NATIONAL SEARCH AND RESCUE MANUAL

CHAPTER 1 -- INTRODUCTION

GENERAL

1. In 1986, the Federal Government of Canada directed the establishment of a National Search and Rescue Program (NSP). The NSP is a unique undertaking by federal and participating provincial, municipal and private SAR organizations with the objective of saving lives by enhancing SAR prevention and the provision, through Canada's accepted areas of responsibility, of effective and affordable SAR services.

2. Jurisdiction. Responsibilities for the provision of SAR services are generally well defined within federal, provincial and local jurisdictions, and private organizations, but not always as clearly among organizations. Membership in the NSP does not in any way change existing jurisdictions, responsibilities or authorities, nor require the mandatory expenditure of resources. However membership does provide a structure and process by which jurisdictional interfaces can be clarified and the effective and efficient and economical use of resources can be more closely coordinated, in a mutual and nationally beneficial manner.

3. NSP Components. The NSP is characterized by the three complementary components of air, marine and land SAR and by the division of each component into two sub-components of SAR operations and SAR prevention.

NATIONAL SAR OBJECTIVE

4. Objectives. The national SAR objective is to prevent loss of life and injury through search and rescue alerting, responding and aiding activities which use public and private resources, including where possible and directly related thereto, reasonable efforts to minimize damage to or loss of property; and by ensuring appropriate priority to aviation and marine safety and prevention measures focused on owners and operators most commonly involved in SAR incidents.

5. Area of Responsibility. The Canadian area of responsibility for air search and rescue is as defined under ICAO agreements, and for marine search and rescue as defined under IMO agreements and in Canadian waters of the Great Lakes and the St. Lawrence system.

INTERNATIONAL SAR TREATIES, CONVENTIONS AND AGREEMENTS

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

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 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 Coordinating Committee (ASCC). Similarly, the Canadian Coast Guard (CCG) seeks standardization of marine SAR procedures through IMO forums such as the Maritime Safety Committee and the Lifesaving, Search and Rescue Sub-Committee. Finally, agreements between Canadian and American SAR agencies enhance coordination and mutual support operations adjacent to the common border.

NSP MANAGEMENT OVERVIEW

7. General. Within the federal system, the focus on SAR as a distinct integrated activity is maintained through the Interdepartmental Committee on Search and Rescue (ICSAR) and the National Search and Rescue Secretariat (NSS). Although numerous federal, provincial, municipal, commercial and volunteer groups contribute to the National SAR Program, this manual will focus on the federal responsibility for Air and Marine SAR activity.

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

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 SAR program. This Committee is the primary forum for the development of advice for the LM SAR. ICSAR is responsible for identifying SAR requirements and advising the government on how best to respond to these requirements. ICSAR exists to provide interdepartmental coordination and advice to the Ministers in the areas of SAR policy, planning, resources, and effectiveness.

10. ICSAR Composition. The ICSAR is chaired by the Executive Director of NSS and consists of members from Department of National Defence (DND), Transport Canada (TC), Department of Fisheries and Oceans (DFO), Environment Canada, the Royal Canadian Mounted Police (RCMP), and Parks Canada (PC). Additional ICSAR representatives include the Department of Energy, Mines, and Resources (EMR), Department of Indian and Northern Affairs (DINA), Emergency Preparedness Canada (EPC), Treasury Board (TB) and the Privy Council (PCO).

11. NSS. The National SAR Secretariat (NSS) is an independent body outside the line authorities of 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 NSP. This includes facilitating the cooperation, communication and coordination among National SAR Program members in the development of policy, resource planning, research and development,

analysis and review. The Executive Director of the NSS has been designated the Chairman of 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.

AIR AND MARINE SAR SERVICE

12. Joint CCG and DND Activity. DND and CCG support the national SAR objective through two areas of activity related to the air and marine SAR service:

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

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

DEPARTMENT OF NATIONAL DEFENCE SAR RESPONSIBILITIES

13. DND Responsibilities - General. The primary responsibility for the provision of air SAR services and effective operation of the coordinated air and marine SAR system is assigned to DND. The provision of assistance to aircraft in distress through a federal air SAR service arises out of Canada's signatory status to the 1944 Convention on International Civil Aviation, Article 25. In 1947 Cabinet Directive 18 (Annex 1A), authorized the Royal Canadian Air Force (RCAF) to establish facilities and equipment to meet this commitment. Cabinet Directive 22 (Annex 1B) further delegated responsibility for marine SAR coordination to the RCAF in 1951.

14. National Defence Headquarters Responsibilities. National Defence Headquarters (NDHQ) is responsible for:

a. DND SAR policy and military resource allocation;

b. liaison with the National SAR Secretariat;

c. the provision of a DND ICSAR representative responsible for departmental SAR policy coordination; and

d. liaison with other SAR operating departments and agencies.

15. Air Command Responsibilities. Air Command (AIRCOM) is responsible for:

a. command of all primary SAR assets;

b. the establishment and manning of the RCC's and the SARSAT Canadian Mission Control Centre;

c. the provision of ground search parties in support of air and marine incidents; and

d. the interface between CASARA/SARABEC and the CF at the national level.

16. Commander MARLANT Responsibilities. The commander Maritime Forces Atlantic (MARLANT), as Commander of the Halifax SRR, is responsible for the planning, coordinating and controlling of SAR response in the Halifax SRR's.

17. Commander ATG Responsibilities. The Commander of Air Transport Group (ATG), as Commander of the Trenton SRR, is responsible for the planning, coordinating and controlling of SAR response in the Trenton SRRs.

18. Commander MARPAC Responsibilities. The Commander Maritime Forces Pacific (MARPAC), as Commander of the Victoria SRR, is responsible for the planning, coordinating and controlling of SAR response in Victoria SRR's.

19. DND SAR Activities. The SAR activities of DND/the Canadian Forces (CF) are:

a. the efficient operation of the coordinated SAR system;

b. the provision and operation of the RCCs and other SAR facilities in conjunction with CCG;

c. the coordination, control, and conduct of air SAR operations within the Canadian area of responsibility and between Canada and the United States in accordance with existing agreements;

d. the setting of priorities pertaining to the allocation of SAR resources to SAR operations;

e. the provision of SAR aircraft in response to SAR incidents within the Canadian area of responsibility, the activities of which are coordinated through RCCs and Marine Rescue Sub-Centres (MRSCs);

f. the provision of humanitarian and civil assistance as a secondary tasking.

g. formulation and promulgation of SAR policy (in collaboration with ICSAR);

h. establishment of operating standards and the provision of SAR training for the coordinated SAR system in collaboration (when appropriate) with CCG authorities;

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

k. the annual review of SAR services, resources and facilities in collaboration with CCG;

m. coordination of Civil Air Search and Rescue Association (CASARA) training and operational activity; and

n. the efficient operation of the Canadian SARSAT ground system.

20. DND Primary Tasks. DND has the following primary SAR tasks:

a. to coordinate, control and conduct SAR operations in relation to air SAR incidents within the Canadian area of responsibility;

b. to provide resources in support of the prosecution of marine SAR operations and to exercise ultimate authority in the allocation of all SAR resources during a SAR incident;

c. to conduct ground searches in relation to air and marine SAR incidents; and

d. to provide the resources to operate the Canadian SARSAT ground system.

21. DND Secondary Tasks. DND has the following secondary SAR tasks:

a. to provide SAR resources when and where available, to assist in the prosecution of humanitarian and civil incidents which occur within provincial or municipal areas of responsibility. DND employs significant resources prosecuting land and inland marine SAR incidents. (This task is in accordance with DND directives outlined in B-GS-055-000/AG001 - Provision of Services to non-Defence Agencies); and

b. to support Transport Canada Aviation and CCG in SAR prevention through participation in related educational programs and by advising the appropriate authority of possible infractions of regulations.

TRANSPORT CANADA SAR RESPONSIBILITIES

22. Transport Canada (TC) Responsibilities - General. Primary responsibility for the provision of federal marine SAR services rests with Canadian Coast Guard (CCG). This responsibility is assigned to TC through legislation contained in various Marine Acts leading to the Department of Transport Act of 1936. In 1948, officials of the Department of Transport, acting on behalf of the government of Canada, signed the Convention for the Safety of Life at Sea, 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 SAR 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 (CSA) (Annex 1C).

23. Transport Canada Aviation. Transport Canada Aviation has primary responsibility for the provision of the air 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 DND SAR authorities in an effort to optimize program priorities and effectiveness. Coordination is effected through ICSAR.

24. TC Aviation SAR Tasks. TC Aviation has the following SAR tasks:

a. 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 Coordination Centre (RCC) and in locating the distressed aircraft;

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

c. to coordinate, control and conduct a SAR prevention program designed to reduce the number and severity of air SAR incidents.

25. TC - CCG Responsibilities. CCG has primary responsibility for the provision of marine SAR prevention programs through education, regulation and enforcement. This responsibility is assigned under authority of the Canada Shipping Act), the DOT Act, and through other legislation which reflects the international responsibilities established under Conventions such as the International Convention for Safety of Life at Sea.

26. Regional Directors General Coast Guard (RDGCGs) Responsibilities. RDGCCGs are designated, on behalf of the Commissioner, as the senior officers responsible to effect, on a regional basis, in collaboration with the SRR Commander, implementation of those CCG policies, standards and objectives designed to provide a SAR service to the marine community. RDGCGs are responsible to the Commissioner through AME to ensure, on a daily basis, the adequate disposition of resources within their respective regions in support of SAR operations.

27. The Director General (DG), Marine Communications and Telecommunications Services, CCG, Responsibilities. The DG is responsible to the Commissioner CCG for the provision of adequate telecommunications and electronic facilities to support the detection of SAR incidents and coordination of distress communications in the Canadian area of responsibility.

28. AME Responsibilities. The Director General Rescue and environmental (AME) is designated, on behalf of the Commissioner, as the senior officer responsible for the exercise of functional authority and direction in relation to marine SAR program activities in the CCG. The authority and direction noted flows through the AME and includes the following:

a. CCG SAR policy and resource allocation;

b. the provision of support to ICSAR concerning marine SAR policy, standards, procedures, planning, resources and program effectiveness;

c. the interface with CMRA and coordination of the CCG aspects of the marine rescue auxiliary program;

d. SAR Loss-Of-Life prevention activities which include:

(1) courtesy examinations,

(2) demonstrations and lectures,

(3) awareness campaigns; and

e. liaison with the National SAR Secretariat.

29. TC - CCG SAR Activities. The SAR activities of the CCG SAR organization are:

a. the provision and participation in equipping of the marine component of RCCs as well as the provision, operation and equipping of MRSCs and other SAR facilities in cooperation with the CF;

b. in collaboration with the CF, the coordination, control and conduct of marine SAR operations within the Canadian area of responsibility;

c. the provision of marine advice and assistance to the CF in the coordination of air SAR and other emergencies which may require the use of marine resources;

d. the provision of marine SAR resources in response to SAR incidents within the Canadian area of responsibility, the activities of which are coordinated by RCCs and MRSCs;

e. the provision of humanitarian and civil assistance (as a secondary task) when such is deemed best provided by CCG SAR resources;

f. formulation and promulgation of SAR policy (in collaboration with ICSAR);

g. establishment of operating standards and the provision of marine SAR training for the coordinated SAR system in collaboration (when appropriate) with the CF;

h. the organization, coordination and administration of Canadian Marine Rescue Auxiliary (CMRA) activities;

j. the evaluation of SAR equipment and procedures, in collaboration with the CF authorities; and

k. the annual review of SAR services, resources and facilities in collaboration with the CF.

30. TC - CCG Primary Tasks. CCG has the following primary SAR tasks:

a. to detect marine incidents and in collaboration with DND to coordinate, control and conduct SAR operations in marine SAR incidents within the Canadian area of responsibility;

b. to provide marine resources in support of the prosecution of air SAR operations where applicable; and

c. to coordinate, control and conduct SAR Loss-Of-Life prevention programs to reduce the number and severity of marine SAR incidents.

31. TC - CCG Secondary SAR Tasks. CCG has the following secondary SAR task: to provide SAR resources, when and where available, to assist in the prosecution of humanitarian and civil incidents within provincial or municipal areas of responsibility.

DEPARTMENT OF FISHERIES AND OCEANS SAR RESPONSIBILITIES

32. Department of Fisheries and Oceans (DFO) Responsibilities - General. DFO is responsible for the provision of multi-tasked resources to augment primary SAR resources. The tasking of these resources is agreed to for specific periods.

33. DFO SAR Activities. The SAR activities of DFO are:

a. the provision of multi-tasked vessels as determined by national SAR objectives; and

b. participation in incidents of a humanitarian nature as required.

34. DFO SAR Tasks. DFO has the following SAR tasks:

a. in collaboration with DND and CCG to determine the requirements to meet national SAR objectives;

b. to provide multi-tasked resources (refer to secondary SAR resources definition) to augment primary resources; and

c. to provide SAR resources when and where available to assist in the prosecution of humanitarian incidents.

DEPARTMENTAL RESOURCES

35. Departmental Resources. Aircraft and vessels of all departments of the federal government are considered secondary SAR resources and will respond to calls for assistance whenever possible.

ANNEX 1A -- TRANSCRIPT OF CABINET DIRECTIVE 18

Use of Air Transport for Passengers and Cargo by Departments and Agencies

The Cabinet, after considering the respective positions of the Air Force and of commercial services in the field of air transportation, agreed that:

(a) the Royal Canadian Air Force should be the air carrier for the Department of National Defence;

(b) except in cases of emergency or where commercial air services were not available, other departments of the Federal Government requiring air transport should use commercial air services;

(c) the Royal Canadian Air Force should continue to provide search and rescue services on behalf of the government of Canada under the International Civil Aviation Organization agreements.

All departments and agencies are being informed of this decision.

original signed by
N.A. Robertson
Secretary to the Cabinet

Privy Council Office
September 26, 1950

ANNEX 1B -- TRANSCRIPT OF CABINET DIRECTIVE CIRCULAR NO. 22
SEARCH AND RESCUE SERVICES

In accordance with the decision of Cabinet the following amended regulations with respect to search and rescue service are circulated:

(a) each department of the government operating ships will issue clear instructions that such ships are to be part of a general marine search and rescue organization and are to render every possible assistance in the event of a marine casualty;

(b) the R.C.A.F. is designated as the agency for coordinating all marine search and rescue services through its Rescue Coordination Centres at Halifax, Vancouver, and Trenton;

(c) all departments concerned will co-operate fully with the R.C.A.F. Rescue Co-ordination Centres and keep them informed of the movements and state of readiness of their ships (for reasons of security the R.C.M. Police may not be able to provide detailed movements for their vessels.);

(d) all departments concerned will co-operate fully with the R.C.A.F. in setting up a system of communication with the R.C.A.F., so that notice of any casualty will reach the Coordination Centre with a minimum of delay;

(e) necessary publicity will be given to this proposed marine search and rescue organization so that all interested agencies and the public will be aware of the action to be taken in the event of an emergency and of the necessity of notifying the appropriate R.C.A.F. Rescue Coordination Centre of any casualty;

(f) instructions to vessels owned by the government are to indicate clearly that:

(i) the immediate action required is that necessary to ensure safety of life and, if possible, prevention of damage to or loss of any ship or its cargo until such time as private or commercial salvage is available for this purpose; and

(ii) any action taken by government owned vessels is of a purely interim nature and should not be competitive with commercial interests.

(g) in order to ensure that immediate action is taken to deal with every case of distress, the following procedures will be followed by all departments concerned:

(i) the R.C.A.F. in its capacity of coordinating authority will inform the nearest and most suitable government ship of any casualty. When this ship is a naval vessel, the R.C.A.F. will communicate with the nearest naval shore operating authority. When appropriate, the Rescue Coordination Centre will broadcast distress information to all ships whether

government or otherwise;

(ii) instructions will be issued by the appropriate departments to all their ships to take whatever action is necessary immediately upon receipt of such information;

(iii) immediately following notification to such ship the R.C.A.F. will notify the local office, if any, of the department which is charged with such ships operations;

(iv) in the event of unwillingness or inability to take action immediately, the Captain or the Commanding Officer of the ship is to inform the R.C.A.F. Rescue Coordination Centre instantly so that immediate notification may be given to the next most suitable ship;

(v) in any case of unwillingness or inability to take immediate action, a preliminary report of the circumstances is to be passed immediately by radio by the ship concerned to its department and thence through normal channels to the R.C.A.F. Rescue Coordination Centre and to the Minister of Transport. The R.C.A.F. Rescue Coordination Centre involved will also pass such a preliminary report to its headquarters (A.F.H.Q.). A full report of the circumstances will be forwarded within three days after returning to port by the ship concerned through its department and thence through normal channels to the R.C.A.F. Coordination Centre and to the Minister of Transport. Within the same period the R.C.A.F. Rescue Coordination Centre involved will also report through normal channels to its headquarters and thence to the Minister of Transport upon the action taken; and

(vi) where R.C.N. ships are involved the necessary reports will be forwarded by the shore operating authority concerned.

The arrangements of this proposed Directive will apply in peacetime only and in the event of war would not be valid.

original signed by
N.A. Robertson
Secretary to the Cabinet

Privy Council Office
July 12, 1951

ANNEX 1C -- EXCERPTS FROM 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 the persons in distress.

SHIPS REQUISITIONED

(2) The master of any ship in distress may, after consultation, 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 COORDINATORS

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

POWER OF RESCUE COORDINATORS

(2) On being informed that a vessel, 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 coordinator 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 coordinator, 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 coordinator 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 and 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 such 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 by the master or person in charge of a vessel with this section does not affect his right or the right of any other person to salvage.

Royal Ascent Granted March 26, 1987

CHAPTER 2 -- SAR AGREEMENTS

GENERAL

1. It is highly desirable that Canadian SAR procedures be as alike as possible to those used by nations participating in the International Civil Aviation Organization (ICAO), North Atlantic Treaty Organization (NATO), Air Standardization and Coordination Committee (ASCC), System of Cooperations Among the American Air Forces (SICOFAA), International Maritime Organization (IMO) and the International Convention on Maritime Search and Rescue. This requires a high degree of liaison and the acceptance of mutual agreements and standards. It is essential, therefore, that close cooperation be maintained between Canadian SAR authorities and those of other nations.

CANADIAN-AMERICAN VISITS

2. To ensure smooth coordination in cross-border SAR operations, periodic liaison visits are required between Canadian and American SAR personnel. Visits by personnel of Canadian SAR formations to adjacent United States Coast Guard (USCG) and United States Air Force (USAF) installations may be made on the approval of the commander responsible for the particular SAR unit concerned. For CF personnel, a visit clearance in accordance with CFAO 20-5 shall be obtained from Canadian Defence Liaison Staff (CDLS) Washington and for CCG personnel in accordance with guidelines provided in TP 789 "SECURITY MANUAL". Details including reports of such visits shall be passed to the appropriate national headquarters agency.

JOINT AREAS OF SAR RESPONSIBILITY - CANADA-USA

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

4. When a SAR incident occurs involving a US aircraft other than military in Canadian territory, US SAR forces will be permitted to provide facilities they consider necessary, but the appropriate Canadian RCC will be responsible for the search. USAF or USCG 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.

5. When an emergency incident occurs involving a US military aircraft in Canadian territory (for which search participation may become necessary), USAF forces will be permitted to take any action that is necessary (consulting with the appropriate Canadian RCC as soon as possible). Under such conditions, a USAF Search Master will be designated as well as a Canadian Assistant Search Master to act as liaison between US and local Canadian authorities. The US Search Master will report details to the appropriate Canadian RCC and the RCC will be kept informed of developments. However, the SRR Commander may assume control of any search that arises in

his area. This power normally will only be exercised when CF search aircraft are participating or when, in his opinion, the CF are better qualified to conduct the search. When a USAF SAR unit gains knowledge of such an incident, immediate notification will be given to the appropriate Canadian RCC giving:

a. full information on flight plan;

b. action taken or being taken;

c. safety and environment risk assessment; and

d. future plans.

6. Canadian and US SAR units will provide mutual assistance when such assistance is requested and is available. A listing of Canadian/US SAR agreements is provided at Annex 2A and the RCAF\USAF master agreement at Annex 2B.

MASTER CANADIAN FORCES - USCG AGREEMENT

7. The USCG is responsible for the coordination of SAR activities in the maritime regions and the inland waters which are under the jurisdiction of the US.

8. A master CF-USCG agreement is attached at Annex 2C.

CUSTOMS AND IMMIGRATION BILATERAL AGREEMENT - SAR AIRCRAFT

9. Customs and Immigration authorities in Canada and the US have approved the following procedures to be employed between RCCs and Customs and Immigration officers in dealing with SAR aircraft of either Canada or the US crossing the international boundary while engaged in SAR operations:

a. 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;

b. 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 United States Aerospace Rescue and Recovery Service (US ARRS) unit 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,

c. should an unscheduled landing be made by US aircraft while employed on search and rescue 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.

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

SAFETY OF LIFE AT SEA (SOLAS)

10. The International Convention on Safety of Life at Sea (1974) 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 SOLAS-1974 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

11. The main purpose of this convention is to facilitate cooperation between governments and to facilitate cooperation between those participating in SAR operations at sea. In this regard IMO has established an International SAR Plan and published a Search and Rescue Manual to

assist governments. This convention has been in effect since June 22, 1989.

ANNEX 2A -- SEARCH AND RESCUE AGREEMENTS

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

INTERNATIONAL

MULTINATIONAL

International Civil Aviation Organization (ICAO)

North Atlantic Treaty Organization (NATO)

Air Standardization Coordinating Committee (ASCC)

International Maritime Organization (IMO)

Convention on International Civil Aviation

International Convention on Maritime Search and Rescue

International Convention for Safety of Life at Sea (SOLAS)

CANADA-UNITED STATES OF AMERICA

DATE	AUTHORITIES	AGREEMENT
31.09.49	CANADA/UNITED STATES	SAR operations along the common boundary outlining customs procedures.
24.06.57	RCAF/USAF	Provide for mutual cooperation, coordination, and support of SAR.
27.04.72	MARPAC/17 DIST USCG	Provide for mutual assistance, delineating responsibility and control.
02.02.73	MARPAC/USCG PACIFIC	Authority for agreements between MARPAC and 13 and 17 districts USCG.
18.05.73	MARPAC/13 DIST USCG	Provide for mutual assistance, delineating responsibility and control.
25.10.74	CDS/Commandant USCG	Areas of responsibility and provision for agreements between sub-commands.
11.06.82	ATGHQ/17 DIST USCG	Provide for mutual assistance, delineating responsibility and

		control for mutual boundary with RCC Edmonton.
10.11.87	ATGHQ/9 DIST USCG	Provide for mutual assistance, delineating responsibility and control for mutual boundary with RCC Trenton.

DOMESTIC

27.04.87	DND/TC	Search and Rescue Training.
04.04.88	DND/TC	Agreement relative to SAR training.
30.04.94	DND/TC	Joint sponsorship and cost-sharing of the Civil Air Search and Rescue Association (CASARA).

Note - Each SRR will have regional agreements between local agencies and authorities as necessary to facilitate the coordination and conduct of regional SAR operations. Each RCC will maintain a list of these agreements.

ANNEX 2B -- TRANSCRIPT OF SEARCH AND RESCUE AGREEMENT BETWEEN THE ROYAL CANADIAN AIR FORCE AND THE CONTINENTAL AIR COMMAND (EXECUTIVE AGENT FOR THE UNITED STATES AIR FORCE)

24 June 1957

1. Purpose. This agreement formulates the broad policies under which the two signatories will provide for coordinated search and rescue activities within their continental areas of search and rescue responsibility.

2. General

a. The Royal Canadian Air Force is responsible for the coordination and conduct of all search and rescue operations within the Dominion of Canada and its maritime regions.

b. The Continental Air Command, acting as executive agent for the United States Air Force is responsible for the coordination of all search and rescue activities within the continental United States.

c. The United States Coast Guard is responsible for the coordination of search and rescue activities in the maritime regions and the inland waters under the jurisdiction of the United States.

3. Agreement. It is agreed that:

a. the Royal Canadian Air Force and the Continental Air Command will provide for mutual cooperation, coordination and support of search and rescue operations involving aircraft and\or personnel of either nation when incidents occur within the area of their common boundary. The two signatories, on request, will assist each other when aircraft and\or personnel of one nation are involved in an incident requiring search and rescue activities within the territory of the other;

b. the subordinate commands of both signatories will provide for coordination and cooperation by the establishment of agreements and standing operating procedures to be effective within their areas of responsibility;

c. nothing in this agreement shall be construed to change or negate previous agreements between the Royal Canadian Air Force and the Air Rescue Service (MATS). This agreement is an augmentation thereof and supplements any such prior agreements.

original signed by
C.R. Dunlap
Air Vice Marshal
Vice Chief of the Air Staff

original signed by
Charles B. Stone, III
Lieutenant General, US Air Force
Commander

Royal Canadian Air Force Continental Air Command

ANNEX 2C -- MASTER CF-USCG SAR AGREEMENT

REFERENCES

1. a. Convention of International Civil Aviation, Chicago, December 7, 1944.

b. International Convention for the Safety of Life at Sea, London, June 17, 1960.

c. Treaty signed at Washington, DC, on May 18, 1908, relating to reciprocal rights in wrecking and salvage in the waters contiguous to the boundary between Canada and the United States of America.

d. Exchange of Notes of January 24 and 31, 1949 between Canada and the United States constituting an agreement relative to Air Search and Rescue along the common border of the two countries.

e. Search and Rescue Agreement between the Canadian Forces and the United States Coast Guard which became effective 21 July 1972.

PURPOSE

2. The purpose of this agreement is to provide for coordinated search and rescue activities in maritime areas of mutual interest.

GENERAL

3. a. The CF are responsible for organizing and coordinating search and rescue operations on behalf of Canada.

b. The USCG is responsible for organizing and coordinating search and rescue operations on behalf of the United States in the maritime areas covered by this agreement.

AGREEMENT

4. a. The CF shall coordinate search and rescue operations in and over the water areas described as follows:

(1) ocean areas contained within the Edmonton Flight Information Region (FIR);

(2) ocean areas contained within the ICAO Victoria SAR Region (SRR);

(3) ocean areas contained within the ICAO Halifax SRR, and the Moncton and Gander FlRs; and

(4) waters on the Canadian side of the international boundary

between Canada and the United States in waters through which such boundary passes;

b. The USCG shall coordinate all search and rescue operations in and over the water areas described as follows:

(1) ocean areas contained within the ICAO Juneau SRR;

(2) ocean areas contained within the ICAO San Francisco SRR;

(3) ocean areas contained within the ICAO New York SRR; and

(4) waters on the United States side of the international boundary between Canada and the United States in waters through which such boundary passes;

c. The CF and the United States Coast Guard shall provide for mutual cooperation in the coordination and support of search and rescue operations.

d. The sub-commands of both signatories shall provide for such coordination and cooperation by the establishment of appropriate agreements and procedures.

e. Nothing contained herein shall prevent either signatory or the officials thereof from initiating search and rescue operations or from assuming coordination of a particular operation in the maritime areas of the other as described above when such action may be required or appropriate to meet the demands of the situation. Each signatory shall keep the other informed of activities of mutual interest in order that continuity in search and rescue operations may be ensured.

5. ICAO approved FLIGHT INFORMATION REGIONS (FlRs) and Search and Rescue Regions (SRRs) referred to in this agreement mean those FlRs and SRRs as they existed on 10 December 1973. Subsequent changes made by ICAO to these FlRs and SRRs will only be incorporated into this agreement with the consent of the parties.

6. This agreement shall come into force upon signature thereof by both parties thereto, and shall supersede reference E. This agreement may be terminated by either party giving six months notice in writing to that effect.

J.A. Dextraze
General
Chief of the Defence Staff
Canadian Forces

Original signed: 12 September, 1974

O.W. Siler
Admiral
Commandant,
U.S. Coast Guard

Original signed: 25 October, 1974

CHAPTER 3 -- TERMS OF REFERENCE CANADIAN SAR SYSTEM

COORDINATION OF SAR

1. As summarized in Cabinet Directives, the DND has overall responsibility for the efficient operation of the coordinated SAR system. The statutory authority for the coordination of Marine SAR response is assigned to the Minister of Transport by the Canada Shipping Act. Under this authority the military SRR Commanders have been designated as rescue coordinators. Within the RCCs, the coordination and control of air and marine rescue operations is conducted by both CF and Coast Guard personnel respectively. RCC personnel function together as a team to ensure that response to distress is coordinated effectively. MRSCs are established for the purpose of coordinating, conducting and controlling response to Marine SAR incidents within the boundaries of local Search and Rescue Region sectors, maximizing 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.

SAR REGIONS

2. In accordance with IMO and ICAO agreements to provide SAR services in Canada and adjacent ocean areas, the country has been divided into three SRRs for marine and air SAR coordination. The international boundaries are in accordance with ICAO and IMO agreements (SRR boundaries are outlined in Annex 3A).

3. RCCs at Victoria, Trenton and Halifax coordinate Air and Marine SAR. MRSCs are established at Quebec City, and St. John's, Nfld. (MRSC responsibility sectors are outlined in Annex 3B.)

TERMS OF REFERENCE - NDHQ SAR STAFF

4. The NDHQ SAR staff in the Director General Aerospace Development (DGAD) division is responsible for:

a. the coordination of equipment procurement and other requirements of the DND SAR system;

b. the coordination of all DND inputs to the New SAR Initiatives (NSI) Program; and

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

5. The Air Command Office Ottawa (ACOO) SAR staff is responsible to the Chief of Staff Operations (COS Ops) AIRCOM for:

a. development and promulgation of DND SAR policy in accordance with ministerial direction;

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

c. liaison with CCG, NSS and other agencies involved in the National SAR Program through membership on the ICSAR sub-committee;

d. provision of information to other NDHQ staffs on matters concerning SAR;

e. provision of staff support to the DND ICSAR representative;

f. coordination of DND participation in the COSPAS/SARSAT program;

g. provision of Canadian representation for SAR policy matters at NATO and ICAO; and

h. monitoring major searches and assisting NDHQ operations in staffing the recommendations for major search reduction.

TERMS OF REFERENCE - CCG HQ SAR STAFF

6. CCG Headquarters SAR staff shall be responsible to the Director, CCG General Rescue and Environmental Response (AME) for:

a. development, approval by appropriate authority, and promulgation of CCG SAR policy;

b. processing of ministerial or other inquiries regarding CCG aspects of the Canadian SAR program;

c. coordination of equipment and other requirements of the marine SAR system;

d. provision of information to other CCG Headquarters staff on matters concerning marine SAR;

e. OPI for primary marine SAR craft types;

f. provision of staff assistance to ICSAR on marine SAR interests;

g. liaison with DND and other agencies involved in the Canadian SAR program;

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

j. maintenance of international marine SAR liaison through IMO and

other international bodies;

k. development and maintenance of training criteria and plans for personnel involved in marine SAR;

m. liaison with and administration of the CMRA and its activities;

n. development and maintenance of marine SAR Loss-Of-Life prevention policies and activities in relation to the Canadian SAR program; and

p. coordination of all CCG inputs to the New SAR Initiatives Program (NSI).

TERMS OF REFERENCE - AIRCOM SAR STAFF

7. The Air Command SAR staff is responsible to the Chief of Staff Operations (COS Ops) AIRCOM for:

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

b. CASARA, SICOFAA and ASCC liaison at the national level;

c. development and maintenance of RCC automation and communication systems; and

d. implementing and maintaining the Major Air Disaster Plan (MAJAID ACOP 210).

TERMS OF REFERENCE - ATG SAR STAFF

8. The Commander AIRCOM has delegated the following responsibilities to the Commander ATG:

a. preparing and publishing CF SAR operational procedures in accordance with current policy;

b. distribution of relevant information and direction to CF SAR formations;

c. supervising the administration, standardization, manning and training of CF SAR formations;

d. ensuring the operational readiness and the regular evaluation of CF SAR formations;

e. CASARA liaison and coordination of CASARA activities; and

f. other duties as may be assigned by the commander.

TERMS OF REFERENCE - THE SRR COMMANDER (RESCUE COORDINATOR)

9. The SRR commander shall be responsible to the Chief of the Defence Staff for:

a. initiating and coordinating SAR operations, and authorizing the reduction of minor SAR operations (those operations not classed as major SAR operations under Chapter 5;

b. recommending the reduction of major SAR operations;

c. carrying out the duties of rescue coordinator pursuant to section 385 (2) of the Canada Shipping Act;

d. formally appointing Searchmasters (SMs) as required;

e. approving the use of SAR resources for Humanitarian or Civil incidents when authorized in accordance with B-GS-055-000/AG-001; and

f. establishing channels of communication to allow the expeditious flow of information between the SRR Commander and the OIC RCC.

TERMS OF REFERENCE - SENIOR MILITARY OFFICER (SMO)

10. The SMO is a senior military officer assigned specific duties and responsibilities by the SRR Commander in respect to the coordinated SAR System.

TERMS OF REFERENCE - REGIONAL MANAGER SAR (RMSR)

11. RMSR shall, under the direction of RDGCG, and in cooperation with CF, be within the CCG unilaterally responsible for planning, organizing, and directing the activities of the CCG Marine SAR Program for the assigned geographical area of responsibility. RMSR shall be responsible to:

a. SRR commander through the RDGCG for:

(1) providing expert marine advice in matters of CG policy and procedures concerning marine SAR,

(2) ensuring that qualified marine SAR controllers are selected and appointed in collaboration with the appropriate OIC RCC,

(3) selecting and appointing qualified Regional Superintendent Marine SAR (RSMS),

(4) ensuring provision of the RCC/MRSC equipment for which CCG is responsible,

(5) ensuring adequate deployment of CCG SAR resources against current levels of SAR activity and trends.

b. RDGCG for:

(1) implementing CG SAR policies and ensuring that CG SAR procedures are followed,

(2) planning and conducting the SAR program and coordinating the multitasking of Coast Guard vessels assigned SAR responsibilities subject to operational control reverting to RCC/MRSC for SAR tasking,

(3) maintaining liaison with the appropriate branches of CCG to ensure the best possible level of support to the SAR program,

(4) evaluating effectiveness of SAR programs through training exercises, and determining the resource requirements,

(5) developing and maintaining public information and relations programs,

(6) establishing and maintaining liaison with relevant departments of federal and provincial governments and other groups, public or private, involved in marine SAR and safety,

(7) providing operationally ready marine SAR units for tasking by RCC/MRSC,

(8) developing and maintaining liaison at an operational level with foreign marine SAR related agencies engaged in marine SAR coordination.

TERMS OF REFERENCE - RCCs

12. General - An RCC is an agency established within each SRR for the purpose of coordinating, controlling, and conducting SAR Operations. In addition, RCCs will coordinate SAR resource response to requests for Humanitarian and Civil incidents in accordance with national policy and regional directives. For this it requires:

a. trained staff, capable of controlling, coordinating and conducting operations;

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

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

d. facilities and equipment for centralizing information;

e. communications equipment which will ensure a timely alerting procedure and provide an efficient network of emergency and routine frequencies for monitoring and working SAR traffic; and

f. accommodation and equipment for the efficient coordination and control of operations.

13. The Officer in Charge of the RCC - The OIC RCC shall be responsible to:

a. The SRR Commander for;

(1) the coordination, control and conduct of SAR operations within the RCC's area of responsibility,

(2) ensuring the effective operation of the coordinated SAR system,

(3) the operational status of RCC communications and other equipment and ensuring that appropriate authorities are notified of any deficiencies or breakdowns in the communications network, both internal or external,

(4) advising on the adequacy and deployment of SAR resources to meet operational requirements,

(5) recommending search reduction,

(6) certifying, in collaboration with the RCC RSMS, Senior Controllers, and collaborating with RSMS (RCC/MRSC) on the certification of Marine Controllers,

(7) liaison with the RSMS on the day-to-day operation and deployment of SAR resources and on the participation and performance of the staff in the operation of the RCC/MRSC,

(8) liaison with the RMSR or his delegate on the operations interface between RCCs and MRSCs, and on the deployment of CCG SAR resources,

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

(10) coordination of SAR training exercises which involve more than one agency (when appropriate),

(11) coordinating the RCC input to SAR educational programs, displays and visits within the SRR,

(12) approving all public information releases on Air SAR services and all RCC/MRSC coordinated SAR incidents (see Chapter 4, Press Releases),

(13) providing staff assistance in SAR matters,

(14) the collection of SAR incident statistical information and

DND program management information.

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

b. The Commander AIRCOM, through the Commander ATG for:

(1) supervising 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 (see Note),

(3) preparation of reports returns and records,

(4) reporting the status of CF SAR resources and operations.

NOTE 1: Administrative procedures which affect or concern both DND and CCG should be published under the joint authority of the OIC RCC and the RSMS.

NOTE 2: Deputy OIC RCC

The Deputy OIC RCC shall be a qualified SAR Air Ops officer. His/her duties shall include:

a. act as OIC RCC in his/her absence;

b. fulfilment of duties as Duty Air Controller, when so employed;

c. supervise the preparation of SAR Operation reports; and

d. review all case files, message traffic, RCC logs, etc.

14. The Regional Superintendent Marine Search and Rescue - RCC (for RSMS in MRSC see paragraph 24b) - The RSMS is the senior CCG officer assigned to an RCC to ensure the continuing effectiveness of the marine SAR system within the SRR with the exception of those sectors assigned to a MRSC (see paragraph 24a). RSMS shall be responsible to:

a. the SRR commander through the OIC RCC, for the following:

(1) the coordination, control and conduct of marine SAR operations within the RSMS RCC's area of responsibility,

(2) ensuring the effectiveness of SAR coordination and control duties performed by the CCG component of the RCC,

(3) providing expert advice on marine SAR operations and their coordination for appropriate areas of the SRR,

(4) providing the marine expertise necessary to evaluate the adequacy and deployment of SAR resources to meet marine 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 exercise and deployment of SAR resources and on the participation and performance of staff in the operations of the RCC,

(8) in collaboration with the OIC RCC, ensuring that all relevant SAR statistical data are recorded,

(9) ensuring that all relevant information pertaining to CCG SAR coordination and control activities in the RCC are duly recorded in the official log books and files designated,

(10) during marine SAR operations, prepare in concert with the OIC RCC the recommendation for search reduction.

b. to the RMSR 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 marine SAR units and prosecution of Marine 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 marine SAR units for SAR purposes within the geographical area noted in sub-paragraph a., taking into account the cyclical nature of certain marine 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 marine SAR incident statistical information and program management information,

(6) coordinating the RCC marine SAR input into SAR education programs, displays and visits within the Coast Guard Region, and

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

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.

15. RCC Senior Controller - The Senior Controller is an experienced and qualified Controller appointed by the OIC RCC. Qualifications will include successful completion of RCC Controllers course, Searchmaster course, Fundamental Marine SAR course (or applicable USCG Marine SAR course), and any unit upgrade OJT's which are applicable. Senior Controllers shall be responsible to the OIC RCC for all incidents (except marine, then through RSMS) for the following;

a. assigning of priorities pertaining to the allocation of SAR resources in response to SAR incidents;

b. when deemed necessary designating or assuming control of a particular SAR incident (see NOTE);

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

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

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

f. monitoring incidents handled by the MRSC's and advising the OIC of significant developments.

NOTE: Assuming or designating control of a SAR, Humanitarian Aid, or Civil Assistance incident is to be considered a formal action and is to be completed in conjunction with formal communications procedures (see Chapter 8).

16. RCC Air Controller - The duty Air Controller shall be a qualified SAR pilot or navigator. Qualifications shall include successful completion of RCC Controllers course, Searchmaster course, and applicable unit OJT. The Air Controller is responsible to the OIC RCC through the Senior Controller for the following:

a. planning, coordinating, controlling and directing the response to air SAR incidents;

b. tasking primary SAR air resources and initiating requests for secondary SAR air and other resources, as appropriate;

c. appointing on-scene commander (OSC) and/or coordinator air search (CAS) when appropriate and, where necessary, recommending the appointment of a SM;

d. tasking and coordinating aircraft in support of marine incidents;

e. assisting the Marine Controller or Searchmaster as necessary, particularly in relation to the tasking and employment of air resources in a marine incident;

f. 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

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

17. RCC Marine Controller - The duty Marine Controller shall be a qualified ships' deck or navigation officer. Qualifications shall include successful completion of the RCC Controllers course, Fundamental Marine SAR course and applicable unit OJT. The Marine Controller responsible to the OIC RCC through the Senior Controller and RSMS (RCC) when applicable for the following;

a. planning, coordinating, controlling and directing the response to marine SAR incidents;

b. tasking primary and secondary SAR marine resources and initiating requests for other resources, as required;

c. appointing OSC or coordinator surface search (CSS) when appropriate and, where necessary, recommending the appointment of a SM;

d. tasking and coordinating marine resources in support of air incidents;

e. recommending search reduction;

f. 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

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

18. RCC Assistant Air Controller - The assistant Air Controller shall be responsible to the OIC RCC through the Air Controller for the following:

a. assisting the duty controllers in SAR operations;

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

c. other duties as may be assigned; and

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

TERMS OF REFERENCE - CANADIAN MISSION CONTROL CENTRE (CMCC)

19. General - The Canadian Mission Control Centre (CMCC) is co-located with RCC Trenton and is the focal point for the receipt of Emergency Radio 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:

a. trained staff, capable of controlling, coordinating and conducting operations;

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

c. communications equipment which will ensure a timely alerting procedure to RCCs and foreign MCCs.

20. The Officer in Charge of the CMCC - The OIC CMCC is also the OIC RCC Trenton and shall be responsible to:

a. the ATG Commander for:

(1) ensuring the effective operation of the Canadian SARSAT ground system, including Local User Terminals (LUTS), the CMCC, the related communications interfaces,

(2) advising on policy and operational matters which may effect the Canadian SARSAT ground system,

(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 SAR point of contact (SPOC) for Canada with regard to operational level matters pursuant to the COSPAS/SARSAT system,

(5) provision of trained staff and material supplies to support 24/7 operations,

(6) distributing operational SAR data to Canadian RCCs, provincial SAR points of contact and other MCCs 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 COSPAS/SARSAT Operations Working Group for international meetings,

(9) monitoring the performance of the LUTs and initiating corrective action as required,

(10) identifying problems in the space segment and relaying to appropriate technical authorities,

21. CMCC Operations Officer - The CMCC Operations Officer is an experienced and highly qualified CMCC DUTY Controller appointed by, and responsible to the OIC CMCC for various duties including:

a. the general operations of the CMCC;

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

c. ensuring operational records are properly maintained; and

d. ensuring the timely distribution of distress data to Canadian RCCs, provincial SPOCs and other MCCs in accordance with established national and international procedures.

22. CMCC Duty Controller - The CMCC Duty Controller shall be a qualified SAR Air Ops Officer and shall be appointed by the OIC CMCC after successful completion of the the CMCC Duty Controller course and applicable unit OJT. The CMCC Duty Controller shall be responsible to the OIC CMCC through the CMCC Operations Officer, for the routine operation of the CMCC and for other duties to include:

a. monitoring the health of the LUTs, CMCC communications and satellite tracking schedule and taking corrective actions as applicable; and

b. ensuring operational ERB information is distributed to the RCCs, provincial SPOCs and other MCCs in a timely manner.

23. CMCC Systems Officer - The CMCC Systems Officer is an experienced and qualified CELE AIR officer responsible for the effective functioning of the hardware/software systems associated with the Canadian SARSAT ground segment and shall be responsible to the CMCC for various duties including:

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

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

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

d. coordinating research and development projects for upgrading the

equipment in the CMCC.

TERMS OF REFERENCE - MARINE RESCUE SUB-CENTRE (MRSC)

24. The Regional Superintendent Marine Search and Rescue - MRSC - The RSMS is the senior CCG officer assigned to an MRSC to ensure the continuing effectiveness of the marine SAR system within the sectors assigned to a MRSC. The RSMS shall be responsible to:

a. the SRR Commander through the OIC of the parent RCC for the following:

(1) the coordination, control and conduct of marine SAR operations within the RSMS MRSC's area of responsibility,

(2) ensuring the effectiveness of SAR coordination and control duties performed by MRSC personnel,

(3) providing expert advice on marine SAR operations and their coordination for the appropriate areas of the SRR,

(4) providing the marine expertise necessary to evaluate the adequacy and deployment of SAR resources to meet marine 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) in collaboration with the OIC RCC, ensuring that all relevant SAR statistical data are recorded,

(7) ensuring that all relevant information pertaining to CCG SAR coordination and control activities in the MRSC are duly recorded in official log books and files designated for this purpose,

(8) liaison with the OIC of the parent RCC on the day-to-day operations interface between the MRSC and RCC,

(9) liaison with the OIC of the parent RCC on the day-to-day operation and deployment of CF SAR resources,

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

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

b. the RMSR 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 SAR units and prosecution of marine SAR incidents within the responsibility sector and making recommendations designed to achieve improved effectiveness and efficiency,

(3) making recommendations on the optimum deployment of primary SAR units for marine SAR purposes within the responsibility sector, taking into account the cyclical nature of certain marine 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) coordinating the MRSC marine SAR input into SAR education programs, displays and visits within the Coast Guard Region,

(7) reporting on the general effectiveness of MRSC activities and on purely Coast Guard matters,

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

25. MRSC Marine Controller - The Marine Controller shall be responsible to the OIC RCC through the Senior Controller and RSMS (MRSC) when applicable for the following:

a. planning, coordinating, controlling and directing the response to marine SAR incidents;

b. tasking primary and secondary SAR marine resources and initiating requests for other resources, as required;

c. appointing an OSC/CSS as necessary, and recommending the appointment of a Searchmaster;

d. tasking and coordinating marine resources in support of air incidents;

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

f. 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;

g. recommending search reduction;

h. 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

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

NOTE - Assuming or designating control of a SAR, Humanitarian, or Civil incident is to be considered a formal action and is to be completed in conjunction with formal communications procedures (see Chapter 8, Communications Procedures).

TERMS OF REFERENCE - ALERTING POST

26. General - In Canada, St. John's MRSC has been designated as an Alerting Post (AP) for marine SAR reports originating seaward of the MRSC responsibility sector adjacent the Newfoundland and Labrador coasts.

27. As an AP, the MRSC responsibility is to receive initial SAR incident reports and forward them verbatim with comments or additional information to the parent RCC for action. This procedure:

a. eliminates the need of CCG radio stations determining the relative location of an incident in relation to MRSC responsibility sector boundaries, which would otherwise be required to facilitate determining the address for SAR alerts, i.e. RCC or MRSC;

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

c. simplifies SAR reporting procedures for Newfoundland and Labrador CCG radio stations, which will normally report all initial SAR alerts to the MRSC only; and

d. allows the St. John's MRSC to be aware of SAR demands and activity in the SRR waters adjacent to the MRSC responsibility sector boundaries.

TERMS OF REFERENCE - Searchmaster(SM)/SAR MISSION COORDINATOR(SMC)

27. In the Canadian context, the responsibilities of a SM are the same as those established for a SMC under ICAO and IMO.

28. Terms of Reference - SM/SMC - When considered necessary, a qualified SM/SMC shall be formally appointed by and be responsible to the SRR commander through the OIC RCC for the efficient conduct of a specific SAR operation. (This may include air or marine controllers). Qualifications shall include successful completion of the Searchmaster Course and satisfactory performance in the position of assistant Searchmaster during an actual search or squadron SAREX, upon being recommended by a Searchmaster and concurrence of unit CO, an assistant Searchmaster maybe upgrade to Searchmaster status. The requirement to perform as an Assistant Searchmaster does not apply to Marine Controllers appointed to act as Searchmaster within an RCC for a marine case.

29. The SM/SMC is responsible for:

a. the planning, coordination, control and conduct of SAR operations;

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

c. tasking primary SAR Air and/or Marine resources and requesting secondary and/or other resources as necessary;

d. coordinating with meteorological services as required at the advanced base in support of the search;

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

f. 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;

g. when search object is found, that appropriate authorities are advised; and

h. or if the search object is not found, through the OIC RCC to the SRR Commander.

30. Terms of Reference - Assistant Searchmaster - On operations requiring the appointment of a SM, one or more qualified assistant Searchmasters may also be appointed. They shall assist in the conduct of the search operation, as directed by the SM. Normally a Marine Controller should be included as one of the assistant Searchmasters during an air search where a portion of the aircraft's route occurs over water and normally an Air Controller/qualified aircrew should be included as one of the assistant Searchmasters on any marine search that involves aircraft.

TERMS OF REFERENCE - ON-SCENE COMMANDER/COORDINATOR SURFACE SEARCH

31. The resolution of a SAR incident (air or marine) commences with the

receipt of the initial alert and continues with the effective coordination of SAR resource activity. The RCC/MRSC may designate an OSC or CSS to accomplish greater effectiveness in coordination.

32. Whenever there is more than one SAR resource (primary or secondary) engaged in an operation, one resource should be designated to coordinate the operation at the scene. The resources engaged may be either air resources or marine resources or a combination of both. Since the crews of SAR resources will be experienced and trained in SAR operations, one of these will normally be designated as OSC. If primary SAR resources, either vessels or aircraft, are not available and only secondary marine resources are engaged, then one of these should assume the duty of CSS.

33. Whenever more than one aircraft is engaged in a search where a vessel is OSC/CSS, then one of these aircraft should be designated to coordinate the air portion of the search as directed by SM/RCC and maintain communication/liaison as the primary point of contact between the OSC/CSS, RCC and the aircraft on scene. The designated aircraft coordinate aircraft hourly checkins, 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 coordinating OSC/CSS and RCC requests for aircraft support within the search area.

34. It will be the responsibility of the OSC or CSS to:

a. carry out the plan for the conduct of the operation as directed by the SM/RCC/MRSC;

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

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

d. maintain communications with the SM/RCC/MRSC and the resources on scene;

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

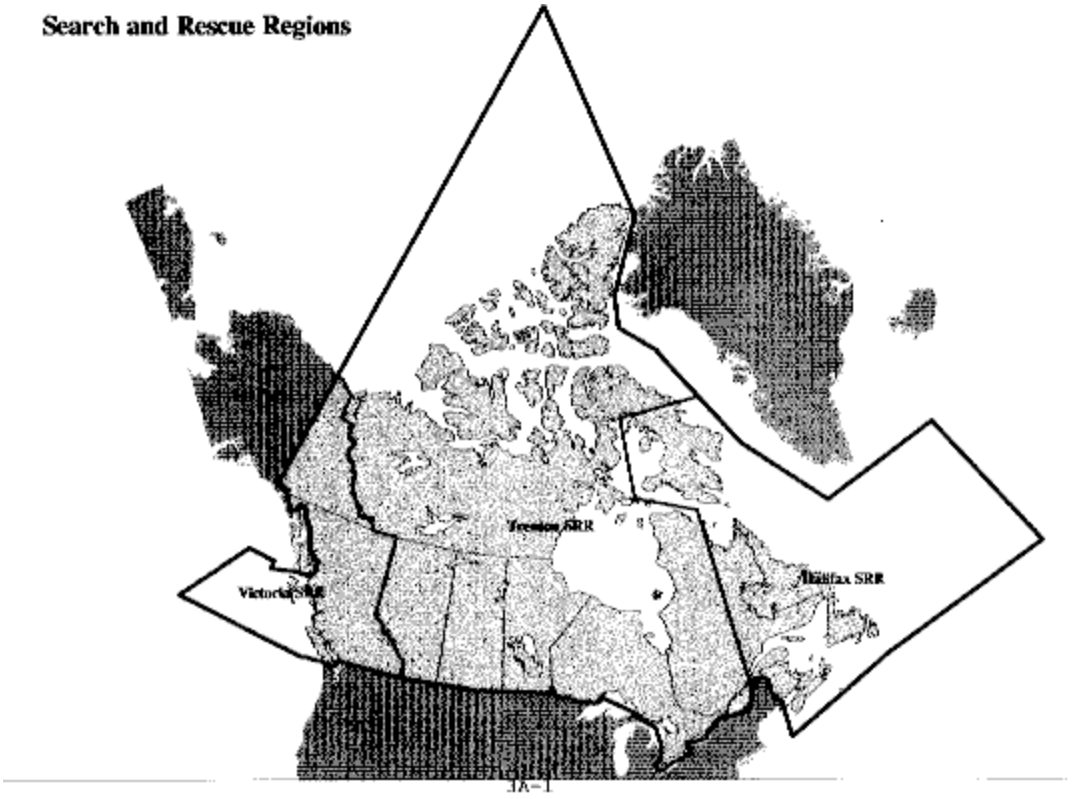
f. issue regular situation reports to the SM/RCC/MRSC which should include, but not be limited to,weather and sea conditions,the results of search to date, any actions taken, and any future plans or recommendations; and

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

TERMS OF REFERENCE - DETACHMENT COMMANDER

35. The detachment commander is normally a senior officer assigned from the Primary Unit tasked. Furthermore, the detachment commander is responsible to the searchmaster for all administrative and disciplinary matters. The detachment commander's duties are amplified in CFACM 60-2605(2)

ANNEX 3A -- SRR BOUNDARIES



VICTORIA SRR

5442.5N 13036.5W, along the Alaska/Canada border to 6939N 14100W, east along the shoreline to the Yukon/North West Territory border, south along the Yukon/North West Territory border to 6000N, east along 6000N 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 4830N 12445W, 4830N 12500W, 4820N 12800W, 4820N 14500W, 5440N 14000W, 5440N 13600W, 5400N 13600W, 5413N 13457W, 5439.45N 13241W, 5442.5N 13036.5W.

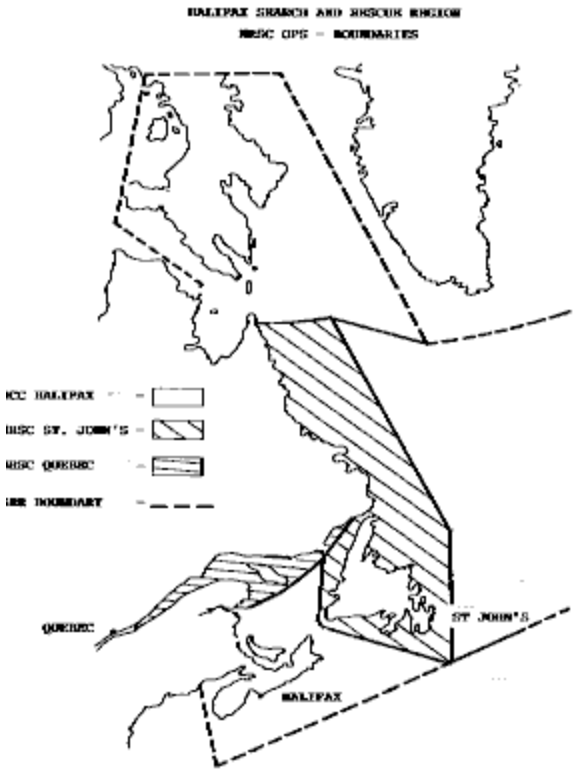
TRENTON SRR

7000N 8000W, 6400N 8000W, 6200N 7000W, 4642N 7000W, westerly along the Canada/United States border to the Alberta/British Columbia border, north along the Alberta/British Columbia border to 6000N 12000W, westerly to 6000N 12400W, north along the Yukon/North West Territory border to the Beaufort Sea, westerly along the coast to the Canada/Alaska border, north along 14100W to the North Pole, south to 8200N 6000W, 7800N 7500W, 7600N 7600W, 7400N 6818W, 7300N 6700W, 7000N 6300W, west to 7000N 8000W.

HALIFAX SRR

6400N 8000W, 7000N 8000W, 7000N 6300W, 6530N 5839W, 5830N 5000W, 5830N 3000W, 4500N 3000W, 4500N 5300W, 4336N 6000W, 4152N 6700W, north to the Canada/United States border, westerly along the Canada/United States border to the 70th meridian, north along the 70th meridian to 6200N 7000W, north west to 6400N 8000W

ANNEX 3B -- HALIFAX SEARCH AND RESCUE REGION MRSC - OPS - BOUNDARIES



ANNEX 3C -- RCC/MRSC SAR STANDARD OPERATING PROCEDURES (SOPs)

1. Each RCC is responsible for preparing a comprehensive document detailing the SOPs for the conduct of SAR in its SRR. The SOPs must be based on agreements between the SRR and the providers of any facilities. Local amplification of national policy and procedures must be included where necessary. MRSC must also have SOPs for the conduct of operations in their area, approved by RCC(s).

2. The SOPs must set out the details for the conduct of SAR 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 SOPs must be brought up to date whenever a change in conditions or experience in actual operations and exercises makes this necessary or advisable.

4. The SOPs should be published regionally and the information therein should be made available to any interested parties.

5. The detailed SOPs should include the information shown in the following paragraphs.

6. General information as follows:

a. the manner in which SAR operations should be conducted in the SRR;

b. conduct of joint operations with adjacent RCCs/MRSCs, including:

(1) notification of emergencies between RCCs,

(2) joint use of facilities, resources,

(3) coordination of SAR operations,

c. any special provisions for redeployment of equipment, 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 air and marine), etc;

d. methods of alerting mobile resources (eg, vessels at sea, aircraft, ground search parties), including broadcast information;

e. methods of obtaining ship and aircraft position information from various sources;

f. procedures for assisting aircraft which must ditch and arrange

rendez-vous with suitable and available surface craft;

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

h. details of agreements of mutual assistance with various other organizations and agencies, such as:

(1) local, provincial and RCM Police,

(2) local, provincial emergency planning departments,

(3) VTS, ECAREG, NORDREG,

(4) CGRS,

(5) CASARA, CMRA, PEP,

(6) crash/casualty investigations,

(7) private industry aircraft and vessel operations,

(8) organizations involved in operations peculiar to the SRR (eg, oil and gas, sealing, Herring Roe, aquaculture),

(9) medical facilities,

(10) other federal government departments and agencies,

j. methods of coordinating the action of the various resources

k. a summary of legal aspects of SAR missions, eg:

(1) entering private property,

(2) removing human remains,

(3) guarding and marking wreckage,

(4) liability of SAR personnel engaged in authorized missions,

m. procedures for assisting disoriented vessels.

7. Personnel - The responsibilities, duties, authority and limitations of personnel assigned to SAR operations and involved in the SRR command structure (ie, CCG, CF, DFO).

8. Resources:

a. description of the functions to be performed and procedures to be followed by the resources, including but not limited to:

(1) CMRA,

(2) CASARA,

(3) primary SAR resources

(4) secondary SAR resources

(5) alerting posts

(6) MRSCs,

(7) IRBs,

(8) other services likely to be useful,

b. arrangement for servicing and refuelling aircraft, vessels and vehicles engaged in SAR operations, including arrangements made for operations from planned redeployment bases or ports and other countries;

c. lists, including address and telephone numbers of official contacts for requesting use of Secondary SAR resources;

d. list of all available resources that have the potential of being employed in SAR, and their priority of use; and

e. list of all other services and facilities of use, including names, addresses and telephone numbers of contacts.

9. Communications - Organization of communications likely to be employed in SAR.

10. Information:

a. methods of obtaining essential information, eg:

(1) past/present/forecast weather data,

(2) distressed craft movement data,

(3) notices to mariners,

(4) notices to airmen,

(5) navigational warnings,

b. a record and, if possible, photographs of all unmoved aircraft, wrecks or objects within the SRR which could be mistaken for wreckage, particularly when viewed from above.

11. Training and Discussion:

a. establishment of training program for all personnel directly involved in SAR in the region;

b. minimum SAR standards for all personnel;

c. arrangements for SAR personnel liaison/familiarization visits to other SAR authorities and agencies;

d. details of the scheduling of routine SAR exercises, both actual and paper exercises, with all SAR facilities; and

e. arrangements for handling periodic discussions between SAR personnel and other interested parties on such subjects as:

(1) SAR system efficiency,

(2) SAR incident critiques,

(3) SAR facilities improvement,

(4) emergency and survival equipment and techniques used by aircraft and vessels.

NOTE: Records of these discussions should be kept in the RCC and copies forwarded to both NDHQ and CGHQ.

12. The above lists are by no means exclusive and any additional information, practices and procedures that it is felt would improve the conduct of SAR operations within the SRR should be included by the RCC/MRSC.

CHAPTER 4 -- POLICY AND OPERATIONAL DIRECTIVES

GENERAL

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 SAR operations may be found within departmental publications.

RESOURCES

2. As per chapter 1, DND and CCG are required to provide primary SAR resources.

3. In addition to primary SAR resources, CCG provides CCG units multi-tasked to the SAR Program. These units are subject to the same standards of operation and procedures that apply to primary CCG SAR units including state of readiness and pre-positioning deployment in anticipation of SAR related demand.

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

a. the primary SAR resources of neighbouring SRRs which may be available and are requested through the appropriate RCC/MRSC;

b. DND secondary SAR resources which may be tasked through AIRCOM/ACOC OR NDHQ/NDOC;

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

d. other federal government departments - SRR commanders shall ensure that procedures exist so that suitable resources and the methods for tasking them are readily available to RCC/MRSC controllers;

e. marine or air resources which may be tasked under the Canada Shipping Act by the RCC controller, acting for the SRR commander; and

f. RCCs\MRSCs may charter required resources if no other method of tasking is available (refer to paragraphs 28 through 32). Any MRSC arranged charter which will be coasted against the RCC's accounting base must be approved by the Senior Controller.

RESCUE COORDINATION CENTRES

5. DND provides RCCs manned by both DND and CCG personnel on a 24 hours a day/7 days a week basis. In addition, CCG provides two MRSCs manned by CCG

personnel on a 24/7 basis. The RCCs and MRSCs will respond to all incidents until such time the incident is resolved or until the incident can be passed to the appropriate authority.

STATE OF READINESS FOR SAR RESOURCES - AIR

6. The standby requirements for primary air SAR resources are shown in Annex 4A.

7. When the standby 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 unit until the aricraft returns to home base. However, should another incident occur which requires the urgent deployment of additional SAR resources, the commanding officer of the unit concerned shall make every effort to provide the necessary aircraft and crews. Approval from SRR Commander must be obtained for any other planned degradation of the minimum state of readiness.

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 total of 40 hours per week.

STATE OF READINESS FOR SAR RESOURCES - MARINE

9. State of readiness for SAR resources - Marine:

a. primary SAR Resources and CCG Units Multi-Tasked to the SAR Program -CCG primary SAR units and CCG units multi-tasked to the SAR Program, when fully operational, shall be capable of responding to SAR tasking immediately or shall otherwise maintain a 30 minute standby posture;

b. other SAR Multi-Tasked Resources - Multi-tasked and chartered vessels shall be on similar standby unless specified otherwise in their charter-party/multi-tasking agreements; and

c. the Commanding Officer of the SAR unit referred to in a. and b. above shall inform the appropriate RCC/MRSC 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 SAR unit may continue SAR activities upon initial approval by the RMSR. 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 DCGR.

SECONDARY SAR RESOURCES

10. Secondary SAR resources are all resources of the Federal government that are not specifically dedicated to SAR but which may be tasked to aid

in the resolution of a SAR incident. When advised of the proposed mission, the resource commander shall only accept the mission if, in the commander`s judgement, the resource's equipment and crew capability will permit completion of the task with safety.

11. Secondary SAR resources 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 commander of the resource.

AVAILABILITY OF CCG HELICOPTERS FOR SAR

12. CCG helicopters are a secondary SAR resource. When conditions indicate that the assistance of a CCG helicopter would be desirable, the request for this assistance may be made directly to the aircraft commander. As per paragraph 10, the responsibility for accepting the tasking is the aircraft commander`s. The aircraft commander or the requesting SAR official shall, as soon as possible, take steps to report through regular CCG channels the action being taken and the circumstances which made a direct approach necessary.

CF SEARCH AND RESCUE TECHNICIANS

13. The employment of SAR technicians (SAR TECHs) in SAR and non-SAR operations is to save lives and reduce human suffering. This is accomplished by:

a. penetration of the site to assess the situation;

b. initiating and maintaining medical treatment;

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

d. evacuating survivors.

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

14. The method of distress site penetration rests with the aircraft commander and SAR Tech Team leader and may be achieved by one of the following:

a. parachute;

b. hoist;

c. Compressed Air Breathing Apparatus (CABA);

d. Lock Rope Descent device;

e. free entry;

f. over land; or

g. over water.

15. Operational deployment of the SAR Tech team for SAR or Non-SAR incidents shall normally be preceded by authorization from the Search Master or the RCC to ensure that it is the most effective method of resolving the situation.

16. With regard to safety it will always be the SAR TECH team leader who will make the final decision, and the team shall not be deployed without his complete concurrence.

17. Procedures pertaining to operational deployment of SAR Techs are detailed in Air Command publication 2605.

CF GROUND SEARCH PARTIES

18. Ground search parties are a primary SAR resource located on several CF bases or stations in each SRR. 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 CF ground search parties are shown in Annex 4B.

19. The organization of ground search parties is the responsibility of the base or station commander of the unit. They are responsible to the regional RCC through the normal chain of command and during operational functions, are at the disposal of the RCC or SM. 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 DND ground search parties are tasked by other agencies they shall obtain approval from the parent RCC.

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

NOTE: Civilian ground search teams may be available through the R.C.M.P provincial police, on PEP.

SEARCH AND RESCUE SATELLITE AIDED TRACKING (COSPAS/SARSAT)

21. Canada participates in the COSPAS\SARSAT system which employs satellites to detect and locate emergency radio signals on 406 MHz and 243 Mhz and 121.5 Mhz. The satellites receive the distress signals and relay the information to Local User Terminals (LUTs) located at Edmonton, Churchill and Goose Bay. The signal data is then automatically sent to the Canadian Mission Control Centre (CMCC), at CFB Trenton, where computer analysis is used to determine the approximate location of the emitted signal. The RCC closest to the scene receives the information and

dispatches SAR resources as required.

EMERGENCY RADIO SIGNALS (ELT\EPIRB\PLB)

22. The response to Emergency Locator Transmitter (ELT) and Emergency Position Indicating Radio Beacon (EPIRB) signals falls within the DND/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 CMCC will disseminate PLB data to a provincial/territorial SAR point of contact (SPOC) for resolution. Transport Canada (CG) maintains a registry for EPIRBs and NSS maintains a registry for PLBs.

USE OF CIVILIAN ASSOCIATIONS

23. When tasking a civilian association the RCC/MRSC 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.

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

25. The Civil Air Search and Rescue Association (CASARA) - The CF assists in the training of CASARA volunteers and the operational evaluation of certified members on a regular basis. CASARA members may be tasked for ELT homing missions, as spotters on military flights, or the provision of fully manned civilian search aircraft as considered appropriate by the RCC/SM. Under the CASARA agreement, TC remains responsible for training sessions relating to safe flying practices.

NOTE: CASARA invoices, as shown in Annex 4E, shall be certified and paid by the SM/SM staff at search headquarters prior to CASARA members leave the search. Other invoices shall be certified by the RCC and submitted to the accounting Base of 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

26. Other Volunteers - When civilian aircraft, vehicle, or marine vessel operators volunteer to assist in a search, but their assistance is considered not essential to the search, the SM or RCC/MRSC 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 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.

27. Spotters - In most cases, trained CASARA or CF spotters shall be used when required. When trained spotters are unavailable, other civilians may be used when it is 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 SM 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

28. When the SM or the RCC/MRSC considers that the assistance of civilian services is required, resources may be employed, at pay/charter rates, on the authority of the SRR 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 SAR distress operation.

29. Before recommending the hiring of civilian personnel services, the SM or RCC/MRSC shall determine that the rates quoted are fair and reasonable and include charges for all services rendered.

30. Invoices charged against the CF, shall be certified by the SM or RCC/MRSC in accordance with paragraph 29 and submitted to the accounting base of the RCC for certification and payment action.

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

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

TASKING OF SAR RESOURCES ON NON-SAR INCIDENTS

33. SAR controllers do not have the authority to task SAR resources for non-SAR incidents.

34. Requests made to the SAR controller for tasking of primary SAR units to other than SAR functions shall be referred to the appropriate authority within DND or CCG as appropriate. Normally, formal tasking approval of DND resources for Non SAR incidents shall be in accordance with the procedures outlined in B-GS-055-OOO\AG001 'Provision of Services to Non Defence Agencies`. Tasking of Coast Guard resources in this instance shall be in accordance with Regional procedures.

SALVAGE OF CIVILIAN PROPERTY

35. SAR resources 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.

36. Salvage operations will not be performed if they jeopardize operations, disrupt training, or unduly hazard SAR personnel or equipment.

37. When a request is made to use CF SAR aircraft for the salvage of civilian aircraft, full details of the commitment will be obtained and its feasibility assessed by the Command Headquarters (CHQ) of the SRR concerned. If the salvage is considered operationally feasible, the requesting agency will be required to obtain Canadian Transport Commission Secretariat approval as per CFAO 20-19 prior to submitting the request to NDHQ through the appropriate CHQ for approval.

38. SAR Units shall comply with POLICY FOR PROVISION OF TOWING ASSISTANCE BY VESSELS ENGAGED IN SEARCH AND RESCUE OPERATIONS, excerpts of which are included in (Chapter 7 and also in Annex 7A).

39. When a request is made to use CCG SAR resources for marine salvage, full details of the commitment shall be obtained. Based on this the RMSR in consultation with RCC/MRSC will decide whether to undertake the mission.

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

CLASSIFICATION OF SEARCH AND RESCUE INCIDENTS

41. For the purpose of reporting and statistical data search and rescue 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.

42. 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 RCCs/MRSCs use the same guidelines for reporting.

HUMANITARIAN AND LAND MISSIONS

43. DND and CCG SAR resources may be tasked for Humanitarian and Land incidents when properly requested and approved by the OIC/RCC or RMSR as appropriate, and when not employed in a SAR case. Procedures pertaining to such tasking are detailed in Chapter 5.

MISSING DIVERS/SWIMMERS

44. 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 a civil incident. Provincial and/or local authorities are to be advised by the RCC/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, until civil control is assumed.

NOTIFICATION OF NEXT-OF-KIN

45. An RCC/MRSC or SM must ensure that the immediate next-of-kin (NOK) of persons involved in a SAR incident have been notified prior to the release of names to the press. Notification of NOK shall be accomplished as follows:

a. for CF personnel, the RCC shall notify the CO of the casualties' parent unit who shall take the action in accordance with CFAO 24-1;

b. for CCG personnel, contact RMSR;

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

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

e. 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

f. in instances where foreign nationals are involved, the RCC shall inform NDOC to advise the appropriate embassy if required.

PRESS RELEASES

46. Whenever possible all public information releases to the news media concerning SAR operations should be made through DND Public Affairs (PA). Unless otherwise directed by the SRR Commander, releases will be authorized by the OIC/RCC or his representative.

47. Unit Commanders, vessel/aircraft captains, or other CCG/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, SM, or designated PA. If such clearance is obtained, Annex 4D should be consulted for guidance as to content of

press/media releases.

48. RSMS-RCC may develop press releases for marine incidents. However, approval of the OIC/RCC must be obtained prior to actual release of the information.

49. RSMS-MRSC may develop press releases for incidents which are solely controlled by MRSCs; 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 CF directives.

ACCESS TO INFORMATION\PRIVACY ACT LEGISLATION

50. All records, logs and reports created during the resolution of an incident are accessible to the public. DND/CCG have departmental procedures in place to allow the public to access this information. If the information request is of a straight forward nature (i.e. factual) and does not impinge on the privacy of other individuals then the OIC RCC may authorize the release of that information. If the information impinges on the privacy of other individuals or is controversial in nature then the party requesting the information should be referred to the proper departmental access to information section. Requests for classified material and requests from non Canadian persons or agencies will be referred to the departmental access to information section.

51. To expedite investigations held by Coroner Board's of Inquiry, Transportation Safety Board of Canada (CTAISB) 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, MOT, or CTAISB personnel unless ordered by NDHQ or a court of law.

SEARCH FOR SURVIVORS

52. The Canadian 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 RCC/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 SRR commander concerned is to retain his responsibility to conduct search operations, but cooperation by RCMP, provincial police, or other appropriate agencies should be sought if required.

53. Reduction\re-opening of searches is covered in chapter 5.

MAJOR AIR AND MARINE DISASTERS

54. DND is responsible for preparing the response to a major air disaster (MAJAID) within Canada`s area of responsibility. The specific details of the response are found in Air Command Operations Plan (ACOP) 210. The general scope of the plan is outlined in Annex 6A.

55. The response to a major marine disaster shall be in accordance with contingency plans published by each SRR commander. These plans are to be developed in accordance with Chapter 7, Annex 7 F, Major Marine Disaster SAR Contingency Plan.

MILITARY SUBMARINE/SUBMERSIBLE SAR OPERATIONS

56. The overall responsibility for SAR in the event of a lost Canadian submarine remains with the SRR commander. The formulation of plans and the control of SAR operations in a Submiss-Subsunk operation is the function of the Commander Maritime Command. In the event of a lost USN submarine, the responsibility for overall coordination of SAR activities rests with the "USN Submarine Operating Authority".

57. Detailed instructions covering submarine disaster SAR operations are contained in NATO ATP 1O(C) and operational orders issued by the Commander Maritime Command and the Commander Maritime Forces Pacific.

NUCLEAR EMERGENCY RESPONSE

58. RCCs will action nuclear emergency responses in accordance with the instructions contained in B-GS-138-001\FP-001 CF Nuclear Emergency Response directives.

59. 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

60. When a RCC/MRSC is notified by any source of an actual or suspected unlawful interference with an aircraft, they shall immediately notify NDOC, NORAD, ACOC, ATOC, ATC, and the other RCCs. The RCC within whose boundaries the incident exists shall declare an alert phase as detailed in Chapter 6 or Chapter 7. The RCC shall maintain communications with the alerting agency and NDOC and provide the latter with expert advice and recommendations pertaining to the SAR response.

61. RCC Trenton, as appropriate, shall prepare the appropriate SAR standby CC130 (Winnipeg or Trenton) with standard 40 person equipment kit for response to the incident regardless of SRR boundaries but within Canada`s ICAO area of responsibility. Response to MAJAID as detailed at Chapter 6, Annex A shall be limited to contingency planning until declaration of

MAJAID on the authority of the Commander of Air Command.

62. The decision to launch SAR resources during the alert phase will be on the authority of NDOC in consultation with the RCC. RCCs shall initiate SAR action, as detailed in Chapter 6, when the incident progresses to the distress phase.

63. When a RCC/MRSC is notified by any source of an actual or suspected unlawful interference with a vessel they shall immediately notify the RSMS/RMSR.

HOAXES

64. Hoaxes and UNSARs are a serious drain on SAR resources and shall be reported to local authorities. Any successful prosecution of a person, or persons, charged with illegally alerting the SAR System should receive the widest possible circulation within the applicable region by the appropriate RCC and/or DND PA.

METEOROLOGY

65. The provision of meteorological support to SAR operations is the responsibility of the Canadian Forces Weather Service (CFWS).

ROYAL VOYAGES/SEA PASSAGES

66. General - Special SAR coverage shall be provided for Royal voyages/sea passages within the Canadian areas of SAR responsibility.

67. Definition of Royal Voyage - A Royal voyage is the movement of an aircraft/vessel carrying one or more of the immediate members of the Royal Family.

68. Category of Royal Voyages - For SAR purposes, Royal voyages have been categorized as follows:

a. Category A - Flights over the more highly populated regions of Canada, and flights which involve a short sea crossing or passages within inland waters or sea routing lanes; and

b. Category B - Long flights over or voyages along the coastline of sparsely populated regions or territories where SAR facilities are limited, and transoceanic flights or sea passages;

69. Special SAR Precautions for Voyages by HM the Queen - For voyages by HM the Queen, the following will apply:

a. for voyages under Category A, all SRR commanders whose SRRs of responsibility are affected by the voyage will alert and bring to a state of immediate readiness, for the appropriate period, all facilities likely to be called on in the event of an incident

occurring. The repositioning of SAR units and/or provision of airborne SAR cover will not normally be required on such occasions; and

b. for voyages under Category B, all SRR commanders whose SRRs of responsibility are to be penetrated by the flight will arrange for the positioning of SAR units at selected places en route and/or the provision of SAR cover, as considered necessary, in light of the route being used and the SAR facilities normally available. The commanders mentioned above will also be responsible for alerting and bringing to a state of immediate readiness, for the appropriate period, all other rescue facilities likely to be called on in the event of an incident.

70. SAR Precautions for Voyages by Other Members of the Royal Family - For voyages by other members of the Royal Family, SRR commanders concerned will be informed by NDHQ if any special SAR arrangements are necessary.

71. Information on forthcoming Royal voyages will be provided by message from NDHQ which will indicate the SAR coverage to be provided, making use of the terminology defined. Any special amplifying instructions will also be included in the message.

GOVERNOR GENERAL (HEGG)\PRIME MINISTER (PM)

72. For HEGG and PM flights the appropriate SAR authorities shall be notified by NDOC and the following posture shall be maintained:

a. Domestic and Oceanic - normal standby posture (30 minutes during working hours and other times 2 hours); and

b. North of 60 degrees north - Winnipeg CC130 to maintain 30 min standby while the VIP aircraft is airborne and north of 60 degrees north.

AIRBORNE ESCORT SERVICE (DUCKBUTT)

73. The Canadian Forces have periodic requirements for SAR aircraft to orbit certain positions or fly along specified routes in support of military operations. The procedures established for the provision of this service are contained in appropriate CF AIRCOM directives.

LEGAL RESPONSIBILITIES

74. RCC/MRSC personnel and other servants of the Crown employed on duly authorized SAR operations, may be held liable as a result of performing their duties. In such cases, the Crown would also be held liable.

75. Where action is taken against the Crown, or against the employee and the Crown, the Department of Justice must conduct the defense at the expense of the government. This includes a lawyer chosen by the employee if

he so wishes.

76. If judgement is awarded against the employee, it will be paid out of public funds, except when the employee has been judged guilty of gross negligence or willful misconduct.

77. If an employee is summoned to give evidence at a Coroner's Inquest, Court of Inquiry or other legal tribunal engaged in the investigation of a SAR related misadventure, he should arrange through his immediate supervisor for legal representation and advice.

78. Where CCG personnel are subpoenaed to testify during formal SAR investigations, in recognition of the CF overall responsibility in SAR coordination, a CF 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.

79. In the case of investigations into incidents having marine implications, the appropriate CCG SAR expert shall also be in attendance to give advice.

ANNEX 4A -- STATE OF READINESS FOR PRIMARY SAR AIRCRAFT

1. The minimum state of readiness (standby), unless otherwise directed by NDHQ, shall be for one aircraft of each type as follows:

413 Squadron Greenwood Nova Scotia

HERCULES AIRCRAFT 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS
LABRADOR HELICOPTER 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS

103 Rescue Unit Gander Newfoundland

LABRADOR HELICOPTER 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS

424 Squadron Trenton Ontario

HERCULES AIRCRAFT 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS
LABRADOR HELICOPTER 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS

435 Squadron Winnipeg Manitoba

HERCULES AIRCRAFT 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS

442 Squadron Comox British Columbia

BUFFALO AIRCRAFT 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS
LABRADOR HELICOPTER 30 MINUTES WORK HOURS, 2 HOURS QUIET HOURS

NOTE - Work hours are as defined by the SRR commander in accordance with Chapter 4 paragraph 8.

2. The SRR Commander has operational control of primary SAR standby aircraft and is the approving authority for states of reading. Primary SAR aircraft not on standby are available for Air Transport Group tasking 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.

CF PRIMARY SAR RESOURCES

103 RU Gander	- 2 CH113 Labrador helicopters
413 Sqn Greenwood	- 1 CC130 Hercules aircraft
	- 3 CH113 Labrador helicopters
424 Sqn Trenton	- 1 CC130 Hercules aircraft
	- 3 CH113 Labrador helicopters
435 Sqn Winnipeg	- 1 CC130 Hercules aircraft
442 Sqn Comox	- 4 CC115 Buffalo aircraft
	- 4 CH113 Labrador aircraft

ANNEX 4B -- CANADIAN FORCES GROUND SEARCH PARTIES LOCATIONS

Location	Personnel Min/Max
CFB Bagotville Quebec	10 - 30
CFB Cold Lake Alberta	10 - 30
CFB Gander Newfoundland	10 - 20
CFB Goose Bay Labrador	10 - 20
CFS Masset British Columbia	10 - 20
CFB North Bay Ontario	10 - 25
CFB Winnipeg Manitoba	10 - 30
NRHQ Yellowknife	10 - 15
CFB Moosejaw Saskatchewan	10 - 30

ANNEX 4C -- CLASSIFICATION OF SEARCH AND RESCUE INCIDENTS

CATEGORY	DEFINITION	AIR	MARINE	HUMANITARIAN	CIVIL	UNKNOWN	LAND
1	DISTRESS	A-1	M-1	H-1	C-1	N/A	L-1
2	POTENTIAL DISTRESS	A-2	M-2	H-2	C-2	N/A	L-2
3	NO DANGER	A-3	M-3	H-3	C-3	N/A	L-3
4	FALSE ALARMS/ HOAX	A-4	M-4	H-4	C-4	U-4	L-4

DEFINITIONS:

Category 1 - All incidents involving distress wherein there is reasonable certainty that one or more individuals are threatened by grave and imminent danger and require immediate assistance.

Category 2- All incidents not included in category 1 where the potential exists of a threat to individuals of grave and imminent danger if timely action is not taken.

Category 3- All incidents where there was no distress and no perceived appreciable risk to life.

Category 4 - All false alarms and suspected hoaxes.

Sub-category P (Previously unreported) To be used whenever a RCC/MRSC receives information about a previously unknown distress incident that has been resolved but would have required a response had the SAR System have alerted at the time of the incident. Applicable only to Category 1 Air or space Marine incidents. Examples A-1P, M-1P.

ANNEX 4D -- RELEASE OF INFORMATION TO THE PUBLIC

1. In conducting SAR operations, occasions arise when CCG and DND personnel are subjected to requests for information from the media/public. This is especially true when a SAR unit (aircraft, vessel, or other headquarters) is geographically distant from the RCC or SM headquarters. In these instances it may be more prudent to respond rather than give the impression of being unaware or unresponsive. Once clearance is obtained from the RCC, SM, or designated PA the facts given in an interview should be limited to the following:

a. number of resources 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's vessel;

e. weather conditions;

f. search units capabilities; and

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

2. Personal opinions on the conduct of a particular SAR operation or on departmental policy should not be offered. Questions regarding topics other than those in paragraph 1 above shall be referred to the SM or RCC/PA.

ANNEX 6E -- 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, B22-096, B13-040, 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 SAR 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 men in a straight line evenly spaced apart. The distance between men will vary depending on the terrain and the object of the search. Each man must be able to see everything between himself and the men on each side. The men 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 of 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 men.

6. The party must proceed slowly and all members must maintain their correct spacing. Each man should maintain his distance from the man on his directing flank and also try to remain in line. Continuous contact is essential. It is a common fault for most personnel 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 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 5717 KHz or at least one of the "scenes of action frequencies" listed in Chapter 7;

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 SM or RCC 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 some one 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 SM or RCC.

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 RCC, SM, or the police, and a receipt obtained.

18. When stretcher cases are to be transported any distance overland, a minimum of six men shall be provided for each stretcher case. When available, an additional six men 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 marine craft or raft.

COOPERATION 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 SAR operation, including comments on equipment and recommendations for the approval of techniques, shall be submitted by the ground search party leader to the RCC or SM for inclusion in the search operation final report.

ANNEX 4F -- CASARA EXPENSE CLAIM

ANNEX 4F

CLAIM # _____ **CASARA EXPENSE 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 PP_____ 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 I 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

GENERAL

JURISDICTION OF RCC/MRSC

1. Any RCC/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 air or marine incident the appropriate authority shall be advised as soon as possible. If the emergency has arisen as a result of an air or marine 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 INITIATING SAR ACTION

2. Any RCC/MRSC which is notified of the existence of a 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.

3. Unless otherwise decided by common agreement of those concerned, the RCC/MRSC responsible shall be the one in whose area:

a. the distress object was according to its last known position (LKP); or

b. the distress object was proceeding if the last known position was on the boundary of two SRRs;

SEARCH PLANNING

GENERAL

4. The information contained in this chapter is based on accepted ICAO/IMO procedures. In addition, specific Canadian search procedures such as the Canadian Search Area Definition (CSAD) and Mountain VFR (MVFR) 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 (CANSARP) is approved for use by SAR officials.

SEARCH PLANNING SEQUENCE

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

a. estimating the datum - determining the position of the emergency and in marine cases determining the effect of wind and current on the survivors;

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

c. selecting appropriate search patterns - considering size of area, type of terrain and capabilities of search units;

d. determining the desired area coverage - considering factors affecting the probability of detection, track spacing and number of sweeps; and

e. developing an optimum and attainable search plan - considering the number of search units available and other limiting factors and circumstances.

6. The search planning sequence may be carried out completely by the RCC/MRSC controller or may be initiated by the controller and continued by the 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 and 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. OSC also have search planning responsibilities (Chapter 3).

SEARCH PLANNING METHODS

7. The degree of search planning can range from the simple tasking of a SAR unit on an ELT search to the complicated coordination of a week-long search using many air and/or marine resources. The planning can be carried out manually or by one of the several computer programs available. The search planner may have to deal with both methods in either the marine or inland environment.

8. The manual methods include the MINIMAX computation for marine search areas (Chapter 7), primarily from the US National SAR Manual, and the Canadian developed CSAD or MVFR methods (Chapter 6) for air searches. Each method is thoroughly discussed at the indicated section of this manual.

9. Each RCC and MRSC has the Canadian SAR Planning Program CANSARP for

calculating drift plots and conducting search planning and effort allocation. In all marine searches CANSARP should be used as the primary means for search planning.

10. A computerized search planning program is also available through USCG RCCs in New York and Seattle. This computer-assisted search planning system (CASP) uses simulation methods and is most efficient in cases where information concerning the incident position is vague. For Canadian users, access to the CASP system is achieved by having RCC contact the appropriate USCG RCC.

11. Marine Search Planning Forms - Forms and worksheets for several of the search planning steps have been devised by various SAR coordinators to aid in the planning process when it must be done manually. Examples of these are provided in Chapter 7, 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

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 (MPP), which is then corrected for drift if necessary. When searching for an aircraft on land, the result is a stationary search area which remains constant 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 MPP of the search object.

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

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

b. possible vessel docking areas;

c. military or civil radar services (TRACS or JETS);

d. aviation or marine authorities along the route;

e. coastal radio stations and VTS Centres;

f. DND HF/DF nets and CCG VHF/DF;

g. owner/operator/NOK 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,

h. Atmospheric Environment Service (AES) offices for weather information, including satellite data which may have influenced the intended voyage.

This initial planning will aid in the determination of the area in which it is possible for the object of the search to be found.

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). 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 air and marine 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.

15. Probability Area (Air) - 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 LKP to intended destination and within a reasonable distance either side of track. The study of Canadian data which led to the CSAD and MVFR methods confirmed this assumption for aircraft cases and determined that definitive area sizes could be established in relation to probability of whereabouts values of an incident location for various track length groupings.

16. Probability Area (Marine) - In marine 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.

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

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

b. 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,

c. the effect of drift in marine cases.

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

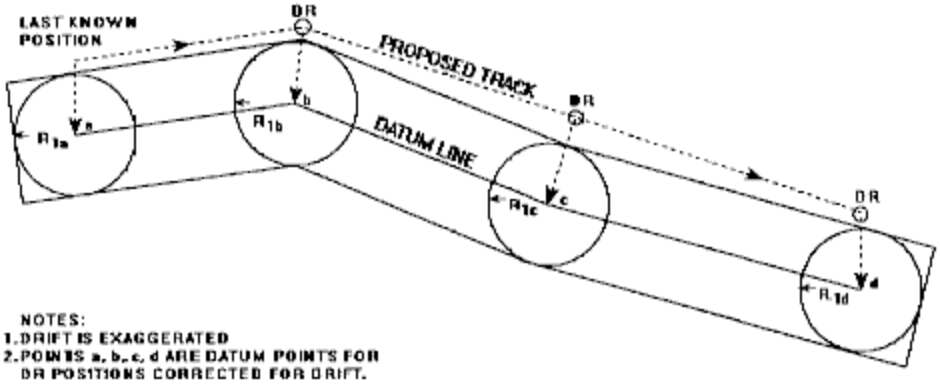
DATUM

18. The first step in either marine or inland search planning is to determine a starting reference point or datum. In an air 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 marine cases the MPP must then be corrected with computed drift forces to obtain datum for a specific time.

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.

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 analyzed for possible errors and the resultant search radii are tangentially joined to construct a search area along the intended track. (Figure 5-1).

DATUM LINE



<FIGURE 5-1>

21. Datum Area - If the LKP 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. Obviously, this area will normally be much too large to search effectively, and the search planner will be required to do extensive detective work to determine a reasonable search area.

DRIFT FORCES

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 air cases it may also be necessary to compute drift to determine the impact point. The forces that must be considered may include:

a. aerospace trajectory (da) - aircraft only; (Chapter 6 Annex B)

b. parachute drift (dp) - aircraft only; (Chapter 6 Annex B)

c. sinking drift (ds);

d. Leeway (LW); (Chapter 7)

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

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

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

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

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

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

m. 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 used rarely. Typically one drift force might be used for aircraft incidents over land, three for surface water incidents, and none for surface land incidents.

PLOTTING DRIFT FORCES

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

AREA COVERAGE

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:

a. track Spacing (S);

b. Probability of detection (P);

c. sweep Width (W); and

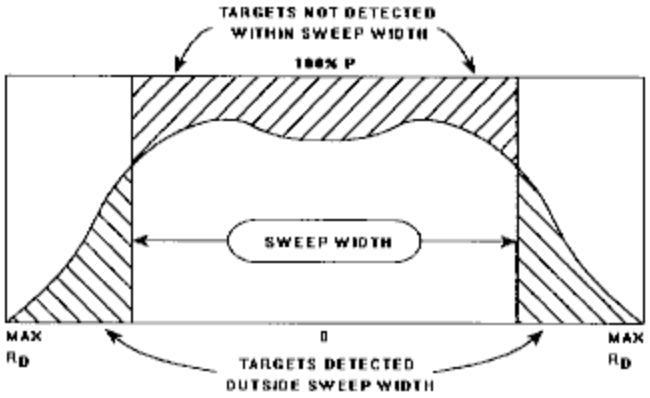
d. Coverage factor (C).

These expressions are measurements, S being a measure of search effort, P 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.

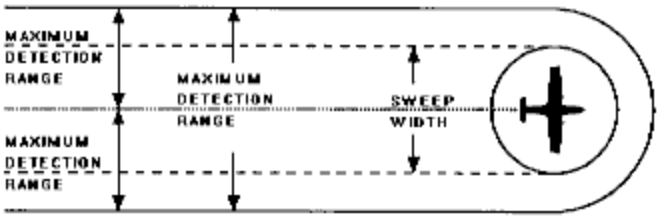
25. Track Spacing (S) - The distance between adjacent search tracks, whether these are by simultaneous sweeps of several units or successive sweeps of a single unit, is known as track spacing (S). It should be apparent that the smaller S is, the higher will be the likelihood of detecting any object which 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 the expectation of target detection within the constraints of time and resource availability.

26. Probability of Detection (P) - Usually expressed as a percentage, the probability of detection (P) refers to the odds of success (or failure) for 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 probabilities of detection.

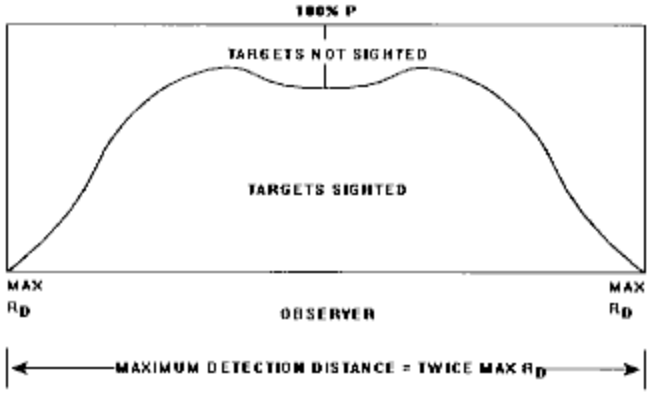
A. GRAPHIC PRESENTATION OF SWEEP WIDTH:



B. PICTORIAL PRESENTATION OF SWEEP WIDTH:

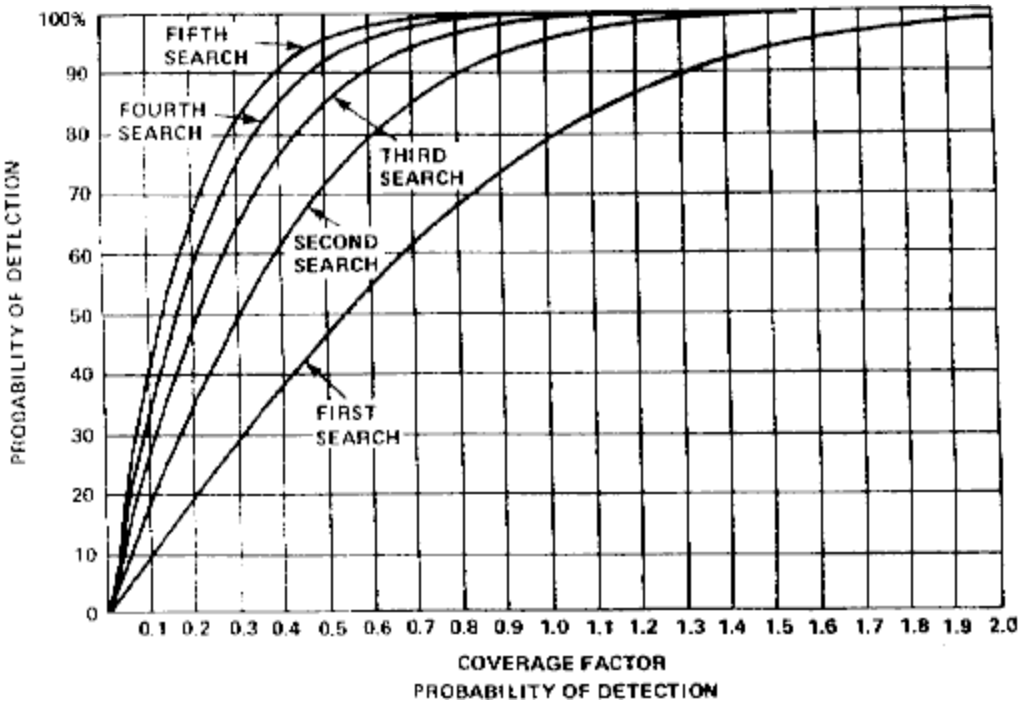


C. RELATIONSHIP OF TARGETS SIGHTED TO TARGETS NOT SIGHTED



<FIGURE 5-2>

27. Probability of Detection (P) - As S and W control C, so C controls P. P is determined using the graph shown in Figure 5-3. The curves on this graph provide P 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 are employed, P is determined by entering the Figure 5-3 with the average coverage factor for the searches that have been completed, 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 sweep width tables, Figure 5-3 cannot be used for determining the P of inland searches.



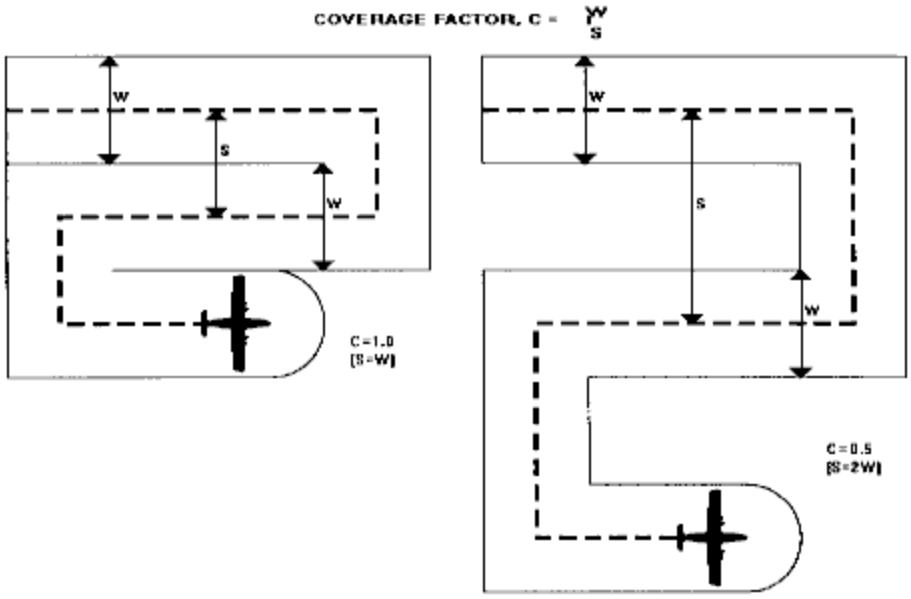
<FIGURE 5-3>

28. Sweep Width (W) - Sweep width is a mathematically expressed measure of detection capability based on target characteristics, weather and other variables. It 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 application of the sweep width concept is equally applicable for any type of search including electronic or aural searches. Tables have been developed to provide W for various types of searches and is discussed in paragraphs 31 through 40.

29. Coverage Factor (C) - Coverage Factor is a measure of search effectiveness or quality. C depends on the relation between sweep width and track spacing, and is expressed:

C = W/S

Figure 5-4 demonstrates the difference between a C of 1.0 and C of 0.5. In the case of inland searches, P varies according to the changing terrain and vegetation within a given search area. Canadian visual sweep width tables have not been developed for inland searches and therefore coverage factors for these searches cannot be determined.



<FIGURE 5-4>

SWEEP WIDTH COMPUTATION

30. General - The computation of sweep width (W) depends on the search methods being used by search units. These can be divided into the following general headings:

a. visual search;

b. electronic search; and

c. miscellaneous methods.

This section summarizes the most recent data on sweep widths and discusses various modifying factors.

31. Visual Search - Tables of sweep widths for visual search have been developed for various types of targets (see Annex 7E). The basic factors included in the tables are: type of target, meteorological visibility and search altitude. The uncorrected sweep width, Wu is expressed in nautical miles. Correction tables are included to account for the effect of weather (fw), search aircraft speed (fv) and crew fatigue (ff). The values from these tables are applied to Wu as follows:

W = Wu x fw x ff x fv

It will be noted that in some cases fw is less than 1 in calm winds. This is due to the detrimental effect glassy water conditions have on sighting small objects. Of course, these tables are for daylight use only.

32. Tables in Annex 7E 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.

33. If it is believed that detection aids may be used by survivors, whether in daylight or in darkness, different tables may be used. These are shown in Annex 7E. It must be emphasized that these values are based on best estimates and that, if more accurate information is available, it should be used. Also, the values expressed in Annex 7E are based on good visibility.

34. Visual Search Pattern Types - There are six main groups of visual search patterns:

a. track crawl;

b. parallel track;

c. creeping line;

d. expanding square;

e. sector; and

f. contour.

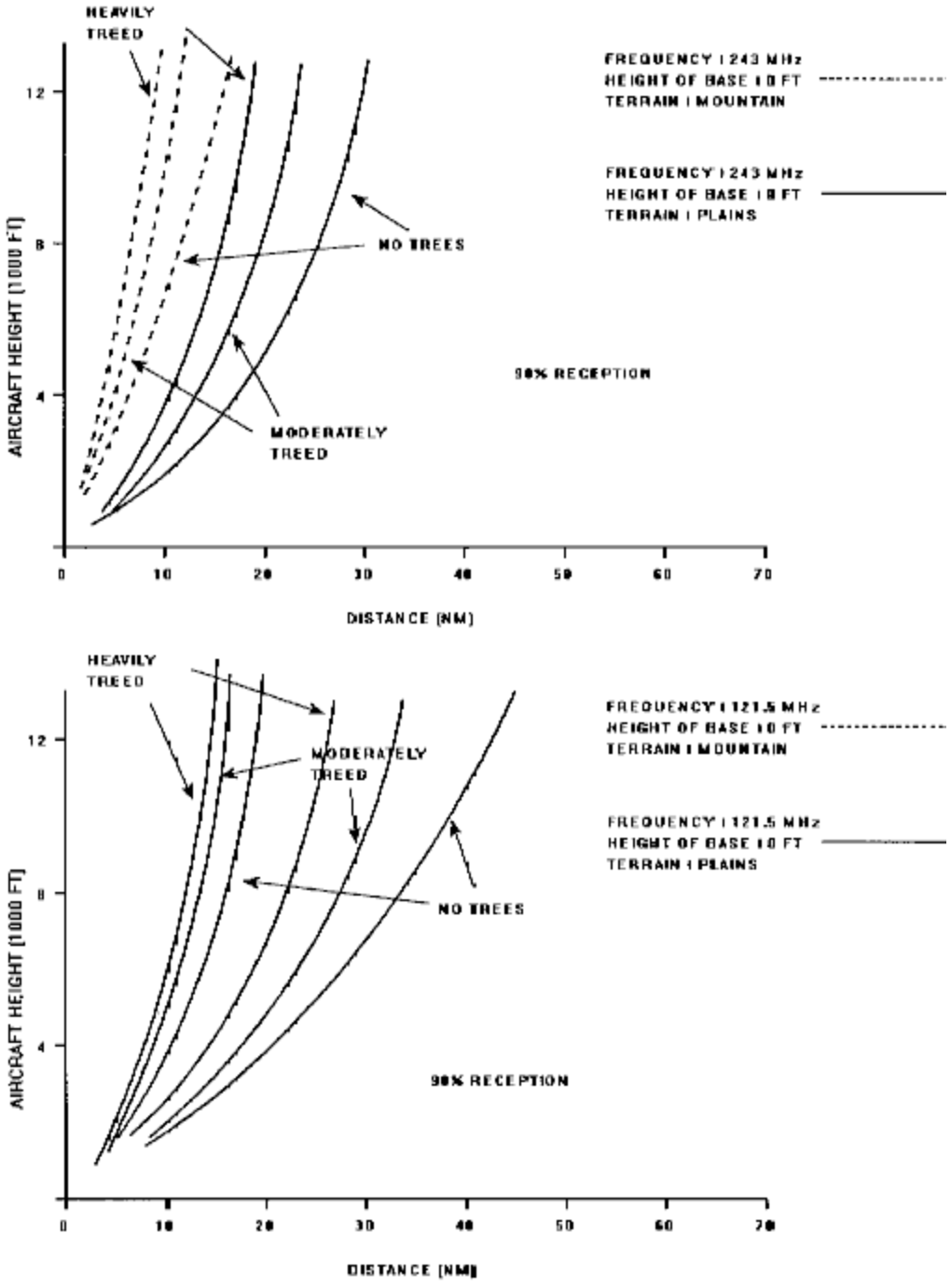
A description of these common search patterns is found in Annex 5A. US SAR authorities often further differentiate these search patterns by whether individual or multiple units are used or whether there is coordination between air and surface units. A listing of US search pattern designators is found in Annex 5B.

35. Electronic Search Patterns for Emergency Beacons - Normally, SAR resources will have a rough position of where an emergency radio beacon is located as a consequence of the COSPAS/SARSAT system. The following general procedures are used to precisely locate the emergency radio beacon. These patterns are used during the initial search phase and apply to Emergency Locator Transmitters (ELT), ejectable Crash Position Indicators (CPI), Personal Locator Beacons (PLB), or Emergency Position Indicating Radio Beacons (EPIRB). 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. (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 CMCC. 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.)

36. While in theory ELT 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.

37. Because of the limited operating life of most ELT 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.



<FIGURE 5-5>

38. The standard visual search patterns are applicable to ELT searches with the following modifications:

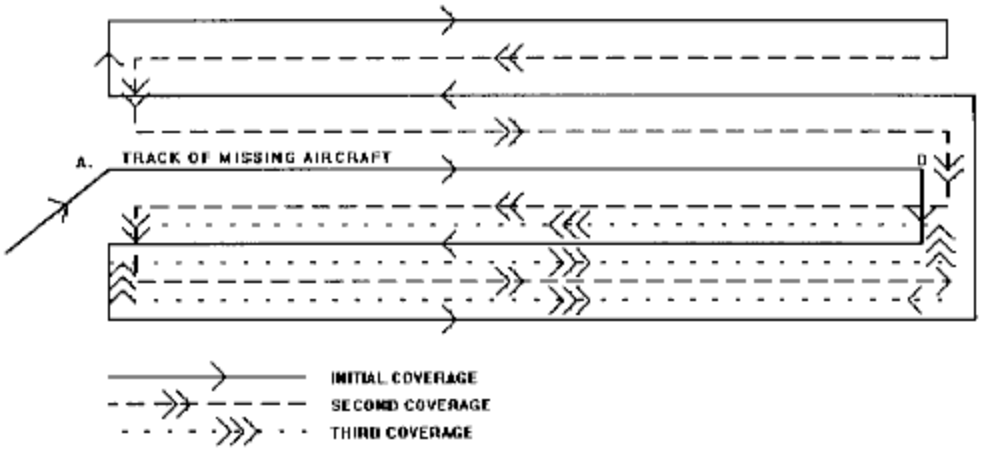
a. effective electronic search can be carried out under all weather

conditions at normal cruise speed;

b. track spacing should be 60 NM at 20,000 feet and 30 NM at 10,000 feet with the spacing reduced by one half over mountainous terrain; and

c. the ELTs position 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 ELT searches. Maximum track spacing 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 track spacing (Figure 5-6). In mountainous areas, the search should be arranged to cut the ridge lines at right angles if at all possible.



<FIGURE 5-6>

39. Often ELT reports are received from pilots of other than SAR aircraft. In Canada, anyone hearing an ELT signal is required to advise the nearest Air Traffic Control Unit, Flight Service Station or RCC, 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 5C.

40. 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 SAR units standard operating procedures.

BASIC SEARCH PLAN

41. 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:

a. an adequate briefing on the search object;

b. description of search area;

c. optimum search pattern; and

d. optimum track spacing.

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

42. 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.

43. 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 resources. If all the desired resources are not available, then compromises or alternative resources must be considered to enable development of an attainable plan.

44. 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 SM should exercise his judgement in initiating a search with the information and search units immediately at hand, increasing the effort when more information and units become available.

45. 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:

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

b. use a track spacing equal to sweep width (C = 1.0);

c. select a timeframe to complete the search;

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

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

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

g. 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 resources should be dispatched to check out such possibilities.

46. 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.

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

Search No.	Type	Period	Target	Preferred Aircraft	Speed	Track Spacing	Altitude
Initial	trackline	Day/night	wreckage, electronic beacons	jet	300/600	50	10-40000
1	electronic	DY/night	electronic beacons	jet	300/600	50	10-40000
2	Visual(aids)	Night	fires, flares, torch, etc.	turbo-prop	150/300	20	1500-3000
3	Visual(aids)	Day	mirrors, dye,	prop	130/190	10	1500-2000
4	Visual(rafts)	Day	rafts	prop,heli	100/180	3.1	300-1500
5	Visual (wreckage)	Day	wreckage,	prop,heli	75/130	0.3	200-500
all aircraft to keep radar search							
NOTE: Searches Initial, 1 and 2 could take place simultaneously at night and 3,4 and 5 during the ensuing daylight hours; five searches could be completed by the and of a 24 or 36 hour period. Search number is not to be confused with number.							

FIGURE 5-7

48. 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 is attached in Annex 5D.

SAR BRIEFINGS

49. Aircrew - The initial briefing to the first crews participating in a search operation shall normally be given by the RCC via telephone/fax using information contained in the SAR Briefing/Tasking Form - Air shown in Annex 9F. When an advanced search base has been set up and a SM appointed, it is the responsibility of the SM to ensure that all search crews are adequately briefed prior to each sortie. The SAR Briefing/Tasking Form - Air shall be filled out by the SM and made available to each search unit commander prior to each mission. Flight planning is the responsibility of the aircraft captain.

50. 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 RCC/MRSC or SM shall provide as detailed a weather picture as is possible.

51. The briefing shall cover all the items detailed in the Search Operation Briefing form and any additional information items considered pertinent to the case.

52. Marine Crew - Briefing for commanding officers of marine SAR units should cover all details concerning the SAR object and other relevant information as described in the SAR Briefing/Tasking Form - Marine (Annex 9F)

53. Other Agencies- 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.

54. Press/NOK. The SM or his representative must ensure the press and NOK are kept informed of the situation. A good rapport with these groups is important.

AIR DEFENCE, ATC AND VTS SUPPORT

55. 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.

56. Military radar sites of 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. RCCs/SMs 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.

57. Recorded radar or voice information from civilian and military Air Traffic Control (ATC) installations may also be used to assist in responding to an air distress incident. In addition, some air traffic control radar facilities have the capability to direct SAR aircraft to the scene of a suspected air distress. When it is believed that ATC information can assist in SAR operations, the base operations officer of CF bases, or the TC regional manager of Air Traffic Services, should be contacted as soon as possible.

58. In addition, ATC should be requested to NOTAM search areas to provide added safety to search crews.

59. Vessel Traffic Service (VTS) systems within the SRR may also be able to provide RCCs/MRSCs with real-time radar information concerning incidents and/or traffic within the within the limits of the VTS zone.

METEOROLOGICAL SUPPORT

60. SAR Operations - The provision of meteorological support to SAR operations is the responsibility of the CFWS. The Search Master/RCC will coordinate with the CFWS to arrange for the meteorological services to be provided at the advanced search base.

61. In the initial planning of a SAR operation, the SM or RCC 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 CF weather offices (CFWO) 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 marine SAR, forecast and prevailing ice conditions should also be obtained. This information shall be obtained from the CFWO/CFFC/METOC designated by the responsible SSOMet. For subsequent operations, the required meteorological information shall be obtained in accordance with the arrangements made by the responsible SSOMet or his delegate. CANSARP and MRSC will normally obtain past, prevailing, and forecast meteorological information directly from their established points of contact with AES.

SATELLITE, AERIAL AND INFRA-RED PHOTOGRAPHY

62. If the use of air or infra-red photography may aid the RCC or SM in the conduct of a search, a request for its use shall be forwarded by priority message to NDHQ/NDOC.

63. Latest space-based, multi-spectrum detection systems may be capable of assisting the SM in detecting the search object. A request for this service may be forwarded to NORAD through NDHQ/NDOC by priority message.

DIVING AND UNDERWATER SEARCH OPERATIONS

64. SAR Technician during procedures are contained in CFACM-2605.

65. Suspension or continuation of a search may depend on underwater detection and recovery measures to locate a missing aircraft or marine craft and 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 coordinate or participate in underwater detection or recovery action.

66. 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 SRR Commander to be impractical.

67. When required, the RCC shall coordinate such action in accordance with paragraph 70 (Location of Search Object). The resources employed may be

those of the CF, CCG, RCMP, 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 Commander having SAR jurisdiction if suitable government facilities are not available, and underwater investigation is deemed necessary to the expeditious conduct of the search. Should the use of CF resources and capability be required, direct communications should be effected with the appropriate Maritime Command Headquarters. In the case of CCG resources being required, a request should be made in compliance with Coast Guard Fleet Order (CGFO) 203.00. The message of request should state the situation, depth of water, tide or current, type of bottom, visibility of water, and other pertinent details.

68. The decision to continue an underwater search will be as a result of consultation between SM/RCC or MRSC and appropriate diving advisor.

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

LOCATION OF SEARCH OBJECT - SAR CREW PROCEDURES

70. When a missing aircraft or vessel is located, it shall be inspected carefully to verify that it is the object sought and the RCC/MRSC or 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.

71. When a SAR unit has located the SAR object, it should attempt to indicate to the SAR object, by any means, that it has been sighted. The position of the object of search shall be carefully plotted and a NOCL message, shall be dispatched to the RCC/MRSC or SM. If possible, the search object should be kept in sight to contribute to the survivors' mental well-being.

72. If unable to affect 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. Several photographs of the scene and surrounding area shall be taken, as outlined in paragraphs 78 and 79. Any open stretches of land on which aircraft could conceivably be landed or SAR TECH personnel 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.

73. 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 (DMBs).

74. 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 for that purpose. If the aircraft locating the object of the search is not carrying the special 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 an aircraft carrying the necessary supply drop equipment be dispatched or diverted to the scene.

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

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

NOTICE OF CRASH/CASUALTY LOCATION MESSAGE (NOCL)

77. The purpose of this message is to advise the RCC/MRSC or SM of the location of an aircraft crash or marine 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 and the order of transmission are listed at Annex 5E.

PHOTOGRAPHY - SEARCH OBJECT

78. When the search object has been located, it shall be photographed if possible at the height and/or distance at which it was first spotted and at the various heights and/or distances normally used in search. The SM and RCC/MRSC 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 SAR units and shall be used in briefing crews and spotters on future searches. Copies of photographs considered useful for briefing and training purposes shall be forwarded to NDHQ (J3 Ops) and DCGR as applicable.

79. When possible, photographs shall be taken at incident sites showing the crash 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 SAR 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

80. Photos for Casualty Investigation - SAR incident photographs may be provided to CTAISB/CORONER/RCMP who shall request these through the RCC when it appears that an investigation will take place. Requests from media

sources for the release of photographs should be directed to DND Public Affairs.

TRANSPORT OF CORONERS/CTAISB/BODIES

81. Authority to transport coroners (or representatives/local authorities) to a crash site during a search operation is vested with the Searchmaster or the RCC duty Air Controller. Bodies can also be removed once approved by the coroner. Hoisting of coroner, their representatives or local authorities and members of the CTAISB is not authorized. Authority to transport coroners (or after the suspension of a search is vested in NDHQ/J-3 only. Similarly, authority to transport members of the Canadian Transport Accident Investigation Safety Board (CTAISB) for any situation must be obtained from NDHQ/J-3.

TRANSPORT CANADA NOTIFICATION - AIR

82. When the subject of the air search has been found, the RCC shall inform the appropriate TC authority for the area and confirm the requirements for guarding the wreckage pending the arrival of the accident investigation team. The RCC or SM 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.

REDUCTION OF MAJOR SAR OPERATIONS

83. While numerous SAR incidents occur daily in all three SRRs, 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 resources. Because of the potential for public reaction when a search object cannot be found, authority to withdraw resources in unsuccessful major SAR operations has been vested in NDHQ. SMs shall ensure SITREPs are completed in enough detail to enable NDHQ staff to process reduction requests. The format for SAR reduction requests is provided in Annex 5G.

NOTE: Minor searches which do not meet the above criteria may be reduced by OIC RCC on the authority of the SRR Commander.

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

a. air and marine SAR incidents where primary marine and/or primary air SAR resources are tasked on an incident for more than four calendar days;

b. incidents which the SRR Commander assesses as being potentially sensitive; and

c. special cases as directed by NDHQ.

85. 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, he should recommend search reduction. Such recommendation in the case of Marine incidents, shall consider advice/evaluation by the RSMS. NOK should be made aware that search reduction is being sought. If the SRR Commander agrees with the search reduction, he shall seek NDHQ approval by submitting a priority message in the format of Annex 5F. The request for a Marine SAR reduction at NDHQ shall be evaluated by NDHQ in consultation with CCGHQ/DCGR staff. Immediately after the SRR Commander decides to request reduction, the OIC RCC should advise NDOC and ACOO/SSO SAR staff by telephone, and the RSMS shall similarly advise CCGHQ staff in case of marine 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.

86. Since a delay in reduction after all reasonable steps have been taken would likely result in a needless waste of SAR resources, it is 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.

87. An authorization for reduction shall not prevent the SM from prolonging the search, should a change in circumstances so demand. In this case, NDHQ/NDOC shall be advised as soon as it is practicable. For cases involving marine resources, CCGHQ/DCGR shall also be advised.

88. 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/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/SM/MRSC shall state that aircraft/vessels in the area will be asked to keep a lookout, and 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.

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

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

b. a total of (number) government and civilian aircraft/vessels have

flown/steamed (number) hours and covered (number) square kilometres;

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

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

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

REOPENING OF SEARCHES

90. Searches may be reopened on the authority of the SRR Commander without reference to NDHQ 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.

91. Requests for reopening searches which do not meet the criteria of the previous paragraph are to be referred to NDHQ/NDOC for the VCDS decision.

92. When searches are reopened, normal daily situation reports shall recommence.

MARKING OF WRECKAGE

93. The CF will be responsible only for the marking of the wreckage of military aircraft that have not been removed from the crash site. TC will be responsible for marking the wreckage of civil aircraft that have not been removed.

94. Military wreckage will be marked by metal plaques manufactured locally by the SAR Squadrons. The plaques will bear the words:

THIS CRASH HAS BEEN REPORTED

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

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

HUMANITARIAN AND LAND SAR INCIDENTS - TASKING

96. DND. Procedures for tasking DND resources for medevacs (including

critical and routine), land SAR, and humanitarian missions are outlined in B-GS-055-000/AG-001 (Provision of Services to Non-Defence Agencies), Chapter 3. On behalf of the SRR Commander, the OIC RCC shall consider requests from non-defence agencies and decide what resources are best suited for the mission. Using regional knowledge and expertise, the OIC RCC shall determine if tasking of DND resources fall within the guidelines of the National SAR Program and if cost recovery action should be initiated. The OIC of RCCs will be responsible for coordinating CF participation in humanitarian and land SAR missions and will make recommendations thru NDHQ COS J3 regarding potential cost recovery actions.

97. Land SAR. Land SAR is an integral part of the National SAR Program. Hence, DND primary SAR resources, should be tasked, when available, for land SAR and humanitarian missions such as a search for missing persons.

98. Medevacs. There are two types of humanitarian assistance that fall under the heading of medevacs. These types are:

a. humanitarian (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

b. humanitarian (routine) - the routine medevac of patients or vital medical resources from one medical facility to another (air or marine ambulance service).

99. TC. CCG SAR resources and facilities may also be tasked for Land 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 RSMS.

100. Given that CCG SAR resources are neither equipped nor intended for use in some types of humanitarian and land SAR incidents, the RSMS shall advise the appropriate regional authority of the request and the participation of CCG personnel, only if satisfied that:

a. other appropriate resources are not readily available;

b. CCG resources are suitable and available for the mission at hand; and

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

101. Should the request be approved and CCG SAR resources be selected as the appropriate vehicle for reacting to the request, the approval and resource requirements shall be transmitted to the RCC/MRSC originating the request. If the OIC/RCC or RSMS is of the opinion that the tasking of the required resources would hamper the marine response capability in the Region the use of the CCG primary SAR units 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 NSM, RCC/MRSC shall consider RMSR to be the final authority respecting the utilization of primary SAR CCG units for Humanitarian and land SAR incidents.

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

DIVING ACCIDENTS

103. 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.

104. 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.

105. 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.

106. 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.

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

a. helicopter capability;

b. weather conditions and sea state;

c. distance to be covered; and

d. condition of the casualty.

108. 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.

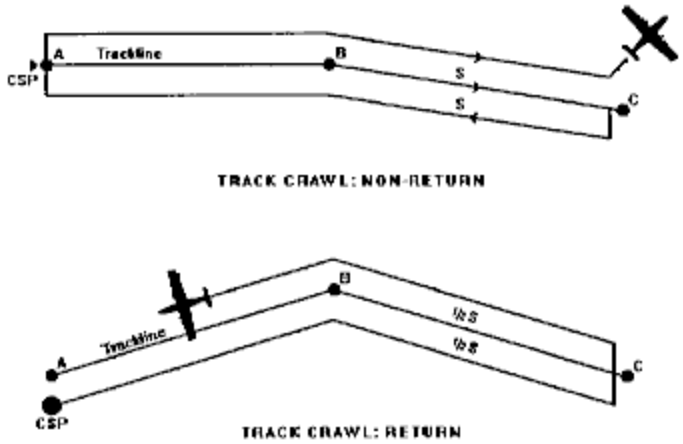
109. Evacuation by helicopter of a patient being treated in a recompression chamber should only be attempted if the helicopter is capable of accommodating the recompression chamber.

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

111. Helicopters evacuating a diving casualty not being treated in a recompression chamber, should preferably fly at altitudes not exceeding 300 feet AGL.

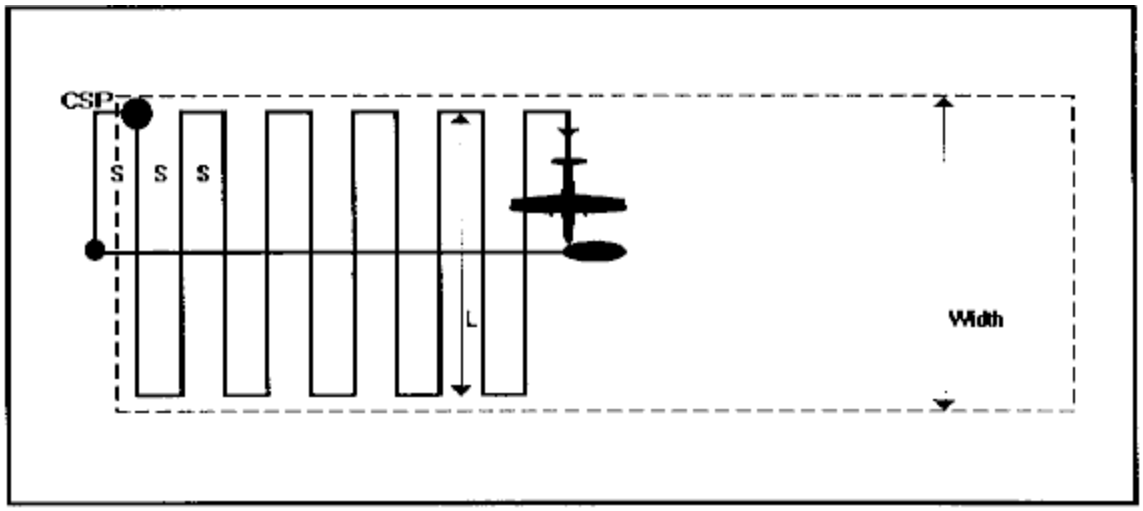
ANNEX 5A -- VISUAL SEARCH PATTERNS

1. Track Crawl Pattern - This 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>

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 pattern. 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 oriented along the shortest side of the search area.

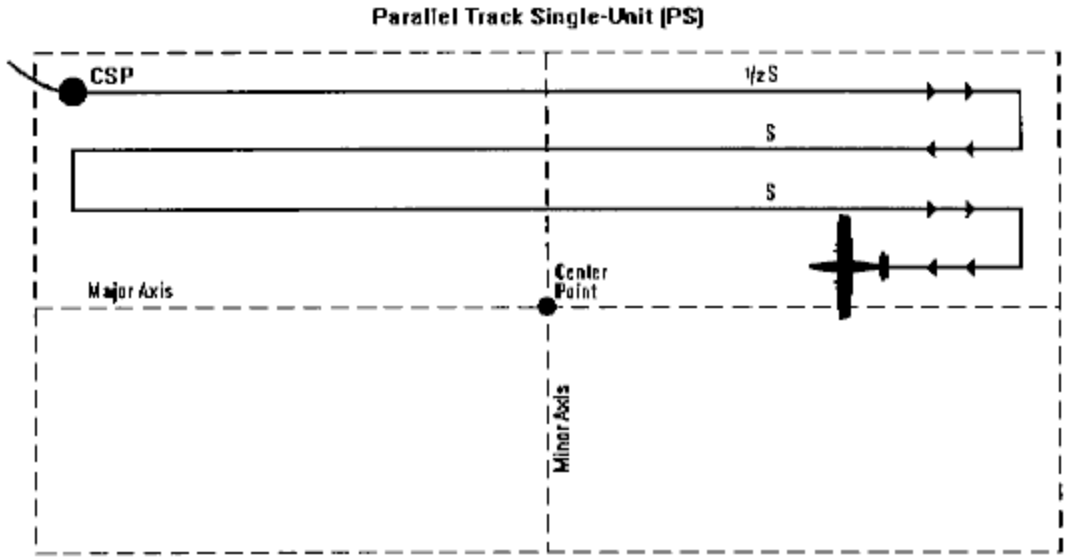


<FIGURE 5A-2>

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

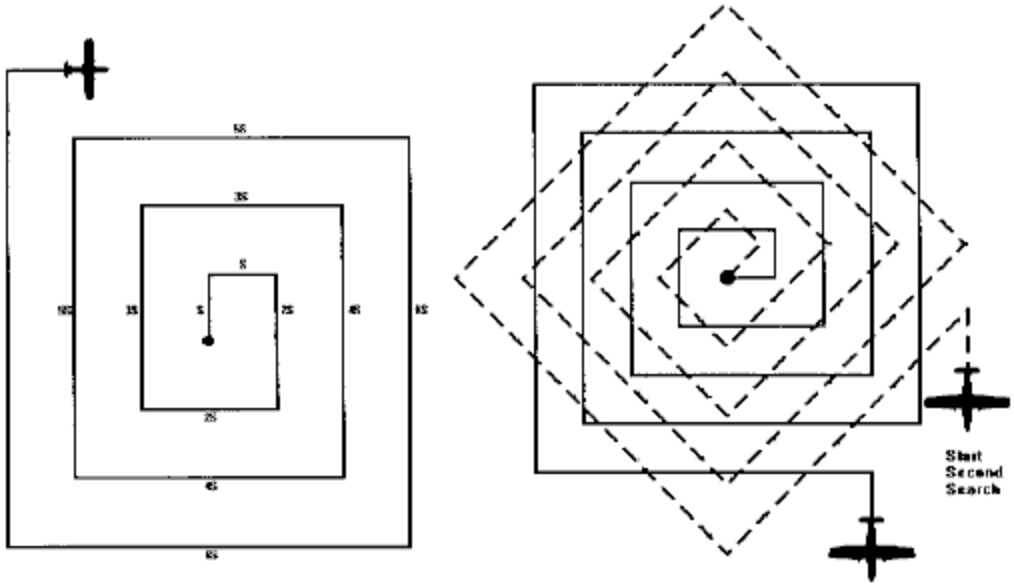
parallel to the longest side of the search area.



<FIGURE 5A-3>

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.



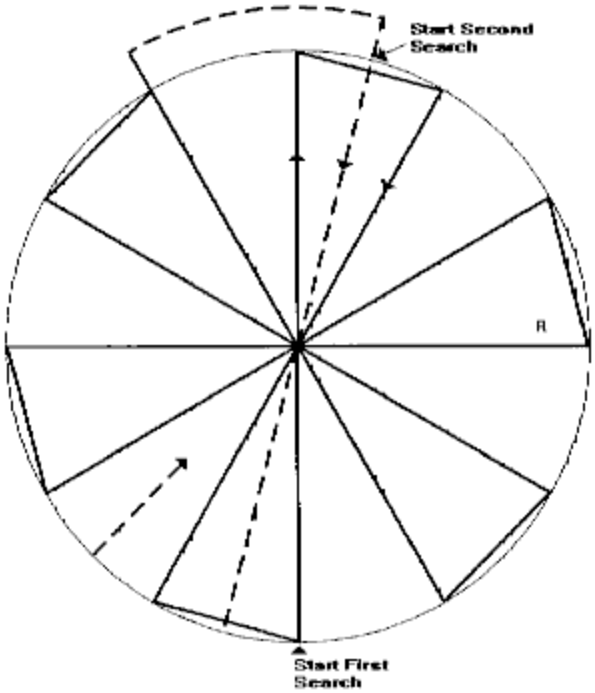
<FIGURE 5A-4>

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 DMB or a smoke marker can be used at the centre of the Pattern to achieve very accurate navigation. The chief advantage of 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 NM for aircraft or 5 NM 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>

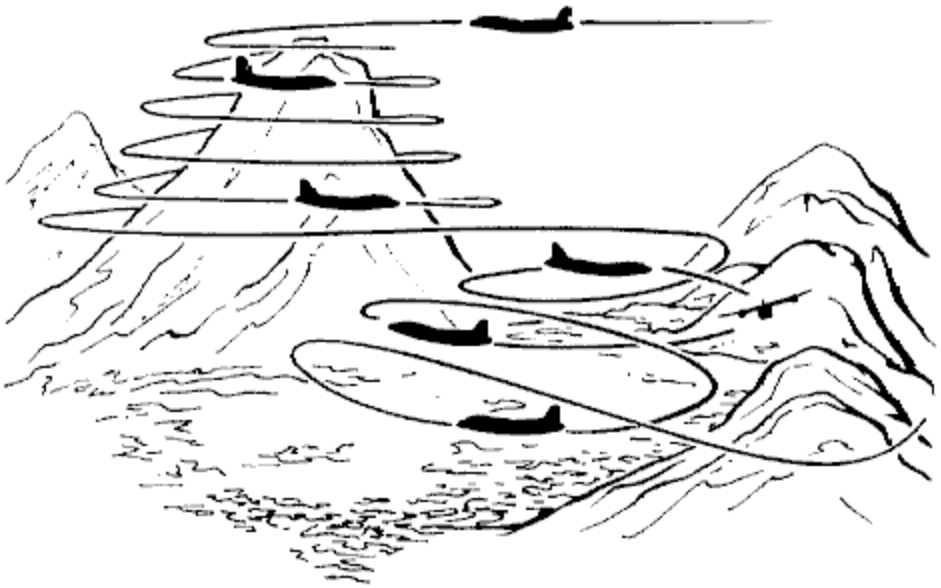
8. Contour Search - In much of the terrain in Canada this is the only suitable search pattern. It is also a hazardous search procedure, and can only be assigned when the following conditions are met:

a. the aircraft used must be suitable, ie: 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.

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



<FIGURE 5A-6>

ANNEX 5B -- SEARCH PATTERN DESIGNATORS

SEARCH PATTERN DESIGNATORS

PATTERN	NAME	SRU required
TSR	Trackline single-unit return	1
TMR	Trackline multiunit return	2 or more
TSN	Trackline single-unit nonreturn	1
TMN	Trackline multiunit nonreturn	2 or more
PS	Parallel track single unit	1
PM	Parallel track multiunit	2 or more
PMR	Parallel track multiunit return	do
PMN	Parallel track multiunit nonreturn	do
PSL	Parallel track single-unit Loran line	1
PSA	Parallel single-unit arc	1
PSC	Parallel single-unit circle	1
PMC	Parallel multiunit circle	2 or more
PSS	Parallel single-unit spiral	1
CS	Creeping line single unit	1
CM	Creeping line multiunit	2 or more
CSC	Creeping line single unit coordinated	1 acft + 1 ship.
CMC	Creeping line multiunit coordinated	2 acft + 1 ship.
CSR	Creeping line single-unit radar	1 acft + 1 ship.
CMR	Creeping line multiunit radar	2 acft + 1 ship.
CMCS	Creeping line multiunit coordinated split	2 acft + 1 ship.
SS	Square single-unit	1
SM	Square multiunit	2
VS	Sector single unit	1
VM	Sector multiunit	2 or 3
VSR	Sector single-unit radar	1 acft + 1 ship.
OS	Contour single-unit	1
OM	Contour multiunit	2 or more
FS	Flare single unit	1 acft + 1 ship. or 2 acft
FM	Flare multiunit	1 acft + ships
HSA	Homing single-unit aural	1
HSM	Homing single-unit meter	1
HMN	Homing multiunit nonreturn	2 or more

ANNEX 5C -- ELT REPORT - PROBABILITY AREAS

UTILIZATION OF ELT RECEPTION REPORTS

With the information received from ELT reports the theoretical reception range for VHF and UHF signals can be used to arrive at a rough estimate of the search probability area.

VHF/UHF THEORETICAL RECEPTION RANGES

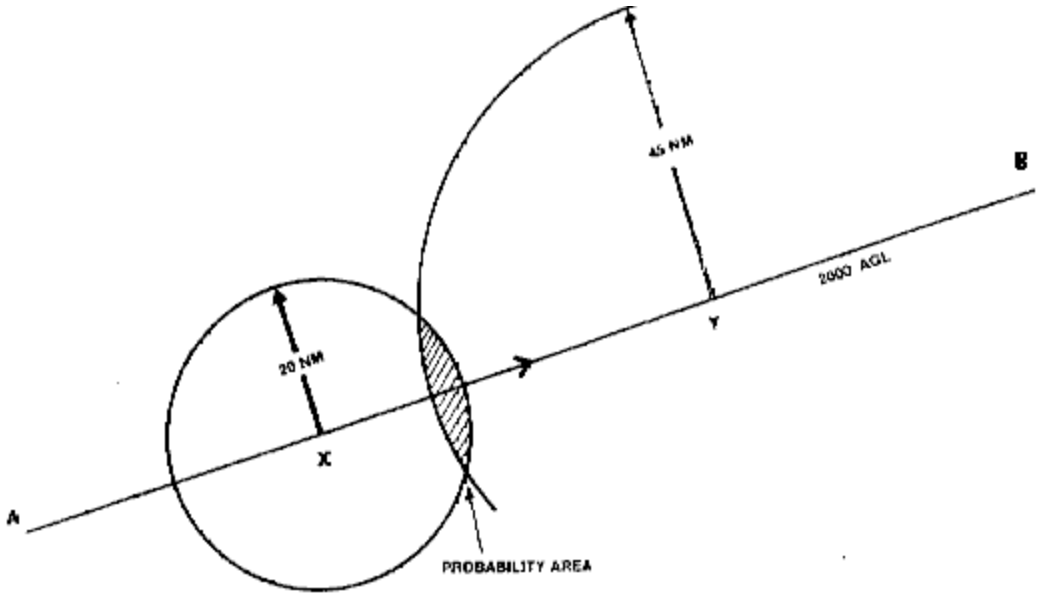
ALTITUDE	RANGE
1,000	30 NMs
2,000	45 NMs
3,000	55 NMs
4,000	67 NMs
5,000	85 NMs
10,000	100 NMs
15,000	127 NMs
20,000	150 NMs
30,000	200 NMs

NOTE: The ranges in this table are for an exceptional 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 isolate the location of a downed aircraft.

EXAMPLE A

This example deals with the case of pilot of a Beaver flying from point A to point B. Over point X at 2,000 AGL received a loud and clear steady ELT signal. He noted the time and his location but because of fuel considerations did not attempt an aural homing but continued his flight and kept monitoring 121.5. Thirty minutes later at point Y, after covering approximately 60 miles, the signal faded out.



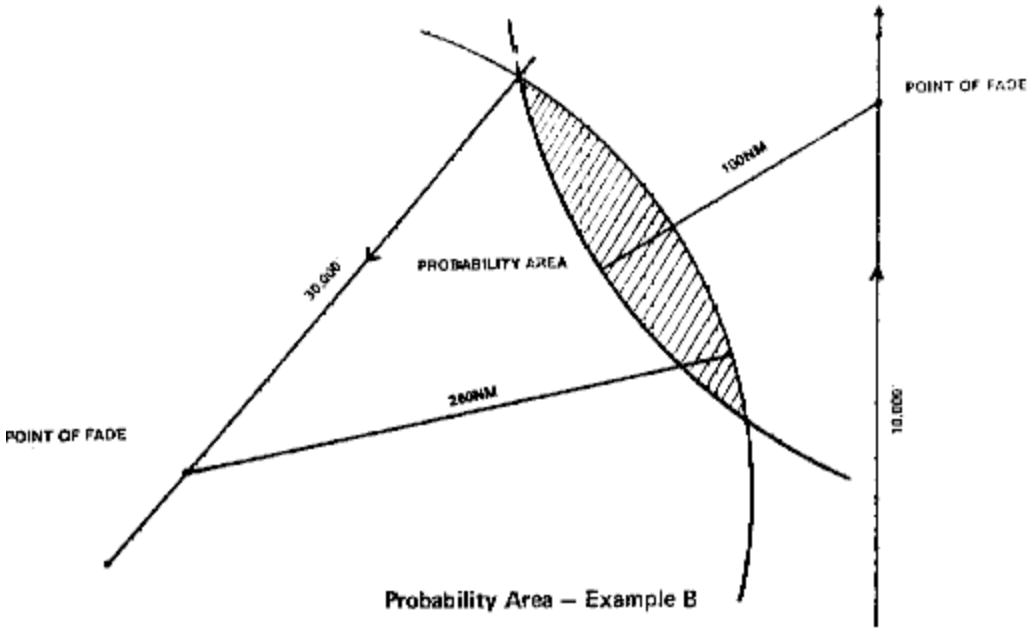
<FIGURE 5C-1>

SOLUTION

It is most likely, judging form the way that the signal was first received (loud and clear) that the downed pilot did not turn the beacon on until he saw or heard the Beaver. At that time, the Beaver was probably within 20 NMs 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 2,000 feet of 45 NMs and draw an arc cutting the 20 NMs circle drawn around point X. The probability area would then be the relatively small shaded area.

EXAMPLE B

This example deals with a case involving two different aircraft on two different routes, one at 10,000 feet AGL and the other at 30,000 feet AGL, each of whom receives ELT signals.



Probability Area – Example B

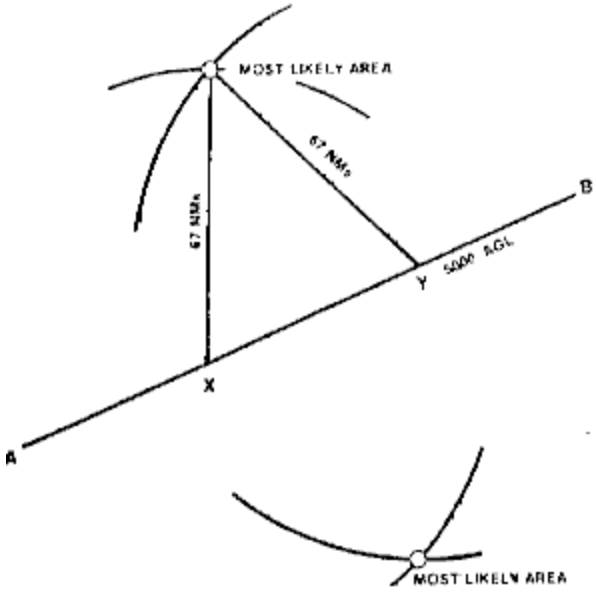
<FIGURE 5C-2>

SOLUTION

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

EXAMPLE C

The third example deals with one aircraft at 5,000 feet AGL picking up a weak signal at point X and tracking it till it fades at point Y.

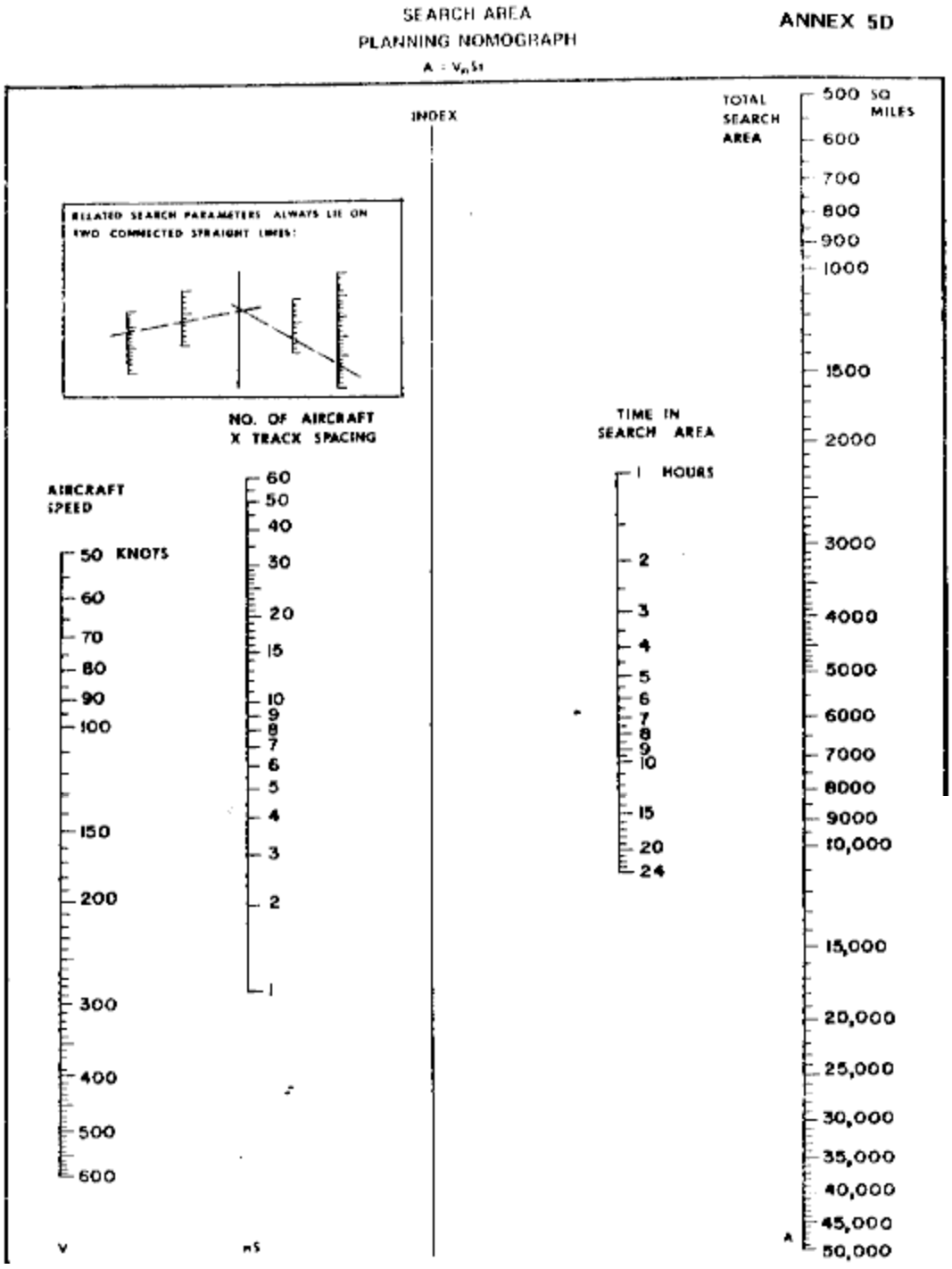


<FIGURE 5C-3>

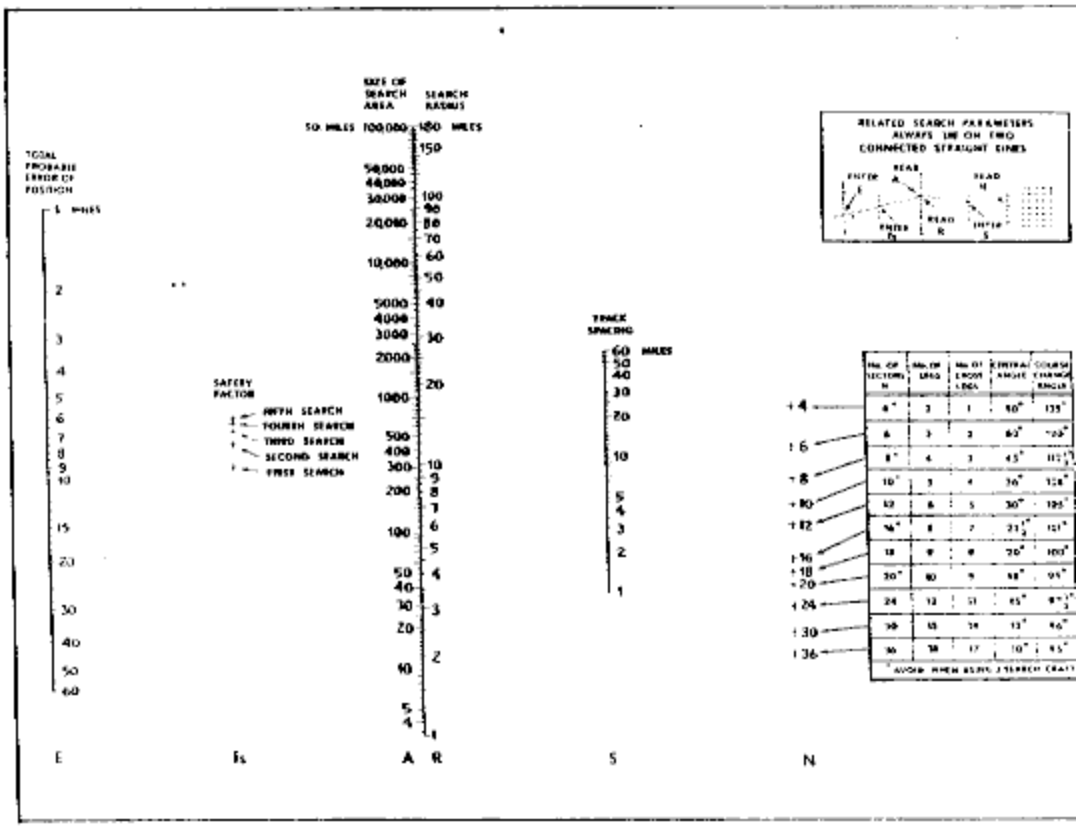
SOLUTION

By using the theoretical reception range of 67 NMs for 5,000 feet, we can draw two arcs, one form point X and one from point Y, and arrive at two most likely areas one on either side of the track.

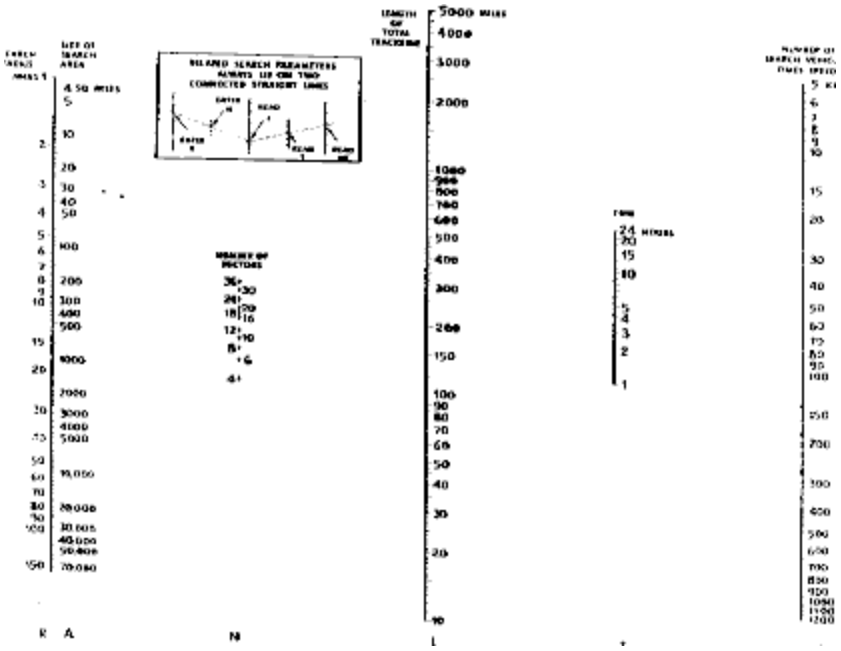
ANNEX 5D -- SEARCH AREA PLANNING NOMOGRAPH



<FIGURE 5D-1>



<FIGURE 5D-2>



<FIGURE 5D-3>

ANNEX 5E -- NOTICE OF CRASH/CASUALTY LOCATION MESSAGE

The originator should transmit only the works on the left; the meaning is shown on the right.

SEARCHMASTER THIS IS RESCUE 000 NOVEMBER OSCAR CHARLIE LIME

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 of West being used.

CHARLIE

NEGATIVE	When no survivors or casualties can be seen.
ANY NUMBER	To indicate number of survivors or casualties actually seen, followed by:
UNDETERMINED	When 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 TECHs or other medically trained personnel.

DELTA

ONE	1. side of hill plus indicate north, south, east, or west slope.
TWO	2. in valley plus indicate north, south east, or west side of floor.
THREE	3. in level country.
FOUR	4. heavily wooded area (can be used in conjunction with one, two or three).
FIVE	5. in water.

- ALPHA NEAR SHORE
- BRAVO WELL OFF SHORE

ECHO

ONE	Request authorization to deploy the SAR TECH 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.

FOXTROT

REMARKS	Briefly provide any detail which allow RCC/MRSC to initiate appropriate action, bearing in mind that the transmission is not secure.

ANNEX 5F -- REQUEST FOR SEARCH REDUCTION

(Message to be sent Priority and Classified CONFIDENTIAL)

DISTRIBUTION

TO: NDHQ OTTAWA//ACOO//SSO SAR//

INFO: AIRCOM HQ WINNIPEG//G3//
ATGHQ TRENTON//SSOSAR//
AME OTTAWA (WHEN APPROPRIATE)

SUBJ: SAR (Name) - REDUCTION REQUEST

A. SEARCH OBJECT - (Aircraft of Vessel - Brief Description)

B. PERSONS ON BOARD - (Name of POB and Name and Address of NOK)

C. EMERGENCY LOCATOR TRANSMITTER - Yes/No and Type)

D. ROUTE - (Intended Route or Flight Plan/Notification)

E. LAST KNOWN POSITION - (As Reported)

F. DATE/TIME - (Of LKP)

G. SEARCH COMMENCED - (Time RCC Notified)

H. SEARCH HEADQUARTERS - (Location)

J. SEARCH MASTER - (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.....SQ MILES (Total coverage, ie, a 30X60 NM square covered three times is 5400 SQ MI)

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 - AIR

AIR INCIDENTS

EVALUATION OF DEGREE OF REQUIRED RESPONSE

1. In the following sections an attempt has been made to provide guidelines to assist the controller in determining the degree of urgency in a SAR 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/her judgement and experience. Initially, the controller should not hesitate to classify an incident at the highest degree of urgency that the available information supports. Later, the degree of urgency can be lowered if necessary.

2. Nothing in the following paragraphs is meant to prevent the controller from assigning the highest degree of urgency.

SAR INCIDENT PROGRESSION

3. When efforts to locate the search object indicate that danger no longer exists, eg: the communication search was successful and no hazards exist or the object and/or the survivors thereof have been located and rescued, the RCC/MRSC shall close the incident and immediately inform the operating agency and any centre, service or facility that has been alerted or activated.

4. If uncertainty 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 urgency phase should be increased, if appropriate, given the circumstances and information available. The decision to declare this change of urgency should be taken without delay and based on past experience with similar situations.

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 AIR URGENCY

6. There are three degrees of urgency used in the conduct of aircraft SAR incidents: UNCERTAINTY, ALERT and DISTRESS.

7. An UNCERTAINTY phase exists in any one of the following circumstances:

   a. 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;

   b. 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;

   c. 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;

   d. a situation exists wherein there is uncertainty as to the safety of an aircraft and its occupants, eg. a responsible person has declared an aircraft overdue which was not on a flight plan but whose tardiness is of sufficient concern; and

   e. an 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.

8. An ALERT phase exists when:

   a. following the uncertainty phase, the communication search procedure has failed to reveal any new information on the aircraft;

   b. 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;

   c. 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

   d. a SARSAT merge position or the ELT signal reported in paragraph 7.e is still being reported and cannot be isolated or otherwise accounted for.

9. A DISTRESS phase exists when:

   a. the fuel on board is considered to be exhausted or to be insufficient to enable the aircraft to reach safety;

   b. information is received which indicates that the operating efficiency of the aircraft has been impaired to the extent that a forced landing is likely;

   c. information is received that the aircraft is about to make or has made a forced landing or requires immediate assistance;

d. a downed aircraft is located either as the result of an inadvertent sighting or as a consequence of a homing on an ELT transmission, regardless of the downed aircraft not being on a flight plan or reported overdue; or

e. the ELT transmission referred to in paragraphs 7.e. and 8.d. has been identified to an overdue aircraft, confirmed by the SARSAT system (merge or combination of event and ELT report), or has continued for two hours and the source has not been located.

RCC ACTION DURING DEGREES OF AIR EMERGENCY

10. During the UNCERTAINTY phase of an aircraft emergency, the RCC shall, when applicable:

a. obtain the data contained on the flight plan or flight notification (INREQ);

b. 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 in accordance with the TC Manual of Operations;

c. notify position fixing agencies (see DF assistance to SAR) to attempt establishment of the aircraft's position, informing them of all known frequencies;

d. notify Regional Operational Control Centre (ROCC) at NORAD HQ, North Bay, and request air surveillance;

e. notify the RCMP, provincial police, and/or CASARA along the route of flight, as they may be requested in collaboration with Flight Service Stations (FSS) to verify alighting areas, or obtain information on the aircraft and its occupants;

f. if the flight is over water, request marine radio stations to take action to alert vessels in the area;

g. if the flight originated in, or intended entering, a country other than Canada, notify the appropriate SAR facility in that country;

h. notify the appropriate 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;

j. in the case of an ELT signal, request all ground stations, including private strips, FSS, towers, ACC, vessels, etc., to monitor the appropriate frequency (121.5 or 243.0 Mhz) in an attempt to verify and isolate the ELT;

k. advise the CMCC of the details of the possible emergency and request a query of the SARSAT system; and

m. select a name for the operation, normally the last name of the aircraft captain with the prefix "SAR", eg: "SAR Jones". If the name of the aircraft captain is not known, then a name appropriate to and descriptive of the operation shall be selected.

NOTE 1: Normally, the communication search should not be pursued for more than one hour in the Uncertainty Phase without upgrading to the Alert Phase.

11. During the ALERT phase of an aircraft emergency, the RCC shall, when applicable:

a. expand the communication search area as the case warrants (ALNOT);

b. alert the rescue unit or flight to prepare aircraft equipment and personnel, especially in circumstances that may require more than the standard configuration;

c. alert secondary and other facilities, including ships at sea, which may be required to assist, in order to establish availability;

d. alert CASARA to prepare aircraft and personnel;

e. ensure that the appropriate ACCs have alerted air traffic flying through the area involved so that a watch will be maintained;

f. obtain additional details on aircraft, equipment on board, the pilot and the passengers;

g. obtain weather along the aircraft's route and assess its effect on the tasking of resources;

h. plan initial briefing of search crews;

j. action all incoming reports and consolidate them into the initial briefing plan;

k. in the case of an ELT signal, task individuals, airport managers, DOC 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

m. advise CMCC of the details of the emergency and request a query of the SARSAT system.

NOTE 1: Tasking of air resources from other SRRs should be considered when:

(1) significant improvement in on-scene time would be realized,

(2) 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.

12. During the DISTRESS phase of an aircraft emergency, the RCC shall carry out the following, when applicable:

a. initiate action with the appropriate SAR units and services: this action will normally be to task the standby crew to immediately take off on an initial search;

b. notify appropriate ACC and other agencies concerned, such as NDOC when deemed appropriate (issue MANOT and SITREP);

c. 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;

d. task additional primary, secondary and/or other resources as deemed suitable to meet the requirements of the search plan, and appoint an OSC as required;

e. 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 (SHQ);

f. assess and coordinate the requirements for telecom facilities, weather services and equipment and ensure that appropriate telecom personnel are available and briefed;

g. notify the operating agency and keep it informed on SAR developments;

h. advise CMCC of the details of the emergency and request a query of the SARSAT system;

j. when an aircraft accident has been confirmed, notify CTAISB with the pertinent details;

k. when the incident involves an aircraft of foreign registry, the RCC shall inform NDOC to advise the appropriate embassy if required; and

m. develop a rescue plan in the event casualties require assistance, notifying medical facilities, police/coroner, and establishing 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 NOK of all occupants. Failing this option, RCC will deal directly with the NOK.

INTERCEPT AND ESCORT OF DISTRESSED AIRCRAFT

13. Intercept and escort services will be provided for aircraft in distress, as required, in areas of Canadian 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 SRR commander is empowered to direct any CF aircraft operating within his area to perform the task, providing it possesses the necessary capability.

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:

a. the distressed aircraft's identification;

b. its last known position with amplification as to the type of navigation aids used; ie: LORAN Doppler, OMNI, TACAN, Celestial, INERTIAL, or estimated;

c. time of position;

d. its altitude and whether or not the aircraft is descending or climbing;

e. true course;

f. ground speed;

g. true air speed; and

h. a brief description of the emergency.

15. The operational procedures for airborne intercept are set out in CFACM 60-2605, Airlift Operations, Search and Rescue.

MAJOR AIR DISASTER PLAN (MAJAID)

16. In the event of a major air disaster, the RCC is to initiate MAJAID in

accordance with CF Air Command Operations Plan (ACOP) 210.

SEARCH PLANNING

17. The search planning task includes the determination of a 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 coordination, transmitting the search plan to the search units and periodically reviewing and updating the search plan.

DETERMINING LKP

18. The LKP can be based on the last reported position a confirmed, sighting report, radar image, SARSAT position, etc. Each one of these determinations has its own inherent potential error which must be considered by the controller.

19. When calculating the last known position (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 6B provides detailed calculations for Aerospace Trajectory and Parachute drift.

SEARCH AREA

20. Two predefined methods of determining and plotting inland search areas have been developed for use in Canada. They are:

a. the Canadian Search Area Definition (CSAD) method, based on empirical data collected on Canadian inland SAR incidents from 1981 to 1986, excluding the data used for the MVFR study; and

b. the Mountain VFR (MVFR) method for utilization in mountainous regions in which visual flight routes are accepted, published, and flown. This method is also based on empirical data collected on Canadian inland incidents involving VFR flights in mountainous regions.

21. These methods were developed for cases where there is little information to go on besides an LKP 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 applies in point-to-point cases. If the Searchmaster has evidence to suggest that these methods are not applicable, then they should be modified subject to the concurrence of the applicable SRR Commander through the respective OIC RCC. Details of the modification to the search area and SM reasoning for the modification are to be included in the SITREP.

CANADIAN SEARCH AREA DEFINITION (CSAD) METHOD

22. 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, combining these variations in such a way as to assign the probabilities of coverage of a crash position by using given rectangular areas.

23. The use of CSAD requires the following information:

a. the Last Known Position (LKP);

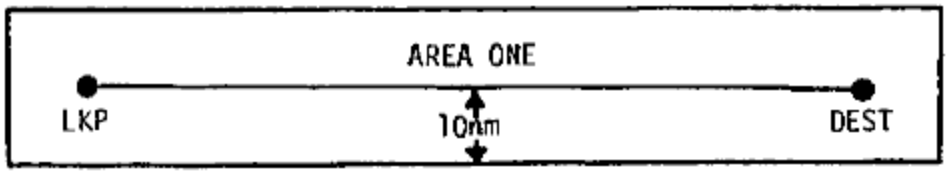
b. the intended route; and

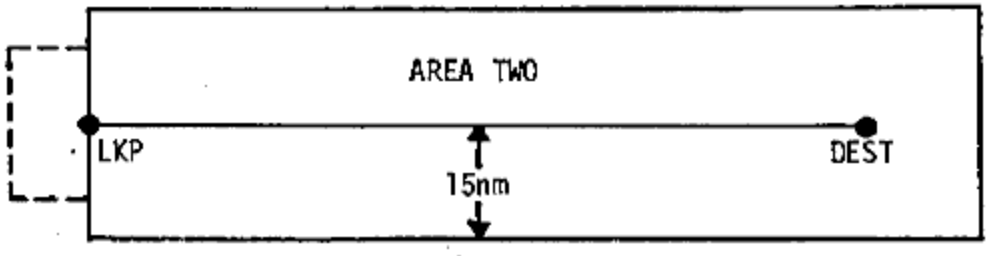
c. the intended destination.

24. The CSAD method applies to all intended track lengths. The two areas are defined below (see Figure 6-1):

a. Area One - A rectangle 10 NM each side of track beginning 10 NM before LKP and extending 10 NM beyond destination; and

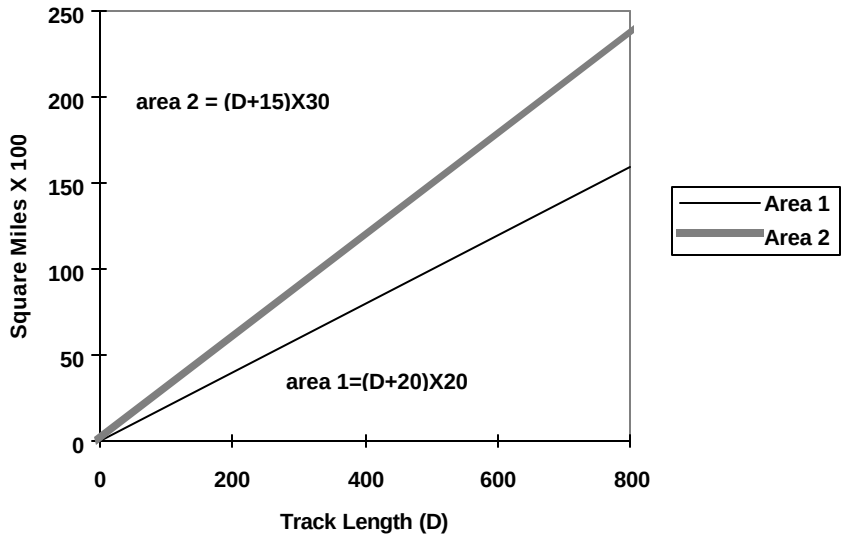
b. Area Two - A rectangle 15 NM each side of track beginning at the LKP and extending 15 NM beyond destination. Area Two includes that portion of Area One where overlapping occurs.





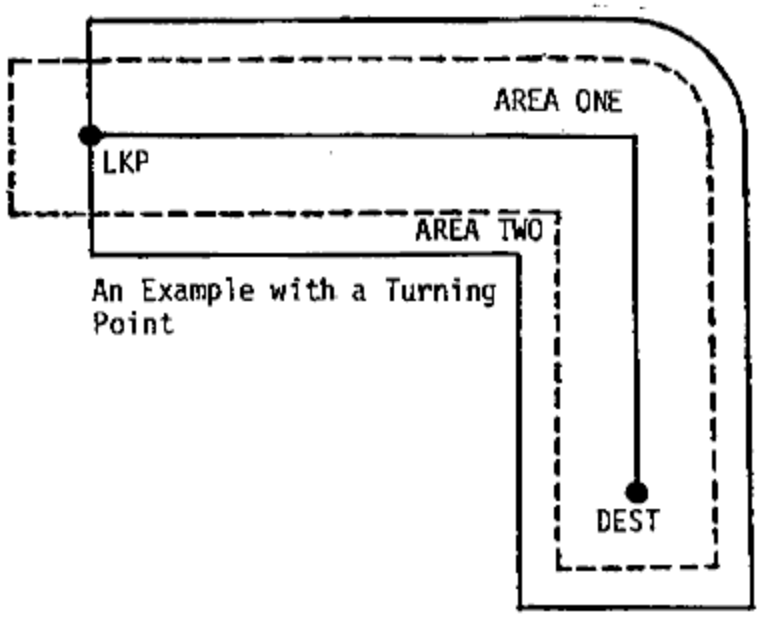
<FIGURE 6-1 CSAD Areas>

NOTE: A graph providing ready reference for determining the square mileage of search areas is included in Figure 6-2.



<FIGURE 6-2 CSAD SQ Mileage Graph>

25. 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 10nm for Area One and 15nm for Area Two, as per figure 6-3.



<FIGURE 6-3 CSAD Turning Point>

26. 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 paragraph 23 should change during the search.

27. Probability of Whereabouts (PW) - The PW 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.

CSAD SEARCH STRATEGY AND SEQUENCE

28. There is no single sequence of search types or patterns which will be suitable for all searches. For searches where the CSAD method is used, the following search sequence is suggested, unless circumstances dictate otherwise:

a. Phase I

(1) Carry out track crawls along the missing aircraft's intended track and thoroughly check in the vicinity of LKP and destination.

(2) Carry out electronic searches.

(3) Carry out a cooperating target/survivor search, over the high probability areas, covering 15 miles either side of the missing aircraft's intended track.

b. Phase II - search Area One in the following sequence, for all track lengths:

(1) the last quarter of track from the track outwards with equal priority along track,

(2) the third quarter from the track outwards with equal priority along track,

(3) the first quarter from the track outwards commencing at LKP,

(4) the second quarter from the track outwards with equal priority along track,

(5) the overfly area followed by the underfly area commencing at the destination and LKP respectively,

c. Phase III - expand the search to Area Two and use the same sequence as given in "b" above.

THE MOUNTAIN VISUAL FLIGHT RULES (MVFR) METHOD

29. Canadian SAR data involving VFR flight plans has revealed distinct differences in PW between the mountainous regions and other regions of the country. In particular:

a. 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;

b. very few crash sites are found before the last known position or beyond the intended destination;

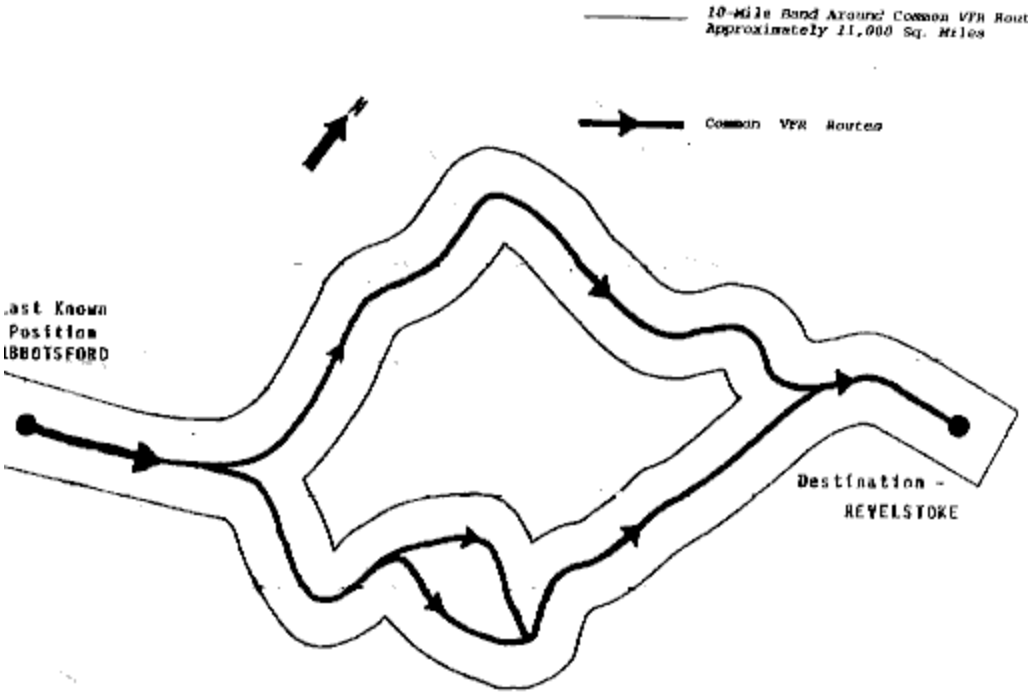
c. crash sites tend to cluster close to the intended track with the PW decaying sharply as you move away from the track; and

d. the minimum search area for a given PW always stretches along the entire length of the track.

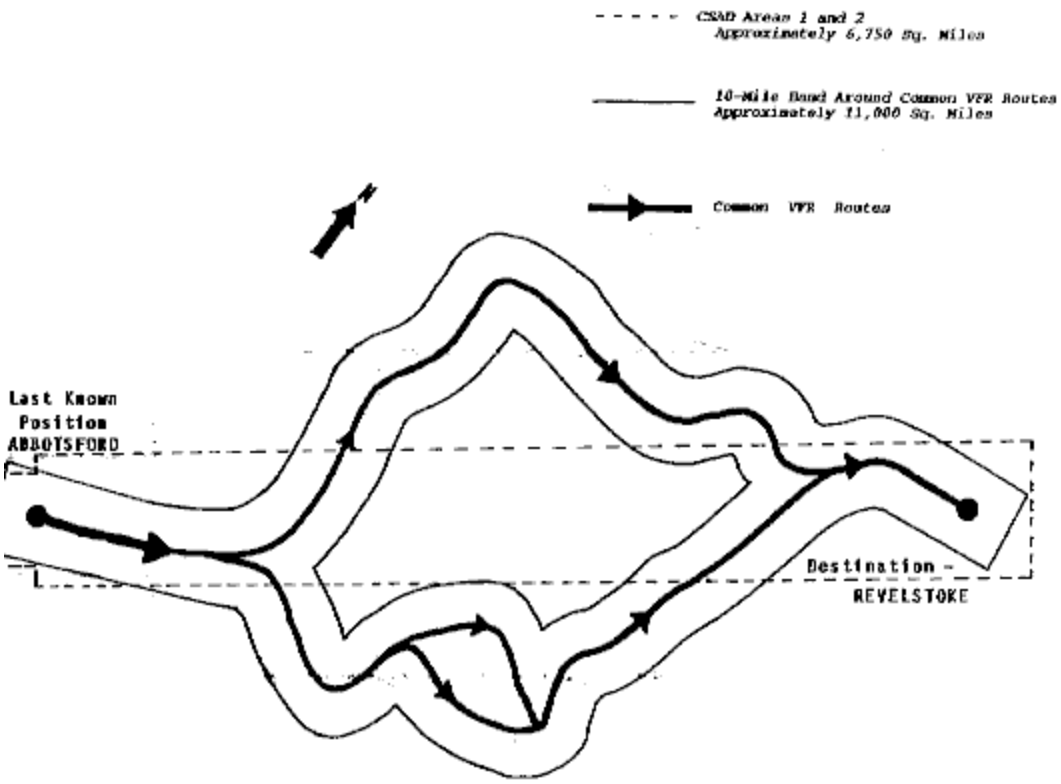
30. Two probability areas are defined for cases involving VFR flight plans in mountainous regions (see Figure 6-4).

a. Area A - This is an area which stretches along the entire track of the missing aircraft, from the last known position to the intended destination, and extends 5 miles either side of the 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 last known position and 5 miles beyond 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.

b. Area B - This is an area which stretches along the entire track of the missing aircraft from the last known position to the destination and extends 10 miles either side of the track. Note that Area B also includes all of Area A.



<FIGURE 6-4 MVRF SEARCH AREA>



<FIGURE 6-5 Comparison CSAD & MVFR>

Area B is extended 10 miles before last known position and 10 miles beyond destination to cover takeoff and landing incidents. Based on previous data this area should include a much greater proportion of

crash sites.

MVFR SEARCH STRATEGY AND SEQUENCE

31. Given that an aircraft is missing on a VFR flight in the mountainous regions of Canada and all the preliminary checks have been completed without success, the following procedure is recommended:

a. Phase I

(1) Carry out track crawls along the missing aircraft's intended VFR route and thoroughly check last known position and destination for near take-off/landing incidents.

(2) Carry out an electronic search to detect any Emergency Locator Transmitter (ELT) signals.

(3) Carry out a cooperative 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 tracks if the intended track is unknown.

b. Phase II - Thoroughly search Area A in the following sequence, for all track lengths. If missing aircraft's intended route 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 last known position,

c. Phase III - Expand the search to Area B, and use the same sequence as given in "b" above. Any valleys, dead-end canyons, passes, etc., that may have been taken accidently by missing aircraft should also be covered.

32. Figure 6-5 shows a comparison between the CSAD and 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

33. General - The computation of sweep width (W) depends on the search methods being used by SAR units. These can be divided into the following

general headings:

a. visual search;

b. electronic search; and

c. miscellaneous methods.

This section will summarize the most recent data on sweep widths and discuss various modifying factors.

34. Visual Search. For inland searches, sweep width tables have not been computed, although research may some day provide better guidance for planners. In general two types of inland search are conducted: initial coverage and intensive coverage. For initial coverage, track spacing is usually two nautical miles or more, depending on terrain. For intensive coverage, track spacing is less than 2 miles with 1 mile being the norm (thereby giving the normal 1/2 mile spotting distance), again depending on terrain.

35. Since inland searches will normally be in areas of varying terrain, the coverage factor will be based on the subjective judgement 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.

36. 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 tend to affect the corresponding probability of detection and are discussed below in their approximate order of influence.

a. Search Object - Detectability is significantly related to its size, and its colour contrast relative to its environment.

b. Terrain Conditions - Effects due to the difficulty of sighting objects through dense brush or tall timber; the distractions of vegetation and other surface irregularities.

c. 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.

d. 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.

e. 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 planners

attention, must be considered as objectively as possible when determining the probability of detection using visual search methods.

HEIGHT OF EYE VS. HORIZON RANGE

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>

37. Electronic Search - Electronic searching includes SARSAT queries, radio, radar, magnetic, radioactive and other electromagnetic band searches. The determination of an appropriate value for W in these searches is just as important as in visual searches.

38. Electronic sweep widths, including SARSAT coverage, may be affected by:

a. the search objects' output;

b. the search units' capability;

c. environmental attenuation level;

d. environmental ambient noise;

e. terrain attenuation; and

f. COSPAS/SARSAT orbital mechanics.

The detection range of locator 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.

39. 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 a series. When such data is available, the following guidelines are recommended in order of preference:

a. when minimum detection range is known, W = 1.7 times minimum detection range;

b. when average detection range is known, W = 1.5 times average detection range;

c. when maximum detection range is known, W = maximum detection range; and

d. when no detection range is known, W = .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.

40. Miscellaneous Methods - The following are methods for which sweep widths are so variable that a subjective estimate of P will be the only option. The search methods include:

a. Forward Looking Infra-Red (FLIR); and

b. Night Vision Goggles (NVGs).

SEARCH AREA COVERAGE

41. The number of times an area should be searched depends on the Probability of Whereabouts and the Probability of Detection (P). Both of these values are subjective. However the following guidelines are suggested:

a. lateral coverage from the airplane is improved to some extent

with increasing altitude without degrading the "P" appreciably. Therefore, a minimum search altitude of approximately 1000 feet should be considered where terrain and/or vegetation are factors;

b. 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

c. 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.

42. Any pre-defined search areas like those of CSAD and MVFR are intended as guides to the SM 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 accidently by the pilot. This canyon should be searched even if it extends more than 10 NM from the intended track. The key is common sense and flexibility.

SEARCH AREA EXPANSION

43. Inland Searches - Unlike marine 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.

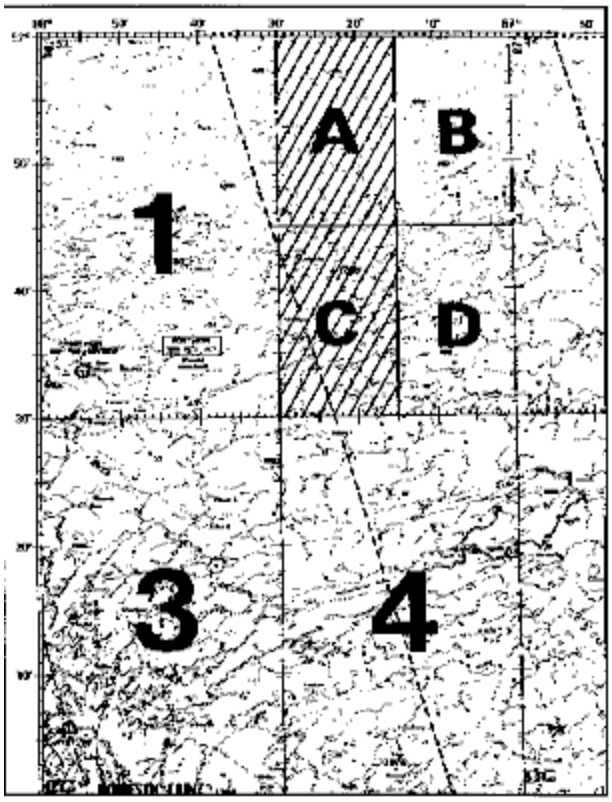
44. Current data does not allow for more than a subjective estimate of the effectiveness of aerial search. Factors such as the type of terrain, the weather, the available light and the capability of the searchers all affect the efficiency of the search units. It will be the responsibility of the search 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

45. 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 described 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.

46. 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 one degree by one 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. This example is portrayed in Figure 6-7.



<FIGURE 6-7 GEOREF Method>

47. 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 indicated the GEOREF grid that can be easily extrapolated onto the map.

48. Other possible methods, described in the US National SAR Manual, Art 828, include the following:

a. boundary method;

b. corner method;

c. centre point method;

d. track line method; and

e. grid method.

The latitude and longitude system of squares (GEOREF) 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 cooperative 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 RCC/SM, but for the other agencies involved with the operation. Marine SAR units will simply use latitude and longitude.

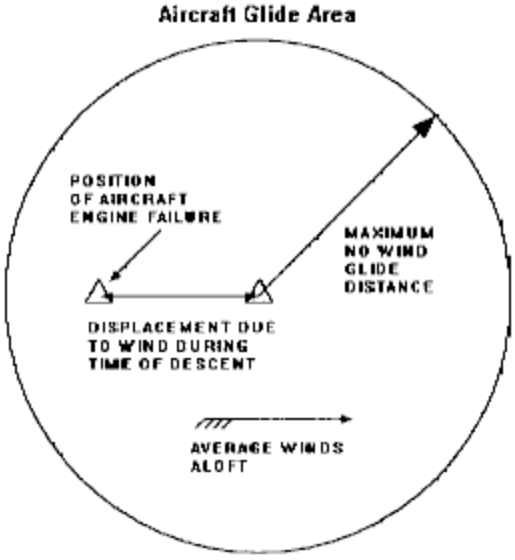
ANNEX 6A -- AERIAL DRIFT FORCES

1. This Annex amplifies Chapter 5 provides for the detailed calculation of aerial drift.

2. Aerospace Trajectory (da) - 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 of 0.5 nm for turbo-prop and medium performance jets or 0.8 nm for high performance jet aircraft. Information is seldom precise enough to make use of aerospace trajectory.

3. Aircraft gliding distance may also be considered part of da 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.

AIRCRAFT GLIDE AREA



<FIGURE 6B-1 AIRCRAFT GLIDE AREA>

4. In all cases of bailout, maximum use must be made of radar, including TRACS and JETS when available, since most ejection seats include automatic chaff dispensers.

5. Parachute Drift (dp)- If the position and altitude of bailout are known, it will be possible for the planner to apply parachute drifts. 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 height 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 6-2 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 CFWO or AES. The applicable winds, from bailout altitude to the local terrain height are applied to achieve an average wind vector; an example is shown in Figure 6-3. Using the wind speed from this vector, enter Figure 6-2 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	.5	.9	1.2	1.5	1.8	2.1

<FIGURE 6B-2 PARACHUTE DRIFT DISTANCE>

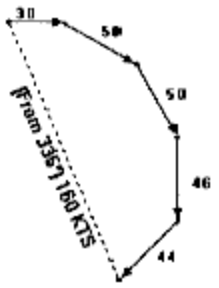
AVERAGE WINDS ALOFT EXAMPLE

A. WINDS ALOFT DATA

SPECIFIED ALTITUDE	EFFECTIVE RANGE	DIRECTION/ VELOCITY	VECTOR VALUE
	9000		
8000		270/30	090/30
	7000		
6000		300/25	120/50
	5000		
4000		330/25	150/50
	3000		
2000		000/23	180/46
	1000		
SEA LEVEL		045/44	225/44

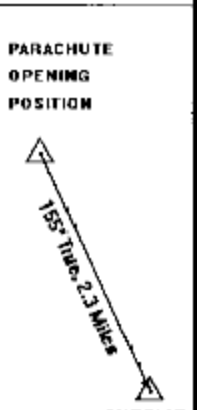
NOTE: THE VECTOR VALUES FOR 8000, 4000, AND 2000 REPRESENT A RANGE OF 2000 FT. EACH. THEREFORE, THE TOTAL NUMBER OF VECTORS FOR 1000 FT INTERVALS IS 8.

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 6B-3 AVERAGE WINDS ALOFT>

CHAPTER 7 -- SAR OPERATIONAL PROCEDURES - MARINE

MARINE INCIDENTS

EVALUATION OF DEGREE OF EMERGENCY

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 SAR 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 judgement 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 necessary.

2. Nothing in the following paragraphs is meant to prevent the controller from assigning the highest degree of emergency.

SAR INCIDENT PROGRESSION

3. When efforts to locate the search object indicate that an emergency no longer exists eg: the communication search was successful and no problem exists or the object and/or the survivors thereof have been located and rescued, the RCC/MRSC shall close the incident and immediately inform the operating agency and any centre, service or facility that has been alerted or activated.

4. If apprehension as to the safety of the search object and its occupants continues to exist, or if the persons on board are considered to be 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 as the circumstances warrant.

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, paragraph 78 to 84.

DEGREES OF MARINE EMERGENCY

6. There are three degrees of emergency used in the conduct of marine SAR incidents: UNCERTAINTY, ALERT, and DISTRESS.

7. An UNCERTAINTY phase exists when there is doubt regarding the safety of a ship or other craft or the persons on board, and when:

a. it has been reported overdue at destination; and

b. it has failed to make an expected position report.

8. An ALERT phase exists when there is apprehension regarding the safety of a ship or other craft or the persons on board, and when:

a. following the uncertainty phase, attempts to establish contact with the ship or other craft have failed and inquiries addressed to other appropriate sources have been unsuccessful; and

b. information has been received indicating that the operational efficiency of a ship or other craft is impaired but not to the extent that a distress situation is likely.

9. A DISTRESS phase exists when:

a. positive information is received that a ship or other craft or a person on board is in grave and imminent danger and in need of immediate assistance;

b. following the alert phase, further unsuccessful attempts to establish contact with the ship or other craft and more widespread unsuccessful inquiries point to the probability that the ship or craft is in distress; and

c. information is received which indicates that the operating efficiency of the ship or other craft has been impaired to the extent that a distress situation is likely.

NOTES:

1. The reception of a 406 Mhz EPIRB signal from a registered beacon shall be considered "positive information" in accordance with paragraph (a) above.

2. Paragraph (c) above confers the authority to declare distress on behalf of a vessel or other craft whether or not the vessel or craft 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 MARINE EMERGENCY

10. During the UNCERTAINTY phase an RCC/MRSC shall, when applicable:

a. 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 CGRS issues a general marine 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 SAR response.)

b. attempt to obtain information on the route, points and times of departure and arrival of the ship or craft;

c. start a plot of the situation based on the information obtained;

d. conduct a communication search, utilizing appropriate resources;

e. issue an all stations broadcast for information on the vessel's whereabouts;

f. if the voyage originated in, intended entering, or may have entered other than Canadian waters, notify the appropriate RCC; and

g. 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.

11. During the ALERT phase the RCC/MRSC shall, when applicable:

a. issue an all stations broadcast under an urgency (PAN PAN) prefix for information on the vessel or, if the vessel is disabled, to locate vessels able to render assistance;

b. alert personnel and SAR facilities, and plan initial briefing of SAR crews;

c. verify the information received;

d. endeavour to obtain information concerning the ship or craft from sources not previously contacted;

e. thoroughly evaluate information on the ship's or craft's intended route, weather, possible communications delays, last known position and last radio communication;

f. consider the possibility of fuel exhaustion and the estimated performance of the ship or craft under adverse conditions;

g. maintain close liaison with associated Coast Guard Radio stations/Vessel Traffic Services (VTS) Centres so that information from ships at sea can be evaluated;

h. plot relevant details obtained through the actions described

above to determine the probable position of the ship or craft and its maximum range of action from its last known position and determine the extent of search area. Also plot the positions of any ship or craft known to be operating in the vicinity;

j. if so indicated by the situation appraisal, initiate appropriate search action and notify the associated Coast Guard Radio stations and/or VTS Centres of any action taken; and

k. whenever possible, communicate to the owner or agent all information received and action taken.

NOTE: Inter-SRR tasking of SAR resources 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.

12. During the DISTRESS phase RCC/MRSC shall carry out the following, when applicable:

a. initiate action in accordance with the detailed plans or instructions for conduct of SAR operations in its area;

b. develop a search plan;

c. advise appropriate authorities;

d. notify the owner or agent, if possible, and keep them informed of developments;

e. notify adjacent RCCs or MRSCs which may render assistance or which may be concerned in the operation;

f. issue an all stations broadcast for vessels to render immediate assistance (Note - this action may already have been taken by a CCG radio station in the form of MAYDAY and/or MAYDAY RELAY as appropriate);

g. when applicable, inform the vessel in distress, if possible, of SAR actions taken;

h. when the incident involves a vessel of foreign registry, notify the consular authorities concerned (see Note);

j. assess and determine the most suitable resource for assuming the duties of OSC/CSS, as appropriate;

k. assess and determine the most suitable location for the search headquarters and arrange for the appointment of a SM; and

m. develop a rescue plan in the event casualties require assistance (consider using EMO for their contacts with local hospitals,

police, etc.).

NOTE: Requests for information received from consulate are to be acknowledged by RSMS and forwarded through RMSR to CGHQ (AME) for action as soon as possible. If any correspondence takes place with a consular authority 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 External Affairs, Legal Advisory Division.

ASSISTANCE TO DISORIENTED VESSELS

13. When a disoriented vessel requests assistance from RCC/MRSC, the duty Marine Controller shall evaluate the degree of emergency (paragraphs 1 and 2 refer) and take such action, as deemed appropriate under the circumstances.

a. Attempt to locate the disorientated vessel by using any available communication network or information source, such as CGRS, VTS and/or ECAREG.

b. Task available SAR resources to locate the disoriented vessel and either escort the vessel to safety or provide guidance so that he can proceed safely.

NOTE: See Annex 7B for information respecting the assistance which VTS Centres can provide to disorientated vessels.

ASSISTANCE TO DISABLED/ABANDONED VESSELS

14. SAR resources often provide assistance in operations not directly related to a 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 15 (below), RCC/MRSC should facilitate the participation of resources 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 SAR resources until the owner or other responsible agency assumes control.

15. SAR Activity taken under the above paragraph shall be in accordance with the Coast Guard Towing Policy, 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 SRR 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 COAST GUARD PROGRAMS

16. Subject to SAR priorities, RSMS shall facilitate the use of on-scene Coast Guard resources to support other Coast Guard Programs and Program responsibilities such as those established under the Navigable Waters Protection Act and those granted to Receivers of Wreck and Pollution Prevention Officers.

CIVILIAN SUBMARINE/SUBMERSIBLE SAR OPERATIONS

17. Civilian Submersibles/Submarines - SAR Operations - 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 SAR organization will be to assist the rescue efforts to save the lives of persons involved. The RCC/MRSC shall coordinate such action.

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

19. Search planning is necessary when:

a. the location of the distress is not known; and

b. a significant period of time has passed since the search object's position was last known.

20. The search planning task includes the determination of datum and a search area, developing an attainable plan of SRU effort allocation, selecting search patterns and track spacing to achieve a suitable area coverage, planning on-scene coordination, transmitting the search plan to the OSCs/SRUs, and periodically reviewing and updating the search plan.

METHODS OF SEARCH PLANNING

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 SRU normally require the use of automated planning tools. Less complex incidents may be resolved by the application of manual planning methods.

22. All marine 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.

23. The search object in the marine environment is rarely static; it is being drifted by the various water current and the affect of the average

surface wind during the drift interval. 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.

24. Canadian Search and Rescue Planning (CANSARP) System - CANSARP is an automated search and rescue planning tool that is available in the RCC/MRSC. It is recommended that the current version of CANSARP be used in search planning and is most useful in cases too complex for the manual method.

25. CANSARP advantages are that the program:

a. accepts more available incident data than is possible in a 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;

b. 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;

c. calculates the Probability of Detection (POD), a measure of search effectiveness, for individual SRUs. CANSARP maintains a record of the POD for each unit allowing the search planner to more effectively evaluate the search effort, especially in large incidents when a number of searches or SRUs are required;

d. CANSARP divides the divergence angle (see paragraph 33) of the assigned targets, by a factor of ten, and drifts each individual set of vectors over the desired time series. This results in eleven drift tracks per target, with the 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 "search concentration", Chapter 5, paragraph 45). 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;

e. CANSARP also calculates the minimax probability area derived by the manual method. If adequate search resources are available to the search planner, this area may still be covered; and

f. to monitor and improve CANSARP, the results of successful and unsuccessful SAR incidents shall be compared with CANSARP

predictions. Copies of incident files, SITREPs, and other information relevant to the CANSARP predictions should be sent to:

Director, Readiness and Monitoring (AMED)
Canadian Coast Guard Rescue & Environmental Response Branch
344 Slater Street
Ottawa, Ontario, K1A 0N7

26. Other SAR planning models, such as DRIFTCALC and the USCG's CASP are available for determining the search area. However, as with all planning tools, their limitations and proper application should be determined.

MANUAL SEARCH PLANNING

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:

a. determine a datum for an appropriate commence search time;

b. calculate a search area surrounding the datum(s) considering the probable drift and navigation errors;

c. 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

d. allocate sub-areas to the SRU in a manner that will maximize their effort during this particular search.

DATUM

28. Datum is defined as the most probable position of the search object,corrected for drift at any specific time. In the marine 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. Therefore, the search planner should include all the appropriate forces, considering the location, when calculating a particular datum. As the target continues to be acted upon by these forces during the search, datum should be periodically recalculated. Datums are usually labelled sequentially (e.g., Datum1, Datum2, Datum3), with the calculation time.

29. One of four possible datums usually exists, depending on the initial position information received by the search planner; a unique 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. Three possible situations

usually exist.

a. 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.

b. 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).

c. 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 DF 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, and a series of dead reckoning (DR) positions are computed for estimated progress along the track. The DR position at the end of the track and turning points along the track are used. 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 sequentially connected by straight lines to form a datum line.

d. 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.

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:

a. First Search/Subsequent Searches: If planning a First Search, the

planner must consider the location of the incident; for Subsequent Searches, determine the LKP type;

b. Determine Location: Establish whether the search object is in Coastal Waters or the Oceanic Environment;

c. 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;

d. Determine LKP Type: Establish the Last Known Position Type. Consider one of the following: single position, multiple position, area or trackline;

e. Compute Total Water Current: Consider all the water current (Sea Current, Tidal Current, Wind Driven Current, etc.);

f. Compute Leeway: Leeway is applied downwind in Coastal Waters, and in cases in the Oceanic Environment where the LKP is determined to be an area of trackline, or if the total drift time is four hours or less (See Leeway below). Leeway Divergence is applied in situations where the LKP is a single position or multiple position and the total drift time is equal to or greater than four hours;

g. Determine DATUM(s) or DATUMminimax: If the planner used Downwind Leeway, then he will determine DATUM (one position per LKP). If he used Leeway Divergence, he will determine DATUMminimax (generate two positions - Dmin and Dmax and solve for DATUMminimax);

h. Determine the Search Radius

(1) For Coastal Waters with less than six hours of drift, use a six nautical mile radius (See sub-paragraph j below). If more than six hours of drift, use Oceanic methodology.

(2) For the Oceanic Environment, if the drift is less than four hours, compute Search Radius without considering Total Drift Error (De). If more than four hours, compute the Search Radius using Total Probable Error (E).

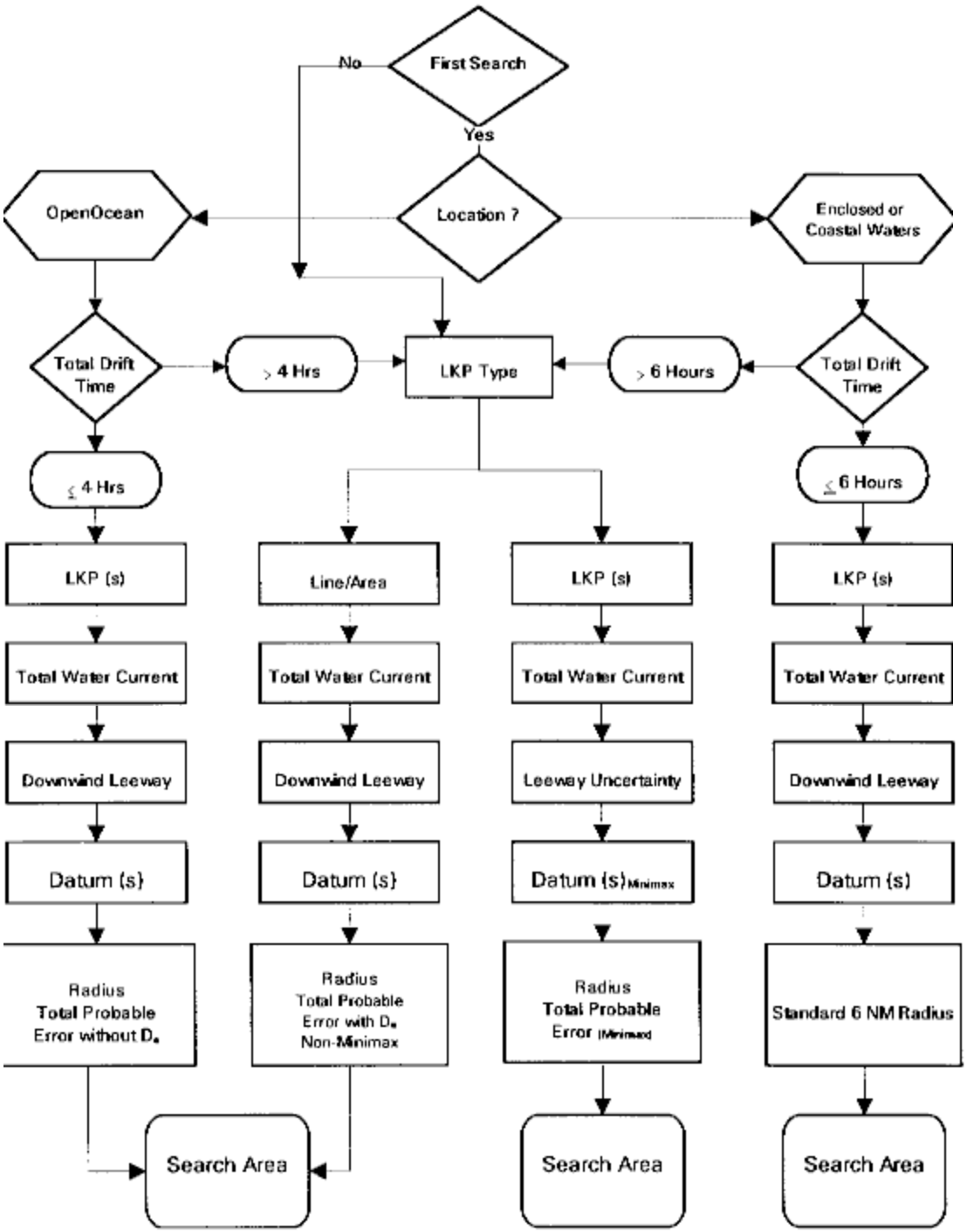
j. Search Area(s)

(1) For Coastal Waters, a six mile radius around DATUM(s) will normally create the desired search area. If these radii are drawn about multiple positions, as a trackline DATUM, then the Search Area can be determined from a chart plot.

(2) For the Oceanic Environment, Search Area (minimax solution) is determined by the Search Radius. For non-minimax solutions, Search Area will be determined by drawing search radii about multiple DATUM positions as in the Coastal

Solution.

Annex 7C contains search planning worksheets as an aid for calculating solutions to these cases.



<FIGURE 7-1 SEARCH PLANNING DECISION MATRIX>

31. Leeway (LW) - Leeway 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 object causes leeway to vary

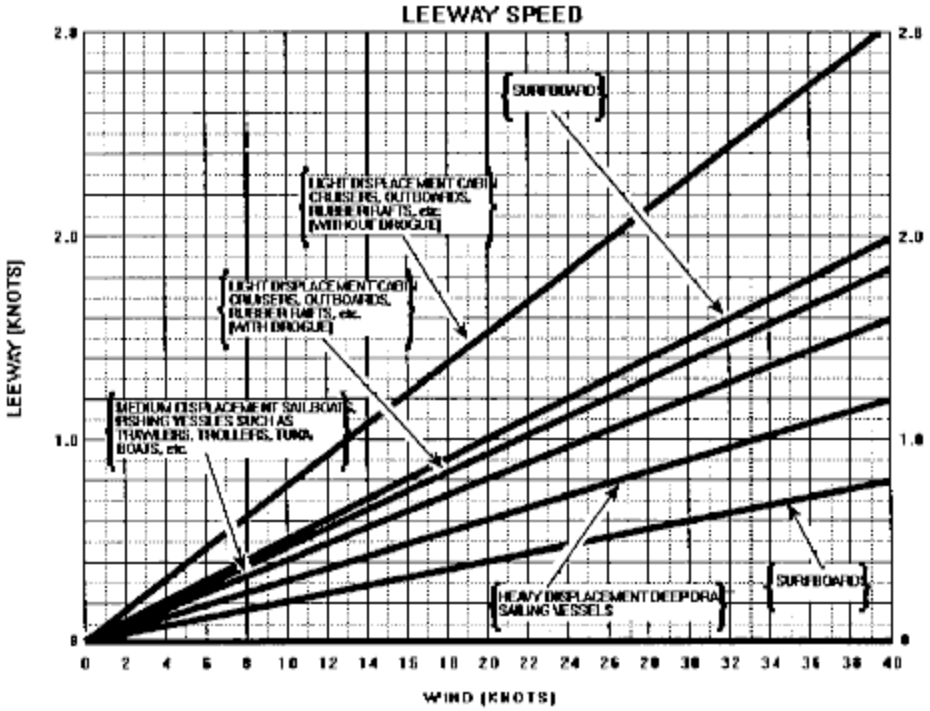
to the point where it is extremely difficult to determine a precise value for leeway direction and magnitude for any given object. The graph at Figure 7-3 provides leeway speed for various objects at windspeeds of up to 40 knots. Alternately, the search planner may calculate the leeway speed of a search object using the formula provided in Table 7-2 (Wind speed in knots = U).

Table 7-2 -- LEEWAY SPEED FORMULAE

Type of Craft	Leeway Speed	Divergence
Light displacement cabin cruisers, outboards, liferafts, etc. (without drogue)	0.07U + 0.04 *	± 35°
Large Cabin Cruisers	0.05U	± 45°
Light displacement cabin cruisers, outboards, liferafts, etc. (with drogue)	0.05U - 0.12 *	± 35°
Medium displacement sailboats, fishing vessels such as trawlers, trollers, tuna boats, etc.	0.04U	± 45°
Heavy displacement deep draft sailing vessels	0.03U	± 45°
Surfboards **	0.02U	± 60°

* Note: Do not use for values of U below 5 knots. Use figure 7-3 instead, if applicable

** The formula for Surfboards may be used for PIW wearing survival suits, if no other information is available.



<FIGURE 7-3 LEEWAY SPEED>

32. Some liferafts are so equipped that adjustments should be made to the leeway speed obtained from the Figure 7-3. The following guidelines should be used:

a. rafts with canopies and ballast buckets - no change;

b. rafts with canopies only add 20 per cent to leeway speed shown;

c. rafts with ballast buckets only, subtract 20 per cent from leeway speed shown; and

d. for rafts with deep draft ballast systems without canopies, leeway speed will be approximately 2.3 per cent of wind speed.

33. The direction of the leeway vector should be considered to be roughly downwind. Experiments have shown that objects tend to diverge either side of the downwind direction, ± 35° for liferafts to ± 60° for shallow draft vessels and ± 45° for vessels with moderate to deep draft, ie, partly loaded to fully loaded cargo vessels/tankers.

34. Wind Current (WC) - Also called wind driven current or wind drift current, it 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. Wind current 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 nm or more from shore.

35. 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, 00Z, 06Z, 12Z and 18Z, or from weather maps and wind speed and direction for each period is considered to be that which was 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.

36. Wind Current Computation (WC) - The USCG 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 7D.

37. Sea Current (SC) - Sea current is the permanent, large-scale flow of ocean waters, not caused by local winds or tides. Sea current 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 sea current information are available, the most recent and preferred sources are the appropriate US Pilot Charts or Canadian Hydrographic Publications. The instructions for deriving sea current from these and other publications are included in the publications. It must be remembered that sea current publications are based on recorded climatological data and should be verified whenever possible with more recent on-scene information.

38. Tidal Current (TC) - The exact 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:

a. when tides reverse, the current effect in one direction may be greater than in the other;

b. the tidal flow will cause changes in the probable position of the search object for different search times; and

c. the cumulative effect may be such as to thrust the search object into areas where sea current may take effect.

39. Lake Current (LC) - 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, the only source will be the local knowledge of boat or marina operators who are familiar with the lake.

40. River Current (RC) - 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.

41. Bottom Current (BC) - Although Canadian SAR resources are seldom involved in underwater incidents, it may be necessary for the SAR planner to obtain information for military or commercial divers on bottom current. This data can be obtained from the Canadian Hydrographic Regional facility.

42. Long-Shore Current (LSC) - Caused by incoming swells striking the shoreline at an angle, LSC is only considered within one mile of the shoreline and must be obtained from direct observation or local knowledge.

43. In general, when planning any kind of inshore search, it will be advisable to seek local knowledge. Each RCC will normally have established reliable contacts who can provide such data. These might include:

a. Coast Guard or Naval experts;

b. Oceanographic Institutes;

c. Professional fishermen or tug operators;

d. Marina operators;

e. Ferry operators; and

f. Local area marine pilots.

44. Total Water Current (TWC) - The vectorial sum of all applicable current in a particular drift plot may be referred to as TWC.

45. 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 empirical data. Some of the methods which may be used are:

a. information on winds or current from vessels operating in the area of the incident;

b. Datum Marker Buoys (DMB) are carried by SAR aircraft and vessels and by some naval aircraft and vessels. A DMB should be employed at the earliest opportunity in a marine 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;

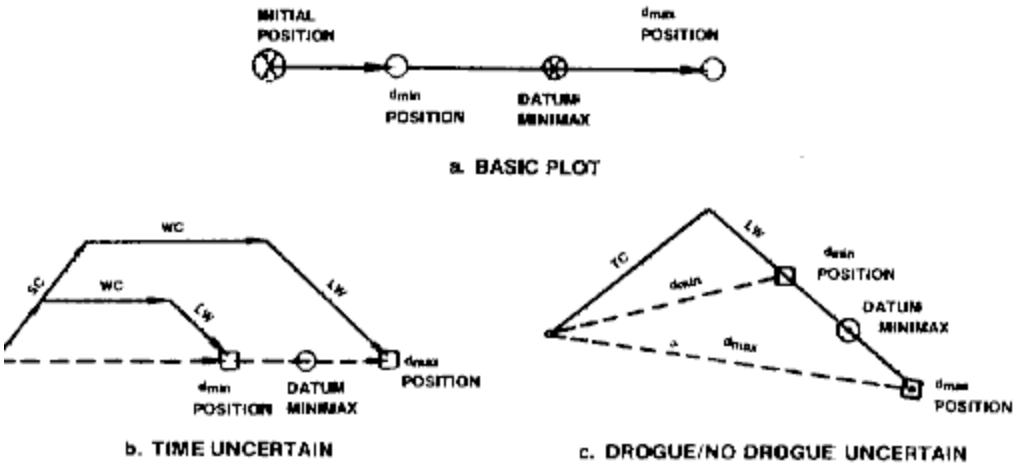
c. Expendable Surface Current Probes (ESCP) are carried by some oceanographic research vessels and should be deployed if available. The same constraints exist with ESCP as with DMB;

d. visual markers such as smoke floats or dye markers can be used but must be continually replaced to ensure continuous marking; and

e. 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

46. Often the information available about a marine 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 effect the object. Then, the least practical values are added vectorially to provide the minimum distance an object should be from LKP, and the greatest practical values are added vectorially to provide the maximum distance it should be from LKP. The datum point is established midway between these two. This procedure is called minimum/maximum (minimax) plotting, and some examples are shown in Figure 7-4. The minimum distance is labelled dmin, the maximum distance dmax and datum point is labelled Datumminimax.



<FIGURE 7-4>

47. 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 will be considered as downwind. If object uncertainty (leeway) is imposed time and position uncertainty will not be included in the computation.

DATUM AND SEARCH UNIT ERRORS

48. 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 LKP, 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 (E2 = a2 + b2 + c2 etc). This calculation is of great importance since the size of the search area which will be developed depends directly on E.

49. Three basic errors which must be considered are:

a. total drift error (De), which includes individual drift error (de) and minimax drift error (de minimax);

b. initial position error (X); and

c. search craft error (Y).

These are used in the basic formula:

$$E = \sqrt{D_e^{\,2} + X^2 + Y^2}$$

50. Total drift error is either the combination of all individual drift errors or the minimax error. Individual drift error is the error which develops during computation and is possible when computing any kind of drift. The errors are due to the assumptions and generalizations which must be made to keep the computations practical and simple. For search planning this error is established as one-eighth (0.125) of the determined drift (three-tenths (0.3) if confidence is low). Again, for practicality, drift error is ignored if less than one mile and this need not be considered except for water surface drift.

51. The minimax drift error is determined using the formula:

$$\text{de minimax} = \frac{\text{Distance} + \text{de min} + \text{de max}}{2}$$

where Distance is the distance between dmin and dmax, and de min is one-eighth dmin and demax is one-eighth dmax

52. The precise definition of total drift error (De) 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. De is used in determining the total probable error, E. In the calculation of the first datum on a mission, de will usually equal De but, as the mission progresses and another datum is calculated, De will equal de 1 + de 2, and so on.

53. 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 De. When using minimax plotting to account for directional

uncertainty, De must be determined for the final datum position only.

54. 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 less error may be expected.

55. Figure 7-5 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.

Navigational Fix Error		Navigational DR Errors	
Type of craft:	Fixe	Type of craft:	DRe
Vessel	5-mile radius	Ship	5 percent of DR distance.
Submarine(military)	Do.	Submarine(military)	Do
Aircraft with over 2 engines	Do.	Aircraft with over 2 engines	Do.
Aircraft with only 2 engines	10-mile radius.	Aircraft with only 2 engines	10 percent of DR distance
Aircraft with only 1 engine	15 mile radius.	Aircraft with only 1 engine	15 percent of DR distance
Submersible	Do.	Submersible	Do.
Boat	Do.	Boat	Do.
Position fixing net	As classified by net.		As classified by net.

FIGURE 7-5

56. 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 DR position, X is the sum of the fix error and the DR error.

57. 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 DR. The values shown in Figure 7-5 apply to the search units.

58. The total probable error may be found using the formula

$$E = \sqrt{D_e^{\,2} + X^2 + Y^2}$$

It should be noted that, in the early hours (up to four) of a search, drift error can be disregarded.

59. It will be necessary for the search planner to recompute E periodically, for example to account for:

a. drift changes, as datum is redefined;

b. search craft changes; or

c. initial position revision.

OFFSHORE SEARCH AREAS

60. 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 marine searches this can be described as a circle with the datum point as centre and having a radius equal to the sum of the total probable error and a safety factor. (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 7-6 shows the safety factors which must be applied to E to determine search radius.

SAFETY FACTORS AND SEARCH RADIUS		
Search	Ie	R
1st.....	1.1	1.1E
2d.....	1.6	1.6E
3d.....	2.0	2.0E
4th.....	2.3	2.3E
5th.....	2.5	2.5E

FIGURE 7-6

61. 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 (LKP Datum minimax line). 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.

INSHORE SEARCH AREAS

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 arbitrarily set at six miles. The safety factors shown in Figure 7-6 may be used to enlarge subsequent searches, the datums for which will be developed using minimax plotting.

SEARCH AREA EXPANSION

63. Offshore Searches - The procedures described in paragraphs 60 and 61 for determining search area result in repeated expansion of the area as the search continues. The concept provides for the continued researching of the datum as more of the possibility area is being added. 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 will continue to increase.

64. Inshore Searches - After the first search in an inshore case, the search areas will be increased using the method of computing total probable

error and safety factors.

AREA COVERAGE

65. 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:

a. track Spacing (S);

b. probability of detection (P);

c. sweep Width (W); and

d. coverage factor (C).

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

SWEEP WIDTH COMPUTATION

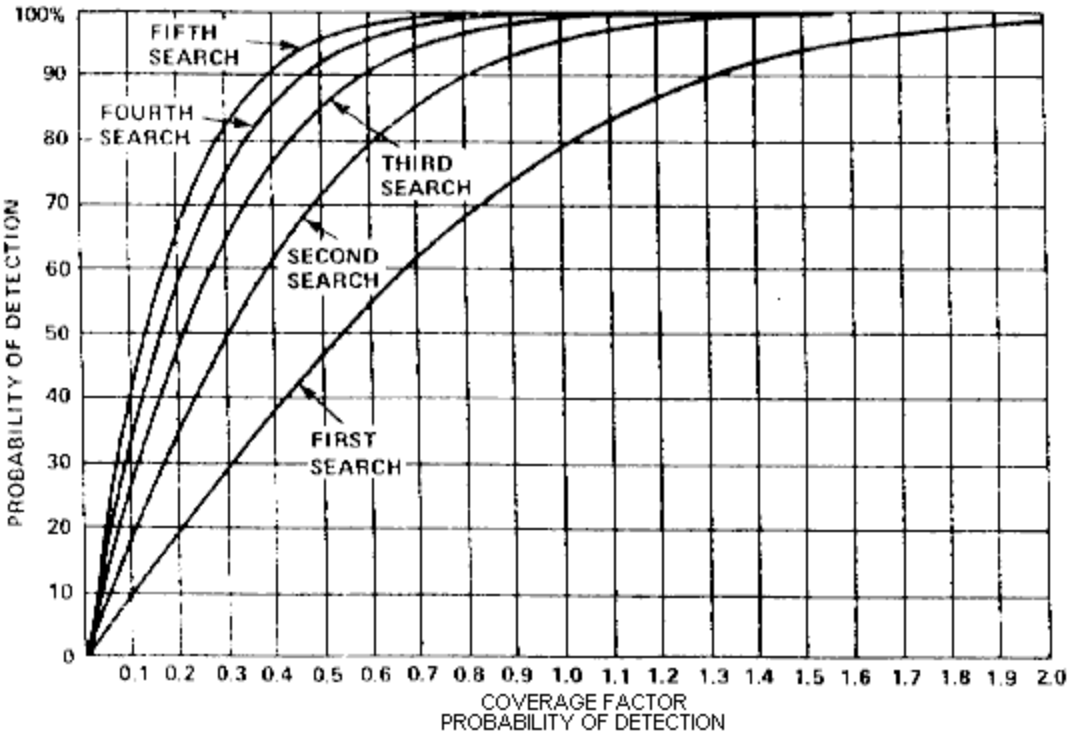
66. General - The computation of sweep width (W) depends on the search methods being used by SRUs. These can be divided into the following general headings:

a. visual search;

b. electronic search; and

c. miscellaneous methods.

This section will summarize the most recent data on sweep widths and discuss various modifying factors.



<FIGURE 7-7 COVERAGE FACTOR>

67. Visual Search - Tables of sweep widths for visual search have been developed for various types of targets (see Annex 7E). The basic factors included in the tables are: type of target, meteorological visibility and search altitude. The uncorrected sweep width, Wu is expressed in nautical miles. Correction tables are included to account for the effect of weather (fw), search aircraft speed (fv), and crew fatigue (ff). The values from these tables are applied to Wu as follows:

W = Wu x fw x ff x fv

It will be noted that in some cases fw is less than 1 in calm winds. This is due to the detrimental effect glassy water conditions have on sighting small objects. Of course, these tables are for daylight use only.

68. Tables in Annex 7E 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.

69. If it is believed that detection aids may be used by survivors, whether in daylight or in darkness, different tables may be used. These are shown in Annex 7E. It must be emphasized that these values are based on best estimates and that, if more accurate information is available, it should be used. Also, the values expressed in Annex 7E are based on good visibility.

70. 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 planners must take them into consideration when developing their search

plan. Visual sweep widths for a variety of search objects and corrections for weather conditions, search aircraft speed, and search crew fatigue are included at Annex 7E. Most tend to affect the corresponding probability of detection and are discussed below in their approximate order of influence.

a. Search Object - Detectability is significantly related to its size and amount of freeboard, its colour contrast or fluorescence, and its motion relative to its environment.

b. Sea Conditions - Effects due to: the difficulty of sighting objects with the distractions of whitecaps, flotsam, and other surface irregularities; glassy water; and wind-blown spray. A weather condition factor is included at Annex 7E, Table 7E-8.

c. 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. A Search Aircraft Speed correction table (fv) is included at Annex 7E, Table 7E-9.

d. Position of Sun - Effectiveness is reduced when looking up-sun, particularly in hazy conditions and when the sun is low on the horizon. Track spacing or orientation may have to be adjusted.

e. 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 planners attention must be considered as objectively as possible when determining the probability of detection using visual search.

71. Electronic Search - Electronic search includes SARSAT coverage, radio, radar, magnetic, radio-active and other electromagnetic band searches. The determination of an appropriate value for W in these searches is just as important as in visual searches.

72. Electronic sweep widths may be affected by:

a. the search objects' output;

b. the search units' capability;

c. environmental attenuation level;

d. environmental ambient noise;

e. terrain attenuation; and

f. COSPAS/SARSAT orbital mechanics.

The detection range of locator 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 7-8.

73. 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 a series. When such data is available, the following guidelines are recommended in order of preference:

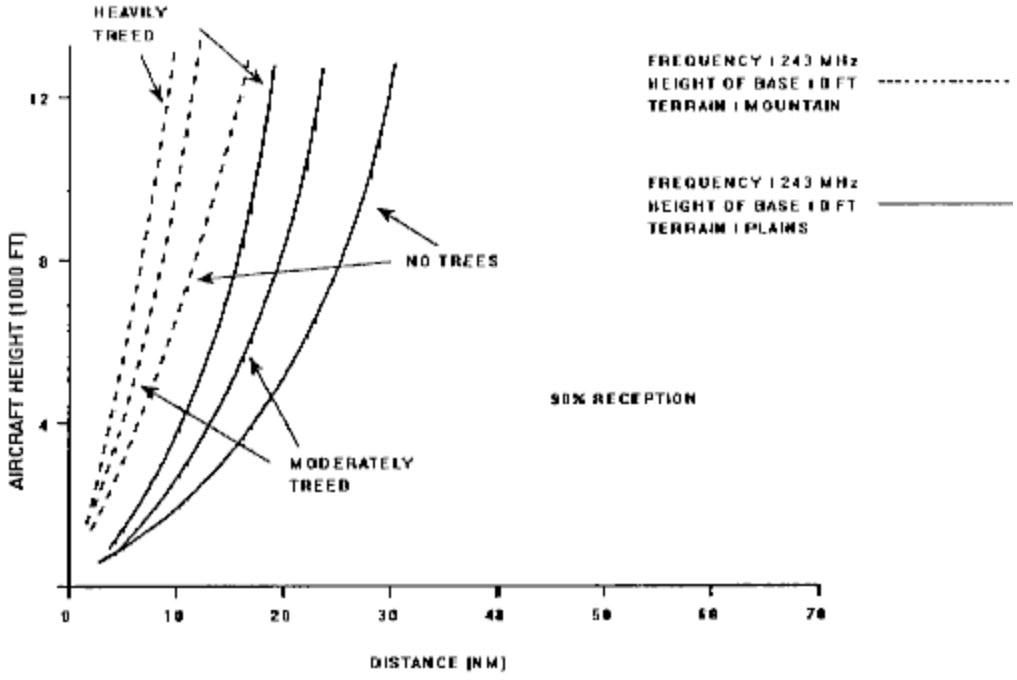
a. when minimum detection range is known, W = 1.7 times minimum detection range;

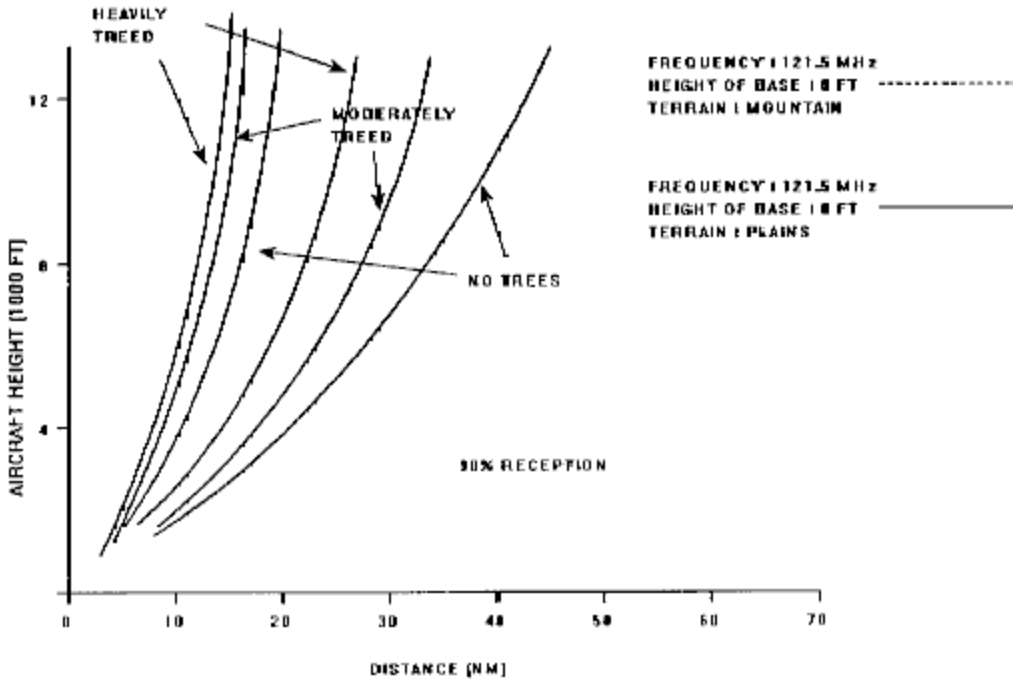
b. when average detection range is known, W = 1.5 times average detection range;

c. when maximum detection range is known, W = maximum detection range; and

d. when no detection range is known, W = .5 times horizon range.

A horizon range chart is provided at Figure 7-9.




HEAVILY TREED
MODERATELY TREED
NO TREES
90% RECEPTION
FREQUENCY : 121.5 MHz
HEIGHT OF BASE : 8 FT
TERRAIN : MOUNTAIN
FREQUENCY : 121.5 MHz
HEIGHT OF BASE : 8 FT
TERRAIN : PLAINS
AIRCRAFT HEIGHT (1000 FT)
12
8
4
0
10
20
30
40
50
60
70
DISTANCE (NM)

<FIGURE 7-8>

HEIGHT OF EYE VS. HORIZON RANGE

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	950	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 7-9>

74. Miscellaneous Methods - The following are methods for which sweep widths are so variable that a subjective estimate of P will be the only option. The search methods include:

a. audible (not aural homing);

b. Forward Looking Infra-Red (FLIR);

c. Magnetic Anomaly Detector (MAD);

d. SONAR; and

e. night vision goggles.

GENERIC PLANNING

75. As stated in Chapter 4, paragraph 55, a major marine disaster SAR contingency plan must be published by each SRR commander. This plan is to be developed in accordance with Annex 7F.

ANNEX 7A -- POLICY FOR THE PROVISION OF TOWING ASSISTANCE BY VESSELS ENGAGED IN SEARCH AND RESCUE OPERATIONS

1. SAR units may provide towing assistance in accordance with the NATIONAL SAR OBJECTIVE as stated in Chapter 1, provided it can be done without imperilling the assisting vessel or tow or persons on board.

2. If in the judgement of the RCC/MRSC or the Commanding Officer 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 the SAR unit will be denied.

CCG ASSISTANCE IN OBTAINING THIRD PARTY RESOURCES

In certain situations, the Coast Guard assists end users, such as a casualty, its agent, or another party, in obtaining resources from the private sector. If it is not made clear to each party at the outset for whose account the resources are to be provided, the supplier may assume that the end user is the Coast Guard, and hence look to the Coast Guard for payment. The following instruction is, therefore, in force upon receipt:

3. If possible, the Coast Guard will have the end user make a direct request to the supplier, rather than through the Coast Guard.

4. If the Coast Guard must relay the request, it is obliged to:

a. on receipt of the request from the end user, make clear that it is for his account, and that signed hard copy reflecting this understanding will be required as soon as possible;

b. on contracting the supplier, make clear that the resources are being obtained for the end user's account, and that signed hard copy reflecting this understanding will be required as soon as possible;

c. if a hard copy of the understanding cannot be obtained then all conversations between the CCG and the end user and supplier should be recorded and/or witnessed; and

d. both the verbal and hard copy formats should include language that covers the following four points:

(1) (supplier) agrees to supply the following resources to (end user) for (end user's) account,

(2) the end user confirms to the CCG that it will be responsible to pay the supplier for the resource,

(3) (supplier) and (end user) accept that the CCG has no contractual or other obligation in this arrangement, and

(4) signature and date of end user and/or supplier as appropriate.

ANNEX 7B -- SAR/VTS PROCEDURES

GENERAL

1. VTS provide service at the following levels:

a. systems where ships report at significant points within a specified area on a designated frequency (usually VHF-FM). All communications on this frequency are monitored continuously; and

b. systems as in subpara a. plus all or part of the zone is under radar coverage from shore where vessel movements may be tracked (high level).

2. The following VTS centres continuously monitor VHF-FM. All stations provide radar service except those indicated.

a. The Bay of Fundy.

b. Halifax Harbour.

c. Port Aux Basques.

d. Placentia Bay.

e. St. John's (no radar).

f. The St. Lawrence River from Sept Isles to Montreal Harbour including the Saguenay River (no radar except Escoumins, Quebec and Montreal).

g. The connecting waters and portions of Lake Erie and Lake Huron (no radar).

h. The waters east of Vancouver Island.

j. Southern British Columbia west of Vancouver Island and Alberni Inlet.

k. Prince Rupert zone comprises all Canadian waters North of a line joining Cape Caution to Triangle Island and South of the International Boundary between Alaska and BC (no radar).

3. The objectives of VTS, in part, are:

a. to facilitate the safe and efficient movement of marine traffic; and

b. to utilize information and all other resources effectively, efficiently and economically.

VESSELS REPORTING

4. While not all of the VTS areas have mandatory reporting of vessels, the types of vessels recommended to participate are the same as those reporting in mandatory schemes.

5. The vessels required to report are as follows:

a. a ship 20m or more in registered length;

b. a towing vessel 8m or more in registered length;

c. a towing vessel less than 8m in registered length, where the length of the two, measured from the stern of the towing vessel, is 30m or more in length or where the extreme breadth of the tow is 20m or more;

d. an air cushion vehicle (ACV) of 8m or more in length; and

e. the provisions do not apply to any vessel or ACV being towed or that is unmanned.

6. The exceptions to the above are:

a. Halifax where only paragraph 5.a. is applicable; and

b. the St. Lawrence system where all vessels, seaplanes on the water and ACVs 7.6m or more in length and pleasure yachts more than 19.8m in length must report.

SAR/VTS PROCEDURES

7. If a vessel in or near a VTS zone communicates a need for SAR assistance to a VTS centre, the Marine Traffic Regulator (MTR) shall perform the following functions:

a. obtain all relevant information about the vessel, its intentions, the nature of the emergency and the assistance required;

b. perform any actions that are immediately required to reduce the danger; and

c. advise the RCC/MRSC of the incident giving full details. (Follow-up reports to the RCC/MRSC will be made as required.)

NOTE: RCC/MRSC has overall authority in all situations involving MEDEVAC and SAR.

8. The RCC/MRSC shall be informed of a vessel that is overdue at a reporting point. This report shall be made only when:

a. the ship is 60 minutes past its Estimated Time of Arrival (ETA); and

b. a brief communication search has failed to contact the ship;

and/or

c. the MTR feels there is reasonable doubt concerning the safety of the ship.

9. VTS will respond to and control all distress, urgency and safety communications transmitted on a VTS working frequency from a ship in or near VTS zone.

10. VTS will respond to and control all distress, urgency and safety communications transmitted on channel 16 VHF-FM if a CGRS does not respond within a short period.

11. Communication control in these situations will be maintained until:

a. the MTR is certain that a change of control will not cause adverse effects or confusion; and

b. approval is received from the SAR controller or OSC for a change in communication control.

12. Change in communication control may be necessary to preserve the safety of other vessels in or near the area and/or to facilitate coordination of the incident. The VTS centre shift supervisor and the CGRS shift supervisor, in concert with the SAR controller will perform the following functions prior to any change in control:

a. hand-off all information concerning the ship;

b. agree on the instructions to the ship to contact the appropriate CGRS and instruct the ship; and

c. agree on the instructions to the ship to re-establish communications with VTS if the CGRS or the ship cannot receive the communications and instruct the ship.

13. If necessary, upon agreement with the OSC or CSS, SAR communications and VTS communications will be separated by moving one or the other from the VTS working frequency. This decision will be based upon the threat to safety involved by changing the frequency, to both the vessel which is the object of the SAR operation and the other vessels in the VTS zone.

14. A VTS centre may, either at the MTR's discretion or on instructions from the SAR controller, rebroadcast a distress or urgency message on a VTS working frequency in accordance with approved standard procedures and/or the SAR controller's instructions.

15. On request by the SAR controller, OSC or CSS, the VTS centres so equipped, will provide shorebased radar assistance. This service may be utilized to identify targets, calculate the drift of objects or to coordinate search patterns. Communications with the vessels involved will be on pre-arranged, mutually agreed frequencies.

16. VTS centres will perform all the above functions in the case of air

incidents on the water (in which case the responsible ATC unit will also be advised) or in assisting air SAR resources in their tasks as requested.

SAR VESSELS IN ZONE

17. SAR vessels, when not engaged on a SAR operation, must comply with the procedures prescribed for other vessels.

18. When CCG or other government vessels are proceeding to the scene of a SAR incident or when transporting sick or injured persons the standard procedures are not mandatory.

19. The VTS centre shall be advised by the CO of a CCG or other government vessel, when that vessel has been tasked to a SAR incident. The report shall be made as soon as practicable after receipt of the tasking.

20. The VTS centre shall make any special provisions necessary for the arrival, departure or transit of a government vessel engaged on SAR operations.

21. COs shall ensure that, to the greatest extent possible, all reporting procedures to VTS are maintained during any SAR operations.

MEDICAL EVACUATION (MEDEVAC)

22. Any request for a MEDEVAC will be immediately passed to RCC/MRSC by VTS.

23. RCC/MRSC, after consideration of the request, shall advise VTS of what action shall be taken.

VTS WORKING FREQUENCIES AND BOUNDARIES

24. Details of VTS working frequencies and boundaries are contained in TP390, Notices to Mariners, Annual Edition.

25. Further information may be found in TP1526 VTS Operational Manual..

VTS STATIONS WITH VHF FM/DF CAPABILITY

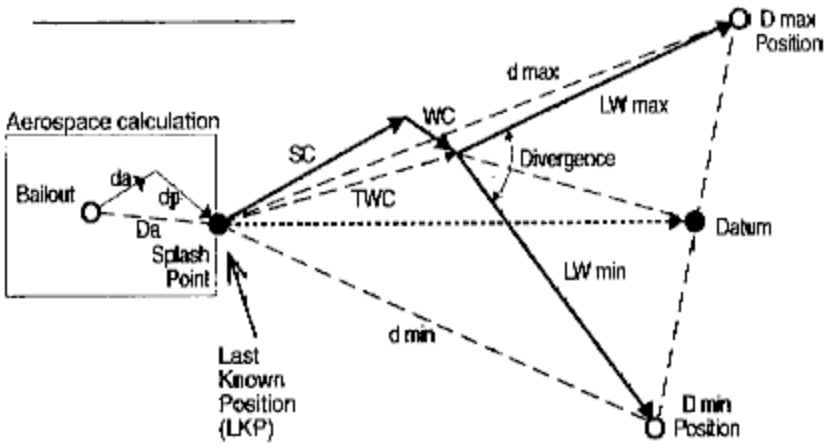
- Vancouver
- Tofino
- Fundy Traffic (Bay of Fundy)
- Halifax Traffic

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

			Minimum		Maximum	
1	Commence search time or mid search time		_____	UTC	_____	UTC
2	Drift interval	**(C1 - B3)**	_____	h	_____	h

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 ☐

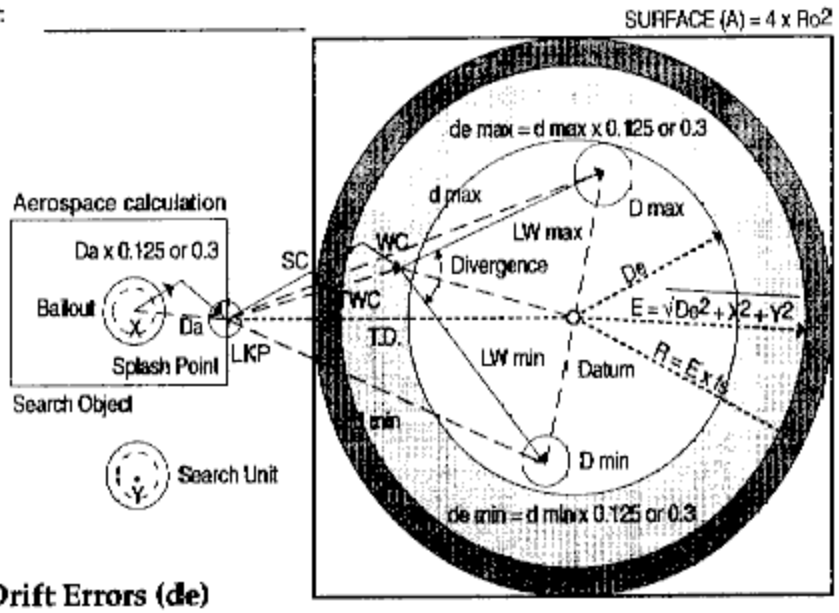
1	Time		UTC		UTC		UTC
2	Latitude	Datum	Dmin		Dmax		N
3	Longitude	Datum	Dmin		Dmax		W

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 **(sum)** _____ M
(de min and de max)

2 Surface Drift Distance **(d min)** _____ M **(d max)** _____ M
(From H2 on Sheet 2)

3 Drift Error Confidence Factor (Choose and circle one) **0.125** **0.3**

4 Drift Error min-max **(de min)** _____ M **(de max)** _____ M
(d min x CF) (d max x CF)

5 Distance between latest dmin and dmax positions **(distance)** _____ M
(From plot H on Sheet 2)

6 Surface Drift Error MiniMax **(de minimax)** _____ M

$$d_e \text{ minimax} = \left[\frac{d_e \text{ min} + d_e \text{ max} + \text{distance} + \text{sum}}{2}\right]$$

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)

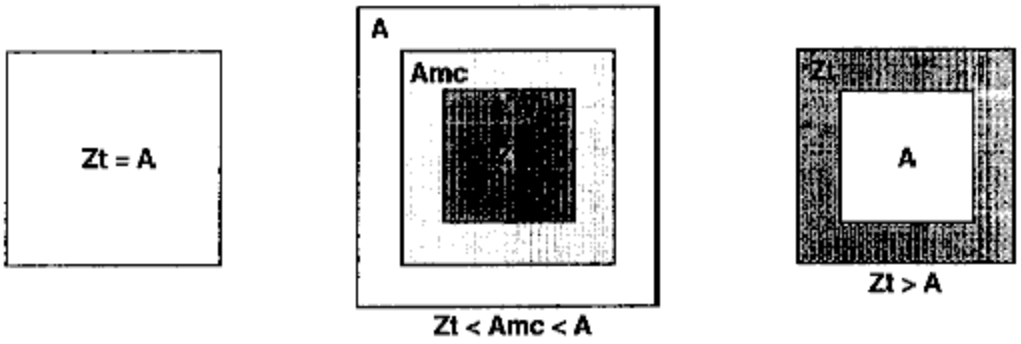
1	Oceanic Search (Square)	$A = 4 R_o^2$	_____	M^2
2	Coastal Search (Square)	$A = 4 \times 6^2$	_____	M^2
3	Rectangle Search Area	(A = length x width)	_____	M^2

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	$C_{mc} = \left[\frac{Z_t}{A_{mc}}\right]$				

	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				

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		**T** _____	hours

(Use the lesser T in lines S4, S5 or S23/0.85, from sheet 5)

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.

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.

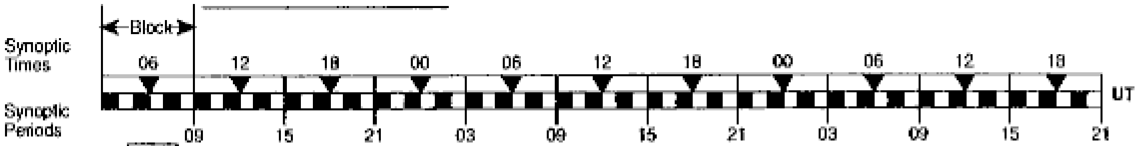
4 If none of the above situations is feasible, conduct an XSB search.
(XSB = Barrier Single Unit Search)

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 — 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 — 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 — 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)

Excel Forms Revised 94.09.07

Wind Current Coefficient Table

North Latitude Only

Period	Latitude												
	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

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

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)

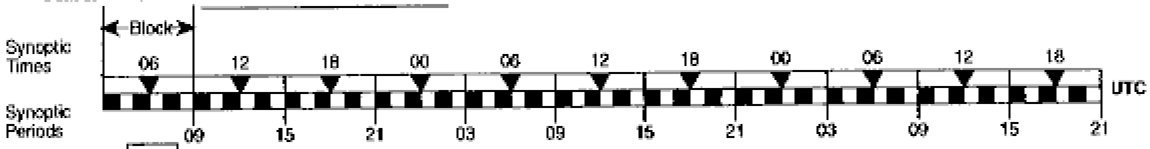
a. Average Surface Wind	(Use Block 6 Sheet 11)	_____ kn	_____ °T
b. Set (reciprocal of ASW)	(Wind Direction — 180°)		_____ °T
c. Maximum expected divergence		(+/-) _____ °	
d. Leeway Rate	(as per graph or formula)		_____ kn
e. Drift Interval	(Use Block C2 Sheet 1)		_____ h
f. Leeway Vector(s)	(Block 3b. +/- block 3c.)	_____ °T	_____ °T
	(Block 3d. X Block 3e.)	_____ M	_____ M
		(Transfer to Block G2 on Sheet 2)	

Case name: ____________

Coordinator: ____________

Search number: ____________

SYNOPTIC BLOCKS



Block # [ ]

	Synoptic Times	Synoptic Winds Direction "A"	Speed "B"	Coefficients Direction "C"	Speed "D"	Effect (A+C)	(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 — Influence Duration — Block Resultant Vector

_____ °T _____ kn X _____ hours = _____ °T _____ M

Block # [ ]

	Synoptic Times	Synoptic Winds Direction "A"	Speed "B"	Coefficients Direction "C"	Speed "D"	Effect (A+C)	(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 — Influence Duration — Block Resultant Vector

_____ °T _____ kn X _____ hours = _____ °T _____ M

Block # [ ]

	Synoptic Times	Synoptic Winds Direction "A"	Speed "B"	Coefficients Direction "C"	Speed "D"	Effect (A+C)	(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 — 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)

Wind Current Coefficient Table

North Latitude Only

Period	Latitude												
	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

TABLE 7E-2 Uncorrected Visual Sweep Width—Fixed-Wing Aircraft Altitudes 1000-2000 feet

Fixed-Wing Searching For	Altitude 1000 (ft) Visibility (NM)							Altitude 1500 (ft) Visibility (NM)							Altitude 2000 (ft) Visibility (NM)						
	1	3	5	10	15	20	30	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	0.0	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	0.3	0.7	0.9	1.2	1.4	1.4	1.4	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 person	0.3	1.0	1.3	1.8	2.1	2.3	2.3	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 person	0.4	1.1	1.6	2.2	2.6	2.8	2.8	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 person	0.4	1.2	1.7	2.4	2.8	3.0	3.0	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 person	0.4	1.3	1.8	2.6	3.0	3.3	3.3	0.3	1.3	1.8	2.6	3.1	3.4	3.4	0.2	1.2	1.8	2.7	3.1	3.5	3.5
Raft 15 person	0.4	1.4	2.0	2.8	3.4	3.7	4.2	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 person	0.4	1.5	2.2	3.2	3.9	4.3	4.9	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 person	0.4	1.6	2.3	3.5	4.2	4.7	5.4	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	0.4	1.0	1.3	1.7	1.8	2.0	2.0	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	0.5	1.7	2.5	3.7	4.4	5.0	5.0	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	5.4	6.8	7.8	9.3	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	0.6	2.7	4.5	8.2	10.9	13.1	16.6	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	0.6	2.8	5.1	9.8	13.6	16.7	21.7	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
Sail Boat 15 ft	0.5	1.6	2.3	3.3	4.0	4.4	4.4	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
Sail Boat 20 ft	0.5	1.8	2.7	4.2	5.1	5.7	5.7	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
Sail Boat 25 ft	0.5	2.1	3.2	5.0	6.2	7.1	7.1	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
Sail Boat 30 ft	0.6	2.3	3.6	6.0	7.6	8.9	10.7	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
Sail Boat 40 ft	0.6	2.6	4.3	7.6	10.9	12.0	14.9	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
Sail Boat 50 ft	0.6	2.7	4.6	8.5	11.4	13.7	17.4	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
Sail Boat 65-75 ft	0.6	2.8	4.9	9.3	12.8	15.6	20.1	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
Sail Boat 75-90 ft	0.6	2.8	5.1	9.9	13.8	17.0	22.2	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 ft	0.6	2.9	5.4	11.1	15.9	20.1	27.0	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 ft	0.6	3.0	5.7	12.5	18.9	24.7	34.9	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 ft	0.6	3.0	5.8	13.2	20.6	27.9	41.4	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

TABLE 7E-3 Uncorrected Visual Sweep Width—Fixed-Wing Aircraft Altitudes 2500-3000 feet

Fixed-Wing Searching For	Altitude 2500 (ft) Visibility (NM)							Altitude 3000 (ft)* Visibility (NM)						
	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 person	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 person	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 person	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 person	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 person	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 person	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 person	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	5.8	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
Sail Boat 15 ft	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
Sail Boat 20 ft	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
Sail Boat 25 ft	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
Sail Boat 30 ft	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
Sail Boat 40 ft	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
Sail Boat 50 ft	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
Sail Boat 65-75 ft	0.3	2.7	4.9	9.4	12.9	15.6	20.3	0.2	2.6	4.9	9.4	13.0	15.8	20.3
Sail Boat 75-90 ft	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 ft	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 ft	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 ft	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 3NM and target size exceeds 25 feet, the sweep widths given for 3000 feet remain applicable.

TABLE 7E-4 Uncorrected Visual Sweep Width—Helicopters Altitudes 300–750 feet

Helicopter Searching For	Altitude 300 (ft) Visibility (NM)							Altitude 500 (ft) Visibility (NM)							Altitude 750 (ft) Visibility (NM)						
	1	3	5	10	15	20	30	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	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	0.4	0.9	1.2	1.6	1.8	1.8	1.8
Raft 4 person	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	0.5	1.2	1.7	2.3	2.6	2.8	2.8
Raft 6 person	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	0.5	1.4	2.0	2.7	3.2	3.5	3.5
Raft 8 person	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	0.5	1.5	2.1	2.9	3.4	3.7	3.7
Raft 10 person	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	0.6	1.6	2.2	3.1	3.7	4.0	4.0
Raft 15 person	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	0.6	1.7	2.4	3.4	4.0	4.5	5.0
Raft 20 person	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	0.6	1.8	2.6	3.9	4.6	5.2	5.9
Raft 25 person	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	0.6	1.9	2.8	4.2	5.0	5.6	6.5
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	0.5	1.2	1.6	2.0	2.3	2.4	2.4
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	0.7	2.0	2.9	4.4	5.3	5.9	5.9
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	0.7	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	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	0.8	3.3	5.7	10.9	15.0	18.4	23.9
Sail Boat 15 ft	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	0.7	1.9	2.7	4.0	4.8	5.3	5.3
Sail Boat 20 ft	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	0.7	2.2	3.2	4.9	6.0	6.7	6.7
Sail Boat 25 ft	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	0.7	2.5	3.7	5.8	7.2	8.3	8.3
Sail Boat 30 ft	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	0.8	2.7	4.2	6.9	8.8	10.2	12.3
Sail Boat 40 ft	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	0.8	3.0	4.9	8.6	11.3	13.5	16.8
Sail Boat 50 ft	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	0.8	3.1	5.3	9.5	12.7	15.4	19.4
Sail Boat 65–75 ft	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	0.8	3.2	5.5	10.4	14.2	17.3	22.2
Sail Boat 75–90 ft	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	0.8	3.3	5.7	11.0	15.2	18.8	24.4
Ship 90–150 ft	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	0.8	3.4	6.0	12.2	17.4	21.9	29.3
Ship 150–300 ft	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	0.8	3.4	6.3	13.6	20.4	26.6	37.3
Ship >300 ft	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	0.8	3.5	6.4	14.3	22.2	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 floatation device.

TABLE 7E-5 Uncorrected Visual Sweep Width—Helicopters Altitudes 1000–2000 feet

Helicopter Searching For	Altitude 1000 (ft) Visibility (NM)							Altitude 1500 (ft) Visibility (NM)							Altitude 2000 (ft) Visibility (NM)						
	1	3	5	10	15	20	30	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	0.0	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	0.4	0.9	1.2	1.6	1.8	1.8	1.8	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	1.8
Raft 4 person	0.5	1.2	1.7	2.3	2.6	2.9	2.9	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 person	0.5	1.4	2.0	2.8	3.2	3.5	3.5	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 person	0.5	1.5	2.1	2.9	3.4	3.8	3.8	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 person	0.5	1.6	2.2	3.2	3.7	4.1	4.1	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 person	0.6	1.7	2.4	3.5	4.1	4.5	5.1	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 person	0.6	1.8	2.7	3.9	4.7	5.2	6.0	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 person	0.6	1.9	2.8	4.2	5.1	5.7	6.5	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	0.5	1.2	1.6	2.1	2.3	2.5	2.5	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	0.7	2.1	3.0	4.4	5.3	5.9	5.9	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	0.7	2.6	3.9	6.3	7.9	9.1	10.8	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	9.2	12.3	14.8	18.6	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	0.8	3.3	5.7	10.9	15.0	18.5	23.9	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
Sail Boat 15 ft	0.6	1.9	2.8	4.0	4.8	5.4	5.4	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
Sail Boat 20 ft	0.7	2.2	3.2	4.9	6.0	6.8	6.8	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
Sail Boat 25 ft	0.7	2.5	3.7	5.8	7.3	8.3	8.3	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
Sail Boat 30 ft	0.7	2.7	4.2	6.9	8.8	10.3	12.4	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
Sail Boat 40 ft	0.7	3.0	4.9	8.6	11.4	13.5	16.8	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
Sail Boat 50 ft	0.7	3.1	5.3	9.5	12.8	15.4	19.5	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
Sail Boat 65–75 ft	0.8	3.2	5.6	10.4	14.2	17.3	22.2	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
Sail Boat 75–90 ft	0.8	3.3	5.7	11.0	15.3	18.8	24.4	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 ft	0.8	3.4	6.0	12.2	17.4	21.9	29.3	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 ft	0.8	3.4	6.3	13.6	20.4	26.6	37.3	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 ft	0.8	3.5	6.4	14.3	22.2	29.8	43.9	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

TABLE 7E-6 Uncorrected Visual Sweep Width—Helicopters Altitudes 2500-3000 feet

Helicopter Searching For	Altitude 2500 (ft) Visibility (NM)							Altitude 3000 (ft)* Visibility (NM)						
	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 person	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 person	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 person	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 person	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 person	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 person	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 person	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
Sail Boat 15 ft	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
Sail Boat 20 ft	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
Sail Boat 25 ft	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
Sail Boat 30 ft	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
Sail Boat 40 ft	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
Sail Boat 50 ft	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
Sail Boat 65–75 ft	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
Sail Boat 75–90 ft	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 ft	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 ft	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 ft	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 3NM and target size exceeds 25 feet, the sweep widths given for 3000 feet remain applicable.

TABLE 7E-7 Uncorrected Visual Sweep Width—Vessels and Small Boats

Search Object	Vessel SRU (1) Visibility (NM)						Small Boat SRU (2) Visibility (NM)					
	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 person	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 person	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 person	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 person	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 person	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 person	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 person	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
Sail Boat 15 ft	1.0	1.9	2.7	3.9	4.7	5.2	0.8	1.5	2.1	3.0	3.6	4.0
Sail Boat 20 ft	1.0	2.2	3.2	4.8	5.9	6.6	0.8	1.7	2.5	3.7	4.6	5.1
Sail Boat 25 ft	1.1	2.4	3.6	5.7	7.0	8.1	0.9	1.9	2.8	4.4	5.4	6.3
Sail Boat 30 ft	1.1	2.7	4.1	6.8	8.6	10.0	0.9	2.1	3.2	5.3	6.6	7.7
Sail Boat 40 ft	1.2	3.0	4.9	8.5	11.2	13.3	0.9	2.3	3.8	6.6	8.6	10.3
Sail Boat 50 ft	1.2	3.1	5.2	9.4	12.5	15.0	0.9	2.4	4.0	7.3	9.7	11.6
Sail Boat 65–75 ft	1.2	3.2	5.5	10.2	13.9	16.9	0.9	2.5	4.2	7.9	10.7	13.1
Sail Boat 75–90 ft	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 ft	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 ft	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 ft	1.8	3.4	6.4	14.1	21.8	29.2	1.4	2.6	4.9	10.9	16.8	22.5

(1) Type 500 and above
(2) Type 400 and below

TABLE 7E-8. Weather Condition Factor

Target Type	Winds > 15 kts Seas 2-3 ft	Winds > 25 Kts Seas > 4 ft
Person in water, or < 30-ft Length Boat	0.5	0.25
Other Targets	0.9	0.9

C. Correcting for Fatigue. If feedback from on scene SRUs indicates search crews were excessively fatigued, reduce sweep width values by 10 percent (multiply by 0.9).

D. Correcting for Search Aircraft Speed Correction. Enter the speed correction table (Table 7E-9) with aircraft type (fixed-wing or helicopter) 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.

TABLE 7E-9 Search Aircraft Speed Correction Table

	Fixed-Wing Speed (knots)			*Helicopter Speed (knots)*			
Search Object	*150 or less*	*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 man	1.1	1.0	0.9	1.3	1.0	0.9	0.8
Raft—6 to 25 man	1.1	1.0	0.9	1.2	1.0	0.9	0.8
Power Boat—to 25 ft	1.1	1.0	0.9	1.2	1.0	0.9	0.8
Power Boat—25 to 40 ft	1.1	1.0	0.9	1.1	1.0	0.9	0.9
Power Boat—40 to 65 ft	1.1	1.0	1.0	1.1	1.0	0.9	0.9
Power Boat—65 to 90 ft	1.1	1.0	1.0	1.1	1.0	1.0	0.9
Sail Boat—to 26 ft	1.1	1.0	0.9	1.2	1.0	0.9	0.9
Sail Boat—30 to 52 ft	1.1	1.0	1.0	1.1	1.0	0.9	0.9
Sail Boat—65 to 90 ft	1.1	1.0	1.0	1.1	1.0	1.0	0.9
Ship—over 90 ft	1.0	1.0	1.0	1.1	1.0	1.0	0.9

ANNEX 7F -- MAJOR MARINE DISASTER SEARCH AND RESCUE CONTINGENCY PLAN

FOREWORD

1. There is no fundamental distinction between a major maritime disaster and other marine 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 Marine Disaster" means a marine distress incident or other distress incident occurring on the waters of the SRR for which the RCC is responsible, where the Federal SAR System alone can no longer coordinate, control and respond to all aspects of the search for and recovery of survivors, and/or the preservation of life. Normally in a Major Marine 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 Marine Disaster by means of using all available resources to their full advantage.

SITUATION

4. a. As part of its responsibility for conducting SAR, the federal government may be required to respond under extremely unfavourable weather and sea conditions to a marine 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 marine 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 marine 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 marine activity in the various SRRs of Canada, it is not possible to prepare a single, detailed national plan for response to major marine 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 marine disaster in the Canadian SAR 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 SAR resources and vessels of opportunity can be expected to provide the initial response, and may provide on scene coordination and control. Depending on the nature and magnitude of the incident, augmentation of these resources 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 marine disaster involves a large number of survivors the requirement to establish one or more Casualty Reception Points (CRP) 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 CRP.

(2) Response

(a) The initial response to any marine 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 marine disaster will likely require the

assistance of agencies not normally part of the SAR system. The plan shall identify such agencies in the 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 resources be required, the RCC shall use all available means to locate and task suitable vessels or aircraft.

(d) When it becomes apparent that a major marine incident is in progress, on duty personnel must be authorized to call in additional personnel to meet the requirements of the SMC organization until a SM is appointed. The SRR commander shall appoint a SM who shall be responsible for the coordination 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 coordinate the extraordinary response that may be called for by the major marine disaster. RCC SOPs are to establish appropriate procedures.

(3) Rescue

(a) Depending upon the number of persons involved in a major marine 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 resources 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 marine 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 CRP. 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 is involved, the Search Master shall canvass all appropriate authorities who may be able to

make suitable resources available, so that these resources can be tasked when necessary. The location and availability of all such resources 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 marine 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 SAR resources applies to major marine disasters. SRR Commanders will of course make use of all primary or any other resources when and if they become needed and available.

SUPPORT

7. a. Concept of Support

(1) General. The response to major marine disasters will be supported initially by the normal SAR system. As requirements become known, that system will be supported by all available and suitable agencies and resources.

(2) DND/CCG Support. As in other SAR incidents, commands or regions may be requested to provide additional primary or secondary SAR resources in the event of a major marine disaster.

(3) Other Departments. All federal departments, by government direction, are committed to respond to Marine SAR incidents when available and capable. The SRR commander shall ensure that current lists of key personnel in the appropriate federal and provincial departments are available to the 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 marine 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 USCG, may be available to assist in a major marine 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 marine disaster should be issued by the OIC/RCC if possible through the appropriate DNDPA.

d. Reports and Returns

(1) In the case of major marine incidents, SITREPS shall be issued at least daily throughout the rescue phase.

(2) Within 30 days after the conclusion of a major marine disaster, the RCC shall submit a report, in addition to the Operation Report, through the appropriate channels, to NDHQ and CGHQ attention DCGR.

8. COMMAND

a. The SRR commander shall command a major marine disaster SAR response: he will normally appoint a SM.

b. The SM shall normally report to the SRR commander through the OIC/RCC.

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.

CHAPTER 8 -- COMMUNICATIONS PROCEDURES

GENERAL

1. SAR units shall maintain a continuous watch on the frequencies allotted by the controlling authority during a search. Subject to the approval of the RCC/MRSC or the SM, a scheduled watch may be adopted.

2. Civil communications procedures shall be used when communicating with civil agencies.

3. SAR aircraft and vessels may communicate with any agency, as required, during a SAR operation.

ALL STATIONS BROADCASTS

4. An all stations broadcast is a broadcast made via Coast Guard radio stations (CGRS) to advise vessels on matters affecting safety of navigation and SAR incidents. Authority for the use of all ships broadcast and prescribed procedures are contained in TP No. 989, Operations Standards for Coast Guard Radio Stations.

5. All stations broadcasts may be initiated by a marine controller verbally but shall be followed up by hard copy as soon as practicable. A RCC/MRSC may initiate an all stations broadcast under a MAYDAY RELAY prefix (see Annex 8A and Chapter 7, paragraph 14 of Annex 7B) when:

   a. a vessel is believed to be in distress based on positive evidence;

   b. a vessel is unable to transmit its own distress call; or

   c. an aircraft is in distress over water and there is a possibility that it has ditched or maybe about to ditch.

   NOTE - The CGRS operator will normally use the auto alarm preceding the first broadcast and any subsequent broadcasts as considered necessary.

6. A RCC/MRSC may initiate an all stations broadcast under a PAN PAN prefix when the broadcast concerns a very urgent message affecting the safety of a ship, aircraft or person. The auto-alarm may be used to announce the loss of a person or persons overboard. In this case the auto-alarm may only be used when assistance of other ships is required and cannot be satisfactorily obtained by use of urgency signal alone.

7. A RCC/MRSC may initiate an all stations broadcast during the uncertainty phase of a SAR incident to obtain more information on the whereabouts of the search object.

TAPE RECORDING - RCC COMMUNICATIONS

8. Operational communications links established at RCCs are equipped with tape recorders. The procedure applied to the custody and operations of the tape recorders is as follows:

a. all conversations on RCC communication lines are to be recorded;

b. tapes shall be changed daily;

c. recorded tapes shall be numbered and dated then placed in locked storage, the control and access to which shall be under the control of the OIC/RCC;

d. all recorded tapes are to be kept for a minimum of 30 days;

e. tapes shall be impounded by the OIC/RCC whenever an investigation, judicial inquiry, etc., has been ordered or is anticipated and the OIC/RCC shall be responsible for providing continuity of possession ensuring that tapes are not recycled until released by higher authority;

f. requests for recordings and transcripts should be directed to the OIC/RCC in writing; and

g. tapes or transcripts are not to be released to other than DOT and DND personnel unless ordered by NDHQ or a court of law.

REPORTS ON SEARCHES

9. All SAR Units engaged on SAR missions shall pass reports to the appropriate RCC/MRSC or SM or to the nearest station for onward transmission to the RCC/MRSC, SM. This will normally consist of an "OPS NORMAL" for SAR aircraft and an operational SITREP (Annex 8B) for SAR vessels.

10. The RCC/MRSC or SM shall specify, during briefings, the reporting times of individual SAR units. These reports should be made at least once per hour for aircraft and once every four hours or less for vessels.

11. When the control of a SAR incident is transferred, a message shall be passed by the rescue centre 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.

ON-SCENE SAR WORKING FREQUENCIES

12. The SAR control frequencies, 5717, 8993, and 11186 kHz, shall be employed for HF air/ground/air communications during SAR operations, using voice.

13. The SAR "scene of action" frequencies to be employed between parties

at the scene of a search are:

a. 123.1 MHz international voice SAR on-scene and ELT training beacon;

b. 282.8 MHz NATO combined on-scene;

c. 246.2 MHz Canadian on-scene, DF, and CF PLB training beacon;

d. 252.8 MHz NATO combined search and rescue training;

e. 3023 kHz international voice SAR on-scene and frequency to be used in the event that communications between commercial aircraft and vessels have not been established on 4125 kHz (see below);

f. 4125 kHz international voice SAR on-scene and recommended communication frequency between commercial aircraft and vessels; and

g. 5680 kHz international voice SAR on-scene.

The SM shall assign one or more of these frequencies for "scene of action" bearing in mind the communications capabilities of the aircraft, ground parties and marine units employed.

14. The international distress and calling frequencies 2182 kHz, 156.8 MHz and 500 kHz should be used for contacting commercial shipping.

15. In the Global Marine Distress and Safety System (GMDSS), radio distress alert is transmitted using satellite or terrestrial means. In either case, appropriate alarm provisions will be activated to attract the attention of operators on watch.

ON-SCENE WORKING FREQUENCIES

16. Ground search parties involved in crash guard team duties will use the following frequencies while so employed:

a. 2216 kHz

b. 3280 kHz

c. 4480 kHz

d. 5832 kHz

e. 9292 kHz

f. 12 115 kHz

g. 15 733 kHz

h. 18 204 kHz

STANDARD DISTRESS FREQUENCIES

17. The following frequencies have been designated as distress or emergency frequencies as shown:

a. 500 kHz international CW/MCW distress and calling;

b. 2182 kHz international voice distress safety and calling;

c. 4125 kHz international on-scene aircraft - vessel frequency with 3023 kHz as the backup frequency;

d. 8364 kHz international CW/MCW lifeboat, liferaft, and survival craft;

e. 121.5 Mhz/ELT international voice aeronautical emergency;

f. 243.0 MHz/ELT joint/combined military voice aeronautical emergency and international survival craft;

g. 156.8 MHz FM (CH16) marine international distress and calling frequency; and

h. 156.75 MHz FM (CH15), 406-406.1 MHz reserved frequency band for electronic position indicating radio beacon (EPlRBs), 406 emergency location transmitters (406ELTs) , and personal locator beacons (PLBs).

18. The following table gives GMDSS radio distress communications frequencies. Note that the satellite communications system INMARSAT (see paragraph 39), which is part of the GMDSS, has not been included since the frequencies used are transparent to the user.

GMDSS RADIO DISTRESS COMMUNICATIONS

	Digital Selective Calling (DSC)	Radiotelephone	Radiotelex
VHF	Channel 70	Channel 16	---
MF	2187.5 kHz	2182 kHz	2174.5 kHz
HF 4	4207.5 kHz	4125 kHz	4177.5 kHz
HF 6	6312 kHz	6215 kHz	6268 kHz
HF 8	8414.5 kHz	8291 kHz	8376.5 kHz
HF 12	12577 kHz	12290 kHz	12520 kHz
HF 16	16804.5 kHz	16420 kHz	16695 kHz

Figure 8-1

USE OF GENERAL RADIO SERVICE FREQUENCIES

19. The Department of Communications (DOC) has authorized the use of aircraft HF radios on the general radio services (GRS) or citizens band (CB) frequencies by SAR crews for the purpose of communicating with ground personnel during actual SAR operations. Crews are cautioned to keep transmissions to a minimum since the power output of aircraft radios greatly exceeds the normal 5 watt limit for the GRS band. The GRS frequencies are not to be used for normal air-to-air communications.

20. The following GRS frequencies have been assigned for use Canada-wide by aircraft for SAR emergencies only. All assignments are for 110W PM (equivalent to 125W PP) and emission 3A3H (compatible sideband). Frequencies given in brackets are reference (window) frequencies for each assigned frequency.

Freq (KHz)	Channel
26966.5 (26965)	1
26976.5 (26975)	2
26986.5 (26985)	3
27006.5 (27005)	4
27016.5 (27015)	5
27026.5 (27025)	6
27036.5 (27035)	7
27056.5 (27055)	8
27066.5 (27065)	9
(GRS Safety and calling - Channel 9)	
27076.5 (27075)	10
27086.5 (27085)	11
27106.5 (27105)	12
27116.5 (27115)	13
27126.5 (27125)	14
27136.5 (27135)	15
27156.5 (27155)	16
27166.5 (27165)	17
27176.5 (27175)	18
27186.5 (27185)	19
27206.5 (27205)	20
27216.5 (27215)	21
27226.5 (27225)	22
27256.5 (27255)	23
27236.5 (27235)	24
27246.5 (27245)	25
27266.5 (27265)	26
27276.5 (27275)	27
27286.5 (27285)	28
27296.5 (27295)	29
27306.5 (27305)	30
27316.5 (27315)	31

27326.5 (27325)	32
27336.5 (27335)	33
27346.5 (27345)	34
27356.5 (27355)	35
27366.5 (27365)	36
27376.5 (27375)	37
27386.5 127385)	38
27396.5 (27395)	39
27406.5 (27405)	40

NOTE - Provincial and municipal governments have preference on Channel 23 in the event of an emergency.

VESSEL TRAFFIC SERVICE SYSTEMS

21. There are four types of vessel traffic service (VTS) systems of use to RCC/MRSC controllers, SMs and OSCs. Each of the systems is capable of providing, to varying degrees, information about the location, construction, cargo, etc, of vessels that may be of use in the SAR planning process.

22. The name, operating agency and area of operation for each of the systems are as follows:

a. VTS Centres operated by the Canadian Coast Guard, Aids and Waterways Branch, are located in a number of inshore and harbour areas in Canada. These centres usually maintain both VHF-FM and radar contact with vessels in their areas of responsibility. Information concerning the vessels reporting, and SAR/VTS procedures is contained in Chapter 7, Annex 7B;

b. Eastern Canada Traffic Zone Regulations (ECAREG) is operated by the Canadian Coast Guard, Aids and Waterways Branch, and covers all eastern Canadian waters south of 60 ° N latitude, including the Gulf of St. Lawrence with the exception of high level VTS zones. Information on the vessels reporting, data available and SAR/ECAREG procedures is contained in Chapter 7, Annex 7B, Appendix 1;

c. Arctic Canada Traffic System (NORDREG) is operated by the Canadian Coast Guard, Aids and Waterways Branch. The system covers all waters north of the 60° parallel, including all of Hudson Bay and Ungava Bay but excluding those portions of MacKenzie Bay and Kugmallit Bay that are south of the 70° parallel, and east of the 139° meridian. Information on vessels reporting, data available and SAR/NORDREG procedures is contained in Chapter 7, Annex 7B, Appendix 2; and

d. St. Lawrence Seaway Traffic Systems is operated by St. Lawrence Seaway Authority (CAN) and St. Lawrence Development Corporation (U.S.) cover the area from west of 73 30°W in Montreal Harbour to Port Colborne, Lake Erie. The traffic centres in the Seaway system maintain radio contact and the reporting procedures are

same as described in Chapter 7, Annex 7B.

23. Each RCC/MRSC should develop mutually agreed procedures with all VTS, ECAREG and NORDREG centres within their area of responsibility. These procedures should be reviewed and updated regularly and must remain within the confines of the national procedures shown in Annex 7B. The local procedures shall be included in the RCC/MRSC SOPs.

24. The Automated Mutual Assistance Vessel Rescue System (AMVER) is operated by USCG. The system covers, in particular, the Atlantic and Pacific Ocean areas. Information on the vessels reporting, the data available, and procedures for accessing AMVER information is contained in Annex 8C.

VHF (FM)/DF ASSISTANCE TO SAR

25. Selected CGRS and VTS stations have the capability to DF on VHF (FM). These stations should be contacted if their assistance is likely to contribute to the success of the SAR effort.

26. Providing the safety of a vessel in the VTS zone is not jeopardized, VTS personnel will give precedence to SAR duties over all other duties if requested to do so by a SAR controller.

27. The list of VTS stations with VHF (FM)/DF capability is attached at Chapter 7, Annex 7B.

28. All primary SAR vessels have a VHF (FM)/DF capability which should be used to the maximum extent.

HF/DF ASSISTANCE TO SAR

29. There are two HF/DF nets in Canada, one operated by the Canadian Forces Supplementary Radio System (CFSRS) and the other by the Department of Communications (DOC), that may be used by the SAR system to pinpoint the source of an HF transmission from distressed vessels or aircraft.

30. Since the primary purpose of the nets is not search and rescue, they should only be alerted when it can reasonably be expected that they could contribute to the successful location of the distressed craft.

31. The following information should be provided when the stations are contacted:

a. emergency phase (distress, alert, uncertainty);

b. SAR operation title;

c. name or call sign of distressed craft;

d. frequency distressed craft is using or expected to use;

e. nature of emergency; and

f. length of watch requested.

32. CFSRS HF/DF SUPPORT - For assistance in locating an aircraft or vessel in distress which has the ability to transmit in the 2-30 MHz range, RCCs are authorized to contact CFSRS stations by telephone. Stations concerned, CFS Masset, CFS Leitrim, and 770 Communication Research Squadron Gander, have established formal procedures with the RCC in their SRR immediate area to ensure timely and workable interaction during periods of actual or potential distress. Stations are required to maintain this local order to reflect present day operational conditions and should update these procedures periodically. Any changes in procedures between RCC and stations are to be forwarded to CFSRSHQ (Attention: SSO OPS SR). Contact telephone numbers for CFSRS station operations shift supervisors are:

a. CFS Masset
DDD 604-626-8363
GP CSN 255-8363

b. CFS Leitrim
DND 613-998-6862
GP CSN 848-6862

c. 770 Communication Research Squadron, Gander
DDD 709-256-7151 Loc 3316
GP CSN 622-3316

33. MANOT (MISSING AIRCRAFT NOTICE) - Additionally, the following procedures, aimed at enhancing CFSRS HF/DF support to SAR activity involving missing aircraft, are to be employed by the RCCs and CFSRS stations:

a. 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 MANOT the following action addressees: CFS Alert, 770 Communication Research Squadron Gander, CFS Leitrim, and CFS Masset. CFSRSHQ (SSO OPS SR) will be included as an information addressee;

b. CFSRS stations shall commence a 48 hour search in response to all MANOTs using dedicated HF/DF facilities, treating requests for CF assistance to actual or potential distress cases as an emergency target;

c. 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 8C. All reports will be submitted at immediate precedence to the initiating RCC, info CFSRSHQ (SSO OPS SR), ACOO (SSOSAR), and NDOC J3 OPS with follow-up reports numbered in a one-up sequence. RCC request for extended surveillance beyond the initial 48 hour period will be addressed to CFSRS addresses specifying the period of extended cover requested, eg, 24 hours, 48 hours. Unless requested to

extend surveillance, contributing stations shall submit their final report as "FOLLOW-UP NR - AND FINAL"; and

d. 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 8C).

34. 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:

a. Morse. Continuous keying for ten seconds followed by radio callsign, repeated frequently;

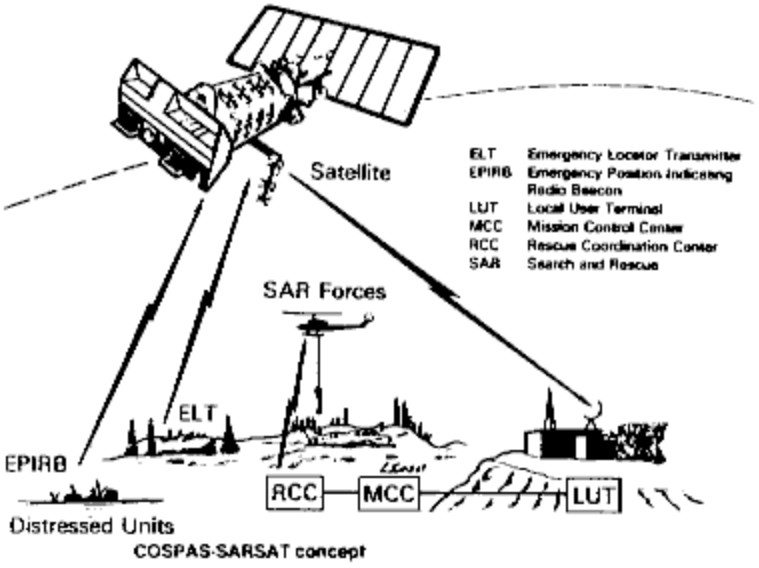
b. HF Voice. Long count from zero to ten to reverse followed by the distressed unit's identification, repeated frequently; and

c. steady carrier or alarm signal.

SEARCH AND RESCUE SATELLITE AIDED TRACKING (COSPAS/SARSAT)

35. Canada participates in the COSPAS/SARSAT system which employs satellites to detect and locate emergency radio signals on 406 MHz and also 243 MHz and 121.5 MHz. The satellites receive the distress signals and relay the information to a local user terminal (LUT) where computer analysis is used to determine the approximate location of the emitted signal for 121.5 signals, or a more precise position for 406 signals. The information is sent to the appropriate RCC for response.

36. Since the successful launch of the first SAR satellite, COSPAS I in 1982, and the adoption of the system by IMO in January 1986, it has been proven operationally.



< FIGURE 8-2 COSPAS>

INTERNATIONAL MARITIME COMMUNICATIONS SATELLITE

37. Ships equipped with standard International Maritime Communications Satellite (INMARSAT) ship-earth-station (SES) are capable of communications with shore based correspondents and other SES equipped ships via INMARSAT satellite.

38. Distress, urgency, and safety services provided in the INMARSAT system include:

a. distress priority telex and telephone communications;

b. medical advice and medical assistance service;

c. maritime assistance; and

d. detection and position finding of activated 406 MHz EPIRB signals.

39. Distress, urgency and safety services are provided for ensuring safety of life at sea and should be used in strict accordance with International Telecommunications Union (ITU) Regulations and SOPs.

40. RCC/MRSC can dial automatically to a ship or off-shore structure provided the Ocean Region Code and ship's number are known. AMVER can provide, if so requested, the information regarding the participating ships in the search area (SURPIC) which are equipped with INMARSAT installation (ship-earth-station).

41. Coast-earth-station (CES), through the back-up of any USCG RCC, may be contacted if any problems arises in calling, for making group calls or area calls.

ANNEX 8A -- SAR/CGRS PROCEDURES - URGENCY COMMUNICATIONS

1. SAR Controllers in RCC/MRSC should adhere to the following procedures with regard to the origination of messages concerning degrees of marine urgency. In this regard the Controllers should also familiarize themselves with TP 989 Chapter 2, which is based on the ITU Radio Regulations.

2. SAR Controllers may request that CGRS re-broadcast a distress message under the following conditions:

a. there has been no response to the initial distress message from a vessel capable of providing effective and timely assistance; or

b. there is a requirement for additional help above and beyond any assistance already provided; or

c. the ship in distress is not in a position to transmit further requests for needed assistance.

3. The distress message shall be repeated until acknowledged by a station in a position to render assistance. The Radio Operator will normally use the auto alarm preceding the first broadcast and any subsequent broadcasts as considered necessary.

4. From time to time, RCC/MRSC will request a CGRS or group of stations to send an "All stations" broadcast. The number of Radio Stations shall be kept to the minimum necessary to provide the required coverage. This shall be done in coordination with the CGRS nearest to the incident.

5. When the distress situation has been terminated the RCC/MRSC shall initiate the distress termination message to the CGRSs initially involved. Care should be taken to specify which distress incident is terminated.

6. RCC/MRSC shall choose the priority of the incidents and forward the appropriate text to the selected stations. The text should be passed via landline facilities whenever possible followed by a confirming telex when practicable.

ANNEX 8B -- OPERATIONAL SITREP FROM MARINE SAR UNIT

1. SITREP NUMBER

2. TIME Z

3. POSITION LATLONG

4. COURSE

5. SPEED

6. PAST ACTIVITIES

7. FUTURE PLANNED ACTIVITIES (NEXT 24 HRS)

8. WEATHER CONDITIONS:

   A. AIR AND WATER TEMP C°

   B. CLOUD COVERAGE 1Oths

   C. VISIBILITY

   D. WIND SPEED/DIRECTION

   E. STATE OF SEA

9. 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.* COMMENTS

*NOTE: Briefly provide any detail which will allow RCC/MRSC to initiate appropriate action, bearing in mind that the transmission is not secure.

ANNEX 8C -- AUTOMATED MUTUAL ASSISTANCE VESSEL RESCUE SYSTEM

GENERAL

1. The automated mutual assistance vessel rescue (AMVER) system is operated by the USCG. It provides important aid to the development and coordination of 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 AMVER centre at Coast Guard, New York.

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 Regulations, all Canadian ships making an offshore voyage of more than 24 hours which will proceed;

a. beyond the limits of VHF and MF coverage; and

b. outside of the ECAREG and NORDREG zones,

must make reports to AMVER in accordance with approved procedures, set out in TP145 and TP146 Radio Aids to Marine Navigation.

5. This does not apply to fishing vessels or Her Majesty's ships engaged in law enforcement.

6. All other ships (ie, other countries) 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 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, US 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.

(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).

(2) The SURPIC can be obtained for a great circle track if requested.

10. Each SURPIC can be further modified by making one of the following requests for listing:

a. all ships, or just those with doctors aboard;

b. all ships, or just those heading east or just those heading west; and

c. the doctor and direction specifications in combination.

PROCEDURES

11. Requests for AMVER information should be made to the AMVER Centre, New York by the most appropriate method. This would normally be through the RCC of the SRR in question.

ANNEX 8D -- CFSRS HF/DF SAR MESSAGE FORMAT

IMMEDIATE/ROUTINE

FM: COMMRSCHSQN GANDER
TO: RCC HALIFAX
INFO: CRSRS HQ OTTAWA//SSO OPS SR//
ACO OTTAWA//SSOSAR//

SUBJ: SAR HF/DF SUPPORT

A. MANOT IDENTIFICATION

B. TIME OF BEARING IN ZULU TIME/NEGATIVE RESULTS

C. TRUE BEARING IN THREE DIGITS WITH VALIDITY INDICATOR

D. LAT/LONG OF REPORTING STATION

E. SIGNAL TYPE/FREQ

F. AMPLIFYING DATA

G. NETTED FIX REPORT

EXAMPLE:

A. MANOT FIFTY-EIGHT, SAR BALDWIN FOLLOW-UP NR10 AND FINAL

B. 1800Z

C. 320T PLUS OR MINUS 10 DEGREES

D. 485704N 0543133W

E. VOICE/5680

F. N/A

G. N/A

CHAPTER 9 -- REPORTS AND RETURNS

GENERAL

1. Accurate reports and returns are essential for the effective control of SAR 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

2. A log or case file shall be kept in which all RCC/MRSC/SM actions are recorded, with times entered in 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 NDHQ/D Hist. SMs shall submit logs to the RCC at the termination of a search.

3. Case files shall be kept on individual 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. SM's case files shall be submitted to the RCC at the termination of a search.

4. Case files shall be retained at the RCC/MRSC for a minimum of two years after the date of the last entry, then forwarded to NDHQ/D Hist, except that case files covering unlocated aircraft, marine craft, or any of their occupants shall be retained indefinitely at the RCC/MRSC.

INITIAL SAR DATA REPORT FORM

5. SARSAT case files shall be retained at the CMCC for a minimum of two years after the date of the last entry, then forwarded to NDHQ/DHist. Archive tapes shall be retained off site for a period of ten years, then recycled.

RCC DAILY SITUATION REPORTS

6. In prolonged distress cases and in all cases necessitating a search reduction, situation reports (SITREPs) shall be issued by the RCC. SITREPSs from MRSCs shall be forwarded to the parent RCC/OIC for approval and onward transmission. These shall be sent PRIORITY in the following sequence:

a. SITREP ONE AND INITIAL;

b. SITREP TWO, etc.; and

c. SITREP (NUMBER) AND FINAL.

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 NDHQ staff officers to process queries and requests for future reduction.

8. Subsequent daily SITREPs shall be finalized and transmitted by the RCC. To facilitate this, the SM shall, at the close of each days activities, prepare a progress SITREP and forward it to the RCC by the fastest means possible. The format shall be as shown at Annex 9C and daily SlTREPs shall be numbered consecutively from TWO.

9. When the 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 SITREP is required (SITREP ONE AND FINAL) a modified Annex 9B format shall be used; para J and K will be replaced with the information form paras 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 (MANOT)

10. Once a distress phase has been declared by a RCC for a distress air incident, a MANOT is to be issued by the RCC and shall contain information using the initial MANOT report message format shown in Annex 9E.

11. On successful completion or reduction of a search, a final MANOT is to be issued using the Final MANOT Report message format shown in Annex 9E, Appendix 1.

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.

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, ie, 1/84 INITIAL, 1/84 FINAL, and 1/84 REOPENED.

SAR BRIEFING/TASKING FORM - AIR

14. The requirement for a search briefing/debriefing is discussed in Chapter 5, (SAR Briefings). The basic formats are given in Annex 9F.

15. The briefing portion of the combined SAR briefing/tasking form, should be completed by the RCC/MRSC or SM and should be passed to each SRU. The search unit commander will pass the pertinent information to each crew member as required.

16. The debriefing portion of the SAR briefing/tasking form, 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 keeping the form during the sortie to ensure accurate information is entered in a timely fashion.

17. On completion of the sortie, the search unit commander shall pass the information to the appropriate controlling agency. If under control of a RCC/MRSC, pass the information on the debriefing form to the RCC/MRSC by the quickest available means. Copies of the form should be subsequently passed to the RCC/MRSC for record purposes either by the aircraft captain or the SM, as applicable.

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.

19. For lengthy searches, the abbreviated briefing/debriefing form shown as Appendix 1, Annex 9F, may be used at the SM's discretion.

SAR BRIEFING/TASKING FORM - MARINE

20. The briefing/tasking form marine should be completed by the RCC/MRSC or SM and passed as soon as possible to the CO of each marine SAR unit being tasked on a SAR 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 marine SAR units is provided in Annex 9F, Appendix 2.

SIGHTING REPORT FORM

21. A search and rescue 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 SAR area. The format for the form is shown in Annex 9G.

SAR OPERATION REPORTS

22. SAR operation reports are compiled for the purpose of recording the pertinent details of an incident for the information of participating 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 will be well received by the CTAISB.

23. This report is required for major SAR operations (see Chapter 5, reduction of major SAR OPs) or when it is desired to make recommendations or comments on the command, control, and/or coordination aspects of the incident.

24. This report will be prepared by the RCC/MRSC or SM involved using the format in Annex 9H.

PREPARATION OF SAR OPERATION REPORTS

25. 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 marine incidents, the OIC and RSMS shall co-sign the report. The SRR commander, or a delegated senior officer shall:

a. review the report; and

b. indicate on the report those items which will be actioned by the SRR commander and those on which other comment or action is desired.

26. It will be necessary to include in the 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 resource 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.

27. Operation reports from MRSCs or SMs shall be forwarded to the parent RCC/OIC for approval and onward transmission.

SAR MISSION REPORT - AIR

28. A SAR mission report shall be filled out on completion of each SAR mission which involves the use of the SAR Tech equipment or to highlight any problems in procedures or equipment involved with the mission.

29. This report shall be filled out by the aircraft commander and SAR TECH team leader of the operation and should include a comprehensive narrative report and photos in accordance with Chapter 5, Photography Search Object. A description of the equipment or techniques used and/or deficiency in equipment or techniques with corrective action should also be provided.

30. The format for this form is shown as Annex 9J.

SAR MISSION REPORT - MARINE

31. COs and coxswains of vessels involved in a SAR incident may provide SAR mission reports to RCC/MRSC as applicable. The use of this report by COs acting as OSC is encouraged for every incident involving more than one SAR resource. The reports should detail any problems involved with the mission (communications, coordination, 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.

32. The format is shown in Annex 9J, Appendix 1.

GROUND SEARCH PARTY REPORT

33. Units with authorized ground search parties shall submit monthly Ground Search Party Training Reports to their regional RCC, with copies to AIRCOM HQ/G3-CNTNTL 7. Report shall be in accordance with Annex 9K.

34. When ground search parties have been employed on SAR operations, the extent of their participation will be reported in the STATS 110 and SAR Operation Reports.

UNNECESSARY SAR ALERT MESSAGE (UNSAR)

35. An UNSAR message is to be sent by the OIC/RCC when the SAR system is unnecessarily activated in a marine or air case. Examples would be unauthorized diversions from or failing to file or close flight/float plans, or the inadvertent or illegal use of ELT/EPlRBs.

36. The format for an unnecessary SAR alert message is shown in Annex 9L.

DAILY SAR SUMMARIES (SARSUM)

37. Daily SARSUMs are prepared by each RCC and are used extensively at the various headquarters in briefings to senior SAR officials. The reporting format is shown at Annex 9M.

38. MRSC shall provide the required data daily to the parent RCC only.

ANNEX 9A -- SEARCH AND RESCUE DATA REPORT FORM

1 Report received at_____
(Date-time Group)

from_____
(Name)

of_____Phone_____
(Organization and Address)

2 Assistance requested_____

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 on board _____

(vi) Name of owner or controlling agency _____

(vii) Emergency equipment carried _____

(viii) ELT 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 ant 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 _____Z
(Date-time Group)

8 ETA place _____ at _____Z
(Date-time Group)

9 Expected route _____

10 Alternate destinations or most likely place for surface vessel or aircraft to go _____

_____

11 Last known position _____

_____

12 Hours of fuel remaining at last known position _____

_____

13 Cruising speed _____

14 Communications:

(a) Transmitting frequencies _____

(b) Receiving frequencies _____

(c) Call signs-Voice _____ W/T _____

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 SAR SITREP MESSAGE

DISTRIBUTION

TO: NDOC OTTAWA//DOPSO//

ACO OTTAWA//SSOSAR//

AIRCOM WINNIPEG//G3-CO-ORD//

ACOC WINNIPEG//OPS DO//

ATGHQ TRENTON//SSOSAR/CMCC//

TRANSPORT CANADA OTTAWA//AAB (for air cases only)

CTAISB OTTAWA//DIA// (FAX 819-997-2239)

CCGHQ OTTAWA//AME (for marine cases only)

RDGCG//RSRER (for marine cases only)

INFO: All other RCCs, Duty Controllers, MRSCs, Commands, CGDMGER, NSS OTTAWA, DNDPA of applicable region, Regional Operations Centre of applicable region, and other units as required.

REQUIRED INFORMATION

Name of SAR Operation

A. Number and type of SITREP.

B. Alerting agency of individual and date and time group. Greenwich/UTC (Local time group in brackets) that RCC 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 people on board

- owner

- colour

- electronic equipment carried

- ELT/EPIRB on board? If yes, indicate type.

E. Last known position of craft.

F. Weather along route including last known position.

G. Weather at destination or possible alternates.

H. Name of Search Master and location of Search Headquarters.

J. Remarks to include action since receiving alert (to include SQN Tasking Time and Aircraft Airborne Time).

K. Future Plans.

NOTE- If the requested info is not available at time of origin of initial SITREP, it is to be forwarded at the earliest possible date and indicated as an addendum to the initial SITREP.

ANNEX 9C -- DAILY SITREP FORMAT (SITREP TWO, ETC)

DISTRIBUTION

TO: ACO OTTAWA//SSOSAR//

NDOC OTTAWA//DOPSO//

AIRCOM WINNIPEG//G3-COORD//

ACOC WINNIPEG//OPS DO//

ATGHQ TRENTON//SSOSAR/CMCC//

TRANSPORT CANADA OTTAWA//AAB//(for air cases only)

CTAISB OTTAWA//DIA// (FAX 819-997-2239

CCGHQ OTTAWA//AME (for marine cases only)

RDGCG//RSRER (for marine cases only)

INFO: RCC TRENTON//DUTY CONTROLLER//

RCC HALIFAX//DUTY CONTROLLER//

RCC VICTORIA//DUTY CONTROLLER//

CMCC TRENTON//

REQUIRED INFORMATION

Name of SAR Operation

A. Progress SITREP numbered consecutively starting with two, three, etc.

B. Period covered.

C. Record for this period of: Unit on search; aircraft employed on search; times for each aircraft and total times for units broken down into search, transit, and total hours. This paragraph to also include ships and their steaming times if available.

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 next 24 hrs.

ANNEX 9D -- FINAL SITREP FORMAT (SITREP FINAL)

DISTRIBUTION

TO: DISTRIBUTION

TO: ACO OTTAWA//SSOSAR//

ACO OTTAWA//DOPSO//

AIRCOM WINNIPEG//G3-COORD//

ACOC WINNIPEG//OPS DO//

ATGHQ TRENTON//SSOSAR/CMCC//

TRANSPORT CANADA OTTAWA//AAB//(for air cases only)

CCGHQ OTTAWA//AME (for marine cases only)

RDGCG//RSRER (for marine cases only)

CTAISB OTTAWA//DIA// (FAX 819-997-2239

INFO RCC TRENTON//DUTY CONTROLLER//

RCC HALIFAX//DUTY CONTROLLER//

RCC VICTORIA//DUTY CONTROLLER//

REQUIRED INFORMATION

Name of SAR Operation

A. SITREP # and Final.

B. Authority for termination/reduction SRR COMD or NDHQ Message with DIG.

C. General areas covered during entire search indicating specific altitude and visibility distances.

D. Total hours flown by: Units on search; aircraft employed on search, times for each aircraft and total times for units broken down into search, transit, and total hours. This paragraph to also include ships and their steaming times if available.

E. Remarks: including type of SAR report to be filed; crash location and briefly covering the who, what, when, where and how.

ANNEX 9E -- MANOT REPORT FORMATS - INITIAL MANOT REPORT

DISTRIBUTION

TO: CMCC TRENTON//DOPSO//
FSS
FSS
FSS
ACC

INFO: ACO OTTAWA//SSOSAR//

NDOC OTTAWA//DOPSO//

AIRCOM WINNIPEG//G3-COORD//

ACOC WINNIPEG//OPSDO//

RCC VICTORIA

RCC HALIFAX

RCC TRENTON

ATGHQ TRENTON//SSOSAR/CMCC//

CFSRSHQ// (IF A/C HAS HF)

CTAISB OTTAWA//DIA// (FAX 819- 997-2239)

TRANSPORT CANADA OTTAWA//AAB//

REQUIRED INFORMATION

A. MANOT NUMBER-SAR OPERATION-INITIAL-RCC

B. REGISTRATION--TYPE OF AIRCRAFT--COLOUR

C. NUMBER OF CREW AND/OR PAX

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 _____Z TO _____Z.

ANNEX 9F -- SAR BRIEFING/TASKING FORM BRIEFING

SAR:_____Date:_____

A/C Type & Number:_____ Unit:_____ Captain:_____

Details as to nature of distress or emergency:_____

_____

_____

_____

Description of Search Object

1. Type of aircraft or vessel:_____
2. Number or name of craft:_____
3. Length:_____ Width (Wing-Span):_____
4. Number on board:_____
5. Full description of craft, including colour and markings:_____

   _____

   _____
6. Frequencies of missing craft: _____

   _____

ASSIGNED SEARCH AREAS

AREA:_____

Type of Search:_____ Altitude Vis: _____

Time on Task:_____

Commence Search at (Posn):_____ and track (N-S) (E-W)_____

_____

Frequencies:

1. Controlling Agency:_____ 2. Aircraft:_____

3. Surface Vessels: _____ 4. Others:_____

PROGRESS REPORTS: To be passed to:_____ every _____

hours with weather report included every _____ hours.

SPECIAL INSTRUCTIONS _____

DEBRIEFING

SAR:_____ A/C No:_____ Date:_____

Point of Departure: _____ Point of Landing: _____

Time OFF:_____ On Task: _____ Off Task: _____ Landed: _____

Area Actually Searched:_____

_____

_____

Type of Search:_____ Altitude/Vis:_____

Terrain or Sea State:_____ Number of Observers: _____

Weather Conditions in Search Area (Vis. 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)
B R I E F E D)

_____

_____

_____

Remarks: (To include any action taken on search, any problems, criticism suggestions)

_____

_____

_____

_____

_____ _____

Date/Time (Lcl) Name and Rank

ANNEX 9G -- SIGHTING REPORT FORM

REPORT NO_____

NAME OF PERSON REPORTING_____

ADDRESS _____

TELEPHONE _____ OCCUPATION_____

DESCRIPTION OF SIGHTING _____

_____

TIME OF SIGHTING _____ LOCAL DATE _____

TYPE _____ COLOUR _____ TRIM _____

- -

FOR AIRCRAFT:_____

WHEELS/FLOATS/SKIS_____ HIGH/LOW WING_____

NUMBER OF ENGINES_____ DID ENGINES SOUND NORMAL_____

APPARENT HEIGHT_____ DIRECTION_____

TURNING?_____ OTHER A/C SIGHTED_____

TYPE_____DESCRIPTION_____ TIME _____

PARACHUTES SIGHTED _____NUMBER/COLOUR_____

DO A/C PASS REGULARLY_____

- -

FOR VESSELS:_____

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 9H -- 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. units 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 search plan (MOTV, etc.)

b. explanation of any departures from a.

c. brief outline of each day's search activities including areas covered, SAR units used and general weather

d. if object is found, a complete explanation of how, to include type of SAR unit, altitude and/or distance, from what position in SAR unit, what was visual reference, was spotter trained, phase of flight, time of day, search conditions, ELT details, etc.

e. if object not found, why (in general terms)

3. RESCUE OPERATIONS

a. condition of survivors

b. resources used

c. evacuation details

d. problem areas, if any

NOTE - copy of SAR Mission Report may suffice here

PART III CESSATION

1. OBJECT LOCATED

a. DTG _____

b. LOCATION _____N _____W

c. NUMBER ON BOARD _____(From Part 1)

d. SURVIVORS_____

e. FATALITIES_____

f. MISSING_____

2. SEARCH REDUCED

a. AUTHORITY _____(MSG DTG)

b. NUMBER ON BOARD_____(From Part 1)

c. SURVIVORS_____

d. FATALITIES_____

e. MISSING _____

PART IV CONCLUSIONS/RECOMMENDATIONS

1. SM CONCLUSIONS

2. SM RECOMMENDATIONS (May include founded recommendations to Transport Canada and CTAISB 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. RESOURCE UTILIZATION (FLYING/STEAMING HOURS)

5. LIST OF OBJECTS RECOVERED

6. PHOTOGRAPHS (if applicable)

ANNEX 9J -- FORMAT FOR SAR MISSION REPORT

SAR MISSION REPORT--(Name of Sqn/Unit)

DATE:_____ RCC CASE NO._____ UNIT MISSION NO._____

SAR NAME: SAR_____ CF/K1017 NO._____

TYPE OF INCIDENT:_____ CODING:_____AIRCRAFT TYPE/NUMBER:_____

TASKED BY:_____ Z H AT (DTG):_____ Z TAKE OFF (DTG)_____Z

REASON FOR DELAY (IF APPLICABLE):_____

TRANSIT TIME:_____ Z H _____ SAR TIME:_____ H TOTAL TIME_____H

FACTORS AFFECTING MISSION (EG., WX, EQUIP): (may be positive or negative factors resulting in significant impact on missions)

NAME/FUNCTION OF PERSONS AIRLIFTED: (ie, J. Smith/doctor, W. Brown/patient, F. Brown/father)

SQN COMMANDER'S REPORT (FOR COST RECOVERABLE MISSION) COMPLETED/N/A

CREW:____AC _____P_____ NAV/FE _____

ST TEAM LDR_____ ST_____ NAV/FE_____

BRIEF NARRATIVES

OPS (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).

OPS (SAR TECH): 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 evaluation.)

MEDICAL (ST): (Description of patient condition, vitals, etc, on scene and on arrival/release to other medical authority diagnosis and treatment given. Attach Air Command medical annex if applicable. Distribution of medical annex should be protected.)

EQUIPMENT REPORT: (Comments on equipment used including inadequacies malfunctions. If changes recommended, indicate follow-up action taken, (UCR, MACR, Memo, etc)

PHOTOS TAKEN: YES / NO (Photos mailed on request)

_____ _____

SAR TECH TEAM LDR / DATE A/C COMD /DATE

_____ _____

SAR TECH SECTION LDR / DATE SQN/UNIT COMD /DATE

DISTRIBUTION LIST

ACTION	INFO	
ATGHQ//SSO SAR	EXTERNAL ACO OTTAWA//SSOSAR// AIRCOM//G3-CNTNTL/ COMD Flt Surg// CFSTS RCC (as applicable)	INTERNAL (Internal, as required)

ANNEX 9K -- GROUND SEARCH TRAINING REPORT SAR REGION "HALIFAX"
STATION OR BASE "CFS SYDNEY - MONTH OF "SEPT 1975"

GROUND SEARCH TRAINING REPORT
SAR REGION "HALIFAX"
STATION OR BASE "CFS SYDNEY"

MONTH OF "SEPT 1975

Exercise Number	Number of Personnel	Defects of Equipment Duration	Dates	Type of Terrain	Rations	Training Carried Out / Remarks
1	5	3	5-8 Sep	Hilly, dense bush	RS6	1 Map - compass Reading Strong requirement for a suitable ground search 2 Cross Country Navigation transmitter and receiver 3 Ground searching exercises See our UCR 4 Setting up base camp
5	4		16-20 Sep	Lake and river area	RS6	Considerable knowledge gained on this exercise in proper use of water equipment 3 Dragging operations 4 Setting up overnight camps

3	10	1	25 Sep	Local Area		Helicopter Familiarization Demonstration by Labrador From 413 Sqn.

ANNEX 9L -- UNNECESSARY SAR ALERT MESSAGE

DISTRIBUTION

TO: THE APPROPRIATE TC REGIONAL DIRECTOR REGULATORY COMPLIANCE or the APPROPRIATE CCG REGIONAL MANAGER AS FOLLOWS: TC--

TO: REGIONAL DIRECTOR REGULATORY COMPLIANCE/(ATLANTIC - MONCTON//

REGIONAL DIRECTOR REGULATORY COMPLIANCE/(QUEBEC)-MONTREAL//

REGIONAL DIRECTOR REGULATORY COMPLIANCE/(ONTARIO)-TORONTO//

REGIONAL DIRECTOR REGULATORY COMPLIANCE/(CENTRAL)-WINNIPEG//

REGIONAL DIRECTOR REGULATORY COMPLIANCE/(WESTERN)-EDMONTON//

REGIONAL DIRECTOR REGULATORY COMPLIANCE/(PACIFIC)-VANCOUVER/

NSS OTTAWA//SENIOR AIR CONTROLLER//

OR CCG-

TO: REGIONAL MANAGER SHIP SAFETY/ /ST JOHNS/ /
REGIONAL MANAGER SHIP SAFETY//QUEBEC//
REGIONAL MANAGER SHIP SAFETY/ /DARTMOUTH/ /
REGIONAL MANAGER SHIP SAFETY/ /TORONTO/ /
REGIONAL MANAGER SHIP SAFETY/ /VANCOUVER/ /

INFO: NDOC OTTAWA//

ACO OTTAWA//SSOSAR//

TRANSPORT CANADA OTTAWA// AAB OR// AME

ACOC WINNIPEG

ATGHQ TRENTON//SSOSAR//

CMCC TRENTON

REQUIRED INFORMATION

UNNECESSARY SAR ALERT NUMBER

1. TIME OF INCIDENT

2. TYPE AND IDENT 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. FOR EMERGENCY BEACONS: INCLUDE TYPE, MODEL, SWITCH POSITION, TIME SINCE A/C LAST FLOWN, AND REASON FOR ACTIVATION

ANNEX 9M -- DAILY SAR SUMMARY FORMAT

FM RCC _____

TO AIG _____

INFO DOTHQ OTTAWA

CCGHQ OTTAWA (AME)

MOT _____ (region)

CAN COAST GUARD RDG AND RPAM AND RSPER_____(region)

NSS OTTAWA

CMCC TRENTON

BT

SIC ICJ

MOTHQ OTTAWA FOR AAB/L
CCGHQ FOR AME

SUBJ: DAILY SAR SUMMARY FOR (region) SRR FOR PERIOD_____0000Z TO__ 2400Z.

DAY MONTH YEAR (OPTIONAL)

A. INCIDENT CATEGORY

(1) CATEGORY 1 AND 2 CASES (distress)

(2) CATEGORY 3, 4, AND 5 CASES (non-distress)

(3) TOTAL INCIDENTS (sum of items 1 and 2 above)

B. INCIDENT CLASSIFICATION

(1) AIR CASES

(2) MARINE CASES

(3) HUMANITARIAN CASES

(4) CIVIL AID CASES

C. RESOURCE UTILIZATION (SEE NOTE 1) FOR PERIOD (SEE NOTE 2)

(1) NO. OF CF RESOURCES USED

(2) NO. OF CG RESOURCES USED

(3) NO. OF OTHER FED RESOURCES USED

(4) NO. OF CMRA USED

(5) NO. OF CASARA USED: SPOTTERS_____/AIRCRAFT_____

(6) CHARTER

(7) OTHER

D. ELT/EPIRB/RELATED INCIDENTS DAY YEAR

(1) CATEGORY 1

(2) CATEGORY 2/3/4

(3) UNRESOLVED

E. INCIDENTS IN PROGRESS (NOTE 3)

INCIDENT No._____ NAME _____

DESCRIPTION

F LATE DEPARTURE OF DEDICATED SAR RESOURCES (if greater then 0 provide explanation at paragraph H)

G. INCIDENTS CONCLUDED NARRATIVE (NOTE 4)

INCIDENT No._____ CLASSIFICATION/CATEGORY _____

DATE/TIME RCC ALERTED _____z 19___ BY _____

DESCRIPTION (NOTE 5)

H. REMARKS: (INCLUDE SUCH ITEMS AS SAR AIRCRAFT RON's, OIL RIG POSITIONS AND OTHER TERMS OF INTEREST NOT ASSOCIATED WITH AN INCIDENT)

NOTE 1 Resources utilization means the number of times a specific resource was used fro a specific incident. Examples:

a) 3 launches of same resource on same incident is 1 use;

b) 3 incidents completed during 1 launch by 1 resource is 3 uses;

c) 3 resources on 1 incident is 3 uses;

d) include CF resources detached with a Search HQ in your region; and

e) CASARA spotters on 1 CF a/c is 1 CASARA use.

NOTE 2 This is a daily summary of resources used. If the resource is launched before 2400Z and lands after, then it will be included

in messages for both days. Therefore, cumulative totals of these figures for the month and year are not required.

NOTE 3 Write a brief description of the Incident, actions taken and resources employed (this should include the resources indicated in para C).

NOTE 4 Include all CAT 1 and 2 incidents and any other incident where CF resources were used.

NOTE 5 Write a brief description of ACTIONS TAKEN, RESOURCES EMPLOYED and INCIDENT CONCLUSION. This must include incident location, POB, survivors and their condition, which resource resolved the incident, and position of rescue if different from incident location.

GLOSSARY

Advance Rescue Base -	A base which is established adjacent to or on a crash site for the purpose of saving the lives of survivors and of initiating evacuation operations.
Aeromedical Evacuation -	A CF term meaning the evacuation by CF aircraft of service patients from one facility to another.
Air Incident -	All SAR incidents in the Canadian area of responsibility involving missing or downed aircraft.
Assistance -	Aid provided by the SAR system in response to a non-distress incident.
Canadian SARSAT Ground System -	The Canadian portion of the ground which collects and distributes the data captured by the COSPAS/SARSAT satellites and other non-Canadian ground systems.
Captain -	A generic term applied to the master of a ship, pilot in command of an aircraft, commanding officer of a warship or the operator of any other craft.
Casualty Reception Point (CRP) -	An intermediate forward location where a large number of survivors can be treated prior to evacuation to appropriate medical facilities.
Non-SAR Incidents -	An incident other than a SAR incident which requires the provision of assistance of SAR resources to the authorities, including assistance to police for specific operations such as apparent suicides, drug interdiction, vessel arrest, body recoveries.
Confirmed SARSAT position -	a. 121.5/243.0 MHz SARSAT position which has been confirmed either by: (1) at least two different satellite passes, or (2) one satellite pass with another outside source such as an aircraft report, or b. a 406 MHz SARSAT location for an operationally coded ELT/EPIRB/PLB.
Coordinated SAR System -	The facilities, equipment and procedures

	established in each SRR to coordinate the response to SAR incidents.
COSPAS/SARSAT -	The international organization which operates the satellite emergency beacon alerting system.
DATUM -	The most probable position of a search object, corrected for drift, at any specific time.
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.
Distress -	A SAR INCIDENT wherein there is a reasonable certainty that one or more individuals are threatened by grave and imminent danger and require immediate assistance.
Ditching -	The forced landing of an aircraft on water.
Duckbutt -	An airborne standby posture carried out by CF Forces to provide navigation or other assistance to military aircraft during a specific operation.
Forward Rescue Base (FRB) -	A base, located as close as possible to an ARB, which is capable of handling large aircraft and has sufficient facilities (with augmentation, if necessary) to support a MAJAID operation.
Land SAR Incident -	All incidents involving missing persons not otherwise classified as an air or marine incident.
Major Air Disaster -	An aircraft accident occurring in Canada which, because of the size of the accident, requires augmentation of established SAR resources.
Marine Incident -	A SAR INCIDENT where the original vehicle of transportation of the person(s) involved was a vessel, including air cushions operating over water.
Marine Rescue Sub-Centre -	A unit subordinate to a rescue coordination centre, established to complement the latter within a specific area of a search rescue region.

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.
Medevac (Routine) -	The routine medevac of patients or vital medical resources from one medical facility to another (air or marine ambulance service).
Other SAR Resources -	Resources other than PRIMARY or SECONDARY which from time to time participate in SAR activities when required. This includes civilian volunteers and partially Federal Government funded resources such as the CMRA and CASARA.
Personal Locator Beacon -	An emergency beacon designated for use by persons independent of other alerting means/facilities in isolated areas. In Canada, these beacons transmit on 406 MHz
Precautionary Response -	Action taken when evidence available to a RCC warrants a response by the SAR system due to imminent DISTRESS or perilous conditions.
Primary SAR Resources -	Aircraft, vessels or formations established and equipped specifically for Search and Rescue and manned with SAR trained crews. Primary SAR resources are under the direct operational control of the SRR Commander for SAR tasking.
Ramp (or Strip) Alert -	An increased standby posture maintained by CF SAR FORCES during periods of increased Air Defence or other notable activity.
Rescue Coordination -	The function of integrating the efforts of SAR facilities and resources to achieve concerted and harmonized resolution of SAR incidents in an effective and efficient manner.
Rescue Coordination Centre -	A unit responsible for providing efficient organization of search and rescue resources for coordinating the conduct of search and rescue operations within a search and rescue region.
Response (by the SAR System) -	Any significant action taken by a RCC/MRSC or SAR resource in response to a SAR, Humanitarian, Civil, or unknown incident other than an immediate transfer of responsibility to an appropriate authority.

SAR Incident -	A reported air or marine incident which requires a response by the SAR System.
SAR Mission -	The task assigned to a SAR resource by an RCC/MRSC/SM in response to a SAR incident. A SAR MISSION commences with formal tasking by RCC/MRSC/SM and is normally defined in scope and time.
SAR Operation -	When the response to a DISTRESS or a PRECAUTIONARY RESPONSE requires the utilization of more than one resource and/or numerous SAR missions are anticipated during the prosecution of the incident, it is considered a SAR operation.
SAR Resource -	A resource capable of responding to a search and rescue incident.
Search and Rescue -	Search and Rescue comprises the search for and provision of aid to persons, ships or other craft which are, or are perceived be, in distress or imminent danger.
Search and Rescue Region (SRR) -	A specific geographical area in which search and rescue operations are coordinated and controlled by a designated Rescue Co-ordination Centre (RCC).
Searchmaster (SM) -	An individual who has been appointed by a SRR Commander to coordinate and direct a specific SAR operation.
Secondary SAR Resources -	Aircraft, vessels or formations established and equipped for other than Search and Rescue, but which can be expected to respond (when available) to SAR tasking. Includes multi-tasked government resources.1
SRR Commander -	The military commander designated by NDHQ as being responsible for SAR operations within a SRR.
SRU (SAR Unit) -	A unit specializing in provision of Search and Rescue Services.
Unknown Incidents -	Any incident which required a response by the SAR System under the assumption of its being related to a SAR, Humanitarian, or Civil incident but which was subsequently identified as being a false alarm/hoax of indeterminate origin.

ABBREVIATIONS

List of Abbreviations

ACOO	Air Command Office Ottawa
ACOC	Air Command Operation Centre
ADAM	Air-Dropped Datum Marker Buoy
AOR	Area of Responsibility
ASCC	Air Standardization Coordination Committee
ATC	Air Traffic Control
ATGHQ	Air Transport Group Headquarters
ATOC	Air Transport Operation Centre
CAS	Co-ordinator Air Search
CCGHQ	Canadian Coast Guard Headquarters
CMCC	Canadian Mission Control Centre
COSPAS	Cosmicheskaya Sistyema Poiska Avariynich Sudov (translation - Space System for the Search of Vessels in Distress)
CSAD	Canadian Search Areas Definition
CTAISB	Canadian Transportation Accident Investigation Safety Board
DFO	Department of Fisheries and Oceans
DMB	Datum Marker Buoy
DND-PA	Department of National Defence - Public Affairs
ERB	Emergency Radio Beacon (generic term to include ELTs, EPIRBs, and PLBs regardless of transmitted frequency or combination thereof)
GMDSS	Global Maritime Distress and Safety Systems.
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
INMARSAT	International Maritime Communications Satellite System.

LKP	Last Known Position
LUT	Local User Terminal (satellite tracking station)
MCC	Mission Control Centre
MFWC	Maritime Forces Weather Centre
MPP	Most Probable Position
MVFR	The Mountain Visual Flight Rules Planning Method
NATO	North Atlantic Treaty Organization
NDOC	National Defence Operation Centre
NOCL	Notice of Crash Location
NORAD	North American Air Defence
NRHQ	Northern Region Headquarters
NSI	New SAR Initiatives
NSM	National Search and Rescue Manual
NSS	National Search and Rescue Secretariat
P(d)	Probability of Detection
PLB	Personal Locator Beacon
PW	Probability of Whereabouts
SARSAT	Search and Rescue Satellite Aided Tracking
SICOFAA	System of Cooperation Among the American Air Forces
SM	Search Master
SMC	SAR Mission Coordinator
SPOC	SAR Point of Contact
VCDS	Vice-Chief of Defence Staff.