9. An example of a contour search pattern is shown in Figure 5A–6.

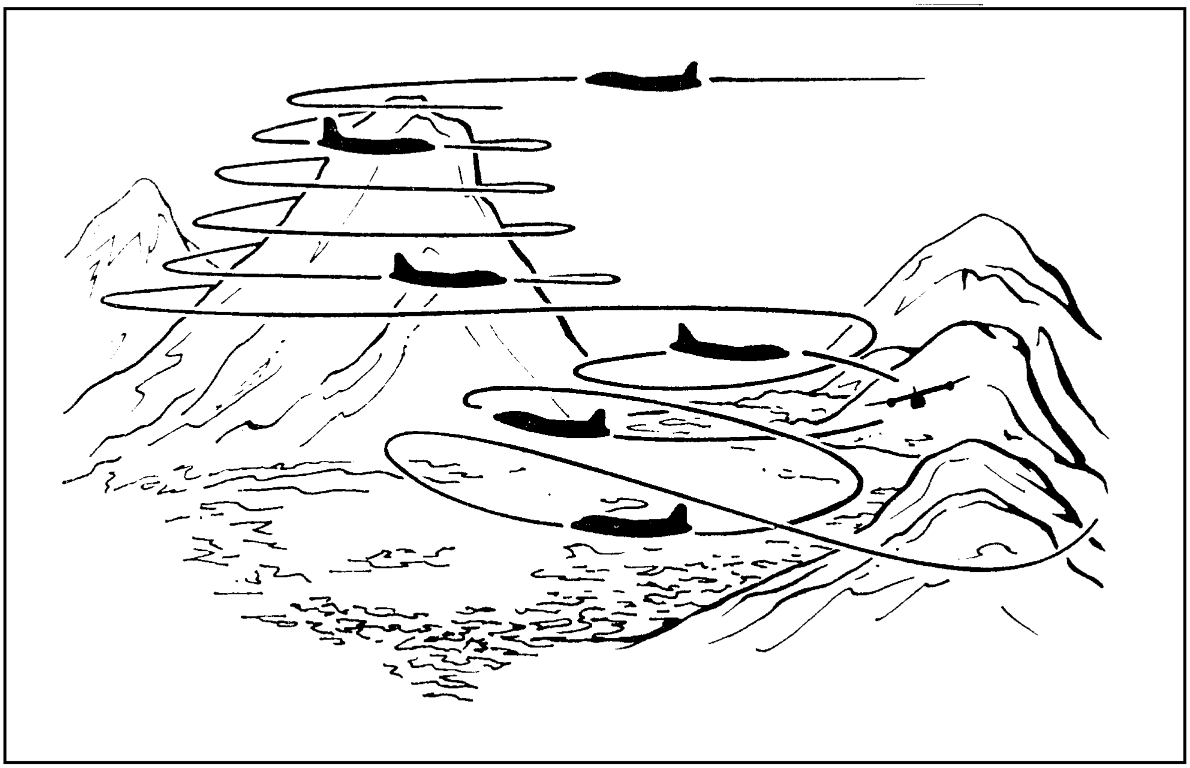

FIGURE 5A–6 CONTOUR SEARCH

ANNEX 5B—
EMERGENCY LOCATOR TRANSMITTER REPORT—PROBABILITY AREAS

UTILIZATION OF ELT RECEPTION REPORTS

With the information received from emergency locator transmitter reports, the theoretical reception range for very high frequencies (VHF) and ultra high frequencies (UHF) signals can be used to arrive at a rough estimate of the search probability area.

VHF/UHF THEORETICAL RECEPTION RANGES

Altitude above ground level	Range
1,000 feet	30 nautical miles
2,000 feet	45 nautical miles
3,000 feet	55 nautical miles
4,000 feet	67 nautical miles
5,000 feet	85 nautical miles
10,000 feet	100 nautical miles
15,000 feet	127 nautical miles
20,000 feet	150 nautical miles
30,000 feet	200 nautical miles

NOTE—The ranges in this table are for an electronic locator transmitter (ELT) operating at full power. Actual reception range will depend on terrain, signal strength and other factors.

The following examples show how ELT tone information received from overflying aircraft can be used to locate the source of the signal.

EXAMPLE A

The pilot of a Beaver is flying from point A to point B. Over point X at 2000 feet above ground level, he receives a loud and clear steady electronic locator transmitter (ELT) signal. He notes the time and his location but because of fuel considerations does not attempt an aural homing. He continues his flight and keeps monitoring 121.5 MHz. Thirty minutes later at point Y, after covering approximately 60 miles, the signal fades out.

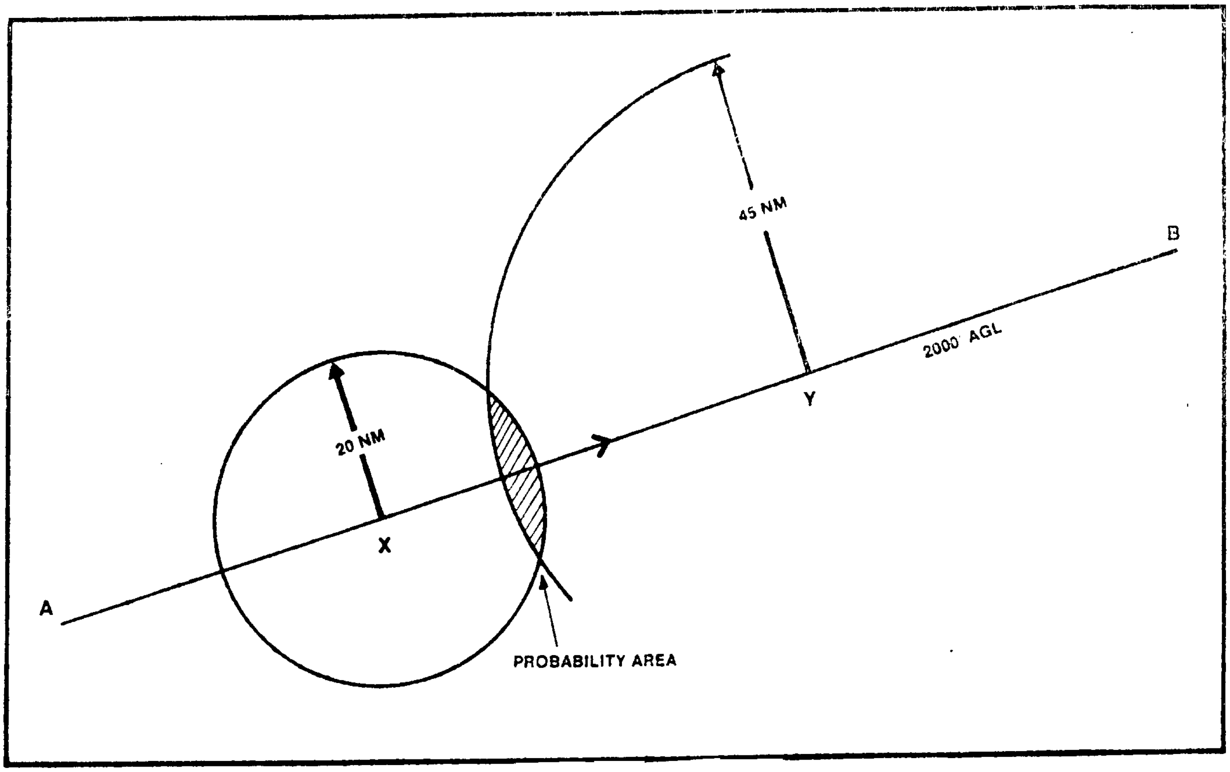

FIGURE 5B–1 ELT SEARCHING EXAMPLE A

SOLUTION

It is most likely, judging from the way that the signal was first received (loud and clear) that the downed pilot did not turn the ELT on until he saw or heard the Beaver. At that time, the Beaver was probably within 20 nautical miles (M) of his position. Since the Beaver pilot continued to hear the beacon until it faded at point y, we can use the VHF/UHF theoretical reception range for 2000 feet of 45 M and draw an arc cutting the 20 M circle drawn around point X. The probability area would then be the relatively small shaded area.

EXAMPLE B

Two different aircraft on two different routes, one flying at 10,000 feet above ground level (AGL) and the other at 30,000 feet AGL, each receiving electronic locator transmitter signals.

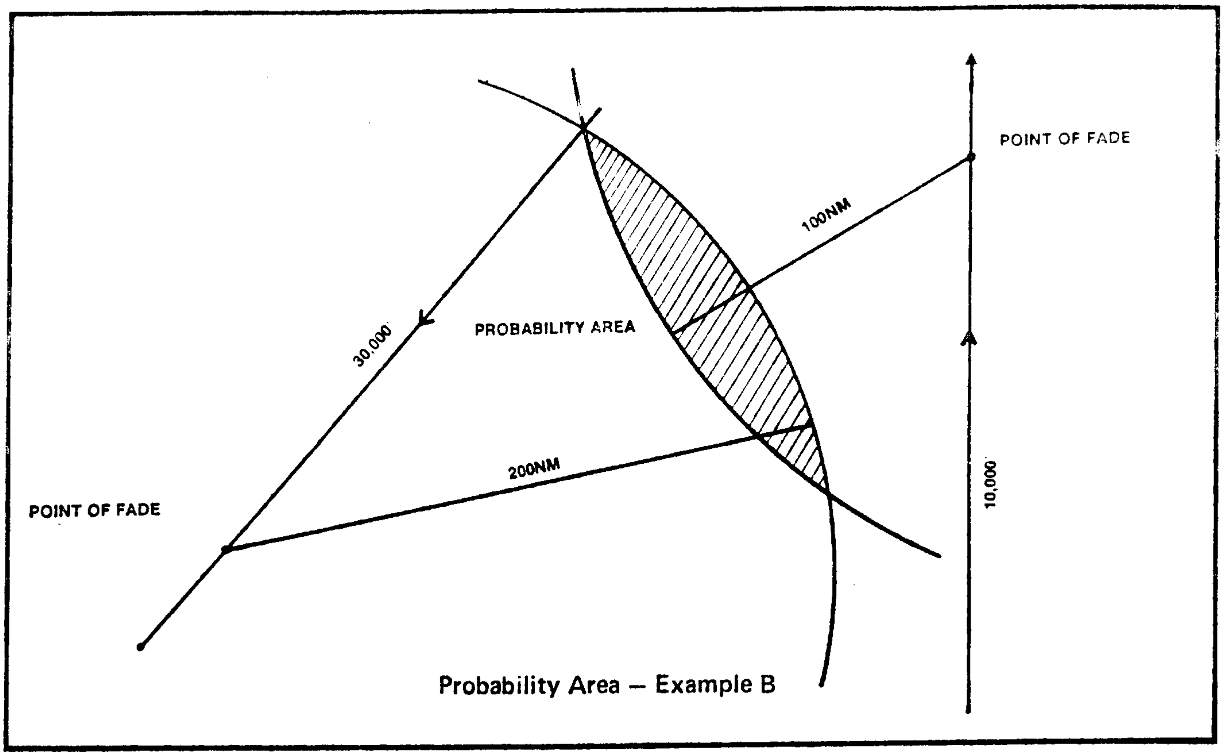

FIGURE 5B–2 ELT SEARCHING EXAMPLE B

SOLUTION

By using the theoretical reception range of 100 nautical miles (M) for aircraft at 10,000 feet and 200 M for aircraft at 30,000 feet, we can draw two arcs and arrive at a relatively small probability area.

EXAMPLE C

One aircraft, flying at 5000 feet above ground level (AGL), picks up a weak signal at point X and tracks it until it fades at point Y.

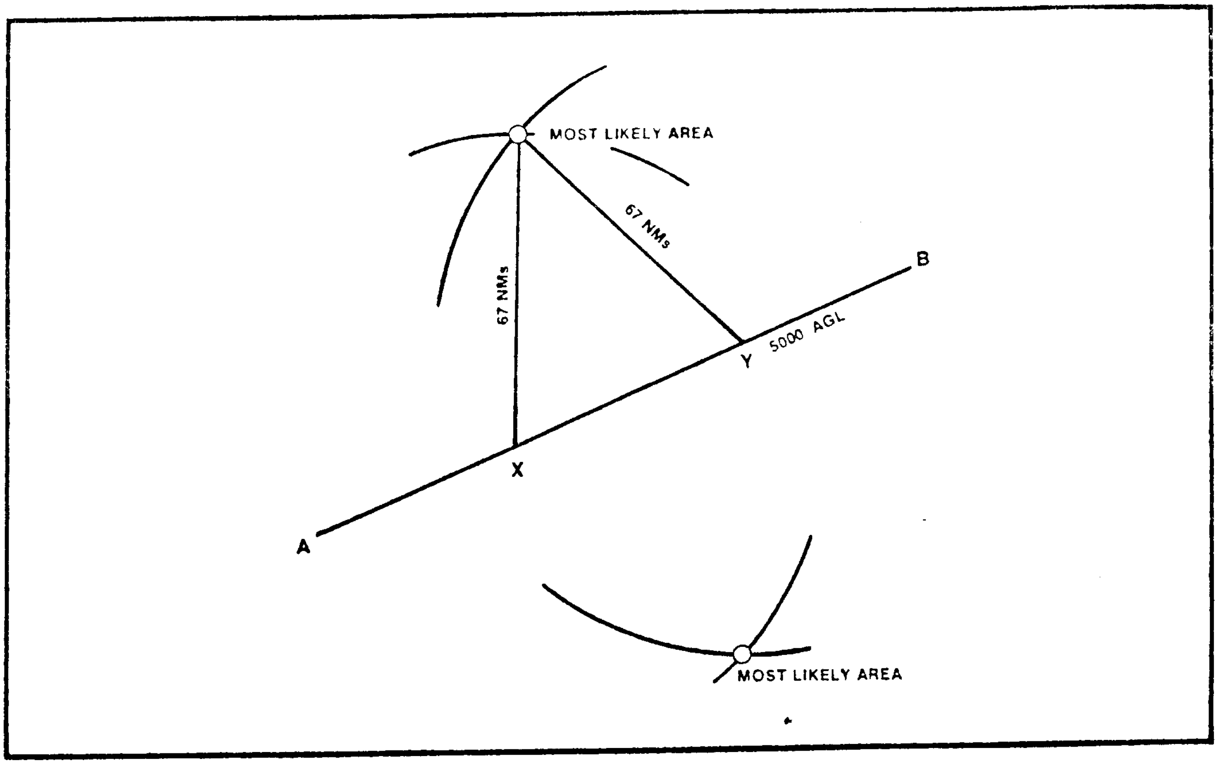

FIGURE 5B–3 ELT SEARCHING EXAMPLE C

SOLUTION

By using the theoretical reception range of 67 nautical miles for 5000 feet, we can draw two arcs from each of the X and Y points and arrive at two most likely areas, one on either side of the track.

ANNEX 5C— SEARCH AREA PLANNING NOMOGRAPHS

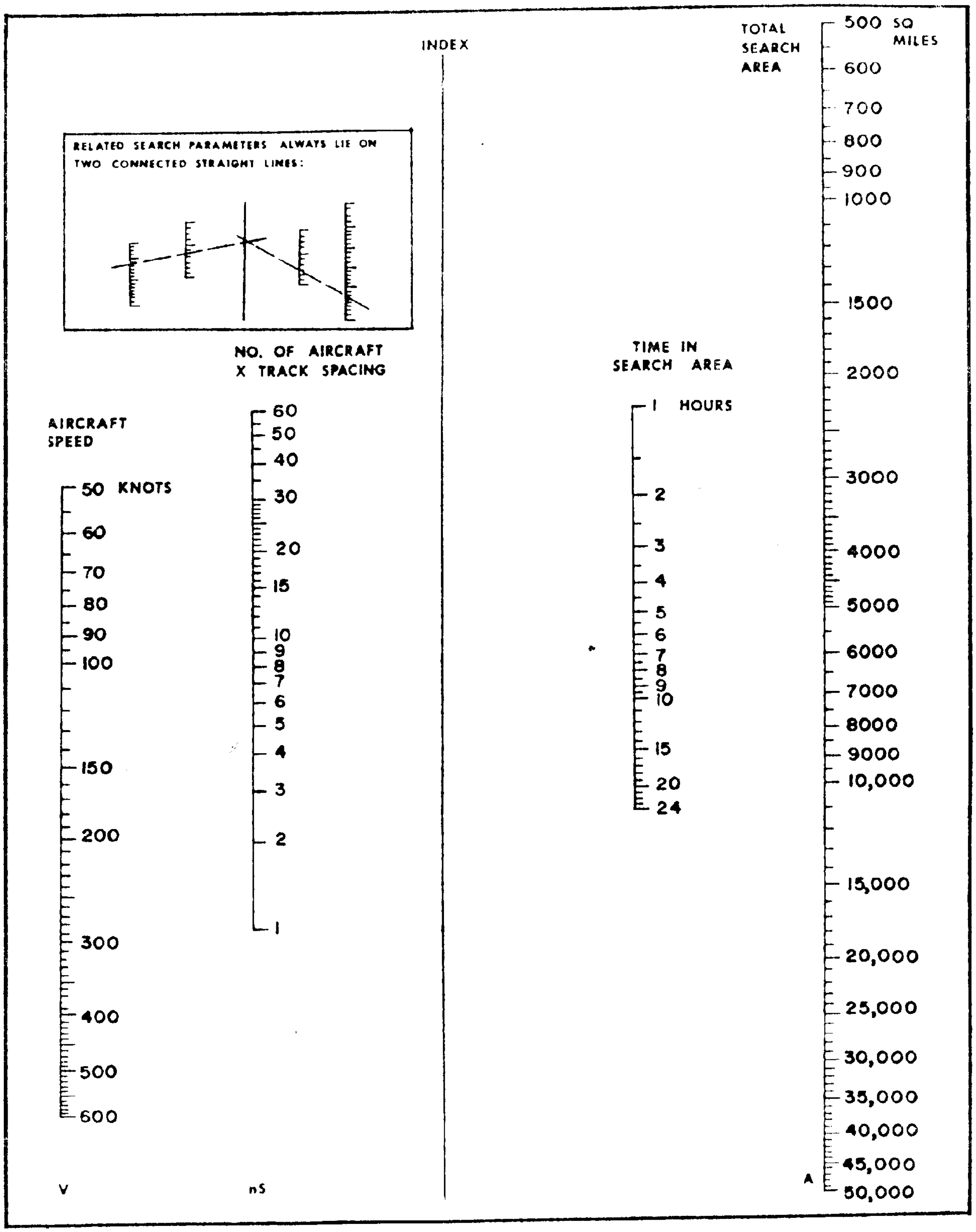

FIGURE 5C–1 SEARCH AREA PLANNING NOMOGRAPH

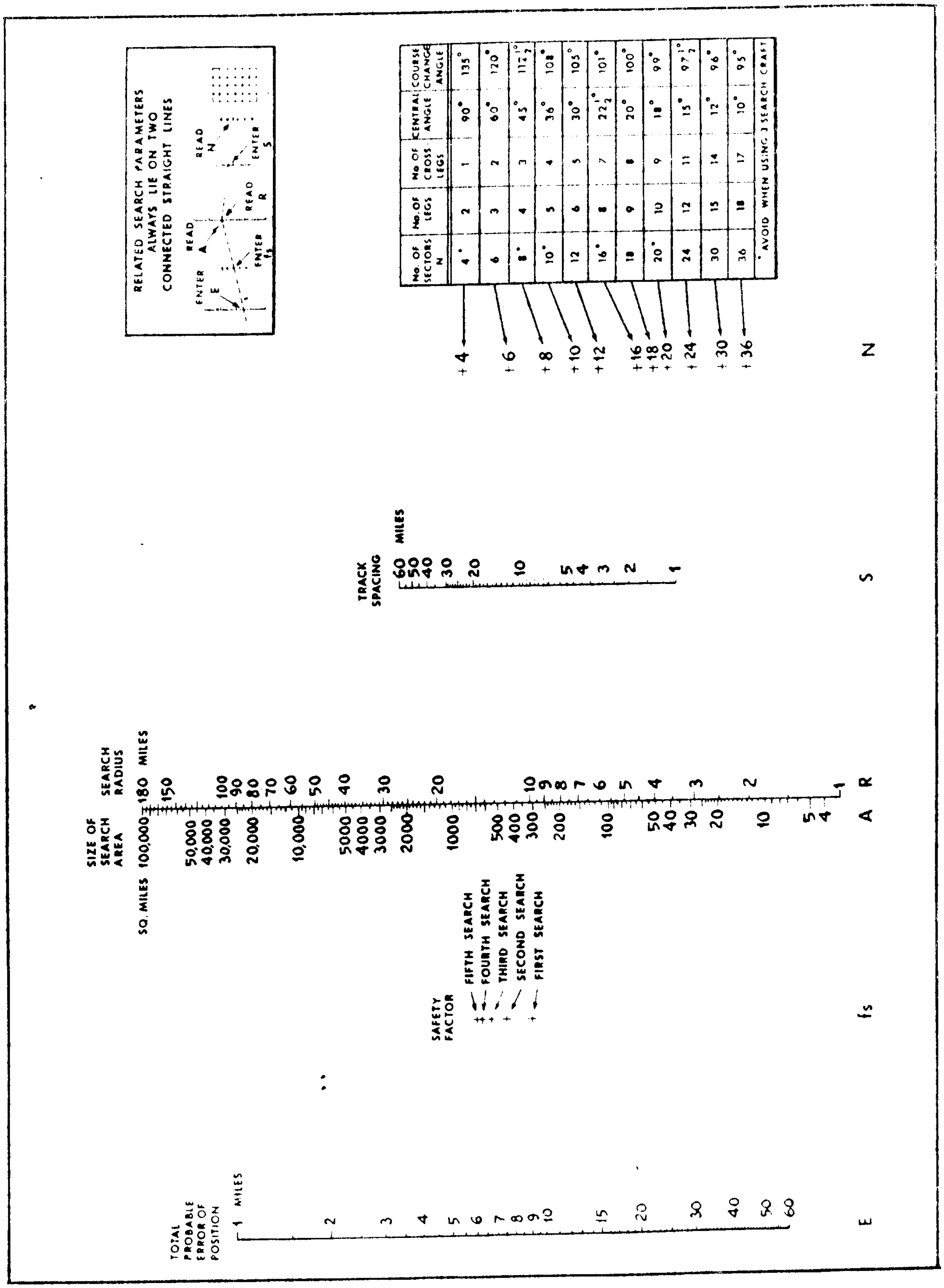

FIGURE 5C–2 SECTOR SEARCH AREA NOMOGRAPH

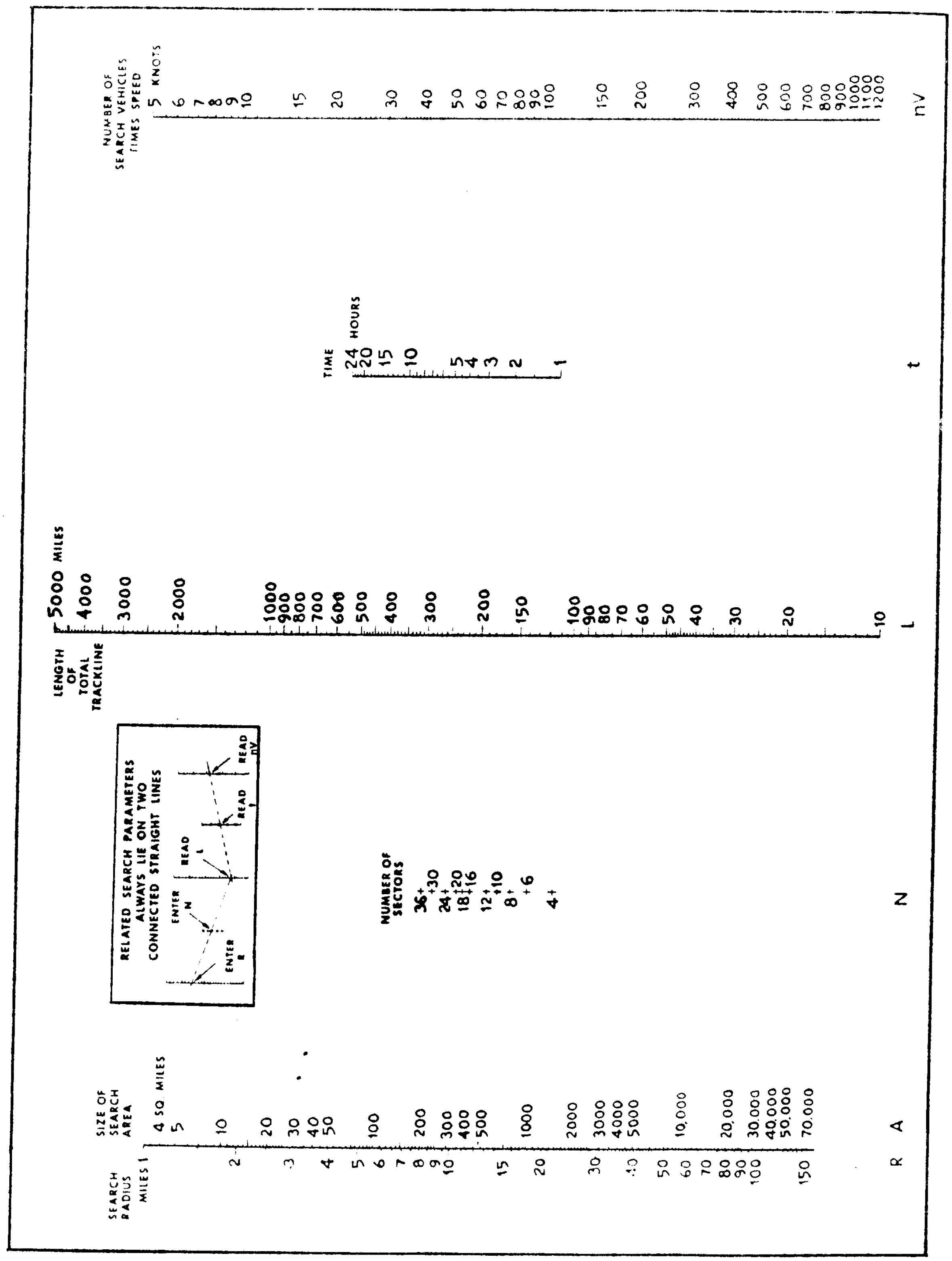

FIGURE 5C–3 SECTOR SEARCH TIME NOMOGRAPH

ANNEX 5D—
NOTICE OF CRASH/CASUALTY LOCATION MESSAGE

The originator should transmit only the words on the left; the meaning is shown on the right.

SEARCHMASTER THIS IS RESCUE 000 NOVEMBER OSCAR CHARLIE LIMA

ALPHA

• AFFIRMATIVE	Positive identification that the object sighted is the search object.
• NEGATIVE	Unable to positively determine that the object sighted is the search object.

BRAVO

- An eight or nine digit group denoting position without North or West being used.

CHARLIE

• NEGATIVE	No survivors or casualties can be seen.
• Any number, followed by (and repeated as necessary)	Indicates number of victims actually seen.
• UNDETERMINED	The status of the survivors or casualties cannot be determined.
• RED	Immediate treatment and evacuation (Priority 1).
• YELLOW	Early treatment and evacuation (Priority 2).
• GREEN	Routine treatment and evacuation (Priority 3).
• BLUE	Deferred treatment and evacuation (Priority 4).
• WHITE	Uninjured.
• GREY	Missing.
• BLACK	Dead.

NOTE—This information on the medical conditions of victims should only be transmitted after investigation by SAR Technicians or other medically trained personnel.

DELTA

• ONE	Side of hill plus indicate north, south, east, or west slope.
• TWO	In valley plus indicate north, south east, or west side of floor.
• THREE	In level country.
• FOUR	Heavily wooded area (can be used in conjunction with ONE, TWO or THREE).
• FIVE	In water:
• ALPHA	– Near shore.
• BRAVO	– Well off shore.

ECHO

• ONE	Request authorization to deploy the SAR Technicians team.
• TWO	A helicopter will be required
• THREE	A ground party could reach the location in good time.
• FOUR	A rescue boat will be required.
• FIVE	Coroner required.

FOXTROT

• REMARKS	Briefly provide any detail which allows the rescue co-ordination centre/maritime rescue sub-centre to initiate appropriate action, bearing in mind that the transmission is not secure.

ANNEX 5E—REQUEST FOR SEARCH REDUCTION

Message to be sent PRIORITY and classified CONFIDENTIAL

TO: NDHQ OTTAWA//NDCC//

INFO: NDHQ OTTAWA//D AIR FE 3//

1 CAD HQ WINNIPEG//A3 SAR//

CCG HQ OTTAWA//DIRECTOR SAR// (when appropriate)

SUBJ: SAR (name)—REQUEST FOR REDUCTION

A. SEARCH OBJECT—(aircraft or vessel—brief description)

B. PERSONS ON BOARD—(names of POBs and names and addresses of next-of-kin)

C. DISTRESS BEACON—(yes/no and type)

D. ROUTE—(intended route or flight plan/notification)

E. LAST KNOWN POSITION—(as reported)

F. DATE/TIME—(of last known position)

G. SEARCH COMMENCED—(time RCC notified)

H. SEARCH HEADQUARTERS—(location)

J. SEARCHMASTER—(identification)

K. TOTAL MILITARY FLYING HOURS—(at time of search reduction request)

L. TOTAL CIVILIAN FLYING HOURS—(at time of search reduction request)

M. TOTAL VESSEL STEAMING HOURS—(at time of search reduction request)

N. TOTAL SEARCH HOURS—(at time of search reduction request)

P. AREA COVERED .... SQUARE MILES
(total coverage, i.e., a 30 miles by 60 miles area covered three times is 5400 square miles)

Q. Narrative summating search activities, explaining reasons for recommending reduction, resolving any apparent anomalies, and advising of any factors that might provoke controversy.

CHAPTER 6— SAR OPERATIONAL PROCEDURES— AERONAUTICAL INCIDENTS

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SAR OPERATIONAL PROCEDURES—AERONAUTICAL INCIDENTS

EVALUATION OF DEGREE OF REQUIRED RESPONSE

6.1 In the following sections an attempt has been made to provide guidelines to assist the controller in determining the degree of emergency in a search and rescue incident. In emergency situations requiring immediate assistance action must be taken quickly and positively. The ability to take appropriate action is a function of the information available to the controller, and of his judgment and experience. Initially, the controller should not hesitate to classify an incident at the highest degree of emergency that the available information supports. Later, the degree of emergency can be lowered if the situation warrants it.

6.2 Nothing in the following paragraphs is meant to prevent the controller from assigning the highest degree of emergency.

SAR INCIDENT PROGRESSION

6.3 When search efforts indicate that danger no longer exists, e.g.: the communication search was successful and no problem exists or the object and/or the survivors have been located and rescued, and all search and rescue units are accounted for, the rescue co-ordination centre/maritime rescue sub-centre shall close the incident and immediately inform the operating agency and any centre, service or facility that has been alerted or activated.

6.4 If apprehension as to the safety of the search object and its occupants continues to exist, or if new evidence implies the persons on board are in grave and imminent danger, the current emergency phase should be increased to a higher degree of emergency phase, as appropriate, given the circumstances and information available. The decision to declare this change of phase should be taken without delay and based on past experience with similar situations.

6.5 When during search operations it has been determined that further search would be to no avail because the area has been adequately searched and all probability areas investigated, or because there is no longer any probability of survival of the persons on board, or for other pertinent reasons, it should be recommended the search be reduced. The procedures for obtaining authority to reduce a search are detailed in Chapter 5.

DEGREES OF AERONAUTICAL EMERGENCY

6.6 There are three degrees of emergency used in the conduct of aeronautical search and rescue incidents: UNCERTAINTY, ALERT and DISTRESS.

6.7 An UNCERTAINTY phase exists in any one of the following circumstances:

.1 no communication has been received from an aircraft within a period of 30 minutes after the time communications should have been received, or from the time an unsuccessful attempt to establish communication with such aircraft was first made;

.2 a flight plan has been filed and no arrival report has been received by the Area Control Centre (ACC) within 60 minutes of when the arrival time was last estimated by the aircraft or by an ACC, whichever is later;

.3 a flight itinerary has been filed and no arrival report has been received by the ACC within 24 hours of the time that the pilot indicated on the flight itinerary;

.4 a situation exists wherein there is uncertainty as to the safety of an aircraft and its occupants, e.g. a responsible person has declared an aircraft overdue which was not on a flight plan but whose tardiness is of sufficient concern; and

.5 an emergency locator transmitter (ELT) signal has been reported by an aircraft, a ground station or the SARSAT system (event) but there is no reason to suspect that an actual distress situation exists.

6.8 An ALERT phase exists when:

.1 following the uncertainty phase, the communication search procedure has failed to reveal any new information on the aircraft;

.2 an aircraft has been cleared to land and fails to land within five minutes of the estimated time of landing and communication has not been re-established with the aircraft;

.3 information has been received which indicates that the operating efficiency of the aircraft has been impaired, but not to the extent that a forced landing is likely; or

.4 a SARSAT merge position or the ELT signal reported in 6.7.5 is still being reported and cannot be isolated or otherwise accounted for.

6.9 A DISTRESS phase exists when:

.1 the fuel on board is considered to be exhausted or to be insufficient to enable the aircraft to reach safety;

.2 information is received which indicates that the operating efficiency of the aircraft has been impaired to the extent that a forced landing is likely;

.3 information is received that the aircraft is about to make or has made a forced landing or requires immediate assistance;

.4 a downed aircraft is located; or

.5 the ELT transmission referred to in 6.7.5 and 6.8.4

.1 has been linked to an overdue aircraft;

.2 confirmed by the SARSAT system (case or combination of event and ELT report); or

.3 has continued for two hours and the source has not been located.

RCC ACTION DURING DEGREES OF AERONAUTICAL EMERGENCY

6.10 During the UNCERTAINTY phase of an aircraft emergency, the rescue co-ordination centre (RCC) shall, when applicable:

.1 obtain the data contained on the flight plan or notification;

.2 confirm that all airports or possible alighting areas along the route of flight and within the possible flight range of the aircraft concerned are checked;

.3 notify position fixing agencies (see Chapter 8, Direction finding assistance to SAR) to attempt establishment of the aircraft's position, informing them of all known frequencies;

.4 notify Region Operational Control Centre at the North American Air Defence (NORAD) headquarters, North Bay, and request air surveillance;

.5 notify the Royal Canadian Mounted Police, the provincial police, and/or the Civil Air Search and Rescue Association (CASARA) along the route of flight, as they may be requested to verify alighting areas, or obtain information on the aircraft and its occupants;

.6 if the flight is over water, request coast radio stations to alert the vessels in the area;

.7 if the flight originated in, or intended entering, a country other than Canada, notify the appropriate search and rescue (SAR) facility in that country;

.8 notify the appropriate Area Control Centres (ACCs) for air surveillance (radar/transponder) and request all ground stations in the area to monitor the primary frequency of the missing aircraft as well as distress frequencies;

.9 in the case of an emergency locator transmitter (ELT) signal, request all ground stations, including private strips, Flight Service Stations, towers, ACC, vessels, etc., to monitor the appropriate frequency (121.5 or 243.0 MHz) in an attempt to verify and isolate the ELT;

.10 advise the Canadian Mission Control Centre (CMCC) of the details of the possible emergency and request a query of the SARSAT system; and

.11 select a name for the incident, normally the last name of the aircraft pilot with the prefix "SAR", for example "SAR Jones". If the name of the aircraft pilot is not known, then a name appropriate to and descriptive of the incident shall be selected.

NOTE: Normally, the communication search should not be pursued for more than one hour in the uncertainty phase without upgrading to the alert phase.

6.11 During the ALERT phase of an aircraft emergency, the RCC shall, when applicable:

.1 expand the communication search area as the case warrants;

.2 alert the rescue squadronto prepare aircraft equipment and personnel, especially in circumstances that may require more than the standard configuration;

.3 alert secondary and other facilities, including ships at sea, which may be required to assist, in order to establish availability;

.4 alert CASARA to prepare aircraft and personnel;

.5 ensure that the appropriate ACCs have alerted air traffic flying through the area involved so that a watch will be maintained;

.6 obtain additional details on aircraft, equipment on board, the pilot and the passengers;

.7 obtain weather along the aircraft's route and assess its effect on the tasking of search and rescue units (SRUs);

.8 plan initial briefing of search crews;

.9 action all incoming reports and consolidate them into the initial briefing plan;

.10 in the case of an ELT signal, task individuals, airport managers, Industry Canada or CASARA ground personnel to isolate the source of the signal, if its general location has been determined and its general location indicates that a distress is unlikely; and

.11 advise CMCC of the details of the emergency and request a query of the SARSAT system.

NOTE 1: Tasking of aeronautical SRUs from other search and rescue regions (SRRs) should be considered when:

a. significant improvement in on-scene time would be realized,

b. there would be no adverse effect on the responding SRR.

NOTE 2: Normally, the communication search should not be pursued for more than one hour in the Alert Phase without upgrading to the Distress Phase.

6.12 During the DISTRESS phase of an aircraft emergency, the RCC shall, when applicable:

.1 initiate action with the appropriate search and rescue (SAR) units and services: this action will normally be to task the standby crew to immediately take off on an initial search;

.2 notify appropriate ACC and other agencies concerned, such as the National Defence Operations Centre (NDOC) when deemed appropriate; issue a Missing Aircraft Notice (MANOT) and a situation report (SITREP);

.3 develop a search plan by ascertaining the position of the aircraft, estimating the degree of uncertainty of this position, and on the basis of this information, the circumstances and the historical weather, determine the extent of the search area;

.4 task additional search units as deemed suitable to meet the requirements of the search plan, and appoint an on-scene commander as required;

.5 in conjunction with the SAR squadron, arrange for the appointment of a searchmaster and assess and determine the most suitable location for the search headquarters;

.6 assess and co-ordinate the requirements for telecommunication facilities, weather services and equipment and ensure that appropriate telecommunication personnel are available and briefed;

.7 notify the operating agency and keep it informed on SAR developments;

.8 advise CMCC of the details of the emergency and request a query of the SARSAT system;

.9 when an aircraft accident has been confirmed, notify the Transport Safety Board with the pertinent details;

.10 when the incident involves an aircraft of foreign registry, the RCC shall inform NDOC to advise the appropriate embassy if required; and

.11 develop a rescue plan in the event casualties require assistance. The plan should have provisions for the notification of medical facilities and police/coroner, and should establish the most expeditious means and method of rescue.

NOTE 1: The operating agency shall be requested to provide all known information regarding the aircraft, its occupants, the experience of the captain, and any special equipment carried.

NOTE 2: The operating agency shall be afforded the opportunity to appoint liaison personnel and participate in the search subject to Chapter 4, Hiring of Civilian Personnel and Services.

NOTE 3: The operating agency shall be requested to inform and update the next-of-kin (NOK) of all occupants. Failing this option, RCC will deal directly with the NOK.

INTERCEPT AND ESCORT OF DISTRESSED AIRCRAFT

6.13 Intercept and escort services will be provided for aircraft in distress, as required, in areas of Canadian search and rescue (SAR) responsibility. If primary SAR aircraft are unable to provide this service owing to unavailability or limitations in operational capability—lack of necessary range or speed—the search and rescue region commander is empowered to direct any Canadian Forces aircraft operating within his area to perform the task, providing it possesses the necessary capability.

6.14 When an aircraft is required to provide intercept and escort service, the captain will be provided with as much of the following information as possible:

.1 the distressed aircraft's identification;

.2 its last known position (LKP) with amplification as to the type of navigation aids used, i.e. LORAN, Doppler, VOR, TACAN, Celestial, INERTIAL, or estimated;

.3 time of the LKP;

.4 its altitude and whether or not the aircraft is descending or climbing;

.5 true course;

.6 ground speed;

.7 true air speed; and

.8 a brief description of the emergency.

6.15 The operational procedures for airborne intercept are set out in *CFACM 60–2605, Airlift Operations, Search and Rescue*.

SEARCH PLANNING

6.16 The search planning task includes the determination of the last known position, datum and a search area, developing a plan that maximizes effort allocation, selecting search patterns and track spacing to achieve a suitable area coverage, planning on-scene co-ordination, transmitting the search plan to the search units and periodically reviewing and updating the search plan.

DETERMINING THE LAST KNOWN POSITION

6.17 The last known position (LKP) can be based on the last reported position, on a confirmed sighting report, on a radar image or on a SARSAT position, etc. Each one of these determinations has its own inherent potential error which must be considered by the controller.

6.18 When calculating the LKP, consideration must also be given to the aerial drift associated with the search object just prior to the accident. This may involve drift associated with a gliding aircraft, parachute drift when an ejection is involved or the drift associated with the aircraft being off course. Annex 6A provides detailed calculations for aerospace trajectory and parachute drift.

SEARCH AREAS

6.19 Two predefined methods of determining and plotting inland search areas have been developed for use in Canada. They are:

.1 **the Canadian Search Area Definition (CSAD) method**—based on empirical data collected on Canadian inland search and rescue incidents from 1981 to 1986, excluding the data used for the Mountain Visual Flight Rules study; and

.2 **the Mountain Visual Flight Rules (MVFR) method**—for utilization in mountainous regions in which visual flight routes are accepted, published, and flown. This method is based on empirical data collected on Canadian inland incidents involving Visual Flight Rules flights in mountainous regions.

6.20 These methods were developed for cases where there is little information to go on besides a last known position and a destination. The MVFR method applies in cases where the intended route of the missing aircraft involves navigation by following such things as valley floors, rivers and roads (in mountainous terrain) as opposed to point-to-point navigation. The CSAD method applies in point-to-point cases. If the Searchmaster (SM) has evidence to suggest that these methods are not applicable, then they should be modified, subject to the concurrence of the search and rescue region commander through the officer in charge of the rescue co-ordination centre. Details of the modification to the search area and SM reasoning for the modification are to be included in the situation report (SITREP).

CANADIAN SEARCH AREA DEFINITION METHOD

6.21 Based on historical data, two definitive probability areas have been established and are categorized according to the priority with which they should be searched. The method takes into account the variations in known crash positions along track and across track. Those variations are combined, giving rectangular areas within which the crash position is likely to be found.

6.22 The use of the Canadian Search Area Definition (CSAD) requires the following information:

.1 the last known position (LKP);

.2 the intended route; and

.3 the intended destination.

6.23 The CSAD method applies to all intended track lengths. The two areas are (see Figure 6–1):

.1 **Area One**—A rectangle 10 miles each side of track beginning 10 miles before LKP and extending 10 miles beyond destination; and

.2 **Area Two**—A rectangle 15 miles each side of track beginning at the LKP and extending 15 miles beyond destination. Area Two includes that portion of Area One where overlapping occurs.

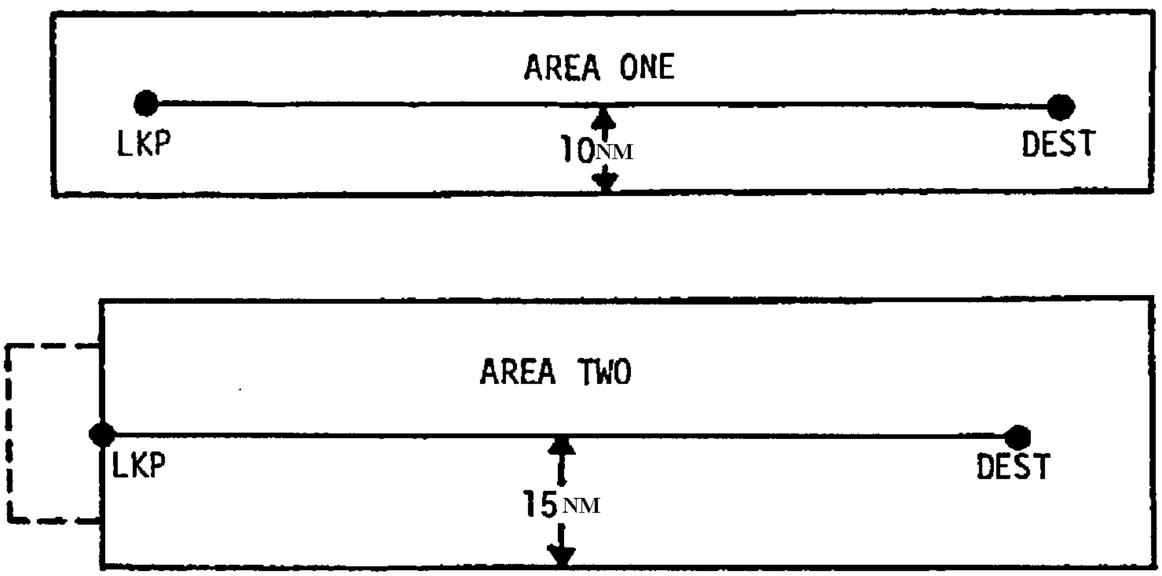


FIGURE 6–1 CSAD AREAS

6.24 Where an enroute turning point includes a track direction change of greater than 20 degrees the outside boundary of each area shall be an arc using the turning point as centre and a radius equal to 10 miles for Area One and 15 miles for Area Two, as per figure 6–2.

6.25 Normally there is no requirement to adjust the search areas in an inland search. Such adjustment would have to be considered, however, if any of the three basic factors listed in 6.22 should change during the search.

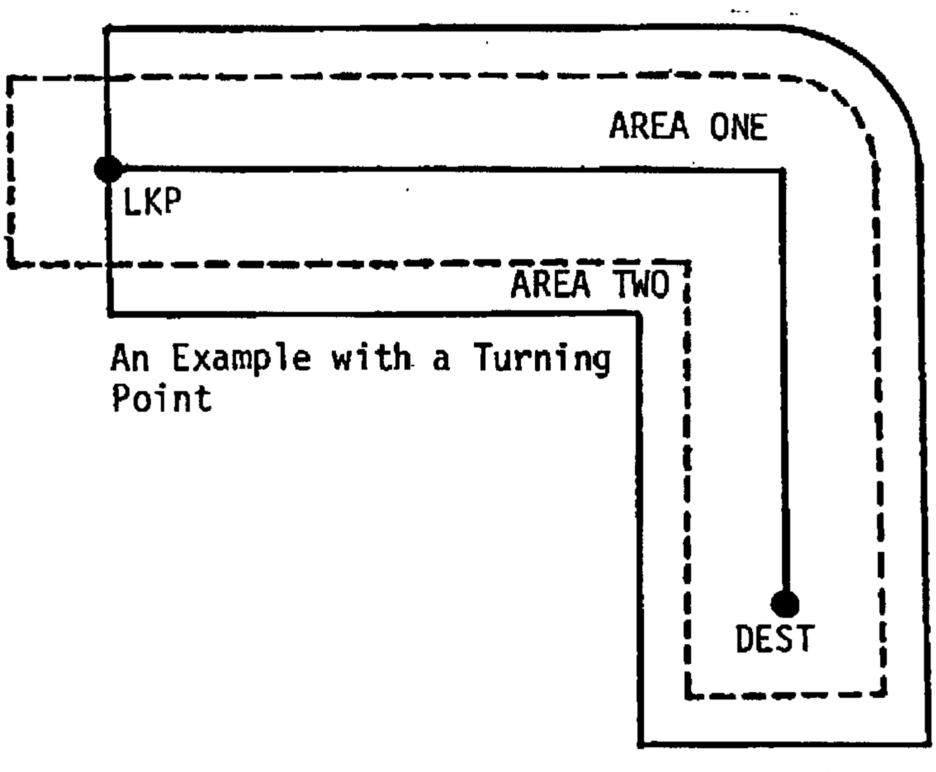


FIGURE 6–2 CSAD TURNING POINT

6.26 **Probability of containment**—The probability of containment (POC) or density of crash positions based on the data varies in the along-track and off-track directions. Generally, cases tend to cluster close to intended track with the density dropping off sharply as offset increases. There are concentrations of cases in the first tenth and last tenth of track but very few cases in the underfly and overfly areas. There also tends to be more cases in the second half of track than in the first half.

> **NOTE:** A graph providing ready reference for determining the square mileage of search areas is included in Figure 6–3.

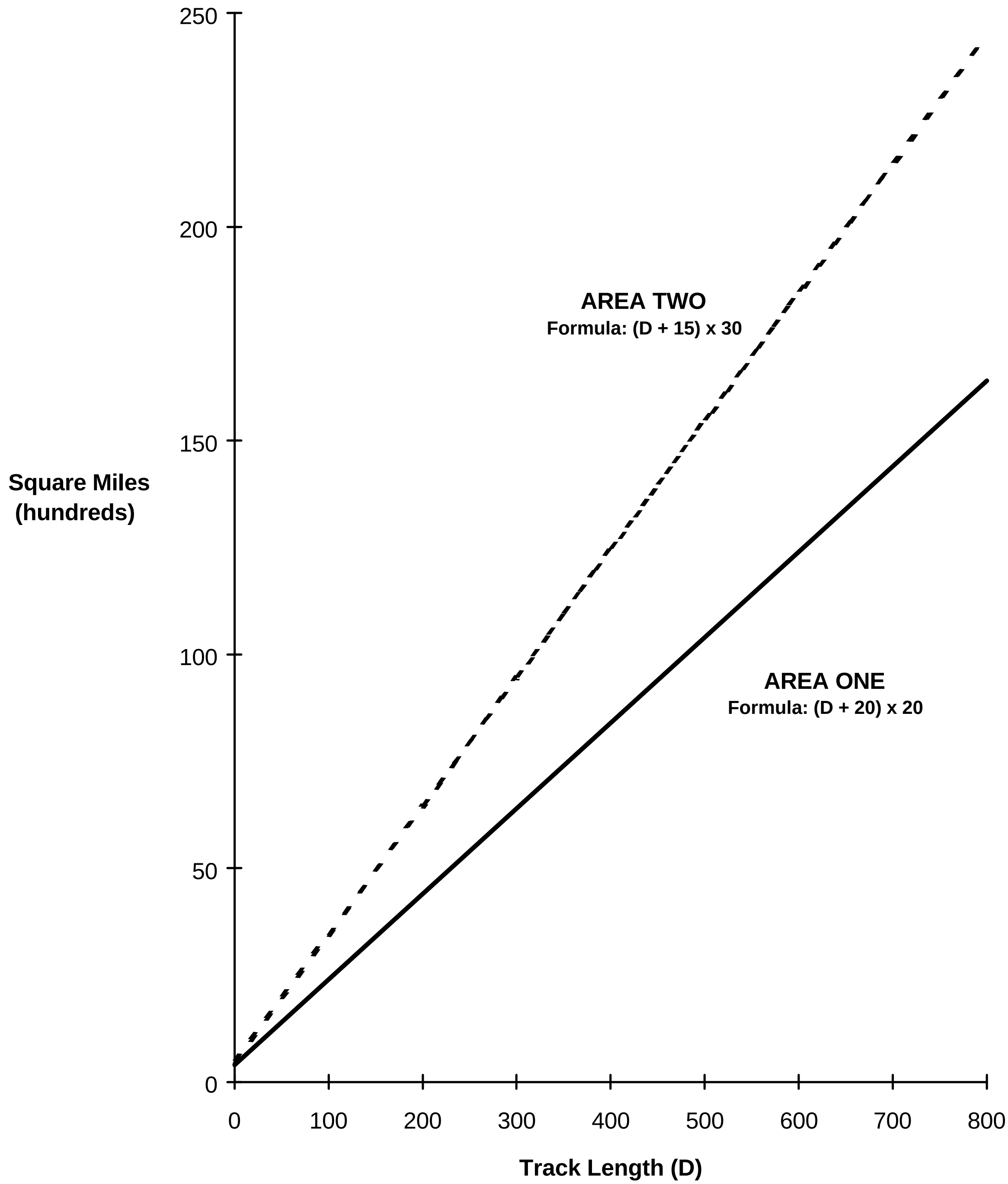


FIGURE 6–3 CSAD SQUARE MILEAGE GRAPH

CSAD SEARCH STRATEGY AND SEQUENCE

6.27 There is no single sequence of search types or patterns which will be suitable for all searches. For searches where the Canadian Search Area Definition (CSAD) method is used, the following search sequence is suggested, unless circumstances dictate otherwise:

.1 **Phase I—**

.1 Carry out track crawls along the missing aircraft's intended track and thoroughly check in the vicinity of the last known position (LKP) and destination.

.2 Carry out electronic searches.

.3 Carry out a co-operating target/survivor search over the high probability areas, covering 15 miles either side of the missing aircraft's intended track.

.2 **Phase II**—search Area One in the following sequence, for all track lengths:

.1 the last quarter of track from the intended track outwards with equal priority along track,

.2 the third quarter from the intended track outwards with equal priority along track,

.3 the first quarter from the intended track outwards commencing at LKP,

.4 the second quarter from the intended track outwards with equal priority along track,

.5 the overfly area followed by the underfly area commencing at the destination and LKP respectively,

.3 **Phase III**—expand the search to Area Two and use the same sequence as in Phase II.

MOUNTAIN VISUAL FLIGHT RULES METHOD

6.28 Canadian search and rescue data involving Visual Flight Rules flight plans has revealed distinct differences in the probability of containment (POC) between the mountainous regions and other regions of the country. In particular:

.1 although there tend to be more crash sites between one-half and three-quarters of the way along the intended track, a substantial portion occur along the other areas of the track;

.2 very few crash sites are found before the last known position (LKP) or beyond the intended destination;

.3 crash sites tend to cluster close to the intended track with the POC decaying sharply as you move away from the track; and

.4 the minimum search area for a given POC always stretches along the entire length of the track.

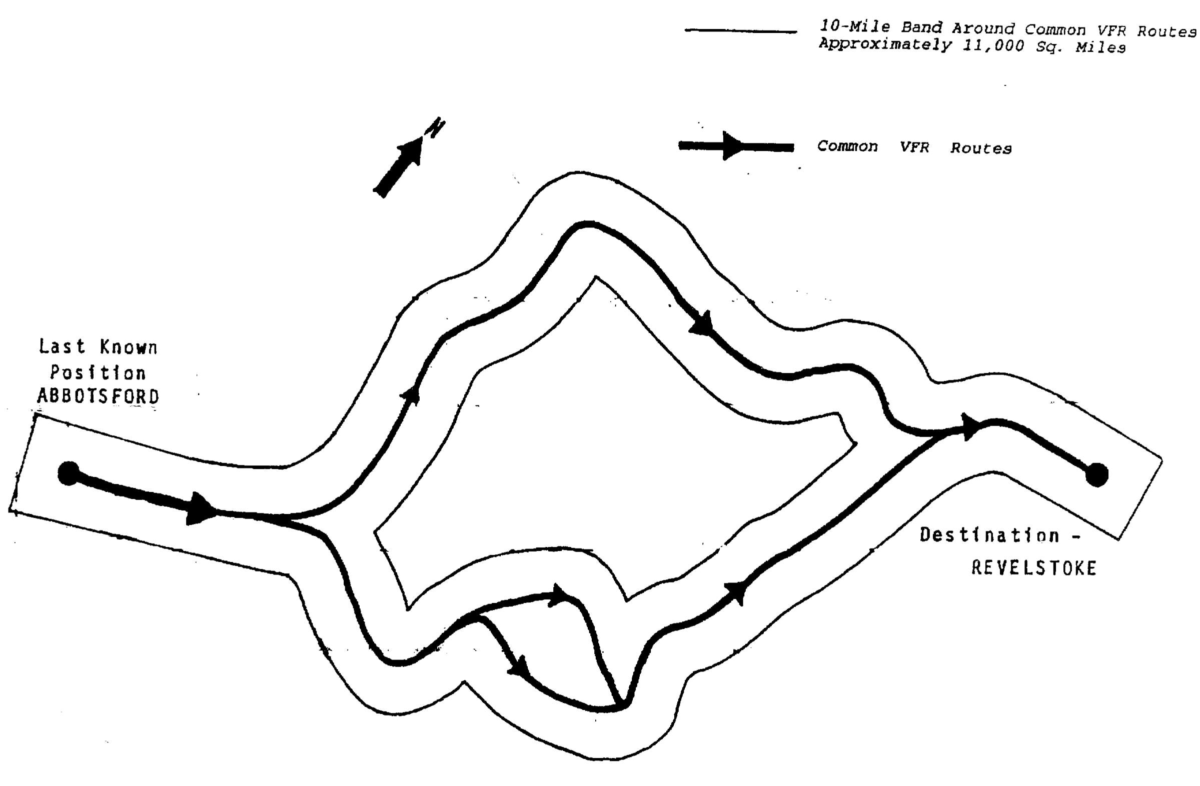


FIGURE 6–4 MFVR SEARCH AREA

6.29 Two probability areas are defined for cases involving Visual Flight Rules flight plans in mountainous regions (see Figure 6–4).

.1 **Area A**—This is an area which stretches along the entire track of the missing aircraft, from the LKP to the intended destination, and extends 5 miles either side of the intended track. Based on previous data and assuming the intended track is known, this area should include a large portion of crash sites. In order to include cases where the crash occurs shortly after takeoff or on approach for landing, this area is extended 5 miles before the LKP and 5 miles beyond the destination. Note that if the missing aircraft's intended route is not known with any certainty, all likely routes must be covered (see Figure 6–5) or another search planning method used.

.2 **Area B**—This is an area which stretches along the entire intended track of the missing aircraft from the LKP to the destination and extends 10 miles either side of the track. It also extends 10 miles before the LKP and 10 miles beyond the destination. Note that Area B also includes all of Area A.

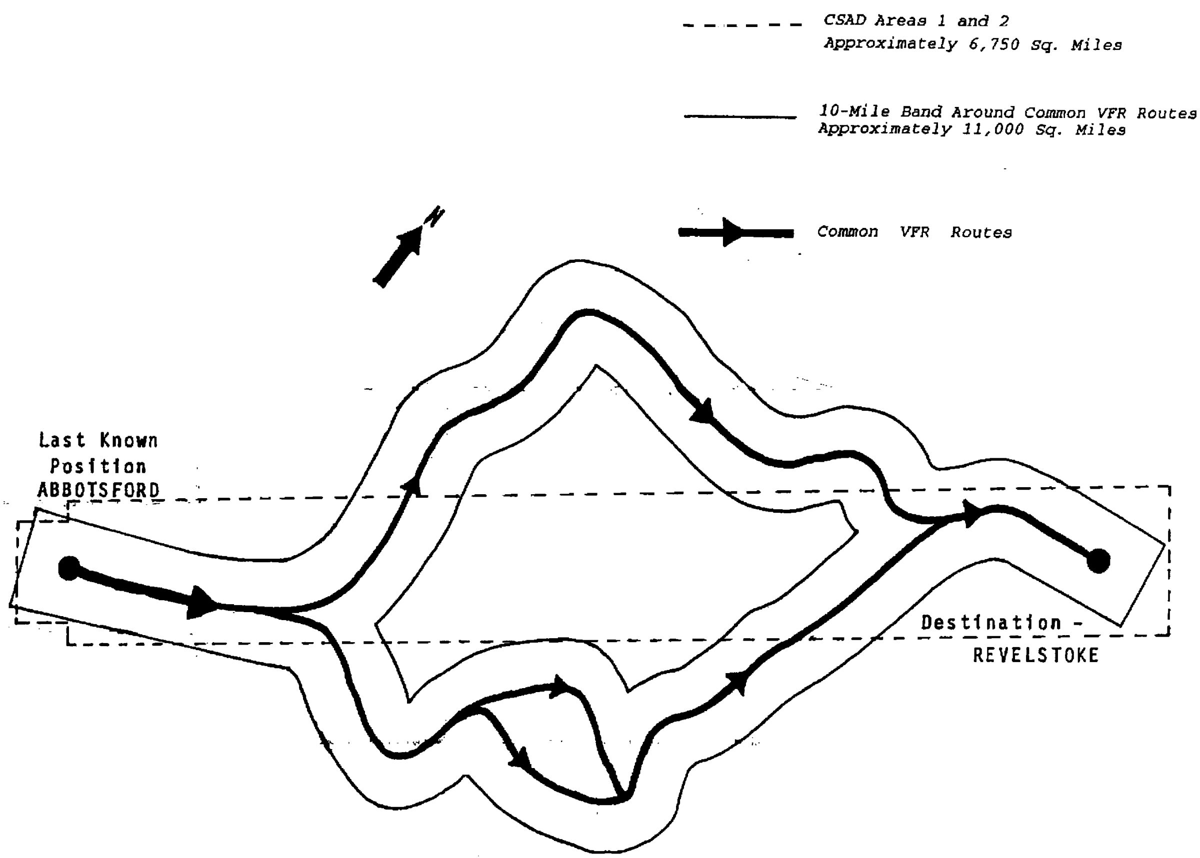


FIGURE 6–5 COMPARISON OF CSAD & MVFR SEARCH AREAS

MVFR SEARCH STRATEGY AND SEQUENCE

6.30 Given that an aircraft is missing on a Visual Flight Rules (VFR) flight in the mountainous regions of Canada and all the preliminary checks have been completed without success, the following procedure is recommended:

.1 Phase I—

.1 Carry out track crawls along the missing aircraft's intended VFR route and thoroughly check last known position (LKP) and destination for near take-off/landing incidents.

.2 Carry out an electronic search to detect any distress beacon signals.

.3 Carry out a co-operative target/survivor search over the high probability area, covering 10 miles either side of the missing aircraft's intended track. This should include all likely routes if the intended track is unknown.

.2 Phase II—Thoroughly search Area A in the following sequence, for all track lengths. Once again, if the missing aircraft's intended track is not known with any certainty, all likely routes must be covered:

.1 third quarter from the track outwards,

.2 fourth quarter from the track outwards,

.3 second quarter from the track outwards,

.4 first quarter from the track outwards,

.5 overfly and underfly areas expanding from the destination and the LKP.

.3 Phase III—Expand the search to Area B, and use the same sequence as given in Phase II. Any valleys, dead-end canyons, passes, etc., that may have been taken accidentally by the missing aircraft should also be covered.

6.31 Figure 6–5 shows a comparison between the Canadian Search Area Definition (CSAD) and the Mountain Visual Flight Rules (MVFR) methods for a case involving a flight from Abbotsford to Revelstoke, BC, where more than one common VFR route is possible. The practicality of the MVFR system is demonstrated by the fact that the CSAD method covers only about one-third of the possible VFR routes.

SWEEP WIDTH COMPUTATION

6.32 **Visual Search**—For inland searches, sweep width (W) tables have not been computed, although research may someday provide better guidance for planners. In general two types of inland search are conducted: initial coverage and intensive coverage. For initial coverage, track spacing (S) is usually 2 miles or more, depending on terrain. For intensive coverage, S is less than 2 miles with 1 mile being the norm (thereby giving the normal 1/2 mile spotting distance), again depending on terrain.

6.33 Since inland searches will normally be in areas of varying terrain, the coverage factor will be based on the subjective judgment of the search crew and the search planner. This value can then be used to assess the effectiveness of the initial coverage and the requirement of repeated searches of an area.

6.34 There are many factors which may modify visual Ws. While the effects of some of these factors may be variable or indefinite, the search planner must take them into consideration when developing a search plan. Most of these factors tend to affect the probability of detection (POD) and are discussed below in their approximate order of influence.

.1 **Search Object**—Detectability is significantly related to its size, and its colour contrast relative to its environment.

.2 **Terrain Conditions**—Effects due to the difficulty of sighting objects through dense brush or tall timber; the distractions of vegetation and other surface irregularities.

.3 **Search Craft Speed**—High speed can reduce effectiveness in aircraft, particularly at low altitude, or in any type of search vehicle if turbulence is being encountered.

.4 **Position of Sun**—Effectiveness is reduced when looking into the sun, particularly in hazy conditions and when the sun is low on the horizon. In mountainous areas, valley floors may only be visible at certain times of the day. Track spacing or orientation may have to be adjusted.

.5 **Spotter Effectiveness**—Fatigue, type of training, physical and mental condition, suitability and comfort of spotter positions will all have a bearing on the effectiveness of spotters.

All of these, and any other factors which come to the search planner's attention, must be considered as objectively as possible when determining the POD using visual search methods.

6.35 **Electronic Search**—Electronic searching includes SARSAT queries, radio, radar, magnetic, radioactive and other electromagnetic band searches. The determination of an appropriate value for sweep widths in these searches is just as important as in visual searches.

6.36 Electronic sweep widths may be affected by:

.1 the search objects' output;

.2 the search units' capability;

.3 environmental attenuation level;

.4 environmental ambient noise;

.5 terrain attenuation; and

.6 COSPAS–SARSAT orbital mechanics.

The detection range of distress beacons varies and the search planner should attempt to determine the specific range of the equipment in question. The same may be true of the search unit capability. Dedicated search units will normally have published standard operating procedures regarding electronic track spacing and detection ranges to which the search planner may refer. Examples of these are shown in Figure 5–5.

6.37 The detection range data available to the search planner may be reported as minimum, average or maximum detection ranges. The classification would be based on a series of ranges at which targets have been first detected, subdivided into the minimum, average and maximum of such series. When such data is available, the following guidelines are recommended in order of preference:

.1 when minimum detection range is known, the sweep width (W) is equal to 1.7 times minimum detection range;

.2 when average detection range is known, W = 1.5 times average detection range;

.3 when maximum detection range is known, W = maximum detection range; and

.4 when no detection range is known, W = 0.5 times horizon range.

A horizon range chart is provided at Figure 6–6. If the search is in a mountainous or heavily wooded area, W should be further reduced by half.

Height feet	Nautical miles	Statute miles	Height feet	Nautical miles	Statute miles	Height feet	Nautical miles	Statute miles
1	1.1	1.3	120	12.5	14.4	940	35.1	40.4
2	1.6	1.9	125	12.8	14.7	960	35.4	40.8
3	2.0	2.3	130	13.0	15.0	980	35.8	41.2
4	2.3	2.6	135	13.3	15.3	1,000	36.2	41.6
5	2.6	2.9	140	13.5	15.6	1,100	37.9	43.7
6	2.8	3.2	145	13.8	15.9	1,200	39.6	45.6
7	3.0	3.5	150	14.0	16.1	1,300	41.2	47.5
8	3.2	3.7	160	14.5	16.7	1,400	42.8	49.3
9	3.4	4.0	170	14.9	17.2	1,500	44.3	51.0
10	3.6	4.2	180	15.3	17.7	1,600	45.8	52.7
11	3.8	4.4	190	15.8	18.2	1,700	47.2	54.3
12	4.0	4.6	200	16.2	18.6	1,800	48.5	55.9
13	4.1	4.7	210	16.6	19.1	1,900	49.9	57.4
14	4.3	4.9	220	17.0	19.5	2,000	51.2	58.9
15	4.4	5.1	230	17.3	20.0	2,100	52.4	60.4
16	4.6	5.3	240	17.7	20.4	2,200	53.7	61.8
17	4.7	5.4	250	18.1	20.8	2,300	54.9	63.2
18	4.9	5.6	260	18.4	21.2	2,400	56.0	64.5
19	5.0	5.7	270	18.8	21.6	2,500	57.2	65.8
20	5.1	5.9	280	19.1	22.0	2,600	58.3	67.2
21	5.2	6.0	290	19.5	22.4	2,700	59.4	68.4
22	5.4	6.2	300	19.8	22.8	2,800	60.5	69.7
23	5.5	6.3	310	20.1	23.2	2,900	61.6	70.9
24	5.6	6.5	320	20.5	23.6	3,000	62.7	72.1
25	5.7	6.6	330	20.8	23.9	3,100	63.7	73.3
26	5.8	6.7	340	21.1	24.3	3,200	64.7	74.5
27	5.9	6.8	350	21.4	24.6	3,300	65.7	75.7
28	6.1	7.0	360	21.7	25.0	3,400	66.7	76.8
29	6.2	7.1	370	22.0	25.3	3,500	67.7	77.9
30	6.3	7.2	380	22.3	25.7	3,600	68.6	79.0
31	6.4	7.3	390	22.6	26.0	3,700	69.6	80.1
32	6.5	7.5	400	22.9	26.3	3,800	70.5	81.2
33	6.6	7.6	410	23.2	26.7	3,900	71.4	82.2
34	6.7	7.7	420	23.4	27.0	4,000	72.4	83.3
35	6.8	7.8	430	23.7	27.3	4,100	73.3	84.3
36	6.9	7.9	440	24.0	27.6	4,200	74.1	85.4
37	7.0	8.0	450	24.3	27.9	4,300	75.0	86.4
38	7.1	8.1	460	24.5	28.2	4,400	75.9	87.4
39	7.1	8.2	470	24.8	28.6	4,500	76.7	88.3
40	7.2	8.3	480	25.1	28.9	4,600	77.6	89.3
41	7.3	8.4	490	25.3	29.2	4,700	78.4	90.3
42	7.4	8.5	500	25.6	29.4	4,800	79.3	91.2
43	7.5	8.6	520	26.1	30.0	4,900	80.1	92.2
44	7.6	8.7	540	26.6	30.6	5,000	80.9	93.1
45	7.7	8.8	560	27.1	31.2	6,000	88.6	102.0
46	7.8	8.9	580	27.6	31.7	7,000	95.7	110.2
47	7.8	9.0	600	28.0	32.3	8,000	102.3	117.8
48	7.9	9.1	620	28.5	32.8	9,000	108.5	124.9
49	8.0	9.2	640	28.9	33.3	10,000	114.4	131.7
50	8.1	9.3	660	29.4	33.8	15,000	140.1	161.3
55	8.5	9.8	680	29.8	34.3	20,000	161.8	186.3
60	8.9	10.2	700	30.3	34.8	25,000	180.9	208.2
65	9.2	10.6	720	30.7	35.3	30,000	198.1	228.1
70	9.6	11.0	740	31.1	35.8	35,000	214.0	246.4
75	9.9	11.4	760	31.5	36.3	40,000	228.8	263.4
80	10.2	11.8	780	31.9	36.8	45,000	242.7	279.4
85	10.5	12.1	800	32.4	37.3	50,000	255.8	294.5
90	10.9	12.5	820	32.8	37.7	60,000	280.2	322.6
95	11.2	12.8	840	33.2	38.2	70,000	302.7	348.4
100	11.4	13.2	860	33.5	38.6	80,000	323.6	372.5
105	11.7	13.5	880	33.9	39.1	90,000	343.2	395.1
110	12.0	13.8	900	34.3	39.5	100,000	361.8	416.5
115	12.3	14.1	920	34.7	39.9	200,000	511.6	589.0

FIGURE 6–6 HEIGHT OF EYE VS. HORIZON RANGE

6.38 **Miscellaneous Methods**—Some methods of searches, i.e., forward-looking infra-red (FLIR), have sweep widths that are so variable, a subjective estimate of the probability of detection will be the only option. For searches involving night vision goggles, refer to 7.69.

SEARCH AREA COVERAGE

6.39 The number of times an area should be searched depends on the probability of containment (POC) and on the probability of detection (POD). Both of these values are subjective. However the following guidelines are suggested:

.1 lateral coverage from the airplane is improved to some extent with increasing altitude without degrading the POD appreciably. Therefore, a minimum search altitude of approximately 1000 feet should be considered where terrain and/or vegetation are factors;

.2 since lateral coverage varies with terrain and vegetation, spotters must adjust their searching accordingly. For example, in densely forested areas, lateral coverage may only be a few hundred feet whereas in open ground, it may be one-half mile; and

.3 adequate coverage of a forested, high probability area may require multiple intensive searches with the narrow track spacings. There are also advantages in varying the search direction, if possible.

6.40 Any pre-defined search areas like those of the Canadian Search Area Definition and Mountain Visual Flight Rules methods are intended as guides when there is little else to go on. Any valid information on the missing aircraft, pilot, route flown, weather, etc., should be used to modify or re-define search areas. This same route may involve a dead-end canyon that could have been taken accidentally by the pilot. This canyon should be searched even if it extends more than 10 miles from the intended track. The key is common sense and flexibility.

SEARCH AREA EXPANSION

6.41 **Inland Searches**—Unlike maritime searches, inland searches do not normally require an expansion of the search area. Rather, repeated coverage of the same areas will usually be required until the conclusion of the search.

6.42 Currently available data does not allow for more than a subjective estimate of the effectiveness of aerial search. Factors such as the type of terrain, the weather, the available light and the capability of the searchers all affect the efficiency of the search units. It will be the responsibility of the search planner to evaluate each coverage of the individual sections of the search area to reach a rational search conclusion in unsuccessful searches.

DESCRIBING SEARCH AREAS

6.43 When the search area has been determined it will be necessary to define it to search units and others who may require the information. The total area will need to be divided in sub-areas for allocation to search units. The accurate definition of these areas is of the utmost importance to the search planner, since the information will have to be recorded and may be referred to over a period of days or even weeks.

6.44 In Canada, the preferred method is the latitude and longitude system of squares. It is especially suitable for large-scale searches where a wide area can be covered without complication. This system is used with the National Topographical Series, Aeronautical Edition, scale 1:500,000. These maps are printed with each GEOREF grid square (1 degree latitude by 1 degree longitude) labelled with a two letter code. Thirty-minute grid lines are also provided, subdividing each 1 degree by 1 degree area into four sub-areas. These are identified numerically from 1 to 4, with 1 being the Northwest corner, 2 the Northeast corner, 3 the Southwest corner and 4 the Southeast corner. These 30 minute by 30 minute squares are referred to as "primary squares" and can be further divided into "secondary squares". These secondary squares are labelled alphabetically from A to D in the same fashion as the primary squares. An example of an assigned area might read as Map 42 NW, square CG4A (see Figure 6–7).

6.45 An added advantage of this system is that the GEOREF overlay is printed not only on the 1:500,000 maps but on the 1:1,000,000 as well. Also, the legend on the 1:250,000 maps indicates a GEOREF grid that can be easily extrapolated onto the map.

6.46 Other possible methods, described in the *United States National Search and Rescue Manual*, include the following:

- **.1** boundary method;
- **.2** corner method;
- **.3** centre point method;
- **.4** track line method; and
- **.5** grid method.

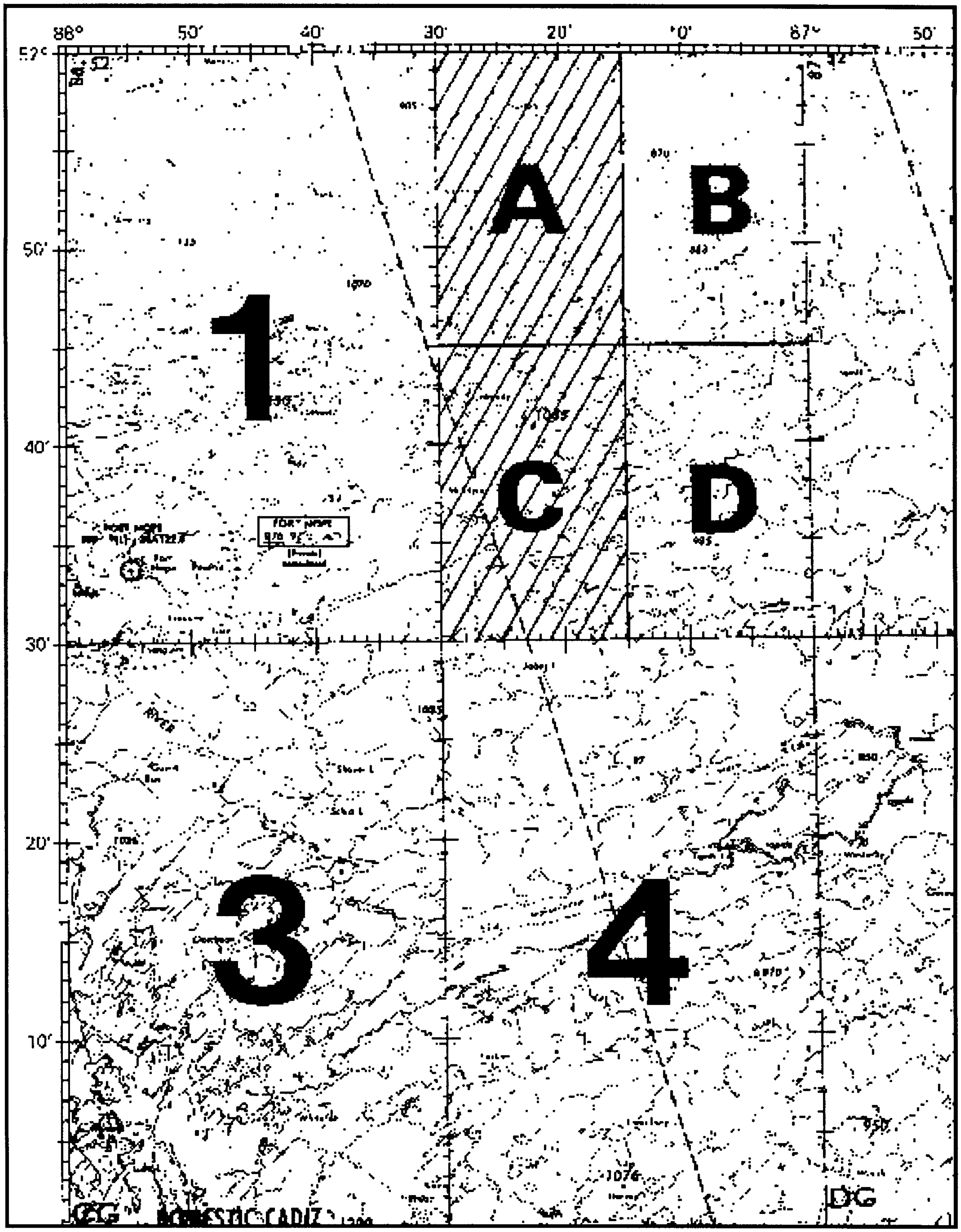


FIGURE 6–7 GEOREF GRID

The GEOREF latitude and longitude system of squares is the preferred method used on inland searches for missing aircraft in Canada, both for tasking and for reporting, and should be used during the intensive search phase. The use of other methods may be more practical during the initial co-operative target/survivor searches, when it is important to follow a priority sequence along the track. It should always be remembered that the method used should be simple, effective and easy to work with, not only for the rescue co-ordination centre/searchmaster, but for the other agencies involved with the operation. Maritime search and rescue units will simply use latitude and longitude.

ANNEX 6—AERIAL DRIFT FORCES

1. This Annex amplifies Chapter 5 and provides for the detailed calculation of aerial drift.

2. **Aerospace Trajectory**—This drift force is the result of the momentum due to aircraft movement at the moment of bailout and acts on the airman in the direction of flight between the moment of ejection and the moment of parachute opening. If this direction is known, and the bailout location precise, the planner may apply an aerospace trajectory ($d_{a)}$ of 0.5 miles for turbo-prop and medium performance jets or 0.8 miles for high performance jet aircraft. Information is seldom precise enough to make use of the d_a.

3. Aircraft gliding distance may also be considered part of aerospace trajectory when the position and altitude of bailout are known. The maximum no-wind glide distance should be requested from the operator. Using the average winds aloft a displacement vector is computed, this point becoming the centre of a circle the radius of which is the maximum glide distance. This force is seldom used since the parachute is the object of the immediate search.

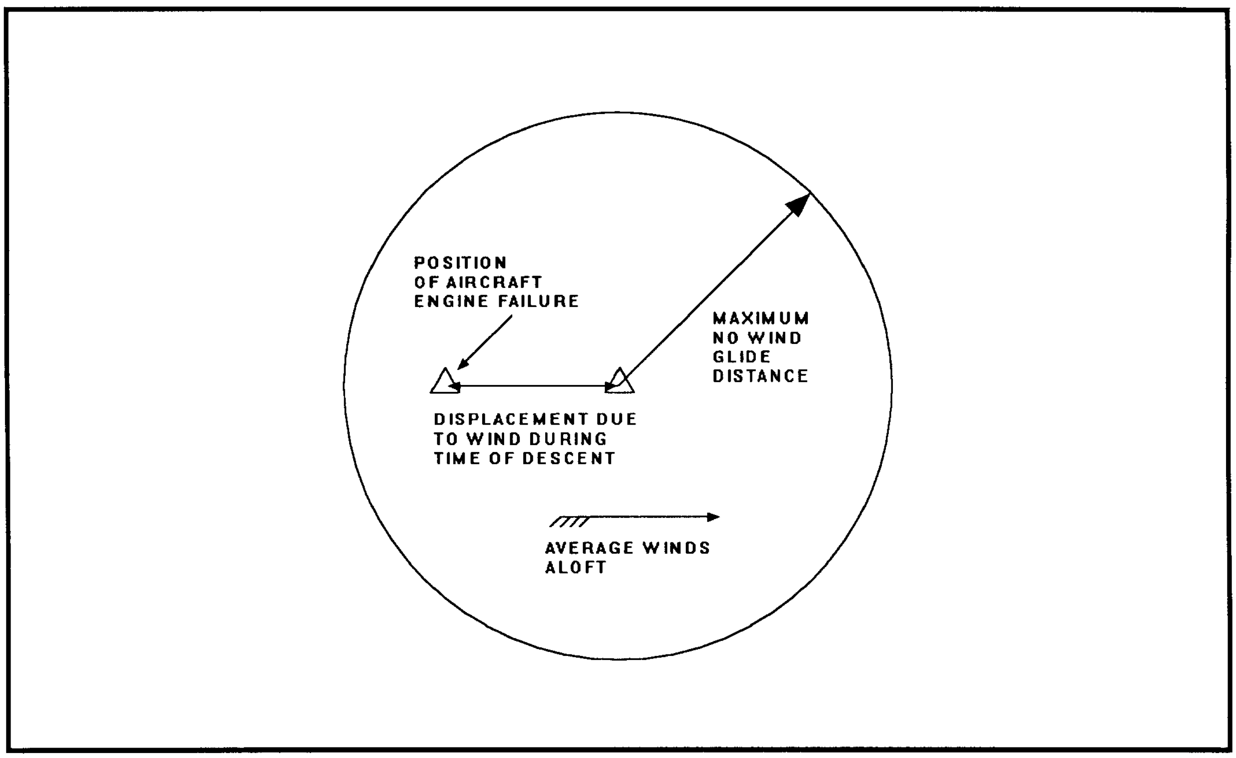


FIGURE 6A–1 AIRCRAFT GLIDE AREA

4. In all cases of bailout, maximum use must be made of radar when available, since most ejection seats automatically dispense chaff during the ejection sequence which can be identified on radar.

5. **Parachute Drift**—If the position and altitude of bailout are known, it will be possible for the planner to apply the parachute drift (d_p). There are four factors to consider:

a. opening altitude;

b. parachute type;

c. average winds aloft; and

d. terrain height.

To determine the opening altitude and parachute type check with the operator, since requirements differ with aircraft type and geographical location. The exact altitude may be available from a witness such as a wingman.

6. The normal emergency parachute in use in Canada is a 28 foot diameter chute, designed to descend vertically in no wind conditions. If a different type of parachute has been used, the operator should provide details on glide ratio and operating procedures. The table at Figure 6A–2 is based on a rate of descent of 16 feet per second, and should be adequate for all types of emergency parachutes.

7. The average winds aloft for the bailout area should be requested from a Canadian Forces Weather Office or Atmospheric Environment Services. The applicable winds, from bailout altitude to the local terrain height, are applied to achieve an average wind vector (see example at Figure 6A–3). Using the wind speed from this vector, enter Figure 6A–2 to determine the parachute drift distance. Interpolation may be required for the average windspeed and opening height, and will be necessary if the terrain height is not at sea level.

PARACHUTE DRIFT DISTANCE (ZERO GLIDE RATIO)

Distance in miles of landing position downwind from position of parachute-opening

Parachute-opening height	Wind in knots 10	20	30	40	50	60	70
30,000 ft. (9,000m)	3.7	7.4	11.1	14.7	18.4	22.1	25.8
20,000 ft. (6,000m)	2.7	5.3	8.0	10.7	13.3	16.0	18.7
14,000 ft. (4,300m)	1.9	3.8	5.7	7.7	9.5	11.4	13.3
10,000 ft. (3,050m)	1.4	2.8	4.2	5.7	7.0	8.3	9.7
8,000 ft. (2,400m)	1.2	2.3	3.5	4.6	5.8	6.9	8.1
6,000 ft. (1,800m)	.9	1.7	2.6	3.5	4.4	5.2	6.1
4,000 ft. (1,200m)	.6	1.2	1.8	2.4	3.0	3.5	4.1
2,000 ft. (600m)	.3	.6	.9	1.2	1.5	1.8	2.1

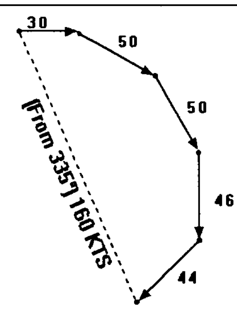
FIGURE 6A–2 PARACHUTE DRIFT DISTANCE

A. WINDS ALOFT DATA

SPECIFIED ALTITUDE	EFFECTIVE RANGE	DIRECTION/ VELOCITY	VECTOR VALUE
8000	9000–7000	270/30	090/30
6000	7000–5000	300/25	120/50
4000	5000–3000	330/25	150/50
2000	3000–1000	000/23	180/46
SEA LEVEL	1000	045/44	225/44

NOTE: THE VECTOR VALUES FOR 6000, 4000 AND 2000 REPRESENT A RANGE OF 2000 FT EACH. THEREFORE, THE TOTAL NUMBER OF 8 VECTORS FOR 1000 FT INTERVALS IS 8

B. VECTOR SOLUTION

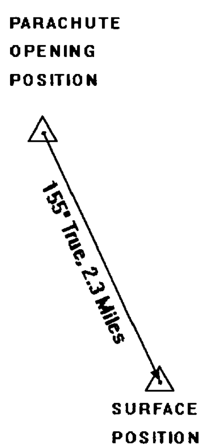


RESULTANT VECTOR:
335/160
AVERAGE WIND DIRECTION: 335
AVERAGE WIND VELOCITY

$\frac{160}{8} = 20$ knots

AVERAGE WINDS ALOFT:
335/20

C. PARACHUTE DRIFT



(PARACHUTE OPENED AT 8000 FEET OVER OCEAN)

FIGURE 6A–3 AVERAGE WINDS ALOFT EXAMPLE

CHAPTER 7— SAR OPERATIONAL PROCEDURES— MARITIME INCIDENTS

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SAR OPERATIONAL PROCEDURES—MARITIME INCIDENTS

EVALUATION OF DEGREE OF EMERGENCY

7.1 In the following sections an attempt has been made to provide guidelines to assist the controller in determining the degree of emergency in a search and rescue incident. In emergency situations requiring immediate assistance positive action must be taken quickly. The ability to take appropriate action is a function of the information available to the controller, and of his judgment and experience. Initially, the controller should not hesitate to classify an incident at the highest degree of emergency that the available information supports. Later, the degree of emergency can be lowered if the situation warrants it.

7.2 Nothing in the following paragraphs is meant to prevent the controller from assigning the highest degree of emergency.

SAR INCIDENT PROGRESSION

7.3 When search efforts indicate that danger no longer exists, e.g. the communication search was successful and no problem exists or the object and/or the survivors have been located and rescued, and all search and rescue units are accounted for; the rescue co-ordination centre/maritime rescue sub-centre shall close the incident and immediately inform the operating agency and any centre, service or facility that has been alerted or activated.

7.4 If apprehension as to the safety of the search object and its occupants continues to exist, or if new evidence implies that the persons on board are in grave and imminent danger, the current emergency phase should be advanced to a higher degree of emergency phase, as appropriate, given the circumstances and information available. The decision to declare this change of phase should be taken without undue delay and based on past experiences with similar situations.

7.5 When during search operations, it has been determined that further search would be to no avail because the area has been adequately searched and all probability areas investigated, or because there is no longer any probability of survival of the persons on board, or for other pertinent reasons, it should be recommended that the search be reduced. The procedures for obtaining authority to reduce a search are detailed in Chapter 5.

DEGREES OF MARITIME EMERGENCY

7.6 There are three degrees of emergency used in the conduct of maritime SAR incidents: UNCERTAINTY, ALERT, and DISTRESS.

7.7 An UNCERTAINTY phase exists when:

.1 there is doubt regarding the safety of a vessel or the persons on board;

.2 a vessel has been reported overdue at destination; or

.3 a vessel has failed to make an expected position report.

7.8 An ALERT phase exists when:

.1 there is apprehension regarding the safety of a vessel or the persons on board;

.2 following the uncertainty phase, attempts to establish contact with the vessel have failed and inquiries addressed to other appropriate sources have been unsuccessful; or

.3 information has been received indicating that the operational efficiency of a vessel is impaired but not to the extent that a distress situation is likely.

7.9 A DISTRESS phase exists when:

.1 positive information is received that a vessel or a person on board is in grave and imminent danger and in need of immediate assistance;

.2 following the alert phase, further unsuccessful attempts to establish contact with the vessel and more widespread unsuccessful inquiries point to the probability that the vessel is in distress; or

.3 information is received which indicates that the operating efficiency of the vessel has been impaired to the extent that a distress situation is likely.

NOTE 1: In the absence of other information, a signal from a distress beacon, on its own, is to be considered as a sign of distress and shall be investigated immediately.

NOTE 2: Paragraph 7.9.3 confers the authority to declare distress on behalf of a vessel whether or not the vessel has declared a distress. Whenever a distress is declared under these circumstances the rationale is to be recorded in the case file log.

RCC/MRSC ACTION DURING DEGREES OF MARITIME EMERGENCY

7.10 During the UNCERTAINTY phase of a maritime emergency, the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) shall, when applicable:

.1 verify the information received and if it is suspected that the vessel is in danger, its master should be asked the following question: "Are you in immediate danger?" If the reply is negative and the RCC/MRSC judges it appropriate, ensure that the Marine Communication and Traffic Services (MCTS) centre issues an "All stations" broadcast and allow up to 15 minutes for vessels in the area to respond. If a response is received, refer to Annex 7A. (The controller should use the replies to prioritize the search and rescue (SAR) response.)

.2 attempt to obtain information on the route, points and times of departure and arrival of the vessel;

.3 start a plot of the situation based on the information obtained;

.4 conduct a communication search, utilizing appropriate resources;

.5 issue an "All stations" broadcast for information on the vessel's whereabouts;

.6 if the voyage originated in, intended entering, or may have entered other than Canadian waters, notify the appropriate RCC; and

.7 select a name for the operation, this will normally be the name of the vessel and will be used throughout the operation when reference to such is made.

7.11 During the ALERT phase of a maritime emergency, the RCC/MRSC shall, when applicable:

.1 issue an "All stations" broadcast under the urgency (PAN PAN) prefix for information on the vessel or, if the vessel is disabled, to locate vessels able to render assistance;

.2 alert personnel and SAR facilities, and plan initial briefing of SAR crews;

.3 verify the information received;

.4 endeavour to obtain information concerning the vessel from sources not previously contacted;

.5 thoroughly evaluate information on the vessel's intended route, weather, possible communications delays, last known position (LKP) and last radio communication;

.6 consider the possibility of fuel exhaustion and the estimated performance of the vessel under adverse conditions;

.7 maintain close liaison with associated MCTS centres so that information from ships at sea can be evaluated;

.8 plot relevant details obtained through the actions described above to determine the probable position of the vessel and its maximum range of action from its LKP, and determine the extent of search area. Also plot the positions of any vessel known to be operating in the vicinity;

.9 if so indicated by the situation appraisal, initiate appropriate search action and notify the associated MCTS centres of any action taken; and

.10 whenever possible, communicate to the owner or agent all information received and action taken.

> **NOTE:** The use of search and rescue units (SRUs) from a neighbouring search and rescue region (SRR) should be considered when:
>
> a. significant improvement in on-scene time would be realized; and
>
> b. there would be no adverse affect on the responding SRR.

7.12 During the DISTRESS phase of a maritime emergency, the RCC/MRSC shall, when applicable:

.1 initiate action in accordance with the detailed plans or instructions for conduct of SAR operations in its area;

.2 issue an "All stations" broadcast for vessels to render immediate assistance;

> **NOTE**: this action may already have been taken by an MCTS centre in the form of a MAYDAY or a MAYDAY RELAY, as appropriate.

.3 develop a search plan;

.4 advise appropriate authorities;

.5 notify the owner or agent, if possible, and keep them informed of developments;

.6 notify adjacent RCCs or MRSCs which may be able to render assistance or which may be involved in the operation;

.7 when applicable, inform the vessel in distress, if possible, of SAR actions taken;

.8 when the incident involves a vessel of foreign registry, notify the consular authorities concerned;

> **NOTE:** Formal requests for information received from a consulate are to be acknowledged by the regional supervisor, maritime search and rescue, and forwarded through the Superintendent, Rescue, Safety and Environmental Response, to the Director SAR, Canadian Coast Guard Headquarters, for action as soon as possible. Correspondence with any consular authority shall be through the Officer in Charge of the RCC. When a foreign ship is involved or if any report about the incident is produced, a copy (for information) should be forwarded to the Department of Foreign Affairs and International Trade, Legal Advisory Division.

.9 assess and determine the most suitable SRU for assuming the duties of on-scene commander/co-ordinator surface search, as appropriate;

.10 assess and determine the most suitable location for the search headquarters and arrange for the appointment of a searchmaster; and

.11 develop a rescue plan in the event casualties require assistance—consider using the Emergency Measure Organization for their contacts with local hospitals, police, etc.

ASSISTANCE TO DISORIENTED VESSELS

7.13 When a disoriented vessel requests assistance from a rescue co-ordination centre/maritime rescue sub-centre, the duty maritime controller shall evaluate the degree of emergency (paragraphs 7.1 and 7.2 refer) and take such action, as deemed appropriate under the circumstances, i.e.:

.1 attempt to locate the disorientated vessel by using any available communication network or information source, such as marine communications and traffic services (MCTS) centres; and

.2 task available search and rescue units to locate the disoriented vessel and either escort the vessel to safety or provide guidance so that he can proceed safely.

> **NOTE:** See Annex 8A for information regarding the assistance MCTS centres can provide to disoriented vessels.

ASSISTANCE TO DISABLED/ABANDONED VESSELS

7.14 Search and rescue units (SRUs) often provide assistance in operations not directly related to a search and rescue (SAR) incident, which if not carried out might result in a definable potential endangerment to life, and/or might result in undue hardship to the interests involved. Examples of the types of assistance provided typically include the provision of aid such as towing, dewatering, firefighting or escort assistance. Subject to SAR priorities and paragraph 7.15, rescue co-ordination centres/maritime rescue sub-centres should facilitate the participation of SRUs in these types of operations, and assign an appropriate incident classification to the activity.

NOTE: Vessels or other craft abandoned during the course of a SAR incident may require assistance from SRUs until the owner or other responsible agency assumes control.

7.15 SAR activity taken under the above paragraph shall be in accordance with the Canadian Coast Guard Towing Policy (Annex 7A), when applicable, and in any event shall not be performed in competition with commercial salvage interests. However, it is recognized that many areas of each search and rescue region are remote and isolated and that there are no commercial salvage firms operating within these areas which can or will respond to the incidents.

ASSISTANCE TO OTHER CCG PROGRAMS

7.16 Subject to search and rescue priorities, regional supervisors, maritime search and rescue shall facilitate the use of CanadianCoast Guard (CCG) units to support other CCG programs within their patrol areas.

CIVILIAN SUBMARINES/SUBMERSIBLES

7.17 A rescue operation where the vehicle in distress is a submersible will require specialized equipment and personnel who are familiar with the lay out and operation of submersibles and rescue equipment. The role of the search and rescue organization will be to assist the rescue efforts to save the lives of persons involved. The rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) shall co-ordinate such action.

7.18 Each RCC/MRSC shall maintain a contact list which will enable appropriate response to be carried out immediately upon receiving information of a submersible in distress.

SEARCH PLANNING

7.19 Search planning is necessary when:

.1 the location of the distress is not known; or

.2 a significant period of time has passed since the search object's position was last known.

7.20 The search planning task includes the determination of datum and a search area, developing an attainable plan of search and rescue units (SRU) effort allocation, selecting search patterns and track spacing to achieve a suitable area coverage, planning on-scene co-ordination, transmitting the search plan to the on-scene commander/SRUs, and periodically reviewing and updating the search plan.

METHODS OF SEARCH PLANNING

7.21 The method used to determine the search plan will depend on the complexity of the incident and the resources available for its prosecution. Complex incidents, involving more than one uncertainty or a number of search and rescue units, normally require the use of automated planning tools. Less complex incidents may be resolved by the application of manual planning methods.

7.22 All maritime search planning methods use the same types of information. This chapter will detail the manual method of search planning. The computations require a knowledge of vectors and algebra. A scientific-function electronic calculator is helpful.

7.23 The search object in the maritime environment is rarely static; it drifts due to the effect of the various water currents and surface winds. The search planning methods are based on the assumed drift errors of these individual drift forces. As these drift errors increase proportionally with the passage of time, it is recommended that search planning be commenced early in the incident, to minimize the search area, and therefore, the effort required to resolve the incident.

7.24 **CANSARP—**The Canadian Search and Rescue Planning System (CANSARP) is an automated search planning tool that is available in the rescue co-ordination centre/maritime rescue sub-centre. It is recommended that CANSARP be used in search planning and it is most useful in cases too complex for the manual method.

7.25 CANSARP advantages are that the program:

.1 accepts more available incident data than is possible in the manual solution. The search planner can evaluate many possible scenarios with a range of incident times, positions, targets, situations, and environmental factors. The manual method averages data to estimate target location;

.2 uses computer simulation to graphically depict the range of possible target locations, and areas most likely to contain the target. When more than one search is necessary, CANSARP can use previous search results in estimating the probable target location for the next search;

.3 calculates the probability of detection (POD), a measure of search effectiveness, for individual search and rescue unit (SRU). CANSARP maintains a record of the POD for each SRU, allowing the search planner to more effectively evaluate the search effort, especially in large incidents when a number of searches or SRUs are required;

.4 CANSARP divides the divergence angle (see 7.31) of the assigned targets by a factor of ten, and drifts each individual set of vectors over the desired time interval. This results in eleven drift tracks per target, with resulting drift error. In a uniform wind and current field, this results in a series of overlapping probability circles, or "arc of probability". The arc of probability defines the area where the search object is most likely to be found, and the search planner can concentrate the search effort in this area (see 5.42, Search Concentration). In a less uniform current field, such as a tidal zone, the arc of probability may be less regular in shape. However, it still defines the best areas to search. The amount of calculations required to make similar predictions manually is prohibitive;

.5 CANSARP also calculates the minimax probability area derived by the manual method. If adequate search units are available to the search planner, this area may still be covered; and

.6 to monitor and improve CANSARP, the results of successful and unsuccessful SAR incidents should be compared with CANSARP predictions. Copies of incident files and situation reports, along with all other information relevant to the CANSARP predictions should be sent to:

Director, Search and Rescue
Canadian Coast Guard
Centennial Towers
200 Kent Street, 5th Floor
Ottawa (Ontario)
K1A 0E6

7.26 Other search planning models such as DRIFTCALC and CASP are available for determining the search area. However, as with all planning tools, the user should be aware of their limitations and proper application.

MANUAL SEARCH PLANNING

7.27 The search planner is usually confronted with a complex variety of uncertainties and possible scenarios when he begins to develop his search plan. However, an organized, methodical approach to preparing the search plan has been developed using the following steps:

.1 determine a datum for an appropriate commence search time;

.2 calculate a search area surrounding the datum(s) considering the probable drift and navigation errors;

.3 determine the coverage of the area, using appropriate search patterns and track spacings in order to achieve an acceptable probability of detection of the search object; and

.4 allocate sub-areas to the search and rescue units in a manner that will maximize their effort.

DATUM

7.28 Datum is defined as the most probable position of the search object, corrected for drift at any specific time. In the maritime environment, many forces act on the search object; wind, sea and tidal current, etc. Unless the search object is immobilized, such as a vessel aground, the actual position of the target of the search may be substantially different from the initial or last known position (LKP). Therefore, the search planner should include all the appropriate forces, considering the location, when calculating a particular datum. As the search object continues to be acted upon by these forces during the search, datum should be periodically recalculated. Datums are usually labelled sequentially (e.g., Datum 1, Datum 2, Datum 3), with the calculation time.

7.29 One of four possible datums usually exists, depending on the initial position information received by the search planner; a single datum, multiple datums, a datum line or a datum area. To compute a datum, the search planner must first consider the time and location of the search object's last reliable position, called the LKP. Four possible situations usually exist:

.1 **Single Position Known**—The incident reported by the distressed vessel itself, or is witnessed by another vessel or on-shore observer, or the position is computed by the planner from a previously reliable position. If the position is known, drift is applied to the search object for the appropriate time interval, and a unique, or single datum is computed.

.2 **Multiple Positions Known**—A variation of the unique datum is the "position uncertainty" situation. In this case, the reported position may be vague, or described in such a manner that the planner must drift two or more possible locations (this should not be confused with the trackline described below).

.3 **Track Known**—The vessel's intended track is known, but its position along the track is unknown, or a single line of position, such as a direction finder bearing, is obtained. If the intended track is known, a datum line (the track corrected for drift) can be established.

.1 The intended track is first plotted. A series of dead reckoning (DR) positions are then computed for estimated progress along the track, including the DR position at the end of the track and the turning points along the track. If the track legs are long, intermediate positions should be computed.

.2 A DR position is recommended for every 5° of latitude or longitude for aircraft over water, and at least every 24 hours on the track of vessels at sea.

.3 Each DR position is considered as a known position and drift is computed for each position up to a common single time. Thus, a series of datum points is developed. All datum points are then sequentially connected by straight lines to form a datum line.

.4 **General Area Known**—Neither the position nor the intended track is known, but the general area the target was probably in, such as a lake, a military exercise area, or an offshore fishing ground, is known. In this case, a datum area is developed. Datum area calculations depend on many factors, such as fuel endurance, natural boundaries, and known or suspected areas of occupancy. Datum area calculations may range from reasonably exact to a best guess.

7.30 **Search Planning Decision Matrix**—The search planning decision matrix (Figure 7–1) illustrates the four possible paths described above that a planner may use to determine a datum, and ultimately a search area. Other factors may occur that will warrant the planner determining the datum via some other method, and this matrix should be used as a guideline only. The following steps describe the use of the matrix:

.1 First Search/Subsequent Searches—If planning a first search, the planner must consider the location of the incident; for subsequent searches, determine the last known position (LKP) type;

.2 Determine Location—Establish whether the search object is in coastal waters or in the oceanic environment;

.3 Determine Total Drift Time—Estimate how long the search object has been adrift. This is normally the time interval between the actual occurrence of the incident and the time chosen by the planner for datum calculation;

.4 Determine LKP Type—Establish the LKP type, considering one of the following: single position, multiple position, area or trackline;

.5 Compute Total Water Current—Consider all the water current acting on the search object (sea current, tidal current, wind driven current, etc.);

.6 Compute LW—Leeway (LW) is applied downwind in coastal waters, and in cases in the oceanic environment where the LKP is determined to be an area or trackline, or if the total drift time is four hours or less (See 7.31, Leeway). LW uncertainly is applied in situations where the LKP is a single position or multiple position and the total drift time is greater than four hours;

.7 Determine DATUM(s) or DATUM$_{minimax}$—If the planner uses the downwind LW, then he will determine DATUM (one position per LKP). If he uses the LW uncertainty, he will determine DATUM$_{minimax}$;

.8 Determine the Search Radius—

.1 In coastal waters, if the drift period is equal to or less than six hours, use a 6 nautical mile (M) radius (See 7.30.9). If the drift period is more than 6 hours, use oceanic methodology.

.2 In oceanic evironment, if the drift period is less than four hours, compute the search radius without considering the total drift error (D_e). If the drift period is more than four hours, compute the search radius using the total probable error (E).

.9 Search Area(s)—

.1 For coastal waters, a 6 M radius around DATUM(s) will normally create the desired search area(s). If these radii are drawn about a series of positions, as a trackline DATUMs, then the circles are grouped together in a simple geometric shape to form the search area.

.2 For the oceanic environment, the search area is determined by the search radius when using the minimax solution. In other cases, the search area will be determined by drawing search radii about the DATUM positions as in the coastal solution.

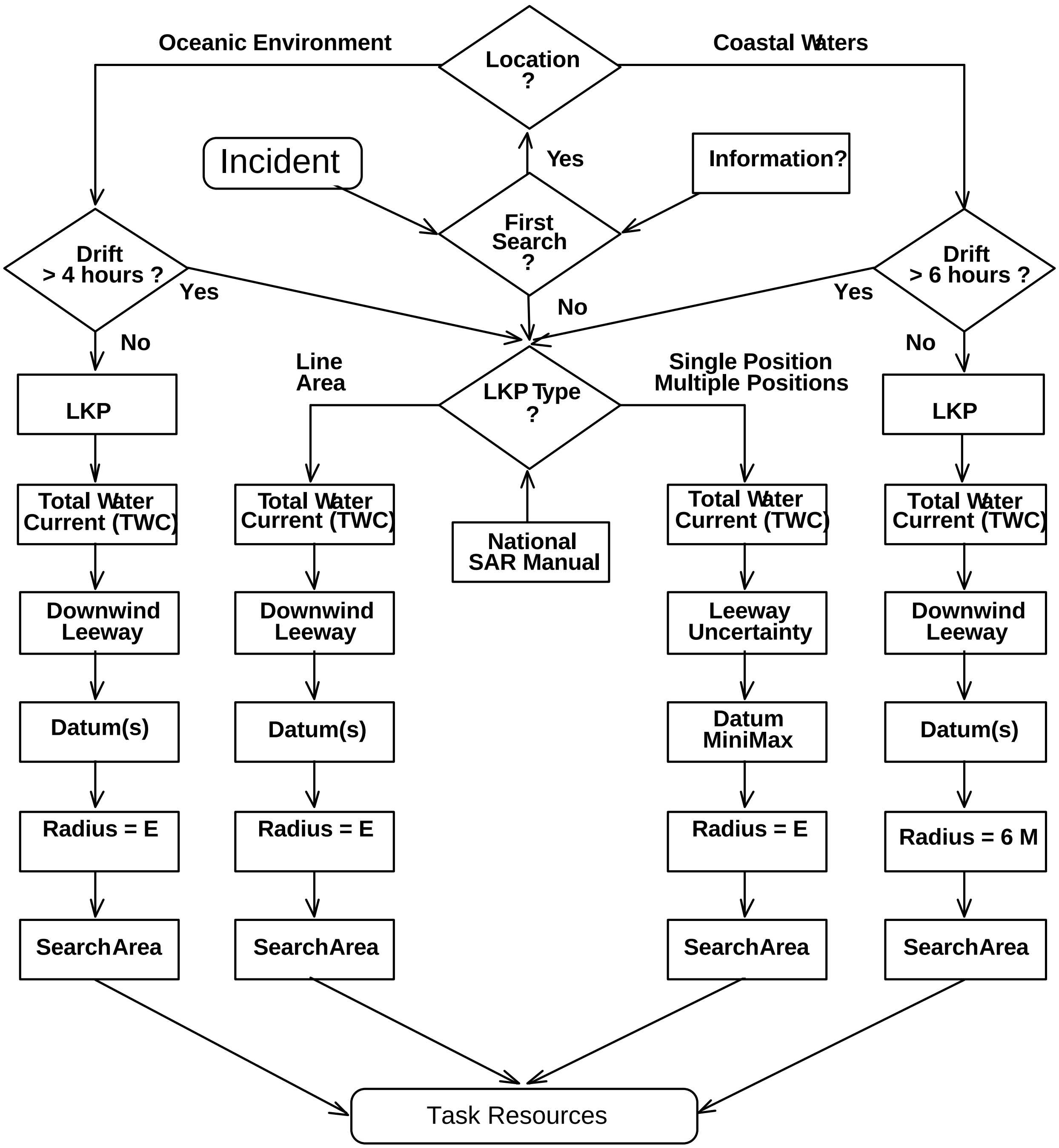


FIGURE 7–1 SEARCH PLANNING DECISION MATRIX

Annex 7C contains search planning worksheets that may be used as guides for these calculations.

7.31 Leeway—Leeway (LW) is the movement of the search object through water, caused by the action of the wind on the exposed surfaces of the object. The shape, size and orientation of the search object cause LW to vary to the point where it is extremely difficult to determine a precise value for LW direction and magnitude for any given object. Also, experiments have shown that objects tend to diverge either side of the downwind direction. The table at Figure 7–2 provides values to calculate LW speed and divergence for various objects at windspeeds of 5 to 40 knots. The table should be used with caution for winds of more than 40 knots, keeping in mind that high waves may reduce the wind speed effect on the search object; for windspeeds of less than 5 knots, do not apply the correction factor.

> **NOTE:** The experimental data used to produce the table at figure 7–2 used wind speeds measured at the 10 metre wave height (U_{10}). Search planners should be aware that winds measured at a higher height may be significantly greater than the U_{10} winds.

NOTE: U=wind speed in knots.	**With drogue or ballast system**		**Without drogue**		**Leeway**
Object	**Coefficient**	**Correction**	**Coefficient**	**Correction**	**Divergence**
Person in Water	0.000 U	nil	0.000 U	nil	00°
Surfboard	0.020 U	nil	0.020 U	nil	±60°
Raft (any size) – capsized or swamped	0.013 U	–0.060	0.013 U	–0.060	±35°
Raft ≤ 10 persons	0.028 U	–0.120	0.037 U	–0.040	±35°
Raft > 10 persons	0.031 U	–0.120	0.037 U	–0.040	±35°
Powerboat < 25 feet	0.050 U	–0.120	0.070 U	+0.040	±35°
Powerboat 25–65 feet	0.050 U	nil	0.050 U	nil	±45°
Powerboat 65–90 feet	0.040 U	nil	0.040 U	nil	±45°
Sailboat < 25 feet	0.050 U	–0.120	0.070 U	+0.040	±35°
Sailboat 25–40 feet	0.040 U	nil	0.040 U	nil	±45°
Sailboat 50-90 feet	0.030 U	nil	0.030 U	nil	±45°
Ship > 90 feet	0.030 U	nil	0.030 U	nil	±45°

FIGURE 7–2 LEEWAY RATES TABLE

7.32 **Wind Current**—Also called wind driven current or wind drift current, the wind current (WC) is the result of wind acting on the surface of the water for a long period. For the purposes of computation the most accurate windspeed possible should be obtained for the 48 hour period prior to the incident. WC are virtually ignored in coastal, lake, river and harbour areas due to the many variable effects of the water/land interface. A rule of thumb is to calculate WC when water depths are greater than 100 feet and at distances of 20 nautical miles or more from shore.

7.33 The wind record for WC calculation should be 48 hours long, and is divided into eight six-hour periods. Period one represents the most recent period, period eight the earliest. Winds are usually available for the normal synoptic hours, 0000 UTC, 0600 UTC, 1200 UTC and 1800 UTC, or from weather maps. Wind speed and direction for each period are considered to be those which were valid at the end of the period. Period one should be selected so that it begins and ends on the synoptic times bracketing the time for which the current is to be calculated. While a 48 hour wind record is preferred, a shorter period could be used with some loss of accuracy.

7.34 **WC Computation—**The United States Coast Guard Oceanographic Unit developed a procedure to calculate the wind current by determining the wind effect for each six-hour time period and vectorially adding these effects. Examples of the worksheets required to complete the calculations are contained in Annex 7C.

7.35 **Sea Current**—Sea current (SC) is the permanent, large-scale flow of ocean waters, not caused by local winds or tides. SC is normally only significant in oceanic areas, and is generally not calculated in depths of less than 300 feet, unless local knowledge suggests differently. While several sources for obtaining SC information are available, the most recent and preferred sources are the appropriate Canadian Hydrographic Publications. The instructions for deriving SC from these and other publications are included in the publications. It must be remembered that SC publications are based on recorded climatological data and should be verified whenever possible with more recent on-scene information.

7.36 **Tidal Current—**The effect of tide on current in any given area may be determined by consulting tide tables or current charts which will include the effects of coastal geography. Whenever possible, local knowledge should be sought to verify tidal computations. While the ebb and flow of tides may tend to nullify the cumulative effect, tide must be considered since:

.1 when tides reverse, the current effect in one direction may be greater than in the other;

.2 the tidal flow will cause changes in the probable position of the search object for different search times; and

.3 the cumulative effect may be such as to thrust the search object into areas where sea current may take effect.

7.37 **Lake Current**—Any large lake will likely have a water current which can vary due to changes in season, weather, etc. Information on current may be found in regional Canadian Hydrographic publications. If charts do not exist, potential sources oflocal knowledge are boat or marina operators who are familiar with the lake.

7.38 **River Current**—Some large rivers, such as the St. Lawrence, have data published on their current. It should be remembered that, where large rivers empty into the sea, their current may have an effect some distance from the river mouth. This should be considered when computing the off-shore or long-shore current, and the only reliable source of information will usually be local knowledge.

7.39 **Bottom Current**—Although Canadian search and rescue units are seldom involved in underwater incidents, it may be necessary for the search and rescue planner to obtain information on bottom current for military or commercial divers. This data can be obtained from the Canadian Hydrographic regional facility.

7.40 **Long-Shore Current—**Caused by incoming swells striking the shoreline at an angle, the long-shore current is only considered within one mile of the shoreline and must be obtained from direct observation or local knowledge.

7.41 In general, when planning any kind of inshore search, it will be advisable to seek local knowledge. Each rescue co-ordination centre/maritime rescue sub-centre will normally have established reliable contacts who can provide such data. These might include:

.1 Coast Guard or Naval experts;

.2 Oceanographic Institutes;

.3 Professional fishermen or tug operators;

.4 Marina operators;

.5 Ferry operators; and

.6 Local area marine pilots.

7.42 **Total Water Current—**The vectorial sum of all applicable current in a particular drift plot may be referred to as the total water current.

7.43 **On-Scene Observations**—Since almost all information available for computing the various drifts is based on historical record, every effort should be made to verify or update it with recent observeddata. Some of the methods which may be used are:

.1 information on winds or current from vessels operating in the area of the incident;

.2 datum marker buoys (DMBs), carried by search and rescue aircraft and vessels and by some naval aircraft and vessels. A DMB should be employed at the earliest opportunity in a maritime search. The DMB vector can then be added to the leeway vector for a more reliable datum. It must be remembered, however, that the DMB will only provide information on the current existing at the time and place it is used;

.3 expendable surface current probes (ESCP), carried by some oceanographic research vessels and should be deployed if available. The same constraints exist with ESCP as with DMB;

.4 visual markers such as smoke floats or dye markers can be used but must be continually replaced to ensure continuous marking; and

.5 if no other marker is available the planner might consider the use of a "drifter", such as a boat, a raft or a large float. The search planner must realize that the object used may have a different draft and plane area from the search object, and may thus have a different leeway speed and direction.

MINIMAX

7.44 Often the information available about a maritime incident is so uncertain that the planner must make several assumptions to determine a datum. This is accomplished by deciding on the least and greatest practical values of all unknown or uncertain factors. These factors include the earliest and latest times the incident may have occurred, the various positions where the incident may have occurred and the many drift forces that may affect the object. Then, the least practical values are added vectorially to provide the minimum distance an object should be from the last known position, just as the greatest practical values are added to provide the maximum distance. The datum point is established midway. This procedure is called minimax (minimum/maximum) plotting, and some examples are shown in Figure 7–3. The minimum distance is labelled d_{min}, the maximum distance d_{max} and datum point is labelled $Datum_{minimax}$.

7.45 It will be apparent that when minimum and maximum values of all uncertainties such as time, position and drift are incorporated into one minimax computation the result will be an extremely complex computation, and so only one uncertainty is normally considered. Thus, if a time uncertainty is imposed, a single position will be used and leeway (LW) will be considered as downwind. If drift rate (and therefore, LW) uncertainty is imposed, time and position uncertainty will not be included in the computation.

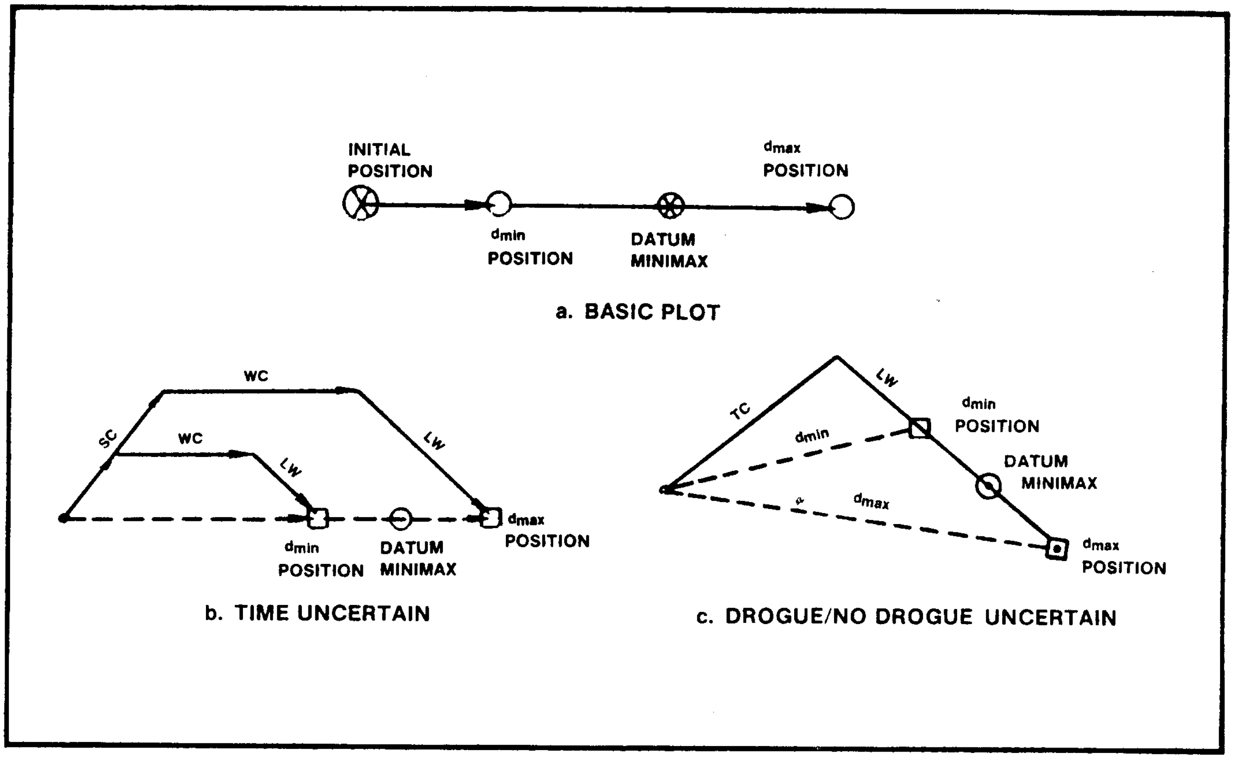


FIGURE 7–3 MINIMAX PLOT

DATUM AND SEARCH UNIT ERRORS

7.46 Once datum has been determined the planner must consider the effect of possible errors in the computations and later planning. These errors include errors in drift estimation, errors in reporting the last known position, and the navigational inaccuracies of search units. The total probable error (E) can be estimated using a basic statistical method which holds that the sum of the squares of all possible errors will equal the square of the total error $\left(E^2 = a^2 + b^2 + c^2 + \text{etc}\right)$. This calculation is of great importance since the size of the search area which will be developed depends directly on E.

7.47 Three basic errors which must be considered are:

.1 total drift error;

.2 initial position error; and

.3 search unit error.

7.48 **Total drift error (D_e)**—Total drift error is either the combination of all individual drift errors (d_e) or the minimax drift error ($d_{e\ minimax}$).

7.49 The individual drift errors are the errors which develop during computation and are possible when computing any kind of drift. These errors are due to the assumptions and generalizations which must be made to keep the computations practical and simple. For search planning, d_e is established as one-eighth (0.125) of the determined drift, or, if confidence is low, at three-tenths (0.3) of the drift. It should be noted that, in the early hours (up to four) of a search, drift error can be disregarded. Again, for practicality, drift error is ignored if it is less than 1 nautical mile and needs only to be considered when calculating surface drift.

7.50 The minimax drift error is determined using the formula:

$$d_{e\ minimax} = \frac{\text{Distance} + d_{e\ min} + d_{e\ max}}{2}$$

where Distance is the distance between d_{min} and d_{max}; $d_{e\ min}$ is one-eighth d_{min} (or three-tenths, depending on confidence); and $d_{e\ max}$ is one-eighth d_{max} (or three-tenths, depending on the confidence).

7.51 The precise definition of total drift error is the arithmetic sum of all the individual drift errors accumulated during the mission, from the time the search object was first exposed to drift to the time of the latest computed datum. D_e is used in determining the total probable error (E). In the calculation of the first datum on a mission, d_e will usually equal D_e but, as the mission progresses and another datum is calculated, D_e will equal $d_{e1} + d_{e2}$ ... and so on.

7.52 This method is appropriate for all cases except when minimax plotting is used to account for directional uncertainty. In such cases the addition of drift errors from a series of minimax calculations causes an unwarranted enlargement of the total drift error. When using minimax plotting to account for directional uncertainty, D_e must be determined for the final datum position only.

7.53 **Initial Position Error (X)**—This error is based on the position fixing accuracy of the reporting agency, whether it was the search object, a passing vessel or aircraft, or an electronic direction finding source such as radar or HF DF. The more sophisticated the reporting agency, the smaller the error that may be expected.

7.54 Figure 7–4 lists the position errors which may be assumed for various types of reporting agencies. The search planner should keep in mind that these are guidelines only, and should alter them should he have information indicating that the accuracy is substantially different from that suggested.

7.55 When the initial position is reported as a fix, X is the same as the fix error. When the initial position is reported as a dead reaconing (DR) position, X is the sum of the fix error and the DR error:

$$X = Fix_e + DR_e$$

Position Errors with Navigation Systems	
Means of Navigation	**Fix Errors — Fix_e**
Global Positioning System (GPS)	0.25 nautical mile (M)
Inertial Navigation System (INS)	0.5 M per flight hour without position update
Radar	1 M
Loran C	1 M
Visual Fix (3 lines)	1 M
Celestial Fix (3 lines)	2 M
Marine Radio Beacon (3 beacon fix)	4 M
VOR (VHF Omni-directional Range) and TACAN (Tactical Air Navigation)	±3° arc and 3 % of distance, or 0.5 M radius, whichever is greater.
If the means of navigation is unknown:	
Type of Aircraft or Vessel	**Fix Errors — Fix_e**
Ship, military submarine or aircraft with more than 2 engines	5 M
Twin-engine aircraft	10 M
Boat< 65 feet, submersible or single engine aircraft	15 M
Dead Reckoning Errors	
Type of Aircraft or Vessel	**DR Errors — DR_e**
Ship, military submarine or aircraft with more than 2 engines	5 % of the DR distance
Twin-engine aircraft	10 % of the DR distance
Boat < 65 feet, submersible or single engine aircraft	15 % of the DR distance

FIGURE 7–4 POSITION ERRORS

7.56 **Search Craft Error (Y)**—Similar errors may be anticipated for search units, depending on their individual capabilities to navigate. However, only fix errors need be considered for search units since they will normally do little or no dead reaconing:

$$Y = Fix_e$$

The values shown in Figure 7–4 also apply to the search units.

7.57 The total probable error may therefore be found using the formula:

$$E = \sqrt{D_e{}^2 + X^2 + Y^2}$$

7.58 It will be necessary for the search planner to recompute the total probable error (E) periodically, for example to account for:

.1 drift changes, as datum is redefined;

.2 search unit changes; or

.3 initial position revision.

OFFSHORE SEARCH AREAS

7.59 One of the most important phases of the search planning process is the delineation of the area to be searched. The objective of the search planner in all cases will be to define an area which will ensure a better than 50 per cent chance that the search object is in the area. For maritime searches this can be described as a circle with the datum point as centre and having a radius equal to the product of the total probable error (E) multiplied by a safety factor, called the optimal search factor (f_s). (While it would obviously be desirable to increase the radius to achieve the highest possible probability, there are usually limitations, including the number of search units available, the time available and the track spacing required). Figure 7–5 shows the f_s which must be applied to E to determine search radius.

7.60 Using the search radius, the planner describes a circle about the datum point usually squaring it off with tangential lines parallel to the direction of drift. As the datum point moves, the search area is redefined by the same process, using the new search radius to enlarge the search area. In this way, the search keeps recovering the water surface area within which the search object is most likely to be.

7.61 **Search area expansion**—The procedures described above result in repeated expansion of the search area as the search continues. While the table provided expands the search area to a radius 2.5 times the total probable area by the fifth search, the area will continue to grow larger on successive searches by virtue of the fact that the total probable error (E) will continue to increase.

Search	f_s	R
1st	1.1	1.1 E
2nd	1.6	1.6 E
3rd	2.0	2.0 E
4th	2.3	2.3 E
5th	2.5	2.5 E

FIGURE 7–5 SAFETY FACTOR AND SEARCH RADIUS

INSHORE SEARCH AREAS

7.62 Inshore search planning differs from offshore planning in that sea current and wind current are not usually included in the total water current and that the initial search radius is set at 6 nautical miles.

7.63 **Search area expansion**—After the first search in an inshore case, the search areas will be increased using the method of computing the total probable error (E) and the safety factor (f_s) as shown in Figure 7–5. The datums will be developed by using minimax plotting.

SWEEP WIDTH COMPUTATION

7.64 **Visual Search**—Tables of uncorrected sweep widths (W_u) for visual search have been developed for various types of targets (see Annex 7D). The basic factors included in the tables are: type of target, meteorological visibility and search altitude. W_u is expressed in nautical miles. Correction tables are included to account for the effect of weather (f_w), crew fatigue (f_f) and search aircraft speed (f_v). The values from these tables are applied to W_u as follows:

$$W = W_u \times f_w \times f_f \times f_v$$

It will be noted that in some cases f_w is less than 1 in calm winds. This is due to the detrimental effect glassy water conditions have on sighting small objects. These tables are for daylight use only.

7.65 Tables in Annex 7D give sweep width value for a person in water. Some of these values are too small to be flown or sailed but provide the search planner with an indication of search effectiveness and a guide for deciding how long to continue the search effort.

7.66 There are many factors which may modify visual sweep widths. While the effects of some of these factors may be variable or indefinite, the search planner must take them into consideration when developing a search plan. Most of these factors tend to affect the corresponding probability of detection (POD) and are discussed below in their approximate order of influence.

.1 **Search Objec**t—Delectability is significantly related to its size and amount of freeboard, its colour contrast or fluorescence, and its motion relative to its environment.

.2 **Sea Condition**s—Effects due to the difficulty of sighting objects with the distractions of whitecaps, flotsam, and other surface irregularities; glassy water; and wind-blown spray. The weather condition factors (f_w) are included at Figure 7D-11.

.3 **Search Craft Spee**d—High speed can reduce effectiveness in aircraft, particularly at low altitude, or in any type of search vehicle if turbulence is being encountered. A search aircraft speed correction (f_v) table is included at Figure 7D-12.

.4 **Position of Su**n—Effectiveness is reduced when looking into the sun, particularly in hazy conditions and when the sun is low on the horizon. Track spacing or orientation may have to be adjusted.

.5 **Spotter Effectivenes**s—Fatigue, type of training, physical and mental condition, suitability and comfort of spotter positions will all have a bearing on the effectiveness of spotters. The crew fatigue factor (f_f) is explained at Figure 7D-13.

.6 **Fatigue**—Fatigue has been recognized around the world as a major contributor to many transportation incident and accidents. Previous misconceptions concerning fatigue have falsely limited the perceived importance of fatigue factor. Fatigue is commonly caused by circadian (daily) rhythms, lack a adequate sleep, and intense work activity. Fatigue affects motivation as much as individual and team task performance. There is no physical or chemical test, which can tell us that a person is impaired with fatigue. Although fatigue can be both physical and mental. Mental fatigue is most critical in SAR operations. Mental fatigue exhibits the following symptoms:

- Increased drowsiness-difficulty staying awake;
- Reduced alertness - less capable of responding to demands of the job;
- Reduced ability to concentrate - more difficulty with decision-making and reasoning; shorter attention span;
- Impaired memory - failure to remember recently completed tasks
- poorer task performance - reduced ability to complete a task as fast and accurately as usual; and
- Increased irritability.

All of these, and any other factors which come to the search planner's attention must be considered as objectively as possible when determining the POD using visual search.

7.67 **NVG searc**h—Night vision goggles (NVG) search performance is significantly influenced by the following factors:

.1 background lighting (i.e., shore lights);
.2 search and rescue unit (SRU) illumination (i.e., deck lights, instrument panels, etc.); and
.3 target illumination (canopy lights, moonlight, active illumination by the SRU, etc.).

Figure 7D–10 shows the available sweep width information for night vision goggles searches. These values should be viewed as rough estimates, the accuracy of which has to be assessed by the search planner on a case by case basis.

7.68 **Electronic Search**—Electronic searching includes SARSAT queries, radio, radar, magnetic, radio-active and other electromagnetic band searches. The determination of an appropriate value for sweep widths in these searches is just as important as in visual searches.

7.69 Electronic sweep widths may be affected by:

.1 the search objects' output;

.2 the search units' capability;

.3 environmental attenuation level;

.4 environmental ambient noise;

.5 terrain attenuation; and

.6 COSPAS–SARSAT orbital mechanics. The detection range of distress beacons varies and the search planner should attempt to determine the specific range of the equipment in question. The same may be true of the search unit capability. Dedicated search units will normally have published standard operating procedures regarding electronic track spacing and detection ranges to which the search planner may refer. Examples of these are shown in Figure 5–5.

7.70 The detection range data available to the search planner may be reported as minimum, average or maximum detection ranges. The classification would be based on a series of ranges at which targets have been first detected. When such data is available, the following guidelines are recommended in order of preference:

.1 when minimum detection range is known, the sweep width (W) is equal to 1.7 times the minimum detection range;

.2 when average detection range is known, W = 1.5 times average detection range;

.3 when maximum detection range is known, W = maximum detection range; and

.4 when no detection range is known, W = 0.5 times horizon range.

A horizon range chart is provided at Figure 7-6.

7.71 **Miscellaneous Method**s—The following are methods for which sweep widths are so variable that a subjective estimate of the probability of detection will be the only option. The search methods include:

.1 audible (not aural homing);

.2 Forward Looking Infra Red (FLIR);

.3 magnetic anomaly detector; and

.4 sonar.

MAJOR MARITIME DISASTERS

7.72 As stated in paragraph 4.54, a major maritime disaster search and rescue contingency plan must be published by each search and rescue region commander. This plan is to be developed in accordance with Annex 7B.

Height feet	Nautical miles	Statute miles	Height feet	Nautical miles	Statute miles	Height feet	Nautical miles	Statute miles
1	1.1	1.3	120	12.5	14.4	940	35.1	40.4
2	1.6	1.9	125	12.8	14.7	960	35.4	40.8
3	2.0	2.3	130	13.0	15.0	980	35.8	41.2
4	2.3	2.6	135	13.3	15.3	1,000	36.2	41.6
5	2.6	2.9	140	13.5	15.6	1,100	37.9	43.7
6	2.8	3.2	145	13.8	15.9	1,200	39.6	45.6
7	3.0	3.5	150	14.0	16.1	1,300	41.2	47.5
8	3.2	3.7	160	14.5	16.7	1,400	42.8	49.3
9	3.4	4.0	170	14.9	17.2	1,500	44.3	51.0
10	3.6	4.2	180	15.3	17.7	1,600	45.8	52.7
11	3.8	4.4	190	15.8	18.2	1,700	47.2	54.3
12	4.0	4.6	200	16.2	18.6	1,800	48.5	55.9
13	4.1	4.7	210	16.6	19.1	1,900	49.9	57.4
14	4.3	4.9	220	17.0	19.5	2,000	51.2	58.9
15	4.4	5.1	230	17.3	20.0	2,100	52.4	60.4
16	4.6	5.3	240	17.7	20.4	2,200	53.7	61.8
17	4.7	5.4	250	18.1	20.8	2,300	54.9	63.2
18	4.9	5.6	260	18.4	21.2	2,400	56.0	64.5
19	5.0	5.7	270	18.8	21.6	2,500	57.2	65.8
20	5.1	5.9	280	19.1	22.0	2,600	58.3	67.2
21	5.2	6.0	290	19.5	22.4	2,700	59.4	68.4
22	5.4	6.2	300	19.8	22.8	2,800	60.5	69.7
23	5.5	6.3	310	20.1	23.2	2,900	61.6	70.9
24	5.6	6.5	320	20.5	23.6	3,000	62.7	72.1
25	5.7	6.6	330	20.8	23.9	3,100	63.7	73.3
26	5.8	6.7	340	21.1	24.3	3,200	64.7	74.5
27	5.9	6.8	350	21.4	24.6	3,300	65.7	75.7
28	6.1	7.0	360	21.7	25.0	3,400	66.7	76.8
29	6.2	7.1	370	22.0	25.3	3,500	67.7	77.9
30	6.3	7.2	380	22.3	25.7	3,600	68.6	79.0
31	6.4	7.3	390	22.6	26.0	3,700	69.6	80.1
32	6.5	7.5	400	22.9	26.3	3,800	70.5	81.2
33	6.6	7.6	410	23.2	26.7	3,900	71.4	82.2
34	6.7	7.7	420	23.4	27.0	4,000	72.4	83.3
35	6.8	7.8	430	23.7	27.3	4,100	73.3	84.3
36	6.9	7.9	440	24.0	27.6	4,200	74.1	85.4
37	7.0	8.0	450	24.3	27.9	4,300	75.0	86.4
38	7.1	8.1	460	24.5	28.2	4,400	75.9	87.4
39	7.1	8.2	470	24.8	28.6	4,500	76.7	88.3
40	7.2	8.3	480	25.1	28.9	4,600	77.6	89.3
41	7.3	8.4	490	25.3	29.2	4,700	78.4	90.3
42	7.4	8.5	500	25.6	29.4	4,800	79.3	91.2
43	7.5	8.6	520	26.1	30.0	4,900	80.1	92.2
44	7.6	8.7	540	26.6	30.6	5,000	80.9	93.1
45	7.7	8.8	560	27.1	31.2	6,000	88.6	102.0
46	7.8	8.9	580	27.6	31.7	7,000	95.7	110.2
47	7.8	9.0	600	28.0	32.3	8,000	102.3	117.8
48	7.9	9.1	620	28.5	32.8	9,000	108.5	124.9
49	8.0	9.2	640	28.9	33.3	10,000	114.4	131.7
50	8.1	9.3	660	29.4	33.8	15,000	140.1	161.3
55	8.5	9.8	680	29.8	34.3	20,000	161.8	186.3
60	8.9	10.2	700	30.3	34.8	25,000	180.9	208.2
65	9.2	10.6	720	30.7	35.3	30,000	198.1	228.1
70	9.6	11.0	740	31.1	35.8	35,000	214.0	246.4
75	9.9	11.4	760	31.5	36.3	40,000	228.8	263.4
80	10.2	11.8	780	31.9	36.8	45,000	242.7	279.4
85	10.5	12.1	800	32.4	37.3	50,000	255.8	294.5
90	10.9	12.5	820	32.8	37.7	60,000	280.2	322.6
95	11.2	12.8	840	33.2	38.2	70,000	302.7	348.4
100	11.4	13.2	860	33.5	38.6	80,000	323.6	372.5
105	11.7	13.5	880	33.9	39.1	90,000	343.2	395.1
110	12.0	13.8	900	34.3	39.5	100,000	361.8	416.5
115	12.3	14.1	920	34.7	39.9	200,000	511.6	589.0

FIGURE 7–6 HEIGHT OF EYE VS. HORIZON RANGE

ANNEX 7A— POLICY FOR THE PROVISION OF TOWING ASSISTANCE BY VESSELS ENGAGED IN SAR OPERATIONS

1. Search and rescue units (SRUs) may provide towing assistance in accordance with the National Search and Rescue Objective as stated in Chapter 1 and in accordance with the applicable *Coast Guard Fleet Order*, provided it can be done without imperilling the assisting vessel or tow or persons on board.

2. If in the judgment of the rescue co-ordination centre/maritime rescue sub-centre/on-scene commander or the commanding officer of the vessel on scene, the conditions for a distress or potential distress are not present, and if suitable commercial assistance is readily available, then the provision of tow by an SRU unit will be denied.

CCG HELP IN OBTAINING THIRD PARTY ASSISTANCE

3. In certain situations, the Canadian Coast Guard (CCG) helps end users, such as a casualty, its agent, or another party, in obtaining assistance from the private sector. It must be made clear to each party at the outset who will pay for the assistance; therefore the following procedure is to be used:

a. If possible, the CCG will have the end user make a direct request to the supplier, rather than through the CCG.

b. If the CCG must relay the request:

(1) the CCG will, on receipt of the request from the end user, make clear that it is for his account, and that a signed hard copy reflecting this understanding will be required as soon as possible;

(2) the CCG will, on contracting the supplier, make clear that the assistance is being obtained for the end user’s account, and that a signed hard copy reflecting this understanding will be required as soon as possible;

(3) and a hard copy of the understanding cannot be obtained, then all conversations between the CCG, the end user and the supplier should be recorded and/or witnessed; and

(4) both the verbal and hard copy formats should include language that covers the following four points:

(a) the supplier agrees to supply the following assistance (list) to the end user for the end user's account,

(b) the end user confirms to the CCG that it will be responsible to pay the supplier for the assistance supplied,

(c) the supplier and the end user accept that the CCG has no contractual or other obligation in this arrangement, and

(d) the document must be signed and dated by the end user and/or supplier as appropriate.

ANNEX 7B— MAJOR MARITIME DISASTER SAR CONTINGENCY PLAN

FOREWORD

1. There is no fundamental distinction between a major maritime disaster and other maritime distress incidents except in scale, and in the scope of the response that is required.

2. For the purposes of this plan, the term “major maritime disaster” means a maritime distress incident or other distress incident occurring on the waters of the search and rescue region for which the rescue co-ordination centre is responsible, and of such scale that the federal search and rescue (SAR) system alone can no longer co-ordinate, control and respond to all aspects of the search for and recovery of survivors, and/or the preservation of life. Normally in a major maritime disaster the number of persons in distress is unusually large and vital support from other agencies not normally party to, or used by, the SAR system is required.

3. The purpose of this contingency plan is to provide a framework for the expeditious and effective resolution of a major maritime disaster by means of using all available resources to their full advantage.

SITUATION

4. a. As part of its responsibility for conducting search and rescue (SAR) services, the federal government may be required to respond under extremely unfavourable weather and sea conditions to a maritime disaster of such magnitude that augmentation of the normal SAR system may become necessary. Examples of such an event are the mass evacuation of an oil rig or the rescue of survivors of a large passenger vessel in difficulty.

b. The SAR system is capable of providing adequate response to most incidents, but at some point a maritime distress could escalate to such a degree that vital support from other agencies is required.

c. Because of the necessity for fast reaction when a maritime incident occurs, as much organization as possible must be pre-planned and possible available resources identified beforehand. To accomplish this, formal agreements must be established with outside agencies which include matters such as single point of contact and on-scene communication frequencies.

d. Because of the very diverse nature of maritime activity in the various search and rescue regions (SRRs) of Canada, it is not possible to prepare a single, detailed national plan for response to major maritime disasters. This plan is therefore, general in nature; each SRR must develop its own more specific regional contingency plans.

e. Contingency plans, particularly those involving outside agencies, must be regularly subjected to formal exercises.

MISSION

5. To ensure the expeditious and effective use of all available resources in the event of a major maritime disaster in the Canadian search and rescue area of responsibility.

EXECUTION

6. a. **Concept of Operation—**

(1) **General—**

(a) Factors to be considered include the number of persons involved and their needs, the environment, the location of the incident, the resources available and the survivor handling facilities.

(b) Speed and flexibility of response are essential. Primary search and rescue units (SRUs) and vessels of opportunity can be expected to provide the initial response, and may provide on scene co-ordination and control. Depending on the nature and magnitude of the incident, augmentation of these unitss from other sources may be required. Such response must be pre-planned and be included in the plan in the form of single points of contact, agreed upon tasking/communications procedures, and capabilities.

(c) The main objective is to remove survivors from the distress situation to appropriate medical or other facilities in the shortest possible time. If evacuation to such facilities is not possible, all available steps must be taken to sustain life until evacuation can be accomplished.

(d) If the major maritime disaster involves a large number of survivors the requirement to establish one or more casualty staging areas may arise. From this point casualties will normally be turned over to the appropriate medical authorities; however, further SAR support, in the form of aeromedical evacuation, may be required beyond the casualty staging areas.

(2) **Response—**

(a) The initial response to any maritime incident shall be consistent with international conventions and constitute an appropriate first level of response regardless of the subsequent escalation of an incident into a major disaster.

(b) A major maritime disaster will likely require the assistance of agencies not normally part of the search and rescue (SAR) system. The plan shall identify such agencies in the search and rescue region (SRR) and reflect the development of liaison and agreements with them through the proper authorities to ensure that necessary assistance will be available and effective when required.

(c) Should the augmentation of units be required, the recue co-ordination centre (RCC) shall use all available means to locate and task suitable vessels or aircraft.

(d) When it becomes apparent that a major maritime incident is in progress, on duty personnel must be authorized to call in additional personnel to meet the requirements of the search mission co-ordinator (SMC) organization until an SM is appointed. The SRR commander shall appoint a searchmaster (SM) who shall be responsible for the co-ordination of the incident until its termination. The SM along with an appropriate staff, may be detached from the RCC to a more suitable location from which to co-ordinate the extraordinary response that may be called for by the major maritime disaster. RCC standard operating procedures are to establish appropriate procedures.

(3) **Rescue—**

(a) Depending upon the number of persons involved in a major maritime disaster it may be necessary for the SM to formulate a detailed plan to allow the appropriate disposition of survivors, and to ensure that adequate medical and other post-rescue care will be available at the proper time and in the correct locations. It will be important to maintain a high degree of flexibility in this respect, as there will be many variables such as the weather, the number and condition of the casualties, the availability of evacuation units and the availability of suitable medical facilities.

(b) To this end, SRR commanders shall ensure the establishment and maintenance of communication lines between RCC and the outside agencies specified in the plan. This includes the regular exercising of the plan.

(c) A successful response to a major maritime disaster will probably result in the recovery of a large number of survivors. These will require evacuation from the scene, possibly through an intermediate location which may not be particularly well suited for handling survivors, to the casualty staging area. Further transportation may be required to deliver the casualties to suitable medical facilities. As soon as it is apparent that a large number of persons are involved, the SM shall canvass all appropriate authorities who may be able to make suitable units available, so that these units may be tasked when necessary. The location and availability of all such units shall be monitored and updated throughout the incident.

(d) Because of the number of agencies which may become involved in the rescue and disposition of survivors in a major maritime disaster, and the possible difficulty in assigning responsibility for survivors at different stages of the events, SRR commanders shall ensure that the advice of authorities such as medical and emergency measures will be readily available to the staff. Prior consultation in this area ensures quick and effective response in situations where the identification of the responsible agency might otherwise not be clear cut. Agreed procedures, together with the names and locations of key personnel, should be readily available to RCC controllers, and should be exercised regularly.

(4) **Readiness**—The Readiness status for primary SRUs applies to major maritime disasters. SRR Commanders will of course make use of all primary or any other units when and if they become needed and available.

SUPPORT

7. a. **Concept of Support** —

(1) **General**—The response to major maritime disasters will be supported initially by the normal search and rescue (SAR) system. As requirements become known, that system will be supported by all available and suitable agencies and resources.

(2) **DND/CCG**—As in other SAR incidents, commands or regions may be requested to provide additional primary or secondary search and rescue units in the event of a major maritime disaster.

(3) **Other Departments**—All federal departments, by government direction, are committed to respond to maritime SAR incidents when available and capable. The search and rescue region (SRR) commander shall ensure that current lists of key personnel in the appropriate federal and provincial departments are available to the rescue co-ordination centre (RCC) controllers.

(4) **Civilian Resources**—There are in Canada extensive resources available through civilian authorities or private companies and individuals for possible use in responding to a major maritime disaster. SRR commanders shall ensure that these are identified to the extent possible, and that adequate liaison is maintained to facilitate their effective participation in an emergency. Lists of key (single point of contact) personnel shall be available in the plan.

(5) **Foreign Support**—Resources of other nations, in particular the United States Coast Guard, may be available to assist in a major maritime disaster. The use of these resources shall be in accordance with current SAR agreements.

b. **Communications**—Communication procedures shall be in accordance with regional communications plans. In general SAR communications procedures must remain flexible and will depend on the capabilities of the resources involved, the nature and location of the incident and the response required. The plan must indicate all agreed upon on-scene frequencies.

c. **Public Information**—The initial announcement of a potential or actual major maritime disaster should be issued by the officer in charge of the RCC, if possible through the appropriate Department of National Defence Public Affairs Officer.

d. **Reports and Returns** —

(1) In the case of major maritime incidents, situation reports (SITREPs) shall be issued at least daily throughout the rescue phase.

(2) In addition to the Final SITREP Operation Report, the RCC shall submit a Major SAR Operation Report within 30 days after the conclusion of a major maritime disaster. This report is to be forwarded to the National Defence Headquarters and to the Director SAR, Canadian Coast Guard Headquarters, through the appropriate channels.

COMMAND

8. a. The search and rescue region (SRR) commander shall command a major maritime disaster search and rescue response: he will normally appoint a searchmaster (SM).

   b. The SM shall normally report to the SRR commander through the officer in charge of the rescue co-ordination centre.

   c. Because of the urgency associated with a major disaster, tasking is to be accomplished by the most expeditious means available. Where tasking is directed by telephone or other verbal means, it is to be confirmed by message or in other written form.

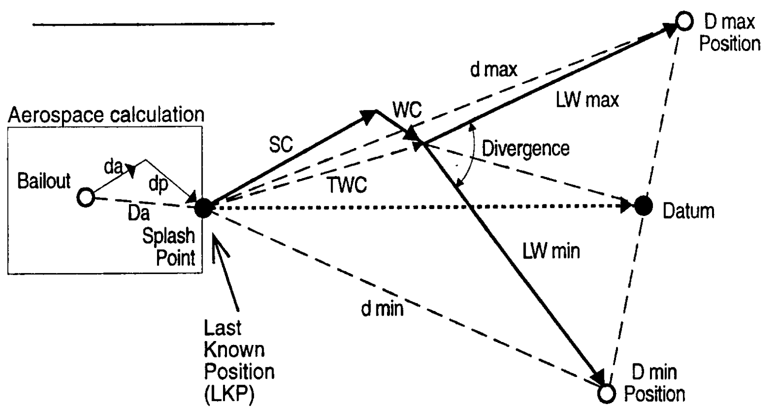
ANNEX 7C— SIMPLIFIED MINIMAX SEARCH PLANNING WORKSHEETS

Case Name: ____________________

Coordinator: ____________________

Search number: ____________________

DATUM



~~A. Aerospace Drift~~

	Bailout Position	*Minimum*		*Maximum*
1	Time	____________	UTC	____________
2	Latitude	____________	N	____________
3	Longitude	____________	W	____________
4	Total Aerospace Vector	____________	°T	____________
		____________	M	____________

B. Position where surface drift will start

Choose one of:

- ☐ **Last Known Position (LKP),**
- ☐ **dmin and dmax positions, or**
- ☐ **Previous DATUM (non-minimax)**

		Minimum		Maximum	
1	Latitude	____________	N	____________	N
2	Longitude	____________	W	____________	W
3	Time	____________	UTC	____________	UTC

C. DATUM Time

1	Commence search time or mid search time		____________	UTC	____________	UTC
2	Drift interval	**(C1 - B3)**	____________	h	____________	h

FIGURE 7C–1 MINIMAX WORKSHEET 1—DATUM

Complete either D, or E and F, not both.

D. Observed Total Water Current (TWC)

(to be used **instead of** WC and SC, eg. data from DMB)

			Minimum		Maximum	
1	Source :	____________				
2	Set		____________	°T	____________	°T
3	Rate		____________	kn	____________	kn
4	Total Water Current Direction	**(D2)**	____________	°T	____________	°T
5	Total Water Current Distance	**(D3 x C2)**	____________	M	____________	M

E. Wind Current (WC)

1	Wind Current Vector		____________	°T	____________	°T
	(resultant from sheet 9)		____________	M	____________	M

F. Sea Current (SC), Tide Current (TC)

1	Publication:	____________				
2	Set		____________	°T	____________	°T
3	Rate		____________	kn	____________	kn
4	Current Direction	**(F2)**	____________	°T	____________	°T
5	Current Distance	**(F3 x C2)**	____________	M	____________	M

G. Leeway (LW)

1	Search object(s):	____________				
2	Leeway Vector		____________	°T	____________	°T
	(From Sheets 11 and 12)		____________	M	____________	M

H. Total Surface Drift (TD)

Plotting Sheet ☐ Calculator ☐

1	Direction		____________	°T	____________	°T
2	Distance	dmin	____________	dmax	____________	M
3	Distance between Dmin and Dmax				____________	M

I. DATUM

MiniMax ☐ Other ☐

1	Time		____________	UTC	____________	UTC	____________	UTC
2	Latitude	Datum	____________	Dmin	____________	Dmax	____________	N
3	Longitude	Datum	____________	Dmin	____________	Dmax	____________	W

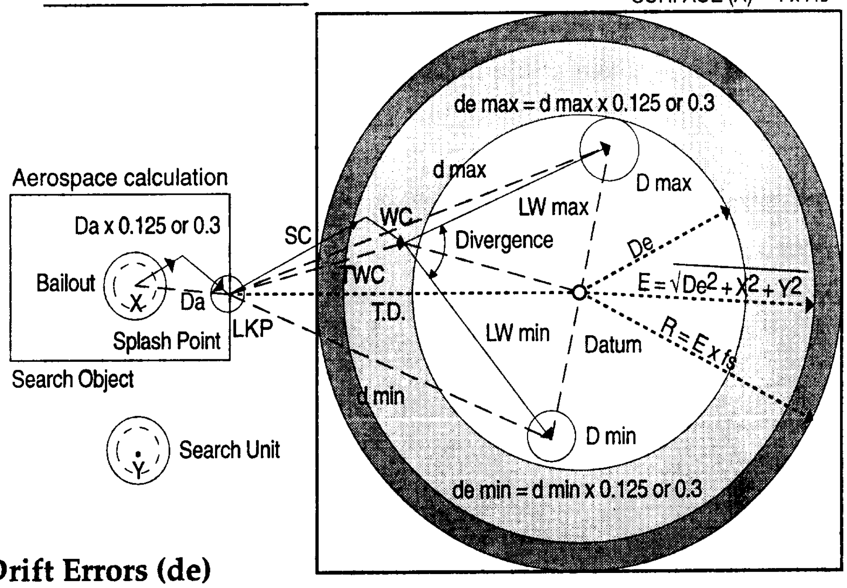
FIGURE 7C–2 MINIMAX WORKSHEET 2

Case Name: ______________

Coordinator: ______________

Search number: ______________

SEARCH AREA



Individual Drift Errors (de)

~~J.~~	~~Aerospace Drift Error (Dea)~~			
1	Aerospace Drift Distance	(Da)	______________	M
2	Drift Error Confidence Factor	(CF)	______________	
3	Aerospace Drift Error	**(Dea = Da x CF)**	______________	M

K. Surface Drift Error MiniMax (de MiniMax)

1 Sum of Previous Drift Errors (de min and de max) **(sum)** ______________

2 Surface Drift Distance (From H2 on Sheet 2) **(d min)** ______________ M **(d max)** ______________

3 Drift Error Confidence Factor (Choose and circle one) **0.125** **0.3**

4 Drift Error min-max **(de min)** ______________ M (d min x CF) **(de max)** ______________ (d max x CF)

5 Distance between latest dmin and dmax positions (From plot H on Sheet 2) **(distance)** ______________

6 Surface Drift Error MiniMax **(de minimax)** ______________

$$d_e \text{ minimax} = \left[\frac{d_e \text{ min} + d_e \text{ max} + \text{distance} + \text{sum}}{2}\right]$$

FIGURE 7C–3 MINIMAX WORKSHEET 3—SEARCH AREA

K. Surface Drift Error (non-MiniMax)

7	Surface Drift Distance	(d)	____________	M
8	Drift Error Confidence Factor	(CF)	____________	
9	Individual Drift Error	**(de = d x CF)**	____________	M

L. Total Drift Error

1	MiniMax (From K6)	**(De = dea + de minimax)**	____________	M
2	non MiniMax (From K9)	**(De = de1 + de2 + de3 + etc)**	____________	M

M. Initial Position Error (X)

1	Navigational Fix Error	Based on ________	**(FIXe)**	____________	M
2	Navigational DR Error		**(DRe)**	____________	M
3	Initial Position Error		**(X = FIXe + DRe)**	____________	M

N. SRU Error (Y)

1	Navigational Fix Error	Based on ________	**(FIXe)**	____________	M
2	Navigational DR Error		**(DRe)**	____________	M
3	Initial Position Error		**(Y = FIXe + DRe)**	____________	M

O. Total Probable Error (E)

$(E = \sqrt{De^2 + X^2 + Y^2})$ ____________ M

P. Safety Factor (Fs)

(Choose and circle one) **1.1 1.6 2.0 2.3 2.5**

Q. Desired Search Radius (R)

1	Search Radius MiniMax	**(R = E x Fs)**	____________	M
2	Search Radius (round up to next whole number)	**(Ro)**	____________	M
3	Search Radius for coastal search (6 M)	**(Ro)**	____________	M

R. Optimum Search Area (A)

1	Oceanic Search (Square)	**$A = 4 R_o^2$**	____________	M^2
2	Coastal Search (Square)	**$A = 4 \times 6^2$**	____________	M^2
3	Rectangle Search Area	**(A = length x width)**	____________	M^2

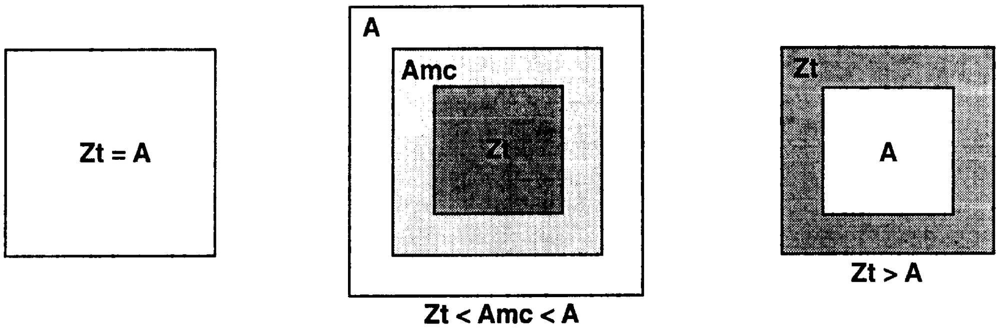
FIGURE 7C–4 MINIMAX WORKSHEET 4

Case Name: ____________

Coordinator: ____________

Search number: ____________

EFFORT ALLOCATION



S. Effort Allocation

	1	Search Sub-Area Designation	____	____	____	____
	2	Search Unit Assigned	____	____	____	____
V	3	Search Unit Speed	____	____	____	____
	4	On Scene Endurance	____	____	____	____
	5	Daylight hours remaining	____	____	____	____
T	6	Search Endurance (Lesser value of S4 or S5, use 0.85 of result for aircraft)	____	____	____	____
VxT	7	Trackline distance (miles)	____	____	____	____
	8	Search Altitude	____	____	____	____
Wu	9	Uncorrected Sweepwidth	____	____	____	____
fw	10	Weather Factor	____	____	____	____
ff	11	Fatigue Correction Factor	____	____	____	____
fv	12	SRU Speed Correction Factor	____	____	____	____
W	13	Corrected Sweepwidth **(W = Wu x fw x ff x fv)**	____	____	____	____
Zn	14	Individual Effort $Z_n = V \times T \times W$	____	____	____	____
Zt	15	Total Effort $Z_t = Z_{n1} + Z_{n2} + Z_{n3} + Z_{n4}$				____
A	16	Optimum Search Area Note: If Zt > A than go to Section T1, otherwise continue with line S17. $A = 4 \times R_o^2$				____
Amc	17	Midpoint Compromise Search Area $A_{mc} = \left[\frac{A + Z_t}{2}\right]$				____
Cmc	18	Midpoint Compromise Coverage Factor $C_{mc} = \left[\frac{Z_t}{A_{mc}}\right]$				____

FIGURE 7C–5 MINIMAX WORKSHEET 5—EFFORT ALLOCATION

	1	Search Sub-Area Designation		____	____	____	____
	2	Search Unit Assigned		____	____	____	____
Smc	19	Midpoint Compromise Track Spacing	$S_{mc} = \left[\frac{W}{C_{mc}}\right]$	____	____	____	____
Sa	20	Track Spacing Assignable (within usable limits of SRU navigational capability - rounded down if C < 1)		____	____	____	____
C	21	Search Sub-Area Coverage Factor	$C = \left[\frac{W}{S_a}\right]$	____	____	____	____
	22	Individual Search Area POD		____	____	____	____
T	23	Assigned Search Time		____	____	____	____
An	24	Individual Adjusted Search Area	$A_n = V \times T \times S_a$	____	____	____	____
At	25	Total Search Area	$A_t = A_{n1} + A_{n2} + A_{n3} + A_{n4}$	____	$\sqrt{A_t}$ ____		
	26	Search Area Coverage Factor	$C = \left[\frac{Z_t}{A_t}\right]$	____			
	27	Search POD		____ %			
l'	28	Estimated Area Length		____	____	____	____
w'	29	Estimated Area Width	$w' = \left[\frac{A_n}{l'}\right]$	____	____	____	____
n'	30	Track Spacing Number	$n' = \left[\frac{w'}{S_a}\right]$	____	____	____	____
n	31	Round off to whole number		____	____	____	____
w	32	Area Actual Width	$w = n \times S_a$	____	____	____	____
l	33	Area Actual Length	$l = \left[\frac{A_n}{w}\right]$	____	____	____	____

(Complete Drift Compensation Sheet 7 for each assigned SRU)

T. Excess Resource Planning

C	1	Search Sub-Area Coverage Factor (C= 1.0 recommended, except in areas of suspected high probability)		____	____	____	____
S	2	Track spacing	$S = \left[\frac{W}{C}\right]$	____	____	____	____
	3	Go back to Section S20 and complete the rest of the worksheet					

FIGURE 7C–6 MINIMAX WORKSHEET 6

Case Name: ______________
Coordinator: ______________
Search number: ______________

Drift Compensated Search Patterns Worksheet

Search and Rescue Unit ____________________

U. Search Planning Summary

1	Target Drift (Direction and Distance)	________ °T	________ M
2	Target Drift (Rate per hour)		v ________ kn
3	Search Area (Length and Width)	L ________	w ________ M
4	SRU Search Speed		V ________ kn
5	SRU Track Spacing		S ________ M
6	Time required to complete the Area (Use the lesser T in lines S4, S5 or S23/0.85, from sheet 5)		T ________ hours

V. Compensation methods

1 To determine whether drift compensation is recommended, complete the following formula:

(vl) ÷ (VS) (___) X (___) ÷ (___) X (___) = (___) ÷ (___) = ______

a. If value is less than 0.1 then drift compensation is not recommended.

STOP HERE. No further computations are necessary.

b. If value is greater than 0.1 then drift compensation is recommended.

Orient the search area so that the major axis is parallel to the target drift direction.
Complete the following formula to see if further drift compensation is recommended.

2 **(vw) ÷ (VS)** (___) X (___) ÷ (___) X (___) = (___) ÷ (___) = ______

a. If value is less than 0.1 then further drift compensation is not recommended.

STOP HERE. No further computations are necessary.

b. If value is greater than 0.1 then further drift compensation is recommended.

Select one option as indicated in next section W.

FIGURE 7C–7 MINIMAX WORKSHEET 7—DRIFT COMPENSATED SEARCH PATTERNS

W. Options for further direct compensation (in descending order of preference)

1 Create a parallelogram along the major axis as follows:

a. Select a CSP for a PS search pattern.

b. Advance the down creep side of the search area by the following:

Distance = (T x v) (___) x (___) = _______ M

c. Connect advanced sides to unadvanced sides.

Determine new latitudes and longitudes of corners.

2 Keep major axis oriented parallel to drift direction and:

a. Conduct a CS search pattern with drift compensated headings as follows:

1 (v) + (V) (___) + (___) = _______

2 Heading Correction = ARCTAN (above value) _______°

3 Round off correction to nearest whole degree _______°

b. Apply the heading correction in the direction of the target drift.

c. Extend the search area in the direction of the target drift by the following distance:

1 (T x v) (___) x (___) = _______ M

3 If the major axis cannot be oriented parallel to the drift direction, orient the search area so that the minor axis is parallel to the drift direction, and conduct one of the following:

a. A PS search pattern with the SRU creeping in the same direction as the target drift, using drift compensated headings.

b. A PS search pattern with the SRU creeping in the opposite direction as target drift, using drift compensated headings.

c. A CS search pattern, and construct a parallelogram.

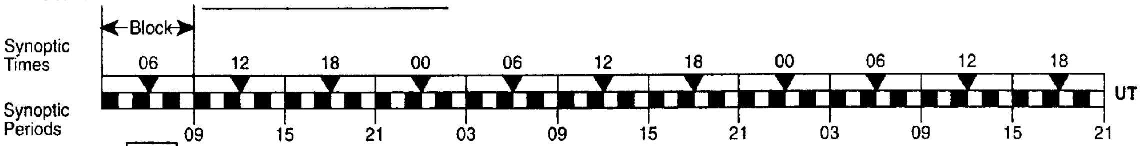
4 If none of the above situations is feasible, conduct an XSB search.

(XSB = Barrier Single Unit Search)

FIGURE 7C–8 MINIMAX WORKSHEET 8

Case name: ____________
Coordinator: ____________
Search number: ____________

SYNOPTIC BLOCKS



Block # ☐

	Synoptic Times	Synoptic Winds Direction "A"	Synoptic Winds Speed "B"	Coefficients Direction "C"	Coefficients Speed "D"	Effect (A+C)	Effect (B x D)
1	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
2	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
3	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
4	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
5	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
6	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
7	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
8	______ UTC	______ °T	______	______ °	______	______ °T	______ kn

Vectorial addition of effect of above 8 vectors X Influence Duration = Block Resultant Vector

______ °T ______ kn **X** ______ hours = ______ °T ______ M

Block # ☐

	Synoptic Times	Synoptic Winds Direction "A"	Synoptic Winds Speed "B"	Coefficients Direction "C"	Coefficients Speed "D"	Effect (A+C)	Effect (B x D)
1	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
2	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
3	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
4	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
5	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
6	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
7	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
8	______ UTC	______ °T	______	______ °	______	______ °T	______ kn

Vectorial addition of effect of above 8 vectors X Influence Duration = Block Resultant Vector

______ °T ______ kn **X** ______ hours = ______ °T ______ M

Block # ☐

	Synoptic Times	Synoptic Winds Direction "A"	Synoptic Winds Speed "B"	Coefficients Direction "C"	Coefficients Speed "D"	Effect (A+C)	Effect (B x D)
1	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
2	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
3	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
4	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
5	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
6	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
7	______ UTC	______ °T	______	______ °	______	______ °T	______ kn
8	______ UTC	______ °T	______	______ °	______	______ °T	______ kn

Vectorial addition of effect of above 8 vectors X Influence Duration = Block Resultant Vector

______ °T ______ kn **X** ______ hours = ______ °T ______ M

Wind Current (WC) — Vectorial addition of all block resultants ______ °T ______ M

(Transfer to block E1 on Sheet 2)

FIGURE 7C–9 MINIMAX WORKSHEET 9—WIND CURRENT CALCULATION

Wind Current Coefficient Table

North Latitude Only

Period	5°N	10°N	15°N	20°N	25°N	30°N	35°N	40°N	45°N	50°N	55°N	60°N	65°N
1	185° 0.029	190° 0.028	196° 0.028	200° 0.027	205° 0.027	210° 0.026	214° 0.025	217° 0.024	221° 0.023	224° 0.022	226° 0.021	228° 0.020	230° 0.020
2	203° 0.012	226° 0.012	249° 0.012	271° 0.011	292° 0.011	312° 0.011	332° 0.011	350° 0.010	007° 0.010	022° 0.09	036° 0.009	049° 0.009	059° 0.008
3	219° 0.009	258° 0.009	296° 0.009	333° 0.009	009° 0.008	043° 0.008	076° 0.008	107° 0.008	136° 0.007	162° 0.007	186° 0.007	207° 0.007	224° 0.006
4	235° 0.008	289° 0.008	342° 0.008	035° 0.007	085° 0.007	134° 0.007	180° 0.007	223° 0.006	264° 0.006	301° 0.006	334° 0.006	003° 0.006	028° 0.005
5	250° 0.007	320° 0.007	029° 0.007	096° 0.006	162° 0.006	224° 0.006	283° 0.006	339° 0.006	031° 0.005	079° 0.005	121° 0.005	159° 0.005	192° 0.004
6	266° 0.006	352° 0.006	076° 0.006	158° 0.006	238° 0.006	314° 0.005	027° 0.005	095° 0.005	159° 0.004	217° 0.004	269° 0.004	315° 0.004	355° 0.004
7	282° 0.006	023° 0.006	123° 0.006	220° 0.005	314° 0.005	044° 0.005	130° 0.005	211° 0.004	286° 0.004	355° 0.004	056° 0.004	111° 0.003	158° 0.003
8	298° 0.005	054° 0.005	169° 0.005	281° 0.005	030° 0.005	134° 0.004	233° 0.004	327° 0.004	053° 0.004	132° 0.003	204° 0.003	267° 0.003	321° 0.003

FIGURE 7C–10 MINIMAX WORKSHEET 10—WIND CURRENT COEFFICIENT TABLE

Case Name: ____________________

Coordinator: ____________________

Search number: ____________________

Average Surface Winds and Leeway (LW)

Incident Summaray

1	Last Known Position — Latitude	(Use Block B1 Sheet 1)	____________	N
	Last Known Position — Longitude	(Use Block B2 Sheet 1)	____________	W
	Time of Incident	(Use Block B3 Sheet 1)	____________	UTC
	Commence Search Time	(Use Block C1 Sheet 1)	____________	UTC
2	Drift Interval	(Use Block C2 Sheet 1)	0.00	hours
3	Search Object — Description:	____________________		
4	Average Surface Winds (ASW)			

Synoptic Date/Time	Wind Period	Number of hours	X	Speed of Wind	=	Vectorial Value	Wind Direction
0000 UTC	0300 — 2100	______		______		______	______ °T
1800 UTC	2100 — 1500	______		______		______	______ °T
1200 UTC	1500 — 0900	______		______		______	______ °T
0600 UTC	0900 — 0300	______		______		______	______ °T
0000 UTC	0300 — 2100	______		______		______	______ °T
1800 UTC	2100 — 1500	______		______		______	______ °T
1200 UTC	1500 — 0900	______		______		______	______ °T
0600 UTC	0900 — 0300	______		______		______	______ °T
0000 UTC	0300 — 2100	______		______		______	______ °T
1800 UTC	2100 — 1500	______		______		______	______ °T
1200 UTC	1500 — 0900	______		______		______	______ °T
0600 UTC	0900 — 0300	______		______		______	______ °T
0000 UTC	0300 — 2100	______		______		______	______ °T

5 Total Wind Vector Resultant ______ M ______ °T

6 Average Surface Wind (ASW) **Speed = $\left[\frac{\text{line 5}}{\text{line 2}}\right]$** ______ kn ______ °T

FIGURE 7C–11 MINIMAX WORKSHEET 11—AVERAGE SURFACE WINDS AND LEEWAY

Leeway — Non Minimax solution (Downwind leeway)

1a. Average Surface Wind	(Use Block 6 Sheet 11)	______	kn	______	°T
b. Set (reciprocal of ASW)	(Wind Direction — 180°)			______	°T
c. Leeway Rate	(as per graph or formula)			______	kn
d. Drift Interval	(Use Block C2 Sheet 1)	______	h	______	h
e. Leeway Vector(s)	(Block 1b.)	______	°T	______	°T
	(Block 1c. X Block 1d.)	______	M	______	M
		(Transfer to Block G2 on Sheet 2)			

Leeway — MiniMax solution (select a scenario)

1 ☐ **Drift rate Uncertainty** (downwind leeway)

Leeway with minimum drift rate eg. drogue—no drogue, search object uncertainty.

a. Average Surface Wind	(Use Block 6 Sheet 11)	______	kn	______	°T
b. Set (reciprocal of ASW)	(Wind Direction — 180°)			______	°T
c. Leeway Rate	(as per graph or formula)	______	kn	______	kn
d. Drift Interval	(Use Block C2 Sheet 1)			______	h
e. Leeway Vector(s)	(Block 1b.)	______	°T	______	°T
	(Block 1c. X Block 1d.)	______	M	______	M
		(Transfer to Block G2 on Sheet 2)			

2 ☐ **Time Uncertainty** (downwind leeway)

a. Average Surface Wind	(Use Block 6 Sheet 11)	______	kn	______	°T
b. Set (reciprocal of ASW)	(Wind Direction — 180°)			______	°T
c. Leeway Rate	(as per graph or formula)			______	kn
d. Drift Interval	(Use Block C2 Sheet 1)	______	h	______	h
e. Leeway Vector(s)	(Block 2b.)	______	°T	______	°T
	(Block 2c. X Block 2d.)	______	M	______	M
		(Transfer to Block G2 on Sheet 2)			

3 ☐ **Direction Uncertainty** (divergence — no other uncertainty)

a. Average Surface Wind	(Use Block 6 Sheet 11)	______	kn	______	°T
b. Set (reciprocal of ASW)	(Wind Direction — 180°)			______	°T
c. Maximum expected divergence			(+/-)	______	°
d. Leeway Rate	(as per graph or formula)			______	kn
e. Drift Interval	(Use Block C2 Sheet 1)			______	h
f. Leeway Vector(s)	(Block 3b. +/- block 3c.)	______	°T	______	°T
	(Block 3d. X Block 3e.)	______	M	______	M
		(Transfer to Block G2 on Sheet 2)			

FIGURE 7C–12 MINIMAX WORKSHEET 12

ANNEX 7D—SWEEP WIDTH TABLES

Search object	Altitude 300 feet Visibility (M)							Altitude 500 feet Visibility (M)						
	1	3	5	10	15	20	30	1	3	5	10	15	20	30
Person in water *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Raft 1 person	0.3	0.7	0.9	1.2	1.3	1.3	1.3	0.3	0.7	0.9	1.2	1.4	1.4	1.4
Raft 4 persons	0.4	0.9	1.3	1.7	2.0	2.2	2.2	0.4	1.0	1.3	1.8	2.0	2.2	2.2
Raft 6 persons	0.4	1.1	1.5	2.1	2.5	2.7	2.7	0.4	1.1	1.5	2.2	2.5	2.8	2.8
Raft 8 persons	0.4	1.2	1.6	2.3	2.6	2.9	2.9	0.4	1.2	1.6	2.3	2.7	2.9	2.9
Raft 10 persons	0.4	1.2	1.7	2.4	2.9	3.2	3.2	0.4	1.2	1.7	2.5	2.9	3.2	3.2
Raft 15 persons	0.5	1.3	1.9	2.7	3.2	3.5	4.0	0.5	1.3	1.9	2.7	3.3	3.6	4.0
Raft 20 persons	0.5	1.4	2.1	3.1	3.7	4.2	4.8	0.5	1.5	2.1	3.2	3.8	4.2	4.8
Raft 25 persons	0.5	1.5	2.2	3.4	4.1	4.6	5.2	0.5	1.6	2.3	3.4	4.1	4.6	5.3
Power boat < 15 ft	0.4	0.8	1.1	1.4	1.6	1.7	1.7	0.4	0.9	1.2	1.5	1.7	1.8	1.8
Power boat 15–25 ft	0.5	1.6	2.4	3.5	4.3	4.8	4.8	0.5	1.7	2.4	3.6	4.3	4.8	4.8
Power boat 25–40 ft	0.6	2.1	3.3	5.3	6.6	7.6	9.1	0.6	2.1	3.3	5.3	6.7	7.7	9.1
Power boat 40–65 ft	0.6	2.6	4.5	8.1	10.9	13.1	16.4	0.6	2.7	4.5	8.1	10.9	13.1	16.5
Power boat 65–90 ft	0.6	2.8	5.0	9.7	13.5	16.6	21.6	0.6	2.8	5.0	9.8	13.5	16.7	21.7
Sailboat 15 feet	0.5	1.5	2.2	3.2	3.8	4.3	4.3	0.5	1.6	2.2	3.2	3.9	4.3	4.3
Sailboat 20 feet	0.6	1.8	2.6	4.0	4.9	5.6	5.6	0.6	1.8	2.7	4.1	5.0	5.6	5.6
Sailboat 25 feet	0.6	2.0	3.1	4.8	6.0	6.9	6.9	0.6	2.0	3.1	4.9	6.1	7.0	7.0
Sailboat 30 feet	0.6	2.3	3.6	5.9	7.5	8.8	10.6	0.6	2.3	3.6	5.9	7.6	8.8	10.6
Sailboat 40 feet	0.6	2.6	4.3	7.5	10.0	11.9	14.8	0.6	2.6	4.3	7.6	10.0	11.9	14.8
Sailboat 50 feet	0.6	2.7	4.6	8.4	11.3	13.6	17.3	0.6	2.7	4.6	8.4	11.3	13.7	17.3
Sailboat 65–75 feet	0.6	2.8	4.9	9.3	12.7	15.5	20.0	0.6	2.8	4.9	9.3	12.7	15.5	20.0
Sailboat 75–90 feet	0.6	2.8	5.1	9.9	13.7	16.9	22.1	0.6	2.8	5.1	9.9	13.7	17.0	22.1
Ship 90–150 feet	0.6	2.9	5.4	11.1	15.9	20.0	26.9	0.6	2.9	5.4	11.1	15.9	20.1	26.9
Ship 150–300 feet	0.6	3.0	5.7	12.5	18.8	24.7	34.8	0.6	3.0	5.7	12.5	18.9	24.7	34.8
Ship > 300 feet	0.7	3.0	5.8	13.2	20.6	27.9	41.4	0.7	3.0	5.8	13.2	20.6	27.9	41.4

* For search altitudes up to 500 feet only, the values given for sweep width for a person in water may be increased by a factor of four if it is known that the person is wearing a personal flottation device.

**FIGURE 7D–1 UNCORRECTED VISUAL SWEEP WIDTH TABLE—
FIXED-WING AIRCRAFT—ALTITUDES 300 AND 500 FEET**

Search object	Altitude 750 feet Visibility (M)							Altitude 1000 feet Visibility (M)						
	1	3	5	10	15	20	30	1	3	5	10	15	20	30
Person in water	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Raft 1 person	0.3	0.7	0.9	1.2	1.4	1.4	1.4	0.3	0.7	0.9	1.2	1.4	1.4	1.4
Raft 4 persons	0.4	1.0	1.3	1.8	2.1	2.2	2.2	0.3	1.0	1.3	1.8	2.1	2.3	2.3
Raft 6 persons	0.4	1.1	1.6	2.2	2.6	2.8	2.8	0.4	1.1	1.6	2.2	2.6	2.8	2.8
Raft 8 persons	0.4	1.2	1.7	2.3	2.7	3.0	3.0	0.4	1.2	1.7	2.4	2.8	3.0	3.0
Raft 10 persons	0.4	1.3	1.8	2.5	3.0	3.3	3.3	0.4	1.3	1.8	2.6	3.0	3.3	3.3
Raft 15 persons	0.4	1.4	1.9	2.8	3.3	3.7	4.1	0.4	1.4	2.0	2.8	3.4	3.7	4.2
Raft 20 persons	0.5	1.5	2.2	3.2	3.8	4.3	4.9	0.4	1.5	2.2	3.2	3.9	4.3	4.9
Raft 25 persons	0.5	1.6	2.3	3.5	4.2	4.7	5.4	0.4	1.6	2.3	3.5	4.2	4.7	5.4
Power boat < 15 ft	0.4	0.9	1.2	1.6	1.8	1.9	1.9	0.4	1.0	1.3	1.7	1.8	2.0	2.0
Power boat 15–25 ft	0.5	1.7	2.4	3.6	4.4	4.9	4.9	0.5	1.7	2.5	3.7	4.4	5.0	5.0
Power boat 25–40 ft	0.6	2.1	3.3	5.3	6.7	7.7	9.2	0.5	2.2	3.4	5.4	6.8	7.8	9.3
Power boat 40–65 ft	0.6	2.7	4.5	8.2	10.9	13.1	16.5	0.6	2.7	4.5	8.2	10.9	13.1	16.6
Power boat 65–90 ft	0.6	2.8	5.0	9.8	13.5	16.7	21.7	0.6	2.8	5.1	9.8	13.6	16.7	21.7
Sailboat 15 feet	0.5	1.6	2.3	3.3	3.9	4.4	4.4	0.5	1.6	2.3	3.3	4.0	4.4	4.4
Sailboat 20 feet	0.5	1.8	2.7	4.1	5.0	5.7	5.7	0.5	1.8	2.7	4.2	5.1	5.7	5.7
Sailboat 25 feet	0.6	2.1	3.1	5.0	6.2	7.0	7.0	0.5	2.1	3.2	5.0	6.2	7.1	7.1
Sailboat 30 feet	0.6	2.3	3.6	6.0	7.6	8.9	10.7	0.6	2.3	3.6	6.0	7.6	8.9	10.7
Sailboat 40 feet	0.6	2.6	4.3	7.6	10.0	11.9	14.9	0.6	2.6	4.3	7.6	10.9	12.0	14.9
Sailboat 50 feet	0.6	2.7	4.6	8.5	11.4	13.7	17.4	0.6	2.7	4.6	8.5	11.4	13.7	17.4
Sailboat 65–75 feet	0.6	2.8	4.9	9.3	12.7	15.6	20.0	0.6	2.8	4.9	9.3	12.8	15.6	20.1
Sailboat 75–90 feet	0.6	2.8	5.1	9.9	13.8	17.0	22.2	0.6	2.8	5.1	9.9	13.8	17.0	22.2
Ship 90–150 feet	0.6	2.9	5.4	11.1	15.9	20.1	27.0	0.6	2.9	5.4	11.1	15.9	20.1	27.0
Ship 150–300 feet	0.6	3.0	5.7	12.5	18.9	24.7	34.9	0.6	3.0	5.7	12.5	18.9	24.7	34.9
Ship > 300 feet	0.7	3.0	5.8	13.2	20.6	27.9	41.4	0.6	3.0	5.8	13.2	20.6	27.9	41.4

FIGURE 7D–2 UNCORRECTED VISUAL SWEEP WIDTH TABLE— FIXED-WING AIRCRAFT—ALTITUDES 750 AND 1000 FEET

Search object	Altitude 1500 feet Visibility (M)							Altitude 2000 feet Visibility (M)						
	1	3	5	10	15	20	30	1	3	5	10	15	20	30
Person in water	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Raft 1 person	0.2	0.7	0.9	1.3	1.4	1.4	1.4	0.1	0.6	0.9	1.2	1.4	1.4	1.4
Raft 4 persons	0.3	1.0	1.3	1.9	2.1	2.3	2.3	0.2	0.9	1.3	1.9	2.2	2.3	2.3
Raft 6 persons	0.3	1.1	1.6	2.3	2.6	2.9	2.9	0.2	1.1	1.6	2.3	2.7	2.9	2.9
Raft 8 persons	0.3	1.2	1.7	2.4	2.8	3.1	3.1	0.2	1.2	1.7	2.5	2.9	3.2	3.2
Raft 10 persons	0.3	1.3	1.8	2.6	3.1	3.4	3.4	0.2	12	1.8	2.7	3.1	3.5	3.5
Raft 15 persons	0.3	1.4	2.0	2.9	3.4	3.8	4.3	0.2	1.4	2.0	3.0	3.5	3.9	4.4
Raft 20 persons	0.4	1.5	2.2	3.3	4.0	4.4	5.1	0.3	1.5	2.2	3.4	4.0	4.5	5.1
Raft 25 persons	0.4	1.6	2.4	3.6	4.3	4.8	5.6	0.3	1.6	2.4	3.6	4.4	4.9	5.7
Power boat < 15 ft	0.3	1.0	1.3	1.7	2.0	2.1	2.1	0.2	1.0	1.3	1.8	2.0	2.2	2.2
Power boat 15–25 ft	0.4	1.7	2.5	3.7	4.5	5.1	5.1	0.3	1.7	2.5	3.8	4.6	5.1	5.1
Power boat 25–40 ft	0.5	2.2	3.4	5.5	6.8	7.9	9.4	0.3	2.2	3.4	5.5	6.9	8.0	9.5
Power boat 40–65 ft	0.5	2.6	4.5	8.2	11.0	13.2	16.6	0.4	2.6	4.5	8.3	11.0	13.3	16.7
Power boat 65–90 ft	0.5	2.8	5.1	9.8	13.6	16.7	21.8	0.4	2.8	5.0	9.8	13.6	16.8	21.8
Sailboat 15 feet	0.4	1.6	2.3	3.4	4.1	4.5	4.5	0.3	1.6	2.3	3.5	4.1	4.6	4.6
Sailboat 20 feet	0.4	1.8	2.8	4.2	5.2	5.8	5.8	0.3	1.8	2.8	4.3	5.2	5.9	5.9
Sailboat 25 feet	0.5	2.1	3.2	5.1	6.3	7.2	7.2	0.3	2.1	3.3	5.2	6.4	7.3	7.3
Sailboat 30 feet	0.5	2.3	3.7	6.1	7.7	9.0	10.8	0.3	2.3	3.7	6.1	7.8	9.1	10.9
Sailboat 40 feet	0.5	2.6	4.3	7.6	10.1	12.0	14.9	0.4	2.5	4.3	7.7	10.1	12.1	15.0
Sailboat 50 feet	0.5	2.7	4.6	8.5	11.4	13.8	17.5	0.4	2.7	4.6	8.6	11.5	13.9	17.5
Sailboat 65–75 feet	0.5	2.8	4.9	9.4	12.8	15.7	20.2	0.4	2.7	4.9	9.4	12.9	15.7	20.2
Sailboat 75–90 feet	0.5	2.8	5.1	10.0	13.8	17.1	22.3	0.4	2.8	5.1	10.0	13.9	17.1	22.3
Ship 90–150 feet	0.5	2.9	5.4	11.1	16.0	20.1	27.0	0.4	2.9	5.4	11.1	16.0	20.1	27.1
Ship 150–300 feet	0.5	3.0	5.7	12.5	18.9	24.7	34.9	0.4	2.9	5.7	12.5	18.9	24.7	34.9
Ship > 300 feet	0.6	3.0	5.8	13.2	20.7	27.9	41.4	0.5	3.0	5.8	13.2	20.7	27.9	41.5

FIGURE 7D–3 UNCORRECTED VISUAL SWEEP WIDTH TABLE— FIXED-WING AIRCRAFT—ALTITUDES 1500 AND 2000 FEET

Search object	Altitude 2500 feet Visibility (M)							Altitude 3000 feet * Visibility (M)						
	1	**3**	**5**	**10**	**15**	**20**	**30**	**1**	**3**	**5**	**10**	**15**	**20**	**30**
Person in water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Raft 1 person	0.1	0.5	0.8	1.2	1.4	1.4	1.4	0.1	0.5	0.8	1.1	1.3	1.3	1.3
Raft 4 persons	0.1	0.8	1.3	1.8	2.2	2.4	2.4	0.1	0.7	1.2	1.8	2.1	2.3	2.3
Raft 6 persons	0.1	1.0	1.5	2.3	2.7	2.9	2.9	0.1	0.9	1.5	2.2	2.7	2.9	2.9
Raft 8 persons	0.1	1.1	1.7	2.5	2.9	3.2	3.2	0.1	1.0	1.6	2.5	2.9	3.2	3.2
Raft 10 persons	0.2	1.2	1.8	2.7	3.2	3.5	3.5	0.1	1.1	1.8	2.7	3.2	3.5	3.5
Raft 15 persons	0.2	1.3	2.0	3.0	3.6	4.0	4.5	0.1	1.2	2.0	3.0	3.6	4.0	4.5
Raft 20 persons	0.2	1.4	2.2	3.4	4.1	4.6	5.2	0.1	1.4	2.2	3.4	4.1	4.6	5.3
Raft 25 persons	0.2	1.5	2.4	3.7	4.5	5.0	5.7	0.1	1.5	2.4	3.7	4.5	5.1	5.8
Power boat < 15 ft	0.1	0.9	1.3	1.8	2.1	2.2	2.2	0.1	0.8	1.3	1.8	2.1	2.3	2.3
Power boat 15–25 ft	0.2	1.6	2.5	3.8	4.6	5.2	5.2	0.1	1.6	2.5	3.9	4.7	5.3	5.3
Power boat 25–40 ft	0.2	2.1	3.4	5.6	7.0	8.1	9.6	0.2	2.1	3.4	5.6	7.1	8.1	9.7
Power boat 40–65 ft	0.3	2.6	4.5	8.3	11.3	13.3	16.7	0.2	2.5	4.5	8.3	11.1	13.4	16.8
Power boat 65–90 ft	0.3	2.7	5.0	9.8	13.6	16.8	21.9	0.2	2.7	5.0	9.9	13.7	16.8	21.9
Sailboat 15 feet	0.2	1.5	2.3	3.5	4.2	4.7	4.7	0.1	1.5	2.3	3.5	4.3	4.7	4.7
Sailboat 20 feet	0.2	1.8	2.8	4.3	5.3	6.0	6.0	0.1	1.7	2.8	4.4	5.3	6.0	6.0
Sailboat 25 feet	0.2	2.1	3.3	5.2	6.5	7.5	7.5	0.2	2.0	3.3	5.3	6.6	7.5	7.5
Sailboat 30 feet	0.2	2.2	3.7	6.1	7.8	9.1	11.0	0.2	2.2	3.7	6.2	7.9	9.2	11.1
Sailboat 40 feet	0.3	2.5	4.3	7.7	10.2	12.1	15.1	0.2	2.4	4.3	7.7	10.2	12.1	15.1
Sailboat 50 feet	0.3	2.6	4.6	8.6	11.5	13.9	17.6	0.2	2.6	4.6	8.6	11.6	14.0	17.7
Sailboat 65–75 feet	0.3	2.7	4.9	9.4	12.9	15.8	20.3	0.2	2.6	4.9	9.4	13.0	15.8	20.3
Sailboat 75–90 feet	0.3	2.8	5.1	10.0	13.9	17.2	22.4	0.2	2.7	5.1	10.0	14.0	17.2	22.5
Ship 90–150 feet	0.3	2.8	5.4	11.1	16.0	20.2	27.1	0.2	2.8	5.3	11.1	16.0	20.2	27.1
Ship 150–300 feet	0.3	2.9	5.6	12.5	18.9	24.8	35.0	0.2	2.8	5.6	12.5	18.9	24.8	35.0
Ship > 300 feet	0.3	2.9	5.7	13.2	20.7	27.9	41.5	0.2	2.9	5.7	13.2	20.7	27.9	41.5

* Visual searches are seldom conducted from altitudes above 3000 feet; however, for altitudes up to 5000 feet where visibility exceeds 3 M and target size exceeds 25 feet, the sweep widths given for 3000 feet remain applicable.

FIGURE 7D–4 UNCORRECTED VISUAL SWEEP WIDTH TABLE— FIXED-WING AIRCRAFT—ALTITUDES 2500 AND 3000 FEET

Search object	Altitude 300 feet Visibility (M)							Altitude 500 feet Visibility (M)						
	1	3	5	10	15	20	30	1	3	5	10	15	20	30
Person in water *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Raft 1 person	0.4	0.9	1.2	1.5	1.7	1.7	1.7	0.4	0.9	1.2	1.6	1.8	1.8	1.8
Raft 4 persons	0.5	1.2	1.6	2.2	2.5	2.7	2.7	0.5	1.2	1.6	2.2	2.6	2.8	2.8
Raft 6 persons	0.5	1.4	1.9	2.7	3.1	3.4	3.4	0.5	1.4	1.9	2.7	3.2	3.5	3.5
Raft 8 persons	0.6	1.4	2.0	2.8	3.3	3.6	3.6	0.6	1.5	2.0	2.8	3.3	3.7	3.7
Raft 10 persons	0.6	1.5	2.1	3.0	3.6	3.9	3.9	0.6	1.6	2.2	3.1	3.6	4.0	4.0
Raft 15 persons	0.6	1.6	2.3	3.3	3.9	4.3	4.9	0.6	1.7	2.3	3.3	4.0	4.4	5.0
Raft 20 persons	0.6	1.8	2.6	3.8	4.5	5.1	5.8	0.6	1.8	2.6	3.8	4.6	5.1	5.9
Raft 25 persons	0.6	1.9	2.7	4.1	4.9	5.5	6.3	0.6	1.9	2.7	4.1	5.0	5.6	6.4
Power boat < 15 ft	0.5	1.1	1.4	1.9	2.1	2.2	2.2	0.5	1.2	1.5	1.9	2.2	2.3	2.3
Power boat 15–25 ft	0.7	2.0	2.9	4.3	5.2	5.8	5.8	0.7	2.0	2.9	4.3	5.2	5.8	5.8
Power boat 25–40 ft	0.8	2.5	3.8	6.1	7.7	8.9	10.6	0.8	2.5	3.9	6.2	7.8	9.0	10.7
Power boat 40–65 ft	0.8	3.1	5.1	9.2	12.2	14.7	18.5	0.8	3.1	5.1	9.2	12.3	14.7	18.5
Power boat 65–90 ft	0.8	3.3	5.7	10.8	15.0	18.4	23.9	0.8	3.3	5.7	10.8	15.0	18.4	23.9
Sailboat 15 feet	0.7	1.9	2.7	3.9	4.6	5.2	5.2	0.7	1.9	2.7	3.9	4.7	5.2	5.2
Sailboat 20 feet	0.7	2.2	3.2	4.8	5.9	6.6	6.6	0.7	2.2	3.2	4.8	5.9	6.7	6.7
Sailboat 25 feet	0.8	2.4	3.6	5.7	7.1	8.1	8.1	0.8	2.4	3.7	5.7	7.1	8.2	8.2
Sailboat 30 feet	0.8	2.7	4.2	6.8	8.7	10.1	12.2	0.8	2.7	4.2	6.9	8.7	10.2	12.3
Sailboat 40 feet	0.8	3.0	4.9	8.6	11.3	13.4	16.7	0.8	3.0	4.9	8.6	11.3	13.5	16.8
Sailboat 50 feet	0.8	3.1	5.2	9.5	12.7	15.3	19.3	0.8	3.1	5.2	9.5	12.7	15.3	19.4
Sailboat 65–75 feet	0.8	3.2	5.5	10.3	14.1	17.2	22.1	0.8	3.2	5.5	10.4	14.1	17.3	22.2
Sailboat 75–90 feet	0.8	3.3	5.7	11.0	15.2	18.7	24.3	0.8	3.3	5.7	11.0	15.2	18.7	24.4
Ship 90–150 feet	0.8	3.4	6.0	12.2	17.4	21.9	29.3	0.8	3.4	6.0	12.2	17.4	21.9	29.3
Ship 150–300 feet	0.8	3.4	6.3	13.6	20.4	26.6	37.3	0.8	3.4	6.3	13.6	20.4	26.6	37.3
Ship > 300 feet	0.8	3.5	6.4	14.3	22.1	29.8	43.8	0.8	3.5	6.4	14.3	22.1	29.8	43.8

* For search altitudes up to 500 feet only, the values given for sweep width for a person in water may be increased by a factor of four if it is known that the person is wearing a personal flottation device.

FIGURE 7D–5 UNCORRECTED VISUAL SWEEP WIDTH TABLE—HELICOPTERS—ALTITUDES 300 AND 500 FEET

Search object	Altitude 750 feet Visibility (M)							Altitude 1000 feet Visibility (M)						
	1	3	5	10	15	20	30	1	3	5	10	15	20	30
Person in water	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Raft 1 person	0.4	0.9	1.2	1.6	1.8	1.8	1.8	0.4	0.9	1.2	1.6	1.8	1.8	1.8
Raft 4 persons	0.5	1.2	1.7	2.3	2.6	2.8	2.8	0.5	1.2	1.7	2.3	2.6	2.9	2.9
Raft 6 persons	0.5	1.4	2.0	2.7	3.2	3.5	3.5	0.5	1.4	2.0	2.8	3.2	3.5	3.5
Raft 8 persons	0.5	1.5	2.1	2.9	3.4	3.7	3.7	0.5	1.5	2.1	2.9	3.4	3.8	3.8
Raft 10 persons	0.6	1.6	2.2	3.1	3.7	4.0	4.0	0.5	1.6	2.2	3.2	3.7	4.1	4.1
Raft 15 persons	0.6	1.7	2.4	3.4	4.0	4.5	5.0	0.6	1.7	2.4	3.5	4.1	4.5	5.1
Raft 20 persons	0.6	1.8	2.6	3.9	4.6	5.2	5.9	0.6	1.8	2.7	3.9	4.7	5.2	6.0
Raft 25 persons	0.6	1.9	2.8	4.2	5.0	5.6	6.5	0.6	1.9	2..8	4.2	5.1	5.7	6.5
Power boat < 15 ft	0.5	1.2	1.6	2.0	2.3	2.4	2.4	0.5	1.2	1.6	2.1	2.3	2.5	2.5
Power boat 15–25 ft	0.7	2.0	2.9	4.4	5.3	5.9	5.9	0.7	2.1	3.0	4.4	5.3	5.9	5.9
Power boat 25–40 ft	0.7	2.5	3.9	6.2	7.8	9.0	10.7	0.7	2.6	3.9	6.3	7.9	9.1	10.8
Power boat 40–65 ft	0.8	3.1	5.1	9.2	12.3	14.7	18.5	0.7	3.1	5.2	9.2	12.3	14.8	18.6
Power boat 65–90 ft	0.8	3.3	5.7	10.9	15.0	18.4	23.9	0.8	3.3	5.7	10.9	15.0	18.5	23.9
Sailboat 15 feet	0.7	1.9	2.7	4.0	4.8	5.3	5.3	0.6	1.9	2.8	4.0	4.8	5.4	5.4
Sailboat 20 feet	0.7	2.2	3.2	4.9	6.0	6.7	6.7	0.7	2.2	3.2	4.9	6.0	6.8	6.8
Sailboat 25 feet	0.7	2.5	3.7	5.8	7.2	8.3	8.3	0.7	2.5	3.7	5.8	7.3	8.3	8.3
Sailboat 30 feet	0.8	2.7	4.2	6.9	8.8	10.2	12.3	0.7	2.7	4.2	6.9	8.8	10.3	12.4
Sailboat 40 feet	0.8	3.0	4.9	8.6	11.3	13.5	16.8	0.7	3.0	4.9	8.6	11.4	13.5	16.8
Sailboat 50 feet	0.8	3.1	5.3	9.5	12.7	15.4	19.4	0.7	3.1	5.3	9.5	12.8	15.4	19.5
Sailboat 65–75 feet	0.8	3.2	5.5	10.4	14.2	17.3	22.2	0.8	3.2	5.6	10.4	14.2	17.3	22.2
Sailboat 75–90 feet	0.8	3.3	5.7	11.0	15.2	18.8	24.4	0.8	3.3	5.7	11.0	15.3	18.8	24.4
Ship 90–150 feet	0.8	3.4	6.0	12.2	17.4	21.9	29.3	0.8	3.4	6.0	12.2	17.4	21.9	29.3
Ship 150–300 feet	0.8	3.4	6.3	13.6	20.4	26.6	37.3	0.8	3.4	6.3	13.6	20.4	26.6	37.3
Ship > 300 feet	0.8	3.5	6.4	14.3	22.2	29.8	43.8	0.8	3.5	6.4	14.3	22.2	29.8	43.9

**FIGURE 7D–6 UNCORRECTED VISUAL SWEEP WIDTH TABLE—
HELICOPTERS—ALTITUDES 750 AND 1000 FEET**

Search object	Altitude 1500 feet Visibility (M)							Altitude 2000 feet Visibility (M)						
	1	3	5	10	15	20	30	1	3	5	10	15	20	30
Person in water	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Raft 1 person	0.3	0.9	1.2	1.6	1.8	1.8	1.8	0.2	0.8	1.2	1.6	1.8	1.8	0.8
Raft 4 persons	0.4	1.2	1.7	2.3	2.7	2.9	2.9	0.3	1.2	1.7	2.3	2.7	3.0	3.0
Raft 6 persons	0.4	1.4	2.0	2.8	3.3	3.6	3.6	0.3	1.4	2.0	2.8	3.3	3.6	3.6
Raft 8 persons	0.4	1.5	2.1	3.0	3.5	3.9	3.9	0.3	1.5	2.1	3.0	3.6	3.9	3.9
Raft 10 persons	0.4	1.6	2.2	3.2	3.8	4.2	4.2	0.3	1.6	2.3	3.3	3.9	4.2	4.2
Raft 15 persons	0.5	1.7	2.4	3.5	4.2	4.6	5.2	0.3	1.7	2.5	3.6	4.3	4.7	5.3
Raft 20 persons	0.5	1.9	2.7	4.0	4.8	5.3	6.1	0.4	1.8	2.7	4.0	4.9	5.4	6.2
Raft 25 persons	0.5	2.0	2.9	4.3	5.2	5.8	6.7	0.4	1.9	2.9	4.3	5.3	5.9	6.8
Power boat < 15 ft	0.4	1.3	1.7	2.2	2.5	2.6	2.6	0.3	1.3	1.7	2.3	2.6	2.7	2.7
Power boat 15–25 ft	0.6	2.1	3.0	4.5	5.4	6.1	6.1	0.4	2.1	3.0	4.5	5.5	6.1	6.1
Power boat 25–40 ft	0.6	2.6	4.0	6.3	7.9	9.2	10.9	0.5	2.6	4.0	6.4	8.0	9.3	11.0
Power boat 40–65 ft	0.7	3.1	5.2	9.3	12.4	14.8	18.6	0.5	3.0	5.2	9.3	12.4	14.9	18.7
Power boat 65–90 ft	0.7	3.2	5.7	10.9	15.1	18.5	24.0	0.5	3.2	5.7	10.9	15.1	18.5	24.0
Sailboat 15 feet	0.6	2.0	2.8	4.1	4.9	5.5	5.5	0.4	1.9	2.8	4.2	5.0	5.6	5.6
Sailboat 20 feet	0.6	2.2	3.3	5.0	6.1	6.9	6.9	0.5	2.2	3.3	5.1	6.2	7.0	7.0
Sailboat 25 feet	0.6	2.5	3.8	5.9	7.4	8.4	8.4	0.5	2.5	3.8	6.0	7.5	8.6	8.6
Sailboat 30 feet	0.6	2.7	4.2	7.0	8.9	10.3	12.5	0.5	2.7	4.3	7.0	9.0	10.4	12.6
Sailboat 40 feet	0.6	3.0	4.9	8.7	11.4	13.6	16.9	0.5	3.0	4.9	8.7	11.4	13.6	17.0
Sailboat 50 feet	0.7	3.1	5.3	9.6	12.8	15.5	19.5	0.5	3.1	5.3	9.6	12.9	15.5	19.6
Sailboat 65–75 feet	0.7	3.2	5.6	10.4	14.3	17.4	22.3	0.5	3.2	5.6	10.5	14.3	17.4	22.4
Sailboat 75–90 feet	0.7	3.3	5.7	11.1	15.3	18.8	24.5	0.5	3.2	5.7	11.1	15.4	18.9	24.6
Ship 90–150 feet	0.7	3.3	6.0	12.2	17.5	22.0	29.4	0.5	3.3	6.0	12.2	17.5	22.0	29.4
Ship 150–300 feet	0.7	3.4	6.3	13.6	20.4	26.6	37.3	0.5	3.4	6.3	13.6	20.4	26.6	37.4
Ship > 300 feet	0.7	3.4	6.4	14.3	22.2	29.8	43.9	0.6	3.4	6.4	14.3	22.2	29.8	43.9

FIGURE 7D–7 UNCORRECTED VISUAL SWEEP WIDTH TABLE— HELICOPTERS—ALTITUDES 1500 AND 2000 FEET

Search object	**Altitude 2500 feet Visibility (M)**							**Altitude 3000 feet * Visibility (M)**						
	1	**3**	**5**	**10**	**15**	**20**	**30**	**1**	**3**	**5**	**10**	**15**	**20**	**30**
Person in water	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Raft 1 person	0.1	0.8	1.1	1.6	1.8	1.8	1.8	0.1	0.7	1.0	1.5	1.8	1.8	1.8
Raft 4 persons	0.2	1.1	1.6	2.3	2.7	3.0	3.0	0.1	1.0	1.6	2.3	2.7	3.0	3.0
Raft 6 persons	0.2	1.3	1.9	2.8	3.3	3.7	3.7	0.1	1.2	1.9	2.8	3.3	3.7	3.7
Raft 8 persons	0.2	1.4	2.1	3.1	3.6	4.0	4.0	0.1	1.3	2.1	3.1	3.6	4.0	4.0
Raft 10 persons	0.2	1.5	2.2	3.3	3.9	4.3	4.3	0.1	1.4	2.2	3.3	3.9	4.3	4.3
Raft 15 persons	0.2	1.7	2.5	3.6	4.3	4.8	5.4	0.2	1.6	2.4	3.7	4.4	4.9	5.5
Raft 20 persons	0.3	1.8	2.7	4.1	4.9	5.5	6.3	0.2	1.7	2.7	4.1	5.0	5.6	6.3
Raft 25 persons	0.3	1.9	2.9	4.4	5.3	6.0	6.9	0.2	1.9	2.9	4.4	5.4	6.0	6.9
Power boat < 15 ft	0.2	1.2	1.7	2.3	2.6	2.8	2.8	0.1	1.1	1.7	2.3	2.7	2.9	2.9
Power boat 15–25 ft	0.3	2.0	3.0	4.6	5.5	6.2	6.2	0.2	2.0	3.0	4.6	5.6	6.3	6.3
Power boat 25–40 ft	0.4	2.5	4.0	6.5	8.1	9.3	11.1	0.2	2.5	4.0	6.5	8.2	9.4	11.2
Power boat 40–65 ft	0.4	3.0	5.2	9.3	12.4	14.9	18.8	0.3	3.0	5.2	9.3	12.5	15.0	18.8
Power boat 65–90 ft	0.4	3.2	5.7	10.9	15.1	18.6	24.1	0.3	3.1	5.7	10.9	15.1	18.6	24.1
Sailboat 15 feet	0.3	1.9	2.8	4.2	5.1	5.6	5.6	0.2	1.9	2.8	4.3	5.1	5.7	5.7
Sailboat 20 feet	0.3	2.2	3.3	5.1	6.3	7.1	7.1	0.2	2.1	3.3	5.2	6.3	7.1	7.1
Sailboat 25 feet	0.4	2.5	3.8	6.1	7.6	8.7	8.7	0.2	2.4	3.9	6.1	7.7	8.8	8.8
Sailboat 30 feet	0.4	2.7	4.3	7.1	9.0	10.5	12.6	0.2	2.6	4.3	7.1	9.1	10.6	12.7
Sailboat 40 feet	0.4	2.9	4.9	8.7	11.5	13.7	17.0	0.3	2.9	4.9	8.7	11.5	13.7	17.1
Sailboat 50 feet	0.4	3.1	5.3	9.6	12.9	15.6	19.7	0.3	3.0	5.3	9.7	13.0	15.6	19.7
Sailboat 65–75 feet	0.4	3.1	5.6	10.5	14.3	17.5	22.4	0.3	3.1	5.6	10.5	14.4	17.5	22.5
Sailboat 75–90 feet	0.4	3.2	5.7	11.1	15.4	18.9	24.6	0.3	3.1	5.7	11.1	15.4	19.0	24.7
Ship 90–150 feet	0.4	3.3	6.0	12.2	17.5	22.0	29.4	0.3	3.2	6.0	12.2	17.5	22.0	29.5
Ship 150–300 feet	0.4	3.3	6.3	13.6	20.4	26.6	37.4	0.3	3.3	6.3	13.6	20.4	26.6	37.4
Ship > 300 feet	0.5	3.4	6.4	14.3	22.2	29.8	43.9	0.3	3.3	6.4	14.3	22.2	29.8	43.9

* Visual searches are seldom conducted from altitudes above 3000 feet; however, for altitudes up to 5000 feet where visibility exceeds 3 M and target size exceeds 25 feet, the sweep widths given for 3000 feet remain applicable.

**FIGURE 7D–8 UNCORRECTED VISUAL SWEEP WIDTH TABLE—
HELICOPTERS—ALTITUDES 2500 AND 3000 FEET**

Search object	Ships — ex. type 500 (90' All Weather Patrol Boat WPB) Visibility (M)						Boats — ex. type 300 (41' Utility Boat UTB) Visibility (M)					
	1	3	5	10	15	20	1	3	5	10	15	20
Person in water	0.3	0.4	0.5	0.5	0.5	0.5	0.2	0.2	0.3	0.3	0.3	0.3
Raft 1 person	0.9	1.8	2.3	3.1	3.4	3.7	0.7	1.3	1.7	2.3	2.6	2.7
Raft 4 persons	1.0	2.2	3.0	4.0	4.6	5.0	0.7	1.7	2.2	3.1	3.5	3.9
Raft 6 persons	1.1	2.5	3.4	4.7	5.5	6.0	0.8	1.9	2.6	3.6	4.3	4.7
Raft 8 persons	1.1	2.5	3.5	4.8	5.7	6.2	0.8	2.0	2.7	3.8	4.4	4.9
Raft 10 persons	1.1	2.6	3.6	5.1	6.1	6.7	0.8	2.0	2.8	4.0	4.8	5.3
Raft 15 persons	1.1	2.8	3.8	5.5	6.5	7.2	0.9	2.2	3.0	4.3	5.1	5.7
Raft 20 persons	1.2	3.0	4.1	6.1	7.3	8.1	0.9	2.3	3.3	4.9	5.8	6.5
Raft 25 persons	1.2	3.1	4.3	6.4	7.8	8.7	0.9	2.4	3.5	5.2	6.3	7.0
Power boat < 15 ft	0.5	1.1	1.4	1.9	2.1	2.3	0.4	0.8	1.1	1.5	1.6	1.8
Power boat 15–25 ft	1.0	2.0	2.9	4.3	5.2	5.8	0.8	1.5	2.2	3.3	4.0	4.5
Power boat 25–40 ft	1.1	2.5	3.8	6.1	7.7	8.8	0.8	1.9	2.9	4.7	5.9	6.8
Power boat 40–65 ft	1.2	3.1	5.1	9.1	12.1	14.4	0.9	2.4	3.9	7.0	9.3	11.1
Power boat 65–90 ft	1.2	3.2	5.6	10.7	14.7	18.1	0.9	2.5	4.3	8.3	11.4	14.0
Sailboat 15 feet	1.0	1.9	2.7	3.9	4.7	5.2	0.8	1.5	2.1	3.0	3.6	4.0
Sailboat 20 feet	1.0	2.2	3.2	4.8	5.9	8.6	0.8	1.7	2.5	3.7	4.6	5.1
Sailboat 25 feet	1.1	2.4	3.6	5.7	7.0	8.1	0.9	1.9	2.8	4.4	5.4	6.3
Sailboat 30 feet	1.1	2.7	4.1	6.8	8.6	10.0	0.9	2.1	3.2	5.3	6.6	7.7
Sailboat 40 feet	1.2	3.0	4.9	8.5	11.2	13.3	0.9	2.3	3.8	6.6	8.6	10.3
Sailboat 50 feet	1.2	3.1	5.2	9.4	12.5	15.0	0.9	2.4	4.0	7.3	9.7	11.6
Sailboat 65–75 feet	1.2	3.2	5.5	10.2	13.9	16.9	0.9	2.5	4.2	7.9	10.7	13.1
Sailboat 75–90 feet	1.2	3.3	5.7	10.8	15.0	18.4	0.9	2.5	4.4	8.3	11.6	14.2
Ship 90–150 feet	1.8	3.3	6.0	12.0	17.1	21.5	1.4	2.5	4.6	9.3	13.2	16.6
Ship 150–300 feet	1.8	3.4	6.3	13.4	20.1	26.1	1.4	2.6	4.9	10.3	15.5	20.2
Ship > 300 feet	1.8	3.4	6.4	14.1	21.8	29.2	1.4	2.6	4.9	10.9	16.8	22.5

FIGURE 7D–9 UNCORRECTED VISUAL SWEEP WIDTH TABLE— VESSELS AND SMALL BOATS

Liferaft Canopy Lights			
Variables	**Below Average Conditions**	**Average Conditions**	**Above Average Conditions**
Wind Speed	24 knots	18 knots	14 knots
Sweep Width	4.0 M	5.0 M	5.7 M

Unlighted Liferaft Canopy Targets		
Significant Wave Height	3 to 5 feet	5.6 to 7.2 feet
Lateral Range	1.3 M	0.6 M

FIGURE 7D–10 UNCORRECTED VISUAL SWEEP WIDTH TABLE— NIGHT VISION GOGGLES

The following table gives the weather condition factor (f_w). When two conditions are present, use the values from the right hand column.

Target Type	Winds > 15 knots Seas 2–3 feet	Winds> 25 knots Seas > 4 feet
Person in water	0.5	0.25
Boat < 30 feet	0.5	0.25
Other targets	0.9	0.9

FIGURE 7D–11 WEATHER CONDITION FACTOR

Search object	**Fixed-wing aircraft (speed in knots)**			**Helicopter (speed in knots)**			
	< 150	**180**	**210**	**60**	**90**	**120**	**140**
Person in water	1,2	1,0	0,9	1,5	1,0	0,8	0,7
Raft 1 to 4 persons	1,1	1,0	0,9	1,3	1,0	0,9	0,8
Raft 6 to 25 persons	1,1	1,0	0,9	1,2	1,0	0,9	0,8
Power boat < 25 ft	1,1	1,0	0,9	1,2	1,0	0,9	0,8
Power boat 25–40 ft	1,1	1,0	0,9	1,1	1,0	0,9	0,9
Power boat 40–65 ft	1,1	1,0	1,0	1,1	1,0	0,9	0,9
Power boat 65–90 ft	1,1	1,0	1,0	1,1	1,0	1,0	0,9
Sailboat < 26 ft	1,1	1,0	0,9	1,2	1,0	0,9	0,9
Sailboat 30-52 ft	1,1	1,0	1,0	1,1	1,0	0,9	0,9
Sailboat 65-90 ft	1,1	1,0	1,0	1,1	1,0	1,0	0,9
Ship > 90 ft	1,0	1,0	1,0	1,1	1,0	1,0	0,9

Correcting for Search Aircraft Speed Correction (f_v)—Enter the speed correction table with aircraft type and the speed flown. Read down the column to the search object. This value is the speed correction. Interpolate as required. There is no speed correction for surface SRUs.

FIGURE 7D–12 SEARCH AIRCRAFT SPEED CORRECTION TABLE

If feedback from on-scene search and rescue units indicates search crews are excessively fatigued, reduce the sweep width values by 10 %:

$$f_f = 0.8$$

FIGURE 7D–13 FATIGUE CORRECTION FACTOR

Use the fatigue correction factor when the crew on the SRU is likely fatigued. Crew will be fatigued if they have been involved in a search for an extended period, and they may exhibit signs of fatigue which include: missed communications; problems with memory; irritability; and increased time to complete tasks or make decisions.

CHAPTER 8—COMMUNICATIONS PROCEDURES

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INTRODUCTION

8.1 Efficient operational communications systems, policies and procedures are vital to the overall delivery of SAR services and to the success of every SAR mission. Communications support; distress alerting, co-ordination, and locating functions by allowing:

.1 those in distress to alert the SAR system;

.2 the SAR system to respond and conduct its mission; and

.3 survivors to help SAR units respond and conduct a rescue.[1]

8.2 This chapter details communications system, policies and procedures to be used in the Canadian SRR in addition to procedures found in other publications such as the IAMSAR Manual.

MINIMUM RCC/MRSC COMMUNICATIONS SYSTEM REQUIREMENTS

8.3 RCC/ MRSC's are the "hub" of Canada's SAR System and shall effectively co-ordinate multi-agency responses to aeronautical or maritime SAR incidents. To support co-ordination, the following communications systems shall be provided in each RCC/MRSC:

.1 Telephone links (includes toll-free and regular emergency lines that are widely published, sufficient non-emergency lines and lines for the press);

.2 Fax links;

.3 Telex links (for A3 sea area and international communications);

.4 SARCOM links (dedicated CCG regional link between RCC/MRSC, MCTS Centres and ROCs);

.5 ADIS links (Automated Data Interchange System (ADIS) which is the Canadian ATC communications network forming the international AFTN (Aeronautical Fixed Telecommunications Network) - RCCs only);

.6 Military Messaging System links (RCCs only);

.7 Internet links;

.8 E-Mail links;

.9 Dedicated data links (as required);

.10 Dedicated voice links (as required);

[1] IAMSAR Vol. 1 Chapter 4 paragraph 4.2.1

.11 Inmarsat-C terminals (for A3 sea area SafetyNet monitoring);

.12 Wireless contingency back-up communications links (terrestrial and satellite);

.13 Contact list of facilities available to support SAR.

RECORDING OF RCC/MRSC COMMUNICATIONS

8.4 Operational communications links at RCC/MRSCs are to be equipped with recording equipment. The *policy* applied to the custody and operations of the recording equipment is as follows:

.1 all conversations on RCC/MRSC operational communication lines shall be recorded;

.2 tapes/disks shall be changed as required;

.3 recorded tapes/disks shall be numbered and dated;

.4 all recorded tapes/disks shall be kept for a minimum of 30 days;

.5 tapes/disks shall be impounded by the OIC RCC or RSMS MRSC whenever an investigation, judicial inquiry, etc., has been ordered or is anticipated and the OIC RCC or RSMS MRSC shall be responsible for providing continuity of possession ensuring that tapes/disks are not recycled until released by higher authority;

.6 requests for recordings and transcripts should be directed to the OIC RCC or RSMS MRSC in writing;

.7 tapes/disks or transcripts are not to be released to other than DFO/Canadian Coast Guard, DND/Canadian Forces and TSB personnel unless ordered by the National Defence Headquarters or a court of law; and

.8 instantaneous playback of all operational telephone lines shall be provided.

FORWARDING AERONAUTICAL & MARITIME ALERTS TO AN RCC/MRSC

8.5 The need for the earliest possible alerting of the RCC/MRSC SAR Co-ordinator to actual or potential aeronautical and maritime incidents cannot be overemphasised. Any facility, either mobile or fixed, that detects an alert of an actual or potential incident, as described below, shall forward, as soon as possible, all related information, including information on any actions taken, to an RCC/MRSC:

.1 all maritime or aeronautical SAR incidents;

.2 any situation which may develop into a SAR incident; and

.3 any incident, which may involve or lead to danger to life, the environment or to property which may require action from the SAR services and/or other authorities.

RECEPTION OF AERONAUTICAL AND MARITIME ALERTS AT AN RCC/MRSC

8.6 The RCC/MRSC is alerted of aeronautical or maritime distress or other incidents, which require a co-ordinated response from the SAR System, via numerous means. These means include but are not limited to;

.1 Radiotelephone (monitored by ATC, MCTS or others),

.2 Radio digital selective calling (monitored by MCTS),

.3 Distress beacons (monitored by Cospas-Sarsat, Inmarsat or MCTS-for VHF-DSC beacons),

.4 Inmarsat,

.5 SARTs,

.6 Reports of official visual or audible distress signals or other indications of distress,

.7 Reports of overdue or missing aircraft ,

.8 Reports of overdue or missing vessels and persons at sea,

.9 Reports of overdue or missing aircraft or vessels participating in an ATC, VTS or offshore reporting system,

.10 Requests for assistance via mobile phone aboard an aircraft or vessel or on behalf of an aircraft or vessel,

Regardless of the means and method, whether regulated by aeronautical or maritime regulations or not, by which a RCC/MRSC SAR Co-ordinator has been alerted of an actual or potential aeronautical or maritime incident, the SAR Co-ordinator shall take action to resolve the incident.

VITAL INCIDENT DATA

8.7 Regardless of the means by which an alert is transmitted to an RCC/MRSC, the SAR Co-ordinator shall, as a minimum, obtain data vital to co-ordinating the effective resolution of the incident. A list of this data is found in IAMSAR Vol 2 Appendix C. At no time shall the SAR Co-ordinator delay the response to a life-threatening incident, if all vital data is not readily available.

DISTRESS BEACON ALERTS - GENERAL

8.8 There are three types of distress beacons regulated for use:

.1 Cospas-Sarsat 121.5/243/406 MHz ELT/EPIRB/PLB

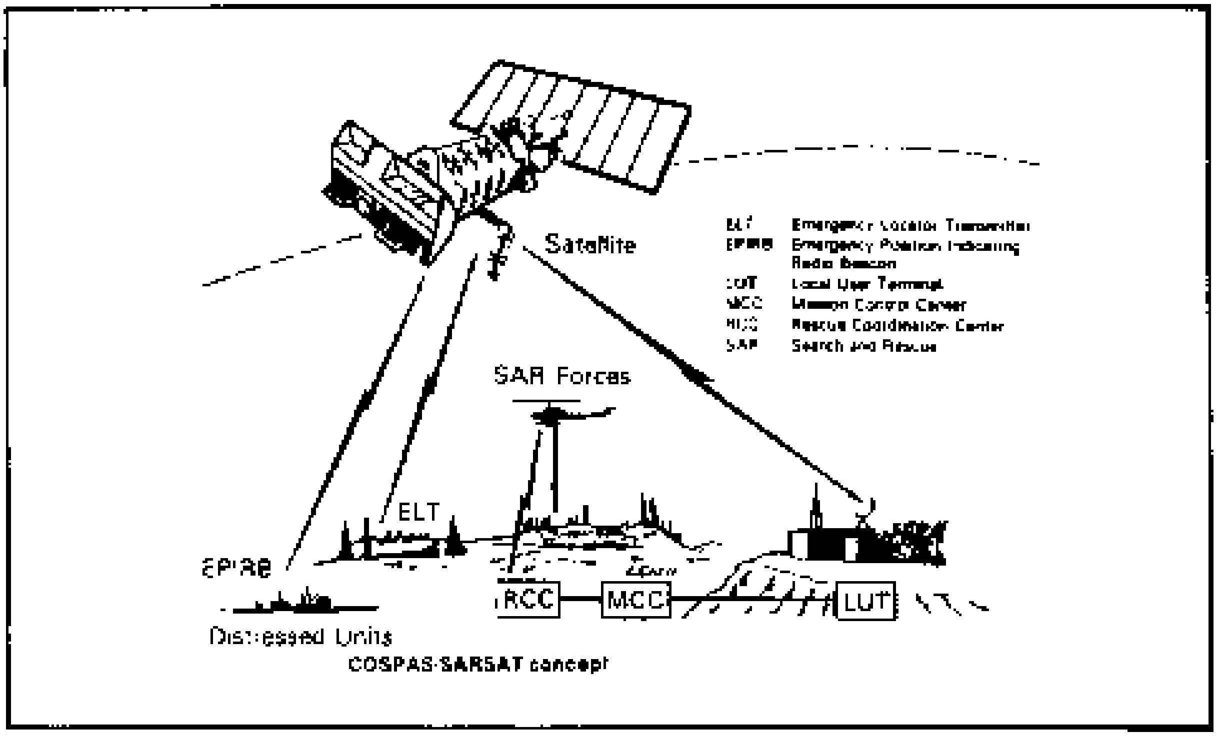
.2 Inmarsat-E EPIRB

.3 VHF-DSC EPIRB

8.9 The response to ELT and EPIRB alerts falls within the DND/CCG mandate. The resolution of PLB alerts does not fall within this mandate and the appropriate authority will be sought to resolve the incident. Normally, the Canadian Mission Control Centre (CMCC) will disseminate Cospas-Sarsat PLB alerts for resolution to a provincial/territorial SAR point of contact (SPOC). In the absence of, or in corroboration with, other information, a distress beacon alert is to be considered as a sign of distress and shall be actioned immediately by the responsible RCC/MRSC until resolved.

COSPAS-SARSAT BEACON ALERTS

8.10 Alerts from 121.5/243 MHz and 406 MHz distress beacons (ELT/EPIRB/PLB) are received by the Cospas-Sarsat constellation of geostationary (GOES) and low-earth orbiting (LEO) satellites and relayed to ground stations called local users terminals (LUTs). Alerts are then forwarded to the associated mission control centre (MCC) for processing and determination of position. The Canadian MCC (CMCC) at RCC Trenton shall forward all ELT and EPIRB alerts to the RCC responsible for the SRR in which the beacon is detected. The RCC or MRSC SAR Co-ordinator shall then action the alert to resolve the incident.



COSPAS-SARSAT concept

8.11 121.5/243 MHz beacons – These are uncoded and thus have no associated registration database. In the absence of other corroborating information, an alert is normally considered to be received at the RCC when CMCC "merges" two unique "hits" to form a CMCC 'case".

8.12 406 MHz beacons – These are coded, and when properly registered, identify the aircraft or vessel and give contact information, which the SAR Co-ordinator shall use in resolving incidents. Some also transmit a low-power 121.5 MHz homing signal. The Canadian 406 MHz beacon registry is maintained by the National Search and Rescue Secretariat (NSS) (toll-free in Canada 1-800-727-9414 or 1-613-996-1504) and accessed by CMCC on a 24/7 basis. SAR Co-ordinators who encounter improperly registered beacons shall advise CMCC.

8.13 Coded Cospas-Sarsat beacons transmit a bit-code that contains vital information, including the 15-digit hexidecimal code, which is used to cross-reference against the distress beacon registry for each country. Some beacons may have a GPS position fixing option, in which case, the position is transmitted within the bit-code. Also included is a "beacon ID" which is coded using one of three protocols:

.1 Call sign;

.2 MMSI; or

.3 Serial number not related to any other registry.

This ID may be useful to cross-reference against other registries.

8.14 406 MHz Cospas-Sarsat beacon alerts are instantaneously detected by the GOES satellites which, however, cannot ascertain the beacon's position because there is no Doppler shift. A position cannot be calculated until a LEO satellite detects the signal. An unlocated signal is initially passed to the MCC of the country that holds the database for that beacon, until a probable position of the beacon can be ascertained. If it is a Canadian registered beacon, CMCC shall forward the alert to the RCC responsible for the SRR in which the aircraft or vessel normally operates.

INMARSAT-E EPIRB ALERTS

8.15 Inmarsat-E is the system that supports the operation of L-band EPIRBs. These beacons provide ship-to-shore distress alerting for ships operating within the Inmarsat satellite coverage footprint. These beacons do not have a homing signal due to the accuracy of the on-board GPS positioning. A SART may be built into the beacon for homing but is not a requirement. These beacons are registered in the Inmarsat registry, which contains vital information on the vessel carrying the beacon.

8.16 When an Inmarsat Land Earth Station (LES) receives a beacon distress alert, it is forwarded, with the accompanying registry information, held at the LES, for action by the RCC associated with that LES. If the position is outside that RCC's SRR, the RCC shall pass the alert to the responsible RCC for resolution. Once received at the responsible Canadian RCC/MRSC, the SAR Co-ordinator shall then action the alert to resolve the incident. If the vessel data is not provided with the alert, it can be obtained from an Inmarsat Operator.

VHF-DSC EPIRB ALERTS

8.17 Ships operating exclusively in an "A1 sea area" may, in lieu of satellite EPIRBs, use VHF-DSC EPIRBs transmitting on channel 70. These EPIRBs transmit an MMSI, GPS position and other vital information. They are registered in the national MMSI database for each country. In Canada, distress alerts from these beacons are detected by CCG MCTS Centres. The MCTS Officer shall then forward all alert information to the appropriate RCC/MRSC as soon as possible. The RCC/MRSC SAR Co-ordinator shall then action the alert to resolve the incident similarly to VHF-DSC distress alerts.

MARITIME MOBILE AND MARITIME MOBILE-SATELLITE SERVICES - GENERAL

8.18 The Maritime Mobile Service is defined by the ITU as, "A mobile (communications) service between coast stations and ship stations, or between ship stations, or between associated on-board communications stations; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service". The Maritime Mobile-Satellite Service is defined by the ITU as, "A mobile-satellite (communications) service in which mobile earth stations are located on board ships: survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service". These services interface with carriage requirements and other shore-side services, required under SOLAS and the International

Convention on Maritime SAR, to form the overall "GLOBAL MARITIME DISTRESS & SAFETY SYSTEM" (GMDSS).

8.19 In the Canadian SRR, CCG Marine Communications and Traffic Services (MCTS) Centres provide 24/7 "coast watching" services required for the detection of all distress alerts issued within the maritime mobile service. Further, these Centres provide the follow-on broadcast and mobile communications services required during the resolution of a SAR incident.

MARITIME MOBILE SERVICE – RADIOTELEPHONE ALERTS

8.20 Upon receipt of a VHF/MF/HF RT transmitted alert at an MCTS Centre, the duty MCTS Officer (MCTSO) will take action in accordance with (IAW) the MCTS National Standards Manual. The MCTS Officer will obtain relevant vital data from the source. Further, the MCTS Officer shall broadcast, on behalf of the Master of the distressed vessel, a "Mayday Relay" if it is clear that there are persons in distress and more assistance is required. The MCTS Officer shall then forward, as soon as possible, all information related to alerts and any actions taken to the RCC/MRSC SAR Co-ordinator via voice and follow-up with a hardcopy message. The RCC/MRSC SAR Co-ordinator shall then action the alert to resolve the incident (refer to Annex 1 for frequencies).

MARITIME MOBILE SERVICE – DIGITAL SELECTIVE CALLING (DSC) ALERTS

8.21 DSC distress and other alerts are detected by: CCG MCTS Centres equipped with DSC; foreign coast radio stations; and vessels within propagation range of the alert broadcast (refer to Annex 1 for DSC frequencies).

.1 **DSC alert message composition:**
Format specifier:

- Distress;
- Urgency;
- Safety.

.2 **9-digit Maritime Mobile Service Identity (MMSI):**

- Ship station: MIDXXXXXX;
- Coast station: 00MIDXXXX;

where MID is Maritime Identification Digits or country code and X is any figure from 0 to 9.
Nature of the distress (default setting is "undesignated");
Distress co-ordinates. (default is "no position information" or 99999 99999);
Time UTC: hhmm (default is "no time information" or 8888);
Mode of subsequent communication (default is "radiotelephony").

8.22 **MCTS actions upon receipt of a VHF-DSC distress alert** – If the distress co-ordinates are *within* an MCTS Centre's area of responsibility, the MCTS Officer will immediately transmit a VHF-DSC distress alert acknowledgement. If no co-ordinates are transmitted or if the co-ordinates are outside VHF range and it is not being acknowledged, the MCTS Officer will acknowledge. After acknowledgement, RT communications will be established on VHF CH 16 in order to obtain vital data. If required, a Mayday Relay may be broadcast. The MCTS Officer will then advise the RCC/MRSC as soon as possible.

8.23 MCTS actions upon receipt of a MF/HF DSC distress alert - If the distress co-ordinates are within the Canadian SRR, the most appropriate MCTS Centre will immediately transmit a MF/HF DSC distress alert acknowledgement on the same frequency. After acknowledgement, communications will be established on RT or NBDP using the associated frequency in order to obtain vital information. If required, a Mayday Relay may be broadcast. The MCTS Officer will then advise the RCC/MRSC. If the distress co-ordinates are outside the Canadian SRR or no co-ordinates were included in the transmission a DSC distress alert acknowledgement will not be sent without consultation with the RCC/MRSC SAR Co-ordinator.

8.24 RCC/MRSC actions upon notification of a DSC distress alert - The SAR Co-ordinator shall:

.1 Obtain distressed vessel's MMSI, and other vital data;

.2 If not received directly by an MCTS Centre, obtain the receiving station's name, MMSI, position, frequency alert received on, time of receipt, and any actions taken;

.3 If the position is within the RCC's SRR or MRSC's *SR*S, assume SAR Mission Co-ordinator (SMC) and continue to resolve the incident;

.4 If the position is outside the RCC's SRR or MRSC's *SRS*, attempt to pass responsibility to the appropriate RCC/MRSC. If this is not possible, *or no position is transmitted*, continue to action the incident IAW the policy of "First RCC" detailed in the IAMSAR Manual Vol 2, chapter 3, section 3.6. *Further, advise the Flag State for that particular vessel.*

8.25 If the MCTS Centre or other station that received the alert is unable to communicate with the vessel that sent the alert, RCC/MRSC shall establish communications directly with the vessel or shore-side contact for the vessel by:

.1 Identifying the distressed vessel and obtaining registry information from *a* MMSI registry and attempting to establish communications using all available means such as Inmarsat; *and/or*

.2 Identifying other vessels in the area of the distressed vessel using MSI broadcasts and AMVER, and request they attempt to contact the distressed vessel; *and/or*

.3 Contacting other RCCs and requesting any further information they may have on the distressed vessel; an*d/or*

.4 Contacting the 24/7 SAR data provider for the national MMSI or Distress Beacon registries.

8.26 The Canadian MMSI Registry is maintained by Industry Canada and is available via the Internet. The ITU also maintains an international MMSI registry available via the Internet. RCC Halifax is designated the 24/7 emergency "SAR Data Provider" for the Canadian MMSI registry.

MARITIME MOBILE SERVICE – SAR TRANSPONDER (SART) ALERTS

8.27 Search and Rescue (radar) Transponders (SARTs) are used for locating survivors by SAR units and are also to be considered as a distress alert. The SART should normally be taken to the survival craft when abandoning the vessel. They transmit a signal in the X-band (3 cm) radio frequency used by common aeronautical and maritime radar. They are detected at various distances depending on scanner height, tuning and band-width of the radar.

8.28 Any RCC/MRSC SAR Co-ordinator that is advised of the detection of a SART shall action the alert to resolve the incident.

MARITIME MOBILE-SATELLITE SERVICE – INMARSAT ALERTS

8.29 Inmarsat A/B/C distress and urgency alerts transmitted from a vessel are first detected by an Inmarsat LES and forwarded directly to its associated RCC. RCC Halifax is associated with the LES at Laurentides, Quebec, for Inmarsat B/C services. A vessel in distress in Canada's SRR using an LES other than Laurentides will have its automatic distress alert sent to the RCC associated with the LES which that vessel has chosen. Vessels may also contact any RCC/MRSC directly by telephone, fax, or telex using Inmarsat A/B/C.

8.30 RCC/MRSC actions upon receipt or notification of an Inmarsat alert – The SAR Co-ordinator shall:

.1 If the distress position is within their SRR *or SR*S, acknowledge reception of the alert *by* establis*hing* contact with the vessel via any means and resolve the incident;

.2 If the position is outside their SRR or SRS, acknowledge reception of the alert and attempt to pass responsibility to the appropriate RCC/MRSC. If this is not possible, the SAR Co-ordinator shall continue to action the incident IAW the policy of "First RCC" detailed in the IAMSAR Vol 2, chapter 3, section 3.6. SAR Co-ordinators shall use the format for "RCC-RCC Distress Alert Information" provided in IAMSAR Vol 2, Appendix B, for the forwarding of distress alerts between RCCs;

.3 Use the services of the Inmarsat LES or Network Operations Centre (NOC) operator to help establish direct follow-on communications, if required.

8.31 Inmarsat Terminal Return ID – The return ID is a "hidden" Inmarsat ID assigned to a ship earth station used by the system for security purposes . Occasionally alerts are received from terminals that have been installed on a ship but have not yet been commissioned on the Inmarsat system. In these cases there will be no terminal ID to identify the vessel. The return ID is programmed into the terminal at the manufacturing stage, as opposed to a terminal ID, which is assigned by Inmarsat when the SES is commissioned. It can be obtained from the Inmarsat NOC or the LES Operator that received the distress alert. Inmarsat equipment manufacturers have records to match return IDs with serial numbers and should be able to identify the dealer to whom the terminal was sold.

8.32 Follow-on Inmarsat communications – Each Inmarsat system provides different services and can be recognised by the first digit of the Inmarsat Mobile Number (IMN):

Type	***First Digit***	***Service***
Inmarsat-A	1	telephone, telex, fax, data
Inmarsat-B	3	telephone, telex, fax, data
Inmarsat-C	4	telex, send fax, data
Inmarsat-M	6	telephone, fax, data

8.33 To call a vessel on Inmarsat, follow the instructions in the Inmarsat Users' Manual or use the assistance of the LES or NOC Operator.

8.34 Inmarsat-C shore-to-ship distress priority message (DMSG) – An RCC/MRSC may initiate an Inmarsat-C DMSG message for follow-on communications. This Internet-based service gives the shore-to-ship message the same priority for immediate delivery as a distress message originating from a ship. An Inmarsat-C DMSG can be sent from the RCC/MRSC or an MCTS Centre with *access to* the service. An acknowledgement request can be attached to the message, which means the LES will send a positive delivery notification (PDN) to the originator when the message is delivered to the vessel, thus ensuring that the message has been delivered on-board the vessel.

8.35 Barred Inmarsat terminals – Inmarsat may bar a ship's terminal from accessing the system due to non-payment of invoices or improper use. The ship will still be able to send a distress alert to an RCC via a LES even when normal access is barred. In the event that RCC/MRSC receives a distress alert from a barred terminal, the SAR Co-ordinator can request that the Operator at the LES that received the alert, activate the terminal for distress communications. Since reception of MSI Broadcasts is a requirement in the GMDSS, all barred terminals will still receive all priorities of EGC broadcasts.

MOBILE PHONE (TERRESTRIAL AND SATELLITE) ALERTS

8.36 Mobile (Cellular) Telephones – Although a cellular phone is not an approved nor suitable substitute for radiotelephone distress communications, RCC/MRSC SAR Co-ordinators must be capable of co-ordinating the response to incidents alerted via this method. In Canada, cellular users can call; *16 to be connected directly to an MCTS Centre, 911 to be connected directly with a Public Safety Answering Point (PSAP), or the RCC/MRSC directly. In addition to the vital data, the following information should also be initially obtained:

.1 Caller's complete cellular telephone number;

.2 Cellular service provider;

.3 Roam number if needed to recall caller;

.4 An alternative point of contact; and

.5 Remaining battery power.

8.37 The caller should be advised to keep the cellular phone on and ensure any call forwarding or messaging is disabled. If the cellular telephone has insufficient battery charge to be left on, then an appropriate communication schedule should be arranged. Further, if possible, the caller should attempt to make a distress alert on standard distress radiotelephone frequencies.

8.38 RCC/MRSCs should make arrangements with the cellular service providers' regional Network Operation Centres (NOCs) to provide SAR assistance such as:

.1 Directory assistance;

.2 When last and next call is made from a particular cellular number;

.3 Which cell site a particular call was received through; and

.4 Locating services, where available.

8.39 **Satellite Communications Services –** Although many mobile satellite communications services are not regulated for the provision of aeronautical or maritime distress alerting, nor are suitable substitutes for approved distress communications, RCC/MRSCs must be capable of co-ordinating the response to incidents alerted via this method. There are numerous international services (systems) used aboard aircraft and vessels for the provision of: voice; fax; e-mail; and data communications. Quite often these services automatically interface with public communications networks.

8.40 Most satellite service providers maintain a Network Operations Centre (NOC) that is staffed 24/7. RCC/MRSCs should maintain contact information for these NOCs to assist in establishing follow-on communications and obtaining vital data in the event of an alert being transmitted via one of these services. If an alert is transmitted via one of these services, either directly to an RCC/MRSC or relayed to an RCC/MRSC via another source, the SAR Co-ordinator shall then action the alert to resolve the incident.

COMMUNICATIONS SEARCHES

8.41 In the uncertainty or alert phases of an incident, the SAR Co-ordinator shall, if required, initiate a communications search for overdue or missing aircraft and vessels, as per IAMSAR Vol 2, Appendix D.

CCG VHF DIRECTION FINDING ASSISTANCE

8.42 Some MCTS Centres have the capability to DF on selected VHF aeronautical and maritime frequencies. SAR Co-ordinators should familiarise themselves as to which MCTS Centres provide which type of DF services. These centres should be contacted if their assistance is likely to contribute to the resolution of the SAR incident.

8.43 Under regulation, all primary SAR vessels have a VHF–FM DF capability which should be used to the maximum extent.

CF HF DIRECTION FINDING ASSISTANCE

8.44 There are two HF DF nets in Canada, one operated by the Canadian Forces Supplementary Radio System and the other by Industry Canada, that may be used by the SAR System to pinpoint the source of an HF transmission from distressed vessels or aircraft.

8.45 One of the primary services of the nets is support to SAR; they should therefore be contacted if their assistance is likely to contribute to the success of the SAR effort.

8.46 The following information should be provided when the stations are contacted:

.1 emergency phase (distress, alert, uncertainty);

.2 SAR incident name;

.3 name or call sign of distressed craft;

.4 frequency distressed craft is using or expected to use;

.5 nature of emergency; and

.6 length of watch requested.

8.47 **CFSR**S—For assistance in locating an aircraft or vessel in distress which has the ability to transmit in the 2 – 30 MHz range, rescue co-ordination centres (RCCs) are authorised to contact the Canadian Forces Supplementary Radio System (CFSRS) by telephone. The Canadian Forces Station (CFS) Leitrim has established formal procedures with RCCs in their immediate area to ensure timely and workable interaction during periods of actual or potential distress. This support should be maintained and procedures should be updated periodically. Any changes in procedures between RCCs and the CFSRS are to be forwarded to the Senior Staff Officer of Operations, at the CFSRS Headquarters. Contact telephone numbers for the CFSRS are:

HF DF service requests
1 888 CAL–HFDF

CFS Leitrim
613-945-5380
General Purpose Canadian Switched Network : 627-5380

8.48 **MANOT**—Additionally, the following procedures, aimed at enhancing the Canadian Forces Supplementary Radio System (CFSRS) HF DF support to search and rescue (SAR) activity involving missing aircraft, are to be employed by the rescue co-ordination centres (RCCs) and CFSRS stations:

.1 on notification that a target with an ability to transmit in the 2 – 30 MHz range is in distress, the applicable RCC will include in its missing aircraft notice (MANOT) the following action addressees: Canadian Forces Station (CFS) Alert and CFS Leitrim. The Senior Staff Officer of Operations (SSO Ops) at the CFSRS Headquarters (HQ) will be included as an information addressee;

.2 CFSRS stations shall respond to all MANOTs using dedicated HF DF facilities, treating requests for CF assistance to actual or potential distress cases as an emergency;

.3 negative reports shall be submitted every 8 hours or at shift turnover. Positive reports shall be submitted as they occur, in accordance with the format described in Annex 8D. All reports will be submitted as immediate precedence to the initiating RCC, info CFSRS HQ/SSO OPS, with follow-up reports numbered in sequence. If the RCC wishes to extend the surveillance beyond the initial 48 hour period, it shall address its request to the CFSRS addresses, specifying the period of extended cover requested, e.g. 24 hours, 48 hours. Unless requested to extend surveillance, contributing stations shall submit their final report as “FOLLOW-UP NR __ AND FINAL”; and

.4 netted HF DF stations may initiate tip-offs to the appropriate net for SAR support as required. When available, netted results will be reported in section G of the SAR support message (Annex 8D).

8.49 To facilitate maximum opportunity for HF DF net prosecution, the SAR authority should attempt to have the distressed unit transmit, at maximum power, an easily identified signal such as one of the following:

.1 **telegraphy**—continuous keying for ten seconds followed by radio callsign, repeated frequently (note, this service has been phased out);

.2 **HF voice**—long count from zero to ten or longer and reverse followed by the distressed unit’s identification, repeated **frequently**; and

.3 steady carrier or alarm signal.

BROADCASTS - GENERAL

8.50 After an alert of an actual or potential aeronautical or maritime incident has been detected, a broadcast of SAR related safety information, that requires and initiates a response by all fixed or mobile stations (aircraft and vessels) in the vicinity, may aid in resolving the incident. The broadcasts are issued via various systems.

8.51 In general, a broadcast of SAR related Aeronautical or Maritime Safety Information shall consist of:

.1 Priority
- Distress Priority transmitted as “Mayday Relay”,
- Urgency Priority transmitted as “Pan Pan”,
- *Safety Priority transmitted as “Securite”*
- Or no specific priority (general broadcast)

.2 All stations (3X)

.3 This is (name of transmitting station)

.4 Details of situation

.5 Action required by all stations

.6 Contact instructions for follow-on communications.

8.52 Broadcasts of SAR related information, are normally initiated by the SAR Co-ordinator at the RCC/MRSC that is SMC for the particular incident. A distress broadcast (Mayday Relay) may, however, be retransmitted or initiated by a station that learns that a mobile stations (aircraft or vessel) or person is in distress and it is apparent that further assistance is required.

MARITIME SAFETY INFORMATION (MSI) BROADCASTS - GENERAL

8.53 The RCC/MRSC SAR Co-ordinator shall initiate the broadcast appropriate to the type of SAR incident and degree of emergency (unless already done so by an MCTS *Office*r), by transmitting the completed “MSI Broadcast” form, provided in Annex 8B, to an MCTS Centre(s) for broadcast. This action may be done verbally and followed-up with a hard copy. SAR Co-ordinators and MCTS Officers should consult *and reach a mutual agreement* to ensure that the broadcast is *properly prioritised*, sent via the most appropriate media and transmitted over the most effective area. This will help ensure the best resolution of the incident while not impacting more stations than necessary. Should a conflict occur that cannot be immediately resolved, the SAR Co-ordinator will exercise ultimate authority and accept responsibility for actions taken to resolve the incident. Finally, the SAR Co-ordinator shall always cancel or downgrade the priority of MSI broadcasts as soon as practicable, by transmitting the completing message, provided in Annex 8C, to an MCTS Centre(s).

MSI – DSC BROADCAST

8.54 Dependent upon the priority of an MSI RT broadcast and the availability of DSC equipment, the MCTS Officer will normally precede the RT broadcast with the appropriate distress or urgency priority DSC broadcast, known as a "relay". The radio autoalarm tone may also precede an RT broadcast. Because DSC relays can be addressed to ships within a rectangular area and due to the negative impact that multiple DSC relays can cause within the Maritime Mobile Service, consultation should occur between the MCTS Officer and SAR Co-ordinator when relays are used.

8.55 VHF-DSC Distress Relay Alert Broadcasts – In accordance with the MCTS National Standards Manual , MCTS Officers will broadcast a VHF-DSC Distress Relay Alert for vessels or persons in distress who require further assistance.

8.56 MF/HF-DSC Distress Relay Alert Broadcasts – In accordance with the MCTS National Standards Manual MF/HF-DSC Distress Relay Alert Broadcast shall only be broadcast after consultation between the MCTS Officer and the SAR Co-ordinator. This is required to control the near global impact associated with these broadcasts.

MSI – RT BROADCAST

8.57 MSI Broadcast via VHF/MF/HF RT – In accordance with the MCTS National Standards, MCTS Officers shall make MSI Broadcasts of SAR information via RT in consultation with the SAR Co-ordinator.

8.58 Continuous Marine Broadcast (CMB) – In accordance with the MCTS Standards Manual, once the priority of an incident has decreased or for other reasons, the MCTS Officer may, in consultation with the SAR Co-ordinator, place the SAR related MSI broadcast on the centre's CMB.

MSI – NAVTEX BROADCAST

8.59 In accordance with the MCTS Standards Manual, MCTS Officers shall make MSI Broadcasts of SAR information via NAVTEX in consultation with the SAR Co-ordinator.

MSI – SAFETYNET ENHANCED GROUP CALL (EGC) BROADCAST

8.60 SafetyNET is the satellite service for dissemination of Maritime Safety Information (MSI) using Inmarsat-C. Navigational warnings, Meteorological warnings and SAR messages are broadcast over the Inmarsat-C system using the Enhanced Group Call (EGC) facility. The CCG is licensed as a "SAR SafetyNet Provider" for the purpose of broadcasting *SAR related* EGCs using this service. One MCTS Centre per CCG Region, shall act as the sole-provider of the SafetyNet service.

8.61 In accordance with the MCTS National Standards Manual, MCTS Officers shall make MSI broadcasts of SAR information via SafetyNet in consultation with the SAR Co-ordinator in order to ensure *that* the most effective broadcast parameters are used. Further, to ensure consistency of information received aboard vessels, only one MCTS Centre shall issue SafetyNet broadcasts for each SAR incident. SAR Co-ordinators shall monitor SafetyNet broadcasts, which they have initiated by using an Inmarsat-C terminal.

MSI – NOTSHIP & NAVAREA WARNINGS

8.62 In relation to SAR incidents, situations arise where a MSI notice should be transmitted to mariners (i.e. abandoned vessels). If the SAR Co-ordinator becomes aware of such situations, he/she shall advise the regional CCG NOTSHIP issuing authority and request a safety notice be issued. Further, if there is a requirement to issue a safety notice on the high seas, this can only be done by the IMO approved NAVAREA 4&12 Co-ordinator at the National Imagery and Mapping Agency in Washington, DC.

1-301-227-3147
1-301-227-3731 (fax)
898334 (telex)
62554950 (Easylink mailbox)

SARNET

8.63 SARNET is an Inmarsat-C EGC broadcast service maintained by the HMCG that provides international wide-area messaging to RCC/MRSCs. It is recommended that RCC/MRSCs make use of this service, where appropriate, in the resolution of international SAR incidents.

MISSION CO-ORDINATION COMMUNICATIONS

8.64 *In the process of co-ordinating a SAR mission, the SAR Co-ordinator shall prepare and issue messages as required, such as:*

.1 Briefings;

.2 Taskings;

.3 SAR Actions Plans; and

.4 Debriefings,

to mobile facilities (aircraft, vessels and others)

8.65 Mobile facilities, in return, will *prepare and* issue:

.1 Sitreps;

.2 NOCLs; and

.3 Debriefings,

to the SAR Co-ordinator at the RCC/MRSC that is SMC or a deployed SMC for that incident.

8.66 Normally, these verbal or hardcopy messages shall be transmitted via MCTS Centre, ATC Unit or CF Radio Station, radio telephone service providers so that all relevant parties are informed and kept up-to-date as to the status of the mission (refer to Annex 8A for frequencies). If not necessary, secure communications should be avoided.

8.67 The SAR Co-ordinator or mobile facility may, however, choose to communicate directly using point-to-point mobile communications. This may be required to: ensure privacy; pass large messages automatically; or because the facility is not within radio *telephone* range. If these communications are used for co-ordination, the SAR Co-ordinator shall attempt to keep necessary parties advised of the mission status.

AMVER

8.68 The Automated Mutual Assistance Vessel Rescue System (AMVER) operated by the USCG shall be used, as required, in resolving a SAR incident. Details are found in Annex 8E.

VESSEL TRAFFIC SERVICES (VTS) AND REPORTING SYSTEMS

8.69 MCTS Centres which provide Vessel Traffic Services (VTS) and/or Vessel Traffic Reporting Systems are capable of providing, to varying degrees, information about participating vessels (location, construction, cargo, etc.) that may be of use in resolving a SAR incident.

8.70 Selected MCTS centres are designated to administer the following Canadian offshore Vessel Traffic Reporting Systems:

.1 the Eastern Canada Traffic System (ECAREG),which covers all eastern Canadian waters south of 60°N, including the Gulf of Saint Lawrence but excluding designated VTS zones;

.2 the Arctic Canada Traffic System (NORDREG CANADA), which covers all waters north of 60°N, including all of Hudson Bay and Ungava Bay but excluding those portions of MacKenzie Bay and Kugmallit Bay that are south of 70°N and east of 139°W; and

.3 the Cooperative Vessel Traffic Services (CVTS OFFSHORE), which cover all western territorial waters of Canada excluding designated VTS zones.

8.71 **St. Lawrence Seaway Traffic Syste**m—Operated by the St. Lawrence Seaway Management Corporation in Canada and by the St. Lawrence Seaway Development Corporation in the United States, it covers the area from west of 073°30’W in Montréal Harbour to Port Colborne, Lake Erie. The traffic centres in the Seaway Traffic System maintain VHF-FM contact and the reporting procedures are the same as described in Annex 8A.

8.72 Each RCC/MRSC should develop mutually agreed upon procedures with all MCTS, and Saint Lawrence Seaway Traffic System Centres within their area of responsibility. The local procedures shall be included in the RCC/MRSC standard operating procedures.

SAR VESSELS IN VTS ZONES

8.73 When a CCG or other government vessel has been tasked to a SAR incident, its commanding officer shall so advise the MCTS Centre as soon as practicable, *if not already advised.*

8.74 The MCTS Centre shall make any special provisions necessary to facilitate the arrival, departure or transit of a government vessel engaged on SAR operations.

8.75 CCG vessels, when not tasked to a SAR incident, must comply with the procedures prescribed for other vessels.

8.76 When CCG or other government vessels are proceeding to the scene of a SAR incident, participating in a SAR mission within a VTS zone or when transporting sick or injured persons the
standard reporting and routing procedures may be waived by the MCTS Officer.

8.77 Commanding officers shall ensure that, to the greatest extent possible, all reporting procedures to MCTS are maintained during any SAR operations.

ON-SCENE COMMUNICATIONS

8.78 The SMC, OSC or ACO shall designate on-scene aeronautical and maritime frequencies as required. SAR facilities shall maintain a continuous watch on the frequencies allotted by the controlling authority during a SAR mission. Subject to the approval of the SMC, a scheduled watch may be adopted (see Annex 8A for frequencies).

8.79 Plain language and non-secure communications shall be used whenever practicable to avoid confusion.

ANNEX 8A
SAR RADIO FREQUENCIES AND CHANNELS

DISTRESS, SAFETY AND CALLING

BAND	FREQUENCY/ CHANNEL	MODE	SERVICE	DESCRIPTION
VHF-FM	156.525 MHz ch 70	DSC	Maritime	International-DSC distress & calling
VHF-FM	156.8 MHz ch 16	RT	Maritime	International-voice distress & calling
VHF-FM	156.75 MHz ch 15	RT	Maritime	Canadian-Frequency for old electronic position indicating buoys (EPIBs) which may still be in existence but are not allowed under regulations
VHF-AM	121.5 MHz	RT	Aeronautical	International-voice distress and distress beacon frequency
UHF	243 MHz	RT	Aeronautical/ Maritime	NATO-combined voice aeronautical distress, international lifeboat and liferaft frequency and distress beacon frequency.
UHF	406-406.1 MHz		Aeronautical/ Maritime/ Land	International-distress beacon frequency
MF	500 kHz	CW	Maritime	International-Morse Code distress and calling (discontinued)
MF	2187.5 kHz	DSC	Maritime	International-DSC distress and calling
MF	2182 kHz	RT	Maritime	International-voice distress
MF	2174.5 kHz	NBDP	Maritime	International-NBDP distress
HF	4207.5 kHz	DSC	Maritime	International-DSC distress and calling
HF	4125 kHz	RT	Maritime	International-voice distress
HF	4177.5 kHz	NBDP	Maritime	International-NBDP distress
HF	6312 kHz	DSC	Maritime	International-DSC distress and calling

HF	6215 kHz	RT	Maritime	International-voice distress
HF	6268 kHz	NBDP	Maritime	International-NBDP distress
HF	8414.5 kHz	DSC	Maritime	International-DSC distress and calling
HF	8291 kHz	RT	Maritime	International-voice distress
HF	8376.5 kHz	NBDP	Maritime	International-NBDP distress
HF	12 577 kHz	DSC	Maritime	International-DSC distress and calling
HF	12 290 kHz	RT	Maritime	International-voice distress
HF	12 520 kHz	NBDP	Maritime	International-NBDP distress
HF	16 804.5 kHz	DSC	Maritime	International-DSC distress and calling
HF	16 420 kHz	RT	Maritime	International-voice distress
HF	16 695 kHz	NBD0	Maritime	International-NBDP distress
HF	8364 kHz	CW	Maritime	International-CW lifeboat and liferaft frequency (discontinued)
HF	27 066.5 kHz CB-ch 09	RT	Land	International-GRS frequency (citizen’s band-CB) unoffical safety and calling

MISSION CO-ORDINATION

BAND	**FREQUENCY/ CHANNEL**	**MODE**	**SERVICE**	**DESCRIPTION**
VHF-FM	156.3 MHz Ch 06	RT	Maritime	International-voice SAR on-scene
VHF-FM	156.95 MHz Ch 19A	RT	Maritime	Canadian-Coast Guard general operations (East Coast & Great Lakes)
VHF-FM	157.125 MHz Ch 82A	RT	Maritime	Canadian-Coast Guard general operations (West Coast)
FHF-AM	123.1 MHz	RT	Aeronautical	International-voice SAR on-scene & ELT training

BAND	FREQUENCY/ CHANNEL	MODE	SERVICE	DESCRIPTION
UHF	246.2 MHz	RT	Aeronautical	Canadian-voice SAR on-scene & DND PLB training
UHF	252.8 MHz	RT	Aeronautical/ Maritime	NATO-voice combined SAR training
UHF	282.8 MHz	RT	Aeronautical/ Maritime	NATO-voice combined SAR on-scene
HF	5717 kHz	RT	Aeronautical	Canadian-voice SAR air/ground/air
HF	8992 kHz	RT	Aeronautical	Canadian-voice SAR air/ground/air
HF	11 187 kHz	RT	Aeronautical	Canadian-voice SAR air/ground/air
HF	4125 kHz	RT	Aeronautical/ Maritime	International-voice SAR on-scene (recommended between commercial aircraft & vessels)
HF	3023 kHz	RT	Aeronautical/ Maritime	International-voice SAR on-scene (to be used between commercial aircraft & vessels if communications not established on 4125 kHz)
HF	5680 kHz	RT	Aeronautical/ Maritime	International-voice SAR on-scene

OTHER

ON-SCENE GROUND SEARCH PARTIES WORKING FREQUENCIES

1. Ground search parties involved in crash guard team duties may use any of the following frequencies while so employed:

- 2216 kHz;
- 3280 kHz;
- 4480 kHz;
- 5832 kHz;
- 9292 kHz;
- 12 115 kHz;
- 15 733 kHz; and
- 18 204 kHz.

2. Frequencies Used by MCTS Centres—Working frequencies and frequencies for maritime safety information broadcasts from Marine Communications and Traffic Services centres can be found in the current volume of Radio Aids to Marine Navigation, Pacific or Atlantic and Great Lakes edition The Admiralty List of Radio Signals—Volume *5* lists those for all international radio stations.

ANNEX 8B
MSI BROADCAST MESSAGE

To: MCTS ______________________
MCTS ______________________
____

From: RCC/MRSC ______________________ Date/time ____________________UTC

SUBJECT: SAR ____

Incident Number: ____________________ Message Number ___________________

The following SAR message is to be issued upon receipt and repeated, in accordance with MCTS standard procedures, until cancelled.

INSTRUCTIONS: (consult with MCTS Officer to ensure most effective broadcast)

Mode (s): (circle)

VHF-DSC	MF-DSC	HF-DSC	NAVTEX
VHF-RT	MF-RT	HF-RT	SafetyNet
VHF-CMB			

Priority & Prefix: (circle)
Distress/Mayday Relay Urgency/PanPan Safety/Securite Routine/Nil

DSC Parameters (if required): (circle)
No geographical area defined
Rectangle geographical area: NW corner point lat/long: ____________________
Side length:____degrees Top length:_____degrees

SafetyNet Parameters (if required): (circle)
The broadcast shall be sent via all Inmarsat satellites appropriate for the area.
Circular geographical area Centre lat/long:______________ Radius:___nm
Rectangular geographical area SW corner point lat/long:_____________________
Side length:____degrees Top length:_____degrees

TEXT:

____
____
____
____
____
____

Contact the nearest Canadian Coast Guard Radio Station or
RCC/MRSC _____________
Telephone _____________
Telefax _____________
Telex _____________

ANNEX 8C
MSI BROADCAST CANCELLATION MESSAGE

To: MCTS ____________________
MCTS ____________________
____

From: RCC/MRSC __________________ Date/time __________________UTC

SUBJECT: SAR ____

Incident Number: ____________________ Message Number ________________

The **MSI broadcast message issued at date/time ____________UTC *is to be cancelle*d.**

REASON FOR CANCELLATION:

____
____
____

ANNEX 8D
CF SUPPLEMENTARY RADIO SYSTEM HF DF SAR MESSAGE

Message to be sent IMMEDIATE/ROUTINE

FM: Applicable Canadian Forces Communication Station

TO: Appropriate RCC

INFO: CFSRS HQ OTTAWA//SSO OPS//

SUBJ: SAR HF DF SUPPORT

MANOT Identification

Time of bearing in UTC or negative results

True bearing in three digits with validity indicator

Latitude and longitude of reporting station

Signal type/frequency

Amplifying data

Netted fix report

EXAMPLE

A. MANOT 58, SAR BALDWIN FOLLOW-UP NUMBER 10 AND FINAL

B. 1800 UTC

C. 320 TRUE PLUS OR MINUS 10 DEGREES

D. 485704N 0543133W

E. VOICE/5680

F. N/A

G. N/A

ANNEX 8E
AMVER

1. Operated by the United States Coast Guard (USCG), the Automated Mutual Assistance Vessel Rescue (AMVER) System provides information that could aid in the resolution and co-ordination of search and rescue (SAR) efforts in the ocean areas of the world, in particular, the Atlantic and Pacific areas.

2. Sailing and position reports are sent via selected coastal, inland and ocean station vessel radio stations to the USCG AMVER centre.

3. Information from these reports is processed by a computer which calculates and maintains dead reckoning plots for the vessels within the plotting area. The characteristics of a vessel that are considered valuable for determining SAR capability are also stored in the computer.

VESSELS REPORTING

4. Under Section 64 of the *Ship Station Technical Regulation*s, all Canadian ships making an offshore voyage of more than 24 hours which will proceed:

1) beyond the limits of VHF and MF coverage; and

2) outside of the ECAREG and NORDREG zones,

must make reports to AMVER in accordance with approved procedures, set out in *Radio Aids to Marine Navigatio*n.

5. This does not apply to fishing vessels or Her Majesty's ships engaged in law enforcement.

6. All other ships are encouraged to make voluntary reports when they are on offshore voyages of more than 24 hours duration.

INFORMATION

7. Information concerning the predicted locations and characteristics of ships known to be near the scene of an emergency is made available to recognized search and rescue (SAR) agencies of any country, or to vessels and persons in distress for use during the emergency.

8. Information provided by AMVER is considered privileged and will not be released for any purpose other than for reasons of maritime safety, unless specifically approved by the Commander Eastern Area, United States Coast Guard.

9. Information provided by AMVER is in the form of a SURPIC (surface picture). A SURPIC is a listing of vessels, their SAR capabilities and dead reckoning positions within a specified geographical area at a specific time. There are three types of SURPIC:

(A) RADIUS SURPIC:

1) The geographic area is defined by a datum (latitude and longitude) provided by the requesting agency;

2) The radius is given by the requesting agency as a distance around the datum;

3) The listing of vessels is in the order of increasing distance from the datum.

(B) Hi/Lo SURPIC:

1) Two limiting parallels of latitude and two limiting meridians of longitude are provided by the requesting agency; and

2) The listing is in random order unless listing by latitude or longitude is specified by the requesting agency.

(C) TRACKLINE SURPIC:

1) The listing is arranged along the track line (which may be obliquely oriented) from the origin to the destination (the first and second positions provided by the requesting agency); and

2) The SURPIC can be obtained for a great circle track if requested.

3) Each SURPIC can be further modified according to specific needs, for example by making one of the following requests for listing:

4) all ships, or just those with doctors aboard;

5) all ships, or just those heading east or just those heading west; and

6) the doctor and direction specifications in combination.

PROCEDURES

10. Requests for AMVER information should be made to the AMVER Centre by the most appropriate method. This would normally be through the rescue co-ordination centre of the search and rescue region in question.

CHAPTER 9—REPORTS AND RETURNS

TABLE OF CONTENTS

REPORTS AND RETURNS

GENERAL

9.1 Accurate reports and returns are essential for the effective control of search and rescue aircraft, vessels, and personnel. They are also needed for the compilation of data and statistics required to indicate or support organizational changes and equipment requirements, and to facilitate planning.

SAR LOG AND CASE FILES

9.2 A log or case file shall be kept in which all rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC)/searchmaster (SM) actions are recorded, with times entered in Co-ordinated Universal Time (UTC). All RCC/MRSC controllers shall sign the log at the beginning and end of each shift. Logs shall be retained in the RCC/MRSC for three years and then forwarded to the Regional Archives Centre. SMs shall submit logs to the RCC at the termination of a search.

9.3 Case files shall be kept on individual search and rescue (SAR) incidents. The case file will be the primary record of a case and shall include all pertinent information on the incident, including all message traffic, records of telephone conversations and, where applicable, such information as coroner's reports and press clippings. Searchmasters' case files shall be submitted to the RCC at the termination of a search.

9.4 To meet the legal retention period for RCCs/MRSCs/Canadian Mission Control Centre (CMCC) data of seven years (JA Ont: 33385–1 6 NOV 95) and the requirement to store SAR files at the National Archives for historical purposes, the following procedure will be followed:

.1 RCC/MRSC/CMCC case files shall be retained at the RCC/MRSC for a minimum of two years after the date of the last entry. Major SAR Operations, unresolved incidents or other cases of interest may be retained longer at the discretion of the centre. If files are retained at the centre, the SAR name, date and case number of the retained file(s) shall accompany the applicable records box sent to the Archives;

.2 after the RCC/MRSC retention period, case files are to be sent to the respective Regional Archives Centre;

.3 the Regional Centre will retain the case files for a period of time stated in the *Records Scheduling and Disposal Manual* (for SAR files, this period is 5 years from the date of receipt). After this time has past, the Regional Centre will forward a letter to the appropriate RCC/MRSC requesting permission to dispose of the files. If the legal time period has been met and the RCC/MRSC can see no reason to retain the files further, they shall advise the Centre to dispose of the files;

.4 the Regional Centre will then forward all files to the Government Archives Division in Ottawa for permanent storage in accordance with the *Records Scheduling and Disposal Manual*; and

.5 the procedure for storing audio tapes is described in Chapter 8, Tape Recording—RCC Communications.

INITIAL SAR DATA REPORT

9.5 Annex 9A lists critical information that should be gathered by the rescue co-ordination centre/maritime rescue sub-centre upon notification that an emergency exists or is anticipated.

RCC DAILY SITUATION REPORTS

9.6 In prolonged distress cases and in all cases necessitating a search reduction, situation reports (SITREPs) shall be issued by the rescue co-ordination centre (RCC). SITREPs from maritime rescue sub-centres shall be forwarded to the officer in charge of the parent RCC, for approval and onward transmission. These shall be sent PRIORITY in the following sequence:

.1 SITREP ONE AND INITIAL;

.2 SITREP TWO, etc.; and

.3 SITREP (NUMBER) AND FINAL.

9.7 A SITREP shall contain all information and action taken using the format at Annex 9B. Wherever possible plain language shall be used in lieu of terse format phrases. Enough information must be relayed to enable headquarters staff officers to process queries and requests for future reduction.

9.8 Subsequent daily SITREPs shall be finalized and transmitted by the RCC. The format shall be as shown at Annex 9C and daily SITREPs shall be numbered consecutively from TWO.

9.9 When the search and rescue (SAR) operation is successfully completed or search reduction has been authorized, the RCC shall send a final SITREP in the format at Annex 9D. In cases where only one situation report is required (SITREP ONE AND FINAL) a modified Annex 9B format shall be used; paragraphs J and K will be replaced with the information from paragraphs B to E of Annex 9D, and the paragraphs re-labelled appropriately. The final SITREP shall state whether a SAR Operation Report will be prepared on the case.

MISSING AIRCRAFT NOTICE

9.10 Once a distress phase has been declared by a rescue co-ordination centre (RCC) for an aeronautical incident, a missing aircraft notice (MANOT) is to be issued by the RCC and shall contain information using the message format shown in Annex 9E.

9.11 On successful completion or reduction of a search, a final MANOT is to be issued using the message format shown in Annex 9F.

9.12 When a search has been reactivated a MANOT is to be issued, using the original number and format, adding the word “REOPENED” after the number.

9.13 Each RCC will number the MANOTs consecutively, commencing each year with the number 1 with a suffix of the last two digits of the calendar year, i.e., 1/98 INITIAL, 1/98 FINAL, and 1/98 REOPENED.

SAR BRIEFING/TASKING FORM—AIRCRAFT

9.14 The requirement for a search briefing/debriefing is discussed in Chapter 5, SAR Briefings. The basic formats are given in Annexes 9G to 9J.

9.15 The briefing portion of the combined SAR briefing/tasking form—aircraft, should be completed by the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or by the searchmaster (SM), and should be passed to each search and rescue unit. The search unit commander will pass the pertinent information to each crew member as required.

9.16 The debriefing portion of the SAR briefing/tasking form—aircraft should be completed by the search unit commander on the completion of each sortie. All information blanks should be completed and, where possible, a designated crew member should be made responsible for updating the form during the sortie to ensure accurate information is entered in a timely fashion.

9.17 On completion of the sortie, the search unit commander shall pass the information to the appropriate controlling agency. If under control of a rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC), pass the information on the debriefing form to the RCC/MRSC by the quickest available means. A hard copy of the form should be subsequently passed to the RCC/MRSC for record purposes, either by the aircraft captain or the searchmaster, as applicable.

9.18 In some cases it may be necessary to complete the briefing and debriefing by telephone or radio. In this case the format should be used as a guide, with the completed briefing/debriefing passed by message if required.

9.19 For lengthy searches, the abbreviated briefing/debriefing form shown in Annex 9H may be used at the searchmaster's discretion.

SAR BRIEFING/TASKING FORM—VESSELS

9.20 The SAR briefing/tasking form—vessels should be completed by the rescue co-ordination centre/maritime rescue sub-centre or by the searchmaster, and passed as soon as possible to the commander of each maritime search and rescue unit (SRU) being tasked on a search and rescue mission. The briefing/tasking form contains information pertinent to the tasking and will normally be updated as more details concerning the search become available. The format to be used for the briefing/tasking of maritime SRUs is provided in Annex 9J.

REPORTS ON SEARCHES

9.21 All search and rescue units (SRUs) engaged on search and rescue (SAR) missions shall pass reports to the appropriate rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or searchmaster (SM), or to the nearest station for onward transmission to the RCC/MRSC or SM. This will normally consist of an "OPERATIONS NORMAL" for SAR aircraft and an operational situation report (Annex 9K) for SAR vessels.

9.22 The RCC/MRSC or SM shall specify, during briefings, the reporting times of individual search and rescue units. These reports should be made at least once per hour for aircraft and once every four hours or less for vessels.

9.23 When the control of a SAR incident is transferred, a message shall be passed by the RCC/MRSC or SM which had the original control to all SRUs involved, advising them of the change. The message should inform them of the time of transfer of control and that all further reports are to be passed to the new controlling authority with an information copy to the former controlling authority if necessary.

SAR SIGHTING REPORT FORM

9.24 A SAR sighting report form should be filled out when sighting reports are received at Search headquarters. Copies of these forms may be distributed to local police forces and responsible persons throughout each search and rescue region. The format for the form is shown in Annex 9L.

SAR OPERATION REPORTS

9.25 SAR operation reports are compiled for the purpose of recording the pertinent details of an incident for the information of participating search and rescue (SAR) agencies, other agencies, the owners and/or operating agencies of the aircraft or vessel. Recommendations that are supported by fact and offer insight into ways of avoiding similar accidents are useful to Transport Safety Board investigators.

9.26 This report is required for major SAR operations (see Chapter 5, Reduction of Major SAR Operations) or when it is desired to make recommendations or comments on the command, control, and/or co-ordination aspects of the incident.

9.27 This report will be prepared and distributed by the rescue co-ordination centre (RCC)/maritime rescue sub-centre (MRSC) or searchmaster (SM) involved in accordance with Annex 9M.

9.28 The RCC/MRSC or SM shall prepare the SAR operation report as soon as possible after completion of the case (normally within 30 days). For maritime incidents, the Officer in Charge (OIC) of the RCC and the regional supervisor, maritime SAR shall co-sign the report. The search and rescue region (SRR) commander, or a delegated senior officer shall:

.1 review the report; and

.2 indicate on the report those items which will be actioned by the SRR commander and those on which other comment or action is desired.

9.29 It will be necessary to include in the SAR operation report sufficient information to allow others to infer the rationale for the more important decisions and actions taken during the search. The information should include weather and search and rescue unit considerations, the impact of sighting reports, the effectiveness of search vehicles and patterns, and any other factors that aided or interfered with the progress of the search.

9.30 SAR operation reports from MRSCs or SMs shall be forwarded to OIC of the parent RCC for approval and onward transmission.

SAR MISSION REPORT—AIRCRAFT

9.31 The aircraft commander and the SAR Technicians' (SAR Tech) team leader of the operation shall fill out a SAR mission report on completion of each search and rescue mission which involves the use of the SAR Tech equipment or to highlight any problems in procedures or equipment involved with the mission.

9.32 This report should include a comprehensive narrative report and photos in accordance with Chapter 5, Photography of the Search Object. A description of the equipment or techniques used and/or deficiency in equipment or techniques with corrective action should also be provided.

9.33 The format for this form is shown in Annex 9N.

SAR MISSION REPORT—VESSELS

9.34 Commanding officers and coxswains of vessels involved in a search and rescue (SAR) incident may provide SAR mission reports to rescue co-ordination centre/maritime rescue sub-centre as applicable. The use of this report by on-scene commanders is encouraged for every incident involving more than one search and rescue unit. The reports should detail any problems involved with the mission (communications, co-ordination, etc.) and/or any new or innovative practices that aided in the mission plus any other comment that might aid the prosecution or prevention of similar incidents in the future.

9.35 The format is shown in Annex 9O.

GROUND SEARCH PARTY TRAINING REPORT

9.36 Squadrons with authorized ground search parties shall submit monthly Ground Search Training Reports to their regional rescue co-ordination centre, with copies to the 1 Canadian Air Division Headquarters in accordance with Annex 9P.

9.37 When ground search parties have been employed on search and rescue (SAR) operations, the extent of their participation will be reported in the SISAR information system and SAR Operation Reports.

UNNECESSARY SAR ALERT MESSAGE

9.38 An unnecessary SAR alert (UNSAR) message is to be sent by the officer in charge of the rescue co-ordination centre when the SAR system is unnecessarily activated in a maritime or aeronautical case. Examples would be unauthorized diversions from or failing to file or close flight/float plans, or the inadvertent or illegal use of distress beacons.

9.39 The format for an UNSAR message is shown in Annex 9Q.

DAILY SAR SUMMARIES

9.40 Daily SAR summaries (SARSUMs) are prepared by each rescue co-ordination centre (RCC) and are used extensively at each headquarters in briefings to senior officials and must provide a logical story of the events that occurred for each of the incidents mentioned. The reporting format is shown at Annex 9R.

9.41 Maritime rescue sub-centres shall only provide the required daily data to their parent RCC.

ANNEX 9A—INITIAL SAR DATA REPORT

1. Report received at..
(Date – time Group)

   from ....
(Name)

   of ....Phone ....
(Organization and Address)

2. Assistance requested..

   Position or location..

3. Description of object requiring assistance (if applicable)

   (a) Surface Vessels

   (i) Tonnage ....Length... Beam ....

   (ii) Type ....Name ....

   (iii) Colour and distinctive markings ....

   (iv) Full description (masts, deckhouse, funnels, etc.)..

   ....

   (v) Number of persons on board ....

   (vi) Name of owner or controlling agency ....

   ....Name of captain ....

   (vii) Emergency equipment carried..

   (viii) EPIRB and type ....

   (b) Aircraft

   (i) Type ....Registration letters or number ....

   (ii) Colour and distinctive markings ....

   (iii) Owner or controlling agency..

   (iv) Name of pilot and passengers or crew ....

   ....

   ....

   (v) Emergency equipment carried..

   (vi) ELT and type..

   (c) Miscellaneous..

   ....

   ....

4. Full details as to nature of distress or emergency ....

....

....

5. Weather conditions in area of distress, including sea conditions, if applicable, as reported by caller ....

....

....

6. If emergency equipment or rations are to be dropped, type and amount likely to be required ....

....

....

7. Aircraft or surface vessel departed

Place .... at .... UTC
(Date – time Group)

8. Estimated time of arrival (place) .... at .... UTC
(Date – time Group)

9. Expected route ....

10. Alternate destinations or most likely place for surface vessel or aircraft to go ....

....

11. Last known position (LKP) ....

12. Hours of fuel remaining at LKP ....

13. Cruising speed ....

14. Communications

(a) Transmitting frequencies..

(b) Receiving frequencies...

(c) Call sign ....

15. General remarks ....

16. After the information listed above was received, the party calling was informed or instructed as follows ....

....

....

....

....

....

....

....
(DUTY CONTROLLER)

ANNEX 9B—INITIAL RCC SAR SITREP

DISTRIBUTION

TO: NDHQ OTTAWA//NDCC/D AIR FE 3//

1 CAD HQ WINNIPEG//A3 SAR/AOC//

RCC AND CMCC TRENTON

TRANSPORT CANADA//AAB/AANDO// (for aeronautical cases only)

TSB OTTAWA//DIA//FAX 819–997–2239

CCG HQ OTTAWA//DIRECTOR SAR// (for maritime cases only)

RD CCG//SUPERINTENDENT RSER// (for maritime cases only)

INFO: All other RCCs, MRSCs, Commands, NSS OTTAWA, DND Public Affairs and Regional Operations Centre of applicable region, and other units as appropriate.

REQUIRED INFORMATION

Name of SAR Operation

A. Number and type of SITREP.

B. Alerting agency or individual and date – time group in UTC (Local time group in brackets) when the rescue co-ordination centre was alerted.

C. Type of distress and reason for declaring distress.

D. Flight Plan or Float Plan of craft in distress. Include following information;

- call sign and type of aircraft or vessel
- number of persons on board
- owner
- colour
- electronic equipment carried
- distress beacon on board? If yes, indicate type.

E. Last known position (LKP) of craft.

F. Weather along route including LKP.

G. Weather at destination or possible alternates.

H. Name of searchmaster and location of Search headquarters.
J. Remarks to include action since receiving alert (to include tasking times and SRU departure times).
K. Future plans.

NOTE : If the requested info is not available at time of origin of initial RCC, SAR, SITREP, it is to be forwarded at the earliest possible date and indicated as an addendum to the initial RCC, SAR, SITREP.

ANNEX 9C—
DAILY RCC SAR SITREP—(SITREP TWO, ETC.)

DISTRIBUTION

TO: NDHQ OTTAWA//NDCC/D AIR FE 3//

1 CAD HQ WINNIPEG//A3 SAR/AOC//

RCC AND CMCC TRENTON

TRANSPORT CANADA//AAB/AANDO// (for aeronautical cases only)

TSB OTTAWA//DIA//FAX 819–997–2239

CCG HQ OTTAWA//DIRECTOR SAR// (for maritime cases only)

RD CCG//SUPERINTENDENT RSER// (for maritime cases only)

INFO: All other RCCs, MRSCs, Commands, NSS OTTAWA, DND Public Affairs and Regional Operations Centre of applicable region, and other units as appropriate.

REQUIRED INFORMATION

Name of SAR Operation

A. Progress SITREP numbered consecutively starting with TWO.

B. Period covered.

C. Record for this period of: Squadrons and SRU employed on search, with times for each SRU broken down into search, transit, and total hours.

D. Complete search, transit, and total times this period and totals to date.

E. Total square miles this period. Total square miles to date.

F. Search areas covered this period. Type of search, effectiveness.

G. Weather condition—search areas and bases.

H. Details of search not indicated above to include major instances and possible leads.

J. Proposed operations for the next 24 hours.

ANNEX 9D—FINAL RCC SAR SITREP

DISTRIBUTION

TO: NDHQ OTTAWA//NDCC/D AIR FE 3//

1 CAD HQ WINNIPEG//A3 SAR/AOC//

RCC AND CMCC TRENTON

TRANSPORT CANADA//AAB/AANDO// (for aeronautical cases only)

TSB OTTAWA//DIA//FAX 819–997–2239

CCG HQ OTTAWA//DIRECTOR SAR// (for maritime cases only)

RD CCG//SUPERINTENDENT RSER// (for maritime cases only)

INFO: All other RCCs, MRSCs, Commands, NSS OTTAWA, DND Public Affairs and Regional Operations Centre of applicable region, and other units as appropriate.

REQUIRED INFORMATION

Name of SAR Operation

A. SITREP .... (number) AND FINAL.

B. Authority for termination/reduction (may be the SRR commander or NDHQ Message with date – time group).

C. General areas covered during entire search indicating specific altitude and visibility distances.

D. Record for the entire search of: Squadrons and SRUs employed on search, with times for each SRU broken down into search, transit, and total hours.

E. Remarks: including type of SAR report to be filed; crash location and briefly covering the who, what, when, where and how.

ANNEX 9E—INITIAL MANOT

DISTRIBUTION

TO: RCC AND CMCC TRENTON

All FSSs and ACCs as appropriate.

INFO: NDHQ OTTAWA//NDCC/D AIR FE 3//

1 CAD HQ WINNIPEG//A3 SAR/AOC//

RCC VICTORIA

RCC HALIFAX

CFSRS HQ//SSO OPS// (if aircraft has HF)

TRANSPORT CANADA//AAB/AANDO//

TSB OTTAWA//DIA//FAX 819–997–2239

REQUIRED INFORMATION

A. MANOT NUMBER ....—SAR OPERATION ....—INITIAL—RCC................

B. REGISTRATION—TYPE OF AIRCRAFT—COLOUR

C. NUMBER OF CREW AND/OR PASSENGERS

D. ROUTE

E. DEPARTURE (LOCAL TIME)

F. LKP AND DATE – TIME LOCAL

G. FUEL EXHAUST TIME

H. TYPE AND FREQUENCY OF EMERGENCY LOCATOR TRANSMITTER

J. REQUEST FSS AT ....
AND ATC AT ....
REVIEW VOICE AND RADAR TAPES IN ....
.... AREA
FOR PERIOD.. UTC TO .... UTC.

ANNEX 9F—FINAL MANOT

DISTRIBUTION

TO: RCC AND CMCC TRENTON//OPSO//

All FSSs and ACCs as appropriate.

INFO: NDHQ OTTAWA//NDCC/D AIR FE 3//

1 CAD HQ WINNIPEG//A3 SAR/AOC//

RCC VICTORIA

RCC HALIFAX

CFSRS HQ//SSO OPS// (if aircraft has HF)

TRANSPORT CANADA//AAB/AANDO//

TSB OTTAWA//DIA//FAX 819–997–2239

REQUIRED INFORMATION

A. MANOT NUMBER ....—SAR OPERATION ....—FINAL—RCC...................

B. SEARCH SUSPENDED AS OF “date/time” (LOCAL)

C. SUCCESS OF MISSION

D. REMARKS

If located, indicate method and by whom and give other pertinent info that may be of general interest.

If not located, recommend continued watch by overflights, and include route and description of missing aircraft.

ANNEX 9G— SAR BRIEFING/TASKING FORM FOR AIRCRAFT— PRIMARY SEARCH AND RESCUE UNITS

BRIEFING

SAR .... Date ....

Tasked aircraft type & number .... Squadron................. Captain ....

Details as to nature of distress or emergency ....

....

Description of Search Object

Type of aircraft or vessel ....

Number or name of craft ....

Length .... Width (Wing-span)..

Number on board ....

Full description of craft, including colour and markings...

....

....

Frequencies of missing craft ....

....

Assigned search areas

AREA ....

Type of search... Altitude/track spacing...

Time on task ....

Commence search at (position)..

and track (N–S) (E–W) ....

Frequencies

Controlling agency.. Aircraft ....

Surface vessels .... Others ....

Progress reports

To be passed to.. every .... hours with weather report included every..... hours.

Special instructions (On-scene commander, co-ordinator aeronautical search, etc.)

....

....

....

DEBRIEFING

SAR... Aircraft No .... Date.......................................

Point of departure .... Point of landing ....

Time airborne............................ On task................. Off task....................................... Landed ....

Area actually searched ....

....

....

Type of search .... Altitude/track spacing ....

Terrain or sea state .... Number of observers ....

Weather conditions in search area (visibility. wind velocity, ceiling, etc.) ....

....

....

Object of search (located)..

at position...

Number and condition of survivors ....

....

....

Sightings and/or other reports...

....

....

....

....

....

....

Telecommunications: (note quality of communications and/or any changes other than BRIEFED)..........................

....

....

Remarks: (to include any action taken on search, any problems, criticism, suggestions)...

....

....

....

....

....

Date – time (Local) Name and rank

ANNEX 9H— ABBREVIATED SAR BRIEFING/TASKING FORM FOR AIRCRAFT

BRIEFING

SAR .... Date ....

Tasked aircraft type and number .... Captain ....

Take off time..

Search area ....

....

....

....

Search height .... Track spacing ....

Type of search...

Remarks (On-scene commander, co-ordinator aeronautical search, etc.)..

....

....

....

....

DEBRIEFING

Area actually searched ....

....

....

....

....

Search time .... Transit time ....

Effectiveness of search ....%............... Percent of area covered ....%

Remarks..

....

....

....

....

....

ANNEX 9I— SAR BRIEFING/TASKING FORM FOR AIRCRAFT— SECONDARY SEARCH AND RESCUE UNITS

BRIEFING

Date – time group .... Tasking authority..

SAR (RCC case N°/name) ....

Tasked squadron/aircraft type...

Nature of distress or emergency (describe)..

....

Search Object

Type: (aircraft/vessel/swimmer/hunter/other—specify)...

Name/registration N° ....

Number on board ....

Name of pilot/operator/owner...

Description, including colours and marking
(hi/low wing, single/multi engine, open boat, cabin cruiser, sailboard, skidoo, etc.)..

....

....

Radios on board/last known frequency...

Emergency equipment..

Assigned Tasking/Mission (describe in plain language)

....

....

....

....

Assigned Search Areas

Area description (corner points, latitude and longitude, etc.) ....

Commence search point ....

Direction to track (N–S) (E–W)..

Track spacing..

Search altitude (not below VFR limits)...

Search pattern (ELT, track crawl, etc.) ....

Other search and rescue units in same or adjacent areas

- aircraft/altitude/area ....
- vessels/area ....
- ground search teams..

Frequencies and callsigns for communications

RCC/OSC/SM ....

Other search aircraft ....

Other search vessels/ground team ....

Search object/survivors ....

....

Communication checks

Progress reports should be passed to..

Every................. hours (Normal: 1 hour for aircraft, 4 hours for vessels)

Advise controlling agency when and why, if progress reports or SITREPs cannot be maintained. IF CONSECUTIVE PROGRESS REPORTS OR SITREPs ARE MISSED, SEARCH ACTION MAY BE INITIATED.

Action on sighting search object

....

If unable to effect rescue, direct other aircraft and/or vessels to scene. Remain on scene until relieved, forced to return or until the rescue has been effected.

Unit certification
(the controller will read these statements to the unit commander and certify his/her acceptance)

- IN THE OPINION OF THE UNIT COMMANDER, THE UNIT AND CREW CAPABILITIES ARE SUFFICIENT TO SAFELY COMPLETE THE MISSION AS BRIEFED. ....
  Initials

- THE UNIT COMMANDER UNDERSTANDS THAT AT ANY TIME A CONDITION/SITUATION IS ENCOUNTERED THAT EXCEEDS THE UNIT OR CREW CAPABILITIES, THE MISSION SHALL BE ABORTED. ....
  Initials

Special instructions (On-scene commander, co-ordinator aeronautical search, etc.)

....

....

....

....

....

....

DEBRIEFING

Immediately upon return to base, advise RCC of the following details:

Time airborne ....

Time on task ....

Time search object sighted ....

Time off task...

Time returned to base...

Area actually searched

....

....

....

....

Remarks/comments on this mission

....

....

....

....

....

....

....

SAR CONTROLLERS WILL TRANSMIT THIS FORM TO THE SRU COMMANDER (IF AIRBORNE, TO THE PARENT UNIT) PRIOR TO DEPARTURE.

ANNEX 9J— SAR BRIEFING/TASKING FORM FOR VESSELS

1. SRU tasked.. at (date – time group) ....

2. SAR (case name)... (case number)...

3. SEARCH OBJECT

    A. TYPE (delete as necessary) AIRCRAFT/VESSEL/other ....

    B. NAME ....

    C. REGISTRATION ....

    D. TONNAGE ....

    E. DESCRIPTION (colour, markings, superstructure, characteristics)..

    ....

    ....

    F. OWNER/OPERATOR/AGENT..

    G. PERSONS ON BOARD...

    H. EMERGENCY EQUIPMENT CARRIED...

    ....

4. NATURE OF DISTRESS OR EMERGENCY (brief description) ....

    ....

5. SEARCH AREA

    A. AREA DESCRIPTION (four corners, latitude & longitude, etc.) ....

    ....

    ....

    ....

    B. COMMENCE SEARCH POINT..

    C. DIRECTION OF CREEP..

    D. REQUESTED SEARCH PATTERN...

    E. REQUESTED TRACK SPACING...

    F. REQUESTED SEARCH SPEED ....

    G. REQUESTED COVERAGE FACTOR ....

6. OTHER SRUs TO BE ENGAGED IN ADJACENT AREAS

   A. AIRCRAFT/ALTITUDE ....

   B. VESSELS ....

   C. GROUND PARTIES ....

7. FREQUENCIES AND CALLSIGNS TO BE USED FOR COMMUNICATION WITH

   A. RCC/MRSC/OSC/SM (delete as necessary) ....

   B. SEARCH AIRCRAFT ....

   C. OTHER SEARCH VESSELS ....

   D. GROUND PARTIES ....

   E. SHIP OR CRAFT IN DISTRESS/SURVIVORS ....

8. ACTION ON SIGHTING THE SEARCH OBJECT (delete as necessary)

   - REPORT TO ....
   - IF UNABLE TO EFFECT RESCUE, DIRECT OTHER VESSELS AND/OR AIRCRAFT TO THE SCENE.
   - REMAIN ON SCENE UNTIL RELIEVED OR FORCED TO RETURN OR RESCUE HAS BEEN EFFECTED.

9. PROGRESS REPORTS TO BE PASSED TO .... EVERY .... HOURS.

10. SPECIAL INSTRUCTIONS (On-scene Commander, etc.) ....

....

....

....

....

....

....

....

ANNEX 9K—
OPERATIONAL SITREP FROM A MARITIME SRU

1. SITREP .... (number)
2. Time...............................UTC
3. Position ....(latitude/longitude)
4. Course............................
5. Speed ....
6. Past activities..
7. Future planned activities (next 24 hours)...
8. Weather conditions:
   A. Air temperature............°C and water temperature............. °C
   B. Cloud coverage.......................(in eighths)
   C. Visibility ....
   D. Wind speed/direction ....
   E. State of sea ....
9. Estimated time of departure (ETD) from present area ....
10. ETA to area of next planned activity ....
11. Helicopter status (if applicable)...
12. Ice conditions ....
13. Other vessels/aircraft involved ....
14. Fuel ....
15. REMARKS (briefly provide any detail which will allow RCC/MRSC to initiate appropriate action, bearing in mind that the transmission is not secure)..

    ....

    ....

ANNEX 9L—SAR SIGHTING REPORT

Report no........................

Name of person reporting..

Address..

....

Telephone .... Occupation ....

Description of sighting..

....

Time of sighting... (local) Date...

Type................................ Colour.. Trim ....

Aircraft...

Wheels/floats/skis .... High/low wing..

Number of engines .... Did engines sound normal? ....

Apparent height .... Direction ....

Turning? .... Other aircraft sighted...

Type................................ Description.. Time...................................

Parachutes sighted.. Number/colour ....

Do aircraft pass regularly?...

Vessel ....

Hull type .... Superstructure ....

Engines/sails... Did engines sound normal? ....

Location.. Direction ....

Turning? .... Other vessels sighted ....

Type................................ Description.. Time...................................

Weather at time of sighting...

Raining/snowing .... Thunder storm...

Wind/sea state..

Remarks..

Date/time received... by..

Received direct or relayed ....

Assessed validity of report...

Action taken..

ANNEX 9M—SAR OPERATION REPORT

TITLE SAR OPERATION NAME AND CASE NUMBER

PART I SEARCH OBJECT DETAILS—
Completed copy of initial SAR data report form (see Annex 9A).

PART II DETAILS OF SAR OPERATION

1. RCC ACTION

   a. Brief narrative of initial actions from log.

   b. Search and rescue units (SRUs) tasked, response times.

   c. SM appointment, name, location of SAR HQ.

   d. Basic assumption regarding search object.

2. SEARCH OPERATIONS

   a. Rationale for arriving at particular search plan.

   b. Explanation of any departures from a.

   c. Brief outline of each day's search activities including areas covered, SRUs used and general weather.

   d. If object is found, a complete explanation of how, to include type of SRU, altitude and/or distance, from what position in SRU, what was visual reference, was spotter trained, phase of flight, time of day, search conditions, distress beacon details, etc.

   e. If object not found, why (in general terms).

3. RESCUE OPERATIONS

   a. Condition of survivors.

   b. SRUs used.

   c. Evacuation details.

   d. Problem areas, if any.

NOTE: A copy of the SAR Mission Report may suffice here.

PART III CESSATION

1. OBJECT LOCATED

a. Date – time group ....

b. Location.. N... W

c. Number on board ....(from Part I)

d. Survivors...

e. Fatalities...

f. Missing ....

2. SEARCH REDUCED

a. Authority.. (message date – time group)

b. Number on board ....(from Part I)

c. Survivors...

d. Fatalities...

e. Missing ....

PART IV CONCLUSIONS/RECOMMENDATIONS

1. SM CONCLUSIONS

2. SM RECOMMENDATIONS (May include recommendations to Transport Canada and to the Transport Safety Board to help prevent future accidents of this kind.)

3. RCC REMARKS

4. SRR COMMANDER REMARKS

ATTACHMENTS

1. Weather reports.

2. Sighting reports.

3. SAR HQ maps.

4. SRU utilization (flying/steaming hours).

5. List of objects recovered.

6. Photographs (if applicable).

DISTRIBUTION OF SAR OPERATION REPORTS

Copies of the SAR operation report shall be forwarded to NDHQ Ottawa//D Air FE 3, 1 CAD Winnipeg/A3 SAR, CCG Headquarters/Manager SAR, each of the RCCs, all of the SRUs involved, Transport Canada, the NSS, and the Regional Aviation Safety Officer or Marine Investigation Officer as applicable. Further distribution shall be made to other agencies co-operating in the search effort or investigation at the discretion of the appropriate SRR Commander. Transport Canada, TSB, CCG and the NSS addresses are:

a. For aeronautical cases:
Transport Canada
Transport Canada Building
Place de Ville
Ottawa (Ontario)
K1A 0N8 Attention: AAB

Canadian Transportation Accident Investigation and Safety Board
Director of Air Investigations
Place du Centre
200 Promenade du Portage, 4th Floor
Hull (Québec)
K1A 1K8

b. For maritime cases:
Director, Search and Rescue
Canadian Coast Guard
Centennial Towers
200 Kent Street, 5th Floor
Ottawa (Ontario)
K1A 0E6

c. One copy of each aeronautical and maritime case report to:
National Search and Rescue Secretariat
275 Slater Street, 4th Floor
Ottawa (Ontario)
K1A 0K2

ANNEX 9N—SAR MISSION REPORT—AIRCRAFT

SAR MISSION REPORT—(Name of Squadron) ....

DATE .... RCC CASE N° .... SQN MISSION N° ....

SAR (name) .... CF/K1017 N° ....

TYPE OF INCIDENT....................... CODING.................... AIRCRAFT TYPE/N° ....

TASKED BY .... AT (date – time group)..................... UTC, TAKE OFF ....UTC

REASON FOR DELAY (if applicable)...

TRANSIT TIME............................ SAR TIME .... TOTAL TIME ....

FACTORS AFFECTING MISSION (may be positive or negative, for example, weather or equipment that resulted in significant impact on mission) ....

....

NAME/FUNCTION OF PERSONS AIRLIFTED: (i.e., J. Smith/doctor, W. Brown/patient, F. Brown/father)

....

SQUADRON COMMANDER'S REPORT (for cost recoverable mission)

CREW: AIRCRAFT COMMANDER....................... PILOT............................... NAV/FE ....

SAR TECH TEAM: LEADER .... SAR TECHS .... NAV/FE ....

BRIEFS NARRATIVES

OPERATIONS (pilot)—(Include narrative account of conduct of mission. Amplify factors affecting mission including latitude and longitude, terrain and environmental conditions, procedures used, problems encountered during penetration of SAR Techs or evacuation of casualties. Pay particular attention to chronological sequence and include pertinent times).

OPERATIONS (SAR Techs)—DATE/TIME OF SAR TECH ACTION ....(local)

METHOD OF PENETRATION ....

(Complement pilot narrative report with account of SAR Tech action, including conditions encountered on scene, communications, duration of operation/rescue or evacuation.)

MEDICAL (SAR Techs)—(Description of patient condition, vitals, etc., on scene and on arrival/release to other medical authority, diagnosis and treatment given. Attach 1 CAD medical annex if applicable. Distribution of medical annex should be protected.)

EQUIPMENT REPORT—(Comments on equipment used including inadequacies, malfunctions, etc. If changes recommended, indicate follow-up action taken—Unsatisfactory Condition Report, Material Authorization Change Request, Memo, etc.)

PHOTOS TAKEN—yes/no (Photos mailed on request)

....
SAR Tech Team Leader—Date Aircraft Commander—Date

....
SAR Tech Section Leader—Date Squadron Commander—Date

DISTRIBUTION LIST

Action	**Information**	
	external	**internal**
1 CAD HQ WINNIPEG//A3 TSR//	NDHQ OTTAWA//D AIR FE 3//	(as required)
	1 CAD HQ WINNIPEG// COMD FLT SURG//	
	CFSSAR COMOX//CMDT//	
	RCC (as applicable)	

ANNEX 9O—SAR MISSION REPORT—VESSELS

SAR CASE NAME ....

NAME OF VESSEL REPORTING ....

FUNCTION OF VESSEL IN INCIDENT (i.e.: OSC, searching, rescuing, etc.)..

CHRONOLOGY OF INCIDENT (as it affects the vessel making the report), to include response times, transit, searching, rescuing, etc. A summary only is required.

OTHER SRUS INVOLVED (aircraft, vessels, etc.)

BRIEF NARRATIVE (include such items as weather on-scene, latitude and longitude, equipment used and its effectiveness, communications procedures and problems, first aid administered, problems on scene affecting the units' capability, innovative techniques, etc.)

LIST OF ATTACHMENTS (charts, photos, etc.)

RECOMMENDATIONS OR COMMENTS.

....
Signature of Commanding Officer

DISTRIBUTION LIST

RCC/MRSC (if applicable)

Superintendent RSER

Director SAR

ANNEX 9P—GROUND SEARCH TRAINING REPORT EXAMPLE

GROUND SEARCH TRAINING REPORT
SRR HALIFAX
STATION OR BASE CFS SYDNEY

MONTH OF SEPTEMBER 1997

Exercise Number	Number of Personnel	Duration	Dates	Type of Terrain	Rations	Training Carried Out	Defects of Equipment Remarks
1	5	3	5-8 SEP	Hilly, dense bush	RS6	• Map/compass reading • Cross-country navigation • Ground searching exercises • Setting up base camp	Strong requirement for a suitable ground search transmitter and receiver See our Unsatisfactory Condition Report
2	5	4	16-20 SEP	Lake and river area	RS6	• Dragging operations • Setting up overnight camps	Considerable knowledge gained on this exercise in proper use of water equipment
3	10	1	25 SEP	Local area		• Helicopter familiarization	Demonstration by Labrador from 413 Squadron.

(J. Doe) Sgt
Ground Search Leader
CFS Sydney

ANNEX 9Q—UNSAR MESSAGE

DISTRIBUTION

TO: *(Aeronautical incident)* TRANSPORT CANADA OTTAWA//AARBI/AARQ//

TO: *(Maritime incident)* The appropriate Regional Director as follows:

TRANSPORT CANADA—ATLANTIC REGION—DARTMOUTH//
REGIONAL DIRECTOR MARINE SAFETY//

TRANSPORT CANADA—QUEBEC REGION—QUEBEC//
REGIONAL DIRECTOR MARINE SAFETY//

TRANSPORT CANADA—ONTARIO REGION—SARNIA//
REGIONAL DIRECTOR MARINE SAFETY//

TRANSPORT CANADA—PRAIRIES AND NORTHERN REGION—OTTAWA//
REGIONAL DIRECTOR MARINE SAFETY//

TRANSPORT CANADA—PACIFIC REGION—VANCOUVER//
REGIONAL DIRECTOR MARINE SAFETY//

INFO: NDHQ OTTAWA//D AIR FE 3//

CCG HQ OTTAWA//DIRECTOR SAR// (for marine cases)

RCC AND CMCC TRENTON

NSS OTTAWA//FEDERAL CO-ORDINATOR//

REQUIRED INFORMATION

UNNECESSARY SAR ALERT NUMBER

1. TIME OF INCIDENT
2. TYPE AND IDENTITY OF SEARCH OBJECT
3. OWNER AND/OR OPERATOR
4. FLIGHT PLAN/FLOAT PLAN OR LOCATION
5. COMMUNICATIONS EQUIPMENT ON BOARD OR AT DESTINATION
6. SAR ACTION REQUIRED; NUMBER OF HOURS FLOWN OR STEAMED
7. REASON FOR ALERT—for distress beacon cases, include type, model, switch position, time since last sortie and reason for activation.

ANNEX 9R—DAILY SAR SUMMARY

DISTRIBUTION

FM RCC ....

TO AIG ....

INFO: CCG HQ OTTAWA//DIRECTOR SAR//
NSS OTTAWA//FEDERAL CO-ORDINATOR//
RCC AND CMCC TRENTON
TRANSPORT CANADA//AAB/AANDO//

SIC OCJ

REQUIRED INFORMATION

SUBJ: DAILY SAR SUMMARY FOR................... (region) SRR
FOR PERIOD ...... (date) 0000 UTC TO .... (date) 2400 UTC.

A. INCIDENT SUMMARY	DAY	MONTH	YEAR
1. CATEGORY 1	......	......	....
2. CATEGORY 2	......	......	....
3. CATEGORY 3	......	......	....
4. CATEGORY 4	......	......	....
5. TOTAL INCIDENTS	......	......	....
6. PREVIOUSLY UNREPORTED	......	......	....

B. INCIDENT TYPE	DAY	MONTH	YEAR
1. AERONAUTICAL	......	......	....
2. MARITIME	......	......	....
3. HUMANITARIAN	......	......	....
4. UNKNOWN	......	......	....

C. SRU UTILIZATION (See Notes 1 and 2)	DAY	MONTH	YEAR
1. CF	......	....	....
2. CCG	......	....	....
3. OTHER FEDERAL	......	....	....
4. CASARA	......	....	....
5. CCGA	......	....	....
6. CHARTER	......	....	....
7. OTHER	......	....	....

D. DISTRESS BEACON RELATED INCIDENTS	DAY	MONTH	YEAR
1. CATEGORY 1	......	....	....
2. CATEGORY 2/3/4	......	....	....
3. UNRESOLVED	......	....	....

E. State cases in progress, providing a detailed but brief description of the incident, actions taken and SRUss employed as per paragraph C.

F. For category 1 and 2 incidents: give a short narrative containing the RCC case number, classification, date-time group when RCC was alerted, detailed but brief description of actions taken, SRUs employed and incident conclusion. Include the location, POBs, survivor condition, which SRU resolved the incident and the position of the rescue if different from the incident location. Also include any other incident where CF SRUss were employed.

G. REMARKS: (include late departure reasons, oil rig positions, aircraft that remain off base overnight, and any other terms of interest not associated with a specific incident).

NOTE 1: SRU utilization means the number of times a specific SRU was used for a specific incident i.e.:

- three sorties of same SRU on same incident counts as one use;
- three incidents completed during one sortie by one SRU counts as three uses;
- three SRUs on one incident counts as three uses;
- CF SRUs detached with a search headquarters in your region are to be included; and
- CASARA spotters on one CF aircraft counts as one CASARA use.

NOTE 2: This is a daily summary of SRUs used. If the sortie of an SRU starts before 2400 UTC and ends thereafter, then the SRU will be included in messages for both days; however, the SRU's times will only be included in the cumulative total of the second day.